

Lower Beaver Brook Dam Safety Repairs

Last month the District informed you that the State Engineer's Office (SEO) inspections conducted after last year's flood require the District to perform safety repairs and upgrades to all three of the District's dams. This month we will begin more detailed descriptions of the nature of those repairs and upgrades and estimations of their likely cost where available. We will discuss the Lower Beaver Brook dam first as it is the most problematic.

The Lower Beaver Brook (LBB) dam created a reservoir for the Golden water system when it was built in 1903 (now the Upper Beaver Brook dam is the main storage reservoir for our system, and it is located about 1 mile upstream of the LBB dam). The LBB dam is an earth/rock fill dam with structural height of 39 feet and impounds approximately 30 acre-feet (AF) when the water is at the spillway crest. The original LBB Dam was constructed around 1903 and was modified to the current configuration in 1935. The dam currently serves as storage and holding pond for the District's water treatment plant, The John P. Downs Treatment Facility, which is located near the base of the dam.

Currently, the LBB spillway is undersized, which is a complicated problem. The spillway is an un-gated overflow channel with a crest width of approximately 29 feet and it has a maximum capacity of 313 cubic feet per second (cfs). During last year's flood, the spillway is estimated to have passed about 230 cfs when the water level behind the dam rose to within 5 inches of overtopping the dam. For comparison, Upper Beaver Brook dam is required by the SEO to be sized for a flood with an inflow of 22,252 cfs and the spillway at that dam has a maximum capacity of 22,326 cfs. Because LBB dam has a larger drainage basin, the maximum design flood is 22,485 cfs at that dam. We are working with the SEO and our engineer, GEI Consultants, Inc. (GEI), to reduce the design flow as much as possible. We have also proposed to raise the height of the dam by adding a stub wall of concrete to the top of the dam that would allow the spillway to handle more water without significant modifications to the dam. The SEO will decide on the adequacy of this solution sometime in the spring of 2015. Therefore, at this time we do not know what remedial action the District will be required to take.

In addition, there are large cracks in the concrete surface of the LBB dam; these cracks are required to be repaired. These cracks will be relatively easy to repair. The cost for the repairs to the LBB dam could range from a few hundred thousand dollars to make necessary maintenance upgrades, expand the spillway, and raise the height of the dam to possibly as much as \$8-9 million to completely redesign and replace the dam. It is GEI's expectation is that the lower cost alternative will be determined to be adequate.

A number of smaller, less expensive repairs or modifications also will be completed. GEI is currently preparing an inundation map and study to define the area downstream of the dam that could be flooded by a dam failure. The goal of this current study is to avoid replacement of the dam. Based on the results of that study, the State Engineer will determine whether the dam can be safely repaired, or in the worst possible case, must be replaced. The District will let you know about the State Engineer's decision and potential fiscal impact soon after the issue is resolved.

LOWER BEAVER BROOK RESERVOIR

FACTS:

1 acre ft = 325,851 gal

1 cubic foot/sec = 448.83 gal/minute

Drainage Basin – 5,120 acres

Crest Width – 12 ft.

Crest Length - 224 ft.

Dam Height – 39 ft.

Year Constructed: 1903

Normal Storage Capacity – 30 acre ft.

Normal Pool Elevation – 7,837.7 ft.