



# CITY OF GILLETTE

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## MEMORANDUM

TO: Ry Muzzarelli, P.E., Development Services Director

CC: Steven L. Peterson, P.E., Capital Projects Coordinator

FROM: Todd Merchen, Sr. Civil Engineer

RE: Council Consideration for the Acceptance of Public Improvements for the Gurley Overpass Deck Rehabilitation Project, Installed by S&S Builders, in the Amount of \$1,576,204.07.

### Scope of Work

This scope of work is similar to the work done in 1999 and 2010 on the deck with the addition of the epoxy overlay.

The unsound and delaminated concrete in the deck was removed, the corroded reinforcement bar was sand blasted, and a new silica fume overlay was placed. After the silica fume was cured adequately, an epoxy overlay was placed. The epoxy overlay adds water resistance, strength, and higher friction wear surface to the deck.

While the overpass was closed, broken concrete paving in the intersection of 4th Street and Gurley Avenue were replaced.

### History

The Overpass was constructed in 1982 to provide an additional separated grade crossing of the Burling Northern Railroad. Burling Northern provided some financial support of the project. There were issues with the expansion device at the center of the overpass early in the structures life. In 1999, the expansion device and the gap between the north and south halves of the overpass had closed and the deck was trimmed, the expansion device replaced, and the deck was resurfaced with a silica fume overlay. Also in 1999 Consolidated Engineers completed a thorough structural condition survey of the overpass, including documentation of pack rust at splice joints and inspection of the bearing devices. By 2010, the expansion device had failed again, the north abutment was leaning, and the bearing devices anchoring the deck to the north abutment were pulling out. It was determined that the bearing devices that support the bridge on each pier were seized and not allowing the structure to retract as expansion and contraction occurred with changes in temperature. Spalled concrete was also present in the deck. In 2010, the rehabilitation work included structural repair and tying back the north abutment with grouted soil anchors, replacing the bearings on the north half of the deck, a new expansion device of an updated design at mid deck, removal of unsound deck

concrete, a new silica fume overlay, sandblasting the barriers, and a new coating on the barriers. In 2013, a “healer/sealer” methacrylate designed to re-bond and seal shrinkage cracks and cracking in the deck was applied for water resistance. In 2017, the barriers were refurbished. The barriers were sand blasted, unsound concrete was removed, the barriers resurfaced with a polymer concrete, and a water repellant was applied. This method was chosen so that spot repairs can be made as distress manifests itself. It is anticipated that the length of closure to perform such repairs may be more frequent but each repair will be much shorter.

### Structural Evaluation and Development of Scope

Structural Dynamics performed a thorough evaluation of the deck condition, sounding (chaining) the entire deck for delaminated concrete. During this process, a deck spall developed on the north span, indicating the delamination of the deck concrete was ongoing and beginning to propagate to the surface. The deck was cored at 10 representative locations to gain an understanding of the depth of the delaminated concrete. Additionally, Structural Dynamics investigated Department of Transportation statistics to help refine estimates of the proportion of deep repairs vs shallow repairs. This information was used to develop the quantities for the bidding document.

Wyoming Department of Transportation specifications and bid items were used in the bid documents.

### Additional Damage

The extent and depth of damaged concrete was substantially more than estimated. The initial area of unsound concrete was estimated to be approximately 14% of the deck surface. The actual extent of unsound concrete involved nearly 40% of the deck surface. Additionally, the pay item for unsound concrete deeper than 1/2 the deck thickness exceeded the original estimate by nearly 10 fold. The corresponding volume also caused the volume of silica fume placed to nearly double.

The sounding and coring that was performed to map the extent and depth of damage prior to the work provided to be inadequate to accurately determine the actual extent and depth of the damage. The proportions of deep removals to shallow removals exceeded averages available from WyDOT. The age of this structure and the rate of progression of damage may be factors in the misinterpretation of the extent of the damage.

### Actual Cost VS Budget

The original contract amount for this project was \$913,121.20. Total change order additions of \$663,082.87, primarily for the overrun in damaged concrete removals and corresponding quantity of silica fume, resulted in a final cost of \$1,576,204.07.

Thirty one (31) additional working were added to the schedule due to the additional repair quantities.