

Lake Eureka Spillway Investigation

April 18, 2024

Prepared for:

The City of Eureka
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Prepared by:

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Introduction / Purpose of Investigation

Lake Eureka is a 259 acre lake located 4.5 miles north of the city of Eureka. The Works Progress Administration, Civilian Conservation Corps, and City of Eureka completed construction of the lake in 1938. The lake was constructed for the purposes of flood control, water supply, and recreation. Several residential homes exist around the lake. The City of Eureka is responsible for maintenance of lake facilities, dam, and spillway.

Eocene Environmental Group (Eocene) was hired by the City of Eureka to investigate the dam and auxiliary spillway conditions. Lake residents had expressed concern with water flowing through the rock in the base of the spillway. They questioned if the water could be detrimental to the structure and lake water level. On April 18, 2024, Curtis Janssen, P.E., Eocene, made a site visit to the lake to investigate the concerns. Several individuals representing the city were also present during the investigation.

On-Site Investigation

The area under investigation was the exposed rock drop-off in the upper section of the spillway as shown in Pic.1 and Pic. 2 - Appendix. More precisely, lake residents observed water flowing in various areas along the base of the rock drop-off. The flow is most observed during dry weather periods. During the on-site investigation, one such area was observed immediately next to the water shown flowing over the spillway crest as shown in Pic. 3 – Appendix. No similar areas were observed at the time. In discussion with the individuals on site, other areas have been observed when the pool at the base of the drop-off is lower and more of the rock drop-off is exposed.

No visible signs of degradation or deterioration were noted along the length of the drop-off or at the specific area noted at the base of the drop-off. The concrete cap or weir along the top of the drop-off also appeared to be in good condition and functioning as designed. The weir serves as the control section of the water level in the reservoir as water exits the lake. Overall, no unusual conditions were observed along the area of concern during the on-site investigation.

Review of Plans / Drawings

The original plans for the dam, prepared by Wm. J. Faulkner, City Engineer, Eureka, dated July 1935, were reviewed. A request for as-built plans and modification from the Kansas Department of Agriculture – Division of Water Resources (DWR) was also made. However, no information relevant to the investigation was found in the materials received from DWR.

Details of the spillway shown on sheet 6 of the original plans, reveal a construction note stating the following:

“Drainpipes 2” in diameter to be placed thru pavement at 20’ cts (centers) on limestone bed. Provide 1 cu.ft. of crushed stone behind each pipe opening.”

The detail associated with this note (Pic. 4 – Appendix) shows the drainpipes to be placed on top of the limestone bed at the base of the spillway. The elevation and placement of these drainpipes directly correspond to the areas of concern noted by the lake residents. The present drop-off of the spillway is much steeper than the original design, however, it appears some type of drainpipes were installed at the base of the spillway either during original construction or

during a later modification. Such pipes were installed to safely relieve hydraulic pressure that may build up within the rock.

Conclusions / Recommendations

The observation of water flowing from areas at the base of the spillway drop-off directly corresponds to drainpipes originally designed in these locations. These areas are not detrimental to the spillway, but rather are an important component to the design of the structure to relieve potential hydraulic pressure within the spillway. Visible observation from the on-site investigation reveals the condition of the spillway drop-off and concrete cap / weir to be in good condition and functioning as designed.

The amount of flow from these areas should not significantly lower the pool level in the lake. The capacity of flow from these areas is minimal compared to the potential amount of inflow coming into the reservoir. The drainage area above the reservoir is 9,835 acres or 15.4 square miles. This size of drainage area is large enough that even during times of drought or limited rainfall, the amount of base-flow or underground flow into the reservoir should far exceed the amount of flow lost from these areas of concern.

Eocene concludes no repair or modification to the spillway is necessary to further address the concern of this investigation.

Appendix – Pictures, Lake Eureka spillway investigation



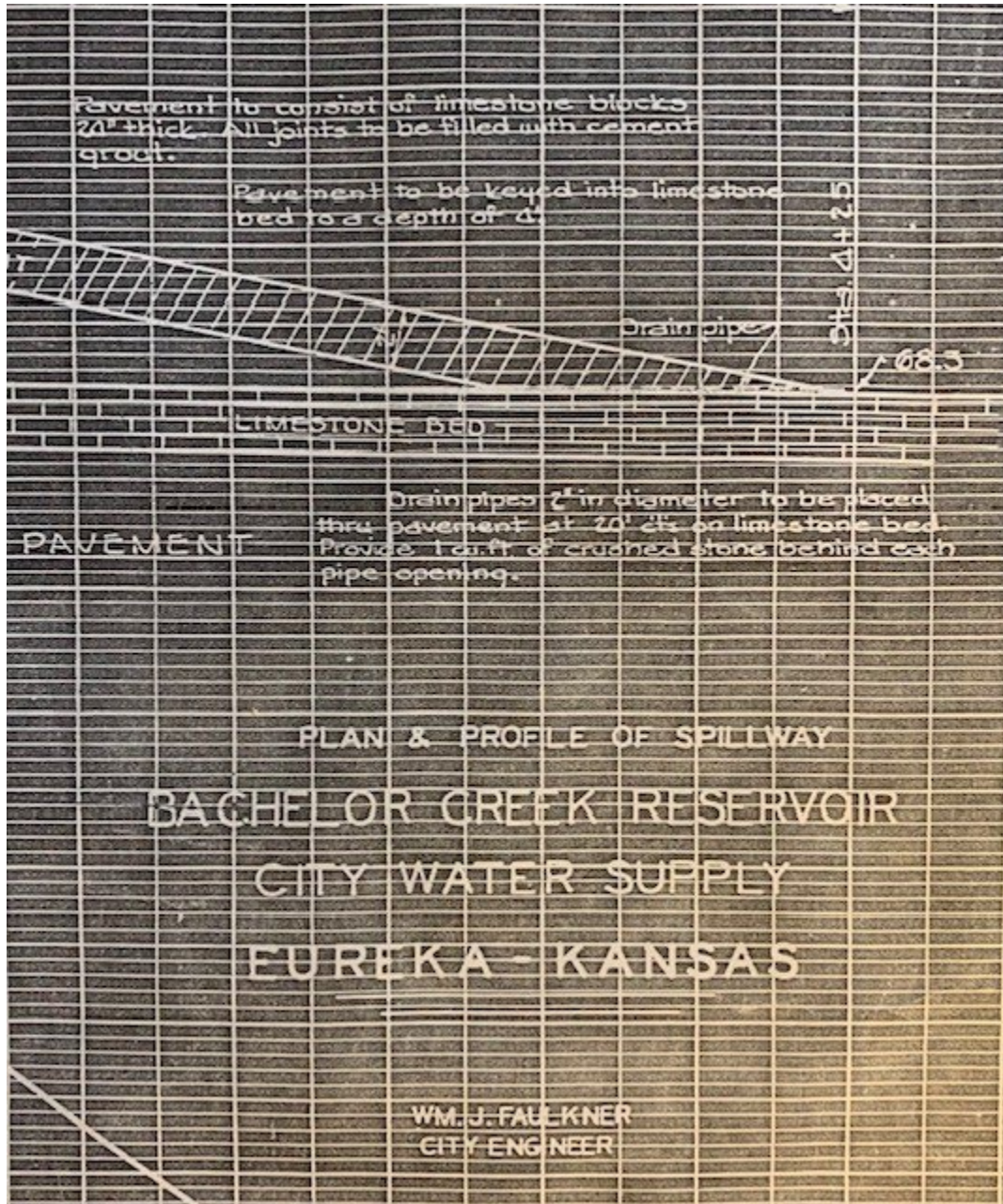
Pic. 1 – Spillway drop-off.



Pic. 2 – Spillway drop-off.



Pic. 3 – Area of concern, shown at base of of the spillway as a black “hole”; immediately left of cascading water in picture.



Pic. 4 – Construction note referencing drainpipes at base of spillway; taken from original 1935 plans.