



A Tradition of Stewardship
A Commitment to Service

Department of Public Works

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Steven E. Lederer
Director

MEMORANDUM

To:	Steve Lederer, Director of Public Works Leigh Sears, Concessions Manager	From:	Chris Silke, Engineering Manager, P.E.
Date:	October 27, 2023	Re:	Steele Park Drainage Culvert Failure

On October 13, 2023 I met with Napa County Concessions Manager at Steele Park on the shores of Lake Berryessa to observe multiple failure locations of a culvert drainage system, perform a condition assessment of the pipe, recommend repair alternatives to restore flow passage and stabilize the inlet bank slopes from further loss of soils. The inlet debris settling pool and 36" galvanized drain pipe was constructed during the introductory 1960s Resort utility infrastructure buildout.

Figure 1 is a Locus Map of Steele Park showing the culvert drainage inspection points listed in the Site Key. The culvert inlet pool at Site Key A has sustained bank scour with several feet of tree and shrub root exposure. Annular space between the inlet corrugated vertical tee and horizontal pipe placed underneath the paved access drive is plugged with vegetative debris. Gravel has infilled approximately half of the 36 inch culvert pipe due to slow entry velocities. The Resort Park Manager reported seeing the culvert surcharged at the inlet with water flowing over the access road during moderate to major AR storm events in 2023. An 8 foot diameter by 12 foot deep sinkhole has emerged at Site Key B due to the pipe collapsing from corrosion. A photo of the storm drain outfall in Site Key C illustrates the extent to which the corrugated metal pipe properties have deteriorated within the wetted perimeter. Uniformity of iron corrosion on the pipe interior is indicative of lake level at full pond elevation (440 ft) and prolonged submergence.

Three Napa County General Sitework Contractors were contacted to request informal bid proposals for three (3) scope of work options described below. Two of which declined to submit a bid proposal as they are unable to commit labor and equipment within the necessary November 2023 construction timeframe ahead of a significant runoff rainstorm. Eakle Trucking and Construction was the Sole Bidder for all three culvert and inlet repair or full replacement options.

Option No. 1 – Excavate and expose the collapsed sinkhole pipe section. Inspect the upstream and downstream pipe interior with Closed Circuit TV equipment. Hydrojet the sinkhole to outfall pipe segment of discharge obstructions. Replace 20 foot section of 36" diameter corrugated metal pipe. Cast concrete collars on each intertie to existing pipe. Backfill and compact excavated soil material. Pull existing vertical culvert pipe, handwork to clean gravel and debris accumulation within the horizontal pipe entry. Reshape geometry of inlet pool banks to be slope compatible for geofabric placement and rip rap armoring. Estimated construction cost - \$81,405.

Option No. 2 – Excavate and replace 200 feet of 36" diameter corrugated metal pipe from the sinkhole to inlet. Cast a concrete collar on the intertie to existing pipe. Backfill and compact excavated

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soil material. Reshape geometry of inlet pool banks to be slope compatible for geofabric placement and rip rap armoring. Estimated construction cost - \$119,014.

Option No. 3 – Excavate and replace 400 feet of 36" diameter corrugated metal pipe from the outfall to inlet. Backfill and compact excavated soil material. Reshape geometry of inlet pool banks to be slope compatible for geofabric placement and rip rap armoring. Estimated construction cost - \$209,456.

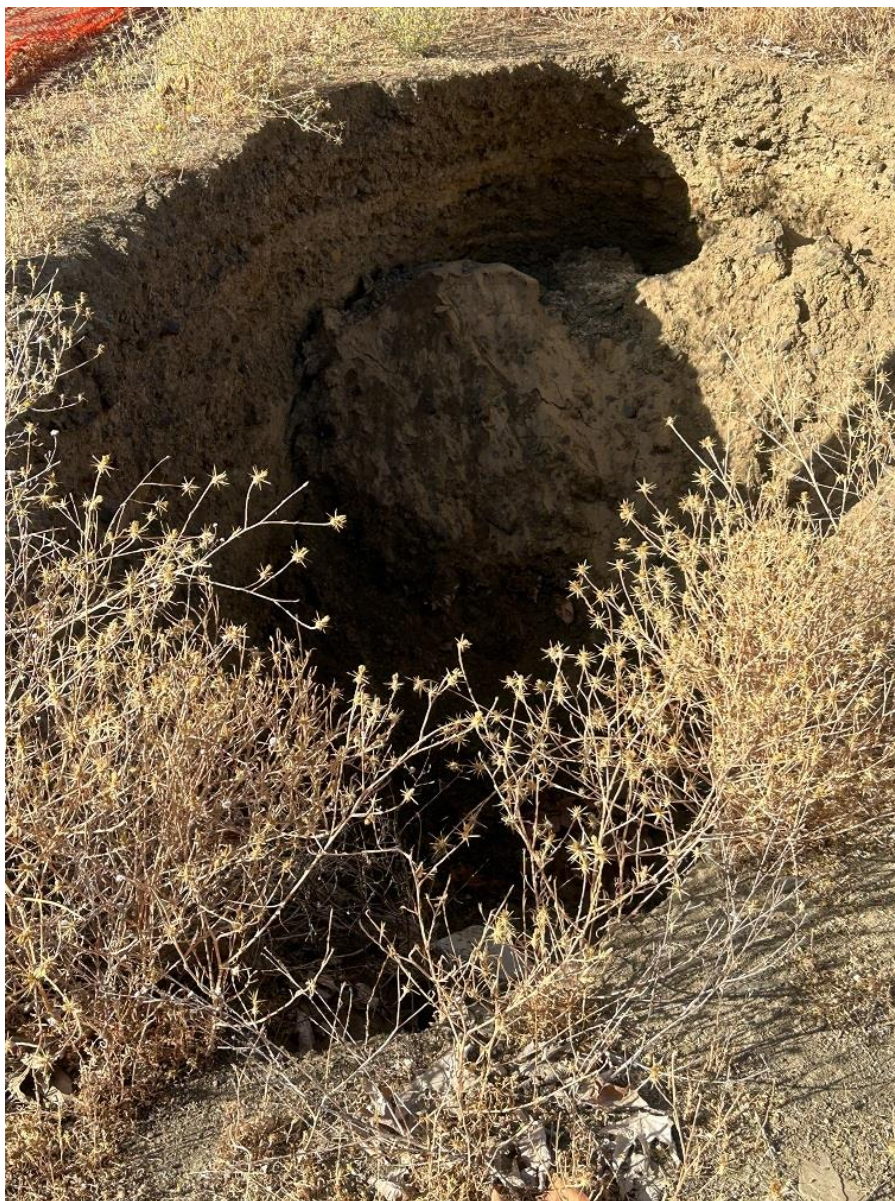
Option No. 2 is recommended to rehabilitate the drainage facility addressing the immediate safety and economic loss risks.



Figure 1 – Steele Park Drainage Assessment Map



Site Key A – Culvert Inlet Pool



Site Key B – Sinkhole



Site Key C – Outfall