DEPARTMENT OF TRANSPORTATION

2424 N. Townsend Avenue
Montrose, Colorado 81401
(970) 683-6400 – PHONE
(970) 249-6018 – FAX

Project Delivery Selection Matrix Meeting
SH92 Stengel's Hill

Project: STA 092A-024 / 17772

Meeting Held: October 30, 2013 Room 308, Grand Junction Office
Video feed to Denver HQ Room 159,

ATTENDEES:

Participants:	*Representing:*
Jason Smith	CDOT R3 Program Engineer
Ron Alexander	CDOT Montrose Resident Engineer
Hans Egghart	CDOT Montrose Project Manager
Jason Fullerton	CDOT Montrose Design Engineer
Kathy Freeman	CDOT R3 Right-of-Way
Mike Vanderhoof	CDOT R3 Environmental Manager
Cole Golden	CDOT Montrose Project Manager
Paula Durkin	CDOT R3 Environmental
Rob Martindale	CDOT R3 Utility Engineer
Rex Goodrich	CDOT R3 Materials Engineer
Preeda Chomsrimake	CDOT Staff Bridge

DISCUSSION	ACTION ITEMS	DUE
1. Introductions **2. Project Overview** This project consists of **3. Project Delivery Selection Overview** *Overview of Project Delivery Selection:* The document includes an overview of three contracting methods including Design-Bid-Build (DBB), Design-Build (DB) and Construction Management/General Contractor (CM/GC), a description of how to develop Project Goals, a Delivery Selection Matrix, and information on how to assess Risk Opportunities/Obstacles for a project.		

Project Description Checklist

The following items should be considered in the project description as applicable. Other items can be added if they influence the project delivery decision. Relevant documents can be added as appendices.

- ❒ Project Name – SH92 Stengel's Hill
- ❒ Location – SH92, MP 13.8 to 15.5
- ❒ Estimated Budget –Estimated Project Delivery Period – Ad
- ❒ Required Delivery Date (if applicable) –
- ❒ Source(s) of Project Funding
- ❒ Project Corridor - SH92
- ❒ Major Features of Work – Bridge over Railroad, Roadway re-alignment
- ❒ Major Schedule Milestones
    - Risk Assessment
    - Project Delivery Selection
      Contractor RFP, including short list and selection
      Begin Construction
    - End Construction
- ❒ Major Challenges (as applicable)
    - Optimizing costs by re-evaluating Structure length vs. MSE wall length
    - Right of Way, Utilities, and/or Environmental Approvals
    -
- ❒ Main Identified Sources of Risk
- Construction Schedule delays due to Railroad review requirements
- Railroad Shoring – designed by contractor's PE, subject to review / approval by UPRR.
- ❒ Safety Issues
    -
- ❒ Sustainable Design and Construction Requirements

Project-Specific Goals (Non-Prioritized)

1. Project Advertised before January 19, 2014
2. Construction Completed by December, 2016.
3. Improve long-term operations and safety
4. Provide an aesthetically pleasing project.
5. Maximize safety of workers and traveling public during construction.
6. Demonstrate wise use of funds. Facilitate and foster collaboration, communication and partnership with all stakeholders.

Project Constraints

There are potential aspects of a project that can eliminate the need to evaluate one or more of the possible project delivery methods. General constraints are provided, but it is critical to identify constraints that are project specific.

Constraints

- Source & Availability of Funding
- Schedule constraints
- Railroad review process
- Third party agreements with BLM
- Third Party agreements with the Union Pacific Railroad

4. Project Delivery Selection Matrix The group discussed each of the four Primary Factors of the Project Delivery Selection Matrix and modified the matrix to include scores for ‘least appropriate’, ‘appropriate’, and ‘most appropriate’ delivery method for Design-Bid-Build, Design-Build and CM/GC. The final matrix is attached to these minutes showing each score. Design-Build was determined to be most appropriate for all four primary factors thus the secondary factors were not considered. CDOT will present the decision of the Project Delivery Selection group to FHWA for their approval.		

Project Delivery Selection Matrix Summary

Determine the factors that should be considered in the project delivery selection, discuss the opportunities and obstacles related to each factor, and document the discussion on the following pages. Then complete the summary below.

PROJECT DELIVERY METHOD OPPORTUNITY/OBSTACLE SUMMARY			
	DBB	**DB**	**CM/GC**
Primary Evaluation Factors			
1. Delivery Schedule	+	++	-
2. Project Complexity & Innovation	+	++	+
3. Level of Design	++	++	+
4. Cost	-	++	X
5. Perform Initial Risk Assessment	-	++	
Secondary Evaluation Factors			
6. Staff Experience/Availability (Owner)			
7.Level of Oversight and Control			
8. Competition and Contractor Experience			

+ +	**Most appropriate delivery method**
+	**Appropriate delivery method**
–	**Least appropriate delivery method**
X	**Fatal Flaw (discontinue evaluation of this method)**
NA	**Factor not applicable or not relevant to the selection**

Project Delivery Selection Matrix Summary Conclusions and Comments:

- The Streamlined Design-Build alternative was selected as the most appropriate method of project delivery, since it alone will meet the time-frame requirements set for this project.
- CM-GC requires much more oversight by the CDOT Project Manager to avoid runaway escalation of design costs by excessive iterations of design alternatives requested by the contractor.

1) Delivery Schedule

Delivery schedule is the overall project schedule from scoping through design, construction and opening to the public. Assess time considerations in getting the project started or funding dedicated and assess project completion importance.

DESIGN-BID-BUILD Requires time to perform sequential design and procurement, but if design time is available has the shortest procurement time after the design is complete.	
Opportunities	**Obstacles**
Design is complete	Design and construction schedules can be unrealistic due to lack industry input
Elements of design can be advanced prior to permitting, construction, etc.	Errors in design lead to change orders and schedule delays
UPRR Plans Approval in Final Phase	UPRR Railroad Agreement at least 3 months out
ROW/Environmental clearances are already in process and can be completed within schedule.	Need to get BLM to revise Letter-of-Consent

DESIGN-BUILD Can get project under construction before completing design. Parallel process of design and construction can accelerate project delivery schedule; however, procurement time can be lengthy due to the time necessary to develop an adequate RFP, evaluate proposals and provide for a fair, transparent selection process.	
Opportunities	**Obstacles**
Encumbers Construction Funds more quickly	Need time for RFP/RFQ Procedure.
Potential to accelerate schedule through parallel Design-Build process	Design changes require lengthy UPRR review / approval
Ability to award Contract prior to finalization of Clearances / Railroad Agreements	Need to get BLM to revise Letter-of-Consent
UPRR expedites approvals/agreements under D-B	

CM/GC Quickly gets contractor under contract and under construction to meet funding obligations before completing design. Parallel process of development of contract requirements, design, procurements, and construction can accelerate project schedule. However, schedule can be slowed down by coordinating design-related issues between the CM and designer and by the process of reaching a reasonable Guaranteed Maximum Price (GMP).	
Opportunities	**Obstacles**
Continuous constructability review and VE	GMP negotiation can delay the schedule
Early identification and resolution of design and construction issues (e.g. ROW, and earthwork)	Designer-contractor-agency disagreements can add delays
Can improve Design / Cost Ratio	Too much $$ Spent in Design already.
	Design changes require lengthy UPRR review / approval

Delivery Schedule Summary

	DBB	**DB**	**CM/GC**
1. Delivery Schedule	**+**	**++**	**-**

Notes and Comments:

2) Project Complexity & Innovation

Project complexity and innovation is the potential applicability of new designs or processes to resolve complex technical issues.

DESIGN-BID-BUILD Allows CDOT to fully resolve complex design issues and qualitatively evaluate designs before procurement of the general contractor. Innovation is provided by CDOT/Consultant expertise and through traditional owner directed processes such as VE studies and contractor bid alternatives.	
Opportunities	**Obstacles**
Project already designed	Increased Costs due to over-design / pricing of risk
Aids in consistency and maintainability	No contractor input to optimize costs
Complex design can be resolved and competitively bid	Constructability issues
Provides more time for CDOT Design Review	Innovations can add cost or time and restrain contractor's benefits

DESIGN-BUILD Incorporates design-builder input into design process through best value selection and contractor proposed Alternate Technical Concepts (ATCs) – which are a cost oriented approach to providing complex and innovative designs. Requires that desired solutions to complex projects be well defined through contract requirements.	
Opportunities	**Obstacles**
Constructability and VE inherent in process	Quality assurance for innovative processes are difficult to define in RFP
Allows contractor to provide design input	Fairness to contractors not selected by process
Designer & contractor collaborate to enhance innovation	Requires desired solutions to complex designs be well defined through technical requirements

CM/GC Allows independent selection of designer and contractor based on qualifications and other factors to jointly address complex innovative designs through three party collaboration of CDOT, designer and Contractor. Allows for a qualitative (nonprice oriented) design but requires agreement on GMP.	
Opportunities	**Obstacles**
Highly innovative process through 3 party collaboration	Innovations can add cost or time – Double design costs
VE inherent in process and enhanced constructability	Scope additions can be difficult to manage
Can take to market for bidding as contingency	Process depends on designer/CM relationship
	Cost Competitiveness – single source negotiated GMP

Project Complexity & Innovation Summary

	DBB	**DB**	**CM/GC**
2. Project Complexity & Innovation	+	++	-

Notes and Comments:

3) Level of Design

Level of design is the percentage of design completion at the time of the project delivery procurement

DESIGN-BID-BUILD 100% design by CDOT, with CDOT having complete control over the design.	
Opportunities	**Obstacles**
The scope of the project is well defined through complete plans and contract documents	Can reduce the level of constructability since the contractor is not bought into the project until after the design is complete
Project/scope can be developed through design	Owner design errors can result in a higher number of change orders, claims, etc.
Design is complete	Design lacks value engineering,

DESIGN-BUILD Design advanced by CDOT to the level necessary to precisely define contract requirements and properly allocate risk (typically 30% or less).	
Opportunities	**Obstacles**
Design has been advanced by the owner to level necessary to precisely define the contract requirements / constraints	Must have very clear definitions and requirements in the RFP because it is the basis for the contract
Revised design could save $ by extending structure, reducing over-designed MSE walls	Potential for lacking or missing scope definition if RFP is not carefully developed
Contractor involvement in design, which improves constructability and innovation	Less agency control over the design
Better Geotechnical options	ROW Phase essentially Complete

CM/GC Can utilize a lower level of design prior to procurement of the CM/GC and then joint collaboration of CDOT, designer, and CM/GC in the further development of the design. Iterative nature of design process risks extending the project schedule.	
Opportunities	**Obstacles**
Contractor involvement in early design improves constructability	Three party process can slow progression of design
Better Geotechnical options	Additional Design & Estimating Costs
Design can be used for DBB if the price is not successfully negotiated.	If design is too far advanced it will limit the advantages of CMGC or could require design backtracking

Level of Design Summary

	DBB	DB	CM/GC
3. Level of Design	-	++	X

Notes and Comments:

The level of design is essentially complete. The current design has significant flaws that increase project costs and make construction more complicated. See attached memo.

4) Cost

Project cost is the financial process related to meeting budget restrictions, early and precise cost estimation, and control of project costs.

DESIGN-BID-BUILD Competitive bidding provides a low cost construction for a fully defined scope of work. Costs accuracy limited until design is completed. More likelihood of cost change orders due to contractor having no design responsibility.	
Opportunities	**Obstacles**
Construction costs are contractually set before construction begins	More potential of costly change orders due to owner design responsibility
No more design costs , unless VE (contract) review	Highest construction costs

DESIGN-BUILD Designer-builder collaboration and ATCs can provide a cost-efficient response to project goals. Costs are determined with design-build proposal, early in design process. Allows a variable scope bid to match a fixed budget. Poor risk allocation can result in high contingencies.	
Opportunities	**Obstacles**
Options to reduce construction costs can limit contract to stay within budget	Increased design costs due to re-design, backtracking

CM/GC CDOT/designer/contractor collaboration to reduce risk pricing can provide a low cost project however non-competitive negotiated GMP introduces price risk. Good flexibility to design to a budget.	
Opportunities	**Obstacles**
Early contractor involvement can result in construction cost savings through VE and constructability	Escalation of design costs by excessive iterations of design alternatives requested by the contractor.
Integrated design/construction process can provide a cost efficient strategies to project goals	Difficulty in GMP negotiation introduces some risk that GMP will not be successfully executed requiring aborting the CM/GC process

Cost Summary

	DBB	DB	CM/GC
4. Cost	-	++	XX

Notes and Comments:

5) Initial Risk Assessment

Risk is an uncertain event or condition that, if it occurs, has a negative effect on a project's objectives. Risk allocation is the assignment of unknown events or conditions to the party that can best manage them. An initial assessment of project risks is important to ensure the selection of the delivery method that can properly address them. An approach that focuses on a fair allocation of risk will be most successful. Refer to risk discussion and checklists in appendix B.

DESIGN-BID-BUILD
Risk allocation for design-bid-build best is understood by the industry, but requires that most design-related risks and third party risks be resolved prior to procurement to avoid costly contractor contingency pricing and change orders and claims.

Opportunities	Obstacles
Risks managed separately through design, bid, build is expected easier	Limited industry input in contract risk allocation
Risk allocation is most widely understood/used	Low-bid related risks
Railroad approves plans prior to bidding	Railroad Shoring – designed by contractor's PE, subject to review / approval by UPRR

DESIGN-BUILD
Provides opportunity to properly allocate risks to the party best able to manage them, but requires risks allocated to design-builder to be well defined to minimize contractor contingency pricing of risks.

Opportunities	Obstacles
Public Utility design and construction risk can be allocated to the design/builder if incorporated in the contract requirements	Construction Schedule delays due to Railroad review requirements
Railroad Shoring can eliminated by extending structure	

CM/GC
Provides opportunity for CDOT, designer, and contractor to collectively identify and minimize project risks, and allocate risk to appropriate party. Has potential to minimize contractor contingency pricing of risk, but can lose the element of competition in pricing.

Opportunities	Obstacles
Contractor can have a better understanding of the unknown conditions as design progresses	Disagreement among Designer-Contractor-Owner can put the process at risk
Contractor will help identify and manage risk	Strong agency management is required to negotiate/optimize risks
Avoids low-bid risk in procurement	Designer-contractor-agency disagreements can add delays

Initial Risk Assessment Summary

	DBB	DB	CM/GC
5. Initial Risk Assessment	-	++	

Notes and Comments:

6) Staff Experience/Availability

Owner staff experience and availability as it relates to the project delivery methods in question.

DESIGN-BID-BUILD Technical and management resources necessary to perform the design and plan development. Resource needs can be more spread out.	
Opportunities	**Obstacles**

DESIGN-BUILD Technical and management resources and expertise necessary to develop the RFQ and RFP and administrate the procurement. Concurrent need for both design and construction resources to oversee the implementation.	
Opportunities	**Obstacles**

CM/GC Strong, committed CDOT project management resources are important for success of the CM/GC process. Resource needs are similar to DBB except CDOT must coordinate CM's input with the project designer and be prepared for GMP negotiations.	
Opportunities	**Obstacles**

Staff Experience/Availability Summary

	DBB	**DB**	**CM/GC**
6. Staff Experience/ Availability			

Notes and Comments:

7) Level of Oversight and Control

Level of oversight involves the amount of agency staff required to monitor the design or construction, and amount of agency control over the delivery process

DESIGN-BID-BUILD Full control over a linear design and construction process.	
Opportunities	**Obstacles**

DESIGN-BUILD Less control over the design (design desires must be written into the RFP contract requirements). Generally less control over the construction process (design-builder often has QA responsibilities).	
Opportunities	**Obstacles**

CM/GC Most control by CDOT over both the design, and construction, and control over a collaborative owner/designer/contractor project team	
Opportunities	**Obstacles**

Level of Oversight and Control Summary

	DBB	**DB**	**CM/GC**
7. Level of Oversight and Control			

Notes and Comments:

8) Competition and Contractor Experience
Competition and availability refers to the level of competition, experience and availability in the market place and its capacity for the project.

DESIGN-BID-BUILD High level of competition, but GC selection is based solely on low price. High level of marketplace experience.	
Opportunities	**Obstacles**

DESIGN-BUILD Allows for a balance of price and non-price factors in the selection process. Medium level of marketplace experience.	
Opportunities	Obstacles

CM/GC Allows for the selection of the single most qualified contractor, but GMP can limit price competition. Low level of marketplace experience.	
Opportunities	Obstacles

Competition and Contractor Experience Summary

	DBB	**DB**	**CM/GC**
8. Competition and Contractor Experience			

Notes and Comments:

MEMORANDUM

DEPARTMENT OF TRANSPORTATION

2424 N. Townsend Avenue
Montrose, Colorado 81401
(970) 249-5285 - PHONE
(970) 249-6018 - FAX

SH 92 Stengel's Hill
Project Code: 17772

DATE: October 30, 2013

TO: Jason Smith, Program Engineer

FROM: Jason Fullerton, PE

SUBJECT: Design Issues for Design Build Consideration

In order to ensure the best design, stay within project budget and meet advertisement date this project is being considered for Design Build. The plans have had final review and will be tentatively developed to a 100% level by URS scheduled November 4th. The current design delivered in the opinion of the Montrose Residency has flaws that increase project cost and complicate construction. These issues are outlined below.

Project Background

This project has been through two FOR reviews. At the first FOR review, the wall design was not at an FOR level and estimated to be approximately $1.5 million in cost. Upon completion of the second FOR the wall design was finalized and escalated to over $4.5 million in cost. It appears that the bridge design was performed in a vacuum with little iteration or consideration for walls vs. structure cost. This was caught by CDOT in the late stages of design and due to design budget, projected advertisement date and Railroad review timing the decision was made to proceed with the current design.

Design Issues to be corrected in Design Build Phase

The current design MSE walls are at 46.7 ft. at the highest point. Due to the poor in-situ soil conditions these walls require over excavation, extended reinforcement zone lengths and caisson reinforcement with mud slabs. As a rule of thumb, once MSE wall heights exceed 25 ft. a structure may be more cost effective. The following list outlines opportunities for project savings if the bridge is extended.

- Railroad Crossing – Due to the current placement of east abutment and east wall the railroad control station and railroad crossing arms will need to be temporarily relocated. To provide space for new construction, the existing SH 92 will need to be shifted to the south to maintain traffic during construction. This results in additional fill, the relocation of controller box, relocation of crossing arms and the need for temporary concrete crossing blocks for a temporary crossing. The extension of the bridge would result in using the existing SH 92 alignment to maintain traffic and eliminate the need for a temporary Railroad crossing and SH 92 temporary relocation.

- Railroad Shoring – Due to the proximity of the West and East wall locations to the Railroad tracks special Railroad shoring will be required for the project. Extending the bridge to outside these limits results in the elimination of the Railroad shoring requirement.

- Elimination of Caissons – At the tallest wall sections 30" reinforced and unreinforced caissons are required for global wall stability. Extending the bridge in these areas eliminates the need for these caissons.

- Reduction of Select Fill – Due to the wall heights the reinforcement length is greatly increased. The extension of the bridge will reduce the amount of this material in the most extreme areas.

- Day Driveway – The current design of the Day Driveway is on a 10 ft. fill. The approach road is elevated to eliminate the need for a wall for the 2:1 fill slope from SH 92. Increasing the length of the bridge eliminates the fill slope, therefore eliminating the need to raise Day Driveway. This results in a reduction of embankment.

- Crash protection of East Pier – The current design has the East pier within the 25 ft. clearance envelope required by the Railroad. Reconfiguration of the bridge my result in the placement of this pier outside this envelope eliminating the need for it to be a crash resistant design and the need for Railroad guardrail.

- Constructability – The current design encompasses 5 different wall configurations. These wall designs include over excavation, load transfer pads, caissons, mudslabs and large quantities of Class 1 reinforcement zones as well as select fill material that needs to meet the friction angle criteria used for the wall design (this is because the failure plane goes outside of reinforcement zone). Increasing the structure length may result in having a more standardized MSE wall design that contractors are familiar with. This may result in less construction time and a reduction of costs.

- Railroad Benefits – Extending/Reconfiguration of bridge may provide space for the Railroad's request for future track and maintenance road. In addition, there would be an increased sight distance along the track where instead of close proximity of walls would be an open span bridge.