



January 4, 2016

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Public Works Director  
City of Silverton  
306 S. Water Street  
Silverton, OR 97381

## Re: Silver Creek Dam (S-66) – Inspection Summary

I inspected Silver Creek Dam on September 1, 2015, with Keith Mills, State Engineer, and Travis Sperle of the City of Silverton. The Water Resources Department conducts routine inspections of the dam's exterior surfaces to identify conditions that might affect the safety of the dam. Dams are assigned a hazard rating based on downstream hazard to people and property, not on the condition of the dam. Silver Creek Dam has a high hazard classification. High hazard dams are inspected annually.

**Summary:** The dam was in satisfactory condition and appeared to be well maintained. No new dam safety concerns were identified during the inspection. Subsequent to the inspection, the City completed repairs to a spillway concrete slab joint. The City is in the process of developing real-time monitoring of Silver Creek Dam. The results of this inspection are illustrated and described in the following photos and text. This inspection includes recommendations to keep the dam safe and functional.

### Results of Inspection:

During the inspection, the reservoir level was at elevation 423.1 feet, which is 0.9 foot below the spillway crest. Silver Creek Dam has an embankment section, with an uncontrolled concrete spillway on the right abutment.



Silver Creek Dam embankment section, upstream slope, spillway at right.



Silver Creek Dam downstream side, spillway in foreground, embankment in background.

The embankment section had a mowed grass cover that effectively reduces surface erosion. No sign of settlement, instability, or erosion were observed on the embankment section. The downstream slope and abutments were dry.



Embankment section crest.



Embankment section downstream slope.

During the inspection, the embankment drain flow measurements were as follow:

Drain No.	1	2	3	4	5	6(left)	7(right)	8	9
Flow (gpm)	25.2	2.8	0	0.3	0.4	0.1	14.2	0	6.9

These flow measurement values were consistent with those from previous inspections.

There is no vehicular access to the main embankment section. In addition to being beneficial for maintenance and repairs, vehicular access to the embankment is important in the event of an emergency.

Cracking and spalling was observed along some of the concrete spillway's transverse slab joints. It appears that this condition may have been caused by hydraulic uplifting of the downstream edge of the adjacent slab. The inspection team returned to the site on September 9, 2015, for the City's repair of the worst of these slab joints, the second from the crest, on the right side of the spillway. Loose concrete was removed and the top of the joint was exposed. The joint was dry. A ¼-inch layer of fine soil was observed underneath the waterstop, where it had lost its bond with the underlying concrete. It appeared that the upper slab had lifted about 3/4-inch relative to the lower slab. The repaired area should be monitored for any changes. If similar cracking returns, it may be an indication that slab uplifting has recurred and further investigation would be required.



Spillway, second transverse joint from crest. Damaged concrete outlined in orange.



Water stop at exposed spillway joint. Note gap between water stop and lower slab.



Repairing damaged concrete at second traverse joint from crest; September 9, 2015.



As-built construction drawings of the spillway show an underdrain placed along the upstream side of each transverse joint, which have outlets in the left training wall. Historically, only drain outlets three and six (numbering starts at crest) have had any significant flow. Drain 6 was discharging about 10 gpm.

Drain 3 is the outlet for the underdrain located along the second transverse joint from the crest. This drain outlet orifice has two plastic pipes extending out of it. One of these pipes was discharging about 5 gpm. Reportedly, these pipes are outlets for embankment section underdrains that were installed subsequent to initial construction. It is not known whether the spillway underdrain remains connected to the outlet orifice.



Discharge from pipes in drain Outlet 3.



Spillway, stilling basin in background.

The spillway stilling basin was repaired in 2013. To date, the stilling basin repairs have not been subjected to a high flow event.

**Recommendations:**

1. Continue vegetation management in your ongoing maintenance program.
2. Provide vehicular access to the main embankment section.
3. Monitor the repaired spillway joint for changes.
4. Continue to develop a remote monitoring program for the dam.
5. Investigate leakage through the low level conduit.

We use a standard inspection form, and a copy of the field inspection sheet for this dam is attached. We plan on another routine inspection next year. Please let me know if you have any questions about this inspection.

Sincerely,

Gerald Pierce, P.E.  
Civil Engineer  
(503) 986-0839

C: Joel Plahn, Watermaster District 16  
Dam Safety File S-66



<b>IV. Conduit</b>		Control: <input checked="" type="checkbox"/> Manual <input type="checkbox"/> Power <input type="checkbox"/> Other <input type="checkbox"/> Conduit Control missing	<b>Rating</b>
Inlet	<input checked="" type="checkbox"/> Submerged <input type="checkbox"/> Debris on Trash Rack <input type="checkbox"/> Deterioration		4
Trickle tube	<input checked="" type="checkbox"/> None <input type="checkbox"/> Screened <input type="checkbox"/> Blockage <input type="checkbox"/> Deterioration		4
Control/Stem	<input checked="" type="checkbox"/> Operable <input type="checkbox"/> Damaged <input type="checkbox"/> Missing		4
Valve(s) cycling	<input type="checkbox"/> Frozen <input type="checkbox"/> unknown <input checked="" type="checkbox"/> past year <input type="checkbox"/> frequent		4+
Size: 42	Material	Condition	4
Outlet Structure	<input type="checkbox"/> Overgrown <input checked="" type="checkbox"/> Clean <input type="checkbox"/> Pressurized <input type="checkbox"/> Leaking gpm		4
Secondary outlet	<input type="checkbox"/> Yes <input type="checkbox"/> No Type Diameter in.		
Comments:			

<b>V. Spillway</b>	<input type="checkbox"/> Earth <input type="checkbox"/> Rock <input checked="" type="checkbox"/> Concrete <input type="checkbox"/> Other	<b>Rating</b>
<b>Modifications</b>	<input checked="" type="checkbox"/> None <input type="checkbox"/> Reduction in capacity <input type="checkbox"/> Feature not on design	
Approach Channel	<input checked="" type="checkbox"/> Clear <input type="checkbox"/> Trees/brush <input type="checkbox"/> debris <input type="checkbox"/> erosion	5
Control Section	Width Depth <input type="checkbox"/> Concrete <input type="checkbox"/> Rock <input type="checkbox"/> Soil <input type="checkbox"/> Culvert <input type="checkbox"/> Unstable	5
Flashboards/Gate	<input checked="" type="checkbox"/> None <input type="checkbox"/> In place <input type="checkbox"/> operational <input type="checkbox"/> deteriorated	
Discharge Channel	<input checked="" type="checkbox"/> Clear <input type="checkbox"/> Trees/brush <input type="checkbox"/> leakage <input type="checkbox"/> headcutting ( feet approaching control section, depth feet.)	4
Stilling basin	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Functional <input type="checkbox"/> Minor Erosion <input type="checkbox"/> Severe Erosion/Undercutting	
Aux. Spillway	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No (use comments below)	
Comments:	Cracks and spalling at right side of second lateral joint below crest.	

<b>VI. Access and Security</b>		<b>Rating</b>
Vehicle access	<input checked="" type="checkbox"/> Public road <input type="checkbox"/> all weather road <input type="checkbox"/> dirt road <input type="checkbox"/> cross country	5
Fencing, signage	<input type="checkbox"/> Remote <input type="checkbox"/> Gate <input checked="" type="checkbox"/> Secure Fence <input type="checkbox"/> Camera <input type="checkbox"/> Uncontrolled	5
New Structure below dam	Dwelling ft Paved public road ft Other sig building ft	
Emergency Action Plan	<input type="checkbox"/> Not required <input checked="" type="checkbox"/> Completed at dam (dated ) <input type="checkbox"/> None	
Comments:		

Instrumentation data reviewed:  N/A  Yes  No

Other: