

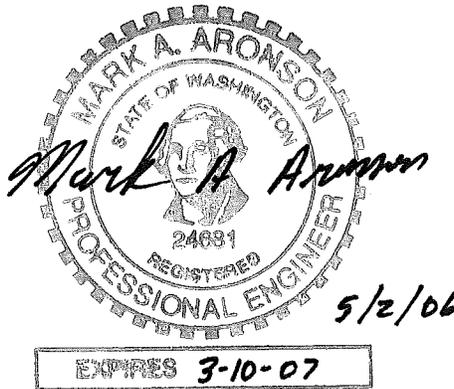
**STORMWATER FACILITIES
OPERATION & MAINTENANCE MANUAL
For
MORNINGSIDE HEIGHTS 5TH AND BRIGADOON 1ST ADDITIONS**

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SPOKANE COUNTY ENGINEER

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**STORMWATER FACILITIES
OPERATION AND MAINTENANCE MANUAL
for
MORNINGSIDE HEIGHTS 5TH AND BRIGADOON 1ST ADDITIONS**

I. Purpose

This Operation and Maintenance Manual is intended to provide general guidelines for maintaining the stormwater facilities built in conjunction with Morningside Heights 5th and Brigadoon 1st Additions. The proper operation and maintenance of these facilities will be the responsibility of the Morningside Heights and Brigadoon Home Owners Associations. Implementation of these guidelines should help to insure that these facilities will continue to operate in the manner in which they were designed as defined by the final approved plans of record on file at the Spokane County Division of Engineering and Roads.

The proper operation and maintenance of the stormwater facilities shall include insuring that the stormwater facilities are maintained in such a manner that the established construction specifications, approved plan configuration and design performance standards are maintained at a level that is at least equal to that which the design engineer approved for this project.

II. Description

The stormwater facilities installed with this project consist of one primary system, which consists of a series of catch basins, storm manholes, and conveyance pipes that outlet to a series of three treatment and detention ponds. This primary system consists of existing catch basins, manholes, conveyance pipes, drywells, and a treatment and detention pond from Morningside Heights 3rd Addition. These existing facilities will continue to be used in conjunction with three additional drywells placed in the existing pond bottom, two additional treatment and detention ponds, and two overflow structures. Overflow structures connect the three ponds and allow for disposal of all stormwater through drywells in the existing pond.

A. Catch Basin, Manholes and Conveyance Pipes

This system provides a series of catch basins located at low points and on grade to collect the stormwater runoff generated from Apollo Road, Daystar Road, Selkirk Drive, Incline Drive, Sundance Drive, Clover Drive, and Shamrock Drive. Once the stormwater is collected by the new catch basins it is transported through the piping system, which consists of a combination of 10", 12", 15", 18", 21", and 24" HDPE pipe. Stormwater is transported by this system to one of three outlets to the treatment and detention ponds, where it receives treatment and ultimately is disposed of through one of seven (7) Spokane County Standard Type B drywells.

B. Treatment and Detention Ponds with Drywells

Treatment of the stormwater is required in accordance with the Spokane County Aquifer Sensitive Area Ordinance. The treatment ponds are also utilized as detention ponds. Design methodology was based on minimizing the land area needed to store runoff volumes.

III. Function

The stormwater facilities for Morningside Heights 5th and Brigadoon 1st Additions are generally very simple and should operate with very little attention. In most instances, a non-functioning system will be visually obvious and regular maintenance of the system will eliminate the occurrence of drainage problems. The following describes each component of the stormwater systems and the proper function of that component in the system.

A. Catch Basin, Conveyance Pipes, and Manholes

Catch basins provide collection of runoff from the road areas. The conveyance pipes are provided to route the runoff to the treatment and detention facilities. Rip rap outlet pads are placed at all outlet pipes from the conveyance system in order to protect the pond bottoms from erosion. Manholes are provided at all angle points in the piping system.

B. Treatment and Detention Ponds with Drywells or Outlet Structures

Treatment and detention ponds accept runoff from the conveyance pipes for treatment in accordance with the Aquifer Sensitive Area Ordinance and provide storage for the stormwater runoff. Overflow structures are placed in two of the ponds at invert elevations of .5' above the pond bottoms. These allow stormwater generated during a storm event to first be treated and then flow between the three ponds before it is disposed of through drywells in the last pond. Similarly, the drywells are set .5' above the pond bottom to provide treatment of the stormwater prior to disposal. Each of the three ponds has two rip rap pad outlet structures to provide erosion control. These structures are placed at all pipes discharging to the ponds. Normal operation of the ponds will include some ponding.

IV. Responsibility to Maintain

Morningside Heights and Brigadoon Home Owners Associations will be responsible for the proper operation and maintenance of the stormwater facilities described in this manual. Those systems include catch basins, conveyance pipes, treatment and detention ponds, and drywells. Morningside Heights and Brigadoon Home Owners Associations shall follow the methods described in this manual.

V. Maintenance

The following information provides a maintenance description for each of the stormwater elements included in this project. Morningside Heights and Brigadoon Home Owners Associations are responsible to provide the maintenance described on the schedule noted within each element.

A. General

The following stormwater facilities shall be visually inspected following a significant rainfall or snowmelt event.

1. Inspect all catch basins, pipe inlets, drywells, and pond overflow and outlet structures making sure that they are clear of debris and obstructions.

B. Catch Basins, Manholes, and Drywells

The catch basins, manholes, and drywells should have the grates removed at least twice a year, once in the spring (April) and once in the fall (October) to insure that they are free from dirt, silt, and debris to insure that they are operating properly. Should excessive silt, dirt, or debris be discovered in any catch basin, manhole, or drywell, it must be cleaned out by means of a vacuum truck.

C. Treatment and Detention Ponds

Periodic maintenance of the ponds should be done to insure it is functioning properly. The following items should be noted:

1. The rip rap pads, located at pipe outlets, should be secure in the areas defined by the plans and should be free from debris. The edges of the rip rap pads should be checked for scouring of the dirt around the pad. Any scouring or gouging of the dirt needs to be repaired and sodded or seeded to insure proper vegetative growth.
2. The bottom of the pond needs to be free from debris and sediment deposition.
3. The treatment and detention pond shall be seeded with the following dryland seed mix:

10% Elka Perennial Rye
20% Durar Hard Fescue
45% Covar Sheep / Fescue
15% Reubens Canadian Bluegrass

Provide mixture composed of grass seed and fertilizer in percentages as follows:

Grass Seed: 90 lbs. per acre
Fertilizer: 16-16-16 timed release
Composition, 300 lbs. per acre.

D. High Density Polyethylene Pipe (HDPE)

The HDPE pipes should be checked periodically for obstructions at each end and twice a year the pipe should be visually inspected to insure that there is not mid-pipe blockage. Should a mid-pipe blockage be observed, it should be removed immediately. In the event that any of the pipes were to fail by being crushed, they must be replaced with the same type and size pipe as soon as the failure is discovered.

VI. Summary

By understanding the stormwater system as described herein and properly maintaining the components, the homeowners of Morningside Heights 5th and Brigadoon 1st Additions will have a long lasting and effective stormwater facility.

