

**SIGNAL BUTTE FRS
FCD GAGE ID #79507**

STATION DESCRIPTION

LOCATION – The dam site is situated about a ¼ mile north of Brown Road, between Signal Butte Road and Meridian Road in east Mesa. Latitude 33° 26' 25", Longitude 111° 35' 25". Located in the NW1/4 SE1/4 SW1/4 S12 T1N R7E, in the Apache Junction 7.5-minute quadrangle.

ESTABLISHMENT – November 10, 1987

DRAINAGE AREA – 16.77 mi² (includes area from Apache Junction FRS.)

GAGE – The gage is a pressure transducer type instrument. The instrument is located at the middle, gated culvert outlet. There is a second culvert outlet on the west side of the dam structure. The instrument at the middle outlet is at elevation -0.46 feet gage height and 1,687.084 feet NAVD88, levels of March 8, 2018.

There are staff gages at several locations along the dam. Staff gages are located at the west outlet, the middle outlet, and at the emergency spillway.

The west outlet staff gages are set to read in feet above that outlet's inlet elevation. Zero on these gages is at 1,702.96 feet NAVD88, levels of March 8, 2018.

The 7 staff gages at the middle outlet are in feet gage height above the lip of the inlet of the middle outlet. The lower staff gages read closes to gage height (within 0.1 feet), and the upper staff gages read within 0.25 feet.

There is one staff gage in the emergency spillway, painted on the west wall. Zero on this gage is equal to the bottom of the spillway. Thus the gage reads depth in the spillway. Zero on the spillway staff gage is equivalent to 1,714.44 feet NAVD88, or 26.9 feet gage height, levels of February 10, 2015.

There are no crest gages at this location.

ZERO GAGE HEIGHT – Zero gage height is defined as the lip of the middle culvert invert. It is at elevation 1,687.539 feet NAVD88, levels of March 8, 2018.

HISTORY – None prior to installation in 1987. Current elevations are based on a 2015 level loop survey, and an update from a March 2018 brief level loop to determine the actual zero gage height based on direct survey of the invert lip of the middle culvert. The outlet gate at the middle outlet was replaced and re-worked in the spring of 2021.

REFERENCE MARKS –

RM-1, marked A-5, is a brass cap set in concrete, elevation 1,723.835 feet NAVD88. Gage height elevation is 36.296 feet, levels of March 8, 2018.

RM-2, marked A-6, is a brass cap set in concrete, elevation 1,723.830 feet NAVD88. Gage height elevation is 36.291 feet, levels of March 8, 2018.

RM-3, marked A-7 is a brass cap at Sta. 230+00, elevation 1,723.950 feet NAVD88. Gage height elevation is 36.411 feet gage height, levels of July 13, 2021.

RM-4, marked A-12, is a brass cap set in concrete, elevation 1,724.951 feet NAVD88. Gage height elevation is 37.412 feet, levels of March 8, 2018.

RM-5, marked A-10 is a brass cap set in concrete, elevation = 1,724.03 feet NAVD88, gage height = 36.50 feet, levels of March 18, 1997.

RM-6, marked B-7 is a brass cap in concrete on the downstream toe of the dam. It is at elevation 1,693.933 feet NAVD88. Gage height elevation is 6.394 feet gage height, levels of March 8, 2018.

RM-7, marked B-8 is a brass cap in concrete on the downstream toe of the dam. It is at elevation 1,694.017 feet NAVD88. Gage height elevation is 6.478 feet gage height, levels of March 8, 2018.

RP-1, marked as point 512, is a chiseled 'X' in the top of the concrete headwall at the west outlet on the downstream side of the dam. Elevation is 1,697.286 feet NAVD88, or 9.747 feet gage height, levels of March 8, 2018.

RP-2, marked as point 502, is a chiseled 'X' in the concrete of the right side of the emergency spillway. Elevation is 1,714.422 feet NAVD88, or 26.883 feet gage height, levels of March 8, 2018.

RP-3, marked as point 506, is a chiseled 'X' in the top of the concrete headwall at the middle outlet on the downstream side of the dam. Elevation is 1,684.190 feet NAVD88, or -3.349 feet gage height, levels of March 8, 2018.

RP-4 is the top of the headwall at the south (middle) outlet. It is at elevation 2.564 feet gage height and 1,690.103 feet NAVD88, levels of March 8, 2018.

RP-5 is was destroyed during the replacement of the middle outlet gate controls.

RP-6 is the bolt, painted white, on the right side of the inlet wingwall at the middle outlet. It is at elevation 1.540 feet gage height and 1,689.079 feet NAVD88, levels of July 13, 2021.

RP-7 is likely destroyed from the replacement of the middle outlet gate.

RP-8 is a chiseled 'X' at the top right side of the first concrete pad from the bottom of the middle outlet. It is at elevation 13.241 feet gage height and 1,700.780 feet NAVD88, levels of July 13, 2021.

RP-9 is a chiseled 'X' at the top right side of the fourth concrete pad from the bottom of the middle outlet. It is at elevation 24.617 feet gage height and 1,712.156 feet NAVD88, levels of July 13, 2021.

RP-10 is a chiseled 'X' on the pad to which the gate control at the middle outlet is anchored. It is at elevation 36.339 feet gage height and 1,723.878 feet NAVD88, levels of July 13, 2021.

RP-11 is a chiseled 'X' on the pad at the ALERT station tube at the middle outlet. It is at elevation 37.299 feet gage height and 1,724.838 feet NAVD88, levels of July 13, 2021.

CHANNEL AND CONTROL – A lower small gated outlet at 0.00 feet gage height is located at the middle of the structure, and a higher, ungated outlet at elevation 15.57 feet gage height controls flow out of the structure until the emergency spillway begins to flow at about 26.9 feet gage height. The lower outlets are culvert pipes and the emergency spillway exhibits the characteristics of weir flow.

PRINCIPAL OUTLETS / EMERGENCY SPILLWAY –

There are two principal outlets for discharges below the spillway. There is a culvert near the middle of the structure near station 230+00. The outlet is gated and is a one foot diameter concrete pipe, 200 feet in length. The elevation of the lip of the entrance is 0.000 feet gage height. The invert of the pipe is -1.35 feet gage height. The invert of the outlet is -5.45 feet gage height. The west outlet discharges directly to Signal Butte Floodway. This outlet is a three foot diameter concrete pipe, 155 feet in length. The entrance to this outlet in the outlet structure is at 15.566 feet gage height, and is ungated. The invert of the entrance is at 4.460 feet gage height from As-Builts. The invert of the outlet is 1.37 feet gage height. Gage heights are from a level survey of February 10, 2015.

The emergency spillway is located on the east side of the dam. The crest is 140 feet in length and has an elevation of 26.95 feet gage height at the center, levels of February 10, 2015. The spillway elevation will be reported as 26.9 feet gage height, or 1,714.44 feet NAVD88.

The top of the dam elevation is 35.86 feet gage height, or 1,723.40 feet NAVD88.

RATING – The current discharge rating is Rating #2 and is a combination of culvert flows for stages below 26.9 feet gage height, adding weir flow above 26.9 feet gage height. Culvert flows were developed using the FHWA HY-8 culvert analysis program. Spillway flows were modeled using the weir equation with weir coefficient of 2.9.

The current capacity rating is Rating #2 computed from DTM data from the FCD 93-51 contract.

DISCHARGE AND MEASUREMENTS – Culvert flow measurements could be made in the outlet channel to the west of the dam in Signal Butte Floodway or in the small wash downstream of the middle culvert.

POINT OF ZERO FLOW – The PZF at the middle outlet is 0.0 feet gage height. The PZF at the west principal outlet is 15.56 feet gage height. The PZF at the emergency spillway is 26.9 feet gage height.

FLOODS / SIGNIFICANT IMPOUNDMENTS – The largest event by volume occurred on September 9, 2014 at a stage of 13.40 feet with a volume of 333 acre-feet.

REGULATION – Apache Junction FRS regulates some of the inflows from the east. The Pass Mountain diversion structure to the north regulates inflows from the north and channels water into Signal Butte FRS.

DIVERSIONS – None known

ACCURACY – Fair to good

JUSTIFICATION – Monitor flows out from Signal Butte FRS and monitor for dam integrity.

UPDATED

January 17, 2024
DE Gardner