SILVERTON PUBLIC WORKS

DATE: March 5, 2018

FROM: Christian Saxe, Public Works Director

RE: Silver Creek Dam 2017 Inspection

The Silver Creek Dam is inspected annually by the Oregon Water Resources Department (OWRD). On February 20, 2018, the City received the 2017 Dam Safety Inspection Form completed by the OWRD along with their inspection summary.

As the summary indicates, the Safety Condition of the Dam is Satisfactory. High hazard dams are rated by a dam's ability to store and release water in a safe manner:

- Satisfactory – No deficiencies
- Fair – Maintenance needed, minor deficiencies
- Poor – Major repairs need
- Unsatisfactory – Failure reasonably possible

The summary report also provides recommendations which the City has addressed in the comments and/or is seeking funding opportunities for completion:

Silver Creek Dam (S-66) – Inspection Summary Recommendations

State Recommendations	**City of Silverton Comments**
Inspect the low level conduit to the value to determine if the seepage is from the value or from another source.	Tentatively planned for summer 2018.
Develop an access road so that equipment can get to the dam if the spillway is flowing	City currently exploring available options.
Monitor the repaired spillway joints for new cracking.	Will be performed during annual maintenance activities.
Update the EAP with unusual condition and potential failure thresholds based on monitoring data. Also update all contact information in the EAP	This is currently in revision with a completion date of summer 2018.

Please contact the Public Works Department at (503) 873-8679, if you have any questions or comments.

Oregon
Kate Brown, Governor

Water Resources Department
725 Summer St NE, Suite A
Salem, OR 97301
(503) 986-0900
Fax (503) 986-0904

February 20, 2018

Christian Saxe
City of Silverton
306 S. Water Street
Silverton, OR 97381

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

This dam was inspected on August 8, 2017. I performed the inspection with Civil Engineer Tony Janicek. Travis Sperle from the City of Silverton and Barry Meyers from Engineering Monitoring Solutions were also there for the inspection. 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 is classified as a high hazard dam and inspected annually.

Summary: The dam is well maintained and operated and in SATISFACTORY condition. One issue of concern was identified at the dam, and was quickly repaired by the City, with photos sent to the dam safety program. The results of this inspection are illustrated and described in the following photos and text, followed by maintenance and repair recommendations as appropriate.

Results of Inspection:

The reservoir level was over 16 feet below the dam crest when inspected. Minimum freeboard was 14 feet, which is excellent. The reservoir was clean.

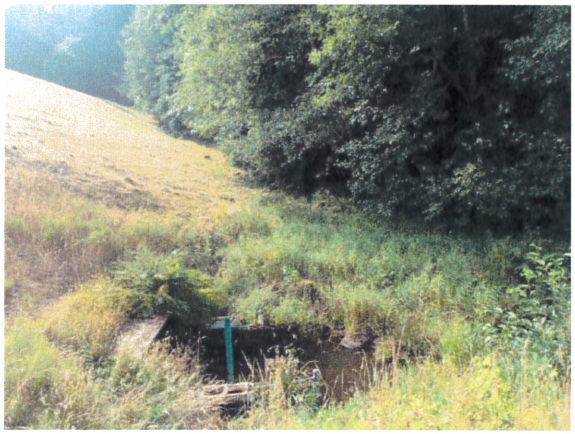
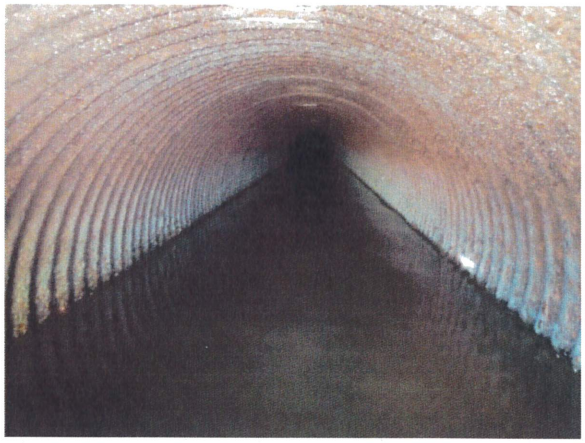
Spillway Approach

Spillways have been a main focus of OWRD dam safety inspections over the last couple of years. There were no obstructions to flow over the spillway approach. It was clear of debris, and so was the reservoir. Vegetation is very well maintained, with short dry grass covering all of the embankment slopes. No significant animal burrows were observed. The one issue is that there is still no road access to the dam, which is very important in the event of unusual conditions in winter months.

Cracking around slab joints and quick repair

Local cracking was observed in concrete joints in the spillway base slabs. The cracking was addressed by the City very quickly. The repair work is shown in the photo on the

right. It is important to watch the spillway slabs for any changes, and complete repairs quickly just as was done this past fall.

Outlet and interior of conduit

There is some continuous flow through the conduit even when the valve is closed. Water is clear. It is most likely an obstruction or minor wear at the seat of the valve. There has been no inspection of this location for at least ten years; it was last inspected done by John Falk (former Dam Safety Engineer for OWRD). It is no longer appropriate to inspect this by walking through the conduit. Inspection by City equipment would be most effective.


Monitoring telemetry


Effects of vegetation and debris on monitoring

Over the last few years the City has worked with an expert engineer on setting up remote monitoring of the dam. Seepage is now very well monitored, with no significant changes over the last year and no sign of internal erosion. Some additional determination of the levels that trigger an unusual condition classification should be developed. These would be added to the EAP. They should set conditions when the City would ask the dam safety program for a more detailed evaluation or expedited inspection.

Emergency Action Plan: There have been no major revisions to the Silver Creek dam Emergency Action Plan since it was completed in 2009. It was tested by an unusual

condition in January 2012 during a moderate flood, and it performed as planned, with full involvement from Silverton Public Works, Police and Fire, and also the dam safety engineer at the Water Resources Department (at that time, me). The EAP does need all phone numbers updated, and at some point will need an exercise as required by HB 3247 (passed by the Oregon legislature and signed by the Governor in 2017.

Recommendations

1. Inspect the low level conduit to the valve to determine if the seepage is from the valve or from another source.
2. Develop an access road so that equipment can get to the dam if the spillway is flowing.
3. Monitor the repaired spillway joints for new cracking.
4. Update the EAP with unusual condition and potential failure thresholds based on monitoring data. Also update all contact information in the EAP.

Recommendation(s):

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 this year. Please let me know if you have any questions about this inspection, and when you might have a pipe inspection camera available to evaluate the conduit and the valve.

Sincerely,

Keith Mills

Keith Mills, P.E., State Engineer
(503) 986-0840
Cell (541) 706-0849

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

Dam Safety
Inspection Form

State of Oregon
Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301-1271
(503) 986-0900

Name of Dam: SILVER CREEK DAM File #: S-66
Height: 65 ft. Storage: 1300 ac. ft. Permit: R-5948 NID #: OR- 00622
Hazard: ☐ **Low** ☐ **Significant** ☐ **High** Inspector(s): JANICEK, MILLS District: 16
Others on site: CHRISTIAN SAXE, TRAVIS SPERLE, LUKAS DAHLBERT, BARRY
Date: 08/08/2017 Temperature: 90's°F ☑ Dry ☐ Rain ☐ Snow ☐ Now ☐ Recently
Prior Inspection Date: 09/28/2016 Issues from prior inspection: NONE

***Rating Criteria**: 5-Exemplary; 4-Adequate 3-Maintenance or minor repair needed*
2-Serious repair needed; 1- ***Urgent dam safety issue – action now - Contact owner and dam safety directly***

General		**Rating**
Structures below dam	☐ New ☐ Existing ☐ **Request Dam Safety review of hazard rating**	
Distance to dam	Dwelling ___ feet Paved public road ___ feet Other building ___ feet	
Vehicle access	☐ All weather road ☑ Dirt road ☐ Cross country	3
Detail:		

Reservoir	**Pool level:** >16'	**Point of Reference:** ☐ Crest ☐ Gage ___	**Rating**
Minimum freeboard	**Vertical distance from debris line to lowest place on crest** >14' **ft.**		4
Debris	☐ Floating Debris/Trash ☐ Log Boom ☐ Unusual Conditions ☑ CLEAN		4
Detail:	2.2' BETWEEN CURRENT WL & HIGH WL		

Spillway	☐ **Earth** ☐ **Rock** ☑ **Concrete** ☐ **Other**	**Rating**
Modifications	☑ **None** ☐ **Reduction in capacity** ☐ **Feature not on design**	—
Approach Channel	☑ Clear ☐ **Trees/brush** ☐ **Debris** ☐ Erosion	4
Control Section	☑ Concrete ☐ Rock ☐ Soil ☐ Culvert ☐ **Unstable** Width ___ Depth ___	4
Flashboards/Gate	☑ None ☐ In place ☐ Operational ☐ Deteriorated	—
Discharge Channel	☑ Clear ☐ Trees/brush ☐ Leakage ☑ CRACKING ☐ **Headcutting** (___ feet from spillway control section, depth ___ feet.)	3
Stilling basin	☐ N/A ☑ Functional ☐ Minor Erosion ☐ **Severe Erosion/Undercutting**	4
Aux. Spillway	☐ Yes ☑ No (use comments below)	—
Detail:	CRACKING IN SPILLWAY DISCHARGE CHANNEL → REMOVE WEEDS - ROLLING UNDERNEATH → RESEAL CRACKED PORTION & SLAB DS OF ABUT SEAL VERTICAL JOINTS	

Seepage/Leakage		**Rating**
Serious conditions	☐ **Leakage** ☐ **Piping** ☐ **Discolored water** ☐ **Boils**	—
Locations*	☐ No evidence ☐ Center ☐ Left ☐ Right ☐ **Around pipe** ☐ On dam ___	—
Flow	☐ Wet vegetation ☐ Spongy ☐ Standing water ☑ Flow ___ gpm	4
Toe drains	☐ None ☑ Working ☐ Damaged ☐ Buried	4
Detail:	DRAINS 3 & 6 FLOWING: #3 @ ~8 gpm #6 @ ~15 gpm	

Conduit	Control: ☑ Manual ☐ Power ☐ Other ☐ Conduit Control missing		Rating
Inlet	☑ Submerged ☐ Debris on Trash Rack ☐ Deterioration		—
Trickle tube	☑ None ☐ Screened ☐ Blockage ☐ Deterioration		—
Control/Stem	☑ Operable ☐ Damaged ☐ Missing		4
Valve(s) cycling	☐ Frozen ☐ Unknown ☑ Past year ☐ Frequent		4
Pipe	Diameter/Size: 42" Material CONCRETE ENCASED CMP	Condition MINOR CORROSION	4
Primary outlet	☐ Overgrown ☑ Clean ☐ **Pressurized** ☐ Leaking _____ gpm		4
Other outlet(s)	☐ Yes ☑ No Type(s)_____ Diameter(s) _____ in.		—
Detail:			

Structure of dam	☑ Earth ☐ Rock ☐ Concrete ☐ Other	Rating
Distress	☐ Cracks - offset _____ in ☐ Landslide(s) ☐ Sinkhole(s) ☐ Crest Settlement ☐ Narrow crest ☐ Wave erosion ☐ Trampling ☐ Surface erosion ☑ NONE	4
Locations*		—
Other	Describe _____	—
Aux. dike (s)	☑ No ☐ Yes ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ over 5	—
Animals	☐ Nutria ☐ Badger Other _____ ☐ Unknown ☑ NONE	Rating
Burrows	☐ Observed max diameter ____ in max depth ____ ft ☐ Trails ☑ NONE	4
Locations*		—
Vegetation		Rating
Cover	☑ Low grass ☐ high grass ☐ brush ☐ blackberries ☐ small trees ☐ large trees	4
Locations*		—
Impairs inspection	☐ toe seepage ☐ conduit outlet ☐ spillway ☐ upstream face ☐ downstream face	—
Detail:		

***Locations** – Upstream face, **C**rest, **D**ownstream face, **L**eft and **R**ight abutments, **T**oe*

Expedited Re-inspection Needed: ☐ Next Inspection Date: _____

Other Issues or Additional Detail Needed:

→ WHEN SYSTEM ALARMS, CITY SHOULD EMAIL OWRD + SEND STATUS REPORT

→ SCOPE PIPE & DETERMINE IF LEAKING WHEN VALVE IS CLOSED

INSTRUMENTATION: - SOLAR POWERED UNIT #1 (NEAR OUTLET)
→ POWERS LEVEL INSTR. FOR WEIRS (6 HORIZONTAL DRAINS)
→ H-FLUMES (3 TOE DRAINS)
- SOLAR POWERED UNIT #2 (ON CREST)
POWERS: 6 PIEZOMETERS ON CREST, RESERVOIR LEVEL, 2 PIEZOMETERS ON G-ABUTMENT
- NO MONITORING OF DRAINS IN SPILLWAY