



## **Nevada Department of Transportation (NDOT) Project Delivery Selection Approach (PDSA)**

### **Overview**

This Project Delivery Selection Approach (PDSA) provides a process to assist the Department in their selection of an appropriate project delivery method(s). The PDSA includes generic forms and questions for use by Department staff and the Project Selection Committee (PSC). Every PSC member must be generally familiar with the alternative contracting delivery methods discussed herein, the overview of these delivery methods provided below, and the applicable reference links attached. By applying the PDSA, the PSC can arrive at a recommended project delivery method for each project evaluated. This recommendation will be forwarded to the Department's Front Office for a final determination on a delivery method. The primary objectives of this document are to:

- Present a structured approach to assist Department staff in making project delivery method recommendations;
- Assist the Department in determining if there is a dominant or obvious choice of project delivery method for the project being evaluated; and
- Provide a project delivery method recommendation based on a consensus opinion.

### **Background**

Currently, there are three types of project delivery methods available for publicly-funded transportation projects in Nevada. The two most common are the Design-Bid-Build (DBB) and the Design-Build (DB), with the Construction Manager at Risk (CMAR) method now considered for evaluation. The following paragraphs only briefly describe each delivery method. For a more complete description, see Section 1.4 of the Pioneer Program Guidelines and the attached reference links.

- DBB is the traditional project delivery method in which an agency designs a project and awards a construction contract to the lowest bidder based on the agency's completed construction documents. The agency "owns" the details of design during construction and the risk associated with any changed conditions, unknowns, errors, or omissions that are encountered during construction.
- DB is a project delivery method in which the agency contracts a single entity to complete design and construction of a project. Characteristically, a project is approximately 25 to 30 percent designed with a well-defined scope and knowledge of project risks at the point invitations to bid are requested via a value-based procurement. The design-builder retains the risks associated with design, quantities, constructability, etc. normally retained by the agency, resulting in greater cost and schedule certainty.

- CMAR is a project delivery method by which the agency leads a coordinated team, which works to develop design and construction documents in a manner to minimize overall project risk, improve project delivery schedule, and apply potential innovation to meet or exceed project goals. The other two members of the team, the designer and contractor, individually and independently are contracted and directly are accountable to the agency. Characteristically, a project is approximately 5 to 10 percent designed with a partially defined scope and vague knowledge and definition of associated risk when invitations to participate on the project's pre-construction team are released. The procurement of the contractor is done through qualifications and/or value-based selection for pre-construction and construction services. The contractor is obtained early in the design phase, allowing for the contractor to offer expertise with regard to the schedule, budget, constructability, as well as the identification, evaluation, and mitigation of risk. Upon final design of the project, or a portion thereof, the agency will ask the contractor to submit a fixed-price bid. The agency and the contractor may negotiate reassignment of risk if the agency finds the bid too high. If the parties cannot agree on a price, the agency may release the project for bid using the DBB method. The contractor may enter into a fixed-price contract with the agency based on a reasonable final cost and time of construction (agreeable to the agency) to complete the project. This method allows the agency to control the development of scope, understand and allocate project risk, encourage the use of new construction techniques, and phase project delivery to reduce overall delivery costs and schedule.

It should be noted that one can use different methods on the same project, and the objective is to recommend the best delivery method for the project. Each project delivery method is distinguished by how risk is managed and how the project's scope, schedule, and budget are managed. Each of the delivery methods poses both overlapping and unique advantages as well as associated disadvantages in their use. Each project must be evaluated individually taking into consideration project goals, prioritization of project goals as each relates to the Department's overall mission, and the attributes of each delivery method in meeting or exceeding a project's goals.

### **Step-by-step Project Delivery Selection Approach**

The PSC should use their professional judgment when recommending the most appropriate delivery method. This PDSA provides a systematic approach to understanding the delivery options; defining project goals, challenges, and opportunities; evaluating potential delivery methods; compiling the results in descending preference; and, lastly, recommending the appropriate delivery method for the project.

Step 1 is for the PSC to research and understand the various elements of the project. The following is a list of representative information that the PSC needs to consider in order to understand the project and apply the PDSA in an effective manner. The checklist is not exhaustive, and certain elements might not be known at the time of evaluation. Other items can be added if they influence the project delivery decision, and relevant information can be appended.

- 1) Project Name
- 2) Project Location
- 3) Project Sponsor
  - Local
  - State
  - Federal
- 4) Project Description
  - Purpose and Need
- 5) Estimated Project Cost Range (Total)
- 6) Budget Availability (Yr. and Qtr.)
- 7) On State Transportation Improvement Program (STIP)? (Fiscal Year)
- 8) NEPA Status
- 9) Right of Way Status
- 10) Desired Project Delivery Date (Yr. and Qtr.): Start of construction and substantial completion of construction
  - Established by what entity?
  - For what purpose?
- 11) Funding Source(s): Local, State, FHWA, etc.
- 12) Project Corridor
  - Corridor Plans
  - Adjacent Projects (status of existing and future projects [3 to 5 years])
- 13) Major Project Features: Pavement, bridge, sound barriers, etc.
- 14) Schedule Milestones: Milestones could include start of construction, end of construction, deliverables, etc.
- 15) Stakeholders
  - Third Party
  - Regulatory Agencies
  - Utility
  - Railroad
  - General Public
  - Other Governmental Interest
- 16) Major Challenges
  - With Right of Way, Utilities, Environmental Approvals, Permits, and Clearances

- During Construction Phase
- Specialty Items or Constructability Issues

17) Sources of Risk

- Design Risk by Discipline: Potential risk related to Utility, Structure, Right of Way Acquisition, Environmental Commitments, Definition of Scope, etc.
- Construction Risk: Potential risk for Geotechnical, Dewatering, Material Sources; Maintenance of Traffic, Environmental Constraints, Long-lead Items, Utilities, etc.

18) Potential for Innovation

19) Availability of Department Resources to Support Delivery Schedule

20) Prior Project Work, including design, and Status

Given that the understanding of the project is completed in Step 1, Step 2 is to clearly define and agree on measurable project goals, challenges, and opportunities. Typically, the project goals can be defined in three to five items. Examples are provided in the footnote below, but the PSC should always consider goals specific to the project being evaluated.<sup>1</sup> The PSC should also consult the Project Manager, the Deputy Director (as applicable), and other significant stakeholders to assist in understanding and developing the project goals. These goals are intended to remain consistent over the life of the project.

Project Goals (Enter the project-specific goals as follows):

1. Goal #1
2. Goal #2
3. Goal #3
4. Goal #4
5. Goal #5

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<sup>1</sup> **Project Goal Examples:**

**Schedule**

- Minimize project delivery time on a phase or the entire project in a desire to reach guaranteed maximum price in six months.
- Reach substantial completion by (month, year).

**Cost**

- Minimize project cost.
- Maximize project budget.
- Complete the project on budget.

**Quality**

- Meet or exceed maintenance of traffic requirements.
  - Maintain x lanes of traffic in each direction at all times during construction except for bridge replacements as noted below.
  - Limit road shut down to one consecutive 72-hour period through the duration of project.
- Provide the lowest life-cycle costs.

Note: Goals should be consistent with environmental documents when applicable.

Once the PSC has defined the project goals, it is critical to define elements of the project that would create the greatest challenges and opportunities related to achieving these project goals. Below are examples of various elements one might consider.

<p style="text-align: center;"><b>Opportunities</b></p> <p style="text-align: center;">What opportunities enhance the probability of achieving project goals?</p>	<p style="text-align: center;"><b>Challenges</b></p> <p style="text-align: center;">What challenges create risk in achieving project goals?</p>
<ul style="list-style-type: none"> <li>• Innovations to reduce maintenance of traffic impacts</li> <li>• Improve water quality</li> <li>• Life cycle benefits</li> <li>• Enhance safety</li> </ul>	<ul style="list-style-type: none"> <li>• Utility conflicts</li> <li>• Railroad conflicts</li> <li>• Right-of-way acquisition delays</li> <li>• Lack of definition of aesthetics</li> <li>• Undefined project limits</li> </ul>

Do these elements constitute a good description of the issues of complexity or risks associated with delivery of the project? Yes:  No:

If no, reevaluate the project goals and the project opportunities and challenges until they represent a good description of the issues of complexity or risks associated with delivery of the project.

**End Result:** The PSC will have an understanding of the project goals and a clear definition of challenges, opportunities, issues of complexity, and associated risks.



### Step 3: Evaluating the Appropriateness of a Delivery Method

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Step 3 is for the PSC to evaluate the appropriateness of each delivery method to the project. NDOT and the Federal Highway Administration (FHWA) have identified five criteria for determining the appropriateness of applying an alternative delivery method. These criteria are:

1. Cost Impacts
2. Schedule Impacts
3. Opportunity to Manage Risk
4. Complexity of Design and Construction Phasing
5. Opportunity for Innovation




This tool provides a list of typical advantages and disadvantages associated with each delivery method that are to be considered when evaluating a delivery method's appropriateness for the specific project. This list of advantages and disadvantages is not exhaustive, and the PSC will supplement additional characteristics, when appropriate, that further describe the advantages and disadvantages of the delivery method from their knowledge of the method and their professional judgment.

Based on their understanding of the delivery method's advantages and disadvantages as well as the Project's goals, challenges, opportunities, risks, and complexities, the PSC will form a consensus opinion of the most appropriate delivery method for each of the five criteria, and then summarize the key issues considered in arriving at this opinion.

For each of the five (5) criteria, the PSC should consider preferred delivery method in descending order by circling the "green," "yellow," or "orange" markers. **Note:** Each delivery method must be rated by one of the three colors under each criterion, and each color may only be used once under each criterion.

**Criterion 1: Cost Impacts**

**Overview:** This criterion considers aspects of project cost, e.g., the ability to handle budget restrictions, early and precise cost estimation, and consistent control of all project costs, not just construction. In other words, this criterion assesses the abilities of each delivery method in terms of cost estimating and project budget control.

Delivery Method	Potential Advantages	Potential Disadvantages	Preference (Circle One <sup>2</sup> )
<b>DBB</b>	<ul style="list-style-type: none"> <li>NDOT is assured the lowest price of the bid package because of competitive bidding.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT may experience less cost certainty from change orders stemming from errors, omissions, and unknowns.</li> <li>Once the bid is open, NDOT may incur costs associated with any changes.</li> </ul>	
<b>DB</b>	<ul style="list-style-type: none"> <li>NDOT may benefit from documentation of a fair price due to competitive bidding.</li> <li>NDOT may benefit from cost certainty at the award of construction (e.g., no or limited change orders) due to the contractor's ownership or increased knowledge of project risks.</li> <li>NDOT may benefit from cost certainty because the contractor accepts the risks associated with design, quantities, constructability, etc.</li> <li>NDOT may benefit from Alternative Technical Concepts from losing Proposers who received a stipend.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT may experience an increase in cost for transfer of risk to the contractor.</li> <li>NDOT may not receive full cost savings for contractor innovation.</li> <li>NDOT pays for RFP development by multiple contractors.</li> <li>NDOT pays for contractor involvement in design work.</li> <li>NDOT experiences increased internal costs for staff to administer procurement and support the design phase.</li> </ul>	
<b>CMAR</b>	<ul style="list-style-type: none"> <li>NDOT may benefit from cost certainty at the award of construction (e.g., no or limited change orders) due to the contractor's ownership or increased knowledge of Project risks.</li> <li>NDOT may reduce overall project costs from avoidance, allocation, or mitigation of a project's risks during design development.</li> <li>NDOT may reduce overall project costs from contractor input on constructability, cost saving innovations, and value engineering input.</li> <li>NDOT may make better quality design solutions with contractor input on cost.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT pays for contractor involvement in design work.</li> <li>NDOT is not assured of receiving the lowest price without competitive bidding.</li> <li>NDOT experiences increased internal costs for staff to administer procurement and support the design phase.</li> </ul>	

Summary of key issues justifying the above opinion:

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<sup>2</sup> **Note:** Each delivery method must be rated by one of the three colors, and a color may only be used once.  = Most appropriate  = Neutral  = Least Appropriate



**Criterion 2: Schedule Impacts**

**Overview:** This criterion considers aspects of project schedule including the ability to shorten the schedule and the opportunity to control and prevent time growth. In other words, this criterion addresses the abilities of each delivery method in terms of schedule compression and control.

Delivery Method	Potential Advantages	Potential Disadvantages	Preference (Circle One <sup>3</sup> )
DBB	<ul style="list-style-type: none"> <li>NDOT can expect a higher probability of completing construction on schedule because third-party agreements (e.g., right-of-way acquisition, utilities, railroads) are normally completed prior to construction beginning.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT may experience a delay in project completion stemming from time extensions to resolve errors, omissions, and unknowns in construction.</li> <li>NDOT may have a delay in schedule due to the awarding of an under-qualified, low-bid contractor.</li> <li>NDOT may experience schedule delay because the DBB process is normally sequential with few options to accelerate delivery.</li> </ul>	
DB	<ul style="list-style-type: none"> <li>NDOT can expect a higher probability of completing construction on schedule because the contractor accepts the schedule risks associated with design, quantities, constructability, etc.</li> <li>NDOT may benefit from the potential for a shortened project delivery due to parallel design and construction activity.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT may have to allot considerable time and staff effort for the preparation and evaluation of the RFQ and RFP as well as during the design phase.</li> </ul>	
CMAR	<ul style="list-style-type: none"> <li>NDOT may be able to compress the schedule through an early start and the shortening of the amount of time between design and construction (e.g., early procurement of long lead items, utility relocation, earthwork, etc.).</li> <li>NDOT may be take advantage of an innovative approach to maintenance of traffic, reducing delay to the travelling public.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT may experience an increase in schedule due to the time needed to agree on price or, in the extreme case in the absence of an agreement, requiring advertising for competitive bids.</li> <li>NDOT may have to allot considerable time and staff effort for the preparation and evaluation of the RFP as well as during the pre-construction phase.</li> </ul>	

Summary of key issues justifying the above opinion:

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<sup>3</sup> **Note:** Each delivery method must be rated by one of the three colors, and a color may only be used once.  = Most appropriate  = Neutral  = Least Appropriate

**Criterion 3: Opportunity to Manage Risk**

**Overview:** Every project has some level of uncertainty (risk) during various phases of its project development, and each delivery method handles uncertainties differently in their ability to identify, quantify, and mitigate risk. The most effective approach to manage and allocate risk is to assign project risks to the parties in the best position to manage them.

Delivery Method	Potential Advantages	Potential Disadvantages	Preference (Circle One <sup>4</sup> )
DBB	<ul style="list-style-type: none"> <li>NDOT has the ability to mitigate risks that they may be positioned best to manage (e.g., third party utilities and right-of-way acquisitions), reducing potential risks and offering more project certainty.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT may experience more change orders because they own risks associated with design, quantities, constructability, etc.</li> <li>NDOT is in the position of managing risk during construction, which is the most expensive time to resolve issues.</li> </ul>	
DB	<ul style="list-style-type: none"> <li>NDOT may experience fewer change orders because the contractor owns the risks associated with design, quantities, constructability, etc.</li> <li>NDOT is able to relinquish risks better managed by the contractor because the contractor's design and approach are tailored to the contractor's abilities.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT may experience fewer bidders because of an increase in proposal costs.</li> <li>NDOT may inappropriately relinquish risk to the contractor that NDOT is more capable of managing, causing a negative impact to schedule, cost, or the public.</li> <li>NDOT may experience less innovation as the contractor may not introduce new construction methods or techniques to avoid taking on risk.</li> </ul>	
CMAR	<ul style="list-style-type: none"> <li>NDOT may reduce project risks resulting in improvements to schedule, cost, safety, quality, and public impacts because of contractor input during development of design.</li> <li>NDOT may reduce the risk of design rework and project unknowns (e.g., reduce right-of-way impacts and acquisitions and identify utilities before construction).</li> </ul>	<ul style="list-style-type: none"> <li>NDOT is least able to manage the risk of the public's and industry's perception of cost reasonableness.</li> <li>NDOT is least able to manage the risk of the public's and industry's perception of a CMAR selection.</li> </ul>	

Summary of key issues justifying the above opinion:

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<sup>4</sup> **Note:** Each delivery method must be rated by one of the three colors, and a color may only be used once.  = Most appropriate  = Neutral  = Least Appropriate

**Criterion 4: Complexity of Design and Construction Phasing**

**Overview:** This criterion considers aspects of a project that are unique or more complex than normally encountered. The factors may be associated with the unique project scope, goals, and objectives specified by the Department. Complexity may occur in the uniqueness of design, maintenance of traffic, phasing of the project, constructability, location of the project, unknowns, etc.

Delivery Method	Potential Advantages	Potential Disadvantages	Preference (Circle One <sup>5</sup> )
DBB	<ul style="list-style-type: none"> <li>NDOT has more time to develop design solutions.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT would not gain constructability value from a contractor until after award, thereby potentially losing the benefit of cost savings.</li> <li>NDOT could experience a limitation for potential innovative constructability concepts.</li> <li>NDOT may incur a higher number of change orders from an inexperienced, low-bid contractor.</li> </ul>	
DB	<ul style="list-style-type: none"> <li>NDOT can transfer risk that could be better managed by the contractor, potentially improving constructability and reducing errors and change orders.</li> <li>NDOT gains the benefit of innovative ideas being integrated early in the design process.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT has less control of the design and implementation.</li> <li>NDOT may incur unexpected project results due to the difficulty in scoping the unique issues and complexities of a project.</li> </ul>	
CMAR	<ul style="list-style-type: none"> <li>NDOT gains the benefit of innovative ideas being integrated early in the design process.</li> <li>NDOT may potentially reduce and mitigate project complexity through design, thereby gaining more certainty to cost, quality, and schedule delivery and construction.</li> </ul>	<ul style="list-style-type: none"> <li>NDOT may be in an undesirable negotiating position having to retain the contractor for subsequent construction project phases.</li> </ul>	

Summary of key issues justifying the above opinion:

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<sup>5</sup> **Note:** Each delivery method must be rated by one of the three colors, and a color may only be used once.  = Most appropriate  = Neutral  = Least Appropriate

**Criterion 5: Opportunity for Innovation**

**Overview:** This criterion considers the opportunity for encouraging and integrating innovation for new designs, products, technologies, project approaches, and construction techniques to achieve the project’s goals.

Delivery Method	Potential Advantages	Potential Disadvantages	Preference (Circle One <sup>6</sup> )
<b>DBB</b>	<ul style="list-style-type: none"> <li>• NDOT can select innovation independent of the contractor’s experience or abilities.</li> <li>• NDOT may gain greater buy-in of the agency for the implementation of innovation ideas given the agency’s control of the value engineering process.</li> <li>• NDOT has more time to explore and integrate opportunities for innovation.</li> </ul>	<ul style="list-style-type: none"> <li>• NDOT may be limited to integrate innovations by using a low-bid contractor instead of a contractor selected on qualifications.</li> <li>• NDOT may incur cost and/or schedule impacts from introduction of NDOT-derived innovations that may not be constructible.</li> <li>• NDOT may have to dedicate additional resources to approve and confirm the success of innovative concepts.</li> </ul>	
<b>DB</b>	<ul style="list-style-type: none"> <li>• NDOT gains the benefit of contractor-derived innovative ideas being introduced early in the design process.</li> </ul>	<ul style="list-style-type: none"> <li>• NDOT may not experience the full opportunity to innovate because innovation may be limited by contractor abilities, comfort, and time constraints to prepare an RFP.</li> <li>• NDOT may not realize savings from innovations because the saving usually accrues to the contractor.</li> </ul>	
<b>CMAR</b>	<ul style="list-style-type: none"> <li>• NDOT can encourage innovation because risk is better identified and communicated.</li> <li>• NDOT can reduce the constraints related to the contractor’s abilities, level of comfort with innovative concepts, or time constraints, providing for increased opportunities for innovation.</li> <li>• NDOT can benefit from contractor participation in helping to mitigate potential risk through the introduction of new technologies or innovative delivery.</li> </ul>	<ul style="list-style-type: none"> <li>• NDOT may experience difficulty in negotiating the guaranteed maximum price due to inherent unknowns associated with the introduction of new innovative concepts.</li> </ul>	

Summary of key issues justifying the above opinion:

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<sup>6</sup> **Note:** Each delivery method must be rated by one of the three colors, and a color may only be used once.  = Most appropriate  = Neutral  = Least Appropriate

Step 4a involves the color coding of each criterion cell based on the colors assigned in Step 3. An example of a completed table is provided.<sup>7</sup>

Step 4a	Criterion	Delivery Method Preference		
		DBB	DB	CMAR
	Criterion 1: Cost Impacts			
	Criterion 2: Schedule Impacts			
	Criterion 3: Opportunity to Manage Risk			
	Criterion 4: Complexity of Design and Construction Phasing			
	Criterion 5: Opportunity for Innovation			

Step 4b is where the PSC summarizes the delivery method preference. The PSC will indicate (with a green, yellow, and orange color coding) the recommended delivery method for the project under evaluation. The recommended delivery method will be identified as green in a table similar to the example below, which shows that the CMAR delivery method is the recommended delivery method for the evaluated project.

Step 4b	Recommended Delivery Method		
	DBB	DB	CMAR

The PSC is to use the attached Project Delivery Recommendation Form to provide a delivery method recommendation to the Department's Front Office for the project. The Department's Front Office will review the PSC's recommendation and, in addition, will consider factors such as program-level considerations, the number of projects to be delivered under a given method at a given time, the capacity of Department staffing to support project procurement and execution, FHWA input, and other factors to make a final decision on a delivery method.

<sup>7</sup> Instruction for electronic users: To use this table electronically and fill in the assigned colors for each criterion and delivery method, the user must double click on the table above to access the table. Once the table is open, an EXCEL toolbar will exist where the WORD toolbar does now. On this toolbar, the user can click on three color styles (green, yellow, and orange) that are located just to the right of the conditional formatting button in order to color code the chosen cell. Complete this step for each cell. Once done, move and click the cursor on any narrative section outside of the table to return to the document.



## Appendix: Delivery Method Reference Material

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For NDOT guidelines, see the Pioneer Program Guidelines at:

<http://www.nevadadot.com/uploadedFiles/NDOT/Micro-Sites/PioneerProgram/Pioneer%20Program%20Guidelines%203-14-11.pdf>

For the approved FHWA SEP-14 application, see:

<http://www.fhwa.dot.gov/programadmin/contracts/sep14nv2011.pdf>

For further material concerning various project delivery methods, see the Transportation Research Board's *Evaluation of Project Delivery Methods* at:

[http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp\\_webdoc\\_41.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_webdoc_41.pdf)



## Project Delivery Method Recommendation Form

Project Name: \_\_\_\_\_

Step 4a	Criterion	Delivery Method Preference		
		DBB	DB	CMAR
	Criterion 1: Cost Impacts			
	Criterion 2: Schedule Impacts			
	Criterion 3: Opportunity to Manage Risk			
	Criterion 4: Complexity of Design and Construction Phasing			
	Criterion 5: Opportunity for Innovation			

● = Most appropriate  
 ● = Neutral  
 ● = Least Appropriate

Recommended Delivery Method		
DBB	DB	CMAR
Step 4b		

Summary of key issues justifying the above opinion:

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