



**Washington State
Department of Transportation**

Small Design-Build Pilot Project Evaluation

Highway Projects

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1.0 Executive Summary

Design-Build (DB) can be an effective project delivery option for small projects, including for projects less than \$10 million.

In RCW 47.20.785, the legislature directed WSDOT to test DB project delivery on five pilot projects that cost between \$2 million and \$10 million to determine if DB is effective in the delivery of small projects. The I-5 Skagit River Bridge – Permanent Bridge Replacement emergency project was also included for analysis.

On a DB project, both design and construction services are procured in the same contract from a single, legal entity referred to as the Design-Builder. With DB delivery, the Design-Builder controls the details of design, based on owner-specified performance requirements and is typically responsible for the cost of any design errors or omissions encountered in construction. The basis for Design-Builder selection is Best Value rather than Low Bid, which is used for Design-Bid-Build projects.

The purpose of this report is to assess WSDOT's experience in using DB delivery for the pilot projects and provide recommendations on future use of DB project delivery for small projects. The report evaluates the small pilot projects with respect to the criteria listed in RCW 47.20.785, including cost, time to complete, efficiencies gained and other pertinent information.

The main conclusions and recommendations include:

- All small projects should be evaluated for the optimal delivery method early in development.
- Efficiencies and quality management on small projects are directly related to a strong partnership between the Designer and Contractor. Emphasizing this and an experienced independent third party providing Quality Assurance (QA) (for proposers without a history of excellent self-performed QA) should be considered in the development of contract documents for small DB projects.
- Small DB projects with lower overall risk are an effective opportunity for WSDOT staff to gain DB experience and should be considered a Best Practice.
- Small DB projects create opportunities for new Design-Builder teams to gain experience with WSDOT, potentially increasing competition on larger WSDOT DB projects.
- Small DB projects create opportunities for DBE participation on Design-Builder teams.

Specific types of projects that can benefit from DB project delivery include:

- Projects with critical phasing and timing;
- Projects with performance specifications allowing innovation/specialty work; and
- Projects with significant risks that can be managed effectively through the DB project delivery structure.

Based on the results of the pilot projects, WSDOT has determined that DB can be an effective means for delivering small projects.

2.0 Background

WSDOT delivered, or is in the process of delivering, 29 projects, ranging in cost from \$3 million to \$1.09 billion, using the DB project delivery method. According to current state law (RCW 47.20.785), WSDOT may use DB procurement for public works projects over \$10 million on which:

1. The construction activities are highly specialized and a DB approach is critical to developing the construction methodology; or
2. The projects selected provide opportunity for greater innovation and efficiencies between the designer and the builder; or
3. Significant savings in project delivery time would be realized.

In RCW 47.20.785, the legislature directed WSDOT to test the applicability of DB procurement on smaller and specialty projects by authorizing up to five pilot projects that cost between \$2 million and \$10 million to be contracted using DB project delivery. The pilot projects were to be evaluated using the following criteria:

1. Cost;
2. Time to complete;
3. Efficiencies gained;
4. Other pertinent information (if any).

This report includes information based on experiences gained to date from five pilot projects delivered over the past three years. These projects were selected because they provide a cross section within the cost range and could be implemented quickly to deliver timely results. In addition to these projects, information from the I-5 Skagit River Bridge-Permanent Bridge Replacement emergency project was incorporated because the project cost fell within the pilot project cost range and provided an example of specialty work not included in the original five pilot projects. (For the remainder of this report, this project will be referred to as a pilot project.) Basic information for the DB pilot projects is listed in the table below:

Table 2-1: Small Design-Build Pilot Project Data

Project Name	RFP Ad.	Contract Award	Open to Traffic	Engineer's Estimate	Contract Award Amount	Final Cost**	% Change***	Benefits from Design-Build Delivery							
								Cost (Optimal Value)	Time to Complete	Efficiencies Gained	Staff Development	New Design Builder Teams	Innovation	Risk Management	Quality Management
US2/Rice Road Intersection - Safety Improvements	05/31/11	09/07/11	04/12/12	\$2,750,002	\$2,170,507	\$2,410,519	11.06%	No	Yes	No	Yes	Yes	No	Yes- except Quality	Poor
SR9/SR92 Intersection Improvements	09/06/11	01/26/12	08/12/12	\$3,900,000	\$3,346,888	\$3,494,226	4.40%	Partial	Yes	Minor	Minor	No	Minor	Yes	Adequate
I-405 & SR518 – Concrete Pavement Rehabilitation	11/13/12	02/12/13	09/25/13	\$8,300,000	\$7,277,888	\$7,744,393	6.41%	Yes	Yes	Yes	Yes	No	Yes	Yes	Excellent
SR92 & I-90 Intersection Improvements and Region-wide Roadside Safety	12/12/12	03/18/13	11/14/13	\$7,250,000	\$7,131,691	\$7,159,840	0.39%	No	Yes	No	Yes	Yes	No	Yes – except Quality	Poor
SR9/32 nd St SE & 84 th St NE – Safety Improvements	11/18/13	02/26/14	11/21/14	\$5,021,868	\$5,699,005	(Estimated) \$5,714,598	(Est.) 0.27%	Yes	Yes	Minor	Yes	Yes	Minor	Yes	Excellent
I-5 Skagit River Bridge – Permanent Bridge Replacement (Emergency Project)	06/03/13	06/18/13	09/15/13	\$10,000,000*	\$6,875,800	\$7,147,118	3.95%	Yes	Yes	Yes	Yes (QV Team)	No	Yes	Yes	Excellent

* The emergency project on I-5 Skagit River Bridge was done on a highly expedited timeline.
 At the time of bid, WSDOT had only general parametric estimates and the Engineer's Estimate was set at \$10 million.
 Since all three bids came in under \$10 million, this project has been included in this evaluation as it provided a project example with specialty engineering.

** Amount paid to Contractor or Final Cost Estimated at Completion (EAC)

*** % Change reflects total contingency (majority of cost change orders) used or projected to be used over the original contract amount.

2.1 Purpose

The purpose of this report is to assess WSDOT's experience in using DB delivery for the pilot projects and provide recommendations on future use of DB project delivery for small projects.

2.2 Project Delivery Method Selection

The project delivery method is the process by which a project is comprehensively designed and constructed from initial scope definition to completion and start-up. Project delivery methods are distinguished by the manner in which contracts between an owner, designers and builders are formed and the technical relationships, including risk allocation, that evolve between each party inside those contracts. No single delivery method is ideal for every project. Each project must be assessed to determine how its attributes align with the available delivery methods. WSDOT's current practice is to deliver projects using Design-Bid-Build (DBB) methods, unless DB delivery is specifically pursued.

WSDOT has authorization to use DB delivery for projects over \$10 Million. Currently, WSDOT's Ferries Division has received approval through the Capital Project Advisory Review Board to use General Contractor/Construction Manager (GCCM) delivery for a project.

The DB project delivery method allows WSDOT to procure both design and construction services in the same contract from a single, legal entity referred to as the Design-Builder. This method typically uses a two-step procurement process consisting of a Request for Qualifications (RFQ) and a Request for Proposal (RFP), which establish the "Apparent Best Value" as the basis of Award. Traditional DBB delivery utilizes the single step Invitation for Bids and the "Lowest Apparent Bid" as the basis for Award. With DB delivery, the Design-Builder controls the details of design, based on owner-specified performance requirements, and is typically responsible for the cost of any design errors or omissions encountered in construction. With DBB delivery, WSDOT provides the design or procures a designer, retaining control of the design process as well as the associated responsibility for design errors and omissions.

The best delivery method for each project can only be selected after careful evaluation. This conclusion is consistent with the October 2013 *Mega Project Assessment* report conducted by CH2MHill and Tom Warne & Associates, which included the recommendation that WSDOT should focus effort on project delivery method selection. At present, WSDOT is in the process of developing improved guidance for

project delivery method selection that will provide a systematic approach to evaluating the project's attributes, goals, risks and constraints relative to the opportunities and obstacles associated with each potential project delivery method. The findings from this Pilot Project Evaluation report will be incorporated into the development of project delivery method selection guidance.

3.0 Evaluation Criteria

This report presents an evaluation of the small pilot projects with respect to three sets of criteria: those listed in RCW 47.20.785; pertinent metrics identified from the pilot projects; and the attributes of using Design-Build that are commonly considered beneficial within the construction industry.

3.1 Cost

3.1.1 Lower Cost/Best Value

Design-Build delivery is based on a single contract and cost for the design and construction of the project, based on owner-specified performance requirements. The value of a proposal is a qualitative measure that factors price and performance into decision making (Apparent Best Value) as part of WSDOT's DB procurement process. Optimum value for a DB project is typically achieved by innovation and efficiencies through coordination between the Designer and Contractor and properly identified and allocated risks in the procurement documents. The DB method allows the Design-Builder team to collaborate and develop Alternate Technical Concepts (ATCs) with WSDOT approval, which can provide a cost-effective response to project goals. Design Build projects typically have a lower average cost growth and funding can be obligated in a very short timeframe if needed. However, risk identification and allocation in the RFP, if poorly done, can result in high contingencies in the proposals. WSDOT will evaluate the pilot projects for cost performance utilizing perceived benefits of innovation, efficiencies and risk allocation as an indicator of best value achieved. Moderately lower costs are generally recognized in the industry as an attribute of DB project delivery, but cannot be easily demonstrated.

3.1.2 Early Price Certainty

Since the total contract cost for design and construction is set after the RFP, prior to most of the design development, and errors and omissions are generally not the responsibility of the owner, the DB method allows the owner to confirm the price of the work early in the project schedule. Although early price certainty is an attribute of DB delivery, the benefit is limited due to the size of the projects. The percentage of changes on the pilot projects will be used to evaluate if early price certainty was achieved.

3.2 Time to Complete

The DB delivery method provides the ability for a project to begin construction before completing design. The parallel process of design and construction can accelerate the project delivery schedule. Procurement of the Design-Builder can be lengthy due to the time necessary to develop an adequate Request for Proposal (RFP), evaluate proposals and provide for a fair, transparent selection process. Schedule risk, including complex phasing and closures, can be shifted to the Design-Builder in the contract documents. This allows contractor input into the schedule, thus incentivizing efficiencies and innovation in resource loading and scheduling by the Design-Builder team. The DB delivery method typically offers fewer opportunities for schedule disputes between the agency and the Design-Builder team and allows more efficient procurement of long-lead items. Success in meeting the project schedule and related goals will be used to determine if speed of delivery was achieved.

3.3 Efficiencies Gained

The Designer/Contractor collaboration during design and construction allows the incorporation of contractor expertise, means and methods, and work phasing to maximize the efficiency of the overall project. Additionally, the collaboration provides for a continuous value engineering and constructability process from development of the Proposal through completion, and it allows the Contractor and Designer to work together to identify issues as early in the process as possible. Changes to the project that are captured in the proposal and design stage typically have much less negative impact on overall project cost and schedule or provide a greater opportunity to save project costs or decrease the schedule. Collaboration between the Design-Builder team and WSDOT also enhances efficiencies by maintaining effective communication design and construction, thus reducing errors and waste in the project and promoting a collaborative approach to resolving problems, such as quality issues. Input from the Design-Builder team members, WSDOT staff and project data will be used to determine if design efficiencies were a benefit received on the pilot projects. The percentage of changes may be an indicator of design efficiencies if verified by other project information and WSDOT staff observations.

Other Pertinent Information

3.4 Staff Resources and Development

3.4.1 Staff Resources

WSDOT Staff provided the technical and management resources and expertise necessary to develop the RFQ and RFP, administer the procurement and contract management of design and

construction. Small DB projects, because of their scale, may be suited to utilizing staff that are not completely allocated to a project or other multiple small projects. However, the intense effort necessary during the RFP phase of a project should be considered when allocating staff. This report presents an evaluation of the impact on staff and their effectiveness in managing small DB projects, based on information from the project data and WSDOT staff comments.

3.4.2 Staff Development

The availability of staff with DB project experience is limited for both owners and Design-Builder teams. Because most small DB projects have relatively low overall risk, they may make good training opportunities for WSDOT staff to expand DB experience; however these opportunities have a tradeoff in overall staff efficiency on the project. This report presents an evaluation of opportunity and effectiveness in utilizing small projects to provide experience in DB to WSDOT staff, based on information from project data and WSDOT staff comments.

3.5 Development of New Design-Builder Teams and D/M/WBE Participation

The DB small pilot projects provide an opportunity for new Design-Builder teams to compete for projects and gain experience in DB, eventually increasing the competition for larger projects. Also, the opportunity for participation of Disadvantaged Business Enterprises (DBEs) or Minority/Women Owned Business Enterprises (M/WBEs) as part of the Design-Builder teams is more likely on these projects due to the smaller scale of the project work. WSDOT will assess if any of these opportunities were met in the small pilot projects.

3.6 Opportunity for Innovation

Design Build incorporates Contractor input into the design process through best value selection and contractor proposed Alternate Technical Concepts (ATCs), which are typically cost reducing proposals that provide an equal or better project to WSDOT. This requires that desired solutions to complex projects be well-defined through contract requirements. The method provides a highly innovative process through three party (WSDOT, Contractor, Designer) collaboration during the RFP process. Through ATC, WSDOT has approval of the Designer/Contractor process for developing innovative solutions and provides for the selection of the best qualified designer and contractor team. Value Engineering and enhanced constructability is inherent in the process. Risk associated with innovation can be better defined, minimized and allocated using DB delivery, which allows Design-Builder teams to

develop means and methods tailored to the strengths of the contractor partner in the proposal. However, there is a risk of time or cost constraints on the designer that inhibit innovation during the RFP and design process. Some proposed design solutions might be too innovative or unacceptable to WSDOT. Quality assurance for innovative processes can be difficult to define in the RFP or there may be unintended consequences to an ATC if the limits are not clearly defined. Innovation may include complex or cutting-edge project phasing, means and methods, or both, that overlap with opportunities for efficiencies. This report provides an assessment of the possibility for innovation on the small pilot projects through evaluation of WSDOT staff comments, Design-Builder team input and project data.

3.7 Risk Management

The DB delivery method provides opportunities to properly distribute risks to the party best able to manage them and requires the risks allocated to the Design-Builder be well-defined to minimize contingency pricing. Performance specifications can allow for alternative risk allocations to the Design-Builder. The Risk-reward structure can be better defined in a DB project, with the unique ability to disseminate risks to different parties (e.g., schedule, means and methods, phasing). Designers and Contractors can work toward state of the art solutions to, or avoidance of, unknowns. This method inherently distributes risks for typical design errors and omissions with the associated claims for change orders to the Design-Builder team. Unknowns and associated risks need to be carefully allocated through a well-defined scope and contract. Poorly defined risks in the RFP are expensive. The Design-Builder may avoid risks or drive the designer to decrease cost, thus impacting quality. This report evaluates whether risks were allocated effectively and if the distribution provided a benefit in the execution of the pilot projects, based on information from WSDOT staff comments, Design-Builder team input and project data.

3.8 Quality Management

The Design-Builder has the responsibility for Quality Control (QC) and Quality Assurance (QA) on DB projects. WSDOT's procurement and administrative processes must ensure quality by providing a well-defined RFP document and contract administration that is based on good communications, clear responsibilities for QC/QA by the Design-Builder and QV by WSDOT, and a commitment to partner during the life of the project. The small pilot projects are assessed in this report on the ability of the Design-Builders and WSDOT staff to achieve the specified quality for the projects through evaluation of WSDOT staff comments, Design-Builder team input and project data.

4.0 Evaluation

For each project, DB delivery method successes and challenges have been outlined and evaluated based on input from the WSDOT project teams, the Design-Builder teams and project data. The evaluation section emphasizes the trends and commonalities of the pilot projects by the identified criteria and other significant trends. The evaluation of each individual project is included in Appendix A of this report.

4.1 Cost

4.1.1 Lower Cost/Best Value

Although a modest benefit in cost is generally accepted using the DB delivery method over DBB, it cannot be directly proven unless the same project is contracted using both methods. Even if this were done, the design developed through DBB would be expected to be significantly different than when developed through the DB process. The value of a proposal is a combined qualitative and quantitative measure that factors price and performance into the decision process (Apparent Best Value) as part of WSDOT's DB procurement process. Optimum value for a DB project is typically achieved by innovation and efficiencies through coordination between the Designer and Contractor. Properly identifying and allocating risks in the procurement documents also contribute to optimum value. On several of the pilot projects, opportunities were limited due to the type of work or the finished level of design. Innovation on design was most significant on the I-5 Skagit River Bridge project, due to the specialty engineering. Innovation for complex phasing and means and methods were identified on several pilot projects and was the most common benefit that demonstrates the projects achieved optimum value. Risk identification and allocation on the pilot projects was considered to be successful by both WSDOT staff and the Design-Builders, except on Quality Management on two of the projects. Changes (contingency funds used over project bid amount) averaged a moderately low range of 0.27 to 6.41 percent, with the US2/Rice Road project having an 11.06 change percentage. Five of the six projects evaluated had contract amounts and final cost less than the Engineer's Estimate in the RFP. Although optimal value and moderate cost benefits are indicated on several of the pilot projects, the type of projects and the completed design of two of the pilots reduced the value achieved for several of the pilot projects.

4.1.2 Early Price Certainty

Because the DB process establishes the contract price at the proposal stage, a benefit called early cost certainty is identified with DB projects. Design Build eliminates or diminishes “scope creep” that can occur between 30 and 100 percent in traditional delivery. The risk allocation inherent in DB delivery results in fewer change orders, fewer claims, and less litigation. The positive effects are due to the single point of responsibility between WSDOT and the Design-Builder team, which typically removes WSDOT’s responsibility for design errors or omissions. Early price certainty was not included in any of the pilot project goals, and because of the small size of the projects, the value of this DB attribute is not considered significant for projects under \$10 Million. On the pilot projects, the DB contract cost increases have been between 0.27 and 6.41 percent with one project outlier at 11.06 percent, demonstrating the benefit of early price certainty can be accomplished for small DB projects even though the value of this benefit is limited.

4.2 Time to Complete

This delivery method provides the ability for a project to begin construction before completing design. Schedule risk, including complex phasing and closures can be shifted to the Design-Builder in the contract documents. Based on the results of the pilot projects, DB can benefit small, schedule-sensitive projects that must be started or completed by a certain milestone or require the quick obligation of federal funds. All of the projects in the pilot program benefited from an expedited construction schedule, with four of the six projects having early delivery as a goal and in all cases the goal was met or exceeded. The benefits were achieved through the transfer of risk of the construction schedule and milestones to the Design-Builder rather than in the overlap of design and construction on the small projects. None of these projects required the quick obligation of federal funds.

Because several of the selected projects were originally designed for DBB, and two of the projects had completed designs, the DB attribute of an expedited schedule overall was difficult to demonstrate on these pilots. Lengthy processes such as utility relocation, environmental permitting and ROW acquisition need be considered in selecting the project delivery method for small projects since the project design may be completed concurrently. Expediting these processes would allow more opportunities to use DB for small projects that need an expedited schedule.

4.3 Efficiencies Gained

The Design-Builder team collaboration during design and construction allows the incorporation of contractor expertise, means and methods, and work phasing to maximize the efficiency of the overall project and provides for a continuous value engineering and constructability process from development of the Proposal through completion. On more than half of the pilot projects, the ability of the contractor to schedule equipment, work crews and other resources as part of the DB delivery method allowed construction efficiencies as well as the ability to phase the work to minimize impacts to the public. Projects on which delivery efficiencies were perceived by the WSDOT staff had teams with strong and established Designer and Contractor/Design-Builder relationships. When the Designer did not seem to have strong partnering with the Contractor, lack of coordination between the Designer, Contractor and WSDOT staff significantly impacted efficiencies gained on the project, including impacts to quality.

4.3.1 Cost of Changes

Although many of the inherent DB method efficiencies may not be obvious because they are internal to the Design-Builder team, a lower range of change percentages for DB projects verses Design-Bid-Build projects is one indicator. Through the collaborative process inherent in DB project delivery, potential impacts to the project are caught earlier in the process. The earlier an impact is corrected, the less the cost of changes impacts the overall project costs and efficiencies. The DB pilot projects change percentages range from 0.27% to 6.41% with one project outlier at 11.06%. Although five of the six pilot projects had low to modest change percentages, and the project with the largest change in cost was not considered to have high efficiencies gained, the correlation is not absolute. One project with a low change percentage was noted to have poor coordination between the Contractor and Designer and associated impacts to efficiencies. Percentage of changes, if used as an indicator of efficiencies gained for a project, should be validated by other project data and observations from WSDOT staff.

4.3.2 Project Bundling

Several of the pilot projects were “Bundled.” The project development team combined projects with similar or complementary scopes of work into one project. Bundling can provide benefits and savings during procurement due to economies of scale, design efficiencies, material cost savings, quality management savings and the ability for the Design-Builder team to consider the

regional impact on the transportation system of multiple small projects, even if the project components end up being treated as several different small projects.

Proximity of the project sites is important in a bundled project. Proximity of work influences the number of subcontractors and the volume of material documents required for the project. Ideally, all the work sites should be within a few miles of each other.

Bundling may not save on preliminary design if a similar effort must be developed for each of the locations. However, if the opportunity for bundling is identified early in the project development process, cost savings are more likely to be gained through an integration of similar project elements in the preliminary design and RFP development and incorporating the work into one consolidated process. One disadvantage of bundling is that if an issue arises, it may affect all the bundled project elements, not just the one with the issue (permitting delays, utility conflicts, and local agency agreements). Bundling projects potentially provides a benefit if the elements are in proximity and have similar or compatible work elements. Bundling does not have a direct relationship to selecting the DB delivery method for small projects, although it can mitigate some of the typical issues such as overlapping Quality Assurance and Quality Verification by increasing the volume of types of work within the project.

4.4 Staff Resources and Development

4.4.1 Staff Resources

WSDOT Staff provided the technical and management resources and expertise necessary to develop the RFQ and RFP, administer the procurement and contract management of design and construction. Developing the RFP and the selection process for the Design-Builder can be a lengthy and intense process for staff as was demonstrated on the pilot projects. There were difficulties with collaboration during design where WSDOT staff and the DB team were not co-located. Large DB projects can justify dedicated WSDOT design review staff, typically co-located with the Design-Builder. This helps maintain the flow of design with “over-the-shoulder” reviews to provide quick response. WSDOT reviewers for the small pilot projects typically split their time between multiple projects, resulting in some inefficiency. As a result, there were challenges prioritizing staff time. Collaboration on design is important for the effective delivery of a DB project, but the appropriate level of effort must be identified on each project to gain the

benefits and cost savings on design from this project delivery method. Also, WSDOT staff managing both DB and DBB projects had difficulty adjusting their roles to each type of project, especially when they were new to Design-Build. Opportunities to consolidate small DB projects to one office, co-locate with the Design-Builder and utilize unallocated time of existing staff may increase the effective use of staff time. The peaks in work load on DB projects need to be considered, as well as the lack of DB experience in many regions and project offices.

4.4.2 Staff Development

Because most small DB projects have relatively low overall risk, they may make a good training opportunity for WSDOT staff. Small DB projects allowed for the utilization of existing staff and four of the six pilot projects engaged staff that administered the contract, which had not worked on a DB project prior to the pilot projects. Without previous DB experience, WSDOT staff was challenged to quickly learn how to execute small DB projects due to the short project durations that are the result of the speed of delivery. Assistance from other WSDOT staff experienced in DB was important in assisting inexperienced staff through critical phases of the project, such as RFP development and procurement. Several comments observed that staff demonstrated increasing skill on the DB pilot projects as they progressed through several of the projects. Staff was better able to identify and resolve issues and pursue opportunities on the later DB pilot projects. On the I-5 Skagit River Bridge project, there were many WSDOT staff members with DB experience because of the sensitivity of this project. WSDOT staff for the QV was inexperienced, but were selected for their high level of competency and openness to learning QV for DB projects, resulting in good performance on the project and an excellent learning opportunity. On future small DB projects, the opportunity to increase experience of staff in DB should be considered a “Best Practice” as long as overall project risk is considered. Assistance at critical stages of the project, especially procurement, by an experienced team can augment less experienced staff and enhance learning opportunities. WSDOT is currently updating DB delivery contract documents, tools, manuals, processes and training that will assist WSDOT staff inexperienced in DB project delivery.

4.5 Development of New Design-Build Teams

Design-Build has been around for a number of years, and the number of projects utilizing this delivery method is growing. However, the number of experienced Contractor/Designer teams available for DB

projects can be limited. Small projects provide an opportunity for new teams to compete for projects and gain experience in DB, eventually increasing the competition for larger projects. Since the execution of the pilot projects, one firm, Rodarte Construction, Inc., was the successful proposer on the SR9/32nd St. Safety Improvement project and used this experience to become shortlisted as a proposer as part of the Hamilton-Rodarte Joint Venture for the SR 167/8th St. E. Vic to S 277th St. Vic - Southbound Hot Lanes project (8665). Other firms had DB experience but not with WSDOT, which may assist them in gaining future work on WSDOT DB projects.

Five of the six pilot projects were federally funded, with DBE participation managed by the Design-Builder. The other project was locally funded with M/WBE participation managed by the Design-Builder. One of the new Design-Builder teams included a DBE, Marshbank of the Graham/Marshbank JV. The rest of the DBE or M/WBE firms on the pilot projects were not part of the Design-Builder teams but participated as subcontractors, as they would have done on a DBB project. Design Build delivery of small projects provides an opportunity for DBE participation on Design-Builder teams.

One concern was raised from a Design-Builder who had proposed on the small pilot projects. The Design-Builder commented that WSDOT needs to do a better job enforcing the conditions of the DB contracts. A perception that contracts are not enforced or not enforced evenly can reduce competition on WSDOT DB projects. Efforts to provide updated DB guidance through templates, tools, procedures and training in support of Reform VII is in process and will be one way to help insure consistency on DB project RFP development, procurement, and contract management during design and construction.

4.6 Opportunity for Innovation

Design Build incorporates Contractor input into the design process through best value selection and contractor proposed Alternate Technical Concepts (ATCs), which are typically cost reducing proposals that provide an equal or better project to the owner. Based on the results of the pilot projects, most innovation was related to complex staging and phasing of the work, construction means and methods and minor design innovation. Along with price, the project goals and selection criteria generally influence innovation. On many of the pilot projects, the Design-Builder had limited opportunity to develop innovation in the design because of the limited scope of work, shorter time frames and prescriptive design standards/design. On the US2/Rice Road project and the SR92/I-90 project, the projects designs were almost complete for DBB contractor procurement before being selected for the

pilot projects. The level of design significantly limited the opportunity for innovation on these projects. Impacts to the traveling public that were reduced through innovative project phasing and construction means and methods were a common goal in the project RFP's and were achievement on most of the pilot projects. Project delivery method selection should occur early enough so that the benefits of the delivery method are not impacted. In support of Reform VII, WSDOT is currently developing Project Delivery Method Selection Guidance to assist in selecting the best delivery method for WSDOT projects.

Design innovation was demonstrated on the I-5 Skagit River Bridge project where the type of work allowed more opportunity for the proposers to pursue innovative ideas that also assisted in meeting the early project delivery. This was achieved in spite of the streamlined procurement process which reduced the time for the proposers to provide ATC's. Designed to shorten the schedule in response to an emergency, the streamlined process included a shorter procurement schedule, less developed preliminary design and a simplified proposal package, thus reducing costs for both WSDOT and the Design-Builders. A less developed preliminary design may also allow more opportunities for innovation on small DB projects. Input from pilot project proposers included concerns over the cost to prepare proposals for smaller projects, which could be mitigated by simplifying the procurement process and proposal requirements. Development of a streamlined procurement process for emergency and small DB projects could shorten the procurement schedule, reduce costs for WSDOT and the DB proposer teams and increase competition on WSDOT small DB projects, while providing more opportunities for innovation through a less developed preliminary design.

4.7 Risk Management

The DB delivery method provides opportunities to properly allocate risks to the party best able to manage them. Effective risk management was achieved on the pilot projects through the DB project delivery method. Through the Request for Proposal process, project goals and contract documents identified and allocated risks to the Design-Builder, such as minimization of impacts to the public and environment, early project delivery, design and construction means and methods, and excellent quality management. Input from WSDOT staff and Design-Builder team members indicated that risk management was a benefit to the owner from the DB delivery of the pilot projects, except on quality on two of the projects, and was appropriately allocated and identified in the RFP documents. Utilizing DB delivery for small projects to allocate appropriate risks to the Design-Builder is effective.

4.8 Quality Management

On traditional DBB projects, WSDOT provides Quality Assurance through testing and inspection. On DB projects, the Design-Builder is responsible for both Quality Control (QC) and Quality Assurance (QA) and WSDOT's role is Quality Verification (QV), including auditing of the project, not inspection. Quality management on the small pilot projects was the item of most concern to WSDOT staff. Two of the six projects had significant issues with the Design-Builder QA, and WSDOT staff provided additional QV to insure quality requirements were met. On the US2/Rice Road project, staff indicated the most severe issues, resulting in a \$15,000 credit change order for QA requirements that were not met by the Design-Builder. The SR92/I-90 project also had QA gaps. The experienced third party inspector had difficulties following the requirements for QA reporting. Staff attributed this to several possible causes, including an unwillingness to implement WSDOT DB QA contract requirements where they differed from his experience in another state. Both of these projects also had poor coordination and relationships between the Designer and the Contractor, poor coordination with WSDOT staff and limited participation of the Designer during construction.

The rest of the projects included one project with acceptable QA and three projects with excellent QA. The QA on two projects, one with adequate results and one with excellent results, was self-performed by the Design-Builder. The QA on the other two projects with excellent results was performed by an experienced, independent third-party. All four of these projects had a strong partnership between the Designer and Contractor/Design-Builder with the Designer taking an active role during construction. There is a strong correlation between excellent quality management by the Design-Builder and strong partnering between the Designer and the Contractor on the pilot projects. This criterion should continue to be emphasized in future DB RFP contract documents and selection of Design-Builders for small projects; although, potential impacts to participation by new Design-Builder teams from this should also be considered. Additionally, the two pilot projects with an independent third party responsible for the QA and a strong Designer and Contractor partnership both had excellent quality management, according to staff comments. Also according to employee feedback, when supported by strong Designer/Contractor relations, an experienced, independent third-party can mitigate the inexperience of a newer Design-Builder team, and also benefit WSDOT staff learning DB roles and responsibilities. An experienced independent third-party providing QA on small DB projects should be considered in the

contract documents for proposers that do not have DB experience with a history of prioritizing quality management and self-performed QA.

WSDOT staff's role during construction is significantly reduced on DB projects. On two of the pilot projects, the Department handled additional quality responsibilities with the goal of ensuring a successful result, however this is not optimal. WSDOT staff should be careful not to assume work assigned to the Design-Builder as WSDOT could unintentionally assume some of the project risk back from the Design-Builder. With staff less experienced in DB, confusion of roles can occur but this could be mitigated with improved guidance and experience in this delivery method. WSDOT is in the process of updating DB project delivery contract documents, tools, manuals, processes and training, which will help support staff new to DB. These updates and training will incorporate the lessons learned from the pilot projects in the improvements to the WSDOT DB Program.

Feedback from staff and Design-Builders on the pilot projects indicated that the Construction Quality Program may be inherently inefficient on small projects due to limited scope and small material quantities. All of the small projects had some overlap and duplication on Quality Verification (WSDOT) and Quality Assurance (Design-Builder), thus reducing efficiencies and increasing the cost of testing. As part of the project delivery method selection for small projects, inherent issues for small DB projects such as this will be incorporated for consideration. Bundling of projects with similar work and proximity may increase the efficiency of the quality management program for a small project. Modifying the quality program model for small projects is a limited option as regulatory requirements drive many of the QV requirements, but a clear understanding of roles and an effective Design-Builder QA program should minimize unnecessary QV on small projects. Specifying an experienced independent third-party for QA for new Design-Builders teams could reduce overlaps and benefit staff new to DB projects as they gain experience with their roles and the management of a DB contract. This may also help new Design-Builder teams be more competitive on proposal quality requirements for small DB projects.

5.0 Conclusions and Recommendations

5.1 Lessons Learned

Cost:

- The benefit of “Optimal Value” is gained on small DB projects through a direct relationship with project innovation, efficiencies and effective transfer of risk.

Time to Complete:

- For small DB projects, the benefit of early project delivery is due to the transfer of the risk for a short construction schedule and milestones to the Design-Builder.

Efficiencies Gained:

- The efficiencies gained on small projects are directly related to effective collaboration with WSDOT staff and a strong partnership between the Designer and Contractor/Design-Builder.

Staff Resources:

- Efficient use of WSDOT staff on small DB projects can be enhanced through careful management of unallocated staff time, typical DB peaks in workload and opportunities for consolidation/collocation of the WSDOT project office with the Design-Builder.

Staff Development:

- Small DB projects with low overall risks are an effective opportunity for WSDOT staff to gain experience in DB and should be considered a Best Practice.

Development of new Design-Builder Teams:

- Small DB projects create opportunities for new Design-Builder teams to gain experience with WSDOT, potentially increasing competition on larger WSDOT DB projects.
- Small DB projects create opportunities for DBE participation on Design-Builder teams.
- Consistency in enforcing contract requirements is critical to enhancing competition on DB projects and can be promoted through improved DB guidance documents and training of WSDOT staff.

Opportunity for Innovation:

- Most innovation on small projects is related to complex staging and phasing of the work and construction means and methods.
- Small projects with specialty engineering provide opportunities for innovation through the use of the DB delivery method.
- Prescriptive designs or designs that are already completed have limited opportunities for innovation.
- A streamlined procurement process for small and emergency DB projects should be developed to shorten the schedule, reduce costs and increase the opportunities for innovation.

Risk Management:

- Small projects with specific risks such as short schedules, complex phasing, and significant impacts to the public may be good candidates for Design-Build.

Quality Management:

- Strong partnering between the Designer and Contractor and an experienced independent third-party providing QA (for proposers without a history of excellent self-performed QA) should be considered in the development of contract documents for small DB projects.
- There are inherent overlaps and redundancy to QA and QV on small projects due to limited scope and small quantities. Increased experience, guidance and training of staff in DB and bundling of small DB projects can help minimize this issue.

General:

- Small projects should be carefully evaluated through a project delivery method selection process to select the best delivery method, as early as possible in the project development.
- Updates to the DB contract documents, tools, manuals, processes and training will provide support for consistent and excellent DB small project delivery.

5.2 Specific Types of Small Projects that Benefit from DB Project Delivery

- Projects with critical phasing and timing;
- Projects with performance specifications allowing innovation/specialty work;
- Projects with significant risks that can be managed effectively through the DB project delivery.

5.3 Specific Types of Small Projects that Typically Would Not Benefit from DB Project Delivery

- Projects with prescriptive or over restrictive design;
- Projects that are not time sensitive;
- Projects without specialty work or where the Design-Builder expertise is not critical;
- Projects with long preliminary engineering phases for environmental permits, ROW or other tasks that WSDOT may not choose to assign to the Design-Builder. This negates the DB project delivery benefit that allows early project delivery due to overlapping design and construction phases.

WSDOT Reform VII focuses on expanding and strengthening contracting methods and protocols. The results of this report on the pilot projects will be incorporated into several tasks that stem from the support of Reform VII. WSDOT is developing project delivery selection method guidance for selecting the best delivery method for WSDOT projects. WSDOT is also updating DB project delivery contract documents, tools, manuals, processes and training to support consistent and excellent delivery of WSDOT DB projects.

Based on WSDOT's experience in using DB project delivery for the pilot projects less than \$10 Million, WSDOT determined that DB can be an effective delivery method for small projects if project delivery method selection guidance is used to determine the optimal project delivery method early in the development of the project.

Issues specific to small DB project delivery will be included in the development of the Project Delivery Method Selection Guidance and the improved DB project delivery contract documents, manuals, processes, tools and training.

As WSDOT proceeds with DB program improvements, RFP documents will continue to emphasize a strong partnership between the Designer and Contractor/Design-Builder as part of the selection process, with the option of specifying an independent third-party to perform the QA program to ensure that excellent quality management is successfully achieved.

Based on the results of the pilot projects, WSDOT has determined that DB can be an effective means for delivering small projects.

Appendix A

Project Summary

for

Small Design-Build Pilot

Project Evaluation

US 2/Rice Road Intersection – Safety Improvements

Project Goals (from RFP)

- Minimize Impacts to the Travelling Public - Minimize inconvenience to the traveling public and adjacent properties during construction through efficient traffic control and construction staging, minimizing overall project duration, and clear and proactive communication to roadway users and adjoining property owners.
- Expedited Safety Improvement - A roundabout in Final Configuration Open to traffic as soon as possible.
- Excellent Quality - Meet or exceed technical quality requirements for design and construction (including materials testing and documentation) through implementation of a clear and thorough Quality Management Plan that ensures quality throughout all stages of the project and protects the environment.
- Design Approach - A high performing roundabout that reduces the potential for severe collisions, maximizes traffic flow at the intersection, and accommodates truck traffic.

1. Cost

Lower Cost/Best Value: The project cost at bid was 12% under the Engineer’s Estimate. Because of the project’s prescriptive design (design completed for DBB), delivering the best value for the project through innovation or efficiencies were minor for design but both WSDOT staff and Design-Builder input indicate that some benefits were provided through the phasing and means and methods associated with the winter work. Best Value obtained is often demonstrated through innovations and efficiencies gained in the project or through transfer of risk. WSDOT staff commented on poor coordination between the designer and the contractor that impacted efficiencies on this project. The change percentage of 11% would typically be an indicator of lost efficiencies but since it was primarily due to an error in sales tax information in the RFP, this does not seem to be a good indicator of efficiency or lack of efficiency for this project.

Early Price Certainty: The change percentage of 11% was high for a DB project. This was due mostly to an error in providing the correct sales tax information in the RFP.

2. Time to complete:

Early completion was one of the project goals in the request for proposal for this project. This was achieved through the transfer of risk of meeting the project milestones to the Design-Builder. The Rice Road project was created to address a safety issue on SR 2 by constructing a roundabout. The community was expressing an urgent need to complete the improvement. Design-Build delivery allowed opening the roadway improvement to traffic by the target milestone of April 2012, even with winter construction. The project was delivered per the proposed expedited construction schedule of the Design-Builder. The schedule benefit from design build, because the design was already complete before it was selected as a pilot project for DB, came from assigning the risk of meeting the schedule to the DB. This project also had permits and ROW agreements that would have negated the benefit in using DB if they hadn’t been acquired already during the lengthy DBB design process.

3. Efficiencies gained

Meeting the schedule for the “open to traffic” milestone was a measure of the delivery efficiency. The design-builder committed to their scheduled number of days for opening to traffic, and then successfully managed the associated risks to achieve the goal. The lack of a co-located facility hindered communications and coordination with the Design-Builder team. After the opening of the road to traffic, the designer requested approximately \$200,000 for extra work associated with delays in WSDOT responses during design. WSDOT staff was surprised as this issue had not been brought up earlier. After several meetings, this issue was dropped, but indicates poor communication by the designer on a coordination issue with the owner. Staff also commented on poor coordination between the designer and the contractor that reduced the possible efficiencies gained on this project. Overall efficiencies gained were considered modest on this project due to the lack of coordination by the designer/contractor and with WSDOT on this project that reduced the inherent efficiencies of the collaborative approach of the DB project delivery method.

Other Pertinent Information

4. Staff Resources and Development

Staff Resources: Project development and procurement was accomplished by a traditional WSDOT NW Region Design Office with guidance from the NW Region DB Team. The design was almost completed as a DBB project when it was selected as one of the pilot projects. The effort to revise the documents for DB and the completed design for DBB when the project was selected as a DB pilot project was not an effective use of staff resources, with high cost for the PE effort.

Staff Development: Project development and procurement was accomplished by a traditional WSDOT NW Region Design Office with guidance from the NW Region DB team. This allowed for broadening WSDOT experience and knowledge base in developing and procuring Design-Build. For contract administration, the project was delivered utilizing a traditional WSDOT Construction Office with no co-location. Although some experience was gained, the lack of a co-located facility hindered communications and coordination with the Design-Builder team. Because most small DB projects have relatively low overall risk, they can be a good training opportunity for WSDOT staff.

5. Development of new Design-Builder Teams and DB/M/WBE participation

The Design-Builder – Lakeside/TSI Joint Venture were not new to Design-Build, but their approach to the project left gaps in the QA requirements in the specifications, possibly an indication that the personnel working on this project for the Design-Builder may not have been as experienced. The designer was not part of the Design-Builder team and was perceived by WSDOT staff as having minimal input into the project. The Designer was performing the QA. This project was federally funded, with DBE participation as subcontractors (same as DBB), but not as part of the Design-Builder team. The Apprenticeship program on DB is essentially the same as DBB and was not affected by the delivery method on any of the pilot projects.

6. Opportunity for Innovation

This project left little opportunity for innovation in the design as the scope of work, a roundabout, was very prescriptive and the design for DBB had been completed. The design had been completed for a DBB project before it was decided to use it as one of the pilot projects. However, the Design-Builder team provided a modest benefit toward innovation in phasing and means and methods through this delivery

method by creating a plan to successfully work through the winter season to deliver the project at the accelerated construction schedule.

7. Risk Management

The project was very short in duration and included critical grading and paving work during months (Jan-March) that are traditionally not conducive to construction. Inclement weather was a significant risk factor for this roundabout project. Minimizing impacts to the traveling public was also a goal identified in the RFP and the Design-Builder assumed the risk of completing the construction with the proposed number and timing of closures in their proposal. One risk assigned to the Design-Builder was QA, which was not performed well and will be addressed in the next section.

8. Quality Management

Another goal was excellent quality through a quality management plan. The Design-Builder assumes the responsibility for ensuring quality through managing the quality control and quality assurance testing and inspection of the project in DB project delivery. In this project, the Design-Builder did not provide all of the QA requirements in the contract and QMP. Gaps in the QA documentation had WSDOT taking a \$15,000 credit. Staff increased QV efforts to insure quality on the project. Staff indicated that this project had the poorest quality management of the pilot projects. The lack of participation of the designer, their lack of a strong relationship with the Design-Builder, was considered part of the cause for the poor performance. This project is not closed out yet, an indicator of the quality management problems on this project.

This project has some duplication or overlap of effort in the Quality Assurance (Design-Builder) and Quality Verification (WSDOT) requirements for DB because the small quantities and limited scope of work of smaller projects. This appears to be an inherent trait of small DB projects that occurs to a greater or lesser extent on projects depending on the SOW.

Conclusions: Speed of Delivery was one of the goals of this project that was met on the construction phase by selecting the DB delivery method by transferring the risk of meeting the schedule to the Design-Builder. Opportunity for Innovation and Delivery Efficiencies were provided through the phasing and means and methods associated with the winter work. The project design for DBB was already completed when this project was selected as a small DB pilot project and limited the opportunities for innovation and efficiencies accordingly. The effort to develop the DB RFP and convert the contract documents to DB from DBB was extensive and because of the DBB design work, was not effective on cost or schedule. The WSDOT staff assigned to this project was primarily inexperienced with DB and had some challenges in the execution of the project, even with some assistance from staff with more experience. The duration of this project did not allow staff to complete the learning curve for Design-Build, but did provide some increase in experience. Risk Management was successfully achieved by identifying Design-Builder responsibility for minimizing impacts to the traveling public, meeting the schedule by working in the winter season but was a problem on managing the quality of the project. Quality Management was one of the challenges, resulting from the Design-Builder team not meeting their QA contract requirements and a Designer that was not engaged in the project nor had strong partnering with the Contractor. The contract amount was well under the Engineer's Estimate. Early Price Certainty was not considered to be achieved on this project because the percentage of changes.

The owner should identify, on a project by project basis, project constraints that may justify the DB delivery method due to complexity and the risk of meeting the schedule, including elements such as construction during winter months, as was done for this project.

SR 9/SR 92 Intersection Improvements

Project Goals (from RFP)

- Minimize Impacts to the Traveling Public - While maximizing safety, minimize inconvenience to the traveling public and adjacent properties during construction through efficient traffic control and construction staging, minimizing overall project duration, and clear and proactive communication to roadway users and adjoining property owners;
- Excellent Quality - Meet or exceed technical quality 1 requirements for design and construction (including materials testing and documentation) through implementation of a clear and thorough Quality Management Plan that ensures quality throughout all stages of the project;
- Timely Completion - Open the new lanes to traffic no later than December 31, 2012

1. Cost

Lower Cost/Best Value: This is typically achieved through innovation or efficiencies on DB projects. It may be verified through lower percentage of changes due to efficiencies and effective risk allocation. This project had a modest change percentage of 4.4% but the prescriptive nature of the work limited innovation. This project was selected to assess small Design-Build but the project had already been designed for DBB before being selected. Because of this, the opportunities for innovation and efficiencies through the DB method were limited. Some efficiencies were documented by staff, specifically the opportunities of co-location facilitating collaboration between WSDOT and the Design-Builder team.

Early Price Certainty: Because contract cost is set after the RFP, prior to most of the design development, and errors and omissions are not the responsibility of the owner, the DB method allows the owner to confirm the price of the work early in the schedule of the project. On smaller projects, this may not be a significant benefit because of the scale of the projects. This project benefited from early price certainty, demonstrated through a modest change percentage of 4.4%.

2. Time to complete:

This delivery method provides the ability to get a project under construction before completing design. However, this project was already designed for DBB when it was selected for DB. The transfer of risk for meeting the schedule and milestones was the schedule benefit for construction received on this project. This project also had permits and ROW agreements that would have negated the benefit in using DB if they hadn't been acquired already during the lengthy DBB design process. The SR9/SR92 project proposed safety and traffic improvements at the intersection. This was a one season project that was opened to traffic in August 2012. Because of the safety improvements, speed of delivery was one of the goals of the project successfully delivered by the DB delivery method through risk transfer.

3. Efficiencies gained

Although there was no co-location requirement, this project had the unplanned benefits of co-location based on the existing WSDOT project office assignment and successful proposer, making efficient use of project staff delivering the I-405 Bellevue Braids Project. Design/Contractor coordination and coordination with WSDOT was effective, an indicator of efficiencies gained. However, this project had a completed design for DBB before it was selected as a pilot project that minimized the opportunities of innovation and efficiency through the DB process.

Other Pertinent Information

4. Staff Resources and Development

Staff Resources: Project development and procurement was accomplished by a WSDOT NW Region Design Office with more DB experience, and help from the NW Region DB team on the RFP process. Staff provided the technical and management resources and expertise necessary to develop the RFQ and RFP and administer the procurement, and contract management of design and construction.

Staff Development: WSDOT staff on this project had more experience with DB projects and help with the RFP process. This project allowed broadening WSDOT staff experience and knowledge in developing, procuring and contract management of DB projects.

5. Development of new Design-Builder Teams and D/M/WBE participation

Small project provides an opportunity for new Design-Builder teams to compete for projects and gain experience in DB, eventually increasing the competition for larger projects. This project had an experienced Design-Builder team – Atkinson.

Also, the opportunity for participation of Disadvantaged Business Enterprises (DBE's) or Minority/Women Owned Business Enterprises (M/WBE's) on the Design-Builder teams is more likely on these projects due to the smaller scale of the project work. This project had local funding with M/WBE participation managed by the Design-Builder team (same as DBB) but not part of the Design-Builder team. The Apprenticeship program on DB is essentially the same as DBB and was not affected by the delivery method on any of the pilot projects.

6. Opportunity for Innovation

DB incorporates Design-Builder input into the design process through best value selection and contractor proposed Alternate Technical Concepts (ATCs) – which are a cost oriented approach to providing complex and innovative designs. Innovation may include complex or innovative project phasing or means and methods, or both, overlapping with opportunities for efficiencies. There was little opportunity for innovation in the scope of the project because of prescriptive/completed design. This project had a completed design for DBB before it was selected as a pilot project. Design-Builder feedback included comments that the phasing of the closures for the work was innovative (two weekend closures with community approval). The scope of work was an intersection improvement.

7. Risk Management

The DB delivery method provides opportunity to properly allocate risks to the party best able to manage them, but requires risks allocated to design-builder to be well defined to minimize contractor contingency pricing of risks. Risk Management was a benefit in using the DB method of delivery for this project. The DB team managed unanticipated added challenges due to a right-of-way parcel that was not obtained as was represented in the contract. The parcel was to be used for drainage dispersion features. Drainage and associated environmental permitting was modified by the DB team and the project was delivered on schedule, with some added costs. DB mitigated larger costs and schedule impacts that would have likely occurred through traditional Design-Bid-Build delivery.

8. Quality Management

Project goals to minimize impacts and manage quality were handled by the Design-Builder team adequately on this project. The co-location of the job office facilitated communication and smooth management of the project. There were some issues with the QA and the Design-Builder was reminded of requirements several times. Staff comments were QA was acceptable and improved over the Rice Road project. The Designer, Jacobs, partnered well with Atkinson. Atkinson self-performed the QA on this project with some subcontracting of testing. This project has not yet closed out, which is another indication of some issues with QA.

Conclusions: Speed of Delivery for construction was one of the goals of this project that was met through risk transfer by selecting the Design-Build delivery method. Opportunity for Innovation and Efficiency was limited because of prescriptive/completed design. The design was completed for DBB before the project was selected as a DB pilot. Delivery Efficiencies were enhanced by the co-location of the project offices (Design-Builder and WSDOT). The WSDOT staff assigned to this project had more experience with DB and was assisted with the development of the RFP and the procurement by the NW DB team. The collaboration with the Design-Builder was effective in supporting the project goals and helped staff gain more experience with Design-Build. Risk Management was successfully achieved by the Design-Builder by minimizing impacts to the traveling public. The goal for excellent quality management was minimally achieved on this project. The QA was considered adequate, not excellent and the project has not yet closed. Unexpected issues with a right-of-way were resolved successfully by the Design-Builder team. Early Price Certainty was achieved on this project.

I-405 & SR 518 – Concrete Pavement Rehabilitation

Project Goals (from RFP)

- Minimize Impacts - Minimize impacts to the traveling public and local communities.
- Quality - Meet or exceed technical quality requirements for design and construction of the project.
- Smooth Start-up and Closeout - Implement a well-planned start-up that ensures efficient delivery of the Project. Carry out a well thought out closeout plan with strategies to ensure Completion on schedule.

1. Cost

Lower Cost/Best Value: This is typically achieved through innovation or efficiencies on DB projects. It may be verified through lower percentage of changes due to efficiencies and effective risk allocation. On this project Best Value was achieved through innovation and efficiencies in minimizing closures and impacts to the public due to the high impact this project had on I-405 in downtown Bellevue. The change percentage of 6.41% is a modest indicator of efficiencies.

Early Price Certainty: This project benefited marginally from early price certainty, demonstrated through a change percentage of 6.41% for a project of this size. However, on smaller projects this may not be a significant benefit because of the scale of the project.

2. Time to complete:

Speed of Delivery was a goal in the RFP (Smooth Start-Up and Closeout) that was met by the quick completion of the project through transfer of schedule risk to the Design-Builder by using DB project delivery. The Design-Builder completed the work per their proposed schedule and also phased the work to minimize impacts to the public.

3. Efficiencies gained

This project combined two concrete pavement rehabilitation projects. The ability of the contractor to schedule equipment, work crews and other resources as part of the DB delivery method allows construction efficiencies as well as the ability to phase the work to minimize impacts. One of the project goals (Smooth Start-Up and Closeout) included an emphasis on efficient delivery. Coordination within the Design-Builder team that delivers these efficiencies are embedded in the delivery method and become apparent through the successful delivery of the project. The change percentage of 6.41% is a modest indicator of efficiencies. The close coordination of the Designer (Jacobs) and Contractor (Atkinson) on the project, with the Owner, was an indicator of project efficiencies gained through using the DB project delivery method.

Other Pertinent Information

4. Staff Resources and Development

Staff Resources: Project development and procurement was accomplished by the experienced NW Region DB team with the less experienced WSDOT NW Region construction office administering the contract. Staff provided the technical and management resources and expertise necessary to develop the RFQ and RFP and administer the procurement, and contract management of design and construction. Full commitment of support staff was needed to keep up with the actual needs during the

RFP process and design and construction contract management, which were much shorter than the original time allowed by the contract. Otherwise the work would not have been done by the deadlines of the contract. An engineer from the WSDOT design team was assigned to be available for coordination during construction and was essential to providing background knowledge, continuity, and success in meeting review commitments.

Staff Development: This project provided an additional training opportunity for WSDOT project development and contract administration staff on DB project delivery. This was the second small DB project accomplished by one contract administration office, and DB experience from the first project was built on with this project.

5. Development of new Design-Builder Teams and DB/M/WBE participation

Small projects provide an opportunity for new Design-Builder teams to compete for projects and gain experience in DB, eventually increasing the competition for larger projects. Atkinson was an experienced Design-Builder team on WSDOT projects and was the successful proposer due to the innovative phasing proposed to reduce impacts to the public. This project had federal funding with DBE participation managed by the Design-Builder (same as DBB) but not part of the Design-Builder team. The Apprenticeship program on DB is essentially the same as DBB and was not affected by the delivery method on any of the pilot projects.

6. Opportunity for Innovation

Innovation may include complex or innovative project phasing or means and methods, or both, overlapping with opportunities for efficiencies. Since 960 concrete pavement panels needed to be replaced on I-405 in downtown Bellevue on a highly congested facility, minimizing impacts to the travelling public was the most important part of the project. When developing the concept and baseline closures, the WSDOT project team arrived at 2 full and 2 partial closures of I-405 being required to accomplish the work. Without direct contractor input on haul specifics, available demo equipment, number of saw cutting crews available, etc., it would have been difficult to accurately estimate production. Involving the Design-Builder early in a project is a good way to solve staging problems. On this project, the selection criteria were heavy weighted toward reducing the required closures of I-405. DB project delivery allowed the design-builder to develop the staging plan. This approach was a success, as the winning proposer committed to utilizing only 2 full closures. This commitment was met during construction.

7. Risk Management

The DB delivery method provides opportunity to properly allocate risks to the party best able to manage them. On this project, WSDOT shifted the risk of unstable panels to the design-builder. The design-builder was responsible for developing the staging plan and had the greatest ability to influence the stability of the panels. On a previous Design-Bid-Build project, saw cut panels started to move and emergency closures of I-5 were required to resolve the situation. Reducing impacts and Quality Management were also goals on this project and were successfully managed by the Design-Builder.

8. Quality Management

Staff and Design-builder coordination facilitated meeting the quality requirements for this project. The Design-Builder team was familiar with the requirements of WSDOT DB projects during the RFP process and design of the project. Staff commented that some differences with DB projects had to be pointed out in Construction to the DB team, but also commented that overall quality was excellent. The Designer, Jacobs, partnered well with Atkinson. Atkinson self-performed the QA on this project with some subcontracting of testing. This project has been successfully closed, an indication of excellent QA.

Conclusions: Opportunity for Innovation and Delivery Efficiencies were benefits for this project associated with construction staging/phasing and minimizing impacts to the public. The WSDOT staff assigned to administration of this project were inexperienced with DB (this was their second small DB project) but gained experience with this project and worked collaboratively with the Design-Builder to meet the project goals. Risk Management was successfully achieved by the Design-Builder for minimizing impacts to the traveling public and managing the project quality including the risk of potentially unstable panels. Quality was excellent on this project.

SR 92 & I-90 Intersection Improvements & Region wide Roadside Safety

Project Goals (from RFP)

- Minimize Impacts - Minimize impacts to the travelling public, local communities and the environment.
- Quality - Meet or exceed technical quality requirements for design and construction.
- Maximize Mobility and Safety - Provide a high performing roundabout that reduces the potential for severe collisions, maximizes traffic flow at the intersection and accommodates truck traffic.

1. Cost

Lower Cost/Best Value: This is typically achieved through innovation or efficiencies on DB projects. It may be verified through lower percentage of changes due to efficiencies and effective risk allocation. This project had a prescriptive design that left little opportunity for innovation and efficiencies. Efficiencies were further reduced through poor coordination between the Design-Builder and the designer. This project had a very low change percentage of 0.39% but due to the issues on the project and the prescriptive design, it is not a good indicator of efficiencies gained on the project.

Early Price Certainty: Because contract cost is set after the RFP, prior to most of the design development, and errors and omissions are not the responsibility of the owner, the DB method allows the owner to confirm the price of the work early in the schedule of the project. On smaller projects, this may not be a significant benefit because of the scale of the projects. This project benefited from early price certainty, demonstrated through a very low change percentage of 0.39% for a project of this size. However, this benefit is relatively minor for a project of this size and was not a goal for the project.

2. Time to complete:

This delivery method provides the ability to get a project under construction before completing design. The parallel process of design and construction can accelerate the project delivery schedule; however, procurement time can be lengthy due to the time necessary to develop an adequate RFP, evaluate proposals and provide for a fair, transparent selection process. This project had complex and lengthy environmental permitting and right-of-way acquisition timelines. For these types of projects, there may be less opportunity for time savings since the design and PS&E phases could occur in parallel with the permitting task. For the construction phase, the project did benefit from the DB delivery method, although this was not a goal for the project. Completion of the project was achieved in one construction season.

3. Efficiencies gained

This project combined safety improvement work at four locations into one project. Design-Builder input indicated some benefits from delivery efficiency were realized on this project. WSDOT staff input felt that in this case delivery efficiency was reduced due to poor coordination between the Design-Builder prime contractor and the design lead, including late execution of the design contract. Staff commented that the Designer was not an active participant and the lack of collaboration between the Contractor and Designer and with the Owner was reflected in the poor QA program execution as well.

Other Pertinent Information

4. Staff Resources and Development

Staff Resources: Project development and procurement was accomplished by the experienced NW Region DB team with the less experienced WSDOT NW Region construction office administering the contract. Staff provided the technical and management resources and expertise necessary to develop the RFQ and RFP and administer the procurement, and contract management of design and construction.

Staff Development: This project provided the third training opportunity for this group of WSDOT staff on the small DB pilot projects. Continual improvement was previously noted, but comments indicated that staff was much more familiar with the differences in DB project delivery, and handled project issues well. Another comment stated that WSDOT staff had learned to deliver a DB project after managing three of the small projects.

5. Development of new Design-Builder Teams and DB/M/WBE participation

Small project provides an opportunity for new Design-Builder teams to compete for projects and gain experience in DB. Graham/Marshbank was a new DB team for WSDOT. This project had federal funding with DBE participation managed by the Design-Builder (same as DBB) with Marshbank, part of the Joint Venture, also being a DBE. The Apprenticeship program on DB is essentially the same as DBB and was not affected by the delivery method on any of the pilot projects.

6. Opportunity for Innovation

Innovation may include complex or innovative project phasing or means and methods, or both, overlapping with opportunities for efficiencies. The scope of work was a roundabout with project specifications that were largely prescriptive so that there was little opportunity for innovation.

7. Risk Management

The DB delivery method provides opportunity to properly allocate risks to the party best able to manage them, but requires risks allocated to design-builder to be well defined to minimize contractor contingency pricing of risks. Project goals of minimizing impacts, quality management and maximizing mobility and safety shifted responsibilities for these items to the Design-Builder. . On small projects, WSDOT may choose to hold more utility relocation risk than on larger long-duration projects. On this project, WSDOT took on the risk for a long lead time utility relocation. Quality management was poor on this project and will be discussed in the following section.

8. Quality Management

There were issues with the Design-Builder's management of the quality program on this project. The third party subcontractor responsible for the QA was appeared to be reluctant to document and inform the Contractor of quality issues. Staff commented that the experience of the independent third party executing the work (from another state) may have made them inflexible applying the WSDOT standards, and resistant to understanding the differences between what they had done before and the requirements of this contract. The Designer on this project was not engaged during construction and

had a weak relationship with the Design-Builder Contractor. Lack of performance by the independent third party managing the QA resulted in poor quality performance.

Conclusions: Opportunity for Innovation was not considered a benefit for this project. Delivery Efficiencies were reduced by lack of coordination within the Design-Builder team. The WSDOT staff assigned to this project demonstrated the DB experience gained from the two previous small DB projects they worked on. Risk Management was utilized in meeting the project goals although risk for a long-lead utility relocation was retained by WSDOT. Quality Management was one of the challenges on this project due to poor performance by the Design-Builder team including their third party subcontractor on QA. In future evaluations for delivery method of small projects, the effect of long lead items should be considered. Early Price Certainty was achieved on this project.

SR 9/32nd St SE & 84th St NE – Safety Improvements

Project Goals (from RFP)

- Safety – Design and construct this project to improve intersection safety.
- Collaboration – A project team that partners effectively with WSDOT to identify issues early in the schedule and efficiently develops positive solutions at the project level.
- Quality – Minimize WSDOT’s quality verification effort by consistently meeting or exceeding DB quality requirements for design and construction.
- Forward Compatibility – Design and construct this project in a way that minimizes demolition and reconstruction of features constructed by this Project when the future northbound and southbound lanes on SR 9 are built as shown in the Forward Compatibility Plan.
- Minimize Impacts – Reduce impacts to the traveling public, the local community, 33 and the environment through use of effective design and construction methods.

1. Cost

Lower Cost/Best Value: This is typically achieved through innovation or efficiencies on DB projects. It may be verified through lower percentage of changes due to efficiencies and effective risk allocation. The design of this project was prescriptive, limiting opportunities for innovation and efficiencies that enhance the best value of the project. Some innovation and efficiencies in phasing/staging and minimizing impacts were achieved. Efficiencies and Best Value can be demonstrated through low percentage of changes. This project had a very low change percentage of 0.27%. Although this project had limited opportunities for innovation, there were efficiencies gained through collaboration of the Designer, Contractor and Owner, demonstrated through staff observations , a low change percentage, and meeting of the project goals.

Early Price Certainty: Because contract cost is set after the RFP, prior to most of the design development, and errors and omissions are not the responsibility of the owner, the DB method allows the owner to confirm the price of the work early in the schedule of the project. On smaller projects, this may not be a significant benefit because of the scale of the projects. This project benefited from early price certainty, demonstrated through a change percentage of 0.27%.

2. Time to complete:

Design-Builder feedback on this project indicated that speed of delivery was a benefit provided by the DB project delivery for this project although it was not a project goal. The risk of meeting the schedule was transferred to the Design-Builder through the DB project delivery method. The project was “open to traffic” ahead of the contract schedule.

3. Efficiencies gained

Project collaboration produced some delivery efficiency and minimized impacts to the public which was a goal of this project. Collaboration on quality management reduced some inherent inefficiency due to overlaps between QA and QV. Rodarte (Contractor) and DEA (Designer) worked collaboratively on this

project, providing efficiencies on project phasing/staging. The excellent QA on this project was another indicator of efficiencies gained.

Other Pertinent Information

4. Staff Resources and Development

Staff Resources: Project development and procurement was accomplished by the NW Region DB team with the now more experienced WSDOT NW Region construction office administering the contract. Staff provided the technical and management resources and expertise necessary to develop the RFQ and RFP and administer the procurement, and contract management of design and construction.

Staff Development: This project provided a training opportunity for WSDOT staff on DB project delivery. Staff demonstrated the experience gained on three previous small DB pilot projects and effectively managed the construction of the project.

5. Development of new Design-Builder Teams and DB/M/WBE participation

This project was the first DB project for Rodarte Construction, Inc., who later partnered with Hamilton and were shortlisted for the larger SR 167 / 8th St E Vic to S 277th St Vic - Southbound HOT Lane Project. This project had federal funding with DBE participation managed by the Design-Builder (same as DBB) but not part of the Design-Builder team. The Apprenticeship program on DB is essentially the same as DBB and was not affected by the delivery method on any of the pilot projects.

6. Opportunity for Innovation

Innovation may include complex or innovative project phasing or means and methods, or both, overlapping with opportunities for efficiencies. This project had limited opportunity for innovation in design due to the prescriptive nature of the WSDOT roundabout design and right-of-way constraints that also limited flexibility. Project phasing/staging – minimizing impacts to the public provided minor innovation and efficiencies gained.

7. Risk Management

The DB delivery method provides opportunity to properly allocate risks to the party best able to manage them. Project goals of quality management, collaboration, minimizing impacts to the public and environment and forward compatibility were effectively managed by the Design-Builder and the project was delivered within the contract requirements.

8. Quality Management

This project had a third part QA subcontractor that performed well on the project. Quality Management was excellent on this project, with strong Designer participation by DEA, strong partnering between the Designer and the Contractor, and an effective independent third party subcontractor managing the QA. All of these projects had an inherent inefficiency resulting from the problems with redundancy and overlap of QA and QV that can happen on small projects. Close coordination with the third party QA subcontractor minimized this issue as much as possible.

Conclusions: Speed of Delivery was not a goal but benefits were provided by selecting the DB delivery method through risk transfer of the schedule to the Design-Builder. Opportunity for Innovation was minimal due to the prescriptive nature of the design. Delivery Efficiencies were provided through coordination within the Design-Builder team and with WSDOT staff. The WSDOT staff assigned to this project had gained experience with DB through three previous small DB pilot projects. Risk Management was effective in meeting the project goals. Quality Management was effective using a third party for QA, and there was a strong partnership between the Contractor and Designer. The inherent redundancy and overlap of QA and QV on small project was minimized as much as possible through effective collaboration among WSDOT staff, Designer, Contractor and third party QA subcontractor. Early Price Certainty was achieved on this project.

I-5 Skagit River Bridge - Permanent Bridge Replacement (Emergency Contract)

Project Goals (from RFP)

- Minimize Impacts - Minimize impacts to the travelling public during construction of the permanent Span 8 of the Skagit River Bridge.
- Early Completion – Open the Permanent Span 8 to traffic as soon as possible after September 4, 2013.

1. Cost

Lower Cost/Best Value: This is typically achieved through innovation or efficiencies on DB projects. It may be verified from innovation, efficiencies and effective risk allocation. This project had innovations and efficiencies to achieve best value on this project on the design of the bridge, schedule and the means and methods of construction. Efficiencies and Best Value is demonstrated through a modest cost change percentage of 3.95% and the observations of staff.

Early Price Certainty: Because contract cost is set after the RFP, prior to most of the design development, and errors and omissions are not the responsibility of the owner, the DB method allows the owner to confirm the price of the work early in the schedule of the project. On smaller projects, this may not be a significant benefit because of the scale of the projects. This project benefited from early price certainty, demonstrated through a modest cost percentage of 3.95% although this is not a significant benefit for projects of this size.

2. Time to complete:

This delivery method provides the ability to get a project under construction before completing design. The parallel process of design and construction can accelerate the project delivery schedule; however, procurement time can be lengthy due to the time necessary to develop an adequate RFP, evaluate proposals and provide for a fair, transparent selection process. Early completion of the project for “Open to Traffic” was one of the project goals. The effort to expedite the project included a shortened procurement process. A streamlined shortlisting process was used. The RFP was written and advertised in four days. A streamlined Instruction to Proposers (ITP) was used to reduce the proposal development effort required by the design-builder and the evaluation effort by WSDOT. Evaluation, announcement of best value, award, and notice to proceed were completed in just two days. The project delivery method also expedited completion of the project so that an early “Open to Traffic” for this project was successfully achieved. This project allowed the ability of DB to expedite the schedule of a project to be effective through overlapping design and construction and the transfer of risk of meeting the schedule to the Design-Builder. Because of the emergency nature of this project, permits did not hinder the schedule. On a regular project, lengthy permits, ROW and agency/city agreements may negate the benefits of speed of delivery during the preliminary and design phase of the project.

3. Efficiencies gained

The Design-Builder team collaboration during design and construction allows the incorporation of contractor expertise, means and methods, and work phasing to maximize the efficiency of the overall project and provides for a continuous VE and constructability process from development of the proposal to completion. Meeting the schedule for the “open to traffic” milestone was also a measure of the

delivery efficiency provided by the collaborative approach of the DB project delivery method. The design-builder committed to their scheduled number of days for opening to traffic, and then successfully managed the associated risks to achieve the goal.

Other Pertinent Information

4. Staff Resources and Development

Staff Resources: This project had staff experienced in DB. Staff provided the technical and management resources and expertise necessary to develop the RFQ and RFP and administer the procurement, and contract management of design and construction. The staff streamlined the RFP processes and the level of design to insure quick delivery of the project in response to the emergency schedule and contract management of the design and construction collaboratively and effectively. Because of the nature of this project, staff resources were highly impacted due to the intense, time sensitive nature of this project.

Staff Development: This was a high risk project with an emergency schedule to meet. Staff on this project was selected with experience in DB project delivery in most cases. This experience allowed the team to streamline the DB delivery process to expedite the schedule of this project and manage the elements of this project to maximize the benefits of DB project delivery. The quality verification staff was inexperienced, but hand selected for their competence and willingness to learn DB project delivery. This team effectively executed their portion of the project and gained significant experience on quality for DB project delivery.

5. Development of new Design-Builder Teams and DB/M/WBE participation

The Design-Builder had experience with DB project delivery and demonstrated this with their performance on this project. This project had federal funding with DBE participation managed by the Design-Builder (same as DBB) but not part of the Design-Builder team. The Apprenticeship program on DB is essentially the same as DBB and was not affected by the delivery method on any of the pilot projects.

6. Opportunity for Innovation

DB incorporates Design-Builder input into the design process through best value selection and contractor proposed Alternate Technical Concepts (ATCs) – which are a cost oriented approach to providing complex and innovative designs. Innovation may include complex or innovative project phasing or means and methods, or both, overlapping with opportunities for efficiencies. The Skagit River Bridge was an emergency project that became necessary after an oversized load struck the bridge and caused collapse of Span 8 into the Skagit River. The collapse of the bridge and subsequent closure impacted area businesses which rely on Canadian and Washington shoppers who could not reach the businesses after the collapse. DB was selected for expedited delivery and the opportunity for innovation. Scoring criteria were setup to incentivize the design-builder to develop innovative construction staging to replace the bridge quickly while minimizing the required closures of I-5. Innovation in the design occurred in the use of materials and design proposed by the Design-Builder. The project achieved those goals. As part of the streamlined process, the preliminary design was less developed, which may have increased the opportunity for Design-Builder innovations.

7. Risk Management

The DB delivery method provides opportunity to properly allocate risks to the party best able to manage them. This project took full advantage of shifting the risks of means and methods of construction, as well as structure type, to the DB team, as allowed by the RFP. Every proposer had a slightly different approach to construction as well as unique structure type proposals. WSDOT benefited from this shift of risk to the DB team. Competitive contract price, speed of delivery, and minimization of impacts to traffic were achieved through the DB delivery of this project.

8. Quality Management

This project demonstrated the best in collaboration and coordination from the proposal stage through completion of the project. The Design-Builder quality management was excellent on this project. QA was excellent and performed by an independent third party subcontractor. The Designer had a strong relationship and partnering with the Contractor and was engaged during the project. All of the pilot projects had an inherent inefficiency resulting from the problems with redundancy and overlap of QA and QV that can happen on small projects. Close coordination with the third party QA subcontractor minimized this issue as much as possible.

Conclusions: Speed of Delivery was the primary goal of this project that was met by selecting the DB delivery method and utilizing a streamlined selection process. Opportunity for Innovation was achieved through the Design-Builder means and methods and specialty design of the structure type. Efficiencies were apparent by the coordination of the Design-Builder team in delivering the goals of the project cost effectively. The WSDOT staff assigned to this project had experience with DB except the Quality Verification team that performed well and gained excellent experience in DB with this project. Risk Management was utilized in meeting the project goals of speed of delivery and minimizing impacts to traffic. Early Price Certainty was achieved on this project. Quality management was performed well by the Design-Builder independent third party subcontractor. The streamlined process created and managed by WSDOT staff for this project accelerated the schedule but also streamlined the effort of both WSDOT staff and the Design-Builder proposers, reducing costs and allowing more freedom for the project delivery method to realize benefits from this type of delivery for small projects. Lessons learned from this project procurement will be evaluated as part of the DB project delivery program update currently in progress, possibly as a procedure for small project/emergency project DB procurement.