

**DRAFT - TRAFFIC DESIGN MEMORANDUM
PROJECT 23558/23559
I-15-AO: US 24
TELLER COUNTY, COLORADO**

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Prepared for:



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Project Description

The CDOT Region 2 Bridge Bundle Design Build Project consists of the replacement of a total of nineteen (19) structures bundled together as a single project. These structures are rural bridges on essential highway corridors (US 350, US 24, CO 239 and CO 9) in southeastern and central Colorado. These key corridors provide rural mobility, intra- and interstate commerce, movement of agricultural products and supplies, and access to tourist destinations. The design build project consists of seventeen (17) bridges and two (2) Additionally Requested Elements (AREs) structures.

The fourteen (14) of the structures in this design build project are jointly funded by the USDOT FHWA Competitive Highway Bridge Program grant and the Colorado Bridge Enterprise (Project No. 23558). The remaining five (5) structures are funded solely by the Colorado Bridge Enterprise (Project No. 23559). These projects are combined to form one design-build project. The two ARE structures are part of the five bridges funded by the Colorado Bridge Enterprise.

The nineteen bridges identified to be included in the ‘Region 2 Bridge Bundle’ were selected based on similarities in the bridge conditions, risk factors, site characteristics, and probable replacement type, with the goal of achieving economy of scale. Seventeen of the bridges being replaced are at least 80 years old. Five of the bridges are Load Restricted, limiting trucking routes through major sections of the US 24 and US 350 corridors. The bundle is comprised of nine timber bridges, four concrete box culverts, one corrugated metal pipe (CMP), four concrete I-beam bridges, and one I-beam bridge with corrugated metal deck.

Project Site

Structure I-15-AO is at US 24 milepost 271.900 in Teller County, Colorado, and crosses a seasonal wash. Categorized as a R-A Rural Highway in the CDOT State Highway Access Code, US 24 traverses mountainous terrain with a 50 mph posted speed limit. In the area of the structure, the highway is approximately 31 feet wide, with two 12-foot lanes and no separation of opposing traffic. **Figure 1** shows the project area. Peaceful Grove, a County dirt road intersects US 24, 75 feet west of the structure. On the southside of US 24 Twin Creek flows parallel to US 24. US 24 is constructed on a bench with a rock cut on the north side as you approach the structure from the east.

Traffic Data

This segment of US 24 has a 2020 Annual Average Daily Traffic (AADT) of 5,700 vehicles per day, and a projected 2040 AADT of 7,079 vehicles per day, according to CDOT’s Online Transportation Information Systems (OTIS). Of these daily traffic volumes, 5.1% are heavy vehicles. This roadway has the capacity to accommodate 2,250 vehicles every hour, resulting in a volume to capacity ratio of 0.46. In the year 2040, the volume to capacity ratio results in 0.56.

A total of 17 crashes were recorded in the vicinity of the structure location (mileposts 271.12 to 272.47) between January 1, 2015 and December 31, 2019. Three crashes occurred at the structure itself during this time, one head on, one sideswipe of vehicles traveling in the opposite direction, and one vehicle involving a parked vehicle. Drugs were suspected for one of these crashes while no impairment was suspected for the other two. There does not appear to be any pattern of crash type, contributing factors, or impairment of drivers. The lack of any crash related pattern results in no specific modified design features.

Construction Phasing Alternatives

Three construction phasing alternatives have been identified to complete the construction of the proposed replacement structure.



Figure 1: Vicinity Map

Complete Closure with Detour Route

The grant application states that the roadway should not be closed during construction due to the lengths of the detour routes. A complete closure of this structure location is not practical as there is no ideal detour route to maintain traffic operations.

Single Lane – Two Way Traffic Operations

Phasing the construction to accommodate a single lane of traffic operations along the route at all times appears to be feasible at this structure location. CDOT's Region 2 Lane Closure Strategy allows for a single lane closure at all hours of the day at this structure location, so long as the lane closure does not exceed $\frac{1}{4}$ mile. Structure I-15-AO is currently a two-cell concrete box culvert. Preliminary structural and hydraulic analysis have determined that this structure may be replaced with a similar two-cell box culvert. In Phase 1, traffic will be placed on the southbound lane. Construction will include the proposed northbound lane and eastern half of the box culvert. During Phase 2, traffic will be placed on the new northbound lane, to accommodate the construction of the southbound lane, the western half of the box culvert, and the western retaining wall. **Figure 2** illustrates the phasing suggested to accommodate the alternative. Note the typical sections are oriented facing south. By accommodating traffic operations in the current alignment, two-way traffic would utilize a single lane, likely by use of temporary traffic signals. Standards and guidance from Typical Application 12 of the Manual on Uniform Traffic Control Devices shall be followed. The use of temporary traffic signals must follow the 630 Traffic Signal (Portable) special provision. Preliminary traffic analysis indicates an acceptable level of service (LOS) of less than 55 seconds

of delay (LOS D or better) on average, given the roadway traffic volumes, length between traffic signals, and speed limit. An acceptable level of service indicates the use of this alternative as feasible.

For the preliminary evaluation we are assuming the following variables: 1000-foot maximum distance between stop bars, speed limit of 40 mph, and a timing plan that uses a 45 second all red and enough green in each direction to clear the queue each cycle. The timing plan we are using for the evaluation is conservative to evaluate the worst-case scenario. The Contractor will be required to submit a traffic control plan to CDOT with a proposed timing plan for evaluation before implementation.

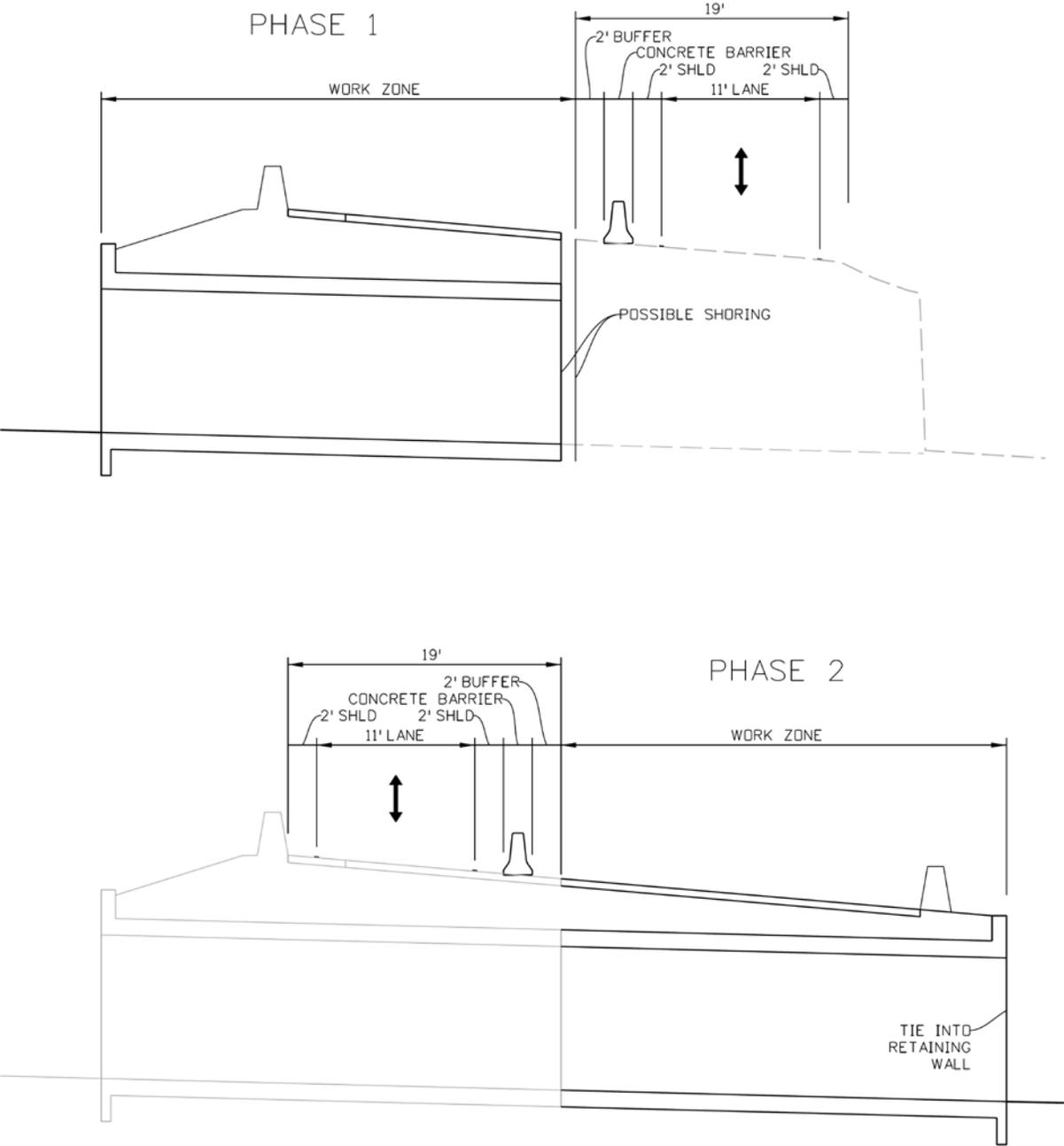


Figure 2: Single Lane – Two Way Phasing

Shoofly

A shoofly alternative was evaluated at this structure location. Given the mountainous terrain, limited right-of-way, and existing roadway geometrics, a shoofly is not practical at this structure location. Conflicts occur on both sides of the roadway. Construction of a shoofly on the south side of US 24 would have major environmental impacts to Twin Creek.

Conclusion:

The recommended traffic control at this structure location, is a single lane, two-way operation. Neither a detour route nor a shoofly is practical at this location. Geographical constraints eliminate a practical detour route, as well as opportunities to route traffic around the structure construction. Traffic operations shall be coordinated between structure locations I-15-T and I-15-AO. These structure locations are separate enough to warrant independent traffic control, yet close enough together that traffic operations of one site will likely influence the operations of the other site. Therefore, the construction phasing of both sites shall be coordinated to accommodate traffic in the most effective manner.