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DRAFT - TRAFFIC DESIGN MEMORANDUM
PROJECT 23558/23559
G-12-C: CO 9
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 G-12-C is at CO 9 milepost 71.445 in Park County, Colorado, and crosses the Middle Fork of the South Platte River. The Structure is located 0.8 miles north of the Town of Alma Colorado. CO 9 services as a southern access to the Breckenridge and Summit County ski area, and is an alternative to I-70. An environmental study was conducted at this structure. There are wetlands located on each side of the roadway, up and down stream of the crossing. These wetlands should be avoided if possible.

Categorized as a R-A Rural Highway in the CDOT State Highway Access Code, CO 9 traverses mountainous terrain with a 50 mph posted speed limit. In the area of the structure, the highway is approximately 37 feet wide, with two 11-foot lanes and no separation of opposing traffic. **Figure 1** shows the project area.

Traffic Data

This segment of CO 9 has a 2020 Annual Average Daily Traffic (AADT) of 6,250 vehicles per day, and a projected 2040 AADT of 6,500 vehicles per day, according to CDOT's MS2 Information Database. Of these daily traffic volumes, 3.2% are heavy vehicles. This roadway has the capacity to accommodate 1,450 vehicles every hour, resulting in a volume to capacity ratio of 0.43. In the year 2040, the volume to capacity ratio results in 0.45.

A total of nine crashes were recorded in the vicinity of the structure location (mileposts 70.88 to 72.02) between January 1, 2015 and December 31, 2019. Two crashes occurred at the structure itself, both overturning. In one of these instances, alcohol was reported to be involved. 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.

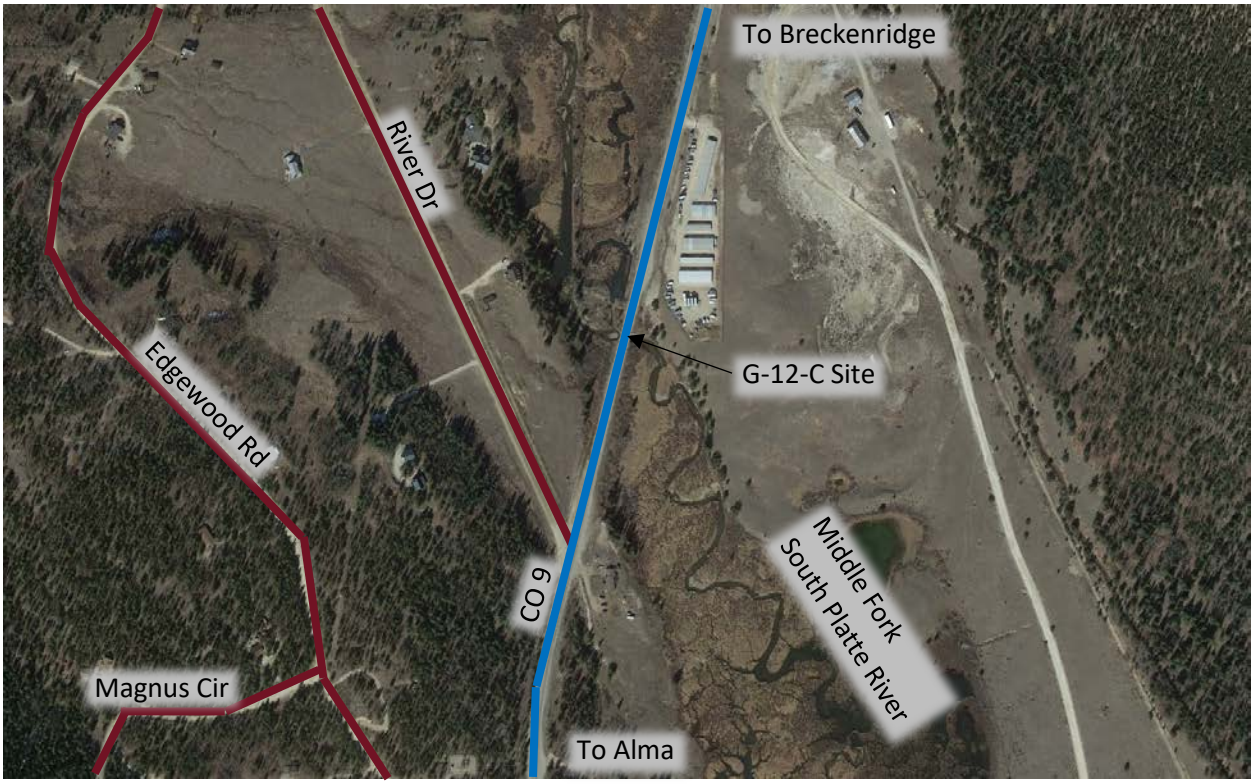

Figure 1: Vicinity Map

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 ¼ mile. Structure G-12-C is currently a two-lane concrete box culvert. Preliminary structural and hydraulic analysis have determined that this structure may be replaced with a box culvert or an arch structure. In Phase 1, retaining walls, temporary railing, and temporary pavement will be constructed along the west side of the roadway. Traffic will utilize the existing northbound lane for two-way operations. The temporary treatments will be necessary to accommodate Phase 2 construction. During Phase 2, traffic would be placed on the temporarily widened southbound lane. Construction will include the proposed northbound lane and eastern half of the box culvert. Phase 3 will switch the traffic back to the northbound half of the road to accommodate the proposed southbound lane and western half of the box culvert. **Figure 2** illustrates the phasing suggested to accommodate the alternative. 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.

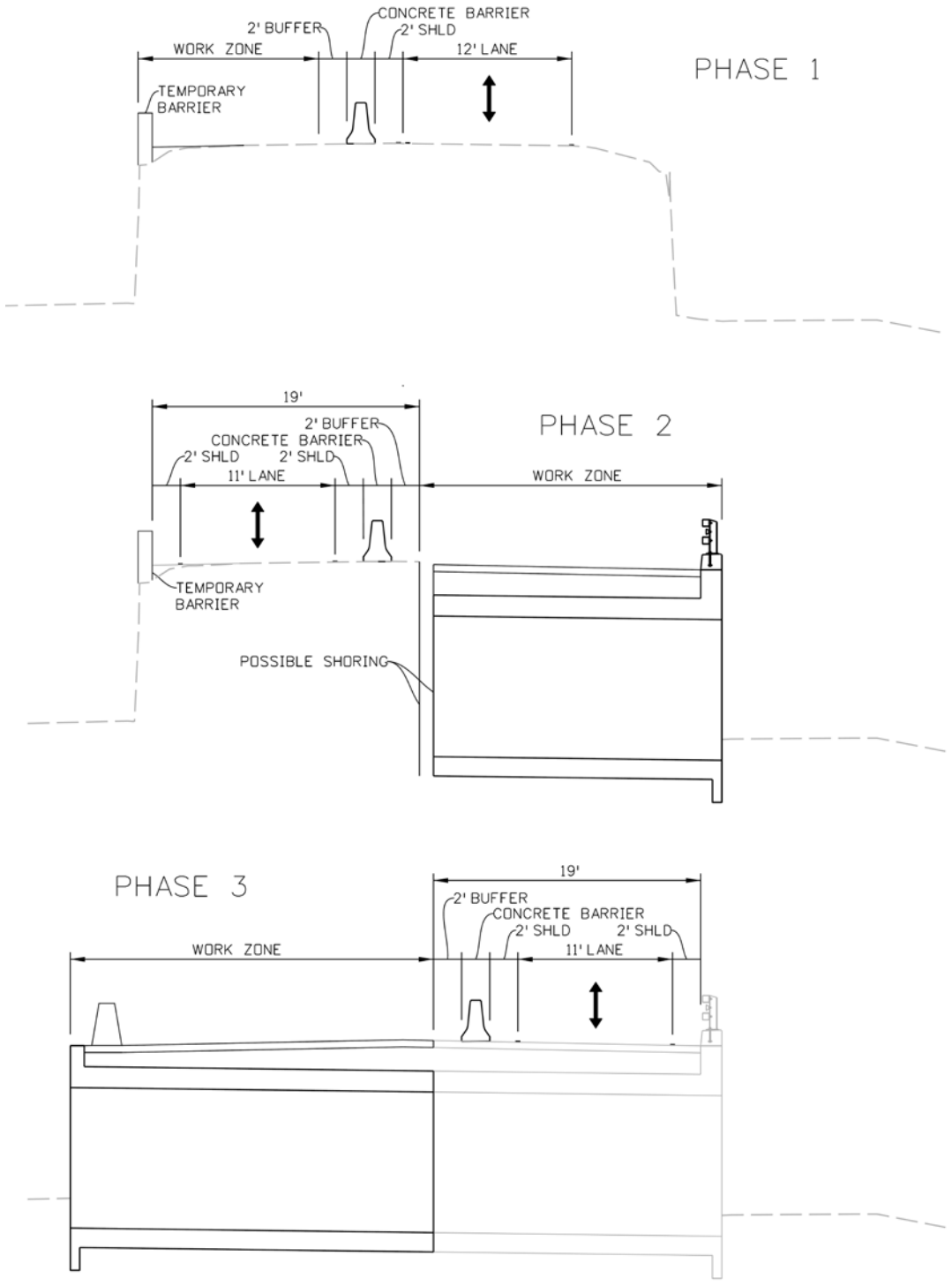

Figure 2: Single Lane – Two Way Phasing

Shoofly

A shoofly alternative was evaluated at this structure location. Given the mountainous terrain, the presence of wetlands along the roadway, and limited right-of-way, a shoofly is not practical at this structure location. Conflicts occur on both sides of the roadway.

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.