Project Delivery Selection Workshop Summary (Volume 24 Issue1)

Workshop Summary	
Project Name:	US 160 Durango East Safety Improvements (a.k.a. Elmore's East)
Workshop Date:	June 26-27, 2024
Workshop Location:	Region 5 Offices, Durango, Colorado
Facilitator:	Casey Valentinelli
Delivery Method Selected:	Design-Build

Workshop Participants	
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Project Delivery Selection Matrix Guidance

If a Project Manager feels that a project could benefit from contractor input during pre-construction to improve constructability, enhance innovation, shorten schedule, reduce risks, or save costs, they should reach out to the Alternative Delivery Program to schedule a meeting to determine if a Project Delivery Selection Matrix Workshop is warranted. If warranted, the Workshop will help to evaluate and select the most appropriate delivery method for the project. It is important to consider this option early in project development and ideally during the scoping phase of the project to maximize potential benefit.

Overview

This document provides a formal approach for assessing project delivery methods for use on highway projects. The information below lists the project delivery methods considered in this process, followed by an outline of the process, instructions, and evaluation worksheets for use by CDOT staff and project team members.

By using these forms, a brief Project Delivery Selection Report can be generated for each individual project. This process should be used on any project that may show potential to benefit from an alternative delivery method. If the project management team has questions about their project and are unsure of the benefit, they should coordinate with the Alternative Delivery Program. A Project Delivery Selection Report documenting the Project Delivery Selection Matrix Workshop must accompany the Chief Engineer Delivery Method Approval Request to use any delivery method **other than** Design-Bid-Build.

The primary objectives of this tool are:

- Present a structured approach to making project delivery decisions.
- Determining if there is a delivery method, that may leverage its strengths to enhance the project goals; and
- Provide documentation of the selection decision.

It is important to distinguish that the PDSM is a decision-making tool, reliant on objective evidence presented in the form of opportunities and obstacles and is not a justification tool.

Background

The project delivery method is the process by which a construction project is comprehensively ***designed and constructed*** including:

- project scope refinement,
- organization of designers,
- contractors and various consultants,
- sequencing of design
- construction operations,
- execution of design and construction,
- and closeout and commissioning of the asset.

Thus, the different project delivery methods are distinguished by the contractual relationships between the agency, designers and contractors and the technical relationships that evolve between each party inside those contracts. Currently, there are several types of project delivery systems available for publicly funded transportation projects. The most common methods are Design-Bid-Build (DBB), Design-Build (DB), and Construction Manager/General Contractor (CMGC). While any of the delivery methods could be used to deliver any project, the most appropriate delivery method when coupled with the right project will optimize the delivery of the project and increase the return on the taxpayer investment. Each project must be examined individually to determine how the project delivery methods opportunities may be leveraged to pursue the project goals.

Primary delivery methods

Design-Bid-Build is the traditional and most common project delivery method in which an agency designs, or retains a designer to furnish complete design services, and then advertises and awards a separate construction contract based on the designer's completed construction documents. The Contractor is selected on the lowest responsible bid. In DBB, the agency "owns" the details of design during construction and as a result, is responsible for the cost of any errors or omissions encountered in construction.

Design-Build is a project delivery method in which the agency procures both design and construction services in the same contract from a single, legal entity referred to as the design-builder. The method typically uses a two-phase selection process, the first phase is qualifications based and entails release of a Request for Qualifications (RFQ). The RFQ is used to establish a shortlist of proposers that are determined to be the most highly qualified. The second phase entails release of a Request for Proposals (RFP), in which design-builders compete to provide value to their proposal, and the selection is based on the proposer that provides best value, as defined by the agency. The design-builder relies on standards, specifications, and prescribed design manuals to accomplish the details of the design and is responsible for the cost of any errors or omissions encountered in construction.

Construction Manager / General Contractor is a project delivery method in which the agency contracts separately with a designer and a construction manager. The agency can perform design or contract with an engineering firm to provide the design. The agency selects a construction manager to perform construction management services for the pre-construction phase of the project. The significant characteristic of this delivery method is the opportunity for the contractor to inform the design to ensure a more complete representation of the scope necessary for construction, and to provide real-time cost estimating to inform the budget of costs based on contractor quotes and supplier rather than historic data. Construction industry/Contractor input into the design development and constructability of complex and innovative projects are the major reasons an agency would select the CMGC method. Unlike DBB, CMGC brings the builder into the design process at a stage where definitive input can have a positive impact on the project. CMGC is particularly valuable for new non-standard types of designs where it is difficult for the agency to develop the technical requirements that would be necessary for DB procurement without industry input.

Facilitation of the tool

A facilitator that is third party to the project team and is neutral in the outcome of the process, shall be brought in for the workshop. The facilitator must be a representative of the agency and have a working knowledge of the alternative delivery methods. The facilitator will assist the project management team by working through the tool and provide guidance for the project and selection of a delivery method. This individual should be knowledgeable about the alternative delivery methods and the selection process. The facilitator will help to answer questions, seed conversation, and assure the process stays on track to move the project team towards a formal selection.

Participation

Using the project delivery selection matrix is only as good as the people who are involved in the selection workshop. Therefore, it is necessary to have a collection of individuals with varying backgrounds and experience to participate in the selection of the delivery method. The selection team needs to include the project manager, the project engineer, a representative of the procurement/contracting office, and any other CDOT staff that is crucial to the project. In addition, the selection team might want to consider including representatives from specialty units and from the local jurisdictions where the project is located. It is important to ensure that the interests of the taxpayers remain at the forefront, and therefore the decision of which delivery method is “Most Appropriate” must only be influenced exclusively by agency representatives and stakeholders (CDOT, Local Agencies, and Funding Partners). Consultants may not participate in the deliberations of the workshop. Consultants may provide technical advice to the group on an as needed basis, but only at the request of the agency representatives.

It is important to keep the selection team comprised of a small strategic assembly of key project decision makers. Workshops with a large group of participants, are more susceptible to confirmation bias, may increase the risk of inefficiency and prolong the workshop, with little added value. A selection team, comprised of 3-7 folks with diverse backgrounds, representing a cross section of stakeholder’s interests, is suggested, however this number should be based on the specific project being analyzed.

The participants should be empowered to **challenge the group consensus and provide counter argument to proposed inputs to the matrix**. When a decision has been tested and challenged the confidence in the decisions increases amongst the group’s members. This exercise is progressive in nature and will help to prepare the group for the scrutiny brought upon by accountability and transparency requirements for Alternative Delivery Projects (SB21-260).

Potential bias

Bias is natural and is typically based on a particular participants experience or qualifications. Bias when appropriately recognized, can generate excellent contributions to the deliberations in the workshop. When Bias is not managed well it may easily spread throughout the group and influence the decision in a way that will reflect an individual perspective and may not reflect the best interest of the taxpayer.

Some key components to ensure bias is managed properly and does not degenerate into coercion are as follows. **All opinions should be documented in the matrix and presented to the group for consideration. The opinion should be evaluated to determine that it has basis in objective evidence, and not hearsay, prejudice, or misconception.** It is also essential that all participants complete the "Pre-workshop Tasks" described below, especially writing down their individual assessment of the opportunities or obstacles for each delivery method. By documenting everyone's thoughts and ideas individually **prior** to meeting in a larger group is a best practice that ensures that every voice in the group can contribute to the deliberations of the group, and it also contributes to mitigate the influence of bias. It is very important that the workshop remain a safe space, in which opposing viewpoints can be discussed without intimidation, ridicule, or fear of retribution. When each participant feels free to express their ideas to the group, and have those ideas discussed robustly, it builds the confidence of the group in their decision that they are making.

Pre-workshop Tasks [Revised from original text]

Prior to conducting the selection workshop, the pre-workshop tasks should be completed by the workshop participants. By completing the workshop tasks, the participants have an opportunity to ensure an efficient use of the time allotted for the workshop. The **project management team** should complete the project attributes portion of this template (pg. 7-10) and distribute it to the participants a minimum of one week prior to the workshop. **The participants should be instructed to become familiar with the project attributes portion of the template**, and to complete the matrix for the primary and secondary factors. The participants will then assemble, and document their opinion of Opportunities and Obstacles in the pre-work tasks for the matrix, and bring it to the meeting, ready to be discussed with the larger group.

Project Delivery Selection Process

The process is described in the outline below and a flowchart on the next page. It consists of individual steps to complete the entire process. The steps should be followed in sequential order.

Pre-Workshop Tasks and responsibilities

STAGE I - Project Attributes, Goals, and Constraints (to be completed by the *"Project Management Team"*)

A. Delivery methods to consider.
    1. Design-Bid-Build
    2. Design-Build
    3. Construction Manager / General Contractor

B. Project Description/Goals/Constraints
    1. Project attributes
    2. Set project goals.
    3. Identify project dependent constraints.
    4. Discuss project risks.

STAGE IIa – Individual Primary Factor Evaluation (to be completed by the *individual participants* pre-workshop)

If each team member has individually reviewed and performed the assessment ***prior*** to the workshop the project team can complete the entire selection process in a 4-8-hour workshop session. The length of the workshop is relative to the complexity of the project.

A. Assess the primary factors (these factors most often determine the selection)
    1. Complexity and Innovation
    2. Delivery Schedule
    3. Project Cost Considerations
    4. Level of Design

Workshop:

STAGE IIb –Primary Factor Evaluation (to be completed by the *participants* **in** the workshop)

B. Assess the primary factors (these factors most often determine the selection)
    1. Complexity and Innovation
    2. Delivery Schedule
    3. Project Cost Considerations
    4. Level of Design

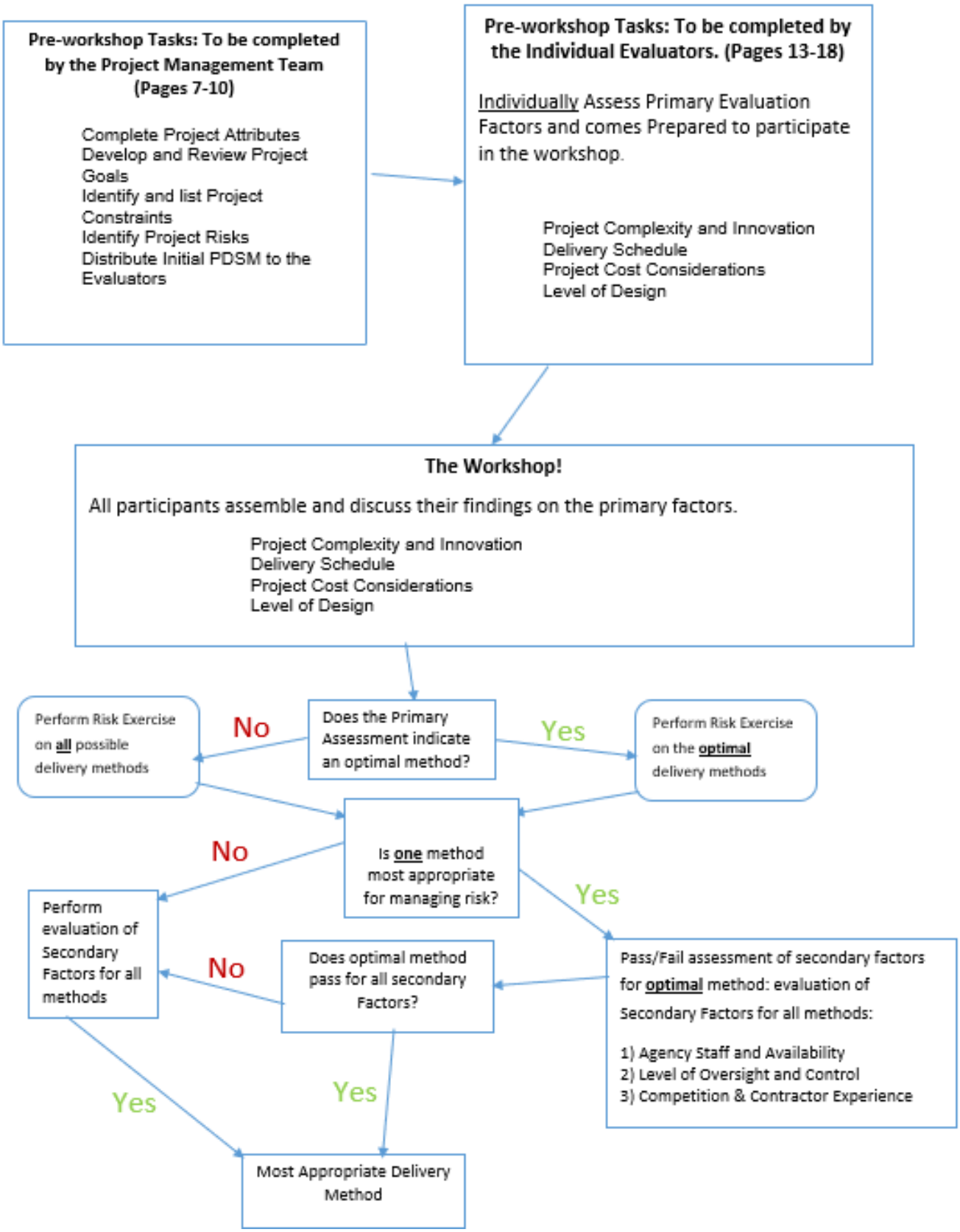
C. If the primary factors indicate there is a clear choice of a delivery method, then:
    5i. Perform a risk assessment for the desired delivery method to ensure that risks can be properly allocated and managed, and then move on to Stage III Part A

D. If the primary factors do not indicate a clear choice of a delivery method, then:
    5ii. Perform a risk assessment for all delivery methods to determine which method can properly allocate and manage risks, and then move on to Stage III Part B

STAGE III – Secondary Factor Evaluation (to be completed by the *participants* in the workshop)

A. Perform a pass/fail analysis of the secondary factors to ensure that they are not relevant to the decision.
    6. Staff Experience/Availability (Agency)
    7. Level of Oversight and Control
    8. Competition and Contractor Experience

B. If pass/fail analysis does not result in clear determination of the method of delivery, then perform a more rigorous evaluation of the secondary factors against all potential methods of delivery


Pre-workshop Tasks: To be completed by the Project Management Team (Pages 7-10)
Complete Project Attributes
Develop and Review Project Goals
Identify and list Project Constraints
Identify Project Risks
Distribute Initial PDSM to the Evaluators
Pre-workshop Tasks: To be completed by the Individual Evaluators. (Pages 13-18)
Individually Assess Primary Evaluation Factors and comes Prepared to participate in the workshop.
Project Complexity and Innovation
Delivery Schedule
Project Cost Considerations
Level of Design
The Workshop!
All participants assemble and discuss their findings on the primary factors.
Project Complexity and Innovation
Delivery Schedule
Project Cost Considerations
Level of Design
Does the Primary Assessment indicate an optimal method?
No
Perform Risk Exercise on all possible delivery methods
Yes
Perform Risk Exercise on the optimal delivery methods
Is one method most appropriate for managing risk?
No
Perform evaluation of Secondary Factors for all methods
Yes
Pass/Fail assessment of secondary factors for optimal method: evaluation of Secondary Factors for all methods:
1) Agency Staff and Availability
2) Level of Oversight and Control
3) Competition & Contractor Experience
Does optimal method pass for all secondary Factors?
No
Yes
Yes
Most Appropriate Delivery Method

Project Delivery Selection Matrix Worksheets and Forms

The following forms and appendices are included to facilitate this process.

Project delivery description worksheet

Provide information on the project. This includes size, type, funding, risks, complexities, etc. All information should be developed for the specific project.

Project delivery goals worksheet – including example project goals.

A careful determination of the project goals is an instrumental first step of the process that will guide the selection of the appropriate method of delivery for the project.

Project delivery constraints worksheet - including example project constraints.

Carefully review all possible constraints to the project. These constraints can potentially eliminate a project delivery method before the evaluation process begins.

Project risks worksheet

In addition to project goals and constraints, a detailed discussion of project risks is a critical step that helps with evaluation of the selection factors.

Project delivery selection summary form

The Project Delivery Selection Summary summarizes the assessment of the eight selection factors for the three delivery methods. The form is qualitatively scored using the rating provided in the table below. The form also includes a section for comments and conclusions. The completed Project Delivery Selection Summary should provide an executive summary of the key reasons for the selection of the method of delivery**.**

Rating Key	
+++	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

Workshop blank form

This form can be used by the project team for additional documentation of the process. It can be used to elaborate the evaluation of the *Assessment of Risk* factor.

Project delivery methods selection factor opportunities / obstacles form

These forms are used to summarize the assessments by the project team of the opportunities and obstacles associated with each delivery method relative to each of the eight Selection Factors. The bottom of each form allows for a qualitative conclusion using the same notation as described above. Those conclusions then are transferred to the *Project Delivery Selection Summary Form***.**

Project delivery methods opportunities / obstacles checklists

These forms provide the project team with direction concerning typical delivery method opportunities and obstacles associated with each of the eight Selection Factors. However, these checklists include general information and are not an all-inclusive checklist. Use the checklists as a supplement to develop project specific opportunities and obstacles.

Risk assessment guidance form

Because of the unique nature of Selection Factor 5, *Assessment of Risk*, this guidance section provides the project team with additional assistance for evaluation of the risk factor including: Typical Transportation Project Risks; a General Project Risks Checklist; and a Risk Opportunities/Obstacles Checklist.

Project Description

The following items should be considered in describing the specific project. Other items can be added to the bottom of the form if they influence the project delivery decision. Relevant documents can be added as appendices to the final summary report.

Project Attributes
Project Name: US 160 Durango East Safety Improvements (a.k.a. Elmore's East)
Location: Durango, Colorado. US160 from Approx. MP 91.5 (SH 172) to Approx. MP 98.5 (Dry Creek Project) [Dry Creek Project is Approx. MP 97.0 to MP Approx. 98.5] [Elmore's Approx. MP91.5 to CR225 MP 94.25]
Estimated Budget: $100M
Estimated Project Delivery Period: All funds obligated by September 30, 2027. All funds expended by September 30, 2032.
Required Delivery Date (if applicable):
Source(s) of Project Funding: Approximately $58.94M INFRA, $2M Freight, $14M BTE, $9M FASTER Safety, $25M SB267/21-260 (7PX), etc.
Project Corridor: Segment of US 160 EIS Durango to Bayfield
Major Features of Work – pavement, bridge, sound barriers, etc.: Reconstruction and widening: Approx. 2.5 miles of two to four lane with 10-foot shoulder section and a center two way left turn lane, including a large Mammal Crossing, a bridge reconstruction and major Intersection improvement of CR 225 (Roundabout; Reduce Severe Crashes by 79% & all other crashes by 41%); Approx. 3.5 miles of two to three lane (alt. passing/climbing) with widened shoulders, including a large Mammal Crossings. Many irrigation, drainage and small mammal crossings. This work includes fill and widening to improve the recovery slope (z-slope).
Major Schedule Milestones: All funds obligated by September 30, 2027. All funds expended by September 30, 2032.
Major Project Stakeholders: FHWA, CDOT, CPW for wildlife and county for development & impacts to current residents
Major General Obstacles: Import material (131k CY from SH172 to CR225), re-evaluation, lane closure policy
Major Obstacles with Right of Way, Utilities, and/or Environmental Approvals: An estimated 30-50 acquisitions/ownerships (likely condemnation)[Est.30+ Elmore's to CR225; 10+ Valley], Many Irrigation facilities (Approx. 8 Private (contentious/likely part of condemnation and with multiple shareholders) and 2 companies (FCDC and Pioneer), Reimbursable relocation/adjustment of LaPLAWD Water line, IKAV, Williams, unknown Other Gas Gathering lines (long lead design/utility agreements), Quality Level A SUE, BOR crossing of FCDC (Retain as-is), Re-evaluation of EIS effect ROW start, mouse, BA timing restrictions, Other environmental? LaPAWD Waterline.
Major Obstacles during Construction Phase: Phasing and maintenance of traffic with grade changes and widening compared to existing, source of import material (Embankment), intersection phasing, bridge construction phasing. BA timing restrictions (2 specific). Habitat/Wetland mitigation
Safety Issues: Maintenance of traffic, structure excavations and structure construction
Sustainable Design and Construction Requirements: Reduce freight bottlenecks: lower greenhouse gas emissions by increasing travel efficiency and reliability. Air quality monitoring for a suite of pollutants and collect meteorological data to help with community concerns about air quality in the area.

Project Goals

An understanding of project goals is essential to selecting an appropriate project delivery method. Therefore, project goals should be set prior to using the project delivery selection matrix. Typically, the project goals can be defined in three to five items and need to be reviewed here. Example goals are provided below, but the report should include project-specific goals. These goals should remain consistent over the life of the project.

Project-Specific Goals
Goal #1: Increase travel mobility, efficiency, and capacity to meet current and future needs. Increasing travel efficiency by moving turning vehicles out of the thru-lane for much of the corridor and by providing passing opportunities by adding or extending passing lanes, Freight climbing lanes or additional thru-lanes.
Goal #2: Improve safety for the traveling public by reducing the number and severity of accidents. Increase safety by improving roadway elements to meet current design standards and by adding wildlife underpasses/connectivity and exclusion fencing as well as improving recovery slopes, widening shoulders, installing passing lanes, and improving intersections.
Goal #3: Improving resiliency of the corridor by adding flexibility within the system to account for potential crashes and avoiding long detours and impacts to lower classification roadways.
Goal #4: Meet Grant timelines (Obligation of funds by Est. to be September 2027; Substantial completion (traffic utilization of final alignment) Est. to be by 2031; expenditure of funds Est. to be by September 2032)
Goal #5: Provide an efficient, innovative, and cost-effective design and approach to construction that maximizes the use of the available budget to ensure the completion of the INFRA Grant scope while striving to extend limits to the east (Dry Creek).
Goal #6: Ensure construction phasing to minimize impacts to highway users and to ensure two lanes of traffic as required by the Lane Closure Policy
Goal #7: Ensure CDOT input in design through effective coordination and partnership

General Project Goals (For consideration)

Schedule

- Minimize project delivery time – Goal 5: Meeting grant obligation and expenditure deadlines
- Complete the project on schedule
- Accelerate start of project revenue

Cost

- Minimize project cost
- Maximize project budget
- Complete the project on budget
- Maximize the project scope and improvements within the project budget
- Quality
- Meet or exceed project requirements
- Select the best team
- Provide a high-quality design and construction constraints
- Provide an aesthetically pleasing project

Functional

- Maximize the life cycle performance of the project
- Maximize capacity and mobility improvements
- Minimize inconvenience to the traveling public during construction
- Maximize safety of workers and traveling public during construction

Project Constraints

There are potential aspects of a project that can eliminate the need to evaluate one or more of the possible delivery methods. A list of general constraints can be found below the table and should be referred to after completing this worksheet. The first section below is for general constraints and the second section is for constraints specifically tied to project delivery selection.

General Constraints
Source of Funding:
Approximately $58.9M INFRA, $2M Freight, $14M FASTER Bridge, $9M FASTER Safety, $25M SB267(21-260?), etc.
Schedule constraints:
All funds obligated by September 30, 2027. All funds expended by September 30, 2032.
Federal, state, and local laws:
All applicable laws and standards apply.
Third party agreements with railroads, ROW, etc.:
Pending ROW, Irrigation and utility agreements
Project Financing
Does your project have any funding gaps that would require Financing*? N/A
Project Delivery Specific Constraints
Project delivery constraint #1:
Designer for D-B-B or CMGC will need to be selected based upon qualifications. Design available to date would then be seen as preliminary only as a new design team would commence independent design effort with potentially new EOR. Under D-B technical Criteria will control design and the same independent design will occur.
Project delivery constraint #2:
Ensure all INFRA Grant funding is expended by September 30, 2032, as well as other Grant timelines are upheld.
Project delivery constraint #3:
Total Project cost must not exceed $100M and must address all components (Design, ROW, Utilities, Environmental, Construction)
Project delivery constraint #4:
Bridge Enterprise (BTE) funds may only be used for structure replacement (STR # P-05-BC) over the Florida River but includes all associated actions. BTE funds total $14M
Project delivery constraint #5:
Considerable irrigation (Company and individual) impacts
Project delivery constraint #6:
Lane Closure Policy; Irrigation season: continuous access; federal stakeholders (USFS, BLM); reevaluation of design required for construction.
Project delivery constraint #7:
ROW acquisition timing and defined design/construction limits

General Project Constraints

Schedule

- Utilize federal funding by a certain date.
- Complete the project on schedule.
- Weather and/or environmental impact

Cost

- Project must not exceed a specific amount.
- Minimal changes will be accepted.
- Some funding may be utilized for specific type of work (bridges, drainage, etc.)

Quality

- Must adhere to standards proposed by the Agency.
- High quality design and construction constraints
- Adhere to local and federal codes.

- *If project financing is required before proceeding with the project delivery selection matrix, the project will need to coordinate with the Colorado High Performance Transportation Enterprise (HPTE). If financing is necessary, the project will need to work with the HPTE to determine the appropriate project delivery method that will accommodate the financing mechanism(s).

Functional

- Traveling public must not be disrupted during construction.
- Hazardous site where safety is a concern.
- Return area surrounding project to existing conditions.

Project Risks

Identified Project Risks
Project Risk: Right of Way Acquisition – timing, conditions and limitations/constraints, possible condemnation.
Project Risk: Irrigation – maintenance of irrigation during season, assurance of irrigation design standards and agreements, including no commingling of highway drainage and irrigation water.
Project Risk: Environmental – Re-evaluations of designs for construction, habitat impact mitigations,
Project Risk:
Access management – maintenance of access during construction, Construction Access permits (Form 138), owner perspectives/change management
Project Risk: Public management – Both adjacent owners directly affected by the project and the traveling public. Navigate questions, perspectives and wants v needs/obligations, and concerns the public may have with CR 225 Roundabout -
Project Risk: Utilities – relocations. Waterline, Gas line, etc. - IKAV relocations? (Relocation agreements and timing and cost), waterline is a constraint.
Project Risk: Traffic – Maintenance of traffic at accesses, and through the project; Night work?
Project Risk: Design - design in various levels of completion. Timeline to complete
Project Risk: Construction - Constructability, weather impacts (potentially short construction season, monsoons, etc.)
Project Risk: Cost – BABA, duration and effect on $$, unknowns, schedule impacts, price escalation
Project Risk: Tight schedule – obligation of funds, timing of bridge replacement, RFPs, bidding, hiring, contracting.

General Risk Categories to Consider

1. Site Conditions and Investigations
2. Utilities
3. Railroads
4. Drainage/Water Quality
5. Environmental
6. Third-party Involvement
7. Organizational
8. Design
9. Construction
10. Right-of-Way

Project Delivery Selection 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	**CM/GC**	**DB**
Primary Selection Factors			
1. Project Complexity & Innovation	+	++	++
2. Project Delivery Schedule	+	++	+++
3. Project Cost Considerations	+	++	+++
4. Level of Design	++	+++	++
5. Risk Assessment	++	++	++
Secondary Selection Factors			
6. Staff Experience/Availability (Agency)			**Pass**
7.Level of Oversight and Control			**Pass**
8. Competition and Contractor Experience			**Pass**

Rating Key	
+++	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 Summary Conclusions and Comments

The US160 Elmore's Corner to Dry Creek (Elmore's East) Project goals align with the Design-Build-Delivery Method as the Project seeks to improve safety for the traveling public by reducing the number and severity of accidents. The Project will increase safety by improving roadway elements to meet current design standards and add wildlife underpasses, connectivity and exclusion fencing. Additional safety will be gained by improving recovery slopes, widening shoulders, installing passing lanes, and improving intersections. The project further strives to provide an efficient, innovative, and cost-effective design with an approach to construction that maximizes the use of the available budget while ensuring the completion of the INFRA Grant scope and striving to extend improvements. CDOT desires an effective partnership in which design is created through input and coordination. The Region also wishes to optimize construction phasing to minimize impacts to highway users. Utmost, the Project must meet tight Grant obligations and expenditure timelines which requires efficient and concurrent acquisition of ROW, contracting, completion of design, and construction.

Project complexity and innovation opportunities support Design-Build include the competitive innovation from multiple proposers to find best value which seeks to maximize scope (ensure grant scope with potential additional elements) while bringing effective solutions to improve safety in the corridor. Additional opportunities are seen as the Design-Build Team's ability to efficiently construct the project and minimize impacts to highway users. The Project sees additional opportunity for innovative design to limit required material import, efficient earthwork phasing, and structural design, and intersection improvements.

In terms of **Project Delivery Schedule**, tight grant timelines offer opportunity through Design-Build which was viewed as the fastest path to obligation of all project funds and provides a maximized overlap of Design, ROW, and Construction. As an example, ROW acquisition can occur concurrently with RFP development and final design can overlap with construction. With the obligation of Grant funding occurring upon RFP Phase Authorization, fulfilling the grant terms will be concise and swift.

As it relates to **Project Cost considerations,** Design-Build uses an upset amount to control the maximum budget avoiding concern over changes to the price index. To this, the later the project is awarded, the greater the market conditions could impact the cost and affect the scope of the project. Design-Build locks in the contract value at the time the contract is signed. Further, having the greatest potential for upfront innovation can maximize scope and/or value.

Elmore's East has a variety of design completeness that make up its **Level of Design** including 90% complete of a proposed roundabout intersection (CR225) design, 30-60% complete of ½ of the project limits (Elmore's to CR225 Segment) and conceptual level design of ½ of the project limits (Valley Segment). There is an opportunity for Design-Build to capitalize on this level of design, believing that little to no work has to be done to create an effective reference design while allowing the Design-Build proposers to competitively reassess the current design to bring best value.

In terms of **Project Risk** for Elmore's east, the opportunity for D-B is the ability to assign or retain risk as deemed best suited for the specific area. Risk and risk allocations are important factors in the most appropriate delivery

method for the Elmore's Project and the selection of three most qualified teams to propose on the project, ensures that the quality is in place to address the Project's needs including risks. Elements of third-party agreements and the navigation of their approvals are beneficially shared to support the design and implementation of the improvements. This coordination and collaboration are required universally, but Design-Build places some of the importance of this action with the contractor. Risk of adhering to Grant commitments can be assigned to the contractor (scope, completion dates, "partial completion", etc.) as they control the schedule. ROW commitments can be shared or retained as appropriate under D-B. Cost risk is mitigated through GMP.

Based upon the findings of the Region 5 Project Delivery Selection Team, comprised of Region leadership, Region project management and specialty units, and Bridge and Tunnel Enterprise, with the observation of FHWA, it is recommended that the most appropriate delivery method for the US160 Elmore's to Dry Creek Project is **Design-Build**. D-B allows opportunity to mitigate cost uncertainty, ensure meeting of grant milestones, provide innovation toward the benefit of maximizing scope and safety, and a nuanced approach to risk management. In short, Design-Build can be leveraged to position the project for its greatest success.

Project Delivery Selection Matrix

Primary Factors

1) Project Complexity and Innovation

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

DESIGN-BID-BUILD - Allows Agency to fully resolve complex design issues and qualitatively evaluate designs before procurement of the general contractor. Innovation is provided by Agency/Consultant expertise and through traditional agency directed processes such as VE studies and contractor bid alternatives.

Opportunities	Obstacles	Rating
Negotiation of 3rd party agreements (Irr. 138, row) aligning with design development	single perspective with less input	+
CDOT control of design (innovation obstacle)	Loss of contractor innovation	
Bid packages for budget	Coordination and timing of phases	
	Budget risk of last phase/Packages	
	Irrigation Companies design requirements	
	Constructability	

CMGC - Allows independent selection of designer and contractor based on qualifications and other factors to jointly address complex innovative designs through three party collaboration of Agency, designer, and Contractor. Allows for a qualitative (non-price oriented) design but requires agreement on CAP.

Opportunities	Obstacles	Rating
Contractor input on design and constructability - Alignment, fill generation, structure types, etc.	Irrigation Companies design requirements	++
VE analysis and Constructability Review to improve design		
CDOT benefits design experience and exposure from process		
Negotiation of 3rd party agreements (Irr. 138, row) aligning with design development		
Contractor input on Earthwork management and fill reduction.		
Contractor input on Structural design and phasing		

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	Rating
Innovation is received from multiple proposers to find best value, which could be to maximize scope (ensure grant scope, add dry creek elements)	Negotiation of 3rd party agreements (Irr. 138, row)	++
CDOT benefits design experience and exposure from process	Balance of prescriptive +technical criteria while allowing innovation	
Competitive innovation on Earthwork management and fill reduction.	irrigation company's design requirement	
Competitive innovation Structural design and phasing		

2) Delivery Schedule

Delivery schedule is the overall project schedule from scoping through design, construction and opening to the public. Assess time considerations for starting the project or receiving dedicated funding 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	Rating
Define Milestones for funding obligations	Limited parallel of Construction and ROW	+
3-years to advertise (1, 2 or 3 Packages)	Separate projects add time	
	Potentially Longest path to obligation	
	ROW clearance duration	
	Irrigation Companies coordination	

CMGC - 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 CAP.

Opportunities	Obstacles	Rating
Parallel 2nd phase design, Construction and ROW	Obligation of funds is potential critical path element	++
Project specific and GC RFPs concurrently	Addition of Constructability review and contractor input adds time to process	
	Development of multiple packages each has timeline that could impact full scope execution	
	Potentially Longest path to obligation	

DESIGN-BUILD - Ability to 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 and transparent selection process.

Opportunities	Obstacles	Rating
Parallel Design, Construction and ROW	Longest lead time	+++
Fastest path to full obligation	3rd party approvals with uncontrollable time	

3) Project Cost Considerations

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. Cost accuracy is limited until design is completed. More likelihood of cost change orders due to the contractor having no design responsibility.

Opportunities	Obstacles	Rating
Greatest competition of initial construction cost	re-Ad.	
single level of design cost	misinterpretation of plans = $$	
Bid packages for budget	Change orders	
VECP	impacted by Price index	+
	BABA material restrictions/Cost	
	Budget risk of last phase/Packages	
	Does not maximize scope (Goal)	

CMGC - Agency/designer/contractor collaboration to reduce risk pricing can provide a low-cost project however, non-competitive negotiated CAP introduces price risk. Good flexibility to design to a budget.

Opportunities	Obstacles	Rating
Package limiting industry effect on cost (depending on timing)	Obligation of funds is potential negotiation conflict element	
issue packages to adapt to remaining budget	Package limiting industry effect on cost (depending on timing)	
adaptable to remaining budget (increase scope)	impacted by Price index	
one design cost	Budget risk of last phase/Packages and impact on scope	
Increased value opportunity from input	Additional pre-construction cost (CM, ICE) 3%	++

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 to bid to match a fixed budget. Poor risk allocation can result in high contingencies.

Opportunities	Obstacles	Rating
GMP approach. Lock into budget	Unknown Impact environmental mitigation costs	
Greatest potential innovation for upfront increased scope	Added design support (owner's Rep) cost to D-B design cost 4.5%	
less impacted by price index	Risk: Proposals may not achieve basic configuration.	
	Risk value takes away from scope	
		+++

4) 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 Agency or contracted design team, with Agency having complete control over the design.

Opportunities	Obstacles	Rating
Ability to adjust ROW to meet design needs to improve safety	Separate projects add effort	++
Bid Elmore's, CR225 and Valley (save PS contracts and capitalize on existing design)	Multiple contractors	
CDOT controls design	Lacks input for innovation	
	With Design RFP may be starting over with new design lead	
	lacks contractor input and competitive ideas	
	Design, Ad, construct	

CMGC - Can utilize a lower level of design prior to procurement of the CMGC and then collaboration of Agency, designer, and CMGC in the further development of the design. Iterative nature of design process risks extending the project schedule.

Opportunities	Obstacles	Rating
With Design RFP would be starting over but is made up by concurrent activities (PS ?)	Loss of existing design cost	+++
CDOT controls design	Time to complete packages	
benefits from contractor input and competitive ideas	RFP for Designer AND GC	
input can improve current design & constructability	Concurrent negotiations with final design?	
Ability to adjust ROW to meet design needs to improve safety		

DESIGN-BUILD - Design advanced by Agency to the level necessary to precisely define contract requirements and properly allocate risk (typically 30% or less).

Opportunities	Obstacles	Rating
With Design RFP would be starting over but is made up by concurrent activities	Control of design is reduced	++
Near level of design for RFP	RFP development and associated actions (LOI, etc.) takes time	
	Procurement process = Time	

5) Risk Assessment of Delivery Methods

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, change orders, and potential claims.

Opportunities	Obstacles	Rating
ROW risk can be mitigation	PS v NPS design	
CDOT coordination and adaptation to 138 process & ROW commitments	3rd party approvals - Delay to Ad	
Ability to control risk of environmental clearances	quality at risk due to low bid	
	added step / added time of long lead procurement	++
	longer timeline could impact grant obligations	
	assumption of TC/Phasing	
	Price Escalation	

CMGC - Provides opportunity for Agency, 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	Rating
Condemnation powers for third party needs (utilities)	3rd party approvals - Delay to Package	
ROW risk can be mitigation	PS v NPS design - Timelines	
Qualifications based selection - Improved quality, team selection	timeline could impact grant obligations	
CDOT coordination and adaptation to 138 process & ROW commitments	Price escalation (mitigated by sooner packages)	
Contractor input on perceived v actual risk and valuation thereof with potential to mitigate and avoid cost.	Structure selection report update	++
Ability to control risk of environmental clearances		
Ability to procure long lead items thru GC contract		
IKAV relocations involves contractor in timing/coordination		
input on TC/phasing / access		

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	Rating
Condemnation powers for third party needs (utilities)	Structure selection report update	
Qualifications based selection - Improved quality, team selection	3rd party approvals- delay claim	
irrigation design coordination is contractors	Re-eval for Basic / Re-Eval for RFC - Timing/approvals	
Unknown Impact mitigation costs /acquisitions - Risk assignment to D-B team	ROW can impact Critical path	
Defined timeline to avoid grant impact		++
Unknown utility Impact costs /acquisitions - Risk assignment to D-B team, ATC potential	Driveways/138 & Property owner commitments/issues - Schedule/design	
Phasing and control of traffic / access is built in	potential Structure design Tech criteria limitations	
GMP (escalation mitigation)		
Long lead is contractor risk		

Weather, constructability risk is contractor's		

Project Delivery Selection Matrix

Secondary Factors

6) Staff Experience and Availability

Agency 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	Rating
		N/A

CMGC - Strong, committed Agency project management resources are important for success of the CMGC process. Resource needs are like DBB except Agency must coordinate CM's input with the project designer and be prepared for CAP negotiations.

Opportunities	Obstacles	Rating
D-B Selected. CM/GC is second approach if D-B fails to gain industry support	Staffing required (consultant owner's rep) for design through Construction	Pass
Less staff than D-B	Less experience in CM/GC	

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	Rating
Staff Experience with D-B	Staffing required (consultant owner's rep) for Procurement through Construction	Pass

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**	**Rating**
		N/A

CMGC - Most control by Agency over both the design, and construction, and control over a collaborative agency/designer/contractor project team		
Opportunities	**Obstacles**	**Rating**
D-B Selected. CM/GC is second approach if D-B fails to gain industry support		**Pass**
CDOT input allowed on design.		

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**	**Rating**
	More staffing required (consultant owner's rep)	**Pass**
	Technical criteria	

8) Competition and Contractor Experience

Competition and availability refer to the level of competition, experience and availability in the marketplace 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	Rating
		N/A

CMGC - Allows for the selection of the single most qualified contractor, but CAP can limit price competition. Low level of marketplace experience.

Opportunities	Obstacles	Rating
D-B Selected. CM/GC is second approach if D-B fails to gain industry support		Pass
CM/GC is fallback to D-B		
good experience in Colorado		

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

Opportunities	Obstacles	Rating
Good experience in Colorado	Risk: Is Industry interested?	Pass
Project of size to draw contractors		

Project Delivery Selection Factors: Opportunities, and Obstacles Checklists

1) Project Complexity and Innovation Project Delivery Selection Checklist

DESIGN-BID-BUILD
Complexity and Innovation Considerations
● Agencies control of design of complex projects ● Agency and consultant expertise can select innovation independently of contractor abilities ● Opportunities for value engineering studies during design, more time for design solutions ● Aids in consistency and maintainability ● Full control in selection of design expertise ● Complex design can be resolved and competitively bid ● Innovations can add cost or time and restrain contractor's benefits ● No contractor input to optimize costs ● Limited flexibility for integrated design and construction solutions (limited to constructability) ● Difficult to assess construction time and cost due to innovation
CMGC
Complexity and Innovation Considerations
● Highly innovative process through 3 party collaboration ● Allows for agency control of a designer/contractor process for developing innovative solutions ● Allows for an independent selection of the best qualified designer and best qualified contractor ● VE inherent in process and enhanced constructability ● Risk of innovation can be better defined and minimized and allocated ● Can take to market for bidding as contingency ● Can develop means and methods to the strengths of a single contractor partner throughout preconstruction ● Process depends on designer/CM relationship ● No contractual relationship between designer/CM ● Innovations can add or reduce cost or time ● Management of scope additions ●
DESIGN-BUILD
Complexity and Innovation Considerations
● Designer and contractor collaborate to optimize means and methods and enhance innovation ● Opportunity for innovation through competitiveness of ATC process ● Can use best-value procurement to select design-builder with best qualifications ● Constructability and VE inherent in process ● Early team integration ● Requires desired solutions to complex designs to be well defined through technical requirements ● Qualitative designs can be difficult to define if not done early in design (example. aesthetics) ● time or cost constraints on designer ● Quality assurance for innovative processes can be difficult to define in RFP ● Ability to obtain intellectual property using stipends

2) Delivery Schedule Project Delivery Selection Checklist

DESIGN-BID-BUILD
Schedule Considerations
● Schedule is more predictable and more manageable. ● Milestones can be easier to define. ● Projects can more easily be “shelved.” ● Shortest procurement period ● Elements of design can be advanced prior to permitting, construction, etc. ● Time to communicate/discuss design with stakeholders. ● Time to perform a linear Design-Bid-Build delivery process. ● Design and construction schedules can be unrealistic due to lack of industry input. ● Errors in design lead to change orders and schedule delays ● Low bid selection may lead to potential delays and other adverse outcomes.

CMGC
Schedule Considerations
● Ability to start construction before entire design, ROW, etc. is complete (i.e., phased design) ● More efficient procurement of long-lead items ● Early identification and resolution of design and construction issues (e.g., utility, ROW, and earthwork) ● Can provide a shorter procurement schedule than DB. ● Team involvement for schedule optimization ● Continuous constructability review and VE ● Maintenance of Traffic improves with contractor inputs. ● Contractor input for phasing, constructability and traffic control may reduce overall schedule. ● Potential for not reaching CAP and substantially delaying schedule. ● CAP negotiation can delay the schedule. ● Designer-contractor-agency disagreements can add delays. ● Strong agency management is required to control schedule

DESIGN-BUILD
Schedule Considerations
● Potential to accelerate schedule through parallel design-build process. ● Shifting of schedule risk ● Industry input into design and schedule ● Fewer chances for disputes between agency and the Design-Build team ● More efficient procurement of long-lead items ● Ability to start construction before entire design, ROW, etc. is complete (i.e., phased design) ● Allows innovation in resource loading and scheduling by DB team. ● Request for proposal development and procurement can be intensive. ● Undefined events or conditions found after procurement, but during design can impact schedule and cost. ● Time required to define and develop RFP technical requirements and expectations. ● Requires agency and stakeholder commitments to an expeditious review of design

3) Project Cost Considerations Project Delivery Selection Checklist

DESIGN-BID-BUILD
Project Cost Considerations
● Competitive bidding provides a low-cost construction to a fully defined scope of work. ● Increased certainty about cost estimates ● Construction costs are contractually set before construction begins. ● Cost accuracy is limited until design is completed. ● Construction costs are not locked in until design is 100% complete. ● Cost reductions due to contractor innovation and constructability is difficult to obtain. ● More potential of cost change orders due to Agency design responsibility
CMGC
Project Cost Considerations
● Agency/designer/contractor collaboration to reduce project risk can result in lowest project costs. ● Early contractor involvement can result in cost savings through VE and constructability. ● Cost will be known earlier when compared to DBB. ● Integrated design/construction process can provide a cost-efficient strategy to project goals. ● Can provide a cost-efficient response to meet project goals. ● Non-competitive negotiated CAP introduces price risk. ● Difficulty in CAP negotiation introduces some risk that CAP will not be successfully executed requiring aborting the CMGC process. ● Paying for contractors' involvement in the design phase could potentially increase total cost. ● Use of Independent Cost Estimating (ICE) expertise to obtain competitive pricing during CAP negotiations
DESIGN-BUILD
Project Cost Considerations
● Contractor input into design should moderate cost ● Design-builder collaboration and ATCs can provide a cost-efficient response to project goals. ● Costs are contractually set early in design process with design-build proposal. ● Allows a variable scope to bid to match a fixed budget. ● Potential lower average cost growth ● Funding can be obligated in a very short timeframe. ● Risks related to design-build, lump sum cost without 100% design complete, can compromise financial success of the project

4) Level of Design Project Delivery Selection Checklist

DESIGN-BID-BUILD
Level of Design Considerations
● 100% design by agency ● Agency has complete control over the design (can be beneficial when there is one specific solution for a project) ● Project/scope can be developed through design. ● The scope of the project is well defined through complete plans and contract documents. ● Well-known process to the industry ● Agency design errors can result in a higher number of change orders, claims, etc. ● Minimizes competitive innovation opportunities. ● Can reduce the level of constructability since the contractor is not bought into the project until after the design is complete

CMGC
Level of Design Considerations
● Can utilize a lower level of design prior to selecting a contractor then collaboratively advance design with agency, designer and contractor. ● Contractor involvement in early design improves constructability. ● Agency controls design ● Design can be used for DBB if the price is not successfully negotiated. ● Design can be responsive to risk minimization. ● Teaming and communicating concerning design can cause disputes. ● Three party process can slow progression of design. ● Advanced design can limit the advantages of CMGC or could require re-design

DESIGN-BUILD
Level of Design Considerations
● Design advanced by the agency to level necessary to precisely define the contract requirements and properly allocate risk. ● Does not require much design to be completed before awarding project to the design-builder (between ~ 10% - 30% complete) ● Contractor involvement in early design, which improves constructability and innovation. ● Plans do not have to be as detailed because the design-builder is bought into the project early in the process and will accept design responsibility. ● Clearly define requirements in the RFP because it is the basis for the contract. ● If design is too far advanced, it will limit the advantages of design-build. ● Carefully develop the RFP so that scope is fully defined. ● Over utilizing performance specifications to enhance innovation can risk quality through reduced technical requirements. ● Less agency control over the design ● Can create project less standardized designs across agency as a whole

Project Risk Assessment

5a) Initial Risk Assessment Guidance

Three sets of risk assessment checklists are provided to assist in an initial risk assessment relative to the selection of the delivery method:

- Typical Transportation Project Risks
- General Project Risks Checklist
- Opportunities/Obstacles Checklist (relative to each delivery method)

It is important to recognize that the initial risk assessment is to only ensure the selected delivery method can properly address the project risks. A more detailed level of risk assessment should be performed concurrently with the development of the procurement documents to ensure that project risks are properly allocated, managed, and minimized through the procurement and implementation of the project.

The following is a list of project risks that are frequently encountered on transportation projects and a discussion on how the risks are resolved through the different delivery methods.

1) Site Conditions and Investigations

How unknown site conditions are resolved. For additional information on site conditions, refer to 23 CFR 635.109(a) at the following link: http://ecfr.gpoaccess.gov/

DESIGN-BID-BUILD
Site condition risks are generally best identified and mitigated during the design process prior to procurement to minimize the potential for change orders and claims when the schedule allows.
CMGC
CDOT, the designer, and the contractor can collectively assess site condition risks, identify the need to perform site investigations in order to reduce risks, and properly allocate risk prior to CAP.
DESIGN-BUILD
Certain site condition responsibilities can be allocated to the design-builder provided they are well defined and associated third party approval processes are well defined. Caution should be used, as unreasonable allocation of site condition risk will result in high contingencies during bidding. The Agency should perform site investigations in advance of procurement to define conditions and avoid duplication of effort by proposers. At a minimum, the Agency should perform the following investigations: 1) Basic design surveys 2) Hazardous materials investigations to characterize the nature of soil and groundwater contamination. 3) Geotechnical baseline report to allow design-builders to perform proposal design without extensive additional geotechnical investigations

2) Utilities

DESIGN-BID-BUILD
Utility risks are best allocated to the Agency, and mostly addressed prior to procurement to minimize potential for claims when the schedule allows.
CMGC
Can utilize a lower level of design prior to contracting and collaboration of Agency, designer, and contractor in the further development of the design.

DESIGN-BUILD

Utilities responsibilities need to be clearly defined in contract requirements, and appropriately allocated to both design-builder and the Agency:

Private utilities (major electrical, gas, communication transmission facilities): Need to define coordination and schedule risks, as they are difficult for design-builder to price. Best to have utilities agreements before procurement. Note – by state regulation, private utilities have schedule liability in design-build projects, but they need to be made aware of their responsibilities.

Public Utilities: Design and construction risks can be allocated to the design-builder, if properly incorporated into the contract requirements.

3) Railroads (if applicable)

DESIGN-BID-BUILD

Railroad risks are best resolved prior to procurement and relocation designs included in the project requirements when the schedule allows.

CMGC

Railroad impacts and processes can be resolved collaboratively by Agency, designer, and contractor. A lengthy resolution process can delay the CAP negotiations.

DESIGN-BUILD

Railroad coordination and schedule risks should be well understood to be properly allocated and are often best assumed by the Agency. Railroad design risks can be allocated to the designer if well defined. Best to obtain an agreement with railroad defining responsibilities prior to procurement

4) Drainage/Water Quality Best Management Practices (construction and permanent)

Both drainage and water quality often involve third party coordination that needs to be carefully assessed with regard to risk allocation. Water quality is not currently well defined, complicating the development of technical requirements for projects.

Important questions to assess:

1) Do criteria exist for compatibility with third party offsite system (such as an OSP (Outfall System Plan))?
2) Is there an existing cross-drainage undersized by design Criteria?
3) Can water quality requirements be precisely defined? Is right-of-way adequate?

DESIGN-BID-BUILD

Drainage and water quality risks are best designed prior to procurement to minimize potential for claims when the schedule allows.

CMGC

The Agency, the designer, and the contractor can collectively assess drainage risks and coordination and approval requirements, and minimize and define requirements and allocate risks prior to CAP.

DESIGN-BUILD

Generally, the Agency is in the best position to manage the risks associated with third party approvals regarding compatibility with offsite systems and should pursue agreements to define requirements for the design-builder.

5) Environmental

Meeting environmental document commitments and requirements, noise, 4(f) and historic, wetlands, endangered species, etc.

DESIGN-BID-BUILD

Risk is best mitigated through design prior to procurement when the schedule allows.

CMGC

Environmental risks and responsibilities can be collectively identified, minimized, and allocated by the Agency, the designer, and the contractor prior to CAP

DESIGN-BUILD

Certain environmental approvals and processes that can be fully defined can be allocated to the design-builder. Agreements or MOUs with approval agencies prior to procurement is best to minimize risks.

6) Third Party Involvement

Timeliness and impact of third-party involvement (funding partners, adjacent municipalities, adjacent property owners, project stakeholders, FHWA, PUC)

DESIGN-BID-BUILD Third party risk is best mitigated through design process prior to procurement to minimize potential for change orders and claims when the schedule allows.
CMGC Third party approvals can be resolved collaboratively by the Agency, designer, and contractor.
DESIGN-BUILD Third party approvals and processes that can be fully defined can be allocated to the design-builder. Agreements or MOUs with approval agencies prior to procurement is best to minimize risks.

5b) General Project Risk Checklist (Items to consider when assessing risk)

Environmental Risks	External Risks
• Delay in review of environmental documentation • Challenge in appropriate environmental documentation • Defined and non-defined hazardous waste • Environmental regulation changes • Environmental impact statement (EIS) required. • NEPA/ 404 Merger Process required. • Environmental analysis on new alignments required	• Stakeholders request late changes. • Influential stakeholders request additional needs to serve their own commercial purposes. • Local communities pose objections. • Community relations • Conformance with regulations/guidelines/ design criteria • Intergovernmental agreements and jurisdiction
Third-Party Risks	**Geotechnical and Hazmat Risks**
• Unforeseen delays due to utility owner and third-party • Encounter unexpected utilities during construction. • Cost sharing with utilities not as planned. • Utility integration with project not as planned. • Third-party delays during construction • Coordination with other projects • Coordination with other government agencies	• Unexpected geotechnical issues • Surveys late and/or in error • Hazardous waste site analysis incomplete or in error • Inadequate geotechnical investigations • Adverse groundwater conditions • Other general geotechnical risks
Right-of-Way/ Real Estate Risks	**Design Risks**
• Railroad involvement • Objections to ROW appraisal take more time and/or money. • Excessive relocation or demolition • Acquisition ROW problems • Difficult or additional condemnation • Accelerating pace of development in project corridor • Additional ROW purchase due to alignment change	• Design is incomplete/ Design exceptions. • Scope definition is poor or incomplete. • Project purpose and need are poorly defined. • Communication breakdown with project team • Pressure to delivery project on an accelerated schedule • Constructability of design issues • Project complexity - scope, schedule, objectives, cost, and deliverables - are not clearly understood
Organizational Risks	**Construction Risks**
• Inexperienced staff assigned. • Losing critical staff at crucial point of the project • Functional units not available or overloaded • No control over staff priorities • Lack of coordination/ communication • Local agency issues • Internal red tape causes delay getting approvals, decisions. • Too many projects/ new priority projects inserted into program	• Pressure to delivery project on an accelerated schedule. • Inaccurate contract time estimates • Construction QC/QA issues • Unclear contract documents • Problem with construction sequencing/ staging/ phasing • Maintenance of Traffic/ Work Zone Traffic Control

5c) Assessment of Risk Project Delivery Selection Opportunities/Obstacles Checklist

DESIGN-BID-BUILD
Risk Considerations
● Risks managed separately through design, bid, build is expected to be easier. ● Risk allocation is most widely understood/used. ● Opportunity to avoid or mitigate risk through complete design. ● Risks related to environmental, railroads, & third-party involvement are best resolved before procurement. ● Utilities and ROW best allocated to the agency and mostly addressed prior to procurement to minimize potential for claim. ● Project can be shelved while resolving risks. ● Agency accepts risks associated with project complexity (the inability of designer to be all-knowing about construction) and project unknowns. ● Low-bid related risks ● Potential for misplaced risk through prescriptive specifications ● Innovative risk allocation is difficult to obtain. ● Limited industry input in contract risk allocation ● Change order risks can be greater
CMGC
Risk Considerations
● Contractor can have a better understanding of the unknown conditions as design progresses. ● Innovative opportunities to allocate risks to different parties (e.g., schedule, means and methods, phasing) ● Opportunities to manage costs risks through CMGC involvement. ● Contractor will help identify and manage risk. ● Agency still has considerable involvement with third parties to deal with risks. ● Avoids low-bidding risk in procurement. ● More flexibility and innovation available to deal with unknowns early in the design process. ● Lack of motivation to manage small quantity costs. ● Increase costs for non-proposal items. ● Disagreement among Designer-Contractor-Agency can put the process at risk. ● If CAP cannot be reached, additional low-bid risks appear. ● Limited to risk capabilities of CMGC ● Strong agency management is required to negotiate/optimize risks. ● Discovery of unknown conditions can drive up CAP, which can be compounded in phased construction
DESIGN-BUILD
Risk Considerations
● Performance specifications can allow for alternative risk allocations to the design builder. ● Risk-reward structure can be better defined. ● Innovative opportunities to allocate risks to different parties (e.g., schedule, means and methods, phasing) ● Opportunity for industry review of risk allocation (draft RFP, ATC processes) ● Avoid low-bidding risk in procurement. ● Contractor will help identify risks related to environmental, railroads, ROW, and utilities. ● Designers and contractors can work toward innovative solutions to, or avoidance of, unknowns. ● Need a detailed project scope, description etc., for the RFP to get accurate/comprehensive responses to the RFP (Increased RFP costs may limit bidders) ● Limited time to resolve risks. ● Additional risks allocated to designers for errors and omissions, claims for change orders. ● Unknowns and associated risks need to be carefully allocated through a well-defined scope and contract. ● Risks associated with agreements when design is not completed. ● Poorly defined risks are expensive. ● Contractor may avoid risks or drive consultant to decrease cost at risk to quality

6) Staff Experience and Availability Project Delivery Selection Checklist

DESIGN-BID-BUILD
Staff Experience and Availability Considerations
● Agency, contractors and consultants have high level of experience with the traditional system. ● Designers can be more interchangeable between projects. ● Can require a high level of agency staffing of technical resources. ● Staff's responsibilities are spread out over a longer design period. ● Can require staff to have full breadth of technical expertise
CMGC
Staff Experience and Availability Considerations
● Agency can improve efficiencies by having more project managers on staff rather than specialized experts. ● Smaller number of technical staff required through use of consultant designer. ● Strong committed agency project management is important to success. ● Limitation of availability of staff with skills, knowledge, and personality to manage CMGC projects. ● Existing staff may need additional training to address their changing roles. ● Agency must learn how to negotiate CAP projects
DESIGN-BUILD
Staff Experience and Availability Considerations
● Less agency staff required due to the sole source nature of DB. ● Opportunity to grow agency staff by learning a new process. ● Limitation of availability of staff with skills and knowledge to manage DB projects. ● Existing staff may need additional training to address their changing roles. ● Need to "mass" agency management and technical resources at critical points in process (i.e., RFP development, design reviews, etc.)

7) Level of Oversight and Control Project Delivery Selection Checklist

DESIGN-BID-BUILD
Level of Oversight and Control Considerations
● Full agency control over a linear design and construction process ● Oversight roles are well understood. ● Contract documents are typically completed in a single package before construction begins. ● Multiple checking points through three linear phases: design-bid-build ● Maximum control over design ● Requires a high-level of oversight. ● Increased likelihood of claims due to agency design responsibility ● Limited control over an integrated design/construction process
CMGC
Level of Oversight and Control Considerations
● Preconstruction services are provided by the construction manager. ● Obtaining input from the CMGC to enhance constructability and innovation. ● Provides agency control over an integrated design/construction process. ● Agency must have experienced staff to oversee the CMGC. ● Higher level of cost oversight required
DESIGN-BUILD
Level of Oversight and Control Considerations
● A single entity responsibility during project design and construction ● Obtaining input from the Design-Builder to enhance constructability and innovation. ● Overall project planning and scheduling is established by one entity. ● Can require a high level of design oversight. ● Can require a high level of quality assurance oversight. ● Limitation on staff with DB oversight experience ● Less agency control over design ● Control over design relies on proper development of technical requirements

8) Competition and Contractor Experience Project Delivery Selection Checklist

DESIGN-BID-BUILD
Competition and Contractor Experience Considerations
● Promotes high level of competition in the marketplace. ● Opens construction to all reasonably qualified bidders. ● Transparency and fairness ● Reduced chance of corruption and collusion ● Contractors are familiar with the DBB process. ● Risks associated with selecting the low bid (the best contractor is not necessarily selected) ● No contractor input into the process ● Limited ability to select contractor based on qualifications
CMGC
Competition and Contractor Experience Considerations
● Allows for qualifications-based contractor procurement. ● Agency has control over an independent selection of best qualified designer and contractor. ● Contractor is part of the project team early on, creating a project “team.” ● Increased opportunity for innovation due to the diversity of the project team ● Currently there is not a large pool of contractors with experience in CMGC, which will reduce the competition and availability. ● Working with only one contractor to develop the CAP can limit price competition. ● Requires a strong project manager from the agency. ● Teamwork and communication among the project team
DESIGN-BUILD
Competition and Contractor Experience Considerations
● Allows for a balance of qualifications and cost in design-builder procurement. ● Two-phase process can promote strong teaming to obtain “Best Value.” ● Increased opportunity for innovation possibilities due to the diverse project team ● Need for DB qualifications can limit competition. ● Lack of competition with experience with the project delivery method ● Reliant on DB team selected for the project. ● The gap between agency experience and contractor experience with delivery method can create conflict