

OFFICIAL PUBLIC DOCUMENT
SPOKANE COUNTY ENGINEER'S OFFICE
ORIGINAL
PROJECT # P-19624
SUBMITTAL # Final Plat
RETURN TO COUNTY ENGINEER

STORMWATER Conveyance and Drainage Pond

OPERATIONS & MAINTENANCE MANUAL

For the

Fairmont Estates – Phase 1 Residential Development

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Section 1 - Purpose

This document is intended to provide general operations and maintenance guidelines for the drainage pond(s) and other facilities located outside of the County road rights-of-way and granted drainage easements within the Fairmont Estates – Phase 1 residential development (Spokane County File No. P-1962-05). Implementation of these guidelines will insure that the drainage facilities will function as designed and installed.

Section 2 – Introduction

The street and drainage system for the Fairmont Estates – Phase 1 residential development is comprised of Fairmont Estates Drive and Fairmont Estates Road. Portions of Chapman Road lie adjacent to the intersection at the northerly end of the plat are disposed of within a natural drainage draw and are not considered in this Operations and Maintenance Manual. Structures within these rights-of-way are comprised of storm drain manholes and catch basins and will be maintained by Spokane County road crews. Remaining drainage facilities are located outside of the right-of-way, are privately owned, and therefore must be maintained, and if needed, replaced by the Homeowner's Association.

Generally, the drainage systems are intended to collect stormwater runoff and convey it by use of storm pipes to infiltration ponds for treatment and infiltration. Excess runoff will be disposed of by the use of drywells and overflow structures within the infiltration ponds. It is of the utmost importance to provide adequate operations and maintenance activities to ensure that the drainage facilities remain free of silt and dirt, as this silt or dirt loading will affect the performance of the pipes, catch basins, conveyance ditches, infiltration structures, and overflow structures. If these facilities were to become completely clogged, the only remedy would be a complete reconstruction of the affected drainage facility. Periodic maintenance is therefore a necessity. A full set of engineering drawings is available for review at Spokane County Public Works, under the Spokane County file number listed above.

Section 3 – General Operational Characteristics

The drainage facilities for Selkirk Estates residential development are generally very simple, functional, and have low maintenance requirements. A periodic visual inspection of the facilities will typically identify any required maintenance. Most of the required maintenance will consist of keeping the drainage structures, pipes, and ponds free of debris and sediment. A specific schedule should be followed. **See Section 4 – Maintenance Requirements and Schedules.**

Section 3.0 – Storm Collection Structures

All catch basins and storm drain manhole that collect and convey the runoff are located within the public right-of-way or drainage easements and will therefore be maintained by Spokane County forces and revenue. Storm collection structures are therefore not further considered in this Operations and Maintenance Manual.

Section 3.1 – Storm Conveyance Systems

Enclosed circular pipes are used exclusively within this residential development to convey stormwater that has been collected by the storm collection structures. The vast majority of these pipes are contained within the public right-of-way and will therefore be maintained by Spokane County forces and revenue. There are however 2 pipes located within the stormwater

tract that will need to be maintained by the Homeowner's Association. These pipes are identified as the 21" diameter PVC pipes that distributes stormwater into the pond and the 8" diameter PVC pipes that conveys emergency overflow stormwater out of the pond and into the natural drainage channel located to the south.

Section 3.2 – Infiltration Ponds

An infiltration pond consists of an earthen depression constructed of native soils, enclosed within earthen berms, which provide temporary storage for the stormwater runoff. The storage volume for each pond was based on the required treatment volume, in general accordance with the '208' Water Quality Requirements from the *Spokane Regional Stormwater Manual*. For the Fairmont Estates – Phase 1 residential development, the detention volume was based on the 10-year storm event being disposed of without reaching the overflow structure.

The primary form of stormwater disposal is pond bottom infiltration. The soil located in the floor of the pond shall be a medium to well-draining material, with a minimum infiltration rate of 0.5 inches/hour. Runoff beyond this rate will be disposed of by infiltration structures. There is one such pond located within the Fairmont Estates – Phase 1 residential development.

Section 3.3 – Infiltration Structures

An infiltration structure is either a single-depth or double-depth drywell (Spokane County Standard Type A or B, respectively). These structures consist of a grated inlet, perforated concrete barrel sections, and buried washed drain rock, wrapped in filter fabric. The grate inlet (rim) elevation is set 0.5 feet above the pond bottom elevation to provide the '208' treatment storage volume. The Spokane County standard drywell has been modified for this development based on geotechnical investigation to more adequately dispose of storm water surpassing the infiltration pond capacity. A copy of the modified drywell detail is available for reference at Spokane County Public Works, under the Spokane County file number listed above.

Section 3.4 – Emergency Overflow Structures

An emergency overflow structure is a structure that collects stormwater that is conveyed to an infiltration pond at a rate so fast that it cannot be disposed of via Infiltration Ponds or Infiltration Structures as described above. Emergency Overflow Structures collect excess runoff residing within the infiltration pond and convey it via piping to a well defined above ground route for eventual infiltration into the natural ground or collection by a down-gradient system. The pond and drywell described above is designed to accommodate a rainfall or snowmelt event that is predicted to occur every 10 years. Therefore, by design, it is not anticipated that the emergency overflow structures will be employed more frequently than once every 10 years. There is one emergency overflow structure proposed for this residential development and shall be maintained by the Homeowner's Association.

Section 4 – Maintenance Requirements and Schedules

Below is a maintenance description for each of the drainage system elements contained within the Fairmont Estates – Phase 1 residential development, including the storm pipes, infiltration ponds, infiltration structures, and emergency overflow structures. All drainage facilities located outside of the Spokane County road rights-of-way and granted drainage easements shall be maintained by the Homeowner's Association. Should the homeowner's association be terminated for any reason, the

maintenance responsibilities will become that of the individual landowners of the Selkirk Estates residential development.

The homeowner's association shall provide the Spokane County Parks and Engineering Departments the name, address, and 24-hour telephone number for the entity responsible for performing routine and emergency maintenance inspections and repairs. This information shall be confirmed on a yearly basis. The homeowner's association shall provide notice of any changes to the Spokane County Parks Department and the Spokane County Engineer within 15 days of said changes.

Proper maintenance procedures are necessary for the continued functioning of the drainage facilities. Improper maintenance or lack of attentive maintenance measures may result in negative drainage impacts. It is strongly recommended that the homeowner's association designate an individual who will be responsible for ensuring that the maintenance measures are implemented.

Generally, maintenance personnel are to conduct a visual inspection of the drainage facilities immediately following a substantial rainfall or snowmelt event. Substantial events include but are not limited to:

- Noticeably hard rain for a short period (30 minutes or less)
- Steady rain for a long period (6 hours or more)
- Significant rainfall and/or snowmelt when the ground is frozen

For storms which persist for longer than 24 hours, maintenance personnel are to inspect the drainage facilities during the storm event to identify any developing problems and correct them before they become more serious problems.

1. Inspect all drainage structures to ensure they are clear of debris and obstructions.
2. Inspect all pond berms for breaches. Immediately repair any breach with native sandy soil and compact in place.

The above noted storm and related visual inspections are in addition to the maintenance schedules noted below for each item.

Section 4.1 – Storm Conveyance Systems

Pipes should be inspected every 3 months, or after every significant storm event (0.5") and/or snowmelt event, whichever is more frequent. Visually inspect the pipes, inlets, and outlets, making sure they are clear of debris and checking that the pipe is in good condition, free of breaks or cracks. If there is an obstruction present, it should be removed immediately.

A flow test of the pipe can be used to readily detect major obstructions or breaks in the pipe. This test requires a water source (hydrant or water truck) and a person at the downstream end of the pipe observing the flow exiting the pipe section.

Section 4.2 – Infiltration Ponds

The infiltration pond should be inspected every 3 months, or after every significant rainfall and/or snowmelt event, whichever is more frequent.

Routine maintenance and inspection of detention ponds will include the removal of any accumulated debris such as leaves, weeds, and trash. Any obstructions that would not allow water to flow freely from the ponds via the outlet structures (drywells) or overflow berms should be removed or repaired. Additionally, the pond berms should be inspected to ensure

that they are in good repair and structurally competent, and that no outflow has occurred other than through the out let structure or overflow berm.

The homeowner's association shall be responsible for replacement of any grass turf and underlying 1-foot depth of soil in ponds whenever the vegetation appears to indicate a problem due to contamination. The turf and underlying soil shall meet Spokane County requirements for permeability in effect at the time of replacement.

Section 4.3 – Infiltration Structures

Infiltration structures should be inspected every 3 months, or after every significant rainfall and/or snowmelt event, whichever is more frequent. During routine inspection, if standing water is found 72 hours or more after the last significant rain event, the infiltration structure is most likely clogged due to silt and sediment. The structure shall be vacuumed of standing water and sediment.

Section 4.4 – Emergency Overflow Structures

Infiltration structures should be inspected every 3 months, or after every significant rainfall and/or snowmelt event, whichever is more frequent. During routine inspection, if standing water is found 72 hours or more after the last significant rain event, the infiltration structure is most likely clogged due to silt and sediment. The structure shall be vacuumed of standing water and sediment.

Section 5 – Recommended Set-Aside Funds for Maintenance & Future Replacement Costs

There will be annual maintenance costs, major renovation costs, and future replacement costs for the privately maintained drainage facilities. The costs are the responsibility of the homeowner's association or successors in interest. Major renovation and future replacement costs have been converted to annual costs in the form of recommended set-aside funds. It is assumed that ½ of the pipe and 1 drywell will need to be replaced within 20 years.

Table 5A – List of Quantities

Description	Quantity	Present Value	
		Per L.F.	Total
8" Dia PVC Pipe	70 LF	\$25.00	\$1,750.00
21" Dia PVC Pipe	60 LF	\$50.00	\$3,000.00
Mod. Type B Drywell	1 EA	\$3,000.00	\$3,000.00
Emergency Overflow Inlet	1 EA	\$1,000.00	\$1,000.00
			TOTAL = \$8,750.00

Table 5B – Annual Maintenance and Operations Costs

Description	Quantity	Present Value	
		Per L.F.	Total
Inspect Structures	4 DAY	\$50.00	\$200.00
Flush/Clean Inlets	26 EA	\$100.00	\$2,600.00

Inspect Ponds	1 LS	\$500.00	\$500.00
Mowing and Irrigation	34 DAY	\$100.00	\$3,400.00
			TOTAL = \$6,700.00

Table 5C delineates the annual cost of assumed future replacement combined with annual costs tallied in Table 5B.

Table 5C – Replacement Cost & Annual Cost Per Lot

Description	Present Value	Future Value ⁽¹⁾
[50%] of Pipe Replaced in 20 years	\$2,375	\$5,204
[25%] of Structure Replacement in 20 years	\$1,000	\$2,191
Replacement Costs	\$3,375	\$7,395
Annual Set-Aside for Future Replacement		\$201.14
Annual Maintenance Costs (From Table 5A)		\$6,700.00

Note: (1) Assume replacement in 20 years, with 4% inflation and a 6% rate of return on investments for set-aside account. (F/P, 4%, 20)=2.1911, (A/F, 6%, 20)=0.0272.

Grand Total/Year = \$6,901.14

Cost per lot/year = \$182 (38 lots, Phase 1)

SECTION 5 TO BE UPDATED WITH THE ADDITION OF EACH PHASE