

**STORMWATER CONVEYANCE  
AND '208' PONDS**

**OPERATION & MAINTENANCE  
MANUAL**

**Jesse's Bluff 3<sup>rd</sup> Addition**

Spokane County No. P1964

March 23, 2007

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SPOKANE COUNTY ENGINEER



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## **1.00 PURPOSE**

This document is intended to provide general operations and maintenance guidelines for the '208' ponds and other drainage facilities located within the Jesse's Bluff 3<sup>rd</sup> Addition single-family residential neighborhood. Implementation of these guidelines will ensure that the drainage facilities installed will function as intended in the plat design.

## **2.00 INTRODUCTION**

Generally, the drainage system is intended to collect onsite stormwater runoff in the streets and convey it via concrete gutters and storm pipes. The runoff is then directed to a '208' pond. The drainage facilities consist primarily of a series of onsite drainage structures, storm pipes, and '208' ponds. It is of the utmost importance to provide adequate operations and maintenance activities to ensure that the drainage facilities remain silt and dirt free, as this silt and dirt loading will affect the performance of the catch basins, storm pipes and ponds. If these facilities become completely clogged, the only remedy will be to completely reconstruct the drainage facilities. A full set of engineering drawings for Jesse's Bluff 3<sup>rd</sup> Addition is available for review at Spokane County Public Works under file P1964.

## **3.00 GENERAL OPERATIONAL CHARACTERISTICS**

The drainage facilities for Jesse's Bluff 3<sup>rd</sup> Addition are generally very simple, functional, and have low maintenance requirements. A periodic visual inspection of the facilities will identify any required maintenance. Most maintenance will consist of keeping the pipes, structures and ponds free of debris and sediment. A specific inspection schedule should be followed. See Section 4.0 for recommended maintenance schedules.

### **3.10 Drainage Structures and Storm Pipes**

The drainage structures include concrete gutters, catch basins, manholes, and piping. The concrete gutters, catch basins, manholes and piping convey stormwater runoff from off the surface of the streets to the ponds for treatment and disposal. The outflow structures from the ponds include pipes to direct outflow to the next pond or the existing drainage ways along North Five Mile Road.

### **3.20 '208' Ponds**

Jesse's Bluff 3<sup>rd</sup> Addition has been designed to use '208' ponds for the treatment and disposal of storm water collected from the site. The ponds have been designed to store the first ½-inch of runoff from all impervious areas on the site. The outflow structures are designed to reduce the peak flow rates from the site to match the existing flow rates.

Each pond is designed with a flat bottom and 3:1 side slopes. The volume of each pond was designed to provide detention volume above the treatment volume in order to store and discharge the 10, 50 and 100-year runoff volumes.

Pond characteristic information is provided in Table 3.20. Additional information is provided in the engineering drawings on file at Spokane County Public Works, under file P1964. While all 6 ponds are included here for reference, only Ponds 2, 4A and 4B are considered for maintenance purposes with this development because the other ponds have been included in prior phases of the Jesse's Bluff Development.

Table 3.20 - Pond Characteristics

| Pond Label | Pond Btm. Elev. | Pond Btm. Area (sf) | Area of 1' Depth (sf) | Area of 2' Depth (sf) | Area of 3' Depth (sf) | Area of 4' Depth (sf) |
|------------|-----------------|---------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Pond C     | 2382.65         | 1,887               | 2,683                 | -                     | -                     | -                     |
| Pond 2     | 2386.50         | 20,500              | 22,841                | 25,263                | 27,765                | -                     |
| Pond 1A    | 2378.00         | 10,455              | 11,853                | 13,305                | 14,810                | 16,368                |
| Pond 1B    | 2362.00         | 6,567               | 8,392                 | 10,217                | 12,096                | -                     |
| Pond 4A    | 2341.00         | 1,618               | 2,443                 | 3,311                 | -                     | -                     |
| Pond 4B    | 2337.00         | 1,764               | 2,559                 | 3,408                 | -                     | -                     |

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

Maintenance of the Jesse's Bluff 3<sup>rd</sup> Addition storm drainage facilities within the public right-of-way will be performed by Spokane County. The Jesse's Bluff Homeowner's Association is responsible for maintenance of the drainage facilities located in tracts or easements, (structures, pipe replacement, sod replacement, etc.). Below is a maintenance description for each of the drainage system elements contained within the development, including the drainage structures, piping, and ponds.

##### General

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.

Generally, maintenance personnel are to conduct a visual inspection of the drainage facilities immediately following a substantial rainfall event or snowmelt event.

Substantial events include:

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

For long duration storms, 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 major problems.

1. Inspect all concrete gutters and drainage structures (catch basins, manholes, outflow structures, and concrete weirs) to ensure they are clear of debris and obstructions.
2. Inspect all pond berms for breaches. Immediately repair any berm breaches with native soil, compacted in place.

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

#### 4.10 Drainage Structures and Storm Pipes

Catch basins, outlet structures, pipes and manholes should be inspected every 3 months, or after every significant storm event ( $\frac{1}{2}$ " ) 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, without breaks or cracks. If there is any obstruction present it should be removed immediately.

A flow test in 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 out of the pipe section.

All catch basins and manholes should be cleaned (vacuumed) every 6 months.

#### 4.20 '208' Ponds

The ponds should be inspected every 3 months, or after every significant rainfall and/or snowmelt event, whichever is more frequent. The ponds consist of an earthen depression constructed from native soils, enclosed within soil berms or existing grade.

Routine maintenance and inspections of the ponds will include regular mowing and removal of any accumulated debris, such as leaves, weeds and trash. Any obstructions, which would not allow water to flow freely into the pond, should be removed. The pond berms should be inspected to ensure that they are in good repair and structurally sound.

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

There will be annual maintenance costs, major renovation costs and future replacement costs of the drainage facilities. Major renovation and future replacement costs for the drainage facilities have been converted to annual costs, in the form of a sinking fund calculation. Because this project is the final phase of other developments in the area that share the drainage facilities, only 3 ponds are included in the sinking fund calculations. It is assumed that ¼ of the pipe and 1 outlet structure or manhole will need to be replaced within 20 years.

The estimated annual maintenance costs and recommended annual set-aside costs are listed below in Table 5.00. It is recommended that the Jesse's Bluff Homeowner's Association set-aside these funds annually to ensure that adequate maintenance and replacement measures of the drainage facilities will be implemented.

Table 5.00 - Maintenance and Future Replacement Costs

| Facility                           | Annual Costs     | Annual Set-Aside Funds for Future Replacement or Major Renovation <sup>(1)</sup> |
|------------------------------------|------------------|--|
| Manhole, Outlet Structures & Pipes | \$ 1,200         | \$ 149   |
| '208' Ponds                        | \$ 12,000        | \$ 0   |
| Taxes                              | \$2,493          | \$ 0   |
| <b>Sub-Total Annual Costs</b>      | <b>\$ 15,693</b> | <b>\$ 149</b>  |

**Grand Total/year = \$ 15,842**  
**Cost per lot/year = \$ 386.39 (41 lots)**

Note: (1) Assume replacement in 20 yrs, with 4% inflation and a 6% rate of return on investments for Future Replacement set-aside account.

**Jesse's Bluff 3<sup>rd</sup> Addition  
Sinking Fund Calculations  
March 23, 2007**

**List of Quantities**

|                   |        |
|-------------------|--------|
| 12" N-12 ADS Pipe | 200 LF |
| 18" N-12 ADS Pipe | 29 LF  |
| 24" N-12 ADS Pipe | 26 LF  |
| Manhole           | 1      |
| Outlet Structures | 2      |

**Annual Costs**

The manhole and outlet structures need to be flushed 2 times per year. There are 3 manhole/outlets @ \$200/MH/Flush. The yearly cost for MH maintenance is  $(3)(200)(2) = \$1,200$ .

Each pond needs to be cleaned and maintained 2 times per year. A pond cleaning will cost \$2,000. Ponds C, 2, 1A and 1B are included in the maintenance calculations for prior developments. Pond 2 is being enlarged however, so it is also included in these maintenance calculations. Therefore, the yearly pond maintenance for ponds 4A and 4B will cost  $(2)(2000)(3) = \$12,000$ .

The total annual maintenance cost is then \$13,200.

The 2006 taxes for the entire parcel are listed as \$2,492.85.

**Replacement Costs**

In 20 years  $\frac{1}{4}$  of the pipe will need to be replaced along with the replacement of 1 manhole or outlet structure.

Present Value Calculations

|                      |                             |                |
|----------------------|-----------------------------|----------------|
| (1/4) of 12" HDPE is | $(200/4)(\$21/\text{ft}) =$ | \$1,050        |
| (1/4) of 18" HDPE is | $(29/4)(\$25/\text{ft}) =$  | \$182          |
| (1/4) of 24" HDPE is | $(26/4)(\$40/\text{ft}) =$  | \$260          |
| 1 OS/MH              | $(1)(\$1000) =$             | <u>\$1,000</u> |
| Total                |                             | \$2,492        |

Future Value to Replace in 20 years (pipe and structure)

$$(2,492)(2.1911) = \$5,460$$

Annual set aside for future replacement @ 6% (pipe and structure)

$$(5,460)(0.0272) = \$149$$