Culvert Design Exceptions Report

Date:	January 16, 2026
Project Name:	BAND 266697 - Underground Utilities Rehabilitation
Contract No:	140P2023D0006
Task Order No:	140P2023F0277
Jacobs Project No:	D3167658
Client:	National Park Service, Denver Service Center
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1.1 Executive Summary

Within Bandelier National Monument there is an existing corrugated metal pipe (CMP) culvert underneath Route 0010 Entrance Road with historic stone headwalls on both the inlet and outlet. The culvert is located near the Visitors Center, and the inlet is buried over 6′ below the existing ground level. The repair design of this culvert inlet was included in the BAND 266697 project within Contract Modification 7.

Throughout the design development multiple concepts for the repairs were investigated, but ultimately the National Park Service (NPS) selected a design concept that uncovered the existing culvert inlet and the allows the historic stone headwall to remain in place. This necessitated regrading a roadside ditch and the surrounding drainage basin, back to what is presumed to be the original design conditions, to direct flows to the culvert inlet. The proximity of the headwall to the existing edge of pavement, combined with the elevation drop to the invert, results in roadside cut slopes steeper than a 2H:1V ratio. It was discussed with the NPS and acknowledged that these slopes do not meet current clear zone design standards as defined by the AASHTO Guidelines for Geometric Design of Low-Volume Roads 2019. The existing roadway width is approximately 22 feet (two 10-foot lanes and two 1-foot unmarked shoulders), which is substandard according to NPS Park Road Standards (requiring two 10-foot lanes and two 3-foot shoulders) and not providing adequate shoulder width. Additionally, a mature Ponderosa pine tree with a 24″ DBH is located near the headwall and contributes to the roadside hazard.

The purpose of This report is to document the identified risks, the mitigation measures, and the formal acceptance of these conditions.

Functional classification of the road:

NPS: Class I Principal Park Road
AASHTO: Recreational Road (Primary Access Road)
Posted speed limit: 25 mph
Estimated ADT Number:

	Year	Entrance Station Visitation (Traffic)	ADT Average
Actual (from NPS IRMA)	2011	78,762	
Current *	2026	91,440	250
Design *	2046	111,574	306

*assumed growth factor 1% (based on visitor counts from 2011 to 2024)

Note: In 2012 the park stopped doing traffic counts at the main entrance station. A bus shuttle system currently operates from May – October which is when 60% of the annual visitation occurs. The ADT shown is a conservative number based on if the shuttle system is not in operation in the future.

Design Standards: AASHTO Guidelines for Geometric Design of Low-Volume Roads 2019 and Park Road Standards 1984

Design Criteria	Standard	As Designed	Exception
Clear Zone	6 ft (AASHTO GDLVR 2019 p.4-35)	3 ft	Yes

Reasons for exception to standards: NPS requested uncovering the silted in culvert invert and restoration of the existing historic stone headwall.

Analysis of risks: Risk associated with this design exception is determined to be low considering the lower vehicle speeds, low traffic volumes and the lack of accident history. The existing roadway has a similar cross section on the other side of the road and there are no records of significant run-off-the-road crash history.

Design features discussed to mitigate exception: Installation of drop inlet with flatter design slopes, reduced speed limit signs, guardrail, curb, and added edge stripe.

The exception to the design standards as noted and their related risk have been reviewed by NPS and are considered acceptable for this project.

1.2 Acknowledgment of Design Exceptions

PREPARED BY:

03/09/2026

Lead Designer, Jacobs Engineering Group, Inc — Date

APPROVAL IS RECOMMENDED:

James Mills Digitally signed by James Mills DN: cn=James Mills, c=US, o=Unaffiliated Date: 2026.03.09 14:15:05 -06'00'

03/09/2026

Project Engineer, Jacobs Engineering, Inc — Date

03/09/2026

Project Manager, Jacobs Engineering, Inc — Date

Digitally signed by PATRICK SUDDATH Date: 2026.03.06 09:07:52 -07'00'

Superintendent, NPS – Bandelier National Monument — Date

THE ABOVE RECOMMENDATIONS ARE APPROVED:

KRIS NESET Digitally signed by KRIS NESET Date: 2026.03.09 06:36:52 -06'00'

Project Manager, NPS - Denver Service Center — Date