

**TRAFFIC DESIGN MEMORANDUM
PROJECT 23558/23559
H-13-N: US 24
PARK 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 H-13-N is at US 24 milepost 240.686 in Park County, Colorado, and crosses the middle fork of the South Platte River. Categorized as a R-A Rural Highway in the CDOT State Highway Access Code, US 24 traverses rolling terrain with a 65 mph posted speed limit. In the area of the structure, the highway is approximately 28 feet wide, with two 12-foot lanes and no separation of opposing traffic. **Figure 1** shows the project area.

Traffic Data

This segment of US 24 has a 2020 Annual Average Daily Traffic (AADT) of 3,300 vehicles per day, and a projected 2040 AADT of 4,026 vehicles per day, according to CDOT's Online Transportation Information Systems (OTIS). Of these daily traffic volumes, 6.8% are heavy vehicles. This roadway has the capacity to accommodate 2,350 vehicles every hour, resulting in a volume to capacity ratio of 0.24. In the year 2040, the volume to capacity ratio results in 0.29.

A total of three crashes were recorded in the vicinity of the structure location (mileposts 240.12 to 241.26) between January 1, 2015 and December 31, 2019. One crash occurred at the structure itself, a collision with the guard rail. Alcohol was recorded as to being a contributing factor. There does not appear to be any pattern of crash type. 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.

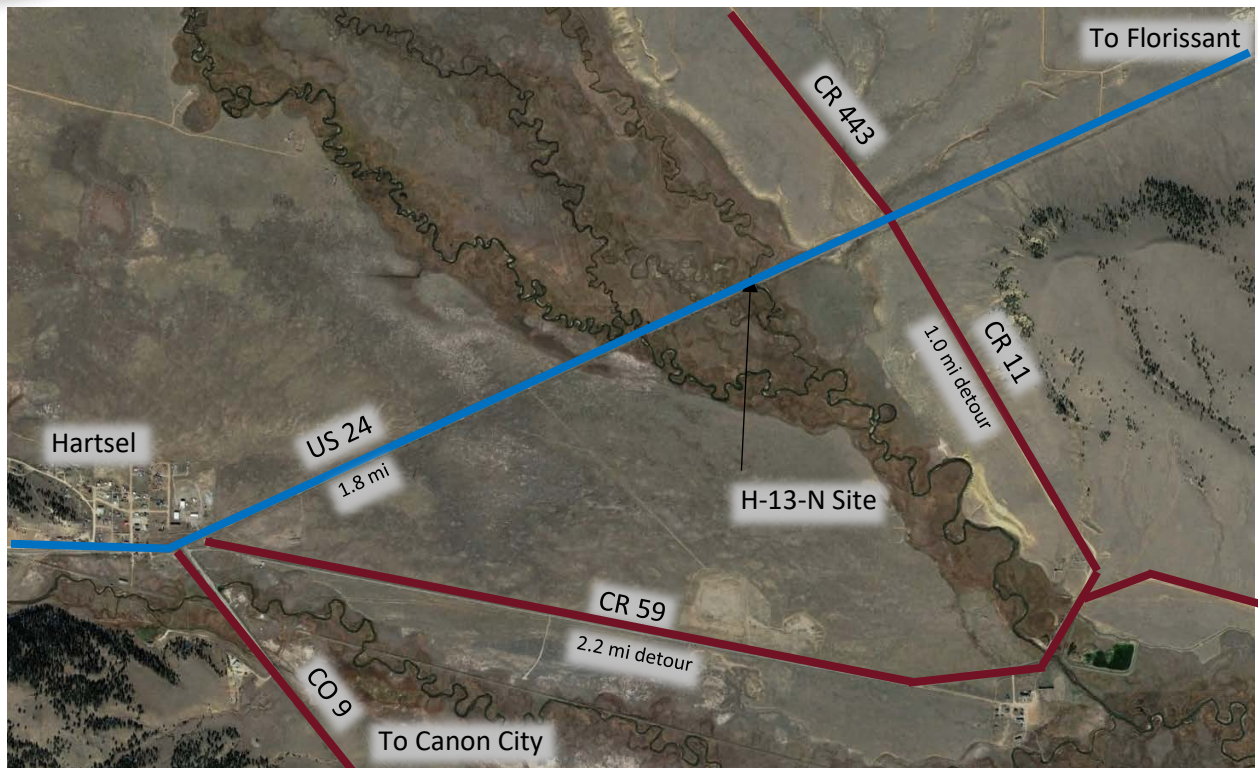


Figure 1: Vicinity Map

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. If a complete closure were allowed, this could be accommodated by utilizing County Roads 59 and 11 as a detour route. Utilizing this detour route will add approximately 5 minutes (1.5 miles of out of direction travel) to the average trip between Hartsel and communities east along US 24 to Colorado Springs. Note, an agreement must be in place with Park County for the use of their roads.

Single Lane – Two Way Traffic Operations

Phasing the construction to accommodate a single lane of traffic operations along the route at all times should be studied further by a structural engineer retained by the Contractor. Preliminary structural analysis has determined that a phased approach to construction should be avoided out of concern for the structural integrity and maintaining traffic operations on the manipulated bridge.

Shoofly

A shoofly has been evaluated at this structure location. With limited right-of-way to both the north and south, a two-lane shoofly cannot be accommodated without right-of-way acquisition or temporary easements set in place. A single lane, two-way operation may fit within the right-of-way without need for acquisition.

The use of a one-way shoofly will also minimize the impacts to the wetlands and will utilize a temporary drainage pipe during construction. One lane, two-way operations on the shoofly will likely require temporary traffic signals for all hours of the day while the shoofly is in operation. 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. **Figure 2** illustrates the shoofly typical section, and **Figure 3** found at the end of the memorandum illustrates the shoofly plan.

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.

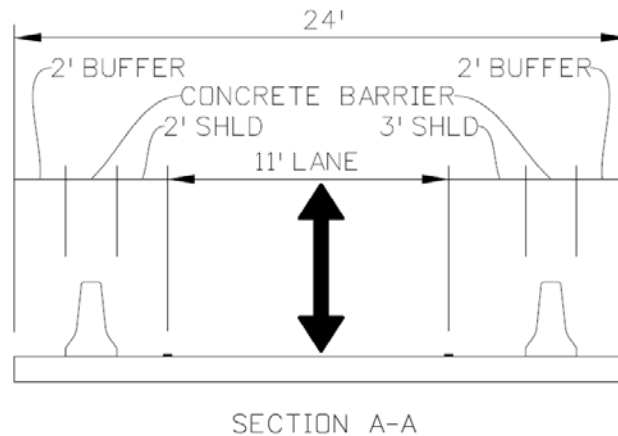


Figure 2: Shoofly Typical Section

Conclusion:

The recommended traffic control at this structure location, is a shoofly operation. An area detour route may be considered, however, agreements and improvements to the detour route would need to be in place with Park County. In addition, preliminary analysis indicates traffic operations should not be maintained on a manipulated timber structure being deconstructed, without further analysis by the Contractor. Consequently, the preferred handling of traffic is recommended by way of a one-lane shoofly.

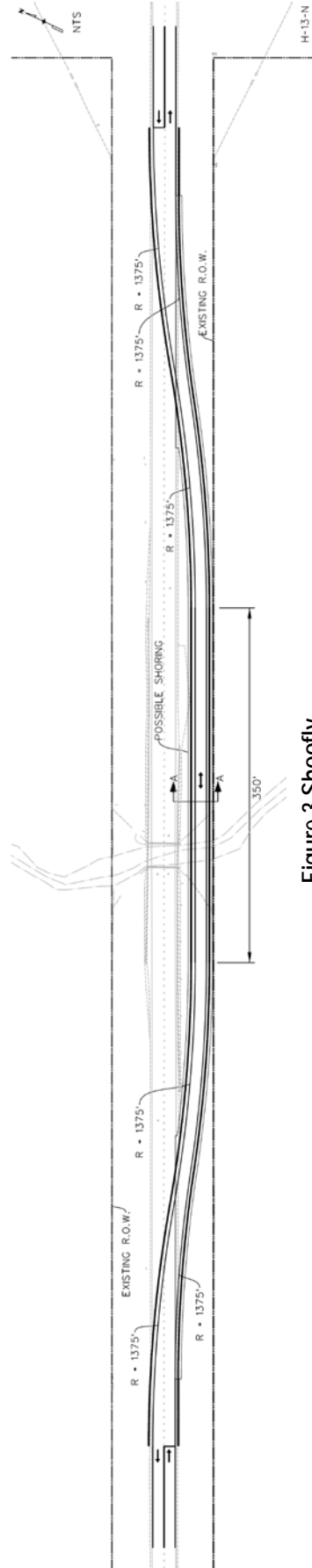


Figure 3 Shoofly