

## **Alternative Bridge Prequalification Proposed Process**

CDOT is proposing to have a mandatory submittal for the alternative bridge prior to opening the project to advertisement. The initial bridge submittal would just need to meet some preliminary criteria for aesthetics, pier locations, and clearance requirements.

The purpose of this would be to ensure that the consultants preparing to submit an alternate bridge design with a contractor would have some idea if their idea is acceptable from a big picture standpoint. This way they would not spend extensive time and money in preparing a full bid package and not have CDOT agree to some basic aesthetic concepts. CDOT doesn't clearly stipulate what we are looking for in aesthetics because we'd like to leave some options available. The design charette for the 4<sup>th</sup> street bridge is included so they can get an idea of what was presented and what was liked.

Before an alternate bridge design could be submitted for the formal advertisement, we'd have a shortened period of 3 weeks to prepare the conceptual alternative bridge design.

The Proposed prequalification requirements would be a portion of the ultimate alternative bridge specification but would just include the following:

*Initial Design Submittal.* Contractors who elect to submit a bid for the alternative bridge shall provide an Initial Design Submittal which consists of a minimum of three (3) 11"x17" plan sheets illustrating to the Department the structure type, typical superstructure section, elevation and section of the typical pier, pier locations and span arrangement of the proposed alternative bridge design. The Initial Design Submittal shall be submitted to the Award Officer in a sealed envelope addressed to the Engineer, along with the Contractor's bid proposal.

*Preliminary Design Approval.* CDOT will notify the contractor of the approval or rejection of the preliminary design within 7 calendar days. If CDOT requests additional information regarding the alternative bridge and/or the alternative design, the approval time period, may be extended at the discretion of CDOT.

*Explanation of Design.* The submittal shall include discussion on how the proposed bridge meets the intent of the aesthetic requirement including how it ties into the Design Charette for the 4<sup>th</sup> street bridge. It should include intent for color of the bridge and any other explanation that may be needed to show that requirements specified are met.

(1) *Minimum Design Requirements.* The alternative bridge design shall, at a minimum, comply with the following design requirements and criteria:

1. Maintain aesthetic intent of the bridge for the motoring public and pedestrians on top of the bridge. The aesthetics for the superstructure and piers should be considered to fit within the environment and be aesthetically pleasing but do not need to match the intent of the default bridge. The theme for the bridge

should match one of the following as presented in the design charette for the bridge: Natural, contemporary, and historic to Pueblo.

2. Stepped piers will not be allowed. The depth of the girders on each side of a pier shall be the same. Girders shall be continuous from Abutment 1 to Abutment 6. Superstructure depth may vary along length of bridge, but any transitions between one section to another shall be curvilinear and similar in type to superstructure depth transitions of the default design.
3. Use a consistent material type, either steel or concrete, for the all the spans. A mixture of precast and cast-in-place concrete is allowable.
4. Horizontal and vertical alignment, and cross slope of the roadway surface finished grade shall be the same as the default bridge. Minor adjustments may be considered to accommodate the new bridge type assuming that the changes meet all the other requirements included in this special provision including no additional ROW with the same or flatter slopes and the changes in alignment are not more than 3' from the original profile. Any earthwork calculations or other re-engineering will be the sole responsibility of the Contractor's engineer at no additional cost to the project.
5. The superstructure exterior face and edge of deck shall be curvilinear with respect to the horizontal and vertical alignment of the roadway. Use of chorded / straight sections within a curved alignment section will not be allowed. The number of box girders shall remain constant for the entire length of bridge.
6. The superstructure shall use girders that are box shaped with sloping exterior web of outermost girder. The use of multiple I-shaped girders, steel or concrete, will not be allowed. The slope of the exterior web is defined as either of the following: 1) y distance along a line perpendicular to bottom flange, to x distance along a line parallel to bottom flange. Bottom flange is parallel to cross-slope of deck; or 2) y vertical to x horizontal for a horizontal bottom flange. The web slope shall be constant for the entire length of bridge. If box girders are constant depth, sloping webs are required at the exterior web of the outermost box for both NB and SB structures. If girders are constant depth the slope of exterior web shall be 4:1. If girders are haunched, all webs of all boxes shall be sloped at minimum 6:1. The bottom flange of constant depth girders shall be constant width and the same width for all girders. All haunched girders shall be the same.
7. For concrete superstructures, well distributed, bonded continuous crack control reinforcement shall be provided at all sections / locations.
8. The number of spans shall remain the same as the default design.

9. The abutment locations and geometric configuration shall remain the same as the default design.
10. The architectural elements of the bridge piers shall be pleasing and blend with the bridge design. The general piers location (plus or minus approximately 1') shall be maintained. Changes in pier location shall still meet all other project requirements. Changes affecting utilities shall be subject to the review and approval by the utility owner.
11. The use of a multi-column pier supporting a continuous pier cap beam will not be allowed.
12. If large diameter drilled caissons are to be utilized for the substructure of the alternative design, as was proposed for the default design, all work shall be in accordance with the project special provisions, Revision of Section 503, Drilled Caissons.
13. Alternate bridge must meet environmental conditions in compliance with the non-programmatic 4(f) approval (available for review). No affect on the railroad lines (temporary or permanent). No affect on levee or river according to environmental document. Final determination will be by CDOT with input from FHWA.
14. Upon completion of construction, the horizontal and vertical clearances as provided in the default design shall be maintained and meet UP and BNSF railroad requirements. Plans (30%, 60%, 90% and 100%) for the alternate bridge will need to be reviewed and approved by Union Pacific and BNSF railroads.
15. Changes in pier shape or type will need to meet BNSF and UP railroad requirements such as crash worthiness as well as any scour or drainage requirements.
16. Construction clearance envelopes for local streets below the bridge and for the railroad, as shown on the plans, shall be maintained.
17. The alternative design shall have approach slabs consistent with that of the default design.
18. The bridge deck and approach slabs shall have a 3-inch HMA overlay with a waterproofing membrane, as required and provided by the default design.

19. In accordance with the CDOT Bridge Design Manual, inspection and maintenance access shall be provided for the alternative bridge.
20. Provide for and accommodate all roadway lighting design elements, conduit and attachments for the alternative bridge as shown or specified in the Contract Documents for the default design. Lighting items which were paid for separately from that shown for the default bridge will likewise be paid for separately for the alternative bridge.
21. Provide deck drains for the alternative bridge at the general locations, and of the same or greater hydraulic capacity, as shown on the Plans for the default design. Drainage details, routing of the drain piping, and aesthetic considerations shall be the same as the default design. Any change of the bridge drainage system necessary for the alternative design shall be analyzed and designed by a Professional Engineer licensed in the state of Colorado, at no cost to the project.
22. Earthquake restraints or pintels for the alternative bridge shall be provided in accordance with the AASHTO specifications.
23. Bearings, expansion devices, bridge rail and fence screening of the alternative bridge shall be in accordance with the Contract Documents for the default design, and CDOT Staff Bridge Design Manual and Staff Bridge Design Worksheets.
24. Lightweight concrete shall not be used for any portion of the alternative bridge.
25. The Color scheme proposed for the alternate bridge would need to be approved by CDOT and be shown to meet the design charrette themes.
26. Overlooks at Pier 2 will need to meet the minimum dimensions shown in the default bridge design (3.3' wide and 17.5' long) but could be larger.
27. The minimum deck overhangs, from outside edge of pedestrian rail parapet to outside face of web at the top of bottom flange, at the section required at midspan, shall be at least 8 ft and shall be constant for the entire length of bridge. The maximum differential dead load deflection of the deck cantilever outside edge, due differential rotations, between adjacent local undulations along the edge of deck, shall be controlled, to 0.07 for  $C/360$ .  $C$  is defined as the length of cantilever, in ft, from outside edge of deck to web at top flange. The definition of the differential dead load deflection is from the top of deck along a reference line from exterior web at deck to top edge of deck at edge that is at the cross-slope of the deck. Depending on deck overhang length it

may be allowed to support the screed machine off of the exterior girder web, and allowed to finish the deck in the overhang area by hand.

28. The pedestrian rail parapet shall completely cover the edge of a cast-in-place deck cantilever. Precast stay-in-place deck forms are allowed at the cantilever. The concrete parapet for the pedestrian rail shall also completely hide the outside edge of stay-in-place forms and deck topping, be connected to the precast stay-in-place deck forms, and the rail parapet shall provide resistance against differential deflection of the adjacent stay-in-place panels under live loads. The parapet shall be placed after the deck is completed in one pour. If the parapet hangs down below the cantilever bottom deck sufficiently to hide the undulating edge of deck caused by differential dead load deflections, then the differential deflection requirement in 27. may be waived.
29. CDOT may allow full-depth precast panels depending on the details. If full-depth precast panels are used details shall be incorporated into the design of the full-depth panels consistent with and similar to details used on the previous CDOT projects. The contractor shall submit details for approval by CDOT at the design pre-qualification.
30. The pier near the River needs to meet all FEMA and scour requirements. All appropriate agency approvals will be required.

**Design References and Guidelines.** The following references and guidelines shall be applicable to the design and construction of an alternative bridge:

- (1) CDOT Standard Specification for Road and Bridge Construction (2005)
- (2) CDOT Project Special Provisions
- (3) American Association of State Highway and Transportation Official (AASHTO) LRFD Bridge Design Specifications, Fourth Edition, 2007
- (4) Colorado Department of Transportation M & S Standards (2000)
- (5) Colorado Department of Transportation Bridge Design Manual (1992)
- (6) Colorado Department of Transportation Bridge Rating Manual (1995)
- (7) CDOT Staff Bridge Design Worksheets
- (8) CDOT Bridge Manual Vol. II Detailing and Checking Chapter 3
- (9) ANSI/AASHTO/AWS Bridge Welding Code D1.5-2002

13141 – Proposed DRAFT prequalification for Alternative Bridge Design  
Looking for comments back by April 12<sup>th</sup>, 2007  
4<sup>th</sup> Street Bridge Project

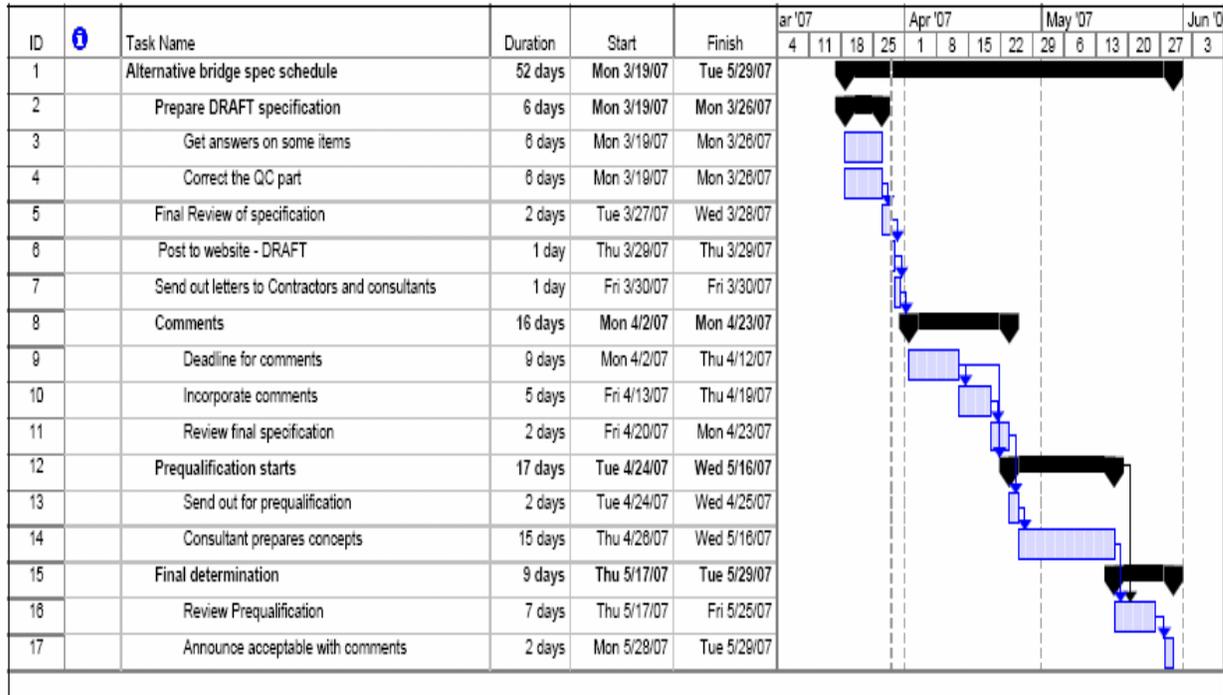
- (10) AASHTO Guide Specification for Design and Construction of Segmental Concrete Bridges
- (11) AASHTO Guide Specification for Horizontally Curved Highway Bridges
- (12) Colorado Department of Transportation (CDOT) Field Materials Manual
- (13) CDOT Survey Manual
- (14) CDOT Cost Estimates Item Book
- (15) CDOT Cost Estimates Cost Data (Current Edition)
- (16) CDOT Procedural Directive 508.1 Professional Engineer's Stamp
- (17) 13141 - Contract plans and specifications
- (18) 4<sup>th</sup> Street Geotechnical Engineering Study
- (19) Non-programmic Final 4(f) Evaluation
- (20) Drainage and scour analysis
- (21) Structure selection report 2003
- (22) Structure Concept report 2001.
- (23) Design Charette voting summary and Design Charette main text.
- (24) Floodplain and Drainage Assessment Report (Ayres), December 2001
- (25) Phase I Environmental Site Assessment for SH 96A (4th Street) Bridge Over the Arkansas River, Hazwaste Technologies Corporation, September 14, 2001

The submittal does not need to show that all the above requirements are met but it should ensure that the design could meet them.

We'd plan to have all the project plans, and project documents currently posted on the website available during the preapproval process. **We are looking for input on whether this information would be enough to submit the conceptual bridge design for approval or what else might be needed or requested.**

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The schedule to complete this preapproval process looks something like this:



**Is this schedule reasonable? Assuming the advertisement date for the project is June 15, 2007 what would you change?**

