Memorandum

To: Carrie Gaston and Traci Alvarez

From: Stephen Ingles-Garcia (WCI) and Glen Selover (WCI)

Date: 8/4/2025

Re: Cantrell Dam Design Summary

In 2020, a large storm event resulted in the partial failure of Cantrell Dam, largely due to a clogged standpipe within the dam's primary outfall structure. Floodwaters traveled south, crossing under I-25 via a 120" culvert pipe and impacting structures adjacent to the primary conveyance channel, ultimately overtopping Cook Street. The flow left the concrete channel crossing in Cook Street due to lack of capacity, and inundated the Sierra County Fairgrounds, South Broadway Street, and the Lousi Armijo Sports Complex. In 2023, Wilson & Company completed a study of local hydrology and dam hydraulics. The purpose of the study was to develop alternatives to mitigate local flooding.

The existing Cantrell Dam has no as-builts or plans to certify its design and is located on Bureau of Land Management (BLM) land, with difficult access for maintenance. Reconstructing the dam was quickly determined to be disadvantageous for several reasons, including the difficulty of maintenance, coordination with the Office of the State Engineer (OSE) due to the size of the structure, and the risk of dam failure due to unknown structural and design criteria. Additionally, the dam provides minimal reduction of flows in its current configuration.

As stated previously, Cantrell Dam cannot be accessed easily, and the only access is via approximately 3 miles of dirt road with steep slopes and sharp turns. Currently, Cantrell Dam does not meet the requirements to be classified as a jurisdictional dam with the OSE. However, the study phase showed that in order for the dam to provide adequate flood protection downstream, the structure would have to be enlarged. This would result in a heightened embankment, increased storage, and the classification as a jurisdictional dam. Beyond the increased cost during construction due to coordinating with OSE, a jurisdictional dam would require ongoing expenses for maintenance and updating safety guidelines, including the Emergency Action Plan (EAP). In addition to these increased expenses, leaving Cantrell Dam in place puts the city in jeopardy of a future dam failure. In the 2020 storm event, the dam overtopped and the damage to the downstream homes and infrastructure was severe. If the dam embankment were to fail, the entire volume of stored water would flow towards the City of Truth or Consequences (City) and the Village of Williamsburg. This amount of water would be greater than any single storm event.

The study phase report estimated the dam reconstruction cost to be $6-8 million. This estimate was only for construction materials and did not include the cost of coordination between the design engineer, OSE, and BLM during the entire design and construction phases. This estimate was also based on improving the downstream Cook Street arroyo, which would require significant property acquisition not included in the total cost. In all alternatives considered beyond this point, Cantrell Dam was proposed to be breached.

Alternative #1 was proposed in lieu of reconstructing the dam. This alternative included a dam breach with downstream channel improvements, which are needed to mitigate issues identified from the study phase. This alternative would include storm drain along City Street; the storm drain would capture local arroyo flows and then outfall to the Cook Street Arroyo. The proposed design also

included raising Cook Street 4-6 feet and using concrete box culverts (CBCs) to convey the arroyo flow. These improvements would prevent the overtopping of the channel at Cook Street, protecting the fairgrounds and other downstream properties from flooding similar to the 2020 event. This alternative was recommended, with an estimated cost of $3 million.

In the design phase, this alternative was further explored. The Cook Street Arroyo is located predominately on private property. After discussion with the City, acquisition of the properties in the arroyo was determined to be not preferred due to the coordination and costs required. Additionally, raising Cook Street near the arroyo crossing would require additional property acquisition or retaining walls due to the narrow right-of-way along the roadway. Alternative #2 was proposed in order to increase arroyo conveyance and reduce the risk of the arroyo overtopping near Cook Street. In this alternative, the flow to the arroyo would be diverted from the historical path into a storm drain network. This change would require a detention pond to attenuate (reduce) flow, as Cantrell Dam was deemed insufficient for this purpose. The dam instead would require a breach, with flow captured in a detention pond constructed on City land for easier maintenance access. The pond would outfall into a new 48” storm drain underneath Hyde Street, and then outfall into the arroyo south of Cook Street.

As the design phase progressed, it was discovered that the City did not possess an easement in Hyde Street. Alternative #3 (Final Design) was planned after discussions with the City and consisted of the storm drain being realigned to the west. The storm drain would be located under the Johnson Street Arroyo, where the City has a 90-foot right-of-way. Due to erosion concerns, portions of Johnson Street Arroyo will be lined with shotcrete, since the arroyo will be disturbed during construction. The outfall for the 48” storm drain would be the arroyo south of Cook Street.

The final design consists of the dam breach, the detention pond, the storm drain, and the channel outfall in Johnson Street Arroyo, as discussed above. The Cantrell Dam breach was designed to convey the flow from the upper watershed through the former dam with no reduction in peak flow, per regulations from OSE. The detention pond captures the flow from the 100-YR, 24-HR storm and conveys it into a 48” storm drain. In the 500-YR, 24-HR storm, the pond will utilize the auxiliary spillway and convey water into existing Cook Street Arroyo. After the construction of the pond, the existing Cook Street Arroyo will only convey local flows in the 100-YR or lesser storm events.

The City’s Streets Department was involved in the coordination during the entire design process, and the final design incorporated their comments to keep maintenance efforts to a minimum. This includes using concrete instead of rock riprap as erosion protection for ease of weed maintenance. The pond has a 15-foot-wide maintenance road along the top as well as two access roads to the pond bottom. The maintenance road will connect to Hyde Street, saving maintenance crews time and allowing for closer monitoring of the pond.

The improvements recommended in the design phase totaled $8 million. This large increase over the study phase is due to the addition of a pond, which will store 27.5 acre-feet compared to the 6.9 acre-feet stored in Cantrell Dam. The detention pond reduces flows more than the existing dam, while allowing for easier access for maintenance and visual inspections. The detention pond from the final design will not be a jurisdictional structure with the OSE, and due to the new location (south of I-25), will capture additional arroyo flows the original dam location was not capable of capturing.