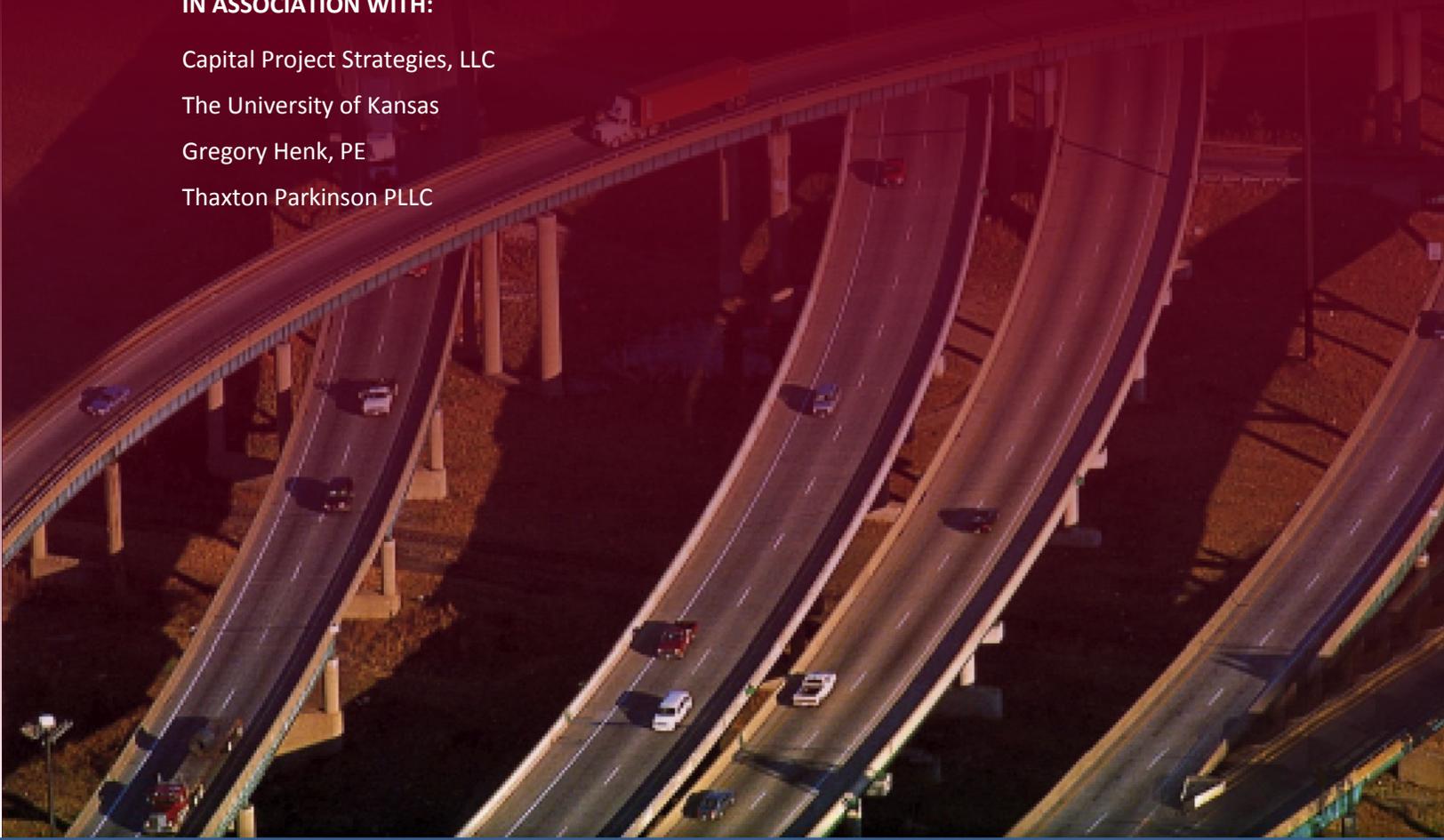# HILL
Hill International

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State of Washington | Joint Transportation Committee

FINAL REPORT

Review of WSDOT's Implementation of Design-Build Project Delivery

December 15, 2016

Review of Washington State Department of Transportation's Implementation
of Design-Build Project Delivery

FINAL REPORT

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EXECUTIVE SUMMARY

Engagement Overview

The Joint Transportation Committee (JTC) of the Washington State Legislature engaged a team led by Hill International Inc. to study the Washington State Department of Transportation's (WSDOT) use of the design-build (DB) project delivery method. The primary objective of the study was to identify potential changes in law, practice, organizational structure, or policy that will allow WSDOT to optimally employ DB delivery to maximize efficiencies in cost and schedule.

The primary tasks to accomplish this study are summarized as follows:

- Provide a basic overview of DB, including the benefits and challenges of DB compared to traditional Design-Bid-Build (DBB) delivery.

- Examine WSDOT's current use of DB project delivery for a representative cross-section of DB projects.

- Compare WSDOT's DB program with transportation industry best practices with the objective of identifying:

  – What WSDOT is doing well (i.e., is in alignment with industry best-practices),

  – How WSDOT has improved its program over time, and

  – What gaps exist in WSDOT's DB program that could be improved.

- Propose potential recommendations for improvements to the program to maximize cost and schedule efficiencies.

- Propose next steps and strategies for WSDOT to effectively implement these recommendations.

To accomplish these tasks, the consultant team worked closely with a six member DB review panel convened for this study, the JTC staff, and a Staff Work Group consisting of members of the JTC, staff from the House and Senate Transportation Committees, and staff from the Office of Financial Management.

The consultant team interviewed the chairs and ranking members of the House and Senate Transportation Committees at the outset of the study, and provided three briefings to the House and Senate Transportation Committees on the findings and progress of the work, which was conducted over a 12-month period commencing in October 2015.

DB Review Panel

Michael Loulakis, DBIA, CPS, Inc.
Gregory Henk, Henk Associates
Bob Adams, AGC of WA
John Ferguson, ACEC of WA
Vince Oliveri, Professional & Technical Employees Local 17
Linea Laird, WSDOT Chief Engineer, Assistant WSDOT Secretary

Staff Work Group

Mary Fleckenstein, JTC project manager
Beth Redfield, JTC
Alyssa Ball, House Transportation Committee
David Munnecke, House Transportation Committee
Kim Johnson, Senate Transportation Committee
Brian Connell, Senate Transportation Committee
Jay Balasbas, OFM
Dana Quam, House Republican Caucus
Jackson Maynard, Senate Majority Coalition Caucus
Debbie Driver, House Democratic Caucus

WSDOT Staff

Chris Christopher, State Construction Engineer
Craig McDaniel, Deputy State Construction Engineer
*Scotty Ireland, Assistant State Construction Engineer
*Teresa Eckard, State Design-Build Engineer
Jay Alexander, Capital Program Development and Management

* Scotty and Teresa left WSDOT before the completion of the study

Oversight and Direction

The study was guided by the JTC staff, and a six-member DB Review Panel that consisted of three representatives from local industry, the Associated General Contractors (AGC) of Washington, the American Council of Engineering Companies (ACEC) Washington, and the Professional & Technical Employees Local 17. The WSDOT panel representative was the WSDOT Chief Engineer and Assistant Secretary for Engineering and Regional Operation. The consultant team provided two national DB experts, one with extensive owner advisory experience and affiliation with DBIA, and the other with extensive DB industry expertise and perspectives.

Both the JTC staff and WSDOT staff were extremely cooperative throughout the study, providing input, feedback, and perspectives to the consultant team. However, the recommendations in this report are based on the consultant team's independent analysis of the study findings and results.

Summary of Findings

DB is contracting method where a single entity is responsible for both the design and construction of a project. This integration of design and construction services under one contract supports earlier cost and schedule certainty, closer coordination of design and construction, and a delivery process that allows for construction to proceed before completion of the final design. The use of DB has grown steadily since it was first introduced in the transportation sector more than 25 years ago. The nature of owner and industry questions have changed from why it should be used to how to accomplish it in the right way.

Analysis Approach

The study consisted of the following integrated tasks:

1. **Basic overview of DB:** The first step in the study was to provide a basic overview of DB project delivery including the benefits and challenges of DB compared to traditional DBB project delivery. This overview was used to evaluate the perceived benefits and challenges associated with WSDOT's DB program. The Task 1 White Paper included on the attached CD provides additional details regarding this review.

2. **Peer Review - Identify and evaluate industry best practices in DB delivery:** Step two of the study involved identifying and evaluating other states' DB programs, as well as reviewing best practices as determined by the nationally respected Design-Build Institute of America (DBIA). Twelve departments of transportation (DOT) with active DB programs as well as selected private sector DB practitioners (consultants and contractors) were interviewed. DOTs were selected based on the maturity of their DB programs, geographical location, range of projects, and differences in legislation and DB implementation strategies. The interviews focused on key topics of interest for DB project delivery including:

   - Program Delivery
   - Organizational Structure, Staffing, and Training
   - Project Development
   - Delivery Method Selection
   - Procurement
   - Risk Allocation
   - Project Execution

   The findings from the DOT interviews were further compared with DBIA best practices for each of the key topics of interest. The detailed findings can be found in the Task 2 White Paper included on the attached CD.

3. **Evaluate WSDOT's current use of DB:** The next step in the study was to evaluate WSDOT's current use of DB. A representative sample of six of WSDOT's 29 DB projects representing large and small project categories (i.e. RCWs 47.20.780 and 47.20.785) were analyzed to understand WSDOT's current implementation of DB project delivery. WSDOT project staff were interviewed for each project. In addition

to feedback on the key topics of interest noted above, performance data and project facts and outcomes were collected to assess the extent to which the intended benefits of DB were realized. The Task 3 White Paper provided on the attached CD contains detailed findings and interviews regarding WSDOT's DB program.

4. **Gap Analysis:** Step four was to conduct a gap analysis to determine where WSDOT varied from current best practice. The national best practices were then compared with the data collected from WSDOT DB projects to assess:

   - What does WSDOT currently do well or in alignment with leading industry DB practices?

   - How has WSDOT improved its DB practices over time?

   - What aspects of WSDOT's DB program could be improved?

5. **Recommendations:** Step five was to develop proposed recommendations based on the results of the gap analysis.

6. **Implementation:** The final step in the study was to propose strategies to adopt the recommendations and to identify the next steps that WSDOT needs to take to adopt the recommendations.

What does WSDOT Currently Do Well?

The study showed that there are many things WSDOT currently does well when implementing DB. These are described below.

- **Industry outreach.** It is generally recognized that for DB to work well, a mutual level of trust and respect must be established between the owner and industry groups. To this end, WSDOT regularly engages industry and has effectively fostered a collaborative working relationship based on mutual trust and respect as it continues to develop and refine its DB program.

- **Commitment of senior leadership.** WSDOT's senior leadership is committed to the success of its DB program. Dedicated staff have been assigned at the Headquarters level to support the development and coordination of the DB program and to act as overall champions of the use of DB. Adequate resources (either internal WSDOT staff or external consultants working on behalf of WSDOT) are generally now allocated to the project teams responsible for managing DB projects.

- **Risk allocation.** WSDOT collaborated with industry to develop a risk allocation matrix that allocates risks commonly encountered on highway construction projects to either WSDOT or the design-builder. This matrix is typically used as a starting point, and then the risk allocation is adjusted for each project based on project-specific risks. WSDOT's risk allocation matrix reflects a best practice risk sharing philosophy where WSDOT takes responsibility for project risks that are not reasonably under the control of the design-builder, and transfers risks to the design-builder that industry can more effectively manage.

- **Shortlisting.** WSDOT routinely shortlists the number of proposers invited to submit a Phase 2 technical proposal. This practice ensures that one of the most highly qualified teams will be awarded the DB contract, and is consistent with DBIA best practices. Creating a shortlist has the added benefits of making the process of evaluating the technical and cost proposals more manageable (such as administering the one-on-one meetings discussed below), and enabling WSDOT to focus its efforts on determining which of the most highly qualified proposers offers the best value (i.e. combination of price and technical solutions).

- **One-on-one meetings.** WSDOT conducts one-on-one meetings with proposers during procurement. This practice is strongly supported by DBIA and used by many DOTs. One-on-one meetings are confidential meetings held during the procurement process between proposing DB teams and DOT staff. Such meetings serve as a key communication tool to encourage the open and candid exchange of concepts, concerns, and

ideas and to help ensure that WSDOT's project needs are being appropriately and consistently interpreted by all proposers.

- **Stipends.** To encourage competition and motivate the industry to innovate, WSDOT offers reasonable stipends, consistent with industry best practice, that compensate shortlisted proposers who have submitted responsive technical proposals.

- **Alternative Technical Concepts (ATCs).** To further promote innovation, WSDOT routinely encourages proposers to submit ATCs. The ATC process is viewed by DBIA and the transportation industry as an effective tool for giving industry the opportunity to suggest new ideas, innovations, or concepts that may not have been directly reflected in the solicitation documents.

How has WSDOT's delivery improved over time?

WSDOT has been using DB for 16 years. Over time, WSDOT has learned from its experience and has improved DB project delivery in a number of ways, as described below.

- **Procedural guidance.** WSDOT recently established an internal DB Work Group composed of WSDOT DB practitioners to provide ongoing support for the development of an updated DB Manual. The manual is intended to provide guidance for all aspects of DB delivery, including project development, procurement, and contract execution and administration.

- **DB template documents.** WSDOT has been working closely with the construction and design industry to develop DB template documents. This includes the Association of General Contractors' Subcommittee for DB and the American Council of Engineering Companies (designers) representation to review standard contract language and update template documents. From a DOT's perspective, standard template documents help streamline the effort needed to develop and review solicitation and contract documents for specific projects, while also ensuring that roles and responsibilities related to design, quality, third-party coordination, and similar requirements that may change under DB are clearly and adequately defined. From industry's perspective, the familiarity and comfort level afforded by an owner's repeated use of standardized documents can facilitate their bidding processes and lead to better proposals.

- **Implementation of Project Delivery Method Selection Guidance (PDMSG).** DB is not appropriate for all projects. WSDOT has developed a PDMSG that provides a robust and scalable process for evaluating different delivery methods against a project's goals, constraints, and risks. Using such a structured approach lends transparency and consistency to the decision process and helps ensure the appropriate application of DB. WSDOT's PDMSG reflects a best practice for project delivery method selection tools.

- **Use of DB on small projects.** WSDOT has piloted the use of DB to smaller projects to test its effectiveness as a delivery method for smaller projects, and help grow the DB industry by expanding opportunities for smaller firms to prime projects.

- **DB experience.** Although DB expertise is not widely dispersed across WSDOT staff, a strong knowledge base of experience and lessons learned now exists among the project team members working in the Puget Sound area. WSDOT is tapping this knowledge base to provide an effective starting point for the development of a robust training program designed to transfer and instill DB knowledge to others within WSDOT.

What aspects of WSDOT's DB program could be improved?

Based on a comparison of current WSDOT DB practices with leading industry practices, the following aspects of the WSDOT program could be improved.

- **Standardization of DB processes.** WSDOT's DB practices (particularly those related to post-award contract administration) are largely improvised and are inconsistently applied by project team members or between WSDOT offices. To address this gap, WSDOT is currently working on the development of a standard DB guidance manual to more formally define its DB processes.

  To ensure the manual will serve the intended purpose and further promote consistency in DB contract administration, WSDOT must also devise an effective strategy for implementing the policy, guidance, and best practices contained therein (i.e., holding the project teams accountable).

  Developing and implementing a more comprehensive set of DB policies and procedures aligned with leading practices, coupled with a robust staff training program in these best practices, should help WSDOT foster a more sustainable and effective DB program.

- **Distribution of DB expertise.** DB expertise is not widely distributed across WSDOT staff. Staff experience is primarily concentrated in the Puget Sound (Northwest and Olympic Regions), where most of the DB projects have been located. However, even within these regions, most staff outside of the DB teams have limited DB knowledge or experience.

- **Training.** WSDOT currently lacks a formalized DB training program. Training efforts are largely ad hoc, with most staff learning on the job through the mentoring efforts of experienced Project Managers. To broaden the application of DB, particularly to other areas of the state, statewide training is needed to promote consistency.

- **Reliance on consultants.** A common complaint regarding WSDOT's DB program voiced by industry representatives was that WSDOT often allocated too much authority to its consultant resources, particularly for design reviews. The issue stems in part from the perception that the consultants, who are paid by the hour, are incentivized to be unnecessarily critical of design-builder submissions.

  With the new Connecting Washington funding, WSDOT is mandated to create a sustainable core workforce. The increase in the program size with the new legislation will also necessitate supplementing WSDOT's core staff with consultants to deliver projects within the program. When using consultants, WSDOT staff should maintain control and responsibility for design reviews and decision-making, and use consultant staff in a supporting role.

- **Flexibility in procurement and delivery options.** WSDOT currently procures DB services using a two-step best-value approach. Several of the DOTs with more mature DB programs have the ability to implement DB in different ways based on project types or characteristics. If WSDOT continues to expand the use of DB to smaller, less complex projects, more streamlined DB procurement options, including a single-step process, low bid DB, and bundling of multiple projects, may help achieve greater efficiencies in project development and procurement. Smaller projects would also benefit from the use of pass-fail criteria and an expanded shortlist.

- **Evaluation criteria.** The evaluation criteria and associated weightings used by WSDOT to select the design-builder have not always provided for clear distinctions aside from cost. Higher weightings are generally allocated to price (i.e. 90% price/10% technical) than noted for similar DB programs. WSDOT could improve their proposal evaluation criteria in two ways. First, while DB projects typically require and encourage contractor innovation, the criteria WSDOT uses to evaluate proposals is heavily weighted toward price (90/10). This undervalues the very innovation needed in a DB project. Increasing the weighting towards non-price factors may result in an award to a higher priced proposer, but the value received may result in greater innovation, improved performance, and a higher quality end product. Second, WSDOT should evaluate the cohesion and working relationships of the various members of the proposed DB teams as part of their proposal evaluation. One approach would be to evaluate whether team members have successfully worked together on similar projects as part of a qualifications criterion. These relationships were a problem on some WSDOT DB projects.

- **Consistent, objective evaluation of proposals.** WSDOT does not appear to have standard guidance or training on the evaluation process, which could allow favoritism to influence selection results. WSDOT should include guidance in the DB Manual to address proper evaluation procedures, develop project-specific evaluation plans, and train evaluators on the importance of impartial selections.

- **Preliminary design and project development.** There are some opportunities for improvement in WSDOT's preliminary design and project development activities. Inappropriate delivery method selection or project scoping definition issues for some DB projects, particularly in the early stages of WSDOT's program, may have prevented WSDOT from achieving some of the desired benefits of DB, such as contractor innovation and cost and time savings.

  – Although DB best practices suggest that preliminary design work for DB should not be advanced too far by the owner, for some WSDOT DB projects additional front-end tasks were needed to adequately define the scope (e.g., geotechnical/environmental investigations, and third party coordination). These front end activities must still be performed by WSDOT to ensure the development of a realistic understanding of the project's scope and budget and to provide proposers with information that they can reasonably rely upon in establishing their price.

  – The use of performance specifications rather than prescriptive requirements is generally viewed as a best practice for DB delivery to provide the greatest opportunity for contractor flexibility and innovation. WSDOT instead relies on prescriptive standards in its DB templates and uses a resource intensive ATC process to achieve the same goal. The current DB templates (Book 2) addressing technical requirements generally cite mandatory prescriptive standards (i.e. design, materials, construction manuals, standard specifications) for various design elements. If WSDOT intends to allow the design-builder more flexibility through the use of performance specifications, which also may require exceptions to standard practices, it will need to articulate specific areas or elements of the work where the design-builder may consider alternative solutions or options. These alternatives may entail design exceptions or identifying where there may be flexibility in the current WSDOT standards that would satisfy the contract requirements. Performance specifications are not appropriate for all applications (i.e. where elements must match existing infrastructure, or where alternatives may have lifecycle maintenance implications), and WSDOT would need to provide guidance for when to use or not to use performance specifications.

  – WSDOT currently lacks a strategy for integrating Practical Design into project scoping and procurement activities for a DB project.

- **Contract administration.** WSDOT currently lacks any formal guidance related to owner monitoring, supervision, and oversight during project execution – a key area affecting DB project success. The design phase in particular is challenging some WSDOT designers who are having difficulty understanding their role in the final design process.

- **Lessons-learned.** WSDOT uses a Construction Contract Information System (CCIS) to track certain project metrics, and uses a Construction Audit Tracking System (CATs) to track non-conformances among other data; however, the information collected in these systems is not used or analyzed to assess DB performance, or capture lessons-learned in a manner that could be used to inform future project development activities.

Recommendations and Strategies to Adopt

Based on our findings throughout the study, we have proposed the following recommendations to improve WSDOT's use of DB, and some strategies WSDOT can use to adopt them.

Table 1: Recommendations and Implementation Strategies

Recommendations	Strategies to Adopt
(1) DB Program Development and Management	
A. Develop and/or update WSDOT's standard DB procurement and contract forms.	The contract document templates are approximately 80% complete. After completing these templates in the short-term, ensure the DB Manual is consistent with the templates. In the longer term, this process should include making the templates scalable to various project sizes or procurement approaches.
B. Complete the updated DB manual, and ensure that the manual reflects the policies and procedures needed to promote the consistent and effective use of DB.	Assign a senior engineer from WSDOT to complete this manual and develop an implementation schedule committed to by all key DB personnel within WSDOT. Develop an internal and external rollout strategy for the programmatic documents that will accomplish the goals of educating WSDOT and its industry partners about WSDOT's DB policies, procedures and philosophies. This may entail a series of meetings/workshops with industry and WSDOT personnel where the topics for the manual will be discussed and policies finalized. Possible subjects include project development, project selection and scoping, front-end investigations, risk assessment, procurement, design development, QA/QC, and the use of performance specifications. An appropriate target for the completion of these materials is 9-12 months.
C. Develop an internal and external rollout strategy for programmatic documents to educate and obtain buy-in from WSDOT staff and its industry partners.	The internal rollout of the manual can be accomplished through the training program discussed under item 2.B below. An external rollout can be accomplished through industry meetings and by having the programmatic documents published online.
D. Maintain and update the contract document templates and DB manual as additional recommended policies or procurement strategies are adopted.	Assign HQ DB staff responsibility for maintaining and updating the DB documents as additional policies and procedures are developed.
E. Establish a database of DB lessons-learned.	Continue to develop a lessons-learned database for DB and all other forms of project delivery. This effort could include the creation of post-construction project report cards to evaluate the extent the project met stated performance goals, including feedback from the DOT staff and the DB industry team.

Recommendations	Strategies to Adopt
(2) Staffing and Training	
A. Increase dedicated full-time DB staff in the near term to support: 1. A statewide DB training program 2. Completion of procurement and contract forms 3. DB manual development (currently at 5%) 4. Procurement support 5. Project-level technical support 6. Public and industry outreach 7. Lessons-learned / performance database	At the time of this study, the dedicated DB staff at HQ was 1-1/2 full time equivalents (FTE). WSDOT has subsequently committed to increase HQ staff from 1-1/2 to 2-1/2 FTEs. Supplement HQ staff with consultant resources if needed to develop statewide DB training materials and DB manual in the intermediate term (approximately 12 months). As part of a longer-term implementation strategy, use HQ and regional staff to present DB training to all regions. After the updated DB manual and training program is rolled out, reevaluate staffing levels at HQ and adjust based on needs of the Regions.
B. Develop and conduct formalized training to more widely disperse the skills (and increase the number) of DB Project Managers (PM) in Regions outside of Puget Sound area (e.g. Eastern, Southwest, North and South Central).	Knowledge transfer and skill enhancement can be achieved through training and peer-to-peer exchanges: *Training:* Develop training materials and conduct training of WSDOT staff in DB fundamentals, with modules for project development (scoping), procurement, contract development, and project execution including design reviews, field quality procedures, responses to requests for information/clarification, change management, payment, and documentation requirements among other specialty topics. *Peer-to-peer exchanges:* Continue to conduct peer-to-peer exchanges between experienced DB PMs and potential PMs from regions with no DB experience to share lessons-learned and DB management best practices. This can be done as part of training programs adapted to working professionals, for example a "lunch-and-learn" seminar or DB training in preparation for a specific project. In addition, consider exchanges with other states/agencies with DB experience, or attendance at DBIA, FHWA, or AASHTO DB forums. This may entail out-of-state travel as an additional training expense.
C. Supplement HQ DB staff with additional HQ or Regional technical staff (i.e. bridge, roadway, geotechnical, environmental, etc.) to serve as subject matter experts (SME) trained in DB development and execution.	Identify technical staff candidates in the relevant technical disciplines. Provide specialized DB training to technical staff candidates to address DB for specific technical topics (i.e. environmental, geotechnical, structural, roadway, utilities). These may include scoping, use of performance criteria/requirements, evaluation criteria, ATCs, and design reviews.

Recommendations	Strategies to Adopt
D. Because excellent WSDOT DB staff are often hired away by local industry, WSDOT should make an effort to keep their well-trained DB staff on the WSDOT payroll. They can do this by offering DB credentials and experience and a more competitive compensation structure as part of an overall career development/retention plan.	WSDOT should recognize those employees who are gaining DB experience and ensure that there is a formal career development process in place that not only has such employees gaining on-the-job experience, but also receiving continuing education that will enhance their careers. These individuals could become active in national or local DB activities and be encouraged to take leadership roles. Aside from training, WSDOT should ensure, to the best it is able, that experience and talent is being recognized and compensation is in line with other local public agencies. Use the 2016 WSDOT Recruitment and Retention study results to update the overall compensation structure and determine the value of DB credentials and experience.
E. Optimize the use of consultants: • Use consultant staff for strategic programmatic support of HQ DB staff. • Use experienced DB consultant staff to in a supporting role to supplement DOT project staff for day-to-day execution of larger DB projects or projects requiring special expertise.	Use consultant support and expertise as necessary to assist with development of training materials and DB manual. After the decision is made to use DB for a larger project, assess project staffing requirements and augment DOT staff with experienced consultant staff to support project execution phase (i.e. design reviews, construction inspection, responses to RFIs, quality management, etc.).
(3) Project Development	
A. Take advantage of Practical Design in the scoping/preliminary design phase for DB through adjustments to scope that do not compromise functionality or quality.	Practical Design (PD) encourages design flexibility to find lower cost design solutions that meet the project purpose and need. Chapter 110 of WSDOT's Design Manual, "Design-Build Projects," states that under Practical Design (PD), design flexibility is encouraged to develop designs tailored to performance needs. WSDOT is currently piloting a Practical Design process that occurs after contract award. Under this process, a Practical Design Review (PDR) will occur within seven days of Contract execution and before Notice to Proceed (NTP). This PDR is also referred to as the "Practical Pause." WSDOT should also pilot a plan to evaluate PD concepts as part of the scoping and procurement phases of DB projects. By implementing during project development and procurement, WSDOT will gain maximum advantage of PD where the DOT can consider design flexibility in the DB Request for Proposal to meet performance criteria and promote cost effective solutions. In place of the current language in RCW 47.01.480 (1) (c) (House Bill 2012, 2015 session) addressing Practical Design that states "For Design-Build projects, the evaluation must occur at the completion of thirty percent design," allow for PD to occur at any stage of project development.

Recommendations	Strategies to Adopt
B. Consider market conditions and availability of DOT resources when determining the scope and size of contract packages.	In the updated DB Manual and training materials, highlight the importance of considering contract packaging from cost, schedule, community impact, DB market, and other perspectives. For large projects or programs, conduct outreach sessions to gauge industry interest and capabilities, with the understanding that smaller DB projects may stimulate more competition from local industry. In expanding the DB program, ensure a healthy mix of projects (both size and type) to create opportunities for firms to gain experience with DB, potentially leading to increased competition on larger projects.
C. Make informed and conscious decisions regarding the use of performance versus prescriptive specifications during project development.	When appropriate, use performance criteria/specifications for projects or project elements to allow bidders to work with less-than-complete designs to develop bid packages that both meet the needs of WSDOT and benefit from innovation and creativity. Provide guidance in DB Manual and formalized training on: • When to use or not to use performance criteria, • How to coordinate performance specifications with standard design manuals, and • Best practices for performance specifying.
D. Perform appropriate levels of front-end investigation and design (i.e. scoping definition), consistent with project goals, risk allocation, and procurement approach.	Ensure that the risk management process (CRA/CEVP) considers the potential for more work to be done before starting the procurement process, and the extent of front-end investigations. Using the results of a risk assessment, set the internal budget and schedule to allow for a level of front-end subsurface, utility, or other investigation of the site required to accurately define the required scope of work for a DB project. The higher the risk rating, the more resources should be applied to front-end investigation and vice versa.

Recommendations	Strategies to Adopt
(4) Delivery Method Selection	
A. Experiment with alternative DB delivery strategies that improve the efficiency of delivery for high risk, complex projects and smaller projects. Alternative DB strategies for high risk or complex projects may include progressive DB. Alternative DB strategies for smaller projects could include bundling or multiple award task order contracts. Bundling small projects (e.g. small bridge rehabilitation, fish passages) under a single DB contract can accelerate delivery and achieve efficiencies in accelerated procurement, design, environmental permitting, construction sequencing, and overall time savings.	Use an objective consistent process with established criteria to determine the most appropriate delivery method. The PDSMG selection process should be refined as needed address alternative DB delivery strategies. For example, adapt the PDSMG to address the DB delivery options available for procuring high risk, complex projects where scope definition and early price certainty are difficult to achieve. Similarly, develop options for smaller DB projects, including a specific set of procurement procedures. Continue to use pilot programs as an approach to test and validate the use of alternative DB delivery strategies. Potential applications for bundled DB projects would be for statewide small or low impact bridge rehabilitation/replacements, selected fish passage culverts in close proximity, or for projects located near each other where efficiency can be gained by one contractor mobilization for multiple projects. Implementation of these options, for example a one-step responsive low bid process, may require revisions to current Washington DB legislation. Alternatively, WSDOT can use the current price less technical credits best-value process for bundled low impact bridges.
B. Refine PDMSG and manuals as appropriate based on lessons learned and systematic comparisons of the results of using the various project delivery strategies -- DB, Bid-Build and GC/CM.	As a project closeout activity in conjunction with identifying lessons learned, the project team should evaluate if the chosen delivery method using the PDMSG was appropriate. One approach could be to re-score the PDMSG matrix and compare with the original PDMSG matrix. Use the feedback in the long-term to assess whether PDMSG, contract templates, or DB Manual needs refinement. Another strategy would be to develop a DB project performance tracking database considering cost growth (i.e. Engineers Estimate to Award Cost, and Award to Final Costs). Compare DB with similar DBB projects (and GC/CM projects) considering project scope and cost. Additional performance metrics to be considered could include timing of award, overall project duration, construction duration, project intensity, change order impacts (by category), and non-conformances. Use the database in the long-term to assess whether PDMSG or DB Manual needs refinement.

Recommendations	Strategies to Adopt
(5) Procurement	
A. Streamline the procurement process for smaller, less complex projects (e.g., one-step procurement process with selection based on low bid or best-value).	Modify procurement process [e.g. Procurement documents for DB] to reflect a shorter one-step process or an accelerated two-step process. WSDOT's DB Manual outline currently has a description of a one-step process. DOTs typically create separate contract templates for a one-step, or qualified low bid process [see FDOT Low Bid template, or CDOT Streamlined DB].
	A one-step process eliminates the Request for Qualifications (RFQ) and shortlisting step; it may also forgo the use of ATCs and stipends unless beneficial to include during the ad period. The ad period would be similar to that for a bid-build process – 6-10 weeks.
	Typically a one-step process requires the submission of separate sealed technical and price proposals. Selection is based on the lowest price for proposers that meet responsiveness requirements. The responsiveness check may include a pass/fail or scored criteria including qualifications, experience, and technical ability. If using a two-step process, consider expanding the short list (e.g. 4) to allow for more competition.

B. Refine evaluation criteria for the two-step best-value process.
 	
1. For high risk or challenging projects, include technical criteria (i.e. geotechnical, utilities, design features) with higher weightings for technical factors (i.e. 75% price/25% technical) based on the prioritization of project goals and risks.
 	
2. Use prior working relationships of DB teaming partners as a qualifications criterion for selected high risk projects where coordination is a key criterion.
 	
3. For projects using a two-step process:
 	
   a. Expand the short list where selection is primarily based on price.
 	
   b. Consider pass/fail for key personnel qualifications (to meet a minimum standard), or add project understanding and approach criteria to allow proposers with less experience to compete.
	As an added refinement to the Instructions to Proposers (ITP) template, decide what the final set of procurement policies are through workshops or other forums with senior staff and industry partners. Based on this dialog, develop guidance in the DB manual to identify and weight key evaluation criteria that align with project goals and risks, and provide differentiation among proposers.

	Use the PDMSG as a guide for defining project goals and risks. For larger projects, conduct separate procurement assessments to identify evaluation and selection criteria and weightings based on prioritization of goals and risks. Eliminate apparent duplication in the current ITP template (i.e. Quality: 3.3.7.2 and 3.3.13, Impacts: 3.3.8 and 3.3.17).
	Adjust the Request for Qualifications (RFQ) template for smaller projects. Consider using pass/fail (P/F) or lower thresholds for experience and past performance, use point scoring as defined in the RFQ template for understanding and approach criterion, and expand the shortlist where selection is primarily based on price and the proposal effort is limited.

Recommendations	Strategies to Adopt
C. Optimize the efficiency of the Alternative Technical Concept (ATC) process and one-on-one meetings. 1. Account for the significant effort associated with conducting these meetings when planning procurement staffing needs and determining the number of firms to shortlist. 2. Keep WSDOT participating staff small; require the contractor to develop an agenda for one-on-one meetings that includes a list of WSDOT staff needed to discuss/evaluate ATCs; and limit consultant support to ensure the strictest confidentiality.	Address protocols for one-on-one meetings and set them forth in the DB Manual. Some DOTs prohibit members of the project proposal evaluation team from participating in proprietary ATC meetings, citing the need to prevent the appearance of bias or a conflict of interest. Non-disclosure agreements or restrictions on DOT or consultant personnel participation will promote sharing innovative ideas and increase the number and quality of ATCs. The current WSDOT Instructions to Proposers (ITP) template addresses submittal and review of ATCs, and the DB Manual also provides guidance for the use of ATCs. Both documents address the concept of "equal or better" as the standard for acceptance of an ATC. The guidelines should also note that the solicitation documents should define areas where ATCs are allowed and where they are not allowed (i.e. some DOTs do not allow ATCs for pavement design, or impacts to third party agreements).
D. Establish a database of ATCs to: • Develop pre-approved elements or options for standard designs that will expedite the ATC approval process. • Promote or introduce more flexibility in current design standards to allow for greater use of performance specification.	Review existing ATCs for DB projects and develop a database of approved ATCs by category (i.e. materials, geometrics, bridge, traffic, walls, drainage, paving, geotechnical, etc.).
E. Ensure the objectivity of the proposal evaluation process.	Develop guidance and training to ensure proposal evaluators do not introduce bias or favoritism into the evaluation process. Possible techniques (particularly for large or high-profile projects) include: • Developing project-specific proposal evaluation plans; • "Blinding" technical proposals (i.e., concealing the identity of the proposers); • Having witnesses observe evaluation discussions and report out on any unfair or biased treatment of proposers; and • Providing adequate documentation to sufficiently support the ratings and scoring.

Recommendations	Strategies to Adopt
(6) Budgeting and Cost Estimating	
A. WSDOT should work with key legislators and legislative staff to more effectively appropriate funds for DB projects.	Engage in a discussion among WSDOT executives and the Office of Financial Management and legislative transportation leaders and legislative staff about improvements that could be made to how funds are appropriated for WSDOT DB projects. After the discussions, the proposed changes would be formalized as an official budget request, and legislative staff would present the proposed budget revisions to legislative members for final approval through the normal budget and legislative process.
B. Examine causes of higher Engineers Estimates (EE) and whether estimating process should be refined.	Based on a review of WSDOT DB projects awarded to date, WSDOT EEs for its DB projects are on average higher than the contract award values, and higher than EE to award values for DB projects at the national level. Examine whether the cause is due to market conditions, risk pricing or other reasons.
(7) Risk Allocation	
A. Use risk analysis results to inform project development and procurement activities.	Develop guidance, for inclusion in the DB Manual, regarding how to use the risk analysis results to assist with: • Project development (i.e., level of design development and front-end investigation) • Procurement (evaluation criteria) • Contractual risk allocation
B. Conduct periodic risk review meetings with the DB team to facilitate collaboration and help ensure project risks are effectively being managed to the benefit of the DB team, WSDOT, and the project as a whole.	Use the project risk register to regularly monitor, manage, communicate, and closeout risks throughout the duration of the project. The risk register can be used as a tool to guide periodic risk review meetings at which the following topics are discussed: • Effectiveness of risk mitigation measures • Additional risks that may have arisen • Previously identified risks that may be retired or closed out
(8) Project Execution	
A. Dedicate qualified key staff as needed to the full project life-cycle (design and construction phases).	At the outset of a project, consider likely resource needs, and commit key experienced and trained staff as necessary for the project duration.

Recommendations	Strategies to Adopt
B. Dedicate experienced staff with delegated authority to the design oversight function.	Empower project staff with decision-making authority over design reviews. Address effective practices for design administration and reviews for DB projects in the DB Manual and training program. Develop design review templates to assist staff with reviewing design submittals for contractual compliance.
C. Conduct project-specific training for large or complicated projects (e.g. projects >$100M or projects with complex geotechnical features, structures, or staging).	Provide project-specific training to the project team on contract administration, execution risks, or challenging procurements, etc. Procurement-related training should include specific training to facilitators, evaluators, technical support staff, and observers.
D. Optimize quality management for small DB projects.	Address effective practices for quality management of smaller DB projects in the DB Manual. This could entail the DOT reducing verification testing frequencies for low risk items or small quantities, taking back acceptance testing responsibility, or not using a third party firm to minimize duplication.

Implementation

Successful implementation of the recommendations identified in Table 1 requires careful planning to ensure that WSDOT's immediate needs are addressed first, followed by a properly sequenced and phased plan of longer-term measures.

For each recommendation, guidance is provided in Table 2 to help WSDOT determine how to best roll-out the recommendations, which have been prioritized within each general category based on the following considerations:

- The proper sequence in which recommendations should occur (for example, development and implementation of programmatic documents must be complete before more advanced training can occur);

- Implementation costs (based on an order-of-magnitude estimate of either one-time (O) or recurring (R) implementation costs);

- Implementation difficulty; and

- The beneficial impact of the recommendation.

The majority of the recommended actions are policy decisions under WSDOT's responsibility. Where legislative action may be required for budgetary or other statutory reasons, further review is needed to determine whether a legislative change is necessary. It is further noted that regardless of responsibility, some of the projected costs of implementation may require additional appropriations. WSDOT will need to develop internal estimates of the time and cost to implement these recommendations.

Table 2: Summary of Recommendations and Implementation Considerations

Recommendation	Implementation					Benefits [3]
	Timing	Cost [1]		Difficulty	Status	
(1) DB Program Development & Management A. Develop and/or update WSDOT's standard DB procurement and contract forms	1-6 months	<$100k	O	Low	Underway	❷ ❸
B. Finalize and issue updated DB manual	6-18 months	$100 - $500k	O	Moderate	---	❷
C. Develop and implement an internal and external rollout strategy for programmatic documents	6-18 months	<$100k	O	Low	---	❷ ❸
D. Maintain and update the contract document templates and DB Manual as additional recommended policies or procurement policies or procurement strategies are adopted	> 18 months	<$100k	R	Low	---	❷ ❸
E. Establish and maintain a database of DB lessons-learned	1-6 months	<$100k	R	Moderate	Underway	❶ ❷ ❸
(2) Staffing and Training A. Increase DB Headquarters staff	1-6 months	$100 - $500k	O	Moderate	Underway	❶ ❷
B. Develop and implement a formal DB training and mentoring program to increase DB skills and expertise across the Regions	> 18 months	$100 - $500k	R	High	Underway	❸ ❹ ❺ ❻
C. Designate technical experts within DOT to support DB teams	6-18 months	<$100k	O	Low	Underway	❶ ❷
D. Offer DB credentials and experience (rotation) and a more competitive compensation structure as part of career development/retention plan	> 18 months	> $500k	R	High	---	❸ ❹
E. Optimize use of consultants	> 18 months	---	-- [2]	Low	---	❷ ❹

(1) Not all costs require a new appropriation or new funding. One-time $ = O, Recurring $ = R. WSDOT will need to determine which of these recommendations require additional funding, and which they can accomplish within their existing budgets.

(2) No cost policy change and/or cost savings

(3) See key of benefits below.

Benefits

❶ Reduce errors and conflicts

❷ Improve DB program consistency

❸ Improve efficiency of DB execution

❹ Increase and retain staff competency

❺ Accelerate project delivery

❻ Save project cost

❼ Reduce change orders/cost growth

❽ Enhance opportunities for innovation

❾ Increase competition

❿ Improved budgeting

⓫ Improve quality/evaluation of proposals

⓬ Improve communication & collaboration

Recommendation	Implementation					Benefits [2]
	Timing	Cost [1]		Difficulty	Status	
(3) Project Development						
A. Develop guidance to address Practical Design reviews for DB projects (including how process ties to preliminary engineering and procurement)	6-18 months	<$100k	O	Moderate	Underway	❻
B. Consider market conditions and availability of DOT resources when determining the scope and size of contract packages	> 18 months	<$100k	R	Low	---	❼ ❾
C. Develop and implement performance specifications	6-18 months	$100 - $500k	O	Moderate	---	❻ ❽
D. Perform appropriate levels of front-end investigation	1-6 months	$100 - $500k	R	Low	---	❻ ❼
(4) Delivery Method Selection						
A. Experiment with alternative DB delivery and procurement methods (e.g., bundling, low bid, single step)	> 18 months	$100 - $500k	O	Moderate	---	❸ ❺
B. Refine PDMSG and manual as appropriate based on systematic comparisons of the results of using various project delivery strategies (e.g., DB, design-bid-build, and GC/CM)	> 18 months	$100 - $500k	O	High	---	❸

(1) Not all costs require a new appropriation or new funding. One-time $ = O, Recurring $ = R. WSDOT will need to determine which of these recommendations require additional funding, and which they can accomplish within their existing budgets.

(2) See key of benefits below.

Benefits

❶ Reduce errors and conflicts	❺ Accelerate project delivery	❾ Increase competition
❷ Improve DB program consistency	❻ Save project cost	❿ Improved budgeting
❸ Improve efficiency of DB execution	❼ Reduce change orders/cost growth	⓫ Improve quality/evaluation of proposals
❹ Increase and retain staff competency	❽ Enhance opportunities for innovation	⓬ Improve communication & collaboration

Recommendation	Implementation				Benefits [3]
	Timing	**Cost [1]**	**Difficulty**	**Status**	
(5) Procurement					
A. Streamline procurement process for small DB projects (e.g., expand shortlist, pass/fail qualifications criteria, or use an accelerated process)	> 18 months	<$100k O	Moderate-High	---	❸ ❻ ❾
B. Refine evaluation criteria to: − Assign greater weight to qualifications and technical evaluation criteria when seeking innovation − Address the prior working relationship of the DB team	> 18 months	<$100k O	Low	---	❼ ⓫ ⓬
C. Optimize the efficiency of the ATC process and one-on-one meetings	6-18 months	--- -- [2]	Low	---	❸
D. Establish and maintain a database of ATCs, and use the data to: − Establish preapproved elements to expedite the ATC process − Identify opportunities to introduce more flexibility into current design standards	> 18 months	<$100k R	Moderate	Underway	❷ ❸
E. Ensure the objectivity of the proposal evaluation process	6-18 months	--- -- [2]	Low	---	⓫
(6) Budgeting & Cost Estimating					
A. Work with legislative staff to more effectively appropriate funds for DB projects	1-6 months	<$100k O	Moderate	---	❿
B. Examine if Engineer Estimates are resulting in an over-allocation of funds and refine estimating process as necessary	1-6 months	<$100k O	Moderate	---	❿

(1)   Not all costs require a new appropriation or new funding. One-time $ = O, Recurring $ = R. WSDOT will need to determine which of these recommendations require additional funding, and which they can accomplish within their existing budgets.

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⓫ Improve quality/evaluation of proposals
⓬ Improve communication & collaboration

Recommendation	Implementation					Benefits [2]
	Timing	**Cost** [1]		**Difficulty**	**Status**	
(7) Risk — A. Develop guidance, for inclusion in the DB Manual, regarding how to use the risk analysis results to assist with: – Project development (i.e., level of design development and front-end investigation) – Procurement (evaluation criteria) – Contractual risk allocation	6-18 months	<$100k	O	Moderate	---	❼
B. During the execution phase of a DB project, conduct periodic risk review meetings and regularly update the project risk register	6-18 months	<$100k	R	Low	---	⓬
(8) Project Execution — A. Dedicate staff as necessary to the full project-lifecycle (design and construction phases)	1-6 months	<$100k	O	Moderate	---	❸ ❹ ⓬
B. Dedicate experienced staff with delegated authority to the design oversight function	6-18 months	$100 - $500k	O	Moderate	---	❷ ❸ ❹
C. Conduct project-specific workshops for larger or complex DB projects	6-18 months	<$100k	R	Moderate	---	❷ ❸ ❹
D. Optimize quality management for smaller projects	6-18 months	<$100k	O	Low	---	❸ ❻

(1) Not all costs require a new appropriation or new funding. One-time $ = O, Recurring $ = R. WSDOT will need to determine which of these recommendations require additional funding, and which they can accomplish within their existing budgets.

(2) See key of benefits below.

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⓬ Improve communication & collaboration

Implementation Timeline

Section 11.2 of the report presents a proposed timeline on page 99 for adopting certain recommendations. It is assumed that the policy-related recommendations under Contract Administration and Project Execution will be addressed in the DB Manual and training activities. The budgeting recommendation is a one-time programmatic policy decision that affects the current Connecting Washington program.

Table of Contents

The companion CD attached to the back of this report contains the following documents:

Task 1 White Paper: DB Overview

Task 2 White Paper: DB Best Practices Review
     Attachment A – Interview Questionnaire
     Attachment B – Interview Responses

Task 3 White Paper: Review of WSDOT's DB Program
     Attachment A – WSDOT HQ Summary
     Attachment B – Project Summaries
     Attachment C – Industry Interviews

Task 4 Benchmarking Analysis of WSDOT's DB Program to Best Practice

Task 5 Recommendations and Preliminary Implementation Strategies

List of Recurring Abbreviations

ATC   Alternative Technical Concept

ASCE   Assistant State Construction Engineer

CEI   Construction Engineering & Inspection

CVEP   Cost Validation Estimating Process

DBIA   Design Build Institute of America

DOT   Department of Transportation

EE   Engineers Estimate

HQ   WSDOT Headquarters

PDMSG   Project Delivery Method Selection Guidance

RFQ   Request for Qualifications

RFP   Request for Proposals

PART 1

Introduction and Design-Build Overview

Part 1 Objectives

- Identify the scope and objectives of the consultant team's engagement
- Define the basic characteristics of the DBB and DB delivery methods, and compare their advantages and disadvantages
- Provide an overview of WSDOT's DB program

1. Introduction

1.1 Scope of Engagement

The Joint Transportation Committee of the Washington State Legislature engaged a team led by Hill International to study the Washington State Department of Transportation's (WSDOT) use of the design-build (DB) project delivery method, with the objective of identifying potential changes in law, practice or policy that will allow WSDOT to optimally employ DB to maximize efficiencies in cost and schedule, and ensure that project risk is borne by the appropriate party.

Key tasks performed as part of this assessment included:

- Comparing the perceived advantages and disadvantages of DB with those of the traditional design-bid-build (DBB) project delivery method.

- Evaluating a representative sample of WSDOT's DB projects to determine the extent to which the perceived advantages of DB are being achieved.

- Identifying gaps / risks between WSDOT's current DB practices and leading industry practices to determine:

    – What WSDOT is doing well,

    – How WSDOT has improved its program over time, and

    – What additional improvements or enhancements could be made to further optimize WSDOT's DB program.

- Developing and prioritizing potential improvement recommendations and implementation strategies based on the resources required to implement the strategy and the potential benefits to be provided.

> The observations and recommendations contained in this report were driven in part by our interviews with WSDOT representatives from Headquarters and each of the Regions, all of whom demonstrated a commendable level of cooperation and transparency, self-awareness, and desire for continuous improvement.

1.2 Overview of WSDOT's DB Program

Between 2000 and 2015, WSDOT expended approximately $11.6 billion on its capital program, of which $4.5 billion (or 38% of the total) was delivered using DB. DB projects thus make up a significant part of WSDOT's overall program in terms of dollars expended.

At the time of this study, WSDOT had applied DB on 29 projects, which have fallen within the following size ranges:

- > $300 M: 5 projects/programs
- $100 - $200M: 4 projects
- $50 - $100M: 4 projects
- $10 - $50M: 8 projects
- $2M - $10M: 8 projects (part of the small project pilot program)

> The Task 1 White Paper provided on the companion CD, includes additional details regarding WSDOT's DB program.

1.3   Assessment Methodology

Stakeholder Interviews and Document Review

To gain an understanding of the "as-is" state of WSDOT's DB program, the consultant team performed the following tasks:

- Conducted interviews with various stakeholders including:

  – Several key personnel at various levels and positions within WSDOT's Headquarters Office who have knowledge of the DB program;

  – Various industry representatives (7 representatives from design firms and 8 from contractors) who have performed work for WSDOT; and

  – Several personnel from Washington State House and Senate legislative staff.

- Reviewed WSDOT's existing policies, procedures, standard forms, contracts and other relevant departmental documentation related to DB delivery, including, but not limited to:

  – Design Manual M22-01.13, Chapter 110 – Design Build Projects (July 2016)
  – Project Delivery Method Selection Guidance (February 12, 2016)
  – DB Request for Qualifications draft template
  – DB Request for Proposals (including Instructions to Proposers, Book 1 and Book 2) draft templates
  – DB Guidebook (June 2004)
  – Draft DB Manual Outline (October 20, 2015)
  – DB Project Delivery Guidance Statement Change Orders (December 18, 2009)
  – DB Contract Data – Stipend Summary
  – DB vs DBB 2000-2015
  – Proposal Evaluation Manual, I-405 / SR 167 Interchange Direct Connector Project (May 3, 2016)
  – Small Design-Build Pilot Project Evaluation (May 2015)
  – SR 520 Pontoon Construction Project Internal Review Report (February 26, 2013)
  – WSDOT Recruitment and Retention Study, Final Report (June 27, 2016)

Interviews with Peer Agencies

In conjunction with its review of WSDOT's DB program, the consultant team also interviewed representatives from 12 other transportation agencies to gain an understanding of how WSDOT's peers are managing their DB programs.

The agencies in the comparison group were selected so as to capture a wide range of DB experience and practices. Specific considerations included:

- The size and maturity of the agency's DB program,
- Geographical location, and
- Differences in legislation and DB implementation strategies.

Key information for each peer agency is provided in Table 1.1.

Agency	First Design-Build Project	Total Approximate Number of Design-Build Projects	Size Range of Projects
WSDOT	2000	29	$2M to $300M
Colorado	1995	20	$3M to $300M
Florida	1987	500+	<$0.5M to $558M
Maryland	1998	35	$20M to $500M
Minnesota	1996	33	$1M to $200M
Missouri	2005	<10	$18M to $535M
Ontario	1995	60+	$0.5M to $55M
North Carolina	1999	111	$2M to $460M
Ohio	1995	247	<$0.5M to $430M
Oregon	1999	16	$2M to $130M
Texas	2003	15	$80M to $1B+
Utah	1999	50	$30M to $1B+
Virginia	2001	78	$0.5M to $100M+

*Table 1.1:
Peer Agencies Interviewed*

All of the peer agencies were extremely cooperative in providing input and sharing documentation related to their DB programs. The Task 2 White Paper, provided on the companion CD, includes a compilation of the interview responses provided by each agency.

The consultant team evaluated performance data for six substantially complete WSDOT DB projects, as identified in Table 1.2, to assess the extent to which WSDOT is realizing the perceived advantages of DB. Key advantages of DB, as discussed further in Section 2.2 of this report, include contractor innovation, time savings, costs savings, and improved risk allocation.

Project Evaluation

Project	Region	Final Contract Value	Substantial Completion Year
US 2/Rice Road Intersection Safety Improvement	Northwest	$2,410,519	2012
I-5 Skagit River Bridge Permanent Bridge Replacement	Northwest	$7,139,139	2013
SR 167 Puyallup River Bridge Bridge Replacement Project	Olympic	$27,331,648	2015
I-5 et al., Active Traffic Management System	Urban Corridors (NW)	$37,021,000	2011
I-405/I-5 to SR 169 Stage 2 Widening and SR 515 Interchange Project	Northwest	$84, 650,000	2011
SR 520 Eastside Transit and HOV Project	Urban Corridors (NW)	$364,131,001	2015

*Table 1.2:
WSDOT DB Projects
Reviewed as Part of this
Study*

These projects were selected to obtain a representative cross-section of WSDOT experience, considering the following criteria:

- Project size (small, medium, large)
- Project type (roadway, interchange, bridge, active traffic management system)
- Region (NW, Olympic)
- Program (e.g., 520, 405, small project)

In addition to reviewing the available project data and documentation, the team conducted in-depth interviews with the project managers for each of these projects.

To supplement this largely qualitative assessment of WSDOT's project performance, the team also compared select project performance data (e.g., cost growth, number of change orders) to that of comparable projects delivered by other DOTs (as retrieved from an FHWA database of DB projects).

The Task 3 White Paper, provided on the companion CD, summarizes the information received through the project interviews.

Gap Analysis

Once the "as-is" state of WSDOT's DB program was understood, the consultant team compared various program governance elements currently used by WSDOT to leading industry practices to identify gaps and diagnose any potential organizational or operational issues related to WSDOT's current processes. Leading practices were obtained by synthesizing:

- Practices recommended by the Design-Build Institute of America (DBIA);

- Successful practices identified by the peer agencies;

- Information culled from various published reports and guidance documents published by the Federal Highway Administration, the Transportation Research Board, and similar sources; and

- Lessons-learned from the consultant team's engagement on similar assignments.

The specific governance elements that were compared as part of the gap analysis include the following:

- DB Program Development and Management
- Organizational Structure and Staffing
- Project Delivery Method Selection
- Procurement
- Project Development
- Funding and Cost Estimating
- Risk Allocation
- Contract Administration and Project Execution

From this comparison we were then able to assess the degree to which WSDOT:

- Is in alignment with leading industry practices;
- Is working towards improving practices (partial alignment); or
- Requires improvement to bring practices into alignment.

After determining the degree to which WSDOT is in alignment with leading industry practices for each governance element, the consultant team developed organizational and process improvement recommendations, which, when implemented, will assist WSDOT with obtaining the maximum benefits from DB delivery.

The improvement recommendations were prioritized based on addressing immediate needs, with consideration given to the:

- Proper sequence in which such recommendations should occur;

- Resources required to implement the recommendation (funding, additional full-time employees, etc.); and

- Beneficial impact of the recommendation (operational efficiency, cost / time savings, innovation, etc.).

A high-level implementation plan was developed for the prioritized improvement recommendations.

1.4   Report Structure

The primary focus of this assessment was to develop improvement recommendations to enhance the performance of WSDOT's DB program. To provide context for these recommendations, Chapter 2 provides a general overview of the potential benefits of DB relative to traditional DBB delivery. The remainder of this Report is then organized into the following chapters:

- Chapters 3 – 10 focus on each governance element reviewed as part of this assessment. Each chapter provides a summary of:

    - Industry leading practices,

    - Observations of WSDOT's current process (as contrasted to relevant findings from the interviews with the peer agencies and industry representatives as applicable),

    - Results of the gap analysis, and

    - Improvement recommendations.

- Chapter 11 summarizes the overall improvement recommendations and provides a high-level implementation timeline.

2. Design-Build Overview

This chapter addresses the following general questions in the context of the current state of practice of DB and DBB in the transportation construction industry:

- What are the basic characteristics of DBB and DB?

- What are the advantages and disadvantages related to the use of DBB and DB?

- To what extent is WSDOT achieving the perceived benefits of DB (and/or mitigating the perceived disadvantages of DB)?

2.1   Design-Bid-Build (DBB)

Definition and Key Characteristics

DBB is the traditional procurement approach for transportation projects in the United States, in which the design and construction of a facility are sequential steps in the project development process.   As shown in Figure 2.1, design and construction services are procured separately, with Architectural/Engineering (A/E) firms selected based on their qualifications and construction contractors selected based on competitive sealed bids, with award to the bidder with the lowest price who meets specific conditions of responsibility.
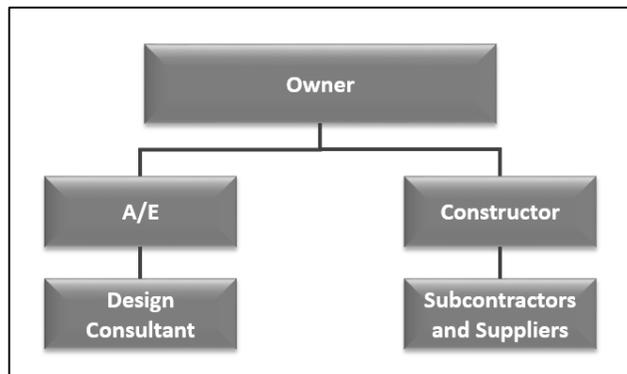
Figure 2.1:
DBB Delivery System

The foundation of the DBB system was formed through:

- For design service, the professional licensing laws established in the late 1800's, and

- For construction services, competitive bidding requirements reinforced with legislation such as the 1938 Federal Highway Act and the Miller Act that requires surety bonding for construction.[1]

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[1] Congress amended the Federal-Aid Road Act of 1916, Ch. 241, 39 Stat. 355, to adopt the precursor to what is now section 112(a). That statute required the Secretary of Agriculture (then the agency head with authority to approve federally funded highway projects) to approve, in connection with federally aided highway construction projects, "only such methods of bidding and such plans and specifications of highway construction for the type or types proposed as will be effective in securing competition and conducive to safety, durability, and economy of maintenance." Pub. L. No. 75-584, § 12, 52 Stat. 633, 636 (1938).

Over the decades, the DBB system has provided taxpayers with adequate transportation facilities at the lowest price. For the most part, it has resulted in a reasonable degree of quality, and has effectively prevented favoritism in spending public funds while stimulating competition in the private sector. However, the separation of services under DBB has the potential to foster adversarial relationships among the parties and result in cost and time growth. Various advantages and disadvantages related to DBB are presented in Table 2.1 below.

DBB Advantages and Disadvantages

Table 2.1:
DBB Advantages and Disadvantages

DBB Advantages	DBB Disadvantages
• Applicable to a wide range of projects	• Slower project delivery method due to the sequential nature of delivery (i.e. design then bid then build)
• Well established and suitable for competitive bidding	• Owner must manage/referee two contracts
• Contractor selection based on objective cost criteria	• Administrative decision-making and approvals are often less efficient and more difficult to coordinate
• Discourages favoritism in spending public funds while stimulating competition in the private sector	• Owner largely bears risk of design problems
• Extensive litigation has resulted in well-established legal precedents	• Separation of contracts tends to create an adversarial relationship among the contracting parties (different agendas and objectives)
• Provides the lowest initial price that responsible, competitive bidders can offer	• Designers may have limited knowledge of the true cost and scheduling ramifications of design decisions
• Clearly defined roles for all parties	• No contractor involvement in design has implications on constructability and pre-construction value engineering
• Designer directly works for and on behalf of owner	• Tends to yield base level quality
• Construction features are typically fully designed and specified	• Least-cost approach often requires higher level of inspection of the work by the owner's staff
• Owners retain significant control over the end product	• Initial low bid might not result in ultimate lowest cost or final best value
• Insurance and bonding are well defined	• No built-in incentives to provide enhanced performance (cost, time, or quality)
	• Greater potential for cost/time growth
	• Greater potential for litigation

2.2   Design-Build (DB)

Definition and Key Characteristics

Under the DB contracting method, a single entity is responsible for both the design and construction of a project. This integration of design and construction services under one contract supports:

- Earlier cost and schedule certainty,
- Closer coordination of design and construction, and a
- Non-sequential delivery process that allows for construction to proceed before completion of the final design.

The Federal Highway Administration, among other Federal agencies, has supported the use of DB delivery, and has developed regulatory policies for DB contracting, in addition to providing leadership and support to state and local agencies implementing DB. [2]

As shown in Figure 2.2, DB delivery in its simplest form is characterized by a single contract between the owner and an integrated DB entity that provides both design and construction services. As DB use has evolved, it has taken on organizational variations that may involve joint ventures or more complicated prime and subcontractor arrangements. In the highway sector, DB is most commonly led by a General Contractor (GC) as the Prime with an A/E firm as a subcontractor.

Figure 2.2: DB Organizational Variations
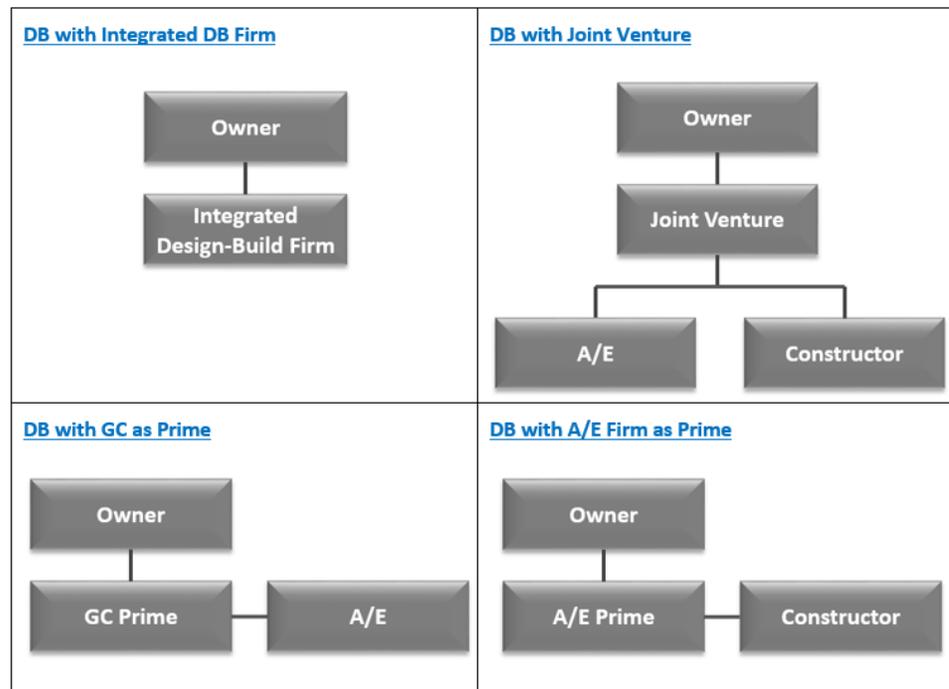
DB Advantages and Disadvantages

Use of DB has in some cases resulted in dramatic improvements in performance, but not without challenges. Empirical studies from the last 20 years comparing DBB with DB across multiple construction sectors have shown use of DB can provide cost and time savings. For example, the first major federal study mandated by Congress compared DB highway projects with comparable DBB projects and found that DB resulted in significant

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[2] See Title 23 USC 112 (b) (3) and Federal regulations: Title 23 CFR Part 636

time savings and to a lesser extent cost savings.[3] Conversely, some DOTs have reported higher initial costs or cost growth with DB. The delegation of quality management responsibilities to industry has also been an ongoing concern.

A summary of additional advantages and disadvantages associated with DB is provided in Table 2.2.

Table 2.2:
DB Advantages and
Disadvantages

DB Advantages	DB Disadvantages

• Single point of responsibility creates opportunity for efficient risk transfer
 	
• Can encourage contractor innovation
 	
• Early contractor involvement
 	
• Owner not at significant risk for design errors
 	
• Less owner coordination of A/E and contractor
 	
• Time savings and often cost savings
 	
• Earlier cost and schedule certainty
 	
• Improved owner risk allocation and management options
 	
• If using a best-value procurement process for DB:
 	
  – Ensures that the Department can select a capable, qualified DB contractor
 	
  – Allows for project schedule, quality, and/or other non-price evaluation criteria to be competed
	• Reduced owner control over design process
	
	• Time and cost to run a 2-step competitive procurement process
	
	• Challenges with scoring technical evaluation factors
	
	• Personnel learning curve - changes in roles and responsibilities requiring different levels of training for owner and industry
	
	• Potential for higher initial costs (i.e. risk pricing)
	
	• Parties assume different and unfamiliar risks
	
	• Standard owner communication and contract administration practices in conflict with expedited delivery
	
	• Fewer opportunities for smaller contractors with limited resources to serve as prime contractors
	
	• Cost for contractors and designers to participate in the procurement process

It is important to note that the advantages of DB are generally only realized when a careful and well-informed approach is taken to enabling legislation, project analysis and selection, procurement, contracting, and oversight. Likewise, some of the identified disadvantages may be averted or mitigated to some extent through similar means.

2.3   Performance of WSDOT's DB Program

To assess the extent to which WSDOT is realizing the perceived advantages of DB, as identified above in Table 2.2, the consultant team evaluated performance data for six substantially complete WSDOT DB projects.

Table 2.3 summarizes the projects on which these advantages were realized (or not realized). Table 2.4 then summarizes the projects on which the potential disadvantages did (or did not) create challenges for the WSDOT project teams.

It should be noted that all six of the projects selected for review were delivered before the Project Delivery Method Selection Guidance (PDMSG) was implemented. For at least two of these projects, staff indicated that in hindsight, DB might not have been the best delivery

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[3] 2005 Design-Build Effectiveness Study: On average, the managers of DB projects surveyed in the study estimated that DB project delivery reduced the overall duration of their projects by 14 percent, reduced the total cost of the projects by 3 percent, and maintained the same level of quality as compared to DBB project delivery. The project survey results revealed that DB project delivery, in comparison to DBB, had a mixed impact on project cost depending on the project type, complexity, and size.

option given the projects' advanced level of design, limits on innovation, or other project constraints.

Table 2.3:
Realization of DB
Advantages

Potential Design-Build Advantages	US 2/Rice Road Intersection Safety Improvements	I-5 Skagit River Bridge Permanent Bridge Replacement	SR 167 Puyallup River Bridge Replacement	I-5 et al. Active Traffic Management System	I-405/I-5 to SR 169 Stage 2 Widening and SR 515 Interchange Project	SR 520 Eastside Transit and HOV Project
Achievement of Project Goals	Yes	Yes	Yes	No	Yes	No
Contractor innovation	No	Yes	Yes	No	Yes	No
Time savings	Yes	Yes	No	No	Yes	No
Cost savings[2]	Yes	Yes	No	No	Yes	Yes
Earlier cost and schedule certainty	No	Yes	No	Yes	Yes	Yes
Improved risk allocation	Yes	Yes	Yes	Yes	Yes	Yes

[1]. A "yes" indicates that the advantage was realized; whereas a "no" indicates the advantage was not realized.

[2]. Cost savings were evaluated by comparing final payment prices to the Engineer's Estimates. A "yes" indicates that the Engineer's Estimates were higher than the final payment amount.

As reflected in the above table, WSDOT achieved mixed results on these DB projects in terms of meeting specific project goals and the advantages of DB identified in Table 2.2:

- The goals for the sampled projects included minimizing work zone impacts to the public, delivering quality designs, safety enhancement, managing geotechnical conditions, and time savings. The projects generally met the project goals with the exception of the I-5 ATMS project, for which the staff reported that minimizing traffic impacts was not an appropriate goal for the project (innovation should have been a goal); and for the SR 520 project, the time savings goal was not realized.

- Innovation was realized on three out of six projects. One of the six projects, the US 2/Rice Road Intersection Safety Improvements, was a small ($2.4M) DB project providing contractors with little opportunity for innovation given the advanced level of design at the time of bid.

- Three out of six projects realized time savings. Delays to the SR 520 were primarily caused by owner design changes, the most significant of which entailed a change to retaining walls attributed in part to unforeseen geotechnical conditions and a change to screening/noise wall designs. Delays to the I-5 Active Traffic Management project were caused by changes to technology specifications and scoping for message signs.

- Four of the six projects recorded costs savings (based on a comparison of the WSDOT Engineer's estimate to the final payment amount).

- Early cost and schedule certainty (i.e. compared to traditional bid-build delivery) was reported for four of six projects.

Table 2.4 summarizes projects on which commonly cited disadvantages of using DB delivery were observed. [1]

Table 2.4: Observation of Common DB Disadvantages

Potential DB Disadvantages	US 2/Rice Road Intersection Safety Improvements	I-5 Skagit River Bridge Permanent Bridge Replacement	SR 167 Puyallup River Bridge Replacement	I-5 et al. Active Traffic Management System	I-405/I-5 to SR 169 Stage 2 Widening and SR 515 Interchange Project	SR 520 Eastside Transit and HOV Project
Reduced owner control over design process	No	No	No	Yes	No	Not discussed
Time and cost to run competitive 2-step procurement process	Yes	No	Yes	No	Yes	Not discussed
Potential higher initial costs (i.e., risk pricing)	No	Yes	No	No	No	No
Parties assume different and unfamiliar risks (learning curve)	Yes	Yes	Yes	Yes	Yes	Yes
Standard owner practices conflict with expedited delivery	No	No	No	No	No	Yes
Fewer opportunities for smaller contractors	No	No	No	No	Yes	No

1. A "yes" indicates that the potential disadvantage of DB created challenges for the WSDOT project team. A "no" indicates that the potential disadvantage did not create any issues.

Respondents generally agreed that two potential DB disadvantages created issues for the six WSDOT DB projects reviewed. The first was inexperienced WSDOT staff being challenged by the differing roles and responsibilities on a DB project. This learning curve disadvantage is common with many DOT DB programs until they mature and develop a core of experienced DB staff.

The second disadvantage was the time and cost to run a competitive two-step procurement process. Though perceived as a disadvantage on three of the six projects, in part due to the time and resources required for the ATC process, both DOTs (including WSDOT) and the industry agree that ATCs and one-on-one meetings are effective procurement tools to improve project outcomes, and the benefits outweigh the disadvantages.

Reduced owner control over design was not seen as a challenge by the project managers interviewed for these projects with the exception of the I-5 ATMS project. For this project, the WSDOT Project Engineer concluded that this technology-driven project was not an ideal candidate for DB in the sense that greater owner control and prescription would have resulted in a better outcome (i.e. fewer design changes).

Aside from the I-5 Skagit River Bridge emergency project, bid pricing was lower than the Engineer's estimates; however it is possible that favorable market conditions were a factor in this outcome. Only one project team (that for I-405) perceived that there may have been issues with opportunities (or lack thereof) for smaller contractors.

PART 2

Assessment of WSDOT's DB Program

Part 2 Objectives

- Address, for each governance element, the extent to which WSDOT is: in alignment with leading industry practices; is working towards improving practices; or requires improvement to bring practices into alignment with best practice.

- Where program enhancements are possible, offer recommendations to assist WSDOT with maximizing the potential benefits of DB delivery.

3. DB Program Development and Management

3.1   Leading Practices

To promote programmatic consistency in the execution of DB projects, many organizations have attempted to formalize their DB processes and procedures. Such formalization or standardization helps establish a sound governance structure within which project sponsors and teams can successfully make decisions and take action to achieve project and organization-wide goals while avoiding unacceptable situations that could increase risks or compromise stakeholder trust.

Possible techniques and strategies to institute such a comprehensive program and project governance structure for DB delivery include the following:

Best Practices in DB Program Development and Management

- Development and maintenance of programmatic documents (e.g., standard policies and procedures, guidance manuals, checklists, forms, standard specifications, etc.) to:

    – facilitate the consistent planning and execution of DB projects;
    – define roles and accountabilities;
    – counter the loss of institutional knowledge (e.g., when long-tenured staff retire or move to new positions); and to
    – facilitate communication, training, and the regular re-evaluation of processes and standards.

- Implementation of scalable processes that set forth minimum requirements for smaller or less complex projects, while mandating enhanced procedures for larger projects;

- Development and maintenance of standard procurement and contract forms to reduce the effort needed by project personnel to develop and review solicitation and contract documents for specific projects;

- Consistent outreach efforts to industry and other stakeholders to assess market conditions and other potential risks and opportunities that could impact the program;

- Regular oversight by senior leadership to provide visibility to the DB program and assure that program outcomes are in keeping with the organization's overarching policies, needs, and goals;

- Standard program-level progress reporting, including key performance indicators (KPIs), to keep senior leadership and other stakeholders apprised of program threats and opportunities; and

- Promotion of a culture of continuous improvement driven by lessons-learned and performance monitoring.

3.2   Observations

In the context of the best practices identified above, the consultant team observes the following:

Programmatic Guidance

1. At the outset of its DB program in 2004, WSDOT developed a DB guidance manual.

   a. For the time, the manual provided well-intentioned guidance and procedural instruction to assist project teams with the planning and development of DB projects.

   b. Since the manual's introduction, WSDOT has developed other standalone DB documents, including the Project Delivery Method Selection Guidance (PDMSG).

   c. Having received few, in any, updates since its introduction, the manual fails to reflect WSDOT's more current DB practices (e.g., use of the PDMSG) and does not provide the detailed guidance project teams need to successfully execute DB projects.

   d. WSDOT's DB practices (particularly those related to post-award contract administration) are therefore largely improvised and are inconsistently applied across WSDOT offices and project teams.

To help transfer and preserve DB knowledge and promote consistency in contract administration, several DOTs (CDOT, FDOT, MDSHA, MoDOT, NCDOT, and VDOT), as well as the Ministry of Transportation Ontario (MTO), have developed DB manuals or guidance documents. For example, the MTO has created a detailed Contract Administration Manual for DB that addresses changes in roles and responsibilities, design administration, construction administration, and inspection.

2. Recognizing the need for more standardization and guidance, WSDOT has established an internal DB working group to provide ongoing support for the development of an updated manual that will more formally define and coordinate its DB processes. However, given current resource constraints (as discussed in Section 4.2), the development of this manual remains incomplete.

   a. The proposed table of contents suggests that, once finalized, the updated manual will provide project teams with comprehensive guidance on all aspects of DB delivery, from project development to procurement to contract execution and administration. In addition, the manual can also serve as a possible training resource to help disseminate DB best practices throughout the organization.

   b. Implementation of an updated manual – particularly one that provides a thorough discussion of post-award contract administration - will place WSDOT among the more advanced of the peer agencies interviewed.

   c. Although most of the peer agencies identified guidance on design and construction oversight as an immediate need, few have moved forward with developing detailed training and guidance on the topic. Time and resource constraints, along with a desire to perform the procedure development work in-house (as a means to ensure staff buy-in), were cited as the key barriers to the development of procedural guidance on DB contract administration by the other agencies.

3. Most of the peer agencies interviewed have developed, often with consultant assistance, standard templates and forms (e.g., Request for Qualifications, Instructions to Proposers, Requests for Proposals, DB General Provisions, standard performance specifications, etc.) containing boilerplate language as well as instructions for tailoring requirements to project-specific conditions.

    a. Use of such templates can help streamline the effort needed to develop and review solicitation and contract documents for specific projects, while also ensuring that roles and responsibilities related to design, quality, third-party coordination, and similar requirements that may change under DB are clearly and adequately defined. They also help the DOT focus programmatically on its DB procurement, contracting, and execution procedures.

    b. From industry's perspective, the familiarity and comfort level afforded by an owner's repeated use of standardized documents can facilitate their bidding processes and lead to better proposals.

4. WSDOT has been working closely with the Association of General Contractors (AGC) Subcommittee for Design-Build and the American Council of Engineering Companies (ACEC) representation to review standard contract language and template documents. Our understanding is that contract document templates are approximately 80% complete. WSDOT senior leadership should continue to characterize this as a high priority, and commit the internal and external staff resources to complete these templates.

5. It is generally recognized that for DB to work well, a mutual level of trust and respect must be established between the owner and industry groups. To this end, all of the DOTs interviewed indicated that they had partnered with industry in developing their DB programs and now continue to meet regularly, which has resulted in greater support for the use of DB.

6. Similarly, WSDOT regularly engages industry and has effectively fostered a collaborative working relationship as it continues to develop and refine its DB program.

7. Efforts that the DOTs recognize to be good practices but which have not yet been widely implemented (primarily due to resource constraints) include:

    - Establishing a database of lessons-learned that could assist with developing future projects.

    - Capturing historical cost and schedule performance to assist with the development of realistic budgets and schedules.

8. Only a few of the DOTs interviewed (FDOT, MDSHA, MnDOT, and Ontario) currently track performance metrics, and none have developed a lessons-learned database.

    a. FDOT and MDSHA track project performance outcomes such as cost increases, time increases, and number of claims.

Contract Templates

Standard contract templates and model forms should be designed to:

- Provide enforceable requirements that clearly define the roles and responsibilities of the contracting parties;

- Reasonably allocate risks to the party that is best able to address and mitigate them; and

- Encourage uniform application of procurement processes and contract management principles across project teams.

Industry Outreach

Performance Monitoring and Lesson-Learned

b. MnDOT monitors more process-oriented metrics such as the DOT's time to respond to ATCs, number of clarifications needed, and variances between promised versus actual dates related to the procurement process.

c. The remaining interviewees all noted that they viewed performance monitoring to be a best practice that they would like to implement in the future, pending available resources.

d. Several of the interviewees also expressed a desire to better document and raise awareness of lessons-learned, which were viewed by some to be just as, if not more, important than tracking metrics. However, as explained by UDOT, tracking performance metrics and lessons-learned can be very resource intensive. Although it has recently conducted a review of change orders on DB projects, UDOT has not yet established a standing database that aggregates all of the data. Similarly, CDOT noted that DB project teams often conduct lessons-learned workshops or after action reviews, but no centralized repository has been established to archive such information.

9. Similar to the other agencies, WSDOT also lacks a formal system to collect and disseminate lessons-learned in a manner that could be used to inform future project development activities. WSDOT also lacks a formal system to monitor any metrics or key performance indicators (KPIs) that could be used to assess the overall performance of WSDOT's DB program in terms cost, schedule, or quality performance, or that could be used to develop comparisons to DBB (or GC/CM) project performance.

a. Although some project managers are already identifying lessons-learned as a project closeout activity, this is not conducted on a consistent basis. However, it is our understanding that WSDOT has an initiative underway to develop a lessons-learned database.

b. One project manager shared an example of the lessons-learned captured for the I-5 Active Traffic Management System project. The format, which included observations and recommendations in the following key areas, could be used to develop a standard template.

- Project Management and Staffing Issues
- Contracts and Project Staff Experience
- Materials and Procurement Issues
- Technical Issues to be Resolved
- Design and Installation Issues
- Testing Plan Issues, Specifications, and Go Live
- New Contractor Difficulties
- Project Closeout

c. WSDOT does maintain a Construction Audit Tracking System (CATS), which is used to evaluate compliance with project-specific contract requirements. Although it is possible to mine the performance data maintained in this system, it has not been used thus far to assess or compare DB to DBB (or GC/CM) project performance.

3.3   Gap Analysis: DB Program Development and Management

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Programmatic Documents and Guidance	DB processes are standardized and integrated into a comprehensive set of guidance documents (e.g., manuals, templates, etc.) that are: • used consistently across the organization, • enforced by senior management (i.e., used to hold project teams accountable for project performance), and • used to facilitate continuous improvement.	**Partial alignment** Some processes and procedures are defined (e.g., the PDMSG), but are not necessarily structured into an integrated framework that encourages consistent application. An updated DB guidance manual is needed to provide more detailed guidance and to supplement existing design and construction policy manuals. *The peer agencies interviewed have largely created a robust DB infrastructure that includes:* • *DB Manuals* • *DB contract templates* • *Selection Guidance*	• WSDOT recognized the need for updated guidance and has established an internal working group to support the development of a new manual. • WSDOT has strong DB experience in the Central Office and certain regional offices, which can be leveraged to create repeatable guidance and training.	Given the delivery expectations surrounding Connecting Washington projects, lack of an updated DB manual may lead to: • Inconsistency in project execution across project teams and team members • Confusion regarding roles and responsibilities • Ineffective or inefficient use of resources • Missed opportunities to preserve and transfer DB and other institutional knowledge	• Continue to update the DB Manual. • Develop training modules to help roll out the new manual. • Refine procurement and contract templates as necessary.
Standard Contract Forms	Standard contract templates and forms are used to help administer and manage contracts and achieve consistency and fairness in the contracting process.	**Partial alignment** Project teams largely rely on the solicitation and contract documents used on past projects, removing any irrelevant requirements and making modifications as necessary.	WSDOT is working with industry to finalize solicitation and contract templates, which should eliminate any unnecessarily onerous terms that could reduce competition or result in higher bid prices.	A lack of standard templates can create inefficiencies in procurement and contract administration as additional time is needed for project teams to develop project-specific documents and for proposers and WSDOT administrators to familiarize themselves with new terms and conditions.	• Continue to work with industry to develop contract templates. • Train staff on the use and application of standard contract clauses.

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations

Performance Monitoring	Project- and program-level performance metrics are monitored and are used to promote strategic decision-making and continuous improvement activities.
	
	Standard program progress reports are regularly provided to keep senior leadership apprised of program threats and opportunities.
		No alignment
		
		DB performance metrics are not routinely monitored or used to develop meaningful comparisons to other delivery methods.
		
		No standard reporting process has been defined for the DB program.
		
		(Only a few of WSDOT's peers currently track DB performance metrics.)
			Although WSDOT does not specifically monitor the performance of its DB program, it does have some existing tools which could be used to obtain insight into the DB program:
			
			• The CAT system could provide a starting point for mining performance data.
			
			• The Gray Notebook (WSDOT's quarterly performance report) generally addresses construction cost performance, highlighting the accuracy of Engineers Estimates compared to award amounts.
				The current lack of DB program performance data:
				
				• Restricts management's ability to proactively identify opportunities to:
				
				  – Enhance the DB program
				
				  – Identify or forecast any adverse trends that require management attention
				
				• Increases the risk of miscommunication and misunderstanding of institutional goals regarding the DB program.
				
				• Increases the difficulty of communicating the benefits of DB to internal and external stakeholders.
					• Develop more systematic comparisons of DB with DBB performance to include additional measures of cost and schedule performance.
					
					• Maintain a database (in CATs or other) with DB performance metrics (e.g., cost growth, schedule, Non Conformance Reports (NCRs) or Incidents, Change Order types, etc.).

Lessons-Learned	Lessons-learned are formally captured for all projects and are used to drive continuous improvement activities.	**No alignment** Lessons-learned are primarily captured on an ad hoc basis and do not appear to be catalogued or compiled in a manner that could be used to inform future project development activities. *(WSDOT's peers are similarly only discussing lessons-learned on an informal and ad hoc basis, if at all.)*	Recognizing the importance of lessons-learned, WSDOT has an initiative underway to develop a database of lessons-learned.	Not documenting lessons-learned creates missed opportunities to: • Identify any opportunities to streamline, enhance or supplement existing processes to increase staff efficiency or effectiveness • Transfer knowledge to other project teams	• As a project closeout activity, ensure lessons-learned are discussed and documented using a standard format. • Develop a readily accessible database for tracking lessons-learned on DB projects. • Create project report cards to evaluate the extent to which the project met performance goals.

3.4   Recommendations on Program Development and Management

Based on the observations and risks identified above, the consultant team offers the following recommendations and implementation strategies:

1. **Continue to develop and/or update WSDOT's procurement and contract templates.** WSDOT's senior leadership should continue to characterize the completion of these templates as a high priority, and commit the necessary internal and external staff resources to completing this activity. The individuals responsible for the updating of the DB Manual should be closely involved with the development of the contract templates to ensure:

   - Consistency between the Manual and contract documents.

   - Adequate coverage in the Manual of any topics where additional clarification or guidance would be helpful to promote consistent interpretation and enforcement of contract clauses.

   Part of this process should include determining how to make the templates scalable to various project sizes or procurement approaches.

2. **Continue development of an updated DB Manual, and ensure that the manual reflects the policies and procedures needed to promote consistent and effective delivery of WSDOT's DB projects.** Given the limited DB experience of most WSDOT staff, development and maintenance of procedural guides and template documents will help accomplish several important goals:

   - It will require WSDOT to clearly and adequately define its specific DB policies and procedures, particularly relative to roles and responsibilities.

   - It will help preserve and transfer DB and other institutional knowledge, and can be used as the basis for training employees in DB best practices.

   - It can be used as a tool to help educate and communicate with project stakeholders.

   Developing and finalizing the manual is largely dependent upon senior leadership mandating this as a high priority need, and committing the staff resources to make this happen in a reasonable time period. The development of this manual should not be viewed as a simple administrative task, but as an opportunity to engage staff in substantive discussions regarding possible improvements to, or clarification of, current processes or outstanding policy issues, particularly relative to procurement, which are discussed in other recommendations.

   Based on the consultant team's review of the manual's working table of contents, WSDOT should consider including the following additional topics in their DB manual:

   - Scalability of processes to projects of different sizes/complexity (e.g., streamlining procurement options and quality management practices for small or non-complex projects);

   - Roles and responsibilities of outside consultants engaged to assist WSDOT with the procurement and execution of DB projects;

> Developing and enforcing a more comprehensive set of DB policies and procedures aligned with leading practices, coupled with a robust staff training program in these best practices, should help WSDOT foster a more sustainable and effective DB program.

- Incorporation of Practical Design into a DB project;

- Determination of effective technical proposal evaluation criteria and associated weightings (with emphasis on how criteria should be informed by project goals and risks);

- Communication plans, and the importance of collaboration, partnering, and co-location to help ensure the expeditious resolution of issues, as needed to support the fast-paced nature of a DB project; and

- Procedure for performance monitoring and tracking of lessons-learned.

- Application of risk analysis results to assist with project development and procurement activities.

In developing content for the manual, care should be taken to determine the best technique for conveying information. In addition to narrative descriptions and text:

- Diagrams and flowcharts can be useful for conveying step-by-step processes and approvals.

- Checklists are beneficial for tracking activities and ensuring task completeness.

- Decision trees and other decision support tools can help with determining the appropriate course of action when options or alternatives are available.

- Example forms, with sample text, can be an effective method for illustrating the appropriate way to complete forms.

- Case studies (highlighting successes or lessons learned) from past WSDOT projects can help make certain topics resonate with readers.

It is our understanding that much of the content for the manual (e.g., policies and procedures) still needs to be developed. Such development work should be done by senior, experienced project managers and external industry resources if necessary. Given this, we suggest the following implementation steps be taken (to the extent not already performed):

(a) Assign an individual from within WSDOT to be in charge of creating the updated manual.

(b) Develop an implementation schedule to be committed to by all key personnel within the department that will be contributing to content development activities.

(c) Conduct workshops with industry representatives to discuss and obtain feedback on any potential changes in policies and procedures that could impact their operations.

We believe that an appropriate target for the completion of these materials is 9 to 12 months after the individual charged with running this activity has been assigned. This individual should also be charged with determining if the

procedures can be developed using in-house resources or if some work must be outsourced to external consultants. Even if consultants are used to facilitate the process, key personnel should still be intimately involved with assessing needs and crafting content to help achieve staff buy-in to any new or changed procedures.

3. **Devise an effective rollout strategy.** To ensure the manual will serve the intended purpose and promote further consistency in DB contract administration, it is necessary to develop and implement an effective strategy for rolling out the manual as well as a process for enforcing the use of the procedures contained therein (i.e., holding the project teams accountable).

   The internal rollout of the manual can be partially accomplished through the training program recommended in Section 4.4.

   An external rollout can be accomplished through industry meetings and by having the programmatic documents published online.

4. **Maintain and update the contract document templates and DB Manual as necessary.** A staff member should be assigned responsibility for maintaining and updating the programmatic documents as additional policies or procurement strategies are adopted.

5. **Develop a framework for monitoring performance, capturing lessons-learned, and fostering a culture of continuous improvement.** As a project closeout activity, lessons-learned should be discussed and documented using a standard format. This could include the creation of project "report cards" to evaluate the extent to which the project met performance goals and to document what went well and what did not go as expected.

   As a longer term goal, these lessons learned should be archived into a readily accessible and searchable database to assist future project development activities. As an additional aspect of this framework, all administrative procedures should be reviewed periodically (e.g., on an annual or biennial basis) to assess compliance and to identify any opportunities to streamline, enhance or supplement existing processes to increase staff efficiency or effectiveness.

   Part of this goal should entail supporting the ability to efficiently roll up detailed metrics (e.g., cost growth, project duration, change orders, quality, etc.) in a user-friendly format that can be used to:

   - Identify any adverse trends that require management attention.

   - Compare DB project performance against DBB (and GC/CM) projects with comparable scope and cost.

   - Assess whether the PDMSG, DB Manual, and document templates require refinement.

4. Organizational Structure, Staffing, & Training

4.1   Leading Practices

As acknowledged by all of the agencies interviewed, the traditional policies and procedures developed to support the standard DBB system will not directly transfer to the implementation of DB. DB often demands different skills, processes, and management and coordination efforts for implementation to be successful. Fully integrating the DB delivery option into a DOT's capital construction program therefore entails fostering a new cultural and organizational context that establishes distinct roles, responsibilities, and standards for DB delivery.

Organizational practices adopted by owners with mature DB programs to ensure the successful delivery of their projects include the following:

Best Practices in Organizational Structure and Staffing

- Establishment of an organizational unit dedicated to administering and coordinating the DB program in recognition of DB projects requiring different skills and management and coordination efforts for implementation to be successful, and that some staff may have difficulty transitioning to the DB process;

- Selection of project teams based in part on their education and experience in the implementation of DB best practices, as well on having personalities well-suited to the leadership and collaborative skills needed to align the often disparate interests of DB project participants;

- Avoidance of cyclic hiring and downsizing plans (which can act to erode morale and deplete institutional knowledge), in favor of nurturing a stable workforce that has the skills and leadership ability to deliver both small and large projects;

- Support of attractive career development paths, which emphasize education, training and continuing personal and professional development, to attract and retain key personnel and ensure a sustainable core workforce;

- Training of personnel on fundamental DB principles, supplemented by peer-to-peer information exchanges as a way to transfer project management knowledge to targeted audiences;

- Commitment of senior leaders to the success of the DB program by:

    – Recognizing the need for key personnel to be trained and educated in DB best practices;
    – Empowering project engineers with appropriate decision-making authority to help ensure timely resolution of any issues encountered; and
    – Championing DB benefits both to internal staff and to other stakeholders.

- Alignment of functional support areas and other project partners to ensure the organizational structure supports the effective planning, design, procurement,

execution, and closeout of projects (to this end, train and develop subject matter experts capable of effectively carrying out supporting activities such as proposal evaluations and design reviews in a manner that supports the DB process);

- Active involvement of key personnel for the duration of the project to:

    – help ensure that valuable information is not lost between project phases (thereby reducing or eliminating project learning curves),
    – foster consistent and timely communication, collaboration, and issue resolution with the design-builder, and
    – hold project teams accountable for decision-making.

4.2   Observations

Internal Staffing and Organization

In the context of the best practices identified above, the consultant team observes the following:

1. WSDOT has assigned staff at the Headquarters level (currently 1 full-time Design-Build Engineer supported by a part-time Assistant State Construction Engineer) dedicated to the development and coordination of the DB program.

2. It is our understanding that WSDOT plans to expand this DB unit to 2 full-time personnel supported by 1 part-time staff member (i.e. 2-1/2 staff) in the near future to accommodate an anticipated increase in the use of DB through the Connecting Washington funding.

3. WSDOT's dedicated DB unit, particularly once enlarged, will be comparable to those established in other DOTs.

4. As summarized in Table 4.1, all of the agencies interviewed have at least one full-time staff position in their Headquarters or the Central Office acting as an organizational unit dedicated to administering, coordinating, and championing the DB program. (Note that TXDOT, with 86 full-time DB positions, is an outlier in that DB is only implemented for mega or very large projects.)

Table 4.1:
Dedicated DB Staff Positions

State	Internal Staffing	
	Dedicated Fulltime Positions	**Part time Support**
Washington (planned)	2	1
Colorado	1	2
Florida	3	-
Maryland	1	-
Minnesota	3	-
Missouri	1	-
North Carolina [a]	15	-
Ontario (MTO)	8	-
Ohio	1	3

State	Internal Staffing	
	Dedicated Fulltime Positions	Part time Support
Oregon	1	-
Texas	86	-
Utah (b)	1	1
Virginia	8	-

(a)   Staff are dedicated to both DB and P3 delivery

(b)   1 F/T manager overseeing DB and CM/GC programs, supported by 1 P/T position focused on DB and 1 P/T position on CM/GC

5.   Differences in the level and mix of staffing shown in Table 4.1 can be attributed to a number of factors, including the DOT's:

- management culture (i.e. centralized versus decentralized),
- program size,
- source of funding, and
- level of outsourcing.

For example, NCDOT describes itself as a centralized organization where all DB projects are developed, procured, and managed at the Central Office with a dedicated team of 15 fulltime staff. In contrast, FDOT, despite its large DB program (over 500 DB projects total), largely has a decentralized management structure where the District personnel have the authority to develop, procure, and deliver DB projects using consultant resources; the Central Office staff in FDOT's case primarily acts to establish policies and procedures and as a sounding board for issues.

> For the majority of the DOTs interviewed, as well as for WSDOT, the primary role of the dedicated Central Office staff, at the programmatic level, is to develop and maintain DB contract and procedural documents and to provide training and outreach to internal and external stakeholders.

6.   DB expertise is not widely dispersed across WSDOT staff. Staff experience is primarily concentrated in the Northwest and Olympic Regions, where most of the DB projects have been located. However, even within these regions, most staff outside of those working directly on DB projects have limited DB knowledge or experience.

Staff Experience and Skillsets

7.   It is our understanding that WSDOT staff have been challenged on past projects by the differing roles and responsibilities on a DB project. This learning curve disadvantage is common with many DOT DB programs until they mature and develop a core of experienced DB staff.

8.   WSDOT's 2016 Recruitment and Retention Study report indicated that there is a perception among current and former WSDOT staff that DB delivery requires WSDOT designers to transition away from the engineering work they were trained and hired to perform towards a more administrative role in which they simply oversee consultant engineers.

This finding reveals a common misconception that DB delivery can act to displace an owner's own experienced and knowledgeable design staff as design work is "outsourced" to industry. However, based on the experience of the DOTs interviewed, reality does not support this perception. Instead, DB practitioners would argue that the project development and design oversight work needed to advance a DB project generally demands more active involvement from senior

> Of the six projects reviewed by the research team, several were staffed with individuals who had limited to no previous experience with DB, which created learning-curve challenges on the project. These projects included:
>
> - US 2/Rice Road
> - I-5 ATMS
> - SR 520

design staff than comparable DBB projects (although fewer opportunities may exist to delegate work to junior staff members). Reasons cited included the following:

- Developing DB scopes of work in terms of minimum requirements and expectations can often be much more challenging and resource-intensive than developing 100% complete designs that largely rely on the DOT's previously developed standard specifications and standard details.

- Effectively implementing a best-value procurement process requires the DOT's subject matter experts to develop meaningful criteria for evaluating proposals that align with the goals of the project and reveal clear differences among the proposers.

- Providing effective design oversight requires DOT staff to understand how to review submittals for compliance to contractual requirements and to be open to solutions that may not be consistent with their own preferences.

- The fast-paced and collaborative nature of DB projects requires higher level management and decision-making skills, which can accelerate the career development of DOT engineering staff by placing them in leadership positions earlier in their career trajectories.

Project Teams

The staff assigned to an owner's DB project team should be:

- Well-versed in DB concepts, particularly with regard to its potential benefits and how it differs from the standard delivery approach

- Committed to the project from inception to completion

9. Unlike WSDOT's traditional project delivery process, in which individual team members may not be active during all phases of a project's lifecycle, DB projects benefit greatly from the continued involvement of key personnel from project inception to project completion. For example, leading practice suggests that:

- Field construction representatives, who will ultimately be overseeing construction, should participate in the RFP development process to ensure that construction-phase issues (e.g., the quality management process, inclusion of "witness-and-hold" points, long-term maintenance considerations of possible design alternates, maintenance and protection of traffic, etc.) are given the appropriate attention in both the RFP itself and in the evaluation and selection of the design-builder.

- Similarly, the designers and engineers that participate in the preliminary design work and in preparation of the RFP should remain involved after contract award to oversee and review the design-builder's design submittals and to respond to any Requests for Information (RFIs) and Requests for Change Orders.

10. Based on interviews with WSDOT project personnel, this leading practice was not always observed on past projects (generally due to staffing constraints).

   a. Project Engineers often were not consulted during the procurement process and disagreed with the evaluation criteria used to select the design-builder.

   b. Design staff were transferred to other projects at the conclusion of the design phase, leading to a knowledge gap among the project participants that impacted timely decision-making.

11. Development of effective DB scopes of work and procurement documents, as well as the proper oversight of design-builders, often requires project teams to seek assistance from internal technical resources (e.g., engineering and design staff with expertise in structures, environmental, geotechnical, etc.).

12. Such supplementary resources can provide effective and valuable expertise if they have had adequate exposure to the DB process through either training or project experience. It appears, however, that on past DB projects, WSDOT designers, who did not possess adequate understanding of the DB process, took actions that were contrary to DB best practices and unintentionally compromised the transfer of design risk to the design-builder. For example,

   a. A finding included in the SR 520 Pontoon Construction Project Internal Review Report (February 26, 2013) indicated that staff in the Bridge and Structures Office:

      Either did not understand the appropriate level of design and specifications for a Design-Build contract or, if they did, they did not communicate that they were advancing their design to higher, more prescriptive level than the SR 520 Program office or WSDOT Executives expected.

      The finding suggests that project performance was hampered in part by:

      - Design staff having inadequate understanding of the scope development process for DB, and

      - Ineffective/dysfunctional communication between the program office and design staff.

   b. Several of the project engineers interviewed indicated that oversight of the design-builder's execution of the final design process was also challenging for staff who were relatively inexperienced with DB. For example, the project engineer for the SR 520 Eastside Transit and HOV Project indicated that design staff, despite having excellent technical skills, initially had difficulty understanding how to review design deliverables for contractual compliance.

      The oversight process for this project was also challenged by a lack of dedicated staff having the right expertise and project knowledge, as design development staff were transitioned off the project too soon to address field design changes.

Internal Technical Resources

On the I-5 Skagit River Bridge Replacement Project, design oversight issues were largely avoided by assigning sufficient resources to the project (including a dedicated bridge engineer), to ensure quick turnaround of submittals as needed to support the accerlated DB schedule.

Use of Consultants

13. In addition to obtaining assistance from internal technical resources, most DOTs, including WSDOT, also rely on outside consultants to some extent to support the development and/or administration of their DB programs. As summarized in Table 4.2, consultants are most often used to assist with development of solicitation documents and preliminary engineering.

Table 4.2:
Use of Outside Consultants

State	Development of Solicitation Documents	Project Development and/or Preliminary Engineering	Design Oversight	Construction Engineering and Inspection
Washington		X	X	X
Colorado	X			
Florida		X		X
Maryland		X		
Minnesota	X	X	X	
Missouri	X			
North Carolina				
Ontario (MTO)	X	X		
Ohio		X		X
Oregon	X		X	X
Texas	X	X		
Utah		X		
Virginia		X	X	X

14. Some correlation can be seen between size of a DOT's DB program and its reliance on outside consultants. Those agencies with larger DB programs, either by number or size of DB projects, (e.g. FDOT, TXDOT, and VDOT) tend to be highly outsourced, with consultants used for multiple aspects of project development and management, including preliminary engineering, design oversight, and construction engineering and inspection. [NCDOT, which also has a large DB program, is an exception to this finding in that it has chosen to build up a relatively large internal group of 15 dedicated staff positions instead of relying on consultants.] Agencies with lower levels of outsourcing tend to use consultants more selectively where specialized expertise is required.

15. The increase in WSDOT's capital program, as provided through the new Connecting Washington funding, is anticipated to require an increase in the use of DB to ensure the program can be delivered in the required time frame. Given WSDOT's staffing constraints, delivery of the upcoming projects will likely require increased use of supplemental consultant staff, consistent with the experience of other DOTs that had to ramp up a DB program.

16. As programs mature, consultant involvement may decline to some extent. Some agencies (MnDOT, MoDOT, Oregon DOT) noted that they relied heavily on consultants to develop their initial DB programs, prepare standard templates, and assist with training and/or staff development. However, as internal staff gained

more experience with DB, the need for consultant assistance became less critical. For example,

- MnDOT indicated that although it views outsourcing to be a "good startup model," it is now seeking to internalize more DB functions.

- Similarly, MoDOT reported that after its first 3 DB projects, it was able to scale back consultant use and now only retains consultants to provide expertise in discipline areas for which it lacks resources in-house.

- Expressing a similar sentiment, Oregon DOT noted that if it were to pursue DB projects again in the future, consultant use would be based on project needs and available internal resources.

17. Although outside consultants can provide much needed assistance, particularly during the early development and expansion of a DOT's DB program, overreliance on consultants can stunt the growth and development of the DOT's own staff, creating a void of sufficient DB experience and qualifications to provide meaningful project-level decision-making. A common complaint regarding WSDOT's DB program voiced by industry representatives was that WSDOT often yielded too much control to its consultant resources, particularly for design reviews. The issue stems in part from the perception that the consultants, who are paid by the hour, are incentivized to be unnecessarily critical of design-builder submissions.

> When using consultants, WSDOT staff should continue to maintain control and responsibility for design reviews and decision-making. Consultants should be used in a supporting role.

Training

18. As noted in Observation No. 6 above, WSDOT staff are largely unfamiliar with the DB delivery method, a knowledge gap that can be attributed at least in part to the lack of a formalized DB training program. Training efforts at WSDOT are largely ad hoc, with most staff learning on the job through the mentoring efforts of experienced Project Engineers.

19. In contrast, most of the agencies interviewed have instituted some type of formal training program. For example,

    a. Each year Florida DOT, through its Design-Build Task Force, conducts training for District and Project Engineers on specific DB topics.

    b. Similarly, Colorado, Ohio, and Virginia DOTs have developed classroom DB training modules addressing project development, procurement and contracts, and post-award contract administration. The training may include role playing, exercises, and case studies designed to enhance understanding of DB delivery.

    c. UDOT has successfully used peer-to-peer information exchanges as a way to transfer DB knowledge to targeted audiences. For example, if a project manager who is not that well-versed in DB processes is identified for a future project, he/she will be brought on to observe or shadow an experienced project manager assigned to an active DB project. UDOT has also found it beneficial to organize face-to-face meetings between current DB project teams that are in the post-award project phase with teams that are still in procurement to discuss any lessons learned. Similarly, UDOT has organized training for project team members assigned to specific roles, with a focus on what individuals assigned to

> An effective training program can be used to help communicate the potential benefits of DB and discuss how DB differs from the traditional DBB process.

those roles in the past would want to convey to future team members (e.g., top 10 design phase tips).

d. Some agencies also noted that they often hold workshops with individuals serving on technical proposal scoring committees to emphasize the need to score only against the minimum requirements stipulated in the RFP rather than according to their own preferences.

4.3   Gap Analysis: Organizational Structure, Staffing, and Training

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Organizational Structure	A core group of dedicated DB professionals is in place and is committed to supporting the successful execution of DB projects.	**Partial alignment** WSDOT has dedicated staff (currently 1 full-time DB Engineer supported by a part-time Assistant State Construction Engineer) assigned to supporting the DB program. However, given the size of the "Connecting Washington" program compared to the DB program to date, HQ appears to be somewhat understaffed to effectively administer and coordinate the anticipated expansion of the DB program.	Similar to other DOTs, dedicated personnel, experienced with DB delivery, have been assigned to administer the DB program.	Without additional full-time staff dedicated to the DB program, it will be challenging to provide the resources necessary to effectively: • Develop and rollout programmatic documents, • Develop and support training efforts, • Provide technical support to project teams, and • Conduct industry outreach.	WSDOT should follow through on its commitment to increase its headquarters DB staff from 1-1/2 to 2-1/2 FTEs, which should provide sufficient resources to oversee the development of the recommended programmatic documents and training program, as well as the anticipated expansion of the DB program.

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Staff Experience and Expertise	WSDOT personnel assigned to DB project teams are: • Trained and experienced in the implementation of DB project delivery; • Have personalities well-suited to the leadership and collaborative skills needed on DB projects; • Sized to effectively deliver the DB program (i.e., project teams are dedicated to a single or a few projects); and • Viewed by senior management as a strategic asset to helping fulfill the organization's needs and goals.	**Partial alignment** DB expertise is not widely dispersed across WSDOT staff. Staff experience is primarily concentrated in the Northwest and Olympic Regions, where most of the DB projects have been located. However, even within these regions, most staff outside of those working directly on DB projects have limited DB knowledge or experience.	• Although DB expertise is not widely dispersed across WSDOT staff, a strong knowledge base of experience and lessons learned now exists among the project team members working in the Puget Sound area. Tapping this knowledge base can provide an effective starting point for development of a robust training program designed to transfer and instill this knowledge to others within WSDOT. • Peer-to-peer mentoring is taking place organically, as WSDOT staff with DB experience recognize the strengths and weaknesses in their colleagues and provide the guidance and support needed to help them properly fulfil their designated role on a DB project team.	Lack of staff resources having knowledge and expertise in DB best practices increases the risk of: • Confusion regarding roles and responsibilities on DB projects; • Inconsistent project oversight leading to cost or schedule growth; • Overreliance on consultants; • Ineffective decision-making; and • Stakeholder dissatisfaction.	• Foster an organization-wide commitment to DB training. • Impress upon senior leaders the importance of cultivating a positive message regarding DB that attracts and retains a committed core workforce with the appropriate skills and competencies.

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Training and Staff Development	Formal training, career development paths, and succession plans are established to help retain key personnel and ensure a sustainable core workforce that is educated and trained in DB concepts.	**Partial alignment** WSDOT currently lacks a formalized DB training program. Training efforts remain mostly ad hoc, with most staff learning on the job through the mentoring efforts of experienced Project Managers. *(Many of WSDOT's peers are in closer alignment to best practice, regularly conducting formalized training and/or promoting peer-to-peer information exchanges to transfer and instill DB information throughout their organizations)*	WSDOT HQ staff recognizes a need for more formal and standardized training in DB concepts, particularly with regard to changing roles and responsibilities.	Inadequate training and staff development opportunities can lead to: • High turnover among experienced staff who may feel that ample opportunities do not exist for advancement • A loss of core DB competencies within WSDOT (therefore requiring continued reliance on consultants) • Confusion regarding the skillset needed for owners to effectively oversee DB projects (as evidenced by the recent Staffing study which revealed a staff perception that DB use requires an owner's own design staff to transition away from performing engineering work)	• Develop formal statewide training materials to include DB basics and more advanced modules for project development (scoping), procurement, contract development, contract administration, and other specialty topics. • Expand mentoring, shadowing, and peer-to-peer exchanges. • Establish a thoughtful career development process that acts to attract and retain experienced DB staff through exposure to diverse DB projects and a more competitive compensation structure. • WSDOT's senior leaders should continue to cultivate a positive message regarding DB that attracts and retains a committed core workforce with the appropriate skills and competencies.

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Continuity of Project Teams	Active involvement of key personnel for the duration of the project to help reduce or eliminate project learning curves and to foster consistent and timely communication, collaboration, and issue resolution with the design-builder.	**Partial alignment** It our understanding that WSDOT strives to commit project teams to projects as necessary. However, in the past, key personnel often transitioned off of projects at inopportune times.	WSDOT recognizes the value of assigning more "cradle-to-grave" responsibility to project teams, particularly the Project Engineer, and is attempting to commit these resources to the duration of a project.	In the past, key personnel often transitioned off of projects at inopportune times. Insufficient project resources can compromise: • Timely communication and issue resolution • Effective oversight of the work	After the decision is made to use DB for a larger project, project staffing requirements should be assessed to determine any need to augment WSDOT staff with experienced consultant staff to support project execution phase (i.e. design reviews, construction inspection, responses to RFIs, quality management, etc.).

4.4 Recommendations on Organizational Structure and Staffing

To successfully accomplish the anticipated increase in DB projects stemming from the Connecting Washington legislation, DB knowledge and expertise must become more widely dispersed throughout the WSDOT organization. Recommendations and implementation strategies for achieving this goal include the following:

1. **Use full-time Headquarters staff to support the development of programmatic DB documents.** It is our understanding that WSDOT has recently committed to increasing the size of its dedicated DB organizational unit from 1.5 to 2.5 fulltime equivalents. In furtherance of Recommendation 2 in Section 3.4, regarding the development of an updated DB Manual, this staff should focus their near term (next 6 to 12 months) efforts on:

   - Supporting the development of formal policies and procedures (i.e., finalizing the DB Manual)

   - Developing and implementing a statewide DB training program

   - Completing and/or refining procurement and contract templates

   - Continuing public and industry outreach efforts

   - Developing a DB lessons-learned / performance database.

   As part of a longer-term implementation strategy, this staff should be used, in conjunction with regional staff as appropriate, to present DB training to all Regions (see Recommendation No. 2 below for more details on training recommendations).

   After the updated DB Manual and training program is rolled out, staffing levels at Headquarters can be reevaluated and adjusted based on the needs of the Regions.

2. **Enhance the skills (and increase the number) of knowledgeable DB Project Managers in Regions outside of Puget Sound area (e.g. Eastern, Southwest, North and South Central) through formal training, mentoring or shadowing, and peer-to-peer exchanges.** To help roll-out the DB Manual and broaden the application of DB to Regions outside of the Puget Sound area, it would be helpful to develop a formal training program on fundamental DB principles affecting procurement, contracting, and project execution. The training should not be generic, but specific to how projects are developed and delivered at WSDOT to articulate and reinforce WSDOT's current policies and procedures.

   The first step to developing a training program is to determine how best to deliver the information to the targeted audience. Options include some combination of:

   - Classroom-style instruction aided by formal training materials (e.g., slide presentations, participant workbooks, case studies, etc.);

   - "Lunch-and-learn" sessions to discuss recent project successes and lessons learned;

WSDOT's mandate under the Connecting Washington legislation is to create a sustainable core workforce at current staffing levels. To achieve this goal, while also increasing the use of DB to deliver the capital program in the required time frame, will require WSDOT to:

- Expand WSDOT's DB knowledge base

- Increase training efforts

- Support career develoment

- Optimize the use of consultant resources

Possible training topcs include:

- Project development (e.g., scoping, goal-setting, risk identification, estimating, client communication, etc.)

- Procurement and contracts (e.g., delivery method selection, proposal evaluation, etc.)

- Post-award contract administration

- Formal mentoring efforts with junior staff "shadowing" more senior staff; and

- Information exchanges with other agencies with DB experience, as well as participation at DBIA, FHWA, or AASHTO DB forums (which may entail out-of-state travel as an additional training expense).

Development of the training program is dependent upon, among other things:

- Completion of the DB Manual and the contract templates; and

- Determination of:

  - whether the training program will be developed using in-house or external resources;

  - whether the trainers will be in-house, external, or a combination of both;

  - who will be trained and over what period of time; and

  - how often "refresher" training should be provided after the delivery of the initial training.

Development of the training program can be started concurrent with the DB Manual, with a target for finalizing any necessary materials approximately three months after the completion of the updated DB Manual.

3. **Identify and train subject matter experts in various technical disciplines.** Experts in various technical disciplines (e.g., bridge, roadway, geotechnical, environmental, etc.) are often consulted on DB projects to assist Headquarters DB staff and the project teams with project development, procurement, and design and construction oversight activities.

To ensure these individuals can effectively support the DB process, they should receive additional specialized training on topics such as:

- DB scope development
- Use of performance criteria/requirements
- Goal setting and evaluation criteria
- Alternative Technical Concepts (ATCs)
- Design review process
- Responses to requests for information/clarification
- Change management
- Quality verification

4. **Support career development.** Because WSDOT staff make attractive hires for local industry, WSDOT needs to make an active effort to retain experienced DB staff on WSDOT's payroll.

To help retain talented staff, WSDOT should recognize employees who assume a leadership role in managing and executing DB projects, and ensure that there that there is a formal career development process in place that:

- Allows such employees to gain valuable on-the-job experience on a diverse set of projects;

- Encourages and supports continuing industry education (e.g., training and certification provided by organizations such as DBIA); and

- Provides opportunities for staff to actively engage in national or local association activities (e.g., DBIA and TRB) by seeking out speaking engagements and assuming leadership roles.

In addition to the above, WSDOT should remain cognizant of how the compensation and benefits packages offered to such individuals measure up to those offered by comparable public and private sector opportunities, and ensure, to the best it is able, that WSDOT appropriately recognizes experience and talent. The recent WSDOT Recruitment and Retention study results can provide insight into the need to update the overall compensation structure.

5. **Optimize the role of consultants with regard to decision-making and supporting DOT staff for DB projects.** Outside consultants can provide valuable support and expertise for developing programmatic documents, as well as for managing peak workloads to avoid cyclic hiring. However, the use of consultants must be balanced against the need to develop core DB competencies within the WSDOT staff accountable for decision-making and project performance.

For a larger project, after the decision is made to use DB, project staffing requirements should be assessed to determine any need to augment DOT staff with experienced consultant staff to support project execution (i.e. design reviews, construction inspection, responses to RFIs, quality management, etc.).

> The development and maintenance of DB procedural guidance, standard templates, and formal training programs can help impart the necessary knowledge, lessons-learned, and skills upon DOT staff assigned to deliver DB projects. Gaining experience on DB projects and realizing firsthand the potential benefits DB can offer can act to further dispel any fears or misconceptions related to DB use.

5. Project Development

5.1   Leading Practices

DB delivery fundamentally changes the traditional project development process. Instead of taking design to 100% completion, the key project development task for an owner is to instead craft an adequate and realistic project scope that will ensure the needs of the agency and other stakeholders will be met, without materially compromising the intended risk allocation strategy, stifling creativity and innovation, affecting value for money, or otherwise detracting from project goals.

Recognizing that a project's development phase represents the best chance to fully influence project outcomes, organizations with mature DB programs generally apply extreme care to defining and developing the project's size and scope and, once established, adhere to strict standards for controlling any scope or schedule changes.

Several best practices used by successful organizations to impart discipline and repeatability to the project development process are summarized below:

> Project scoping is of critical importance for DB projects as it provides the basis for the design-builder's pricing and subsequent design and construction completion efforts.

Best Practices in Project Development

- Develop clear guidance that clarifies how project development practices can change under different project delivery methods;

- Collaborate with key project stakeholders (including those that will ultimately operate and maintain the work) at the early stages of project planning to identify project goals, risks, constraints, and priorities;

- Structuring and packaging of projects in a way that enhances cost and schedule efficiencies, reduces administrative burden, and maximizes participation by the contracting community (which in turn can lead to better bid pricing);

- Align level of scope definition to project goals (e.g., maximize use of performance requirements when innovation is a goal);

- Perform sufficient preliminary engineering and investigative work (e.g., geotechnical/environmental investigations, permitting, etc.) to:

  – Develop a realistic understanding of the project's scope and budget, and

  – Provide proposers with information that they can reasonably rely on in establishing their price and other commercial decisions.

- Perform outreach as needed to coordinate regulatory and other third-party coordination issues so as to reduce external bottlenecks in project execution.

5.2 Observations

In the context of the best practices identified above, the consultant team observes the following:

1. WSDOT HQ lacks a standard policy and guidance that the regions/programs can use to develop appropriate scopes for DB projects. In accordance with WSDOT's Design Manual, the standard process requiring development of a project summary package applies regardless of delivery method. However, Headquarters staff indicated that each Region has flexibility to otherwise modify the processes for DB as long as the required deliverables are produced.

2. This flexibility has in some cases resulted in a level of design or detail that did not match what was needed for a project, and/or WSDOT not achieving some of the desired benefits of DB, such as cost and time savings or contractor innovation. For example,

   - For the SR 520 Eastside Transit project, the procurement documents did not clearly define the geotechnical risks the project could encounter. WSDOT ultimately required a change to the retaining walls, which could be attributed in part to unforeseen geotechnical conditions. The screening/noise wall design also underwent a significant change post-award. Such changes contributed to project delays.

   - Delays to the I-5 Active Traffic Management project were caused by changes made by WSDOT to the technology specifications and the scope of work for message signs.

   - Had WSDOT performed additional upfront investigation on the SR 167 project, work that was ultimately paid for under a change order could have been included as part of the original scope of work (thus eliminating the premium cost associated with negotiating a change order after award).

3. All of the agencies interviewed agreed that sufficient preliminary engineering must be performed to obtain the necessary environmental clearances and to adequately understand and define project risks.

   Although federal regulations allow agencies to issue RFPs and select design-builders prior to completing the National Environmental Policy Act (NEPA) process, none of the agencies interviewed expressed a desire to pursue such an approach.

4. The appropriate level of front-end work should be informed in part by the identified project risks. Although WSDOT has a very mature standardized risk assessment process that is used to identify and evaluate project risks that could impact budget and schedule, the extent to which WSDOT's risk evaluation process is integrated with other project development activities, such as scoping and selection of appropriate proposal evaluation criteria, is unclear. For example, given the geotechnical risks on the SR 520 project, it may have been beneficial to evaluate proposers' geotechnical design/approach as part of the scored criteria and to have more fully defined the risks in the solicitation documents

> **Lessons-learned** shared by the peer agencies:
>
> - The scope needs to address both what the DOT wants and does not want with regard to design options.
> - Limiting scope development activities to a core group of staff that fully understands the DB process generally results in better proposals and pricing.
> - Project goals should inform the level of design and front-end investigation work.

> Although preliminary design work should not be advanced too far by the owner, appropriate front-end tasks must still be performed to ensure the development of a realistic understanding of the project's scope and budget and to provide proposers with information that they can reasonably rely upon in establishing their price.

5. Use of performance specifications is generally viewed as a best practice for DB delivery to provide the greatest opportunity for contractor flexibility and innovation.

    a. Industry representatives, for example, indicated that they are more likely to propose on DB opportunities that allow for flexibility and innovation (which they see as providing a competitive advantage).

    b. Although most of the agencies acknowledged that performance specifications are a DB best practice, they noted that their DB project requirements still tend to be fairly prescriptive due to:

        • The need to advance the design to satisfy the NEPA process and to accommodate project constraints or third party (or joint jurisdictional) issues;

        • Public safety concerns; and

        • Unwillingness by some DOT departments (e.g., structural, traffic control, etc.) to allow deviations from Standard Specifications.

6. Similar to some of the peer agencies, WSDOT generally uses more prescriptive specifications, and then relies on a resource-intensive ATC process to achieve innovation.

7. Most of the peer agencies indicated that they attempt to use the identified project goals to help determine whether or not to use performance specifications. For example,

    a. If contractor innovation is the primary goal, the preliminary design should only be advanced to the level needed to identify the minimum requirements and technical criteria in accordance with the risks to be allocated to the design-builder. Performance specifications should then be used to the extent possible to provide the greatest opportunity for flexibility and innovation.

    b. In contrast, if an expedited delivery schedule is the motivating factor for using DB, a higher level of design and prescription may result in better pricing and allow for a quicker and more streamlined procurement process (e.g., low bid). As explained by NCDOT, even with prescriptive specifications, design and construction flexibility can still be achieved through the ATC process.

8. DOTs with mature DB programs that also implement Practical Design (PD),

    • Incorporate PD as early as possible in design development;

    • Integrate PD as part of the procurement process, encouraging proposers to submit ATCs that take advantage of cost-saving PD ideas; and

    • Publish guidance regarding the PD process.

> Practical Design (PD) encourages design flexibility to find lower cost design solutions that meet a project's purpose and need.

9. Due to concerns that implementing PD during procurement will result in an unequal playing field for proposers, WSDOT currently is piloting PD only as a post-award process, referred to as a "Practical Design Pause." If the parties agree, a Practical Design Workshop (PDW) is held prior to Notice to Proceed and may last up to 30 calendar days.

   a. The purpose of the PDW is to explore ideas that differ from the work included in the original Contract, and to identify cost reduction ideas and other potential Contract changes, while continuing to satisfy the project's purpose and need.

   b. Changes identified through the PDW will be administered similarly to Design-Builder Initiated Changes, with the savings to be shared between the parties. The process is similar to a Value Engineering (VE) Change Proposal process.

Potential disadvantages with WSDOT's post-award approach are that PD ideas are only offered by the successful proposer and not competed as part of procurement process. Also, WSDOT must share in the savings realized by a PD after award.

10. WSDOT is adding language to its proposal process encouraging the design-builder to pursue PD. It is our understanding that, as part of the procurement process, WSDOT is considering asking proposers to identify PD ideas that will provide cost/schedule savings during procurement, and awarding technical credits based on the PD ideas brought forward. After award, WSDOT will then evaluate all the PD ideas submitted during the RFP process for incorporation into the work.

In the future, WSDOT is also considering asking for ATCs during procurement that provide for cost-savings if the "equal or better" concept is met or equal performance can be demonstrated.

5.3 Gap Analysis: Project Development

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Scoping, Preliminary Investigation,& Engineering	Standard guidance is provided to address the project development process for DB projects, and the appropriate level of design based on project goals, risk allocation, and procurement approach.	**Partial alignment** WSDOT currently lacks standard guidance that the regions/programs can use to develop appropriate scopes and contract packaging for DB projects. However, the proposed table of contents for the updated DB manual indicates that guidance will be included to address how the project development process differs for DB versus DBB projects.	WSDOT staff, as they have become more experienced with DB, have to come to generally recognize basic differences in the project development process for DB vs. DBB.	There is considerable latitude in how the Regions can modify the standard project development process for DB, which can lead to: • Inconsistency in how DB projects are developed and scoped • The level of design not matching what is needed for the project • Change orders stemming from inadequate scoping or preliminary investigation • DB mega-projects may present management challenges, more risk, and restrict industry competition	Develop guidance, to be included in the DB Manual and the formalized training program, to address the scope development process for DB projects. Carefully consider contract packaging for DB from cost, schedule, community impact, DB market, and other perspectives. Smaller DB projects can alleviate funding limitations, and stimulate more competition from local industry
Performance Specifications	Use performance specifications to provide the greatest opportunity for contractor flexibility, particularly when innovation is a project goal.	**Partial alignment** WSDOT lacks sufficient guidance and training regarding the effective use of performance requirements for DB projects. WSDOT (as well as other DOTs) often use fairly prescriptive specifications to satisfy environmental requirements and to accommodate project constraints or third party (or joint jurisdictional) issues.	Recognizing that its requirements are fairly prescriptive, WSDOT uses a robust ATC process to obtain contractor innovation.	WSDOT currently uses relatively prescriptive specifications for its DB projects. For example, Book 2 of a typical WSDOT solicitation package prescribes a list of Mandatory Standards for each work element that design-builders must adhere to in developing their designs. Incorporation of such standards into the DB contract can: • Significantly restrict contractor innovation • Require use of a prolonged and resource-intensive ATC process to allow for design deviations and foster contractor innovation	Develop guidance, to be included in the DB Manual and the formalized training program, to help project teams make informed and conscious decisions regarding the use of performance versus prescriptive specifications. For example, see SHRP2 R07 Performance Specifications Implementation Guidelines.

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Practical Design	Agencies are developing standard processes and guidance to address how to adapt PD to a DB project. This often entails integrating PD into the procurement process by encouraging proposers to submit ATCs that take advantage of cost-saving PD ideas.	**Partial alignment** WSDOT currently lacks a clear strategy for seamlessly integrating PD into the delivery of a DB project.	WSDOT appears to be carefully considering various options to determine the best way to apply PD to DB projects.	Potential disadvantages with the post-award approach to PD that WSDOT is piloting include: • PD ideas are limited to those offered by the successful proposer and are not competed as part of procurement process • WSDOT must share in the savings realized by a PD after award	• Develop guidance, to be included in the DB Manual and the formalized training program, to address how to adapt PD to a DB project. • Consider evaluating PD concepts prior to and as part of the procurement phase.

5.4   Recommendations on Project Development

Based on the observations and risks identified above, the consultant team offers the following recommendations:

1. **Take advantage of Practical Design (PD) for DB projects in all phases of design development (which may include Phase 1 - Project Inception to Basis of Design (BOD), Phase 2 - Procurement, and Phase 3 - Post-award).** To more effectively implement PD for DB projects, we recommend that WSDOT evaluate PD concepts as part of the preliminary design and scoping phase and during the procurement phase.

   The WSDOT Design Manual M 22-01.12 dated November 2015 addressing PD states that:

   > *Practical Design can be applied at all phases of project development, but is most effective at the scoping level or earlier where key decisions are made as to what design controls and elements are affected by alternatives, and how they can best be configured to meet the project and contextual needs.*

   WSDOT should consider adding PD to the RFP process, inviting proposers to identify PD ideas and potential cost/schedule savings that do not compromise the project purpose and need. WSDOT could award technical credits for the ideas and bring them forward in Phase 3 as part of a 30-day Practical Design Workshop similar to a VE process. Alternatively, WSDOT could consider developing PD guidance to allow cost-saving ATCs in place of standard designs.

   To implement PD during preliminary design or procurement would require revising the current language in RCW 47.01.480 (1) (c) (House Bill 2012, 2015 session) addressing PD that states:

   > *For Design-Build projects, the evaluation must occur **at the completion of thirty percent design**.* (emphasis added)

2. **Develop guidance and training to address project development processes for DB projects.** To expand upon Recommendation No. 2 in Section 3.4, regarding the development of an updated DB Manual, guidance should be developed to allow project teams to make informed and deliberate decisions regarding topics such as:

   - Goal setting and prioritization, which will later help the project team make informed decisions regarding:

     – Proposal evaluation criteria for inclusion in solicitation documents and subsequent award decisions, and

     – Appropriate response strategies should issues arise during project execution.

   - Careful consideration of contract packaging for DB from cost, schedule, community impact, DB market, and other perspectives (as smaller DB projects can alleviate funding limitations, and stimulate more competition from local industry);

- The level of pre-design investigation, scoping, and design development work needed given the project goals, risks, and procurement approach;

- Best practices for performance specifying, including when to use or not to use performance criteria, and how to coordinate criteria with standard design manuals and other reference materials; and

- Whether change order requests represent actual changes from the original scope (or are simply the result of design evolution allowed for in the contract documents).

3. **Consider expanding the use of performance specifications.** The technical requirements included in Book 2 of WSDOT's current DB procurement templates generally refer to mandatory prescriptive standards (e.g., design, materials, construction manuals, standard specifications) for various design elements.

    If WSDOT intends to allow the design-builder more flexibility through the use of performance specifications, the referenced standards should be reviewed to identify any potential conflicts. It may then be necessary to articulate in the solicitation documents where WSDOT would consider alternative solutions or options to what is mandated in the referenced standards (but which would meet the performance criteria).

4. **Perform appropriate levels of front-end investigation and design.** The necessary level of front-end investigation and design (i.e. scoping definition) will largely depend on project goals and the intended risk allocation strategy established for the project.

    For complex or high-risk projects, WSDOT's risk management process (CRA/CVEP) should evaluate, as possible risk analysis scenarios, the impact of performing varying levels of investigation and design before starting the procurement phase. The results of the risk assessment could then be used to inform the internal budget and schedule to allow for the appropriate level of front-end subsurface, utility, or other site investigative work required to effectively define the scope of work within an acceptable level of risk. The higher the risk rating, the more resources that should be applied to front-end investigation.

6. Delivery Method Selection

6.1   Leading Practices

No single delivery method is appropriate for *all* projects and situations. For any given project, a key early decision in the project development process therefore entails selecting the *optimal* delivery approach based on project characteristics, goals, risks, and constraints.

Practices used by organizations with successful DB programs to assist with the delivery decision include the following:

Best Practices in Delivery Method Selection

• Fostering of an organization-wide understanding of the potential benefits, limitations, and attributes of various delivery methods;
 	
• Flexibility for project teams to select a delivery strategy (e.g., DBB, DB, GC/CM, etc.) that best aligns with the project's characteristics, goals and needs while minimizing costs and risks;
 	
• Early identification of the delivery method of choice to ensure the level of project design and development aligns with the delivery method chosen;
 	
• Implementation of guidelines that clearly identify how the project delivery decision integrates into the organization's traditional project development process, including processes that address:
 	
    – When the delivery method decision is to be made,
    – Who has final accountability for the decision, and
    – How the decision is to be documented to effectively communicate and provide an auditable trail of how the delivery decision was made.
 	
• Use of lessons-learned on past projects to inform future delivery method decision-making.

6.2   Observations

In the context of the best practices identified above, the consultant team observes the following:

Decision Process

1. As discussed in Chapter 2, both DBB and DB hold advantages and disadvantages that should be carefully weighed when considering how to best deliver a particular project. In support of this observation, all of the peer agencies interviewed acknowledged the following:

    • DB is not appropriate for all projects.

    • Key drivers behind the decision to use DB include a need or desire to:

  – Expedite the delivery schedule
  – Encourage industry innovation
  – Improve risk allocation
  – Obligate funds for the entire project

- The decision as to which delivery approach best aligns with a given project's characteristics, goals, risks, and constraints should be made relatively early on in the project development process.

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Common considerations included in decision support processes include:

- Project delivery schedule

- Project complexity

- Design flexibiltiy and/or opportunities for innovation

- Level of design needed to clearly define the DB scope and requirements

- Staff experience and availability to execute the project delivery methods under consideration

- Competition and contractor experience

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2. To support the delivery method decision, several DOTs have developed systematic processes or tools that align project goals and characteristics with the attributes of a given delivery method (e.g., DBB, DB and its variants, GC/CM, etc.).

   a. Of the peer agencies interviewed, CDOT, MDSHA, MnDOT, and Ontario have implemented formal decision tools modeled after the Project Delivery Selection Matrix (PDSM) developed for FHWA's Transportation Pooled-Fund Study, TPF-5(260).

   b. Such processes generally entail considering a project's goals and constraints and then evaluating the opportunities and challenges associated with each delivery method under consideration.

   c. Using such a formal and structured approach can lend transparency and consistency to the decision process – a key benefit that some of the peer agencies noted was particularly useful for justifying the delivery decision to executive leadership and other stakeholders, including the public.

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The agencies that use more informal decision processes include FDOT, NCDOT, and ODOT, whose DB programs are among the oldest and most active in the United States.

This finding suggests that as the use of DB becomes more ingrained in the culture of an organization, less deliberation and formal justification may be needed to support the decision to use DB on a particular project.

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3. The remaining agencies interviewed, which formed the majority of our peer group, use less systematic processes to make their project delivery decisions, but have nonetheless established guidance or criteria for appropriate and/or inappropriate application of DB.

   a. Such screening criteria have generally been informed by each DOT's past experience with DB and the other delivery methods under consideration.

   b. Prior to finalizing the decision, a risk workshop may also be performed to ensure that the delivery method aligns with the risk allocation strategy selected for the project.

4. WSDOT has recently developed a formal and scalable decision process similar to those used by the agencies described in Observation No. 2 above. Prior to the development of this decision tool, which WSDOT refers to as the Project Delivery Method Selection Guidance (PDMSG), all projects were pursued using DBB unless the Region/program specifically requested approval for DB.

   a. WSDOT collaborated with the Association of General Contractors (AGC) of Washington and the American Council of Engineering Companies (ACEC) to adapt the PDSM used by Colorado DOT to suit its own programmatic needs, policies, and values.

   b. Consistent with best practice, the selection decision is fully integrated into WSDOT's overall project development phase. All projects are evaluated in two steps:

- The Probable Project Delivery Method (PDM) is determined during the Project Definition Phase.

- The Final PDM is then determined after validating (and updating or revising as necessary) the Probable PDM sometime between the Project Planning and Endorsement Phase and Geometric Review (i.e., 10 to 30% design).

c. The PDMSG provides built-in scalability to streamline the selection process for simple projects that do not require significant deliberation to identify the optimal delivery method. In this respect, WSDOT's PDMSG provides an effective and efficient balance between the formal and systematic processes described in Observation No. 2 above and the more simple screening criteria discussed in Observation No. 3.

  - The Selection Checklist provides the ability to quickly identify projects suited for DBB as well as to eliminate GC/CM.

  - If the Selection Checklist does not determine a Probable PDM or if the project is $25 million or more, a more robust decision matrix (i.e., the "Selection Matrix") can be used. All projects with costs of $100 million or greater must also undergo a selection Workshop.

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5. Based on some of the projects reviewed, past decisions to use DB were often made after designs had already been advanced beyond what would be considered ideal or appropriate for obtaining the full benefits of DB. For example, the design for US 2/Rice Road was almost complete when the decision was made to include it as part of the DB small projects program. This required the design team to restructure the design documents to make them more suitable for DB. It also caused some confusion for the design-builder who did not initially recognize that some of the completed designs still had to be revised, stamped, and resubmitted by the design-builder.

6. Adherence to the PDMSG, which provides detailed guidance on how to integrate the delivery method decision into the overall project development process, should prevent the recurrence of similar situations.

Timing of the Decision

Due to late delivery decisions in the past, WSDOT has procured DB services using designs that were much more developed and prescriptive than what is normally considered appropriate for DB.

6.3   Gap Analysis: Delivery Method Selection

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Project Delivery Method (PDM) Selection	A standard process is in place that is designed to: • Ensure consistent PDM decision-making, and • Establish an auditable trail documenting why a particular method was chosen and how it aligns with the project goals.	**Full alignment** WSDOT recently implemented a formal decision tool to assist with project delivery method selection. This process, referred to as the Project Delivery Method Selection Guidance (PDMSG), provides a scalable and systematic process for identifying the appropriate delivery method based on a given project's attributes, opportunities, and risks.	• WSDOT worked with industry to tailor a selection process to suit its programmatic and stakeholder needs. • The PDMSG recognizes that as the project becomes more defined, new information may impact the original delivery decision. The process thus entails two steps: Determination of the Probable PDM followed by validation or revision of this Probable PDM as preliminary design work advances.	No apparent gaps.	• Evaluate the effectiveness of the PDMSG as DB projects are executed and completed, and adjust as needed based on lessons-learned and feedback from project managers and industry. • Include guidance in the DB Manual that discusses the PDMSG and how it integrates with the overall DB project development process.
Timing of the Delivery Decision	The delivery decision should be made earlier enough in the project development process to ensure the level of project design and development aligns with the method chosen.	**Full alignment** With the development of the PDMSG, WSDOT now has detailed guidance identifying when the delivery decision should be made.	Recognizing the problems that delayed decision-making caused on past projects, WSDOT incorporated clear instructions in the PDMSG identifying how the delivery decision should integrate with various existing phases of project development.	In the past, delayed delivery decisions resulted in WSDOT not receiving all of the potential benefits of DB and perhaps also adversely impacted cost and schedule. Adherence to the PDMSG should prevent such risks associated with late decision-making on future projects.	Monitor the effectiveness of the timing of the delivery decision, and adjust guidance as needed based on lessons-learned and feedback from project managers and industry.

6.4 Recommendations on Delivery Method Selection

Based on the observations and risks identified above, the consultant team offers the following recommendations:

1. **Experiment with alternative DB delivery strategies that improve the efficiency of delivery for high risk, complex projects and smaller projects.** Alternative delivery strategies for high risk or complex projects could include progressive DB. Progressive DB is a method, similar to GC/CM, where the design-builder will perform preliminary services to develop the preliminary design and a guaranteed maximum price/lump sum price. In contrast to GC/CM, the design-builder has single point responsibility for design and construction

   Alternative delivery strategies for smaller projects could include bundling or multiple award task order contracts. Bundling projects under a single DB contract can accelerate delivery and achieve efficiencies in procurement, design, environmental permitting, and construction sequencing, and help obtain overall time savings, if the projects to be bundled are carefully selected. Decision criteria identified by some of the peer agencies who have successfully bundled projects include:

   - Are the projects small, non-complex, or low risk?
   - Do the projects entail similar work elements?
   - Are they located in reasonable proximity to one another?
   - Can efficiencies be obtained in design, quality management, mobilization, etc.?
   - Are minimal external agency reviews required?

   If alternative strategies prove successful, the PDSMG process should be refined accordingly to incorporate criteria for these delivery options.

2. **Consider DB project performance and lessons-learned, and refine the PDMSG as appropriate.** Expanding upon Recommendation No. 5 in Section 3.4 regarding performance monitoring, as a lesson-learned activity on future DB and other projects, an assessment should be conducted to determine if the chosen delivery method using the PDMSG was appropriate. One approach could be to re-score the PDMSG matrix and compare the results with the original PDMSG matrix. Feedback from such assessments can be used in the long-term to identify any necessary changes or enhancements to the PDMSG.

Applications for bundled DB project could include:

- Statewide small or low impact bridge rehabilitation/replacements,

- Selected fish passage culverts in geographic proximity, or

- Projects lcoated near each other, for which efficiency can be gained by one contractor mobilizing for multiple projects.

7. Procurement

7.1   Leading Practices

To promote programmatic consistency, many organizations have adopted standard procurement processes designed to:

- Enhance cost and schedule efficiencies,
- Reduce administrative burden,
- Maximize participation by the contracting community; and
- Enhance the objectivity, fairness, and transparency of the award decision.

General characteristics of well-designed procurement processes used by DOTs with mature DB programs to achieve these objectives include the following:

Best Practices in Procurement

- Flexibility to select a procurement method (e.g., low bid, best value) that aligns with the project goals and enhances the objectives of using DB;

- Use of appropriate project-specific evaluation criteria that align with project goals and risks, and provide for a meaningful evaluation of proposers while not being overly burdensome;

- Use of evaluation factors and award algorithms that clearly differentiate between proposers and enhance the objectivity, fairness, and transparency of the evaluation process;

- Consideration of current market conditions to identify any procurement actions that could limit or expand competition (e.g., bundling smaller projects together where logical based on location, type of work, funding source, etc.);

- Selection of personnel to evaluate proposals that are knowledgeable about the procurement process, unbiased, and committed to performing their evaluation in a manner consistent with the philosophy and methodology described in the solicitation documents and evaluation plan;

- Shortlisting of the number of proposers invited to submit proposals when using a two-step best value process;

- Consideration of ATCs and use of confidential one-on-one meetings to encourage the open and candid exchange of concepts, concerns, and ideas; and

- Payment of reasonable stipends to unsuccessful but responsive proposers.

7.2   Observations

In the context of the practices identified above, the consultant team observes the following:

Procurement Options

1. Several of the DOTs with more mature DB programs have the ability to procure DB projects in different ways based on project types or characteristics. Such differences are in keeping with the FHWA Final Rule on Design-Build Contracting, which grants agencies broad discretion in selecting a procurement approach appropriate for the specific needs of a given program or project.

2. The most common distinction seen in commonly used procurement strategies for transportation construction is between a low bid DB process and a best-value DB process. This distinction and defining characteristics are briefly summarized in Table 7.1.

Table 7.1:
Comparison of Low Bid and
Best-Value Procurement

	Low Bid Design-Build	Best Value Design-Build
Description	Selection of design-builder based on lowest price	Selection of the design-builder based on price and other factors including qualifications, experience, and technical solutions
Rationale	• Streamline procurement • Time-savings	• Encourage industry innovation to get better designs, constructability, or enhancements resulting in cost or time savings • Select the best qualified team
Applicability	Smaller projects, with less flexibility or room for innovation	Larger, more complex projects with more flexibility or opportunity for innovation
Process	Submission of separate pricing and qualifications packages, followed by selection of the lowest priced offeror (meeting the qualification requirements)	Most often implemented as a two-step process: • Phase 1 - submission of a qualifications package, followed by evaluation and shortlisting 3 to 5 proposers • Phase 2 - submission of separate technical and cost proposals, followed by evaluation and selection of the design-builder offering the best value in terms of cost and other factors

3. With this basic distinction between low bid and best value in mind, some of the more mature DOTs have the flexibility to use different procurement strategies to meet the unique needs of a given project. For example, as shown in Table 7.2, most of the transportation agencies interviewed have the ability to use (and have in fact used) both a two-step best value process and more streamlined procurement options (e.g., one-step best value, or one or two-step low bid) to procure DB services. Flexibility with regard to procurement options is perceived by such agencies to be beneficial in that it allows them to tailor the procurement effort to the project type and objectives in the interest of saving cost, time, and effort.

State	Low Bid Design-Build	Best Value Design-Build
Washington	X	X
Colorado[(1)]		X
Florida	X	X
Maryland	X	X
Minnesota	X	X
Missouri[(2)]		X
North Carolina	X	X
Ohio	X	X
Oregon	X	X
MTO	X	X
Texas[(3)]		X
Utah	X	X
Virginia	X	X

Table 7.2:
Summary of DOT Experience with Different Procurement Strategies

(1) CDOT used the low bid DB approach once but does not plan to use it again.

(2) For MoDOT, industry innovation is the clear driver for using DB, and thus best value options are the most appropriate.

(3) TxDOT primarily uses DB on very large or mega projects, for which low bid options would not be desirable.

4. WSDOT primarily procures DB services using a two-step best-value approach. While consistent with DBIA best practice, a two-step best value approach may be overly burdensome and not beneficial for smaller projects where innovation or creativity are not sought.

5. Feedback provided by industry representatives supports the need for more flexibility in WSDOT's procurement options.

   a. Industry respondents generally agree that WSDOT's current procurement process for DB (particularly a two-step process, where proposers are short-listed and are then required to submit technical proposals in phase two) can be burdensome, requiring significant effort to prepare technical submissions that are not fully compensated for in the stipends offered.

   b. To pursue a more involved best-value DB procurement, industry participants noted that the opportunity would have to be both large enough to justify the effort needed to respond and sufficiently open and non-prescriptive to provide the potential for innovation (and thereby allow the team to differentiate itself from other proposers).

   c. By way of example, one industry representative noted that greenfield projects, such as highway or bridge projects on new alignments, offer the greatest opportunity for creativity and cost and time savings, and thus are good candidates for best value. In contrast, an interstate widening

> Several DOTs with mature DB programs tailor the procurement process to project-specific conditions and goals. This generally entails use of:
>
> - A two-step best value process when innovation is sought, and
>
> - More streamlined solicitation processes (e.g., one-step or low bid processes) for simple or small projects having clearly defined scopes of work for which limited innovation is sought (i.e., time savings is the primary driver).

project for which the DOT is looking primarily for time savings, not innovation, would be a better candidate for a low-bid process.

DB for Small Projects

NCDOT touted the ability of small project DB to allow firms with less DB experience to participate, which ultimately helps expands the pool of qualified DB contractors and designers.

6. WSDOT is beginning to expand the use of DB to smaller projects, which, based on the experience of other DOTs, should help grow the DB industry in Washington State by expanding opportunities for smaller firms to prime projects. However, in contrast to how other agencies have executed small DB projects, WSDOT has not adjusted or streamlined its procurement practices to align better with project characteristics and goals.

7. Several of the peer agencies (e.g., Maryland, Minnesota, Missouri, North Carolina and Oregon) have also had success bundling projects (e.g. small bridge rehabilitation) under a single DB contract to accelerate delivery and achieve efficiencies in design, environmental permitting, and construction sequencing. Lessons-learned from the experience of these agencies with bundling include the following:

    a. Allocation of funding can make multi-year bundled contracts difficult.

    b. Bundling can help deliver projects that would have been too small to otherwise attract adequate competition.

    c. Bundling is effective for projects that have similar work, are geographically close together, and require minimal external agency review.

Evaluation and Selection Processes

Common concerns with WSDOT's DB procurement processes as expressed by industry include:

- Perceived subjectivity of evaluation and selection process

- Cost of preparing technical proposals and the value of stipends for shortlisted firms

- The size of DB projects limiting the ability of smaller contractors to participate in DB and challenges regarding teaming.

8. WSDOT does not have any guidance or standardized processes to assist project teams with identifying appropriate project-specific evaluation criteria and proposal deliverables that align with project goals and risks. For example, although a common goal of DB projects is to encourage contractor innovation, WSDOT often applies evaluation criteria that are heavily weighted towards price (i.e. 90% price / 10% technical). Such weightings have not always provided for meaningful distinctions among proposers (aside from price). However, it should be noted that some WSDOT DB projects have been awarded to the proposer that did not have the lowest price.

9. Use of a more qualifications-focused procurement process on certain projects may have allowed WSDOT to achieve better results on certain projects. For example,

    - On the I-5 et al. Active Traffic Management System project, a more non-price technically focused procurement process could have led to the selection of a more qualified and innovative design-builder. According to the Project Engineer, a large discrepancy in price proposals led to selecting the team that was least able to deliver innovation.

    - On at least 2 of the 6 projects reviewed (US 2/Rice Road and SR 520), poor relationships between the DB teaming partners hampered project performance. Moving forward, the past collaboration of DB teaming partners could be a useful RFQ/RFP qualifications criterion.

10. WSDOT does not appear to have standard guidance or training on the proposal evaluation process, which could allow favoritism to influence selection results. WSDOT should include guidance in the DB manual to address proper evaluation

procedures, develop project-specific evaluation plans and train evaluators on the importance of impartial selections.

11. Consistent with best practice, WSDOT routinely shortlists the number of proposers invited to submit a phase 2 technical proposal. By winnowing down to the highest qualified proposers, the proposers are encouraged to invest resources to develop innovative approaches to design and construction, and WSDOT can focus its efforts on selecting the firm offering the best value (i.e. combination of price and technical solutions).

12. To promote innovation, WSDOT routinely encourages proposers to submit Alternative Technical Concepts (ATCs) that are equal to or better than the base design requirements.

   a. An ATC is a request by a proposer to modify a contract requirement, specifically for that proposer's use in gaining a competitive benefit during the proposal process.

   b. Consistent with DBIA, WSDOT's philosophy is to evaluate ATCs based on obtaining equal or better value without consideration of cost savings. In contrast to this practice, several DOTs evaluate cost savings as well.

13. Most of the agencies interviewed reported that the use of ATCs during the procurement process has been a powerful and key source of innovation or cost savings, particularly for more complicated projects.

14. Several of the agencies also noted that reviewing ATCs can be a time consuming process that may require significant resources and effort. Strategies used by some agencies to streamline the ATC process include the following:

   - Capping the number of ATCs proposers may submit (so as to discourage the submittal of unnecessary ATCs that seek only to clarify that a concept is allowable under the base requirements);

   - Defining pre-approved exceptions to design standards; and/or

   - Restricting ATCs to certain project elements (e.g., some agencies do not allow ATCs for pavement design, or items that will affect third party agreements).

15. The industry representatives who were interviewed also viewed the ATC process favorably, noting that ATCs can help distinguish their proposal from those of other DB teams.

   However, for the ATC process to be effective, industry stressed that the DOT must be open to allowing changes in specification requirements in order to support innovation.

16. One-on-one meetings are confidential meetings held during the procurement process between proposing DB teams and agency staff.

17. All of the agencies interviewed considered such meetings to be a key communication tool that helped to:

Alternative Technical Concepts

FHWA promotes the ATC process as being an effective means to encourage industry innovations that will:

- Incorporate construction efficiencies,

- Reduce risks,

- Accelerate schedules, and/or

- Reduce project costs.

Most agencies (including WSDOT) report that the use of ATCs during the procurement process has been a powerful and key source of innovation or cost savings, particularly for more complicated projects.

One-on-One Meetings

- Encourage the open and candid exchange of concepts, concerns, and ideas.

- Ensure that the agency's project needs are being appropriately and consistently interpreted by all proposers.

WSDOT staff further noted that the collaborative environment fostered through such meetings often carries through to the post-award design and construction phase of the project, helping to build rapport and promote trust, equity, and a commitment to project success among the contracting parties.

18. Confidential meetings also often form an integral part of the ATC process, as proposers and agency staff meet to clarify and discuss ATCs.

    a. WSDOT staff indicated that they allocate 1 to 1.5 hours <u>per week</u> to each proposing team during the procurement process to provide proposers with the opportunity to vet ideas with DOT staff. This may amount to 3 to 5 hours per week for ATC-related meetings during the procurement phase (which may extend anywhere from one to several months).

    b. WSDOT staff touted the usefulness of these weekly meetings for:

       - Working out any kinks in the solicitation documents.

       - Nurturing a relationship with proposers that would ideally carry through to the post-award design and construction phase.

    c. The other agencies interviewed similarly placed high value on holding one-on-one meetings, but also stressed that there was a need to effectively manage the time expended on the ATC effort by both their own staff and the proposing teams.

Stipends

> WSDOT routinely offers reasonable stipends to shortlisted proposers. Such stipends are an essential tool to stimulate competition and motivate the industry to innovate.

19. To encourage competition and motivate the industry to innovate, WSDOT routinely offers reasonable stipends consistent with industry best practice that compensates shortlisted proposers that have submitted responsive technical proposals.

20. Transportation agencies generally award stipends to shortlisted proposers as a percentage of the contract value (e.g. 0.1% to 0.5%). In response to industry concerns and pushback that stipend amounts are insufficient, and to motivate industry to submit better proposals, some DOTs are moving towards increasing stipend amounts where larger proposal efforts are required.

7.3   Gap Analysis: Procurement

Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Procurement Strategy				
Well-designed procurement processes: • Entrust project teams to evaluate available procurement options (e.g., one vs. two-step processes; low bid vs. best value) against the circumstances of each project to make informed and strategic procurement decisions. • Focus on the qualifications of DB teams (including the demonstrated history of how the teaming partners have successfully collaborated on prior projects), • Encourage the use of appropriate project-specific evaluation criteria that align with project goals and risks, and provide for a meaningful evaluation of proposers while not being overly burdensome.	**Partial alignment** Based on its current practice, WSDOT uses a two-step best value procurement process for all DB projects. *(In contrast, several DOTs with mature DB programs actively consider other options to determine the optimal procurement approach given project-specific conditions.)*	Consistent with DBIA best practice, WSDOT routinely uses a two-step best value process that entails selecting short-listed firms on the basis of price and technical factors.	For certain projects, the requirement to use a two-step best value procurement process may: • Result in an overly burdensome and time-consuming solicitation phase • Unnecessarily restrict competition	• Develop policies and procedures related to the use of more streamlined procurement options. • Develop guidance (perhaps incorporated into the PDMSG) to help project teams determine the most appropriate procurement strategy for a particular project.

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Evaluation Criteria	Formal processes or procedures exist to guide project teams in the selection of evaluation criteria and associated weightings that: • Closely align with project goals and risks, and that will • Reveal clear differences among proposers And will <u>not</u>: • Require an unreasonable level of effort on the part of proposers to respond • Unnecessarily duplicate information already sought during the first phase of a two phase procurement process	**Partial Alignment** It does not appear that WSDOT has any guidance or standardized processes to assist project teams with identifying appropriate project-specific evaluation criteria and deliverables that align with project goals and risks.	WSDOT's solicitation documents do not appear to ask proposers to provide an unreasonable level of detail in their technical proposals.	In the absence of guidance or standardized processes to assist project teams with identifying appropriate project-specific evaluation criteria, • Teams may rely on criteria used in past solicitation documents (which may not be indicative of the risks and goals of the current project). • The evaluation criteria and associated weightings may not provide for meaningful distinctions among proposers.	• Develop repeatable procurement guidance in the DB manual to carefully identify and weight key evaluation criteria that closely align with project goals and risks. • For high risk or technically challenging projects, include technical criteria (e.g., geotechnical, utilities, design features) with higher weightings for technical factors (i.e. 75% price/25% technical) based on the prioritization of project goals and risks and adjust other factors (i.e. stipends) accordingly.
Objectivity in Evaluating Proposals	For best-value procurements, an objective and impartial evaluation of proposals is performed by personnel who are committed to performing their evaluations in an unbiased manner, consistent with the philosophy and methodology described in the solicitation documents and project-specific evaluation plans.	**Partial alignment** WSDOT does not appear to have standard guidance or training on the evaluation process.	For past projects, WSDOT has developed Proposal Evaluation Manuals to help evaluators with the selection decision.	For best value selections, without a comprehensive proposal evaluation plan and training of evaluators, favoritism could influence selection results (whether intentionally or not).	• Include guidance in the DB Manual to address proper evaluation procedures. • For all best value procurements, develop project-specific evaluation plans and standard scoring forms. • Train evaluators on the importance of impartial selections.
Shortlisting	Shortlist the number of proposers invited to submit proposals for a two-step process.	**Full alignment** WSDOT routinely targets shortlisting to 3-4 proposers.	WSDOT is in full alignment with best practice.	Short-listing for smaller, non-complex projects may unnecessarily restrict competition.	For smaller projects, consider expanding the short-list to broaden the reach of DB and allow more firms to gain experience

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Alternative Technical Concepts (ATCs)	Encourage proposers to submit ATCs as a means to obtain innovation.	**Full alignment** WSDOT routinely encourages proposers to submit ATCs. *(Consistent with DBIA, WSDOT's philosophy is to evaluate ATCs based on obtaining equal or better value without consideration of cost savings. In contrast to this practice, several DOTs evaluate cost savings as well.)*	WSDOT is in full alignment with best practice.	Because WSDOT's approach to ATCs does not address cost savings, and Practical Design is implemented as a post-award strategy for DB, the opportunity to realize cost-savings during the DB procurement phase is limited.	Develop and maintain a database of commonly submitted and approved ATCs, which could be used to help streamline the approval process and/or to identify trends that could be used to relax design standards or specification requirements.
Confidential One-on-one Meetings	Use one-on-one meetings with proposers to encourage the open and candid exchange of concepts, concerns, and ideas.	**Full alignment** WSDOT routinely engages proposers in one-on-one meetings as part of the ATC process.	WSDOT is in full alignment with best practice.	WSDOT appears to have more frequent confidential meetings than other DOTs, which can create a stress point in administering the procurement.	• Optimize the efficiency of one-on-one meetings. Account for the significant effort associated with conducting these meetings on the part of DOT staff when planning procurement staffing needs and determining the number of firms to shortlist. • For one-on-one meetings, keep WSDOT participating staff small; and limit consultant support to ensure the strictest confidentiality.
Stipends	Offer a reasonable stipend to unsuccessful shortlisted proposers when the proposal preparation requires a significant level of effort.	**Full alignment** WSDOT routinely offers stipends in a range (i.e., 0.1 - 0.3% of the estimated project costs) that is consistent with stipends offered by the majority of DOTs with DB programs.	WSDOT is in full alignment with best practice.	If industry perceives stipends to be insufficient, • The project may encounter difficulty attracting interest. • WSDOT may not receive good proposals.	Develop guidance, for inclusion in the DB manual, to guide project teams in the determination of an appropriate stipend amount. For example, a higher stipend may be warranted for complex, high risk projects for which WSDOT is asking for a greater proposal effort (i.e. more technical detail).

7.4 Recommendations on Procurement

Based on the observations and risks identified above, the consultant team offers the following recommendations and implementation strategies:

If WSDOT continues to expand the use of DB to smaller, less complex projects, more streamlined DB procurement options, including low bid DB and bundling of multiple projects, may help achieve efficiencies in project development and procurement.

1. **Consider streamlining the procurement process for smaller or non-complex projects.** To implement different procurement options, many DOTs develop guidance and separate contract templates that reflect the streamlined process. For example, a one-step procurement process would entail:

   - Eliminating the Request for Qualifications (RFQ) and shortlisting step;

   - Adjusting the ad period to 6 to 10 weeks;

   - Possibly foregoing the use of ATCs and stipends; and

   - Selecting based on the lowest price for proposers that meet responsiveness requirements.

   The responsiveness check may include pass/fail or scored criteria including qualifications and experience, and technical ability.

   Alternatively, if a two-step process is used for smaller projects, adjust the Request for Qualifications (RFQ) by incorporating more pass/fail criteria or lowering the thresholds for experience and past performance.

2. **Refine evaluation criteria for the two-step best value process.** WSDOT currently uses a two-step best-value process where the evaluation criteria tend to be weighted towards price (i.e. 90% price /10% technical).

   Possible refinements to this process include the following:

   - For high risk or technically challenging projects, consider including technical criteria (i.e. geotechnical, utilities, design features) with higher weightings (i.e. 75% price/25% technical) based on the prioritization of project goals and risks.

   - Consider prior working relationships of DB teaming partners as a qualifications criterion.

   - To help grow the DB industry and to allow proposers with less experience to compete for small or simple projects, consider expanding the short list and/or using more pass/fail criteria (or lower thresholds for experience and past performance) for key personnel qualifications.

   To finalize procurement policies, conduct workshops or other forums with senior staff and industry partners. Based on this dialog, develop guidance for inclusion in the updated DB manual to assist project teams with identifying and weighting key evaluation criteria that align with project goals and risks and that will help differentiate proposers.

3. **Refine the processes for ATCs and one-on-one meetings.** Protocols for one-on-one meetings should be set forth in the DB Manual. Some DOTs prohibit members of the project proposal evaluation team from participating in proprietary

ATC meetings, citing the need to prevent the appearance of bias or a conflict of interest. Safeguards such as non-disclosure agreements or restrictions on DOT or consultant personnel participation will promote sharing innovative ideas and increase the number and quality of ATCs.

The current WSDOT Instructions to Proposers template addresses submittal and review of ATCs, and the DB Manual also provides guidance for the use of ATCs. Both documents address the concept of "equal or better" as the standard for acceptance of an ATC. The guidelines should also note that the solicitation documents should define areas where ATCs are allowed and where they are not allowed (e.g., some DOTs do not allow ATCs for pavement design, or impacts to third party agreements).

4. **Establish a database of ATCs and refine ATC process and standard manuals accordingly.** The current WSDOT documents require that design deviations must be approved before being incorporated into any ATC. Given that ATCs quite often involve designs that deviate from DOT design standards, some DOTs have developed pre-approved exceptions to design standards to streamline the approval process.

   Developing and maintaining a database of commonly submitted and approved ATCs by category (e.g., materials, geometrics, bridge, traffic, walls, drainage, paving, geotechnical, etc.) could be used to:

   - Expedite the evaluation of ATCs for specific projects.

   - Identify appropriate pre-approved exceptions for inclusion in solicitation documents.

   - Revise the current design standards for DB projects as appropriate to allow for more flexibility and greater use of performance specifications.

5. **Ensure objective evaluation of proposals.** Guidance and training should be developed to ensure proposal evaluators do not introduce bias or favoritism into the evaluation process. To help ensure the objectivity of the proposal evaluation process, owners use a variety of techniques that WSDOT may wish to consider, particularly for large or high-profile projects, such as:

   - Developing project-specific proposal evaluation plans;

   - "Blinding" technical proposals (i.e., concealing the identity of the proposers);

   - Having witnesses observe evaluation discussions and report out on any unfair or biased treatment of proposers; and

   - Providing adequate documentation to sufficiently support the ratings and scoring.

8. Cost Estimating and Budgeting

8.1   Leading Practices

Cost estimating is an integral part of the capital allocation process, as estimates are often the primary input for evaluating and prioritizing capital projects and developing annual and long-range total capital plans. Due to the importance of the budgeting and cost estimating function, owners with mature construction programs have adopted some or all of the cost estimating practices identified below:

Best Practices in Cost Estimating and Funding for DB

- Implementation of a standard cost estimating process that considers:

    - Explicitly identified risks and uncertainties to establish appropriate cost contingencies
    - Market conditions (projected labor, material and equipment availability)
    - Historical cost information to validate estimate realism

- Commitment of funding for the entire duration of a DB project, generally in advance of project approval or the start of procurement (RFQ release);

- Consideration of the best project delivery and contracting methods to meet any funding constraints; and

- Retention of historical project cost information to enhance future project development activities.

8.2   Observations

In the context of the best practices identified above, the consultant team observes the following:

Budgeting / Funding

1. Based on the experience of most DOTs, DB projects are generally fully funded before the release of solicitation documents. However,

    a. In some cases, project cash flow may be subject to limits or caps for mobilization, NEPA approval (federal funds), or cash availability schedules based on percent complete.

    b. For larger or multi-year projects, funds may be incrementally encumbered using a cash flow curve agreed upon in advance.

2. The budgeting process for the Connecting Washington funding package identified and prioritized projects in the capital program schedule over a 16-year period, which is longer than a typical DOT program cycle (i.e., a 5-year STIP).

    a. With this funding policy, it could be challenging to determine in advance how projects should be sequenced to optimally balance DOT and

industry resources (especially as the decision to use DB for given projects is made independently of the capital program budget or funding schedule).

b.   WSDOT has inserted a maximum rate of payment specification into certain contracts to limit the expenditure of funds in a given fiscal year to the amount allocated to that particular project or program.

c.   The Washington State Legislature does allow for adjustments to be made to the funding schedule through the annual legislative budget process.

d.   Some industry representatives expressed the concern that incrementally funding a DB project could reduce the effectiveness of DB delivery by constraining the ability of the design-builder to expedite design and construction activities to their full potential.

Cost Estimating

3.   Consistent with best practice, WSDOT has a rigorous yet scalable risk-based cost estimating standard that helps ensure consistency in estimate development.

4.   A review of the cost data provided for WSDOT DB projects to date suggests that WSDOT estimates are conservative, and may not be reflective of market conditions for DB.

a.   A comparison of WSDOT's **Engineer's Estimate (EE) to award** or bid prices for 29 WSDOT DB projects to date indicated that on average the WSDOT DB projects resulted in a net savings, with an average award savings of approximately 17%.

b.   Table 8.1 below compares this data with that from a larger FHWA sample of 108 DB projects. As summarized in the table, all of the DB projects realized some level of award savings (i.e., negative cost growth), when the EEs are compared to the award or bid prices. For the national FHWA database, the average award savings was 5 to 7%. For the WSDOT DB projects awarded to date, the average award savings was much higher, approximately 17%.

Table 8.1:
Analysis of Average Award
Savings Compared to
Engineers Estimate

Project Sample	Project Type	# of Projects	Average Cost Growth (%)
FHWA [1]	DB/Low Bid	37	-5%
	DB/Best Value	71	-7%
WSDOT	DB/Best Value	29	-17%

[1] Source: Preliminary Findings for FHWA DFTH61-13-C-00024

c.   Based on the above analysis, the award savings associated with the WSDOT projects is approximately 2-3 times higher on average than the larger FHWA data set. This suggests that the WSDOT estimates for DB projects are much more conservative than the national average estimates for DB, and WSDOT could benefit by examining the reasons for this difference.

    d.   To further explore WSDOT's DB estimates, the consultant team compared the **EEs to final payment cost** for data available from 27 WSDOT DB projects. In this comparison, WSDOT's relative savings were again higher on average than the national averages:

- For the FHWA database (with data reported for 114 DB projects), the savings (EE to final payment amount) were approximately 2% on average.

- For the WSDOT DB projects, the savings were approximately 12% on average.

Thus, even after accounting for cost growth during construction, WSDOT's EEs appear to be more conservative than those in the larger FHWA database.

5.   To evaluate the cost performance of WSDOT's DB program, the consultant team compared award price to final cost. WSDOT data was available for comparing **award to final payment cost**, for 24 WSDOT DB projects that have reached substantial completion. Table 8.2 summarizes the comparison of the WSDOT sample to the average cost growth from the FHWA database.

Cost Performance

Project Sample	Project Size ($M)	# of Projects	Average Cost Growth (%)
WSDOT	$0-20M	7	9%
	$20-100M	9	4.6%
	>$100M	8	9.6%
	All Projects	24	7.5%
FHWA	DB/Low Bid	36	2.8%
	DB/Best-Value	74	4.0%

Table 8.2:
Comparison of Award Cost to Final Payment Cost

    a.   The data in the WSDOT 24-project sample indicated that the average cost growth (award to final payment cost) was approximately 7.5%. The national average cost growth for DB projects was approximately 3.5%, slightly lower than that for the WSDOT sample.

    b.   Comparing actual cost growth for WSDOT DB projects, the largest DB projects (i.e. > $100M) have experienced the most significant cost growth.

    c.   The national database did not have a comparable breakout of cost growth data based on project value. However, it did show that on the whole, the average percent cost growth for DB is slightly less than that for DBB.

8.3   Gap Analysis: Cost Estimating and Budgeting

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Budgeting / Funding	Commitment of funding for the entire DB project duration prior to the start of procurement.	**Partial alignment** Although funding may not be committed for the entire DB project duration prior to procurement, the Legislature allows for adjustments to be made to the capital plan through the annual legislative budget process.	WSDOT is beginning to engage industry and legislative staff in discussions regarding effectively appropriating funds for DB projects.	DB industry representatives perceive that WSDOT's application of a maximum rate of payment specification could potentially constrain the ability of design-builders to expedite design and construction activities to their full potential.	• WSDOT should work with key legislators and legislative staff to ensure funds are effectively appropriated for DB projects. • Consider funding constraints when selecting the optimal project delivery method as part of the PDMSG process.
Cost Estimates	Cost estimates are developed, reviewed, and approved based on formalized standards and processes. Historical cost information is used to assist with developing realistic estimates.	**Partial alignment** WSDOT has developed a scalable and standardized process for cost estimating that should assist with the development of realistic budgets. However, comparisons of cost data with national averages suggest that WSDOT's estimates may be overly conservative.	Through its cost risk assessment (CRA)/cost estimate validation process (CEVP), WSDOT has developed rigorous yet scalable risk-based cost estimating standards that promote consistency in estimate development.	Overly conservative estimates could: • Result in inefficient budget allocation and planning • Instill a lack of urgency on the part of WSDOT project teams to control contingency spending	Examine the causes behind the higher EEs, and refine the estimating process (and/or the historical cost and risk database) as necessary.

8.4   Recommendations on Cost Estimating and Budgeting

Based on the observations and risks identified above, the consultant team offers the following recommendations:

1. **WSDOT should work with key legislators and legislative staff to more effectively appropriate funds for DB projects.** The current funding appropriation process is perceived by industry as presenting potential challenges to the most effective use of DB delivery. Given the uniqueness of the Connecting Washington legislation and state funding processes, it may be appropriate for WSDOT to work with key legislators and the legislative staff to discuss how to appropriate funds more effectively for DB projects. To this end, WSDOT executives and the Office of Financial Management should engage in a discussion with legislative transportation leaders and legislative staff about improvements that could be made to how funds are appropriated to better accommodate DB projects. After the initial discussions, the proposed changes should be formalized as an official budget request, which legislative staff can present to legislative members for final approval through the normal budget and legislative process.

2. **Examine causes of higher Engineers Estimates (EE) and whether estimating process should be refined.** Comparison of cost data from a sample of WSDOT DB projects to national averages suggests that WSDOT's EEs are high. WSDOT should examine whether the cause is due to market conditions, risk pricing or other reasons, and refine the estimating process if deemed necessary. For example, WSDOT's high EEs could be attributed to conservative estimating practices that build more risk (contingency) pricing into estimates than necessary, misreading of market conditions, use of outdated cost information, or other factors.

9. Risk Management

9.1   Leading Practices

Implementation of a disciplined and comprehensive risk management process can help:

- Ensure identified project risks are assigned to the party best able to manage them.

- Encourage the project teams of both the owner and the design-builder to take appropriate measures to:

    – Minimize adverse impacts to project scope, cost, and schedule;

    – Maximize opportunities to improve the project's objectives (e.g., with regard to lower cost, shorter schedules, enhanced scope, and higher quality); and

    – Minimize management by crisis (i.e., by proactively mitigating *risks* as opposed to reacting to *issues*).

To successfully allocate and manage risks on a DB project generally entails implementation of some of the practices identified below:

Best Practices in DB Risk Allocation

- An organization-wide culture of risk awareness that:

    – supports the participation of all stakeholders in the identification and management of risks and issues;

    – recognizes that uncertainties can lead to *opportunities* (positive outcomes) as well as *risks*;

    – allows for scalability of processes and requirements based on project size, complexity, and criticality; and

    – promotes open and transparent communication of factors that could compromise the successful delivery of a project or program.

- Use of a rigorous and equitably-balanced project risk assessment process (initially conducted early in the project development process and then updated/refined as the project progresses) to:

    – Develop a fair and balanced risk allocation approach that assigns to the design-builder only those risks that it can reasonably control;

    – Identify the need for any contractual incentives (e.g., time-based incentives, shared contingency funds, etc.) to help align the design-builder's goals with those of the owner and the risks being assumed for the project; and

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> – Coordinate risk management processes across the entire DB program to support management of cross-project dependencies (e.g., with regard to DOT resource constraints), synergies in mitigation efforts, and unified reporting of lessons-learned.
>
> • Updating and maintenance of risk registers and issue logs to support lessons-learned and continuous improvement efforts.

9.2   Observations

In the context of the best practices identified above, the consultant team observes the following:

Risk Identification and Allocation

1. WSDOT has a mature and standardized risk assessment process that is used to identify and evaluate project risks that could impact budget and schedule.

2. WSDOT worked with industry to develop a risk allocation matrix for DB projects that allocates risks commonly encountered on highway construction projects to either WSDOT or the design-builder. The matrix is typically used as a guide or starting point, and then the risk allocation is adjusted in the solicitation documents for each project based on the project-specific risks and conditions that are identified through the project development and risk assessment processes.

3. WSDOT's risk allocation philosophy is in alignment with industry best practices:

    a. WSDOT assumes responsibility for project risks that cannot reasonably be placed under the control of the design-builder, while transferring to the design-builder those risks that can be more effectively managed by industry.

    b. In some cases, risks may also be shared. For example, consistent with other DOTs, WSDOT has used a differing site condition (DSC) risk allocation pool set at specific cap (e.g. if cap is set at $6M, the design-builder is responsible for the first $6M in DSC costs, and WSDOT is responsible for DSC costs in excess of $6M).

4. The overarching risk management philosophy endorsed by all interviewees (from both agencies and industry alike) was that risks should be allocated to the party best able to manage them, after considering project-specific conditions and goals. This philosophy has resulted in DOTs adopting risk sharing approaches for most of the key risk areas. From the industry's perspective, capping or sharing risks can help ensure that DB contracts are not overly onerous.

5. Common risk allocation strategies for key risk areas, as identified through the interviews with the peer agencies, are summarized in the table below. Except where noted, WSDOT's typical approach to these risks is consistent to that of the other transportation agencies.

Risk Area	Common Risk Allocation Strategies (as reported by the peer agencies)	WSDOT Strategy
Differing Site Conditions (DSC)	DOTs allocate the risk of encountering subsurface conditions that are materially different than anticipated or planned (i.e., a "differing site condition") in a variety of ways: • Shifting the risk of subsurface conditions entirely to the design-builder (and thereby inducing the design-builder to build the risk of DSCs into their bids) • Retaining full responsibility for DSC (consistent with federal contract provisions addressing DSC for standard DBB contracts) • Applying a time and materials approach to payment (or alternatively, establishing an owner allowance) for the purposes of paying for removal of known hazardous materials • Sharing the risk for DSC impacts (e.g., delays and/or additional costs) by assigning the design-builder with responsibility for delays and costs up to a defined ceiling, above which the DOT would be responsible for additional delays and costs For DOTs that transfer greater DSC risk to industry for DB projects, a key prerequisite is that the DOT perform reasonably detailed subsurface investigations, perform more borings than would normally be performed, or compensate proposers to perform additional site investigations prior to their submitting proposals.	As part of the procurement documents, WSDOT provides a geotechnical report, which establishes a baseline for what would be considered a differing site condition. Each proposer can also ask for three additional borings, with the resulting information used to supplement the original baseline report. WSDOT has also used a DSC risk allocation pool set at specific cap.
Environmental Permits	The impacts related to permitting risks typically entail delays in obtaining and maintaining the required project permits and conducting any required environmental mitigation. Most DOTs, as the permit holder, retain the primary responsibility and risk for permitting; however, the design-builder's scope will often include assisting with the permitting process and assuming responsibility for permit modifications necessitated by a proposed ATC.	Consistent with the practices of other DOTs: • WSDOT generally obtains all environmental permits prior to issuing the final RFP (and includes such permits with the RFP for the proposers' reference). • If changes are needed based on the DB proposal (or ATC process), WSDOT generally holds the design-builder accountable for the required permit modifications.

Risk Area	Common Risk Allocation Strategies (as reported by the peer agencies)	WSDOT Strategy
Utilities, Railroads, and other Third Party Coordination Efforts	DOTs have applied different approaches to manage utility/third party coordination risks depending on the applicable statutes, the specific project conditions, and/or the level of control a DOT has over utilities and third parties. • Generally, the DOTs will try to mitigate third party risks by coordinating with municipalities and railroads (e.g. by obtaining consent agreements, easements, etc.) in advance of issuing an RFP. • Some DOTs enter into master utility agreements or can claim eminent domain over utilities in the Right of Way (ROW). • Others transfer responsibility for certain utilities to the design-builder or evaluate proposers on their ability to minimize or avoid utilities. • If utility relocations are necessary, some DOTs use a utility reserve account and incentivize the design-builder to come in under the reserve account and share in the savings (or pay up to stipulated amount and require the design-builder to absorb any costs above the allowance).	WSDOT identifies all utility impacts, and relocations needed for the baseline configuration, but holds the design-builder responsible for conducting a site investigation to verify the utility relocations needed. The design-builder will be issued change orders for utilities not shown within a reasonable degree of accuracy in baseline documents, but they are responsible for utilities not found during their required site investigation.
Right of Way (ROW)	The responsibility for acquisition of ROW and easements are generally retained by the DOT. Alternatively, if ROW responsibility is delegated: • The design-builder will be required to develop the ROW map, compile ROW information and conduct appraisals. • The DOT's ROW department will then review and approve each step and handle the legal work. • In some cases, acquisition costs are included in the pricing, and proposers are evaluated based on minimizing the ROW costs. In others, if the design-builder proposes a different concept or alignment, the ROW risk is on the design-builder.	Consistent with the practices of other DOTs: • WSDOT generally assumes responsibility for ROW acquisition. The RFP provides a means for the design-builder to pursue additional permanent ROW for the Work, but doing so requires DOT approval. • The design-builder is responsible for obtaining additional temporary construction easements.

6. WSDOT's Project Risk Management Guide provides a comprehensive summary of each step in a standard risk management process (i.e., risk management planning, risk identification, risk analysis, risk response planning, and risk monitoring and control), and stresses the importance of tracking and managing risks throughout the project development phase of a project.

7. Once a DB project progresses out of the development phase and into design and construction, it does not appear, based on interviews with some of the WSDOT project managers, that project teams are regularly updating and maintaining a project risk register. Maintenance of a risk register for the full project lifecycle can provide an effective tool for promoting regular communication with the design-builder regarding the status of risks facing a project and the effectiveness of the risk mitigation measures being applied.

Risk Monitoring and Control

9.3   Gap Analysis: Risk Management

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Risk Identification & Allocation	A formal, repeatable risk management process is routinely used by project teams to identify and assess possible project risks and allocate them to the party deemed to be in the best position to effectively manage/mitigate these risks.	**Full alignment** • WSDOT has a mature and standardized risk assessment process that is used to identify and evaluate project risks that could impact budget and schedule. • WSDOT also has a standard DB risk allocation matrix that is adapted for each project to guide risk allocation in the contract documents.	• WSDOT worked with industry to develop the standard risk allocation matrix. • Risk assessment and the allocation matrix will be addressed in the updated DB Manual (based on the Manual's proposed table of contents). • WSDOT strives to clearly document in the solicitation and contract documents all agreements or commitments made with third parties.	Although WSDOT carefully allocates contractual risk, the extent to which WSDOT's risk assessment process is otherwise integrated with other project development and procurement activities is unclear. (For example, on the SR 520 project, the Project Manager commented that it may have been helpful to consider geotechnical approaches as part of the scored criteria and to have more fully defined the geotechnical risks in the contract.)	Develop guidance, to be included in the DB Manual and the formalized training program, to address how the results of the risk assessment process can be used to inform project development and procurement activities.
Risk Monitoring & Control	A project risk register is used to regularly monitor, manage, communicate, and closeout risks for the duration of a project	**Partial alignment** Project teams do not appear to be consistently updating the risk register for the duration of the project.	• A project risk register is generally developed and maintained during the project development phase of a project.	Failure to regularly update the risk register and discuss risks with the design-builder results in missed opportunities to: • Foster a collaborative relationship with the design-builder regarding risk response strategies that benefit the project as a whole • Catalogue risks and effective response strategies to help inform future project development activities	Develop guidance, to be included in the DB Manual and the formalized training program, that stresses the importance of regularly updating the risk register for the duration of the project and using it to facilitate collaborative risk review meetings with the design-builder

9.4   Recommendations on Risk

Based on the observations and risks identified above, the consultant team offers the following recommendation:

1. **Develop guidance to address how to use risk analysis results to assist with project development and procurement.** In furtherance of Recommendation No. 4 in Section 5.4 regarding the appropriate level of front-end investigation and Recommendation No. 2 in Section 7.4 regarding evaluation criteria, guidance should developed to address how the results of the risk assessment can be used not just for contractual risk allocation purposes but also to inform other aspects of project development and procurement. For example, for high risk projects, the project team may want to conduct more front-end investigation and possibly advance the design to a higher level. Alternatively, proposers could be asked, as part of their technical proposals, to identify project risks and how they would manage or mitigate such risks.

2. **Conduct periodic risk review meetings with the design-builder and maintain a risk register for the duration of the project.** Risk review meetings can help foster collaboration and help ensure project risks are effectively being managed to the benefit of the DB team, WSDOT, and the project as a whole. Topics to be discussed include:

    *   Effectiveness of risk mitigation measures
    *   Additional risks that may have arisen
    *   Previously identified risks that may be retired or closed out

    A regularly updated risk register can be an effective tool for facilitating such meetings, as well as for supporting lessons-learned and continuous improvement of the DB program.

10. Contract Administration & Project Execution

10.1 Leading Practices

One of the key areas affecting DB project success involves the practices used by owners to oversee the design-builder's design and construction of the work. The design phase in particular is a critical area where roles and responsibilities between the owner and design-builder must be clearly defined. For public owners in particular, an effective balance must be struck between ensuring the public a good value and allowing industry to have control of the design process. Similarly, the approach to construction quality management may also differ from that used on a DBB project, creating challenges for DOT staff accustomed to traditional roles and responsibilities.

Practices used to help overcome such challenges and successfully administer and oversee DB projects include the following:

Best Practices in DB Contract Administration

Contract Administration

- Development of standard contract templates and forms to help administer and manage contracts;

- Education and training for those individuals who administer contracts to ensure consistent understanding of the contract's language and its practical application;

- Post-construction (or after action) reviews to identify any lessons-learned or trends (e.g., in commonly submitted RFIs, change order requests, non-conformance reports, incident reports, etc.) that could suggest a need for changes to the contract documents; and

- Effective communication practices, including co-location and consistency of staff.

Quality Management and Oversight

- Well-documented and robust oversight processes that:

    – Are scalable to a project's size, complexity, and criticality
    – Promote consistency in design and construction oversight
    – Allow for seamless transitions between the design and construction phases
    – Recognize the changing roles and responsibilities for quality management under DB delivery for both design and construction

- For oversight of design:

    – Implementation of standard review processes that define who performs the review, what types of review are performed, and how reviews are documented

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- For larger or more complex projects, co-location of owner's design staff with that of the design-builder to promote collaboration and facilitate over-the-shoulder reviews

- Documentation of commonly submitted ATCs, Practical Design concepts, and successful value engineering outcomes to identify any trends that could suggest a need for changes to design standards

- For oversight of construction:

  - Requirement that the design-builder develop and implement a comprehensive and robust quality management plan designed to assure that the materials and workmanship incorporated into the construction conform to the requirements of the approved plans and specifications

  - Verification that the design-builder is adhering to its quality management plan

  - Use of risk management principles to prioritize project elements and quality assurance activities on the basis of the probability of failure and consequence of failure (from the perspective of difficulty to repair or replace, safety, environmental impact, maintenance cost, or cost of rework)

  - Effective handoff to maintenance staff to ensure critical knowledge is not lost

Change Order Management

- Development and adherence to definitive change order management processes to ensure that changes are identified, evaluated, coordinated, reviewed, approved, and documented; and

- Inclusion of a fair and balanced contractual process that facilitates and expedites the review and resolution of potential changes to the contract and adjustments in the contract price and time.

10.2   Observations

In the context of the best practices identified above, the consultant team observes the following:

Policies and Procedures for Contract Administration

1. WSDOT currently lacks any formal guidance or training program related to owner monitoring, supervision, and oversight during project execution – a key area affecting DB project success. The design phase in particular is challenging some WSDOT designers who are having difficulty understanding their role in the final design process.

2. Existing DB manuals from other agencies primarily focus on pre-construction activities (e.g., project development and procurement). Based on interviews with the peer agencies, the lack of post-award guidance for staff responsible for overseeing the design and construction phases of a DB project is a common concern and not a gap unique to WSDOT.

3. WSDOT does not have any formalized guidance related to design oversight, which has contributed to staff difficulties in understanding their role in the final design process (as the design-builder and not the DOT assumes the role of Designer-of-Record).

4. WSDOT staff have in some cases struggled with:

    - Letting go of their own preferences with regard to design solutions, and

    - Understanding that the adequate level of design detail to construct a DB project does not necessarily need to mirror that used to bid and construct a DBB project.

    Industry representatives indicated that such issues can hinder the efficient progression of their design effort, and delay the overall completion of the project.

5. The agencies interviewed acknowledged that a successful design phase was dependent in part on DOT staff understanding the need to:

    - Complete and turnaround design reviews quicker than would be the case for a standard DBB contract.

    - Limit design reviews to verifying for compliance with the approved design criteria and the design-builder's quality plans. Practicing such restraint with regard to personal preferences will help prevent design risk from inadvertently shifting back to the DOT and/or resulting in scope changes that increase project costs.

6. Practices used by some DOTs to streamline the review process include:

    - Co-locating with the design-builder and conducting over-the-shoulder reviews;

    - Engaging additional staff (or consultant) resources, with knowledge of the DB process, to assist with reviews;

    - Establishing limits on DOT review timeframes and/or stressing the importance of the expedited nature of DB projects; and

    - Coordinating comments to provide the design-builder with a single set of comments to address

7. WSDOT generally delegates construction quality management responsibilities to the design-builder for all DB projects. This practice has allowed the DOT to help grow the quality assurance industry in Washington.

8. The success of this practice appears to be mixed. For example:

    - On the I-405/I-5 to SR 169 Stage 2 project, it was reported that third-party inspectors had difficulty understanding and/or applying WSDOT's materials inspection standards.

Design Oversight

Consistent with best practice, on larger projects, WSDOT routinely co-locates its staff with those of the design-builder.

Co-location helps promote communication, collaboration, and effective and efficient resolution of issues.

Construction Oversight

- On the SR 520 Eastside Transit and HOV project, construction quality was reportedly an issue as was the communication flow process for non-conformance reports. The QA staff were described as being challenged to think as an owner would in identifying quality problems.

- On the US 2 / Rice Road Intersection Safety Improvement project, the design-builder's quality manager was reportedly often not present on the jobsite when needed to perform quality management activities. This resulted in the WSDOT project team having to assume a larger quality verification role than originally anticipated.

9. For smaller DB projects, having the design-builder assume QA responsibility may not be as efficient (due to the duplication of testing effort needed to ensure compliance with the FHWA verification requirements in 23 CFR 637). For example, the project engineer assigned to the US 2 / Rice Road project noted that the redundancy between the design-builder's quality control testing and the DOT's verification testing generally becomes more pronounced the smaller the project.

Change Order Management

10. WSDOT's current template documents contain what appears to be a balanced contractual process for administering changes to the contract.

11. The consultant team reviewed the change orders executed for several WSDOT DB projects. However, the team was unable to reach a meaningful conclusion regarding the impact of change orders for WSDOT DB projects. Though the number of change orders were somewhat higher for WSDOT projects than for projects outside of Washington, a more meaningful metric would be a comparison of the relative cost growth for different categories of change orders (i.e. owner-directed, unforeseen conditions, errors and omissions, etc.). These change order categories were not consistently provided in the sample of WSDOT DB projects reviewed. Thus, no conclusions can be made from reviewing this data aside from noting the observations made by the WSDOT project engineers in addressing the causes of specific change orders.

10.3   Gap Analysis: DB Contract Administration

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Design Oversight	Design oversight processes are standardized and consistently applied.	**Partial alignment** Post-award DB processes remain largely ad hoc and may be inconsistently interpreted or applied by staff. Best practices are informally conveyed to project team members through the mentoring efforts of experienced project engineers.	• Based on the proposed table of contents, WSDOT's updated DB Manual will address design oversight processes. • WSDOT has some very experienced project engineers, whose knowledge and lessons-learned could be leveraged to develop effective guidance and training materials.	Lack of guidance related to effective design review practices could contribute to: • Inconsistency in design reviews across project teams • Misunderstanding of WSDOT's role in the design phase (i.e., DOT staff should be reviewing designs for contractual compliance) • Inadequate turnaround of design reviews to meet the expedited pace of a DB project • Delays and inefficiencies to the design process	• Develop guidance, to be included in the DB Manual and the formalized training program, to address the design oversight function. • For large projects, continue to co-locate DOT staff with that of the design-builder. • Collect lessons-learned to identify any need to refine processes. • Design oversight staff should be dedicated to the project and provided with delegated authority to provide the design-builder with a single set of comments to address.
Construction Oversight	Construction management processes are standardized and consistently applied. Contract closeout process is used to facilitate continuous improvement.	**Partial alignment** Post-award DB processes remain largely ad hoc and may be inconsistently interpreted or applied by staff. Best practices are informally conveyed to project team members through the mentoring efforts of experienced project engineers.	• Based on the proposed table of contents, WSDOT's updated DB Manual will address construction oversight processes and other administrative functions (e.g., change orders, documentation, etc.). • Contractual responsibility for construction quality management is primarily assigned to the design-builder – a practice which has fostered growth and maturation of the quality management industry in Washington	Lack of guidance related to effective construction oversight practices could contribute to: • Inconsistency across project teams • Misunderstanding of WSDOT's role • Inefficient allocation of resources	• Develop guidance, to be included in the DB Manual and the formalized training program, to address the construction oversight function. • For smaller projects, consider retaining responsibility for quality assurance to avoid duplication of testing efforts. • Collect lessons-learned to identify any need to refine processes.

	Leading Practices	WSDOT's Alignment with Leading Practices	What is WSDOT doing well?	What are the gaps/risks with WSDOT's current practice?	Recommendations
Change Management	Contracts include a fair and balanced process that facilitates and expedites the review and resolution of potential changes to the contract.	**Partial alignment** WSDOT has clear contractual language and standard guidance addressing the delegation of approval and execution authority for change orders. However, there appears to be minimal guidance to assist project teams with the evaluation of change order requests submitted by design-builders.	WSDOT's current template documents contain what appears to be a balanced contractual process for administering changes to the contract.	Lack of guidance on change order evaluation and management for DB projects can lead to: • Questionable decisions regarding whether a change order request truly represents a change to the DB scope of work • Delays in decision-making on change order requests and claims (which in turn, could increase costs and exacerbate relations between the owner and design-builder).	Develop guidance, to be included in the DB Manual and the formalized training program, to assist project teams with the evaluation, tracking, and reporting of change orders.

10.4   Recommendations on Contract Administration

Based on the observations and risks identified above, the consultant team offers the following recommendations:

1. **Dedicate qualified key staff as needed to the full project life-cycle (design and construction phases).** After the decision is made to use DB, particularly for larger projects, a project team should be assembled and remain intact as long necessary help ensure that valuable information is not lost between project phases (thereby reducing or eliminating project learning curves), and help ensure effective collaboration with the design-builder and timely issue resolution.

2. **Develop guidance to assist DOT staff with the design and construction oversight functions.** Expanding upon Recommendation No. 2 in Section 3.4, regarding the development of an updated DB Manual, guidance should be developed to assist staff responsible for overseeing the design-builder's execution of the design and construction phases of the project. Development of standard design review templates and inspection checklists could further promote consistency.

   Best practices in design and construction oversight should also be incorporated into the training program recommended in Recommendation No. 2 in Section 4.4.

3. **Conduct project-specific training for large or complicated projects (e.g. projects >\$100M or projects with complex geotechnical features, structures, or staging).** For large or complicated projects, WSDOT should provide project-specific training to the project team on contract administration, execution risks, and similar matters.

   While this is being done on an ad hoc basis to some extent currently (through peer-to-peer mentoring), we recommend that it be considered a fundamental part of WSDOT's project execution process and training/mentoring program. Such training is intended to help inform the WSDOT project team about specific project risks and application of contract terms and conditions, thereby priming the team for effective management of the project.

4. **Optimize quality management for small DB projects.** The processes described in the DB Manual should be scalable to projects of varying types, sizes, and complexity. To this end, WSDOT may want to consider optimizing the quality management processes for smaller DB projects by:

   - Reducing verification testing frequencies for low risk items or small quantities, and/or

   - Retaining acceptance testing responsibility (instead of assigning this to the design-builder) to minimize duplication of testing efforts.

PART 3

Implementation Plan

Part 3 Objectives

- Prioritize the improvement recommendations previously identified in Part 2 on the basis of urgency, need, and the anticipated beneficial impacts.

- Propose a high-level implementation timeline that considers the proper sequence in which recommendations must occur and the resources required to implement them.

11. Implementation Plan

11.1 Recommendations

Part 2 of this report identified recommendations and enhancements to better align WSDOT's DB program with leading industry practices. Successful implementation of these recommendations requires careful planning to ensure that WSDOT's immediate needs are addressed first, followed by a properly sequenced and phased plan of longer-term measures.

Table 11.1 prioritizes the recommendations identified in Part 2 within each general category based on consideration of the following:

- The proper sequence in which recommendations should occur (for example, development and implementation of programmatic documents must be complete before more advanced training can occur);

- Implementation costs (based on an order-of-magnitude estimate of either one-time (O) or recurring (R) implementation costs);

- Implementation difficulty; and

- The beneficial impact of the recommendation.

As WSDOT moves toward implementation, it will need to estimate the implementation costs and determine which recommendations require additional funding, and which they can accomplish within their existing budget. The level of difficulty to implement a recommendation, particularly in the short term, may or may not be tied to funding or available resources. Other challenges could be internal DOT or external industry resistance to adopting a recommendation, the need for legislative action, or timing (e.g., advance work is required before a recommendation can be implemented). The potential benefits should be weighed against the cost and difficulty. As noted below, WSDOT is moving forward with several initiatives in alignment with these recommendations.

Table 11.2: Recommendations and Implementation Considerations

Recommendation	Implementation					Benefits [3]
	Timing	Cost [1]		Difficulty	Status	
(1) DB Program Development & Management						
A. Develop and/or update WSDOT's standard DB procurement and contract forms	1-6 months	<$100k	O	Low	Underway	❷ ❸
B. Finalize and issue updated DB manual	6-18 months	$100 - $500k	O	Moderate	---	❷
C. Develop and implement an internal and external rollout strategy for programmatic documents	6-18 months	<$100k	O	Low	---	❷ ❸
D. Maintain and update the contract document templates and DB Manual as additional recommended policies or procurement policies or procurement strategies are adopted	> 18 months	<$100k	R	Low	---	❷ ❸
E. Establish and maintain a database of DB lessons-learned	1-6 months	<$100k	R	Moderate	Underway	❶ ❷ ❸
(2) Staffing and Training						
A. Increase DB Headquarters staff	1-6 months	$100 - $500k	O	Moderate	Underway	❶ ❷
B. Develop and implement a formal DB training and mentoring program to increase DB skills and expertise across the Regions	> 18 months	$100 - $500k	R	High	Underway	❸ ❹ ❺ ❻
C. Designate technical experts within DOT to support DB teams	6-18 months	<$100k	O	Low	Underway	❶ ❷
D. Offer DB credentials and experience (rotation) and a more competitive compensation structure as part of career development/retention plan	> 18 months	> $500k	R	High	---	❸ ❹
E. Optimize use of consultants	> 18 months	---	-- [2]	Low	---	❷ ❹

(1)   Not all costs require a new appropriation or new funding. One-time $ = O, Recurring $ = R. WSDOT will need to determine which of these recommendations require additional funding, and which they can accomplish within their existing budgets.

(2)   No cost policy change and/or cost savings

(3)   See key of benefits below.

Benefits

❶ Reduce errors and conflicts

❷ Improve DB program consistency

❸ Improve efficiency of DB execution

❹ Increase and retain staff competency

❺ Accelerate project delivery

❻ Save project cost

❼ Reduce change orders/cost growth

❽ Enhance opportunities for innovation

❾ Increase competition

❿ Improved budgeting

⓫ Improve quality/evaluation of proposals

⓬ Improve communication & collaboration

	Recommendation	Implementation					Benefits [2]
		Timing	Cost [1]		Difficulty	Status	
(3) Project Development	A. Develop guidance to address Practical Design reviews for DB projects (including how process ties to preliminary engineering and procurement)	6-18 months	<$100k	O	Moderate	Underway	❻
	B. Consider market conditions and availability of DOT resources when determining the scope and size of contract packages	> 18 months	<$100k	R	Low	---	❼ ❾
	C. Develop and implement performance specifications	6-18 months	$100 - $500k	O	Moderate	---	❻ ❽
	D. Perform appropriate levels of front-end investigation	1-6 months	$100 - $500k	R	Low	---	❻ ❼
(4) Delivery Method Selection	A. Experiment with alternative DB delivery and procurement methods (e.g., bundling, low bid, single step)	> 18 months	$100 - $500k	O	Moderate	---	❸ ❺
	B. Refine PDMSG and manual as appropriate based on systematic comparisons of the results of using various project delivery strategies (e.g., DB, design-bid-build, and GC/CM)	> 18 months	$100 - $500k	O	High	---	❸

(1) Not all costs require a new appropriation or new funding. One-time $ = O, Recurring $ = R. WSDOT will need to determine which of these recommendations require additional funding, and which they can accomplish within their existing budgets.

(2) See key of benefits below.

Benefits

❶ Reduce errors and conflicts
❷ Improve DB program consistency
❸ Improve efficiency of DB execution
❹ Increase and retain staff competency

❺ Accelerate project delivery
❻ Save project cost
❼ Reduce change orders/cost growth
❽ Enhance opportunities for innovation

❾ Increase competition
❿ Improved budgeting
⓫ Improve quality/evaluation of proposals
⓬ Improve communication & collaboration

Recommendation	Implementation					Benefits [3]
	Timing	**Cost** [1]		**Difficulty**	**Status**	
(5) Procurement						
A. Streamline procurement process for small DB projects (e.g., expand shortlist, pass/fail qualifications criteria, or use an accelerated process)	> 18 months	<$100k	O	Moderate-High	---	❸ ❻ ❾
B. Refine evaluation criteria to: – Assign greater weight to qualifications and technical evaluation criteria when seeking innovation – Address the prior working relationship of the DB team	> 18 months	<$100k	O	Low	---	❼ ⓫ ⓬
C. Optimize the efficiency of the ATC process and one-on-one meetings	6-18 months	---	-- [2]	Low	---	❸
D. Establish and maintain a database of ATCs, and use the data to: – Establish preapproved elements to expedite the ATC process – Identify opportunities to introduce more flexibility into current design standards	> 18 months	<$100k	R	Moderate	Underway	❷ ❸
E. Ensure the objectivity of the proposal evaluation process	6-18 months	---	-- [2]	Low	---	⓫
(6) Budgeting & Cost Estimating						
A. Work with legislative staff to more effectively appropriate funds for DB projects	1-6 months	<$100k	O	Moderate	---	❿
B. Examine if Engineer Estimates are resulting in an over-allocation of funds and refine estimating process as necessary	1-6 months	<$100k	O	Moderate	---	❿

(1) Not all costs require a new appropriation or new funding. One-time $ = O, Recurring $ = R. WSDOT will need to determine which of these recommendations require additional funding, and which they can accomplish within their existing budgets.

(2) No cost policy change and/or cost savings

(3) See key of benefits below.

Benefits

❶ Reduce errors and conflicts

❷ Improve DB program consistency

❸ Improve efficiency of DB execution

❹ Increase and retain staff competency

❺ Accelerate project delivery

❻ Save project cost

❼ Reduce change orders/cost growth

❽ Enhance opportunities for innovation

❾ Increase competition

❿ Improved budgeting

⓫ Improve quality/evaluation of proposals

⓬ Improve communication & collaboration

Recommendation	Implementation				Benefits [2]
	Timing	Cost [1]		Difficulty	Status	

(7) Risk

Recommendation	Timing	Cost [1]		Difficulty	Status	Benefits [2]
A. Develop guidance, for inclusion in the DB Manual, regarding how to use the risk analysis results to assist with: − Project development (i.e., level of design development and front-end investigation) − Procurement (evaluation criteria) − Contractual risk allocation	6-18 months	<$100k	O	Moderate	---	❼
B. During the execution phase of a DB project, conduct periodic risk review meetings and regularly update the project risk register	6-18 months	<$100k	R	Low	---	⓬

(8) Project Execution

Recommendation	Timing	Cost [1]		Difficulty	Status	Benefits [2]
A. Dedicate staff as necessary to the full project-lifecycle (design and construction phases)	1-6 months	<$100k	O	Moderate	---	❸ ❹ ⓬
B. Dedicate experienced staff with delegated authority to the design oversight function	6-18 months	$100 - $500k	O	Moderate	---	❷ ❸ ❹
C. Conduct project-specific workshops for larger or complex DB projects	6-18 months	<$100k	R	Moderate	---	❷ ❸ ❹
D. Optimize quality management for smaller projects	6-18 months	<$100k	O	Low	---	❸ ❻

(1) Not all costs require a new appropriation or new funding. One-time $ = O, Recurring $ = R. WSDOT will need to determine which of these recommendations require additional funding, and which they can accomplish within their existing budgets.

(2) See key of benefits below.

Benefits

❶ Reduce errors and conflicts	❺ Accelerate project delivery	❾ Increase competition
❷ Improve DB program consistency	❻ Save project cost	❿ Improved budgeting
❸ Improve efficiency of DB execution	❼ Reduce change orders/cost growth	⓫ Improve quality/evaluation of proposals
❹ Increase and retain staff competency	❽ Enhance opportunities for innovation	⓬ Improve communication & collaboration

11.2 Implementation Timeline

Figure 11.1 presents a proposed timeline for adopting certain recommendations. It is assumed that the policy-related recommendations under Contract Administration and Project Execution will be addressed in the DB Manual and training activities. The budgeting recommendation is a one-time programmatic policy decision that affects the current Connecting Washington program.
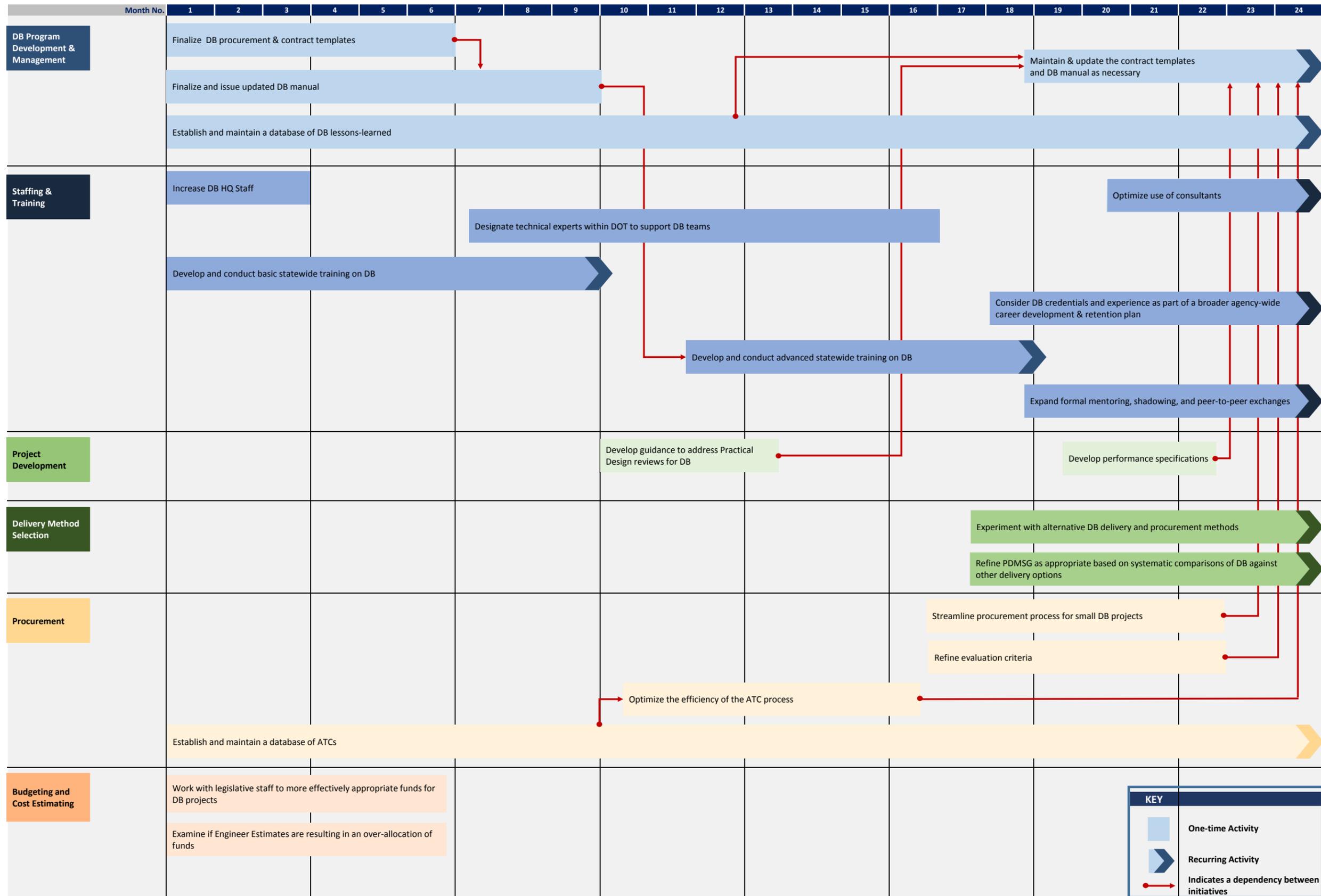
Figure 11.1: Implementation Timeline