



Whipple Consulting Engineers, Inc.

Crestview HOA Short plat

---

**OPERATION & MAINTENANCE  
MANUAL**

---

**FOR**

**DRAINAGE FACILITIES**

**Located in**

**Spokane, WA**

8904 N. Ash Street

WCE W.O. No. 22-3376

**August, 2023**

**By**

Whipple Consulting Engineers (WCE)

21 S Pines Road

Spokane Valley, WA 99206

**DRAINAGE FACILITIES  
OPERATION & MAINTENANCE MANUAL**

---

**1.00 PURPOSE**

This maintenance manual is to provide:

1. For the overall storm water management of the Crestview HOA Short plat.

**2.00 GENERAL OPERATIONAL CHARACTERISTICS**

**Drainage Facilities**

Generally, the drainage system is intended to capture, treat, and detain the increase in stormwater runoff generated on-site, by routing the stormwater through a series of catch basins, manholes, pipes, curb inlets, bio retention swales and finally discharging the treated stormwater to a pond bottom and drywells. The drainage facilities in this residential subdivision consist primarily of catch basin, pipe, and bio retention swale. It is therefore of the utmost importance to provide adequate operations and maintenance activities to ensure that the catch basin, pipe, curb inlets are free flowing so silt or dirt, and or grass will not affect the function of the drainage facilities. Should these facilities fill up or become clogged, the remedy would be to remove the silt, debris, and grass. Therefore, periodic maintenance is a must. Maintenance details are discussed below in Section 3.00.

**3.00 MAINTENANCE DISCUSSION**

**Drainage Facilities Maintenance**

The drainage facilities consist of a of catch basin, pipe, bio retention swale, and are located as shown in the civil construction plans sheets C5.0 thru C5.2. The following describes these facilities and the recommended maintenance.

At a minimum inspection of the drainage facilities should be conducted each season (spring, summer, fall, and winter) and after significant rainfall and snowmelt events. For long duration storms, greater than 24 hours, the drainage facilities should be inspected during the storm event to identify any developing problems and safely correct them before they become major problems.

In general, it is important to provide adequate maintenance activities to ensure that the structure, pipe, curb inlet and bio retention swale, drywells remain silt, dirt, debris, and grass free, because accumulations of these substances will affect the system's ability to treat and store the required stormwater volumes as well as the ability of the structures to discharge stormwater. Should these facilities fill up or become clogged, the remedy would be to remove the offending material. Therefore, periodic maintenance is a must.

DRAINAGE FACILITIES  
OPERATION & MAINTENANCE MANUAL

---

#### **4.00 MAINTENANCE REQUIREMENTS AND SCHEDULES**

##### **General**

Proper maintenance procedures are a necessity for the continued functioning of the drainage facilities. Improper maintenance, or lack of attentive maintenance measures, may result in substantial on-site and downstream impacts. It is strongly recommended that the owner designate an individual who will be responsible for making sure the maintenance measures are implemented.

**Warning: The Crestview HOA is responsible for removing, disposing, and replacing the soil and grass sod located in drainage facilities situated within private lots at such time the city engineer deems necessary.**

**The Crestview HOA shall be responsible for payment of all claims and other liabilities which may become due for said maintenance responsibilities. The city of Spokane does not accept the responsibility to inspect and/or maintain the drainage easements. If the lot owners fail to maintain the drainage facilities in conformance with the accepted drainage plan on file at the city engineer's office, a notice of such failure may be given to the Crestview HOA owner owners by the city engineer. If not corrected within the period indicated on said notice, the city has the right to correct the maintenance failure, or have it corrected, at the expense of the lot owners.**

##### **4.10 Drainage System**

Below is a maintenance description for each of the drainage system elements contained within the Crestview HOA Short plat, including the roadside swales and ponds. All drainage facilities located outside of City of Spokane road rights-of-way and within the site is expected to be maintained by the Crestview HOA.

- **Swale A - Maintained by Crestview HOA**
- **Swale B - Maintained by Crestview HOA**
- **Swale C - Maintained by Crestview HOA**
- **Swale D - M Maintained by Crestview HOA**

## DRAINAGE FACILITIES OPERATION & MAINTENANCE MANUAL

---

### **4.11 Treatment and Storage Inspection**

Generally, maintenance personnel are to conduct a visual inspection of the drainage facilities in the spring and fall and immediately following a substantial rainfall or snowmelt event. This could be that it rained noticeably hard for a short period (30 minutes or more) or that it rained steadily for a long period (6 hours or more) or if a significant rainfall and then snow melt event, associated with a “Chinook” melt were to occur in January, February or March when the ground is frozen. For long duration storms, greater 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 major problems.

1. Inspect all catch basin, gutters, inlets, drywells, swales, ponds or other appurtenances, making sure that they are clear of debris and obstructions.
2. Inspect the pond banks/sides/berms, making sure there are no breaches or breaks in the sides of the pond. Immediately repair any breaches or breaks, with a sandy loess soil, compacted in place and follow up after the storm event with more substantial maintenance activities.
3. Inspect the pond bottoms and be sure that they are free of trash or other debris that would preclude the infiltration of storm water. Additionally, the drywell, conveyance pipes and catch basins within the ponds should be checked to be sure that they are free of debris and remain free draining.

These above noted storm event related visual inspections (no. 1, 2, and 3) are in addition to the maintenance schedules noted for each item.

### **4.12 Conveyance**

Inspection of the following items should be performed once in the spring and once in the fall as noted:

- Drainage Structures (catch basins, inlets and drywells) – should be visually inspected by either looking through or removing the grate to insure that no build up of sediment or other deleterious material is blocking the opening to the pipe. If encountered the City of Spokane should be contacted for maintenance to remove the extra sediment and deleterious material from the structures.
- Pipes – pipe ends should be inspected for breakage, crushing or other damage which could impede storm water flows.
- Gutters – should be evaluated for settling, cracking, spalling or other damage that would impede the flow of storm water or other runoff from reaching the curb inlets and pond bottoms.
- Curb Inlets – should be evaluated for sediment or grass encroachment at the inlet/curb

**DRAINAGE FACILITIES  
OPERATION & MAINTENANCE MANUAL**

---

interface. This material should be removed and the inlet should be free and clear of sediment, weeds, grass or other deleterious material to ensure free flow into the grassy swales and ponds, with no ponding in the adjacent public road.

- Grassy Swales - should be evaluated for mowing damage, under watering, over watering and the presence of extra sediment. In the event that any of these elements are found, remediation back to a green healthy stand of mowed grass should be performed. Extra sediment should always be removed from the swale.

#### **4.13 Inlets**

Inspections and maintenance of the inlet should be done during inspections of the ponds, making sure that each of these inlets is clear of obstructions and debris, and in good condition. If there is any obstruction present, it should be removed immediately.

#### **4.20 Private “Public” Open Spaces**

Within this residential subdivision there is a Private “Public” Open Space not dedicated to storm drainage. All maintenance of this open space is the responsibility of the Crestview HOA, including the western fence, turf, sprinklers, and any other passive or active recreation amenities.

#### **5.00 Recommended Set-Aside Funds for Maintenance & Future Replacement Costs**

There will be annual costs which will be required to maintain the described facilities within this development. Similarly, there will be replacement costs and major renovation costs of all the describe facilities which will occur in the future. These replacement costs are the responsibility of the Homeowners Association or successors in interest. Future replacement and major renovation costs have been converted to annual costs, in the form of recommended set-aside funds.

commended annual set-aside costs are listed in Table 5.00A. It is recommended the Crestview HOA or management set-aside these amount of funds annually, to ensure that adequate maintenance and replacement measures of the drainage facilities will be implemented. \_ This does not Apply to this project.

**DRAINAGE FACILITIES  
OPERATION & MAINTENANCE MANUAL**

---

## Sinking Fund Calculations

**Job#** 22-3376

**Date:** 8/7/2023

---

### LIST OF QUANTITIES

---

Description	Units	Quantity	Unit Price	Total
24" Pipe	LF	0	\$40.00	\$0.00
21" Pipe	LF	0	\$40.00	\$0.00
18" Pipe	LF	0	\$26.00	\$0.00
15" Pipe	LF	0	\$24.00	\$0.00
12" Pipe	LF	40	\$30.00	\$1,200.00
8" Pipe	LF	0	\$24.00	\$0.00
6" Pipe	LF	0	\$20.00	\$0.00
			<b>Pipe Total</b>	<b>\$1,200.00</b>
Catch Basins	EA	1	\$1,500.00	\$1,500.00
Gravel Gallery	EA	1	\$2,000.00	\$2,000.00
Type 1 Drywell	EA	1	\$2,500.00	\$2,500.00
Type 2 Drywell	EA	0	\$2,500.00	\$0.00
			<b>Structure Total</b>	<b>\$6,000.00</b>

---

### ANNUAL MAINTENANCE AND OPERATION COSTS

---

Description	Units	Quantity	Unit Price	Total
Inspect Structures	HRS	2	\$50.00	\$100.00
Clean Curb Inlets	HRS	2	\$50.00	\$100.00
Flush Pipes	-	-	-	-
Inspect Ponds and Clean Outlets	HRS	2	\$50.00	\$100.00
Mowing & Irrigation of Pond	HRS	3	\$50.00	\$150.00
			<b>Annual Maintenance Cost</b>	<b>\$450.00</b>

**DRAINAGE FACILITIES  
OPERATION & MAINTENANCE MANUAL**

---

**REPLACEMENT COST & ANNUAL COST PER LOT**

---

Description	Total
Assume 50% of Pipe is Replaced in 20 years (=Pipe Total*0.5)	\$600.00
Assume 25% of Structures are Replaced in 20 years (=Structure Total*0.25)	<u>\$1,500.00</u>
<b>Total Present Value (PV) of Replaced Pipe and Structures</b>	<b>\$2,100.00</b>
 Future Value of Pipe and Structures (FV), assume inflation=4%, n=20 FV=PV(F/P,4%,n=20)	 \$4,601.10
 Annual Set-Aside for Future Replacement (A), assume interest=6%, n=20 A=FV(A/F,6%,n=20)	 \$125.15
<b>Annual Maintenance and Operation Costs (from subtotal above)</b>	<u>\$450.00</u>
<b>Total Annual Costs</b>	<b>\$575.15</b>
 Total Charge Per Unit Charge Per Unit = Total Annual Costs/# of Units	
	# of Units      20
	<b>Charge Per Unit /yr      \$28.76</b>

Note: F/P, A/F factors are from interest tables