

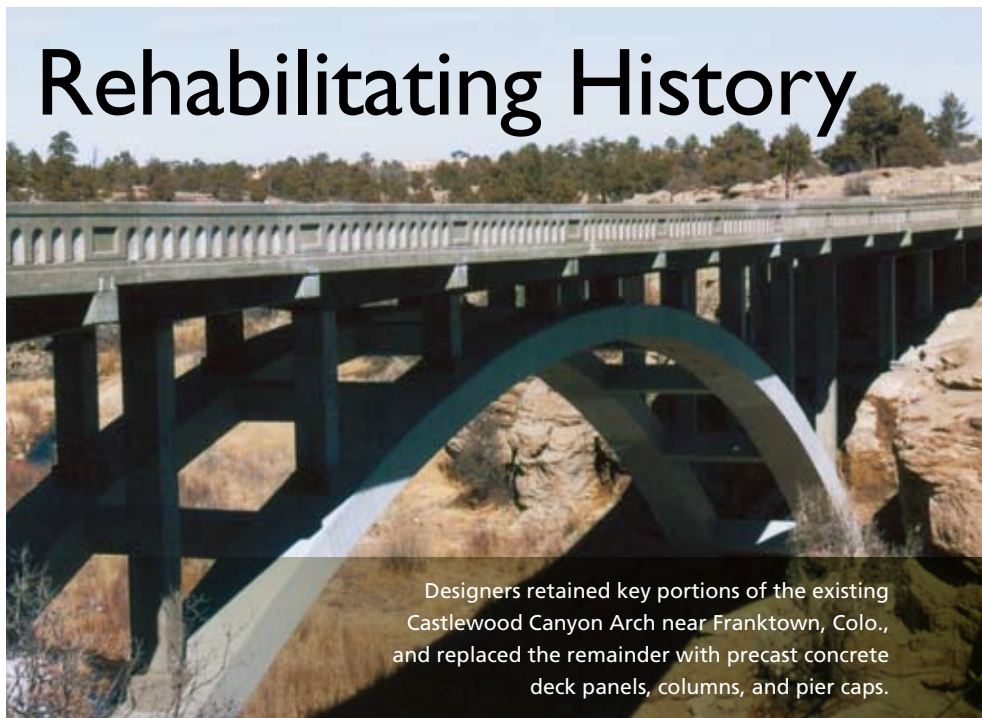
Precast concrete upgrade retains original arch on historic Colorado design

Designers on the Castlewood Canyon Arch Bridge near Franktown, Colorado, faced a number of challenges when they decided to replace the 446-ft-long 1940s-era bridge. By upgrading the structure with precast concrete deck panels, columns, and pier caps, while retaining key elements of the original design, a multitude of goals were accomplished.

In designing the new structure, officials at the Colorado Department of Transportation wanted to preserve as much of the existing structure as possible while improving safety, increasing the structural capacity, and widening its lanes. The structure also had to be environmentally friendly, aesthetically pleasing, and historically considerate to the previous design.



Precast concrete components of various sizes were installed due to their ease of use and rapid construction.



Designers retained key portions of the existing Castlewood Canyon Arch near Franktown, Colo., and replaced the remainder with precast concrete deck panels, columns, and pier caps.

Their design retained the bridge's arch ribs and part of the south abutment as well as the spread footings on the north side due to their historical value. The rest of the bridge was replaced with precast, prestressed components to create a 15-span, 404.5-ft-long structure.

Construction was accomplished by working from above to avoid harming the environment, with components removed and replaced from the center outward, balancing loads as two crews worked toward the abutments.

The design allowed for longitudinal and lateral connection of the deck-girder members, which function as the new deck. Connections between other precast and between precast and cast-in-place

were made with NMB splice-sleeves. The arched ribs were encased in wraps made of carbon-fiber reinforced polymer. Carbon-fiber plastic reinforcement strengthened the connections between the arch ribs and the foundation.

The aesthetics of the original bridge were retained in replacement components, such as the Colorado Type-7 rails with indentation on the exterior side, resembling the original rail. To ensure smooth progress on the arch's reconstruction, the design engineer remained on site throughout construction.

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profile

CASTLEWOOD CANYON ARCH BRIDGE / FRANKTOWN, COLORADO

ENGINEER: Colorado Department of Transportation, Denver.

OWNER: Colorado Department of Transportation, Denver.

GENERAL CONTRACTOR: Kiewit Western, Littleton, Colo.

PRECASTER: Plum Creek Structures, Littleton, Colo., a PCI-Certified Producer

SPLICE SLEEVE SUPPLIER: Splice Sleeve North America, Inc., Ontario, Calif.

BRIDGE DESCRIPTION: Precast concrete replacement bridge, retaining key original components

STRUCTURAL COMPONENTS: 15 spans of precast concrete deck panels, precast columns and pier caps, carbon fiber plastic reinforcement, and carbon fiber polymer wrap

BRIDGE CONSTRUCTION COST: \$3.2 million