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Office of Innovative Program Delivery
Center for Innovative Finance Support

Case Studies on Alternative Contracting Method Evaluation by Select State Departments of Transportation in the United States and Australia

Summary Report

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16. Abstract This summary report documents research on the alternative contracting method (ACM) selection processes employed by select State departments of transportation (DOTs) and Australia. A series of interviews were conducted with agencies leading in the use of ACMs in order to document and develop an understanding of how they determine the most appropriate ACM for a given project. The case studies contained in this report are part of a larger project to develop a suite of tools that will assist public agencies in the evaluation and selection of ACMs by incorporating and expanding upon current tools and processes developed by the Federal Highway Administration and State DOTs. The ACMs considered include construction manager/general contractor, design-build, indefinite quantity/ indefinite delivery, and public-private partnerships.		
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Acronyms and Abbreviations

ACM	alternative contracting methods
AP	availability payment
APD	alternative project delivery
ATC	alternative technical concepts
Caltrans	California Department of Transportation
CM/GC	construction manager/general contractor
CMR	construction manager-at-risk
CTB	Commonwealth Transportation Board
DB	design-build
DBB	design-bid-build
DBE	disadvantaged business enterprise
DBM	design-build-maintain
DBOM	design-build-operate-maintain
DBFOM	design-build-finance-operate-maintain
DOT	department of transportation
EES	environmental effect statement
EOC	Engineering and Operations Committee
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FOPI	Finding of Public Interest
FTA	Federal Transit Administration
GAO	Government Accountability Office
GDOT	Georgia Department of Transportation
GMP	guaranteed maximum price
IA	Infrastructure Australia
ICC	Innovative Contracting Committee
ICU	Innovative Contracting Unit
ID/IQ	indefinite delivery/indefinite quantity
JOC	job order contracts
LEED	Leadership in Energy and Environmental Design
LRT	light rail transit

MDOT	Michigan Department of Transportation
MP	milestone payment
MTA	Maryland Transit Administration
NCHRP	National Cooperative Highway Research Program
O&M	operations and maintenance
ODOT	Ohio Department of Transportation
OIDD	Office of Innovative Design and Delivery
OMR	operations, maintenance, and rehabilitation
P3	public-private partnership
PAB	Private Activity Bonds
PDM	project delivery method
PDMSG	Project Delivery Method Selection Guidance
PDSM	Project Delivery Selection Matrix
PPTA	Public-Private Transportation Act
PSAC	Public Sector Analysis and Competition
PSC	Public Sector Comparator
QA/QC	quality assurance/quality control
QBS	qualifications-based selection
RFP	request for proposals
ROW	right-of-way
RTA	regional transportation agencies
SCC	standard cost categories
SME	subject matter expert
STIP	State Transportation Improvement Plan
TCRP	Transit Cooperative Research Program
TIFIA	Transportation Infrastructure Finance and Innovation Act
TRB	Transportation Research Board
TSC	Transportation Service Center
TxDOT	Texas Department of Transportation
UDOT	Utah Department of Transportation
VDOT	Virginia Department of Transportation
VfM	value for money
WSDOT	Washington State Department of Transportation

Executive Summary

This report documents the alternative contracting method (ACM) selection process employed by select State departments of transportation (DOT) and an international organization. It is based on information from a series of case studies undertaken to document and develop an understanding of how agencies leading in the use of ACMs determine the most appropriate ACM for a given project. The case studies are part of a larger project to develop a suite of tools that will assist public agencies in the evaluation and selection of ACMs by incorporating and expanding upon current tools and processes developed by the Federal Highway Administration and State DOTs.

The case study development for this phase of the project involved in-depth interviews with a select number of public agencies. During the interviews, researchers explored types of ACMs in use, how the decision is made to use an ACM over a traditional method and on which ACM to use, and how the ACM decision is evaluated after project completion. The results will be incorporated into the ACM evaluation toolset to be developed under this project and to identify candidate agencies for pilot testing.

Based on the desktop research performed and screening calls, seven State DOTs (California, Florida, Michigan, Texas, Utah, Virginia, and Washington) and an international agency (Victoria, Australia's North East Link Authority) were selected for case study interviews. Using the three-tiered process outlined in the Transportation Research Board's *Transit Cooperative Research Program (TCRP) Report 131: A Guidebook for the Evaluation of Project Delivery Methods,* the project team was unable to identify a transit project for a case study. However, a Value-for-Money analysis for a P3 pre-solicitation assessment for the Maryland Transit Administration Purple Line Light Rail Transit project is included in this report.

Preliminary observations on the reasons for selecting ACMs at each of the State agencies are similar: project size, schedule, technical complexity, risk management, and innovation potential. ACMs are considered for a wide variety of projects. An analysis of the response data from the case study interviews provided weak trends for weighing the various ACMs based on project objectives and requirements, but it may be possible to use this output to determine default weights in Tool 2 of the proposed toolset that could be adjusted by DOTs for each project.

The offices or specialized units that facilitate innovative contracting more heavily rely on professional judgment and experience to select ACMs than on formal processes. Where formal processes are in place, there is still a measure of flexibility that allows for engineering judgment. Overall, they are open to using a tool to assist in ACM selection if available, especially if the outcome of the tool has the flexibility to accommodate professional judgment and allow for agency-specific needs.

The innovative contracting units generally have a small number of employees who more often rely on collaboration within their office and the agency to track ACM successes and challenges on an informal basis, such as by sharing lessons learned. There is interest in a tool that can track ACM results, such as a nationwide database, as well as one that would provide a ranking of procurement methods for a given project to assist staff in making those decisions.

Chapter 1. Introduction

Purpose

The intent of this project is to develop a suite of tools that will build on the reporting of innovative contracting to date and assist public agencies in the evaluation and selection of alternative contracting methods (ACM). These newly developed tools will incorporate and expand on current tools and processes already developed by the Federal Highway Administration (FHWA) and State departments of transportation (DOT), filling in gaps where they exist and enhancing the current capabilities.

This case study summary report contributes technical details with regard to current State DOT processes and/or tools for ACM selection and their corresponding evaluation methodologies. The information and data gathered for the case studies will help inform the parameters for the suite of ACM selection tools to be developed.

Case Study Development

States' willingness to participate in the case study effort was gauged during initial telephone contacts. The overall goal of these contact calls was to ascertain the state of the practice in each agency. These criteria served as a means of comparison against the methodologies found in the literature review and aided in selection of seven States, with two alternates, to participate in the case studies. A transit agency and an international agency were included as well.

In the *ACM Evaluation Methodologies in the United States [and Select International Practices]* report, it was stated that a concerted effort would be made to select case study agencies that have mature experience with at least two different project delivery methods. The following selection rubric was used to select the DOTs:

- ACM program is mature, having more than 10 completed design-build (DB) projects.
- ACM program includes more than one ACM (not including variations on design-bid-build (DBB) such as cost-plus-time / A+B bidding).
- ACM program has been institutionalized by the development of standard guidance in the form of manuals, guidebooks, policy documents, etc. containing ACM selection and/or evaluation methodologies.
- Project performance data is available for both ACM and DBB projects on a program basis.

Based on these criteria, the research team selected seven State DOTs from across the United States as primary case example candidates, as well as two alternate DOTs and a transit agency and international agency. The seven primary State DOTs that were selected and agreed to participate in the case study interviews were California (Caltrans), Florida (FDOT), Michigan (MDOT), Texas (TxDOT), Utah (UDOT), Virginia (VDOT), and Washington (WSDOT). The two alternates were Georgia (GDOT) and Ohio (ODOT).

The international agency selected was the North East Link Project, a project team within the Major Transport Infrastructure Authority established to oversee several major transport projects

in Victoria, Australia. The transit agency case study summarizes a value-for-money analysis for the Maryland Transit Administration for a pre-solicitation assessment.

Table 1. Case study State selection criteria.

Mature Program (more than 10 DB projects)	More than one ACM	Documentation	Performance Data in Literature	Possible ACM[1] Case Study	Remarks
CA	X	X	X	All	Limited P3
FL	X	-	X	All	Extensive P3
GA	X	X	-	DB, P3, ATC	Limited P3
MI	X	X	-	All	Limited P3
OH	X	X	-	DB, P3, ATC	Limited P3
TX	X	X	-	DB, P3, ATC	Extensive P3[2]
UT	X	X	X	DB, CM/GC, ATC	-
VA	X	X	-	DB, P3	Extensive P3
WA	X	X	X	All	Limited P3

[1]Alternative technical concepts (ATC), construction manager/general contractor (CM/GC), design-build (DB), and public-private partnerships (P3).

[2]P3 (Comprehensive Development Agreements in Texas terminology) projects are currently not allowed by statute but the agency has completed several in the past.

The research team contacted staff from each of the seven primary DOTs by phone and e-mail to invite them to participate as a case example on ACM selection practices and request an in-person meeting. Participation involved a structured interview based on a detailed questionnaire provided in advance, collection of ACM documents related to selection tools and practices, and review of the final analysis for accuracy.

Researchers were provided with summaries of the desktop research done in Task 2 on ACMs employed by the respective State DOTs. These summaries were intended to support the research team members in preparing for and conducting the cases.

For each DOT, the following was provided to the researchers:

- An overview of the DOT's ACM unit(s) and program.
- A summary of existing ACM selection methodologies (if applicable).
- A summary of available ACM guidelines and materials.

- A summary of active projects (in planning, procurement, or implementation) and recent projects (construction completed) by ACM.
- A summary of any additional relevant material.

A structured interview protocol was used during discussions and data collection. The protocol and general categories for the questions are described in Chapter 2.

Chapter 2. Case Study Protocol

The following structure was used as a guide during discussions and data collection for this project.

To begin, a short statement of purpose/letter of intent summarizing the project and its objectives was sent to potential participants, providing the reasons behind the project and asking them to take part. The primary research objectives given for this project were as follows:

- *Document and categorize* **current practices** and applications for selecting a given ACM from the general population of all project delivery methods.
- *Explore* **how** highway construction projects of all project delivery methods are effectively applying ACM systems.
- *Identify* **benefits** and **limitations** of the approaches.
- *Explore* **how** to **implement and apply** project performance metrics and evaluation methods for all forms of project delivery.
- *Produce* a decision-making tool that will guide project sponsors in determining when to use each of the entire range of ACMs.
- *Produce* an ACM Evaluation Toolset, including both analytical and decision-making tools.

Across the highway construction and engineering industry, terms relating to quality often have multiple meanings that in some cases overlap with one another and in others supersede each other. To prevent confusion among several vital terms important to this project, definitions of design-bid-build (DBB), design-build (DB), construction manager/general contractor (CM/GC), public-private partnership (P3), and indefinite delivery/indefinite quantity (ID/IQ) were provided. The definitions provided (see Appendix A: Relevant Definitions) are in accordance with the most recent issuance of Transportation Research Board (TRB) Circular E-C137: *Glossary of Highway Quality Assurance Terms* and TRB's National Cooperative Highway Research Program (NCHRP) Synthesis 376: *Quality Assurance in Design-Build Projects*.

Note: These terms are used for the purpose of consistency in writing this report, acknowledging that the terminology is not standard and the States may use an alternative, such as job order contracting instead of ID/IQ and GC/CM or CM-at-Risk instead of CM/GC.

Field Procedures

The primary input to the case studies was gathered through structured interviews with agency personnel involved with ACM project selection. The process involved developing a questionnaire that was made available to each interviewee prior to the interview. Representatives from each of seven DOTs were interviewed using the same list of questions. The questions were adjusted for the uniqueness of the transit agency and international agency case studies.

The interview process generally followed this set of steps provided to researchers:

- Once an appointment for the interview has been made, send the questionnaire to the point of contact with instructions to review it prior to the interview. Also, request that the

interviewee obtain access to any relevant documents and have them available at the interview.

- Commence the interview with a short explanation of the project, the desired information, and a statement that nothing will be published before the interviewee has had an opportunity to review the draft material and correct it as required.
- Next, explain the questioning process. You will ask a question and then ask the respondents if they understand it. If not, further explanation will be provided. After the answer is given and recorded, you will read it back to the interviewee and give them an opportunity to refine it if required.
- The process then proceeds question by question until it is complete.
- It is particularly important to allow the interviewee to digress if the tangent appears to be of interest to the research. The questionnaire is generally applicable to all agencies but it is not in and of itself complete. Therefore, the local variations and subtleties will be found in the digressions from the questions.
- Complete the interview by recapping the major findings that you have drawn from the interview and ensure that you have correctly interpreted them.
- Be sensitive to local semantics/jargon and ask for clarifications even if you think you understand. Do not assume that your past experiences are in any way reflective of how things work in the interviewed agency.

Project Researchers

- Dan D'Angelo, ARA / Applied Research Associates, Inc.
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- Steve DeWitt, ACS Infrastructure Development, Inc.
- Mike Garvin, Virginia Tech
- Doug Gransberg, Gransberg & Associates
- Sasha Page, IMG Rebel
- David Peterson, IMG Rebel
- Sid Scott, HKA Global

Case Study Delegation

- Garvin and Gransberg – Virginia DOT (pilot case[1])
- Chesnik and DeWitt – Texas DOT
- Benton and Peterson – Utah DOT
- Gransberg – California DOT
- Scott and Peterson – Washington State DOT
- D'Angelo and Benton – Florida DOT
- Chesnik and Benton – Michigan DOT
- Garvin – Australia

[1] The VDOT interview was used as a pilot case for researchers to test the effectiveness of the questionnaire. Some modifications were made as a result, as noted on the questionnaire in Appendix A.

Informant Selection

Once a case study DOT was selected, several members of the team directly associated with the agency's ACM selection decision process and, if possible, the agency's project performance measurement process were contacted and asked for an appointment for an interview. Potential interviewees included the following:

- Agency-level ACM office directors or equivalent for centralized DOTs.
- District engineers and staff responsible for selecting ACMs for decentralized DOTs.
- Project-level project managers, construction managers, design managers, etc.

Data Analysis

The data collected was synthesized and evaluated to produce the following output:

1. Advantages and disadvantages to each ACM selection system from the agency's point of view.
2. Identification of trends and common findings between the literature review, survey, and case studies.
3. Common findings triangulated from these three sources of data to arrive at valid conclusions.
4. Case studies summarized individually in the lens of the ACM selection decision model.
5. Comparison of key attributes of the baseline approach to key attributes in the ACM models, incorporating literature review and previous phone survey information.
6. Individual findings analyzed across the cases using pattern-matching techniques.
7. Comparison to baseline DBB project delivery approaches.

Chapter 3. Case Studies

California DOT

Sacramento, CA

Table 2. Caltrans ACM experience.

ACM Experience	CM/GC	DB	P3	ID/IQ
ACMs authorized	Yes	Yes	Yes	No
ACMs in use	Yes	Yes	Yes	-
Number of projects	over 10	over 10	3	-
ACM % of annual budget	less than 10%	less than 10%	less than 10%	-
If not used, why?	NA	NA	NA	Lacks authority

Table 3. Caltrans selection rationale.

ACM Selection Rationale	CM/GC	DB	P3	ID/IQ
Accelerate schedule	Yes	Yes	Yes	-
Improve cost performance	Yes	Yes	Yes	-
Enhance quality	Yes	No	No	-

ACM Delivery Structure

The California DOT (Caltrans) employs a combined organizational structure to deliver ACM projects. The program is split between the Office of Innovative Design and Delivery (OIDD) of the Caltrans Design Division, which oversees all ACM activities except P3, and the agency's P3 program manager, who is positioned directly under the Caltrans Director. OIDD works with the district that nominated the ACM project and jointly manages the pre-award activities, procurement, and award. Once an ACM project is awarded, it is transferred to the appropriate district office for contract administration and execution. OIDD is also responsible for conducting post-construction project performance measurements, as well as publishing those results in reports provided to the California Transportation Commission and the State legislature, when required by statute. The Caltrans P3 Program Office develops, administers, and manages P3 projects directly. P3 activity has been minimal, however, with the agency having completed only three projects and currently having no future P3 identified, nor does it currently have P3 authority.

California also has a robust set of regional transportation agencies (RTA), with which Caltrans is often involved, that have the authority to use ACMs of all varieties. The RTAs have been using ACMs longer than Caltrans, which received its DB and CM/GC authority in the past 10 years.

Caltrans' annual construction budget is $4 billion. The recent passage of a gas tax increase is predicted to double that number in the next fiscal year. Since Caltrans completes the majority of its preconstruction workload using State employees, the projected workload spike will likely be accompanied by an increase in ACM projects as a means to level the workload and deliver projects faster and more efficiently.

ACM Decision-making

Caltrans' districts identify potential ACM project candidates and send the list of projects to the OIDD. OIDD conducts an assessment using its published ACM selection tool and makes a recommendation to a central office steering group that decides which of the ACM candidates will proceed as ACM projects.

Caltrans has a formal policy that requires districts to nominate potential ACM projects using a standard ACM Nomination Fact Sheet. Districts use the nomination sheet to detail the circumstances and conditions in which the project must be delivered. Caltrans' staff said the ACM program has matured to a point where if the right project is selected, it has a high probability of achieving very satisfactory results. The use of the nomination sheet introduced an element of consistency that has increased over time. The foremost need for improving the ACM program is to expand the formal training instituted for ACM project team members to include decision-makers from the district and some from the central office.

The driving factors in the ACM selection decision are the need to accelerate the delivery schedule, the level of the project's technical complexity, the level of design at the time the ACM decision is made, the ability to use performance specifications, the presence of environmental issues, the need for third-party involvement, and the number and influence of external stakeholders. Additional factors leading to ACM selection are the project's monetary size, the need to control the budget, and quality assurance requirements.

CM/GC is generally selected for the following reasons:

- Obtain early contractor involvement—the most important.
- Accelerate delivery.
- Address complex project requirements.
- Establish budget early.
- Encourage innovation through performance requirements.
- Facilitate value engineering.
- Transfer risk.
- Attain flexibility in construction.
- Shorten procurement time.
- Utilize internal and external support for the delivery method.
- Ensure qualified contractors are selected.

DB is selected for the following reasons:

- Accelerate delivery—the most important.
- Address complex project requirements.

- Establish budget early.
- Involve contractors early.
- Encourage innovation through performance requirements.
- Enhance innovation through alternative technical concepts (ATCs).
- Encourage price competition.
- Transfer risk.
- Utilize internal and external support for the delivery method.

P3 is selected for the following reasons:

- Project revenue generation potential.
- Innovative financing.
- Follow-on operations and maintenance.

As a general rule of thumb, key aspects for ACM selection are as follows:

- If a third party has a large amount of influence over the project, then CM/GC is selected.
- If that is not the case, then DB is appropriate.
- P3 is considered when additional funding is required to execute the project.

Once the decision is made to use an ACM, the district project team holds a risk assessment workshop in conjunction with OIDD. Despite the academic risk literature, DOTs rarely select ACMs to address risk. They are picked to address schedule. The workshop includes assessing project scope, schedule, cost, and contracting risk. Both qualitative and quantitative risk analyses are completed, including brainstorming and expert interviews. The outcome of the risk workshop must validate the ACM selection decision. The availability of funding is not a factor in selecting DB, but could be the determining factor for selecting P3. The workshop's output includes a risk register, risk management plan, and risk mitigation plan. These are used to develop special contract provisions for the differing site conditions clause and incentive/disincentive clauses. Additionally, Caltrans will decide whether to ask for specific unit prices to be included in the DB price proposal as a means of providing a yardstick for measuring cost reasonableness.

Caltrans has a broad variety of performance measures for ACM cost and schedule performance. Key performance indicators are as follows:

- ATC performance versus stipends paid.
- Shadow project comparisons.
- Innovation savings.
- Cost.
- Time.
- Customer satisfaction surveys.

Caltrans used the years it took to achieve ACM-enabling legislation to actively research ACM implementation by other DOTs, capturing lessons learned that eventually became the foundation for its formal ACM selection, implementation, execution, and performance evaluation program. Caltrans staff believes the agency's ACM selection process is stable for CM/GC and DB, and they see no barriers to continuing those ACMs. However, one issue that affects the program is

pressure from the districts to use ACMs on projects that do not meet its published criteria. It would also be beneficial if local sponsors would adopt the Caltrans ACM selection tool to enhance consistency in the industry.

OIDD is understaffed, having only four members, but given additional resources, it could improve the process by more comprehensively capturing lessons learned and facilitating their dissemination for use in both DBB and ACM projects. OIDD is also in the process of seeking authority for ID/IQ and believes that it is the one missing component to its ACM toolbox. Caltrans can no longer use P3. So only past use information was collected.

Procurement Process

Caltrans' procurement process includes low bid, best value, and qualifications-based selection (QBS) negotiated price options. In all cases, if Federal funds are used the requirement to implement the disadvantaged business enterprise (DBE) program can be challenging. Low bid is also constrained by procurement regulations and, at times, statute. Low bid is mandated on all DBB projects. ACM preferences for each method are as follows:

- Low bid: need to demonstrate compliance with statutes and procurement constraints.
- Best value: need well-qualified contractor, need to move rapidly into construction, and need to justify selection to the public.
- QBS-negotiated: highly complex project, need early contractor involvement (CM/GC).

The low-bid award process includes short-listing (DB only), financial prequalification, bonding requirements, and verification of DBE goal commitment as well as price evaluation. The best-value process also includes evaluation of qualifications, design approach, ATCs, schedule, quality management, and environmental and safety plans. QBS involves short-listing, financial prequalification, bonding requirements, and evaluation of qualifications, design approach, quality management, and safety plans.

Achieving Value through Contracting Method Selection

Caltrans staff was asked their opinions on each ACM's ability to add value to their department's capital project delivery process. Table 4 reflects how each ACM in use affects the quality of different project aspects.

Table 5 identifies how each ACM affects the value of a list of preconstruction services for typical projects within the department.

A rating of 1 to 5 was assigned based on the department consensus, where 1 indicates worst, 2 indicates worse, 3 indicates neutral, 4 indicates better, and 5 indicates best.

Table 4. Caltrans perspective on ACM impacts on various project aspects.

Project Aspects	DBB	CM/GC	DB	P3	ID/IQ
Completeness of final design deliverables	4	5	3	3	-
Accuracy of design calculations	3	3	3	3	-
Accuracy of quantities	4	5	-	-	-
Acceptance of design deliverables	5	5	2	2	-
Accuracy of specifications	4	5	3	3	-
Accuracy of as-built documents	4	4	3	3	-
Accuracy/applicability of O&M manuals, etc.	-	-	-	3	-
Implementation of approved QA/QC plans	3	3	5	3	-
Accuracy of preconstruction cost estimates	4	4	-	-	-
Ability to achieve post-award budgets	3	5	4	3	-
Accuracy of preconstruction schedules	5	4	4	4	-
Ability to achieve post-award schedules	3	5	5	3	-
Material quality	5	5	4	4	-
Workmanship quality	4	5	3	4	-
Aesthetics	5	5	3	3	-
Maintainability	5	5	4	5	-
Operability	5	5	4	4	-
Maintenance of traffic	4	5	4	4	-
Interest to potential bidding community	5	3	4	3	-

Table 5. Caltrans perspective on ACM impacts on value of preconstruction services.

Preconstruction Service	DBB	CM/GC	DB	P3	ID/IQ
Conceptual estimating	2	5	4	4	-
Value analysis/value engineering	3	5	4	4	-
Design charrettes	1	3	1	1	-
Design reviews	3	5	3	3	-
Regulatory reviews	2	2	2	2	-
Security impact studies	-	-	-	-	-
Environmental studies	3	3	3	3	-
Early contractor involvement	1	5	3	3	-
Design alternates	2	5	3	3	-
ATCs	1	1	5	4	-
Cost engineering reviews	2	5	1	1	-
Constructability reviews	3	5	2	2	-
Biddability reviews	4	3	1	1	-
Operability reviews	1	1	1	3	-
Life cycle cost analysis	-	-	-	-	-

Observations of the Researchers

- Caltrans uses a formal ACM selection tool. The agency believes that it is in need of an update to capture the experience gained since implementing ACMs.
- Caltrans would like to consider/make the ACM decision earlier than it currently does, which is at some time during the planning phase. Since nearly all projects pass through the project development process, assuming DBB delivery with design being completed with in-house assets, determining that a project will be delivered using DB would reduce the amount of design that is done during the preliminary engineering phase.
- More education is needed for decision-makers at the district level to manage expectations. OIDD asks the following questions to vet projects nominated for ACM delivery:
    - What is your goal for using an ACM?
    - Can benefits actually be realized through ACM delivery?
- Caltrans invests in the training of all ACM project team members. The agency believes this has paid dividends in terms of increasing the overall success rate of its ACM program.

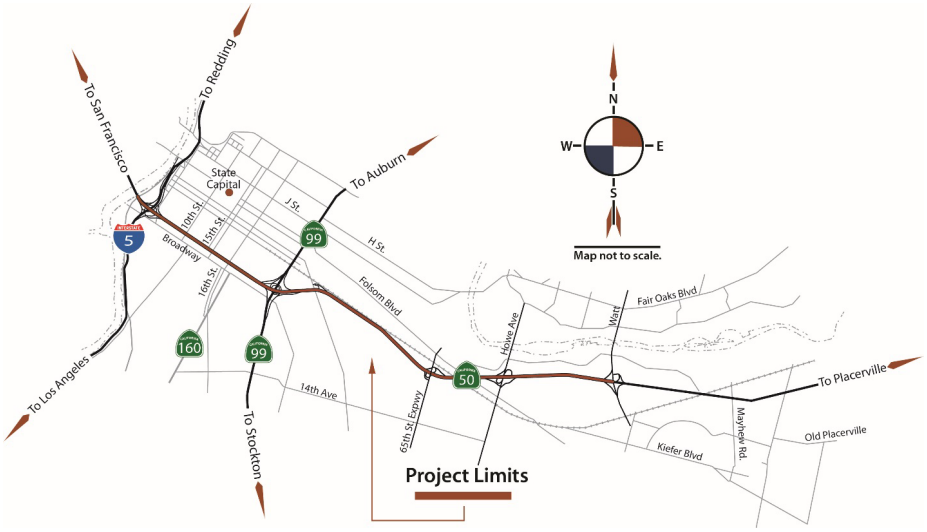
- The ACM projects that did not go according to plan were judged to have been the wrong project for the selected ACM. Hence, there is a high emphasis by OIDD and the central office steering group on vetting the ACM selection decision and ensuring that the selected ACM matches the project's characteristics.

Caltrans ACM Nomination Fact Sheet

DESIGN-BUILD NOMINATION FACT SHEET
03-Sac-50-L0.20/R6.1
EA: 03-3F360 & 03-0H080

Project Description

In Sacramento County, on United States Route 50 (US 50), construct High Occupancy Vehicle (HOV) lanes from Interstate 5 (I-5) to 0.8 mile east of Watt Avenue, construct sound walls from Stockton Blvd to 65th St, rehabilitate pavement from I-5 to Watt Ave and increase vertical clearance at seven overcrossings between I-5 and Watt Ave as part of the US 50 Multimodal Corridor Enhancement Project.



Purpose and Need

The purpose of the HOV lanes project (03-3F360) is to reduce congestion on US 50 by extending the existing HOV lanes on US 50 west from the Watt Avenue Interchange, where the current HOV lanes terminate, to the I-5 Interchange in downtown Sacramento to help implement the Sacramento Region Bus/Carpool Lane Network Vision.

The HOV lanes project is needed because the US 50 corridor is experiencing substantial recurring congestion during peak commute periods. The amount and duration of congestion is expected to increase in the future as suburban development continues in the eastern portions of Sacramento County and El Dorado County. This Project will improve mobility, provide an option for reliable peak period travel time, and meet sustainability goals by providing incentives for commuters to use buses, carpools, or vanpools for peak period travel to improve traffic operations by reducing congestion and travel time.

The State Highway Protection Program (SHOPP) rehabilitation project (03-0H080) will extend the service life of the pavement and reduce maintenance expenditures by rehabilitating the existing lanes and other…

An example of Caltrans' ACM Nomination Fact Sheet for a DB project is available here:

https://dot.ca.gov/-/media/dot-media/programs/design/documents/sac-50-hov-and-rehab-a11y.pdf

Caltrans Design-Build Project Selection Tool

DESIGN-BUILD PROJECT SELECTION TOOL

The following is a tool that the Department of Transportation (Department) is developing to assist in determining the appropriate delivery method for projects. The Department is testing this tool on projects on the State Highway System that have been nominated for the Design-Build Demonstration Program authorized by Senate Bill (X2) 4. Please provide a response to each question below.

EVALUATION OF PROJECT SCOPE AND CHARACTERISTICS		
QUESTION No.	**QUESTION**	**Rating (A, B or C)**
1a)	**Where is the project in the project development process?** **A**. Detailed or final engineering stage **B**. Preliminary design **C**. Conceptual engineering stage	
1b)	**What is the size/complexity of the project?** **A**. Relatively simple, smaller project with no need for specialized outside expertise **B**. Medium size project with more technically complex components and schedule complexity **C**. Large, complex project with significant schedule complexity (e.g. multiple phases, extensive third-party issues, specialized expertise needed)	
1c)	**Does the project involve significant impacts to highway users and local businesses/community during construction?** **A**. No more than typical **B**. More than typical **C**. Much more than typical	
1d)	**Does the project present right-of-way limitations that would benefit from a contractor's assistance?** **A**. No more than typical **B**. More than typical **C**. Much more than typical	
1e)	**Does the project present environmental permitting issues that would benefit from a contractor's assistance?** **A**. No more than typical **B**. More than typical **C**. Much more than typical	
1f)	**Does the project present utility or third-party issues that would benefit from a contractor's assistance?** **A**. No more than typical **B**. More than typical **C**. Much more than typical	
1g)	**Does the project present unique work restrictions or traffic maintenance requirements that would benefit from a contractor's assistance?** **A**. No more than typical **B**. More than typical **C**. Much more than typical	
1h)	**Would the project benefit by packaging features of work to allow early lock-in of construction materials/labor pricing?** **A**. No more than typical **B**. More than typical **C**. Much more than typical	
1i)	**Would the project benefit by raising quality standards/benchmarks to minimize maintenance and achieve lower life-cycle cost?** **A**. No more than typical **B**. More than typical **C**. Much more than typical	

The ACM selection tool Caltrans is using for DB projects is available here:

https://catc.ca.gov/-/media/ctc-media/documents/programs/design-build/db-projdel-selection-questionnaire-a11y.pdf

Florida DOT

Tallahassee, FL

Table 6. FDOT ACM experience.

ACM Experience	CM/GC[1]	DB	P3	ID/IQ
ACMs authorized	Yes	Yes	Yes	Yes
ACMs in use	less than 5	Yes	Yes	Yes
Number of projects	1–5	over 10 (50+/year)	over 10	over 10
ACM % of annual budget	less than 10%	26–50%	less than 10%[2]	less than 10%
If not used, why?	See note[3]	NA	NA	mostly for maintenance

[1] Construction Management at Risk in FDOT terminology.
[2] Very large P3s can be a much larger portion of the budget.
[3] CM/GC has not been used much due to the great success of the DB program. Florida does not see the need to use it. The agency has used it on vertical construction and rest stops, but it is rarely used.

Table 7. FDOT ACM rationale.

ACM Selection Rationale	CM/GC	DB	P3	ID/IQ
Accelerate schedule	Yes	Yes	Yes	Yes
Improve cost performance	Yes	Yes	Yes	Yes
Enhance quality[1]	Yes	Yes	Yes	Yes

[1] Quality is not a driver to choose a contracting method because FDOT gets high quality with all methods. Contractors and consultants are graded based on the results of the projects.

ACM Delivery Structure

The Florida DOT (FDOT) has three staff members within its Central Construction Office who review requests for proposals (RFP) and ACM requests that are outside the norm; however, the decision to use and deliver most projects with ACMs is decentralized and is made in FDOT's eight districts. The primary ACM used is DB. Florida also uses P3s, which are administrated by the Project Finance Office within the Office of the Comptroller. The decision to use a P3 is made in the Central Office at the executive level. It also requires approval from the State legislature and the Governor as outlined in Title XXVI 339.2825 of the 2018 Florida Statutes.

ACM Decision-making

The decision on which delivery method to use is decentralized and is made primarily by district staff. Based on statute 337.11(7)(a), DB is pre-approved as a delivery method for major projects (generally considered to be >$25 million) if they meet one of the following four criteria:

- On a limited access facility.
- Major bridge.
- Rail.
- Vertical construction.

District staff may also consider the use of DB for projects that do not meet any of these criteria with approval from FDOT's Chief Engineer. Decisions to use P3 to deliver projects are made at the executive level and are typically larger projects (at least $100 million, sometimes $1 billion or greater).

Florida DOT typically delivers more than 50 DB projects per year. FDOT is very proficient at delivering DB contracts. Because of this, CM/GC has not gained much traction. FDOT only considers CM/GC for vertical construction and rest areas. For that reason, CM/GC was not a primary focus of this case study.

FDOT does not have a formal policy or procedure to determine which projects are potential ACM candidates. The decision on whether to use an ACM or which ACM to use is mostly an informal one made by experienced professionals, usually district staff. Using the guidelines set in legislation, many projects are pre-approved for DB. Other projects are considered and can be approved with a step as simple as an e-mail to the Chief Engineer. The growth of the program has been built upon the shoulders of past successes and experienced staff making the decisions.

The driving factors in the ACM selection decision are the need to involve the contractor in constructability (bridges, maintenance of traffic, phasing, etc.), the potential for innovation, and the need to share risk. The other main factors that lead to whether an ACM is selected are the project size, the project schedule, the technical complexity, the need to obligate funding, the number of third-party stakeholders, and the project financing options.

The following table shows the factors FDOT considers when choosing ACMs. The underlined Xs indicate the primary factor for selecting that particular ACM as chosen by FDOT.

Note: ID/IQ is not shown as it is a small percentage of work and mostly used for maintenance. ID/IQ selection is driven by a small scope of work, repetitive task nature, and conduciveness to bundling. CM/GC is included for reference although, as FDOT noted, it is rarely used.

Table 8. Factors FDOT considers when selecting ACMs.

Item	CM/GC	DB	P3
Reduce/compress/accelerate project delivery period		X	X
Establish project budget at an early stage of design development		X	X
Get early construction contractor involvement			
Encourage innovation through performance requirements		X	X
Encourage innovation through ATCs		X	X
Facilitate value engineering		X	X
Encourage price competition (in procurement process)		X	X
Compete different design solutions through the proposal process			
Redistribute or transfer risk		X	X
Complex project requirements		X	X
Flexibility needs during construction phase		X	X
Reduce life cycle costs			
Increase scope by bundling requirements/tasks			
Provide mechanism for follow-on operations and/or maintenance			
Innovative financing			X
Project is a revenue generator			
Procurement time		X	X
Procurement cost (internal and/or external)			
Unit/agency experience		X	X
Political and agency support		X	X
Statutory issues			
Availability of qualified service providers/contractors			
Other:		X	X

Most of the time, projects do not go through a risk analysis until after the process of selecting an ACM is finished. FDOT requires a formal risk analysis for projects greater than $100 million, which is more restrictive than the FHWA requirement of projects greater than $500 million. This includes assessing project scope, schedule, cost, and contracting risk. It involves both qualitative

and quantitative risk analyses and may include brainstorming, scenario planning, expert interviews, and Monte Carlo simulations. The risk analysis is run by FDOT's Estimates Office and is usually conducted by consultants. The risk assessment's output includes a risk register, risk management plan, and risk mitigation plan. These are used to help choose the proper ACM and develop the procurement documents. For smaller projects using ACMs, the risk analysis and results are more informal and are not always documented. FDOT uses a very prescriptive RFP with partial plans. The agency provides a lot of preliminary information in the RFP in an effort to minimize the risk that contractors will need to take.

There was no indication that the $100 million threshold for risk analysis was burdensome or resulted in fewer projects being assessed and approved. FDOT thinks that it is worthwhile to do a risk analysis for projects that are $100 million or greater, indicating the $500 million threshold is too high. Although FDOT does not have a formal process to evaluate ACM performance, it was evident that the agency informally evaluates its results and tweaks its process. Staff members rely on their vast experience with ACMs, particularly DB, to inform selection.

While FDOT does not have a formal process to evaluate ACM performance, the Construction Office does have a large database with schedule and cost data for each DB project. Additionally, the contractors and consultants are graded after each project. Since one of its drivers for selecting ACMs is to shift risk, FDOT would like to know how the contractors are quantifying risk and how beneficial the agency's efforts have been. This would require input from the private sector.

FDOT has adjusted staff and policies to efficiently develop DB RFPs and deliver a large DB program. The staff has been very successful with their DB efforts, and they have gained a lot of experience from their long history. The P3 program has been a natural progression of the DB program and has helped deliver mega projects well ahead of schedule. There is a hesitancy to expand ACM use to include CM/GC for most infrastructure projects because current programs are so successful. DB has become such a part of their program, that the staff seems to refer to it more as a contracting method than an alternative contracting method. Due to the vast experience and success that FDOT has had with ACM use, ACMs will remain a vital part of its program delivery for the foreseeable future.

Procurement Process

FDOT uses a best-value procurement process for the majority of its ACMs. The selection is a two-step process that takes 9-12 months. Following an advertisement for services with a draft RFP, a short list of teams is made based on scoring of Letters of Interest from interested parties. The scoring is completed by a Technical Review Committee and approved by a Project Selection Committee. Once the short list of teams is determined, the final RFP is produced. There is time allotted for the ATC process, and then technical proposals are submitted. The Technical Review Committee reviews the proposals and develops questions. Contractors may respond to the questions, and then they submit their price proposals. The award is made based on a combination of the price and technical score. The process is very transparent. Technical scores are made available as soon as the first step is completed, so contractors know where they stand before they enter phase two of the procurement process. Occasionally, when the scope of a project is well defined, FDOT also uses low-bid procurement with the DB contract delivery.

Achieving Value through Contracting Method Selection

FDOT staff were asked their opinions on each ACM's ability to add value to their department's capital project delivery process. Table 9 reflects how each ACM in use affects the quality of different project aspects.

Table 10 identifies how each ACM affects the value of a list of preconstruction services for typical projects within the department.

A rating of 1 to 5 was assigned based on the department consensus, where 1 indicates worst, 2 indicates worse, 3 indicates neutral, 4 indicates better, and 5 indicates best.

Table 9. FDOT perspective on ACM impacts on various project aspects.

Project Aspects	DBB	CM/GC	DB	P3	ID/IQ
Completeness of final design deliverables	5	-	5	5	4
Accuracy of design calculations	5	-	5	5	5
Accuracy of quantities	5	-	3	3	5
Acceptance of design deliverables	5	-	5	5	5
Accuracy of specifications	5	-	5	5	5
Accuracy of as-built documents	5	-	5	5	5
Accuracy/applicability of O&M manuals, etc.	-	-	-	-	-
Implementation of approved QA/QC plans	5	-	5	5	5
Accuracy of preconstruction cost estimates	4	-	3	3	4
Ability to achieve post-award budgets	5	-	5	5	5
Accuracy of preconstruction schedules	4	-	4	4	4
Ability to achieve post-award schedules	5	-	5	5	5
Material quality	5	-	5	5	5
Workmanship quality	5	-	5	5	5
Aesthetics	5	-	5	5	5
Maintainability	5	-	4	4	5
Operability	5	-	5	5	5
Maintenance of traffic	5	-	5	5	5
Interest to potential bidding community	5	-	5	5	5

Table 10. FDOT perspective on ACM impacts on value of preconstruction services.

Preconstruction Service	DBB	CM/GC	DB	P3	ID/IQ
Conceptual estimating	-	-	-	-	-
Value analysis/value engineering	4	-	5	5	4
Design charrettes	5	-	3	3	3
Design reviews	5	-	5	5	5
Regulatory reviews	5	-	5	5	5
Security impact studies	-	-	-	-	-
Environmental studies	5	-	5	5	5
Early contractor involvement	3	-	5	5	3
Design alternates	4	-	5	5	4
ATCs	3	-	5	5	3
Cost engineering reviews	-	-	-	-	-
Constructability reviews	4	-	5	5	4
Biddability reviews	5	-	3	3	5
Operability reviews	4	-	4	4	4
Life cycle cost analysis	5	-	4	4	5

Observations of the Researchers

- FDOT does not have a formal ACM selection tool. The agency relies on the experience of its staff to decide the best delivery method for a project.
- FDOT has a long history of successful ACM projects. It primarily uses DB for highway infrastructure. There is reluctance to using CM/GC due to the success of the DB program.
- FDOT does not use a formal risk analysis to help decide which delivery method to use. When preparing an RFP, however, the agency tries to remove risk by clearing right-of-way (ROW), getting permits, and beginning coordination with utilities prior to advertising.
- FDOT does not have a formal process to analyze the success of its ACM projects. The agency does have a grading system for contractors and consultants that is used when evaluating proposals on future projects.
- FDOT staff said they were open to evaluating a tool if it was available. Given the agency's long history of success with its current methods, the tool would have to be flexible enough to fit into the current system.

Michigan DOT

Lansing, MI

Table 11. MDOT ACM experience.

ACM Experience	CM/GC	DB	P3	ID/IQ
ACMs authorized	Yes	Yes	Yes	Yes
ACMs in use	Yes	Yes	Yes	Yes
Number of projects	6-10	6-10	1-5	1-5
ACM % of annual budget	less than 10%	11–25%	less than 10%	less than 10%
If not used, why?	NA	NA	NA	NA

Table 12. MDOT ACM selection rationale.

ACM Selection Rationale	CM/GC	DB	P3	ID/IQ
Accelerate schedule	Yes[1]	Yes	Yes	Yes
Improve cost performance	No[2]	Yes[3]	Yes[4]	No
Enhance quality	Yes	No	Yes	No

[1]Offers schedule certainty; may be possible to accelerate schedule in some cases.
[2]Does not lower cost, but gives cost certainty earlier in the process.
[3]Cost is lower through economies of scale.
[4]Cost is lower through economies of scale and when considering life cycle cost.

ACM Delivery Structure

The Michigan DOT (MDOT) Innovative Contracting Unit (ICU) assists the regional Transportation Service Centers (TSCs) in delivering ACM projects. The ICU is made up of six staff members with diverse backgrounds in project design and construction. Two MDOT committees are also involved in the delivery: first, the Innovative Contracting Committee (ICC) reviews all projects that have been screened by the ICU, and second, the Engineering and Operations Committee (EOC), which is composed of senior MDOT management, must approve all ACM use. The MDOT Director becomes involved if either P3 or CM/GC is proposed.

ACM Decision-making

Typically, project staff in each of MDOT's seven regions initially flag projects for ACMs. Occasionally, potential ACM projects are first considered by the ICU itself. Once a project is under consideration, the ICU evaluates its potential for ACMs as an initial screening and assists the TSC with submitting an application to the ICC. If the ICC agrees with the recommendation, it then goes to the EOC for a final decision. The use of either P3 or CM/GC also requires the concurrence of the MDOT Director.

MDOT does not have a formal policy or procedure for determining which projects are potential ACM candidates. In most cases, it relies on the regions to make the initial identification based on

the circumstances and conditions in which the project must be delivered. The agency is currently working on a spreadsheet selection tool to assist the process of choosing projects for ACMs. The tool has been under development for some time, but there are concerns that use of a spreadsheet by a region project manager who is not knowledgeable about the inputs could lead to unreliable results. While they continue to believe that such a tool would be valuable to their program, they feel strongly that the ICU should be involved in filling out the project inputs to help ensure consistency in the results.

The driving factors in the ACM selection decision are the need to accelerate the delivery schedule and the project's technical complexity. Other main factors that lead to whether an ACM is selected are the level of project design at the time the decision is made, project environmental issues, the number of third-party stakeholders, and the need to obligate the funding before it expires.

Table 13 shows the factors considered when choosing ACMs. The underlined Xs indicate the primary factor for selecting that particular ACM.

Table 13. Factors MDOT considers when selecting ACMs.

Item	CM/GC	DB	P3	ID/IQ
Reduce/compress/accelerate project delivery period	X	X	X	X
Establish project budget at an early stage of design development	X		X[1]	X
Get early construction contractor involvement	X	X	X	
Encourage innovation through performance requirements			X	
Encourage innovation through ATCs		X	X	
Facilitate value engineering	X[2]	X[3]	X[3]	
Encourage price competition (in procurement process)		X	X	X
Compete different design solutions through the proposal process		X[4]	X[4]	
Redistribute or transfer risk	X	X	X	
Complex project requirements	X	X	X	
Flexibility needs during construction phase	X	X	X	
Reduce life cycle costs			X	
Increase scope by bundling requirements/tasks		X	X	X
Provide mechanism for follow-on operations and/or maintenance	X[5]		X	
Innovative financing			X	
Project is a revenue generator				
Procurement time		X		X
Procurement cost (internal and/or external)				
Unit/agency experience				
Political and agency support	X	X	X	
Statutory issues				
Availability of qualified service providers/contractors				

[1]Cost certainty is during design development, but this is post-award. Cost certainty is not gained pre-award.
[2]Value engineering would be achieved during the design phase by considering alternatives proposed by the CM/GC.
[3]Value engineering would be achieved during the ATC process.
[4]Through using ATCs.
[5]CM/GC planting contract only.

Once the decision is made to use an ACM, a risk assessment is performed. This includes assessing project scope, schedule, cost, and contracting risk. It involves both qualitative and quantitative risk analyses and may include brainstorming, scenario planning, expert interviews,

and Monte Carlo simulations. The outcome of the risk workshop must validate the ACM selection decision. The availability of funding is not a factor in selecting DB but could be the determining factor for selecting P3. The risk assessment's output includes a risk register, risk management plan, and risk mitigation plan. These are used to develop project-specific special contract provisions.

MDOT does not have a formal process for evaluating ACM performance. The ICU is a small unit with offices in close proximity, so they track ACM performance and lessons learned informally among each other. There is no formal database. They believe it would be beneficial to have information on schedule, cost, design cost, and third-party impacts.

MDOT staff believes there is great value in utilizing all the tools in the toolbox. They are open to using all types of ACMs to deliver their program better. One of the primary constraining factors in the effectiveness of ACMs is that they often come into the program later in the process, after many critical decisions have been made. The staff believes that earlier identification of projects for ACMs will allow for more flexibility and innovation, yielding a better result.

Procurement Process

MDOT's procurement process includes low bid, best value, QBS, A+B, and build to budget. MDOT has not faced statutory constraints. Although they do not have specific legislation that allows the use of ACMs, the interpretation of existing selection laws allows the use of ACMs as long as there is a competitive selection. The agency's ACM preferences for each method are as follows:

- Low bid: preferred for most projects by the agency and industry; used in DB, P3, and ID/IQ projects.
- QBS: need well-qualified contractor and need to justify selection to the public.
- Best value: available but typically not used as a selection method.
- A+B: schedule is just as important as cost.
- Build to budget: desire to maximize work for a fixed budget.

In general, low-bid DB is used for most projects. For DB and P3, the award process includes short-listing, financial prequalification, bonding requirements, and DBE commitment as well as evaluation of qualifications and price. The QBS process is mostly used for CM/GC, which is primarily used for complex projects where a contractor is needed during the design phase.

Achieving Value through Contracting Method Selection

MDOT staff were asked their opinions on each ACM's ability to add value to their department's capital project delivery process. Table 14 reflects how each ACM in use affects the quality of different project aspects. Table 15 identifies how each ACM affects the value of a list of preconstruction services for typical projects within the department.

A rating of 1 to 5 was assigned based on the department consensus, where 1 indicates worst, 2 indicates worse, 3 indicates neutral, 4 indicates better, and 5 indicates best.

Table 14. MDOT perspective on ACM impacts on various project aspects.

Project Aspects	DBB	CM/GC	DB	P3	ID/IQ
Completeness of final design deliverables	3	5	3	3	3
Accuracy of design calculations	3	5	3	3	3
Accuracy of quantities	3	5	3	3	3
Acceptance of design deliverables	3	5	3	3	3
Accuracy of specifications	3	5	3	3	3
Accuracy of as-built documents	3	3	5	5	3
Accuracy/applicability of O&M manuals, etc.	3	3	3	3	3
Implementation of approved QA/QC plans	3	3	3	5	3
Accuracy of preconstruction cost estimates	3	5	3	3	3
Ability to achieve post-award budgets	3	5	3	3	3
Accuracy of preconstruction schedules	3	5	3	3	3
Ability to achieve post-award schedules	3	5	5	5	3
Material quality	3	3	3	5	3
Workmanship quality	3	5	3	5	3
Aesthetics	3	4	3	3	3
Maintainability	3	3	3	5	3
Operability	3	3	3	5	3
Maintenance of traffic	3	5	4	4	3
Interest to potential bidding community	5	2	4	3	2

Table 15. MDOT perspective on ACM impacts on value of preconstruction services.

Preconstruction Service	DBB	CM/GC	DB	P3	ID/IQ
Conceptual estimating	3	5	3	3	1
Value analysis/value engineering	3	5	4	4	3
Design charrettes	3	5	3	3	3
Design reviews	3	4	3	3	3
Regulatory reviews	3	5	3	3	3
Security impact studies	3	1	1	1	1
Environmental studies	3	4	3	3	3
Early contractor involvement	3	5	4	4	4
Design alternates	3	5	4	4	4
ATCs	3	1	5	5	1
Cost engineering reviews	3	5	3	3	3
Constructability reviews	3	5	3	3	3
Biddability reviews	3	5	3	3	3
Operability reviews	3	3	3	5	3
Life cycle cost analysis	3	3	3	5	3

Observations of the Researchers

- MDOT would like to have a formal ACM selection tool. The staff members are currently working on a spreadsheet, and they are looking forward to seeing the outcome of this project. Additionally, they would like to see a quantitative result but are unsure of how it would be possible. They expressed that any tool must have flexibility in interpreting the results so that professional judgments can be made based on external factors not in the model.
- MDOT would welcome a tool that would provide a ranking of procurement methods for a given project to assist in making the selection decision.
- MDOT is interested in a database that would help document past ACM performance and predict future ACM benefits.
- MDOT believes that any tool is only as good as the inputs, and therefore it is critical that all proposed ACM projects be evaluated by the ICU for consistency in the decision results.

Texas DOT

Austin, TX

Table 16. TxDOT ACM experience.

ACM Experience	DBB	CM/GC	DB	P3	ID/IQ
ACMs authorized	Yes	No	Yes	[1]See Note	Yes
ACMS used?	Yes	No	Yes	Yes	Yes
Number of projects	over 10	-	1–5	1–5	over 10
ACM % of annual budget	over 50%	0	less than 10%	less than 10%	less than 10%
If not used, why?	-	Not allowed by legislature	-	Currently not allowed but has been done in the past	-

[1]P3 (Comprehensive Development Agreements in Texas Terminology) projects are currently not allowed by statute but the agency has completed several in the past.

Table 17. TxDOT ACM selection rationale.

ACM Selection Rationale	DBB	CM/GC	DB	P3	ID/IQ
Accelerate schedule	Yes	-	Yes	Yes	No
Improve cost performance	Yes	-	Yes	Yes	No
Enhance quality	Yes	-	Yes	Yes	No

ACM Delivery Structure

The Texas DOT (TxDOT) Project Finance, Debt and Strategic Contracts Division's Strategic Contracts Management Section (33 total staff) performs procurement and support activities for the agency's ACM (DB) projects. DB is the most widely used procurement method in the State of Texas. Currently the State does not have authority to use P3. CM/GC is also not used in the State and ID/IQ is not used for construction projects. Though the perception of ACMs has generally remained consistent, when districts new to the process go through it, they generally gain a more positive perspective on the ACM.

ACM Decision-making

TxDOT's Project Delivery Selection Tool contains 12 tabs for entering project characteristics. Users populate these tabs at the outset with details including project characteristics, project information, designer and contractor information, and associated costs. The first run-through of the tool is for internal use among district SMEs. The second run-through is completed to incorporate feedback from upper management, which results in a final scored answer.

Administrative staff in TxDOT districts works in conjunction with a committee of upper leadership, including the Chief Engineer, the Director of Transportation Planning and Programming, the Director of District Operations, etc., to make ACM decisions. TxDOT also uses external consultants as an extension of its staff to complete background work that supports the process. Overall, the agency uses a 5-year planning committee to make the majority of the ACM decisions for individual projects. When considering ACM use, project monetary size is a key component; projects must meet a $150 million minimum to be considered. Additionally, scheduling, technical complexity, and level of design are also considered. Project location (urban, suburban, or rural), environmental considerations, life cycle issues, and stakeholders play a role in the decision-making process.

When considering DB against other alternatives such as P3, project delivery period is often analyzed. In addition to project delivery schedule, reducing life cycle costs and providing follow-on operation or maintenance mechanisms were the most important considerations when deciding between DB and P3 during the time P3 was used.

Over time, the decision-making process has evolved to include more documentation. Currently, legislative barriers somewhat limit broad use of DB by TxDOT. Similarly, when districts new to DB utilize the process, there is a possibility of issues with risk transfer. Formal risk analysis is conducted on project scope, project schedule, project cost, and contracting risk (performed using a Monte Carlo risk assessment). Risks are identified using brainstorming processes, expert interviews, and Monte Carlo simulation as well as through a risk workshop. In order to manage these risks, risk management plans are used and one-on-one meetings with contractors are conducted to assign risk to the contractor.

Procurement Process

TxDOT uses a 5-year, performance-based planning methodology for ACM selection. First, a screening process that analyzes monetary value, project size, scheduling, and environmental considerations, among other factors, is used to identify potential projects that would benefit from use of the DB procurement method. A list of pre-screened projects is then provided to staff at the TxDOT districts, who add or remove projects from the list based on experience and preferences. These decisions are then uploaded to Decision Lens® (planning software used to align priorities and resources) to analyze projected performance, safety, economics, and environmental factors to provide a performance-based score. These scores allow the projects to be ranked, and the top 25-rated projects are selected for analysis with the State's ACM screening tool. The districts provide a readiness checklist for projects, which is converted into a score. These scores are used to re-order the list in Decision Lens®, and the resulting portfolio of projects is presented to the 5-year planning committee. Districts work with the Traffic and Transportation Division to schedule projects and create plans for funding and other concerns, which will then be approved by the planning committee.

Since the tool is now 4 years old, updating it would improve decision-making during ACM selection. With experience, TxDOT is making modifications to change project drivers based on input from its districts and the Associated General Contractors of Texas. In terms of performance

measurements, monthly updates provide tracking that is compiled at project completion into a lessons-learned session. Safety data is also included in monthly reports.

Procurement constraints expressed during the case study interview included Texas Transportation Commission rules and Federal DBE program requirements. Similarly, department preference can affect the use of procurement processes. Preferences, including elimination of poorly performing firms, maintenance of fairness, and justification of selection, are among the drivers for use of particular procurement processes.

Award method algorithms are often used during award of projects. TxDOT employs the use of the award method algorithms shown in Table 18.

Table 18. TxDOT award method algorithms.

Component	Low Bid	Best Value
Short-list		X
Financial prequalification	X	X
Evaluation of qualifications		X
Alternative design concepts		X
Evaluation of design approach		X
Schedule evaluation (A + B)	X	X
Quality management plan evaluation		X
Environmental plan evaluation		X
Security plan evaluation		X
Safety plan evaluation		X
Price evaluation	X	X
Bonding requirements	X	X
DBE goals		X

Achieving Value through Contracting Method Selection

TxDOT staff were asked their opinions on each ACM's ability to add value to their department's capital project delivery process. Table 19 reflects how each ACM in use affects the quality of different project aspects.

Table 20 identifies how each ACM affects the value of a list of preconstruction services for typical projects within the department.

A rating of 1 to 5 was assigned based on the department consensus, where 1 indicates worst, 2 indicates worse, 3 indicates neutral, 4 indicates better, and 5 indicates best.

Table 19. TxDOT perspective on ACM impacts on various project aspects.

Project Aspects	DBB	DB
Completeness of final design deliverables	4	3
Accuracy of design calculations	3	3
Accuracy of quantities	4	3
Acceptance of design deliverables	3	4
Accuracy of specifications	4	3
Accuracy of as-built documents	4	3
Accuracy/applicability of O&M manuals, etc.	3	4
Implementation of approved QA/QC plans	3	4
Accuracy of preconstruction cost estimates	4	3
Ability to achieve post-award budgets	3	4
Accuracy of preconstruction schedules	3	4
Ability to achieve post-award schedules	3	4
Material quality	3	3
Workmanship quality	4	3
Aesthetics	3	4
Maintainability	3	4
Operability	3	4
Maintenance of traffic	-	-
Interest to potential bidding community	4	3

Table 20. TxDOT perspective on ACM impacts on value of preconstruction services.

Preconstruction Service	DBB	DB
Conceptual estimating	2	3
Value analysis/value engineering	3	3
Design charrettes	1	2
Design reviews	4	4
Regulatory reviews	3	4
Security impact studies	3	3
Environmental studies	4	4
Early contractor involvement	1	4
Design alternates	1	3
ATCs	1	5
Cost engineering reviews	2	2
Constructability reviews	2	4
Biddability reviews	3	2
Operability reviews	2	2
Life cycle cost analysis	2	3

Observations of the Researchers

- TxDOT's Project Delivery Selection Tool is a formal process that contains 12 tabs for entering project characteristics. Users populate these tabs at the outset with details including project characteristics, project information, designer and contractor information, and associated costs. The first run-through of the tool is for internal use among district SMEs. The second run-through is completed to incorporate feedback from upper management, which results in a final scored answer. Additionally, one of the tabs includes project goals, which uses a scoring method to select between DB and DBB. Project goals also include graphics such as heat maps, which are documented as part of the selection process. By State statute, only three DB projects are allowed in Texas per year, and these projects must be larger than $150 million.

Utah DOT

Salt Lake City, UT

Table 21. UDOT ACM experience.

ACM Experience	CM/GC	DB	P3	ID/IQ
ACMs authorized	Yes	Yes	Yes	Yes
ACMs in use	Yes	Yes	No	Rarely
Number of projects	over 10	over 10 (50+)	0	1-5
ACM percent of annual budget	less than 10%	26-50%	0	less than 10%
If not used, why?	NA	NA	UDOT has a low bond rating.[1]	Mostly used for maintenance and SW

[1] Bond ratings affect how cheaply the DOT can borrow money. UDOT has such a great bond rating, that it can finance projects itself more inexpensively than from a third party through a P3.

Table 22. UDOT ACM selection rationale.

ACM Selection Rationale	CM/GC	DB	P3	ID/IQ
Accelerate schedule	Yes[1]	Yes	NA	NA
Improve cost performance	No[2]	No[2]	NA	NA
Enhance quality[3]	Yes	Yes	NA	NA

[1] CM/GC does not accelerate the overall project delivery, but it does often reduce actual construction duration and impacts to the public. It also has the advantage of releasing early packages for areas that are cleared.

[2] DB and CM/GC have not been chosen for cost performance, but recent DB prices have been well below the engineers estimate. CM/GC project costs are very competitive when compared to post-construction costs for other methods.

[3] Quality is not a driver to choose a contracting method because UDOT gets high quality with all methods.

ACM Delivery Structure

The Utah DOT (UDOT) has an Innovative Contracting Unit (ICU) that is housed in the Central Office in Salt Lake City. The ICU presently comprises four staff members: two UDOT employees and two consultants. The ICU does not actually administer projects but serves primarily in an advisory role. The decision on how to best deliver projects is decentralized and is made by regional directors and staff.

ACM Decision-making

The decision on which delivery method to use is decentralized and is made by UDOT regional directors and staff. The size of the project plays a key part. Any projects over $50 million are considered for an ACM, while any projects over $100 million almost certainly use an ACM. If DB is going to be used, it is decided very early in the process. CM/GC can be decided when project design is anywhere from 10- to 90-percent complete. Historically, the Central Office was more involved in the decision to use an ACM. The current trend is for the regions to have more autonomy, with these decisions occurring there. It is UDOT's goal to decentralize decisions regarding projects as the regions gain experience and are comfortable in doing so.

UDOT does not have a formal policy or procedure to determine which projects are potential ACM candidates. The decision on whether to use an ACM and which ACM to use is mostly an informal one made by experienced professionals, usually regional directors with consultation from the Office of Innovative Contracting. There is no formal selection tool, although some regions have preferences on using particular ACMs. Because the Office of Innovative Contracting is small and experienced, and because UDOT has a very collaborative environment, there is consistency in the decision-making department wide. From the interview, it was evident that the primary decision-making occurs currently at the Regional Director level. It was also evident that none of the decisions are made in a vacuum. UDOT has a collaborative environment; Regional Directors consult with each other and Executive Management.

The driving factors in the ACM selection decision are the project size, the need to accelerate the delivery schedule, the project's technical complexity, the potential for innovation, and the need to share risk. The other main factors that lead to whether or not an ACM is selected are the level of project design at the time the decision is made, the location, project environmental issues, the number of third-party stakeholders, and the need to obligate funding before it expires. These selection factors are not prioritized. UDOT relies heavily on the experience of staff to select projects for ACMs. The selection factors listed are not used quantitatively in any manner. These are simply the project elements identified as contributing to the decision to use an ACM.

Table 23 shows the factors considered when choosing ACMs. The underlined Xs indicate the primary factor for selecting that particular ACM.

Table 23. Factors UDOT considers when selecting ACMs.

Item	CM/GC	DB	Progressive DB
Reduce/compress/accelerate project delivery period		X (1st)	
Establish project budget at an early stage of design development		X	
Get early construction contractor involvement	X	X	X
Encourage innovation through performance requirements		X	X
Encourage innovation through ATCs		X (2nd)	X
Facilitate value engineering			
Encourage price competition (in procurement process)		X	
Compete different design solutions through the proposal process	X	X	X
Manage risk	X	X	X (2nd)
Address complex project requirements	X	X	X
Meet flexibility needs during construction phase	X		X (1st)[1]
Reduce life cycle costs			
Increase scope by bundling requirements/tasks			
Provide mechanism for follow-on operations and/or maintenance			
Facilitate innovative financing			
Leverage project's revenue generation potential			
Procurement time	X	X	X
Procurement cost (internal and/or external)	X	X	X
Other: Try new innovation (i.e., model-based design and construction)	X	X	X

[1]Primarily chosen for flexibility in design and construction.

During the process of selecting an ACM, all projects go through a risk analysis. This includes assessing project scope, schedule, cost, and contracting risk. It involves both qualitative and quantitative risk analyses and may include brainstorming, scenario planning, expert interviews, and Monte Carlo simulations. The level of effort for the risk analysis is scaled to the size of the project. For larger projects (over $300 million), consultants usually direct a more formal risk analysis. The risk assessment's output includes a risk register, risk management plan, and risk mitigation plan. These are used to help choose the proper ACM and develop the procurement documents. UDOT staff feels the agency has been very successful with the use of ACMs and its current processes. Although there is no formal process for evaluation, they work collaboratively and they learn from their successes and shortcomings with each ACM contract.

Funding and financing options are considered as part of a 5-year program defined by a State Transportation Improvement Plan (STIP). Projects included in the STIP are allocated funds accordingly. Typically, funding and financing do not affect selection of an ACM.

Generally, ACM use has met stated project goals. Successes with ACMs have been crucial in the continued funding that UDOT receives from its State legislature, and consequently the ACM program has continued to grow. UDOT's first successful ACM project was the I-15 Design-Build Reconstruction Project completed in advance of the 2002 Winter Olympics. An unprecedented amount of work was completed in a short period, and this project became the springboard for the use of ACMs.

UDOT does not have a formal process to evaluate ACM performance. The Office of Innovative Contracting collaborates with other UDOT staff to informally track ACM performance and lessons learned. There is no formal database. They do believe that it would be beneficial to have information on schedule, final construction, and design costs versus engineer estimates and on change orders. They also expressed an interest in cost and schedule comparisons between different ACMs, but there was concern about being able to compare "apples to apples."

UDOT has a progressive environment that encourages innovation. With its ACM use dating back more than two decades to the I-15 Design-Build Reconstruction Project, the agency continues to build on its experience, and with each ACM success, it has gained the confidence of the legislature and the public. Equally important to the successful implementation of the innovative contracting program is the unique partnering environment that UDOT has with its contractors. Due to this experience and to buy-in from the contracting community, legislative funding and politics have not been an issue and do not factor in ACM selection. UDOT is open to using all types of ACMs to deliver its program better, and there are no legal barriers to ACM use.

With CM/GC, one challenge for UDOT is involvement in the sometimes-unpleasant price development and negotiation process. A competitively bid environment is more comfortable for DOTs because they do not have a role in price development beyond preparing an engineer's estimate when the project is let. Utah does not usually finance projects. If it does have a need for financing, the agency has a very good bond rating that allows it to borrow money with low interest rates. Because of its available cash flow and ability to borrow money cheaply, P3s have not been a practical option.

Due to the vast experience that UDOT has with ACM use, its staff members understand the peaks and valleys. They have a broad view based on this long history, affording them the opportunity to use any challenges encountered to improve the program without concerns that it will damage future ability to use ACMs. UDOT's primary focus is to continue that tradition of excellence and maintain the trust and confidence the agency currently enjoys.

Procurement Process

UDOT's ACM procurement process includes best value, QBS, and build to budget. Its ACM preferences for each method are as follows:

- Best value: preferred for DB selection.

- QBS: used for CM/GC selection.
- Build to budget: desire to maximize work for a fixed budget; used in conjunction with DB delivery.

UDOT primarily uses best value for DB selection. Historically, the agency based it on 90 percent bid and 10 percent technical score. This has resulted in essentially a low-bid selection. As a result, DB teams stopped putting as much effort into their proposals because it did not make a difference. At the request of the contracting community, UDOT has begun increasing the weight of the technical score to as much as 30 percent. The agency has concerns about how it may be perceived when a successful bidder is not the low bidder, especially if there is a significant difference in price. The QBS process is mostly used for CM/GC, which is primarily used for complex projects where a contractor is needed during the design phase. UDOT also currently has one progressive DB project, which was selected using a best-value approach.

Achieving Value through Contracting Method Selection

UDOT staff were asked their opinions on each ACM's ability to add value to their department's capital project delivery process. Table 24 reflects how each ACM in use affects the quality of different project aspects. Table 25 identifies how each ACM affects the value of a list of preconstruction services for typical projects within the department.

A rating of 1 to 5 was assigned based on the department consensus, where 1 indicates worst, 2 indicates worse, 3 indicates neutral, 4 indicates better, and 5 indicates best.

Table 24. UDOT perspective on ACM impacts on various project aspects.

Project Aspects	DBB	CM/GC	DB	P3	ID/IQ
Completeness of final design deliverables	5	4	3	-	-
Accuracy of design calculations	3	5	4	-	-
Accuracy of quantities	3	5	4	-	-
Acceptance of design deliverables	-	-	-	-	-
Accuracy of specifications	5	3	4	-	-
Accuracy of as-built documents	3	4	5	-	-
Accuracy/applicability of O&M manuals, etc.	NA	NA	NA	-	-
Implementation of approved QA/QC plans	3	4	5	-	-
Accuracy of preconstruction cost estimates	4	5	3	-	-
Ability to achieve post-award budgets	3	5	4	-	-
Accuracy of preconstruction schedules	4	3	5	-	-
Ability to achieve post-award schedules	4	3	5	-	-
Material quality	All similar. Not specific to delivery method.			-	-
Workmanship quality				-	-
Aesthetics	1	2	3	-	-
Maintainability	All similar. Not specific to delivery method.			-	-
Operability				-	-
Maintenance of traffic	-	-	-	-	-
Interest to potential bidding community	3	4	5	-	-

Table 25. UDOT perspective on ACM impacts on value of preconstruction services.

Preconstruction Service	DBB	CM/GC	DB	P3	ID/IQ
Conceptual estimating	3	4	3	-	-
Value analysis/value engineering	3	1	3	-	-
Design charrettes	1	4	4	-	-
Design reviews	3	5	5	-	-
Regulatory reviews	2	2	2	-	-
Security impact studies	1	1	1	-	-
Environmental studies	2	4	5	-	-
Early contractor involvement	1	5	5	-	-
Design alternates	1	5	5	-	-
ATCs	1	1	5	-	-
Cost engineering reviews	4	5	4	-	-
Constructability reviews	3	5	4	-	-
Biddability reviews	3	5	4	-	-
Operability reviews				-	-
Life cycle cost analysis	3.5	3.5	3.5	-	-

Observations of the Researchers

- UDOT has not identified a need for a formal ACM selection tool, but the staff seemed open to evaluating one for potential use if it were available.
- UDOT expressed that any tool must have flexibility in interpreting the results so that professional judgments can be made based on external factors that are not in the model. UDOT has had an incredible amount of success with ACM use based on employing past experience to make ACM selection decisions. If available, UDOT would welcome a tool that would track project success and better help the agency tell its story.

Virginia DOT

Richmond, VA

Table 26. VDOT ACM experience.

ACM Experience	CM/GC	DB	P3	ID/IQ
ACMs authorized	No	Yes	Yes	Yes
ACMs in use	-	Yes	Yes	Yes
Number of projects	-	over 10	6–10	-
ACM percent of annual budget	-	11–25%	11–25%	-
If not used, why?	-	NA	NA	only used for preventative maintenance

Table 27. VDOT ACM selection rationale.

ACM Selection Rationale	CM/GC	DB	P3	ID/IQ
Accelerate schedule	-	Yes	Yes	-
Improve cost performance	-	No	Yes	-
Enhance quality	-	No	Yes	-

ACM Delivery Structure

The Virginia DOT (VDOT) employs a combined organizational structure to deliver ACM projects. VDOT has two distinct units that handle its ACM program: the Alternative Project Delivery Division and the Office of Public-Private Partnerships.

The Alternative Project Delivery (APD) Division is responsible for the State's Design-Build and Consultant Procurement Programs. It reports to the Deputy Chief Engineer and, subsequently, to the Chief Engineer. The Office of Public-Private Partnerships (P3 Office) is responsible for P3 projects authorized by the Public-Private Transportation Act (PPTA), and it reports to the Chief Financial Officer and, subsequently, to the Chief Deputy Commissioner. The office also provides support to the Department of Rail & Public Transport. These units work with other central offices, and they are responsible for pre-award activities, procurement, and awarding the ACM projects. Once a DB or P3 project is awarded (including asset O&M), it is transferred to the appropriate district office for implementation and contract administration. Support is still provided by the P3 Office.

ACM Decision-Making

Design-Build

VDOT districts identify candidate potential ACM projects and send the list to the APD Division. In conjunction with other VDOT districts and Central Office divisions, the APD Division determines which of the ACM candidates will proceed as ACM projects. That decision is validated and passed to upper management to provide a "statement of need."

VDOT's APD Division does not have a formal policy or procedure to determine which projects are potential ACM candidates. It relies on the districts to make the initial identification based on the circumstances and conditions in which the project must be delivered. The Division considered formalizing the process but decided not to so that it could retain the maximum amount of flexibility in the decision-making process. Additionally, the Division has a highly mature ACM program, which has produced highly satisfactory results, making the potential value added by formalizing the decision process questionable.

The driving factors in the ACM selection decision are the need for an accelerated delivery schedule and the project's technical complexity. The other main factors that lead to ACM selection are the level of project design at the time the decision is made, project environmental issues, the number of third-party stakeholders, and the need to obligate the funding before it expires.

Design-build is selected for the following reasons:

- Accelerated delivery — the most important.
- Complex project requirements.
- Early budget establishment.
- Early contractor involvement.
- Enhanced innovation with ATCs.
- Risk transfer.
- Internal and external support for the delivery method.

Once the decision is made to use an ACM, a risk assessment workshop is convened that includes stakeholders from the district and the central office. The risk workshop is performed to validate the ACM decision. It includes assessment of project scope, schedule, cost, and contracting risk. It involves both qualitative and quantitative risk analyses, which may include brainstorming, scenario planning, expert interviews, and Monte Carlo simulations. If the workshop does not validate the decision, then DB will not be used.

The availability of funding is not a factor in selecting DB. The workshop's output includes a risk register, risk management plan, and risk mitigation plan. These are used to develop project-specific special contract provisions.

VDOT has dashboard performance measures for ACM cost and schedule performance. It also conducts a formal evaluation of the design-builder's performance, which may be used for future selection processes (this implementation tool has not yet been approved for use).

VDOT believes its ACM selection process is no longer evolving and it sees no barriers to continuing with DB. The agency is not interested in using CM/GC. The one potential improvement is to enforce the use of the VDOT lessons learned capture and dissemination process. It is also developing a progressive DB process, which only requires internal approval as the current enabling legislation does not prohibit or constrain progressive DB.

Public-Private Partnerships

VDOT has an established process for identification and selection of projects for delivery as P3s, which is described in the 2017 PPTA Implementation Manual and Guidelines. These guidelines have been amended several times, with the first version published in October 2005. An overview of this process is shown in Figure 1.

The process involves three major stages: (1) project identification and screening, (2) project development, and (3) project procurement. The key participants in the process are:

- Commissioner of Highways (CEO in Figure 1)
- Commonwealth Transportation Board (CTB)
- PPTA Steering Committee
    - Deputy Secretary of Transportation (Chair)
    - Two members of CTB (usually representatives from the project region)
    - Staff Director of House Committee on Appropriations (or designee)
    - Staff Director of Senate Committee on Finance (or designee)
    - Chief Financial Officer of VDOT
    - Non-agency public financial expert (selected by Secretary of Transportation)
- Office of Public-Private Partnerships (P3 Office)

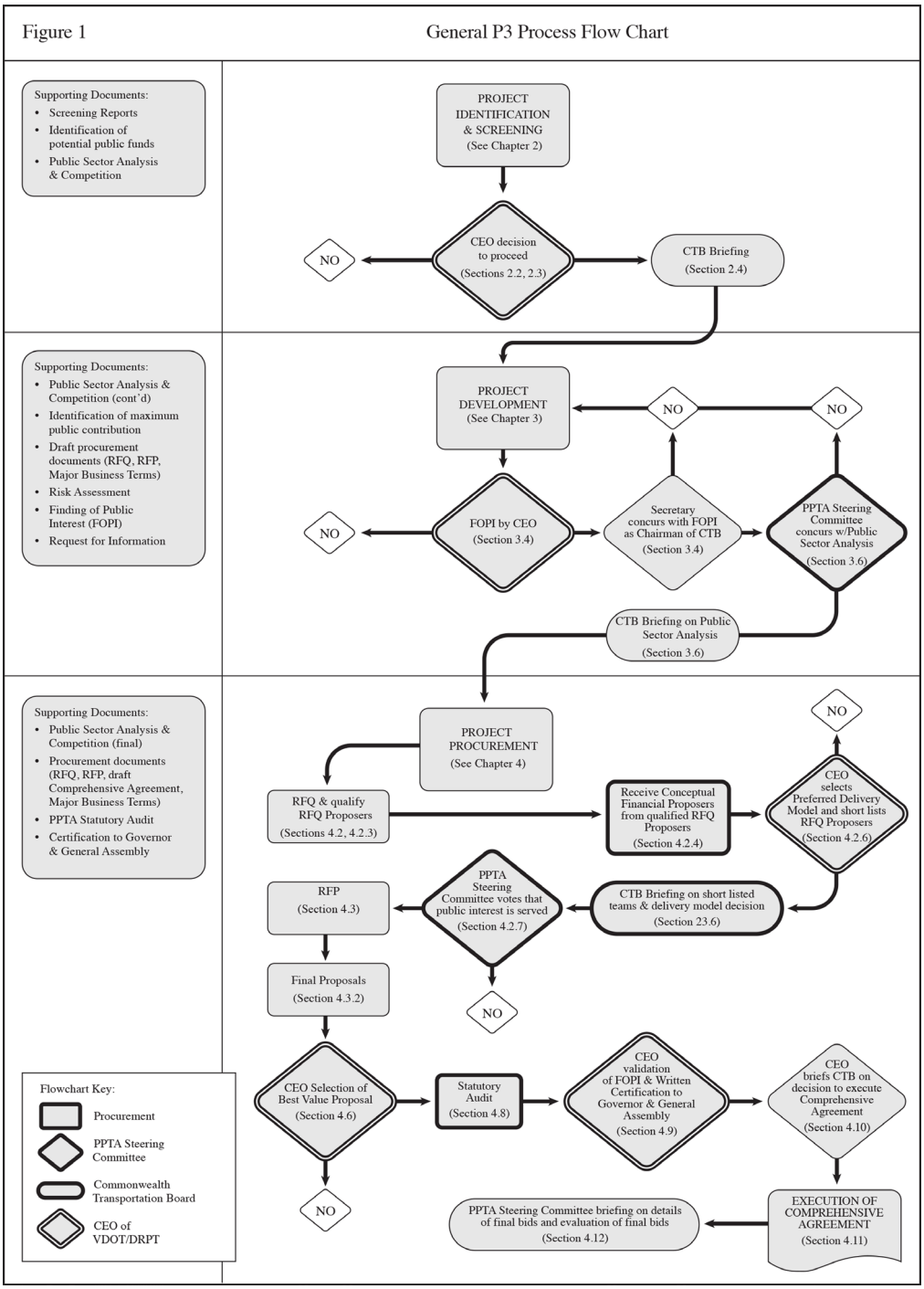
The Commissioner and the PPTA Steering Committee have several points in the process where they decide whether a project is suitable for P3 delivery. The Secretary of Transportation, as Chair of the CTB, also has a distinct point to make this decision as well. The supporting information for those decisions is documented by the Commissioner in a Finding of Public Interest (FOPI).

Candidate projects either are developed by the P3 Office for consideration as solicited projects or can be submitted by private entities as unsolicited proposals. Solicited projects undergo qualitative and quantitative screening. The quantitative screening involves conducting the Public Sector Analysis and Competition (PSAC) to determine whether a P3 project provides more benefits to users than a conventional approach. The PSAC process is iterative and progresses as a project moves forward. This process was recently adopted. The P3 Office uses the PSAC approach rather than the more well-known Value for Money (VfM) analyses since it (1) determines whether a P3 delivery is in the public's interest as opposed to generating value for money and (2) is designed to ultimately provide data rather than forecasts to support the P3 delivery decision. The P3 Office submits screening reports and initial PSAC findings to the Commissioner, who decides whether to proceed. Unsolicited proposals are evaluated by the P3 Office and a recommendation about whether they should advance to the project development phase is submitted to the Commissioner.

If a candidate project proceeds, the CTB receives a briefing prior to the start of the project development stage. In the project development stage, several supporting documents are generated, including the next iteration of the PSAC and, notably, the FOPI document. The Commissioner, the Secretary of Transportation, and the PPTA Steering Committee will review the project and supporting documentation during this phase to make go/no-go decisions.

If a project proceeds to procurement stage, the P3 Office generates a request for quotes, an RFP, and a comprehensive agreement. The PSAC is also finalized. The Commissioner has two additional opportunities to review the project's suitability for P3 delivery, and the PPTA Steering Committee affirms whether the best interest of the public is served. In addition, a statutory audit is completed.

In summary, VDOT's P3 process has evolved over time based on past project experience as well as executive and legislative changes and input. This process contains multiple stages and several checkpoints for go/no-go decisions. Further, the PSAC process is an improvement from customary VfM methods. The P3 Office is currently developing guidelines for the PSAC.



Source: VDOT[2]

Figure 1. VDOT P3 process flowchart.

[2] Virginia Department of Transportation (VDOT). (2017). "The Commonwealth of Virginia PPTA Implementation Manual and Guidelines." 1995 (October), Richmond, VA.

More generally, projects are considered P3 candidates for the following reasons:

- Projected revenue generator—most important by far.
- Redistributed or transferred risk.
- Accelerated delivery.
- Early contractor/private entity involvement.
- Complex project requirements.
- Project financing options.
- Stakeholder support for project.

A project must have revenue generation potential since current restrictions in Virginia preclude the use of the availability payment P3 model. This eliminates a number of projects from consideration for P3 delivery, and it is a barrier to bundling requirements into a program such as bridge preservation or rehabilitation projects. Another important consideration is the ability to leverage Federal programs such as the Value Pricing Pilot Program and the Interstate System Reconstruction and Rehabilitation Pilot Program.

Formal risk analysis is done for each project. Like the APD Division, the P3 Office conducts risk workshops where risks related to scope, schedule, cost, and contracting are evaluated and a range of outcomes are considered. Techniques for risk analysis include brainstorming, scenario analysis, expert consultation, and risk diagramming. Comprehension of a project's risks is crucial for the PSAC process as well as for evaluating a project's general suitability for P3 delivery. Key outputs from the workshops are a risk register, risk management plan, and a risk mitigation plan. The P3 Office's methods for risk assessment and management are documented in the 2015 P3 Risk Management Guidelines.

Overall, the P3 Office believes that the P3s implemented have achieved the stated objectives. While some projects have experienced issues, the outcomes on average have been satisfactory. The office considers its processes and practices mature, and it is now adjusting or tweaking its program rather than making any stepwise or quantum changes. Areas for improvement include:

- Better hand-off process for project implementation by district offices, particularly delineation of roles and responsibilities.
- Enhancement of district office competencies for P3 project implementation and oversight.
- Identification and utilization of internal and programmatic performance metrics to track project preconstruction, construction, and O&M outcomes; in hindsight, this is an area that the office should have initiated much sooner, but its operational pace was a hindrance.
- Better contract development and management; to this end, the office has started a Strategic Contract Management Program.

Procurement Process

Design-Build
The APD Division's procurement process includes low bid, best value, lump sum, and QBS-negotiated price options. All of them have statutory constraints, which influence the procurement process selection decision. Its preferences for each method are as follows:

- Low bid: simple project.
- Best value: need well-qualified contractor, need to move rapidly into construction, and need to justify selection to public.
- QBS-negotiated: highly complex project, need design-builder involvement in environmental process.

The low-bid DB award process includes short-listing, financial prequalification, bonding requirements, and application of DBE program requirements as well as evaluation of qualifications and price. The best value process also includes evaluation of design approach, ATCs, schedule, and environmental and safety plans.

Public-Private Partnerships
The P3 Office uses best value and QBS-negotiated price options. Likewise, their use has statutory constraints. Their award processes involve short-listing, evaluation of qualifications, evaluation of design and schedule approach, compliance with DBE program requirements, and evaluation of financial and asset management plans. It is extremely important for the P3 Office to be able to justify its selection to higher authorities.

Achieving Value through Contracting Method Selection

VDOT staff were asked their opinions on each ACM's ability to add value to their department's capital project delivery process.

Table 28 reflects how each ACM in use affects the quality of different project aspects. Table 29 identifies how each ACM affects the value of a list of preconstruction services for typical projects within the department.

A rating of 1 to 5 was assigned based on the department consensus, where 1 indicates worst, 2 indicates worse, 3 indicates neutral, 4 indicates better, and 5 indicates best.

Note: CM/GC and ID/IQ were not included for comparison as CM/GC is not authorized and the two units interviewed reported limited use of ID/IQ.

Table 28. VDOT perspective on ACM impacts on various project aspects.

Project Aspects	DBB	DB	P3
Completeness of final design deliverables	5	4	3
Accuracy of design calculations	5	3	3
Accuracy of quantities	5	3	3
Acceptance of design deliverables	5	4	3
Accuracy of specifications	5	3	3
Accuracy of as-built documents	5	5	3
Accuracy/applicability of O&M manuals, etc.	-	-	3
Implementation of approved QA/QC plans	5	4	3
Accuracy of preconstruction cost estimates	3	3	4
Ability to achieve post-award budgets	2	5	5
Accuracy of preconstruction schedules	3	5	3
Ability to achieve post-award schedules	3	4	3
Material quality	5	5	3
Workmanship quality	4	4	3
Aesthetics	5	4	3
Maintainability	3	3	4
Operability	-	-	4
Maintenance of traffic	4	5	3
Interest to potential bidding community	5	5	5

Table 29. VDOT perspective on ACM impacts on value of preconstruction services.

Preconstruction Service	DBB	CM/GC	P3
Conceptual estimating	3	-	3
Value analysis/value engineering	4	-	4
Design charrettes	-	-	4
Design reviews	5	-	4
Regulatory reviews	3	-	4
Security impact studies	3	-	-
Environmental studies	4	-	4
Early contractor involvement	1	-	5
Design alternates	3	-	4
ATCs	1	-	4
Cost engineering reviews	4	-	5
Constructability reviews	4	-	5
Biddability reviews	5	-	-
Operability reviews	5	-	4
Life cycle cost analysis	5	-	4

Observations of the Researchers

- VDOT does not want a formal ACM selection tool. The staff believes that the development of a one-size-fits-all model is impossible. Additionally, if one were adopted, the agency would lose the flexibility to make professional judgments based on external factors that are not in the model.
- VDOT would welcome a tool that would provide a ranking of procurement methods for a given DB project to assist staff in making that decision.
- VDOT is beginning to look into "resiliency" as a design and/or construction criterion for DB and P3 ACM selection and contract award. It has nothing formal yet, but the interviewee sees the possibility for this to become a reality in the near future.
- If a tool were available that somehow assessed potential ACM cost, time, quality, etc. benefits, VDOT would not believe it nor use it.
- The P3 Office has a well-established process for identification and selection of P3 projects. This process has evolved over time and, in its current state, reflects recent attention on how VDOT selects and implements projects of this nature so that they meet multiple stakeholder interests and sustain some level of legislative oversight.

- The P3 Office's transition to its PSAC approach is a consequence of the lack of executive and legislative confidence in VfM studies. At this point, it is difficult to judge how effective the PSAC process will be.
- The P3 Office is subject to significant scrutiny, which influences how it does its business.

Washington State DOT

Washington State Highways, Ferries, Rail, and Aviation
Olympia, WA

Table 30. WSDOT ACM experience.

ACM Experience	DBB	CM/GC[1]	DB	P3	ID/IQ
ACMs in use	Yes	No	Yes	No	Yes
Number of projects	over 130 per year	NA	over 10	NA	NA
ACM percent of annual budget	25%	NA	75%	NA	NA
If not used, why?	-	-	-	-	-

[1] WSDOT used CM/GC (general contractor/construction manager [GC/CM] in Washington State terminology) for the Seattle Multi-modal Terminal Project and has no plans in the immediate future to use CM/GC for any upcoming projects until it assesses outcomes and lessons learned by local agencies in Washington State and elsewhere.

Table 31. WSDOT ACM selection rationale.

ACM Selection Rationale	DBB	CM/GC	DB	P3	ID/IQ
Accelerate schedule	No	NA	Yes	NA	NA
Improve cost performance	No	NA	Yes	NA	NA
Enhance quality	No	NA	Yes	NA	NA

ACM Delivery Structure

The ACM focus at the Washington State DOT (WSDOT) was initially on achieving DB legislation authorization and getting the DB program running smoothly. This allowed for greater buy-in from within the agency and from stakeholders before WSDOT turned its focus to other ACMs. CM/GC, progressive DB, and P3 may be used in the future. Washington is a unique State in that the DOT may get authority to use any type of ACM. WSDOT currently has a group dedicated to working on the P3 method. Historically, selection of an ACM has depended largely on project schedule; additionally, the State's legislature has encouraged the use of DB as a delivery method. They are very cautious and deliberate about implementing a new ACM and involve local industry and consultants in the development process. WSDOT's implementation of DB is a good example of that.

ACM Decision-making

The decision on which ACM to use is a regional administrative staff decision; WSDOT is not a centralized organization when it comes to delivery and procurement. During the decision-making process, no outside agencies are involved. Individual regions make decisions with their project engineering teams. In general, the process is a two-stage process as follows:

- Early probable choice.
- Final decision after scoping.

When making the decision to use ACMs, considering project-specific factors is key. Many factors are considered in the decision, as shown in Table 32. Additionally, the table shows which factors drive the use of one ACM over other methods. The Xs indicate the factors considered in ACM selection.

Table 32. Factors WSDOT considers when selecting ACMs.

Project Factor	Considered in decision	Drives use of ACM
Project monetary size	X	X
Project budget control issues	X	
Project schedule issues	X	X
Project technical complexity	X	X
Project level of design	X	
Project type (new build vs. enhancement/improvement)	X	
Project location (urban, suburban, rural)		
Project environmental issues	X	
Project third party interface issues	X	
Project quality assurance requirements		
Project life cycle issues (maintenance/operations)		
Obligate funding	X	X
Incentives for obtaining Federal or State funding		
Project has revenue generation potential		
Project amenable to performance-based specifications		
Project stakeholders (range and level of interest)	X	
Project financing options		

Table 33 shows the factors considered when choosing DB, specifically. The Xs indicate the primary factors for selection. Of these factors, the single most important is the encouragement of innovation.

Table 33. Factors WSDOT considers in selecting DB.

Item	Design-Build
Reduce/compress/accelerate project delivery period	X
Establish project budget at an early stage of design development	
Get early construction contractor involvement	
Encourage innovation through performance requirements	
Encourage innovation through ATCs	X
Facilitate value engineering	
Encourage price competition (in procurement process)	
Compete different design solutions through the proposal process	
Manage risk	X
Complex project requirements	X
Flexibility needs during construction phase	
Reduce life cycle costs	
Increase scope by bundling requirements/tasks	
Provide mechanism for follow-on operations and/or maintenance	
Innovative financing	
Project is a revenue generator	
Procurement time	
Procurement cost (internal and/or external)	
Other: Try new innovation (i.e., model-based design and construction)	

During the ACM selection process, all projects go through Project Delivery Method Selection Guidance (PDMSG), which WSDOT created based on the University of Colorado and Colorado DOT selection process and tailored to its program. The most current version of this selection guidance was issued in March 2017 and is a more simplistic version of the original PDMSG, scaled down to exclude extraneous factors. This refined PDMSG is a systematic, scalable selection process that identifies how and when a project should be assessed for project delivery and provides documentation for approvals and endorsements. WSDOT worked in collaboration with the Associated General Contractors of Washington and the American Council of Engineering Companies' Washington chapter to develop the PDMSG. It originally evaluated

DB, DBB, and CM/GC; however, it currently does not evaluate CM/GC, as that method is not being used. Regional WSDOT authorities typically provide approval of final project delivery method decisions, with additional approvals necessary for larger projects or special cases.

WSDOT's PDMSG is integrated with the existing project development process, and all projects are ultimately evaluated in two steps:

- The probable project delivery method (PDM) is established during the scoping phase prior to the approval of the project profile by WSDOT Region Program Management Offices while collaborating with region subject matter experts.
- The final PDM is determined once the project profile is approved, a work order is set up for the project, and the project is assigned to a region project engineer's office. This final PDM is determined at approximately 10- to 30-percent design.

The process to determine the probable PDM and the final PDM is scalable to fit the size and the complexity of the project. For projects less than $2 million, the default is DBB and programmatically exempt, meaning authorizations are not needed. For projects between $2 million and $25 million, a selection checklist is used during the final PDM to quickly identify projects that have an obvious optimal PDM. For projects over $25 million but less than $100 million, the selection checklist and a selection matrix are used for complex projects to determine the final PDM. Lastly, for projects over $100 million, the selection matrix and a workshop are required to determine the final PDM.

The selection checklist asks four basic screening questions, all of which have a yes or no answer. If yes is selected for any of the questions, then DB is considered a viable option. The next section asks a series of yes/no questions in four categories, including schedule, innovation, complexity, and cost. These answers are organized into two columns: DB and DBB. The equally weighted answers for each column are then summed to determine the most advantageous PDM. For more complex projects (i.e., over $25 million), if the checklist results are inconclusive or a more in-depth analysis is necessary to justify the selection, the PDM selection matrix is used.

The matrix is goal-driven and identifies project goals in each general category, including schedule, cost/funding, standards, and function or innovation. The user is then directed to select project goals (usually four or five) and select weightings for each of these goals based on priority. The template includes a generic 2-point range for each of the rating values, which are intended to represent the probability that the PDM will achieve the goal, but these can be modified as appropriate on a scale from 1 to 10. Funding decisions are made by the Washington State legislature; original project or program funding may be revisited through the annual legislative budget process. Funding and financing does not generally factor into PDMSG decision-making.

For the most part, project goals are met by ACMs. The State has had very few unfavorable performance evaluations for DB, but the assessment process could still be improved. For the traditional DBB program, WSDOT produces a contractor evaluation report form for each project,

similar to the process being used in Virginia. The report assesses project management, subcontractor management, DBE utilization, and quality of work. This performance report feeds into a contractor's prequalification past performance rating, and WSDOT is currently working on designing a DB evaluation form based on the one in use by Virginia DOT.

Decision-making could be improved in the State via the development of an ATC database, which was recommended by a legislative review of the WSDOT DB program. A database of lessons learned would also aid in identifying challenges and solutions. WSDOT can track performance, but performance data is not currently being used. An improved database for this data could help both capture and evaluate project decision-making. WSDOT currently uses a construction-auditing database for the standard construction program. Some data is being gathered but is not being used programmatically. This system has limitations, and WSDOT is currently seeking to replace it. Despite this, the implementation of DB has led to greater acceptance of ACMs. DB was originally limited to the Puget Sound region, but is now spreading to more regional offices. Implementation has resulted in a more mature program, improved innovation, schedule compression, and a larger dedicated DB staff performing training as well as other functions. See *Final Report: Review of WSDOT's Implementation of Design-Build Project Delivery*.

Over time, the ACM decision-making process has evolved from a relatively informal process, to the adoption of the CDOT decision process, to the current simplified PDMSG procedure. The program continues to mature, and WSDOT now has an updated DB manual, which is online and publicly accessible. Additional staff have been assigned to the DB program and trained. The State's legislature is very supportive of DB, but this is limited to projects greater than $2 million.

Some regional offices have limited experience with DB, which does provide some concern. Additionally, there is concern regarding the availability of qualified contractors, as the market condition in the Puget Sound is trending toward a buyer's market. The region is on pace to require $30 billion in work in the next 5 years. Going forward, WSDOT believes its selection process works well. Comments have been made about the process still being too cumbersome or not streamlined enough, which will be considered when updates are made in the future.

A formal cost-risk assessment is performed for large projects and does not have to validate the ACM decision. More informal assessments, such as task force meetings, are done for smaller projects. WSDOT defines large projects in its Cost Estimate Validation Process (CEVP®), which can be found on WSDOT's Cost Risk Assessment and CEVP® website. These assessments include project scope, project schedule, and project cost during analysis. Monte Carlo simulation and less formal qualitative risk assessments are also used. WSDOT has some of the most comprehensive and formal guidelines for risk management and performing risk assessments in the industry, including qualitative and quantitative risk assessment and analysis techniques. Risk register, risk management plans, risk mitigation plans, and contingency management techniques are used for larger projects. Currently, WSDOT maintains a formal risk allocation matrix for DB

contracts for several years. The risk allocation can be modified as needed to suit the specific project risk profile.

Procurement Process

Constraints in the procurement process are shown in the following table. Legislation for DB requires a two-step, best-value process to be used to evaluate criteria such as cost and technical weightings.

Table 34. WSDOT procurement process constraints.

Constraint	Low-bid	Best Value	Qual-based	Neg-Reimb	Remarks
State law		X			*Legislation for DB requires a best-value process*
Procurement regulations		X			*Current procurement regulations for DB call for a two-step best-value process with specific criteria, cost/technical weightings, and award algorithm*

Aside from constraints, the procurement preferences of the department were queried and the results are shown in Table 35.

Table 35. WSDOT procurement process preferences.

Preference	Low Bid	Best Value	Qual-based	Neg-Reimb	Remarks
Desire to not change past procurement methods		X			
Desire to eliminate firms with poor past records from competition		X			
Desire to encourage firms with good past records to compete		X			
Need to ensure selection of well-qualified designers and/or builders		X			

Lastly, the award method algorithms shown in Table 36 designated by the Xs are used during award for the specified procurement methods.

Table 36. WSDOT award algorithms by ACM.

Component	Low Bid	Best Value	Qual-based	Neg-Reimb	Remarks
Short-list		X			
Financial prequalification		X			
Evaluation of qualifications		X			
Alternative design concepts		X			
Evaluation of design approach		X			
Schedule evaluation		X			
Quality management plan (QMP) evaluation		*			**Don't ask for and evaluate QMP until after award/execution*
Environmental plan evaluation		*			**If plan deviates from permit*
Security plan evaluation					
Safety plan evaluation					
Price evaluation		X			*Part of final evaluation. If using an upset price, evaluation is only in terms of compliance with upset price*
Bonding requirements		X			
DBE goals		X			

Achieving Value through Contracting Method Selection

WSDOT staff were asked their opinions on each ACM's ability to add value to their department's capital project delivery process. Table 37 reflects how each ACM in use affects the quality of different project aspects. Table 38 identifies how each ACM affects the value of a list of preconstruction services for typical projects within the department.

A rating of 1 to 5 was assigned based on the department consensus, where 1 indicates worst, 2 indicates worse, 3 indicates neutral, 4 indicates better, and 5 indicates best.

Table 37. WSDOT perspective on ACM impacts on various project aspects.

Project Aspects	DBB	CM/GC	DB	P3	ID/IQ
Completeness of final design deliverables	5	N/A	4	N/A	N/A
Accuracy of design calculations	5	N/A	3	N/A	N/A
Accuracy of quantities	5	N/A	3	N/A	N/A
Acceptance of design deliverables	5	N/A	4	N/A	N/A
Accuracy of specifications	5	N/A	4	N/A	N/A
Accuracy of as-built documents	5	N/A	3	N/A	N/A
Accuracy/applicability of O&M manuals, etc.	N/A	N/A	3	N/A	N/A
Implementation of approved QA/QC plans	3	N/A	4	N/A	N/A
Accuracy of preconstruction cost estimates	3	N/A	4	N/A	N/A
Ability to achieve post-award budgets	2	N/A	4	N/A	N/A
Accuracy of preconstruction schedules	3	N/A	4	N/A	N/A
Ability to achieve post-award schedules	3	N/A	4	N/A	N/A
Material quality	5	N/A	4	N/A	N/A
Workmanship quality	5	N/A	4	N/A	N/A
Aesthetics	3	N/A	3	N/A	N/A
Maintainability	5	N/A	3	N/A	N/A
Operability	5	N/A	3	N/A	N/A
Maintenance of Traffic					
Interest to potential bidding community	3	N/A	4	N/A	N/A

Note: WSDOT does not include maintenance in DB, so therefore does not use DBOM or design-build with warranty.

Table 38. WSDOT perspective on ACM impacts on value of preconstruction services.

Preconstruction Service	DBB	CM/GC	DB	P3	ID/IQ
Conceptual estimating	4	N/A	3	N/A	N/A
Value analysis/value engineering	4	N/A	3	N/A	N/A
Design charrettes	2	N/A	2	N/A	N/A
Design reviews	4	N/A	2	N/A	N/A
Regulatory reviews	4	N/A	4	N/A	N/A
Security impact studies	2	N/A	2	N/A	N/A
Environmental studies	2	N/A	4	N/A	N/A
Early contractor involvement	1	N/A	4	N/A	N/A
Design alternates	3	N/A	3	N/A	N/A
ATCs	1	N/A	5	N/A	N/A
Cost engineering reviews	3	N/A	4	N/A	N/A
Constructability reviews	3	N/A	4	N/A	N/A
Biddability reviews	3	N/A	3	N/A	N/A
Operability reviews	3	N/A	3	N/A	N/A
Life cycle cost analysis	4	N/A	2	N/A	N/A

Observations of the Researchers

- WSDOT's team is very comfortable with the DB process. The legislature in the State is strongly supportive of ACM usage and has embraced it. Results have been broadly positive, and DB use is growing to include smaller regional offices. WSDOT staff like the current decision-making tool being used and feel it is well understood by the regions using it. The team is also open to learning from other States' experiences, as this is how they developed their guidelines.

WSDOT Simplified Project Delivery Method Selection Guidance

Simplified Project Delivery Method Selection Guidance

March 02, 2017

Purpose:

In alignment with Reform VII, this guidance aids WSDOT staff in evaluating projects for the most appropriate Project Delivery Method (PDM). Each project's attributes, opportunities and risks will be considered in identifying the most cost effective and best value delivery method.

Goals:

1. Establish a systematic consistent approach to be applied throughout WSDOT,
2. Establish how and when a project should be assessed,
3. A scalable selection process,
4. Provide the documentation for PDM approval,
5. Identify approval levels and endorsements in the process.

Historically, Design-Bid-Build (DBB) has been the default for WSDOT projects unless an Alternative PDM, such as Design-Build (DB) or General Contractor/Construction Manager (GCCM) was pursued. In those cases, internal approval was required from the WSDOT Chief Engineer.

WSDOT is legislatively pre-approved and strongly encouraged to use DB as a PDM for projects with a cost of $2 Million and greater. The use of GCCM by WSDOT currently requires approval from the Capital Projects Advisory Review Board, a separate entity outside of WSDOT.

Consistent with the goals identified above, WSDOT, working in collaboration with the Association of General Contractors (AGC) of Washington and the Association of Engineering Companies (ACEC), has developed the Project Delivery Method Selection Guidance (PDMSG) as outlined in this document. This guidance will be applied to all WSDOT projects from this point forward to determine the optimal PDM. Originally, the PDMSG evaluated three methods: DBB, DB, and GCCM. At this point, GCCM is set aside. Regional authorities will typically provide the approval of the Final PDM with additional approvals for larger projects and special cases.

The PDMSG focus group evaluated selection processes of other DOT's and agencies in US and Canada. The Project Delivery Selection Matrix from University of Colorado, Boulder, and Colorado DOT was selected as a foundation for developing WSDOT's PDMSG (See http://www.colorado.edu/tcm/project-delivery-selection-matrix. The guidance in this document is tailored to incorporate WSDOT's policies and values while retaining the data and evaluation criteria applicable to all transportation projects. After…

WSDOT's Simplified Project Delivery Method Selection Guidance is available here:

https://www.wsdot.wa.gov/publications/fulltext/design/PDMSG.pdf

Australia: North East Link Project

Contracting Method Selection in Australia

Purpose

This case study analyzes the contracting method selection approach adopted in Australia, specifically the selection methodology followed for the North East Link Project (NELP) in Victoria. Several projects on the Infrastructure Priority List of Infrastructure Australia were considered for this case study. NELP was selected from among the candidates due to its scale and complexity; further, the decision-making processes followed to determine the project's scope and contracting method were well documented compared to other candidates. Based on these factors, it was selected for further study.

NELP is referred to as the "missing link" in the metropolitan ring road network of Melbourne. Currently, the arterial road network supports orbital trips of freight and vehicular traffic in the northeastern region of Melbourne. Due to increasing safety concerns and congestion, the Victorian Government has decided to proceed with the project.

The North East Link Authority was established to oversee various aspects of the project's development, such as preparation of the business case, selection of the procurement option (i.e., contracting method), selection of the developer, and construction of the project corridor.

National Environment

The major parties involved in infrastructure development in Australia include:

- Department of Infrastructure, Regional Development and Cities: Handles various aspects of the infrastructure development like the creation of policies and programs, implementation of infrastructure plans, and infrastructure investment decisions.
- Infrastructure Australia (IA): An independent statutory body to prioritize nationally significant infrastructure. IA prepares an infrastructure priority list and audits Australia's infrastructure to assess future needs. The infrastructure priority list includes projects from different States based on the business cases submitted by the States. The projects on the priority list receive special consideration for funding. IA also prepares national infrastructure plans recommending changes in the planning, funding, delivery, and use of the country's infrastructure.
- State Governments and their respective infrastructure agencies: The State Governments are responsible for development and implementation of their State's infrastructure policies. Each State generally has the autonomy to develop its own policies to supplement national policies.

Summary of Contracting Method Selection Guidelines in Australia

The Australian Government has prepared several guideline documents for the selection of contracting methods (which are referred to as "procurement options" in Australia):

- National Public-Private Partnership Guidelines – Volume 1: Procurement Options Analysis Guidelines: Outlines the process to assess and identify the optimal procurement method for a given project. The guidelines do not suggest any single tool or analysis but provides guidance for this process.

- National Alliance Contracting – Guide to Alliance Contracting: Provides practical guidance to State agencies for use of the alliance contracting method, including preparation of a governance plan, a commercial framework, etc.
- Infrastructure Australia Assessment Framework: Explains the necessary conditions that State agencies must meet for submission of a project to include in Australia's Infrastructure Priority List. The framework includes detailed checklists to follow for submissions.

Summary of Procurement Options Analysis Guidelines

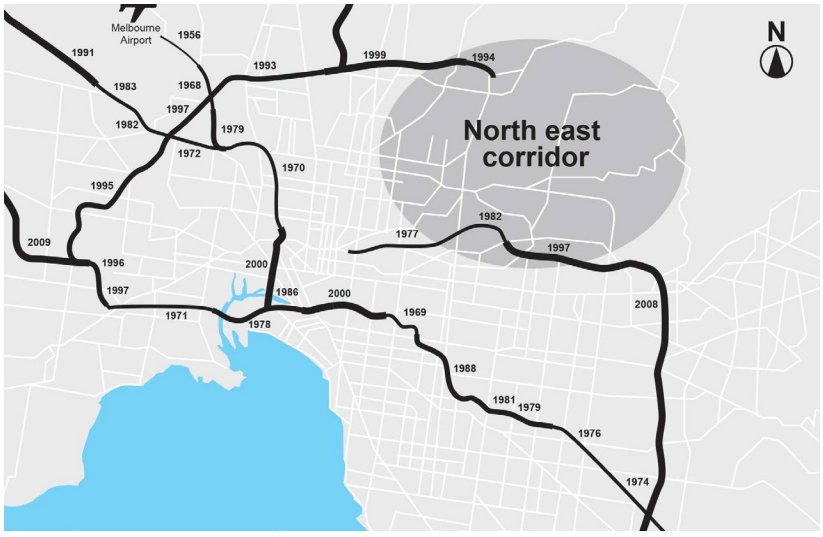
The Procurement Options Analysis Guidelines are the first volume in Australia's National Public-Private Partnership Guidelines. The document provides an approach for shortlisting the appropriate procurement options for a given project. The procurement analysis is a part of the business case that is suggested for assessment of a project. Data from other parts of the business case (or feasibility/scoping study) preparation, such as risk analysis, market analysis, cost analysis, and agency capability, are used as inputs into the procurement options analysis. The analysis seeks to address the following challenges:

- Ensuring proper planning and risk assessment.
- Managing timeframe pressures emerging for projects.
- Managing market sentiment.
- Focusing on value-for-money drivers.

North East Link Project – Melbourne

Project Background

Various parts of the Melbourne transportation network have been built during different time periods, as shown in Figure 2. The arterial network that facilitates connection to the central business district is well established, but the orbital network in the northeast is incomplete.



Source: North East Link Project Business Case – Executive Summary

Figure 2. Melbourne freeway network construction over time.

Melbourne's northeast is currently home for approximately 20 percent of the population and is expected to experience significant population growth in the next 30 years. At present, the arterial road network in the northeastern suburbs supports most of the traffic, including local and regional trips and freight traffic. Approximately 10 percent of the total freight traffic (46 million tons) in Victoria travels through these roads. Estimates indicate that the arterial road network carries a daily average of 250,000 vehicles between the northeastern suburbs and inner Melbourne. Further, the arterial road network also supports a daily average of 340,000 orbital trips in the north and east regions of Melbourne. After completion of this project, a 65 percent improvement in the 2035 peak travel time between the M80 (the metropolitan ring road in Figure 3) and the Eastern Freeway is expected. In addition, diversion of the arterial traffic is estimated to save 30 percent of the peak hour travel times.

The project is set to address the following three main challenges:

- Melbourne's poor orbital connectivity.
- Inefficient freight movement along the eastern edge of the City.
- Congestion and heavy vehicles on neighborhood roads.

Figure 3 shows the current alignment of the North East Link Project.

Source: www.theage.com.au

Figure 3. North East Link corridor.

The project has been under consideration for a long time, and its support has fluctuated as local businesses, communities, and residents raised various concerns about its impacts. In 2010, both local and political support for the project began to increase. By 2016, Infrastructure Victoria declared the project a priority in its 30-year strategy.

North East Link Authority

The North East Link Authority was created in December 2016 to oversee the delivery of the NELP. After the Victorian Government announced the North East Link as a priority project in Infrastructure Victoria's 30-year strategy, the North East Link Authority was created to manage various aspects of the project including developing the business case, stakeholder and community engagement, and procurement.

Contracting Method Selection for the North East Link Project

Overview

NELP was proposed to reduce the arterial traffic load of the northeastern suburbs of Melbourne. The project proposes to build a continuous freeway standard road between Melbourne's southeast and north from the M3 to the M80 to ease the arterial traffic in Melbourne's northeastern suburbs and reduce pressure on the M1 Monash Freeway.

The Victorian Government prepared a detailed business case for selection of the route, packaging of the project, selection of procurement option (i.e., the contracting method), and the delivery framework of the project. The project delivery method selected for the project is Availability Public-Private Partnership (PPP). Other methods considered were Economic PPP, Design-Construct (Design-Build), Alliance Bidding, and DBOM. Figure 4 summarizes the selection process that the North East Link Authority followed.

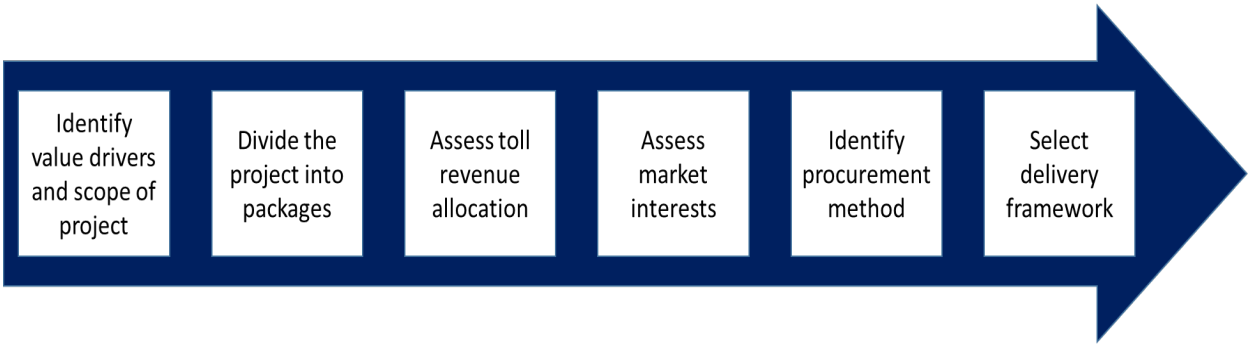


Figure 4. North East Link Authority process to select procurement option.

ACM Selection Approach

The selection approach has been divided into the following subsections:

- Identification of value drivers.
- Project packaging assessment.
- Procurement option analysis.
- Delivery framework assessment.

Identification of Value Drivers

Table 39 illustrates the characteristics and value drivers that the Victorian Government identified to create alternative work packages for the project.

Table 39. Value drivers for North East Link Project.

Overarching Characteristic	Value Driver	Description
Optimize competition	Size & scale	The extent to which the package is of sufficient value to be attractive to the market and provide opportunities for economies of scale; aiming to reduce design and construction cost and reduce industry bid costs.
	Market capacity	The extent to which the very large scale may limit the market's ability to provide a competitive process and therefore deliver a competitive outcome.
	Innovation	The extent to which the packaging approach creates or reduces opportunities for innovation in design, construction, and/or a whole-of-life focus.
Manage interface risk	Deliverability	The extent to which packaging considerations would support the required project timetable.
	Geography	The extent to which elements are located to provide efficiency or synergy (e.g., in delivery).
	Functional interdependence	The extent to which elements have inherent functional interdependencies that need to be managed through construction and operations, therefore limiting packaging consideration without introducing major interface risk.
	Risk profile	The extent to which the proposed packaging solutions support an optimum risk transfer.
	Operations	The extent to which the operating performance of the project's assets comprising the package is comparable.
	Technical requirements	The extent to which the elements have similar or consistent technical/skills/capabilities requirements that would provide value in keeping together or risk in splitting them apart.
Other project considerations	Independent project benefits	The extent to which elements of the works can achieve project benefits (e.g., improved access outcomes) independently and could be delivered on a stand-alone basis.

Source: North East Link Project Business Case

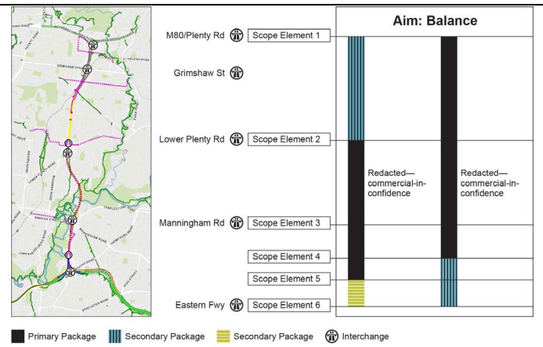
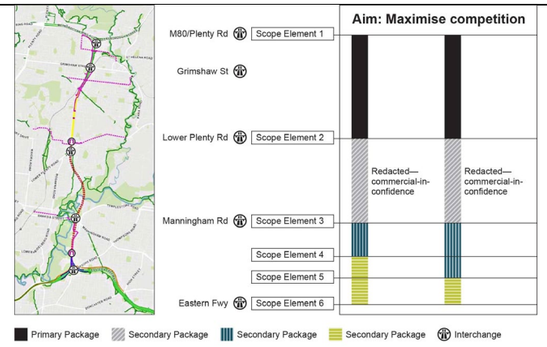
The scope of the project is divided into the following scope elements:

- Free flow connections at Plenty Rd. (M80 Ring Road) to Lower Plenty Road (including Watsonia Station).
- Tunnels (using a tunnel boring machine) through to Manningham Road interchange.
- Mined tunnel and cut & cover to Southern Portals at Bulleen Road.
- Viaduct structures from Southern Tunnel Portals to Eastern Freeway.
- Eastern Freeway Widening at Burke Road and Elgar Road.
- Eastern Freeway Widening from Elgar Road to Springvale Road.
- Eastern Freeway Widening from Burke Road to Hoddle Street.

Project Packaging Assessment

Based on the value drivers, the project was divided into packages consisting of primary and secondary packages. Three package options were identified that would suit the project objectives. The difference among the options is the choice of scope elements in the primary and secondary packages. These options were analyzed for advantages and risks as shown in Table 40. Based on the analysis, option 2 was selected as the reference package for further consideration. The project delivery model for the primary package would be decided in the initial phase, while the models for secondary projects would be decided at later stages.

Table 40. Project packaging assessment summary.

			
	Package Option 1	**Package Option 2**	**Package Option 3**
Description	The project is composed of a large single package which includes all elements of construction and operations	This package divides the work into a primary package consisting of scope elements 2, 3 & 4 and secondary packages for scope elements 1 & 5, each with scope element 1 being optional to the primary package.	In this option, the primary package contains either scope element 2 or scope element 2 & 3, and the rest of the elements are divided into secondary packages.
Advantages	Packaging option 1 performs most strongly in relation to minimization of interface risk and potential for innovation in an end-to-end functional design solution; however, the key trade-offs are likely to be: Reduced or no competition, including the potential to limit participation from international entrants. Potential to limit the ability of the market to provide security for the package size with consequent limitations on the risk allocation that may be desirable to the State.	Packaging option 2 provides better performance in relation to market competition and interface risk; however, the key trade-offs are likely to be: A still very large construction package with potential outcomes including few or no quality entrants for a competitive tender process. Increased interface risk, both in construction and for operations associated with a potential longer-term P3 solution. Impacts on the timing and magnitude of any required up-front capital contribution. Increased requirement for pre-tender innovation and detail in the design of the link (or risk loss of overall innovation).	Packaging option 3 performs most strongly in relation to competition, market capacity, and capability; however, the key trade-offs are likely to be: A still very large construction package (but smaller than options 1 and 2) with potential outcomes including few or no quality entrants for a competitive tender process. Increased interface risk, both in construction and for operations associated with a potential longer-term P3 solution. Impacts on the timing and magnitude of any required up-front capital contribution. Increased requirement for strong State-side management and resources. Increased requirement for pre-tender innovation and detail in the design of the link (or risk loss of overall innovation).
Key Risks	Given the current market environment and level of activity, potential outcomes include few or no quality entrants for a competitive tender process. In moving forward with this option, the consequences of poor market involvement or unacceptable limitations on risk allocation may not be apparent until the market is formally engaged in a tender process, resulting in cost, time, and reputational impacts for the project.	The ultimate design solution may result in interface locations that do not reduce the size of the packages sufficiently to reduce fully the risk of the primary package being too large.	There may be a reduction in the risk allocation that can be achieved by the State. Given the nature of the project and the design and construction controls identified, it may not be possible to break the packages into the size limits sought without introducing unmanageable interface risks.

Source: North East Link Project: Business Case Business Case Appendix S: Procurement Options Assessment

Procurement Options Analysis

After the selection of the preferred package, assessment criteria for procurement options analysis were determined along with their relative importance to the project goals, as shown in Table 41.

Table 41. Procurement option assessment criteria.

Evaluation Criteria	Description	Relative Weight
Maximize market interest	The extent to which a procurement option assists in maximising market interest among the appropriate market participants with the relevant skills, expertise, and capacity (and therefore drive a competitive process and optimal value for money outcomes for the State).	High
Transport network integration	The extent to which a procurement option allows for sufficient flexibility to: Manage the project assets as part of the existing transport network (including flexibility to implement operational changes to the network over time). Optimize the technical scope of the project and future connectivity. Accommodate the technical requirements of other transport projects as required.	High
Price and budget certainty	The extent to which a procurement option allows the State to confidently predict its financial contribution to the project (i.e., certainty around capital costs/operating and maintenance expenditure associated with the project assets/quantum of public funding where required) and support competitive pricing.	High
Risk transfer	The extent to which a procurement option transfers risk across the project's life cycle (design, construction, financing, operations, maintenance, and revenue) via an effective and efficient risk allocation to the parties best able to manage and price risk.	High
Innovation	The extent to which a procurement option provides incentives for the private sector to introduce new ideas and approaches over the whole of the life of the project that meet the performance expectations and generate additional value to the State and users (through cost savings, optimizing toll revenues, additional sources of revenues, enhanced user experience, innovative technical solutions) and meet the project's guiding principles (i.e., minimizing impacts on communities, environmental and cultural assets, and optimizing the use of resources).	Moderate
Time	The extent to which the procurement model allows the project to be delivered early to enable benefits realisation and efficient funding; and the extent to which the procurement model is able to support achieving an optimum time certainty for the State in relation to construction completion and commencement of operations.	High
Operational performance	The extent to which a procurement option drives operational performance via incentives and risk allocation.	Moderate
Simplicity	The degree to which an option helps minimize the need to implement overly complex and/or unprecedented (domestic or international) commercial structures and the extent to which it allows for genuine transparency over the true cost of the bid and fair comparison of bidder proposals.	Moderate
Weights: High = 3; Moderate = 2		

Source: North East Link Project Business Case

From among the various procurement options available for implementing the project, the following were eliminated from further consideration. The rationale for eliminating each mode is explained in Table 42.

Table 42. Rationale for eliminated procurement models.

Procurement Option	Rationale for Elimination
Construct only (i.e., DBB)	State retains design risk and, hence, cost uncertainty. Due to size, some of the risks (design, interface, geotechnical) could be easily transferred in other models. Loss of design innovations for better project management.
Construction management (i.e., CM-agency)	Similar to construct only, this model does not transfer design risk or any construction risk.
Managing contractor	State is exposed to cost overrun, geotechnical, and commissioning risks that could be transferred to private players due to the size of the project. The scope of the project and risks are not too uncertain to use this model.
Early contractor involvement	Similar to managing contractor, risks cannot be transferred even though the size of the project facilitates such in other models.

Source: North East Link Project Business Case

Concurrently, a market sounding activity was conducted to determine the interest of private players about the packaging of the project and their opinions on topics such as possible procurement options and allocation of toll revenue risk. Based on these inputs and the project objectives identified by the team, each model was scored based on the established assessment criteria and was multiplied by assigned criteria weights to obtain a weighted score. The weighted score was then used to rank each model and to arrive at the preferred procurement model for the primary package of the project. The scoring matrix for the assessment is shown in Table 43. The rationale for scoring of each model per criteria is provided in the appendix.

Table 43. Procurement model evaluation matrix.

Criteria	Rating	D&C	Alliance	DBOM	Availability P3	Economic P3
Maximize market interest	High	3	3	3	3	1
Transport network integration	High	3	3	2	2	1
Price & budget certainty	High	1	0	1	3	3
Risk transfer	High	1	0	1	3	3
Innovation	Moderate	1	1	2	2	3
Time	High	2	2	2	3	3
Operational performance	Moderate	1	1	2	2	3
Simplicity	Moderate	3	3	2	1	1
Unweighted score		15	12	15	19	18
Weighted score		40	32	39	52	47
Weighted Rank		**3**	**5**	**4**	**1**	**2**
Weights: High = 3; Moderate = 2						

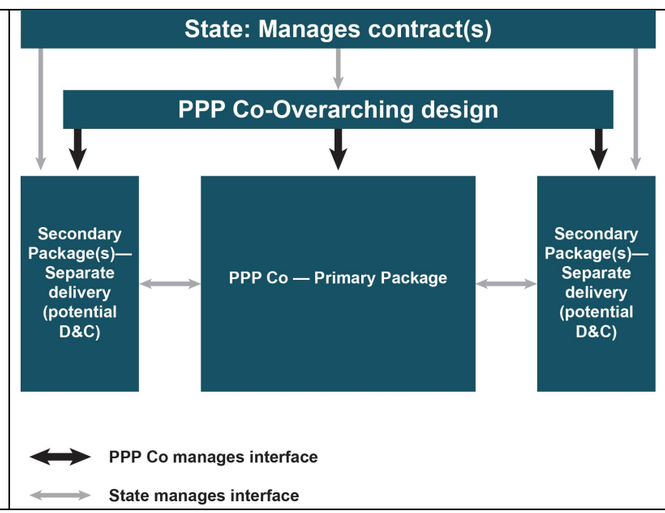
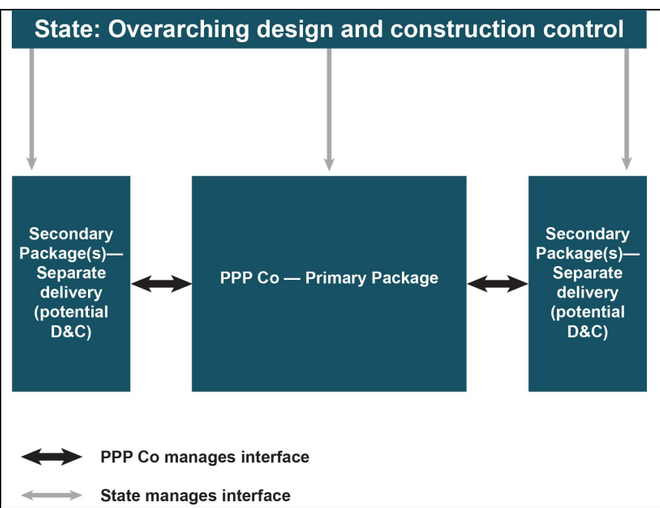
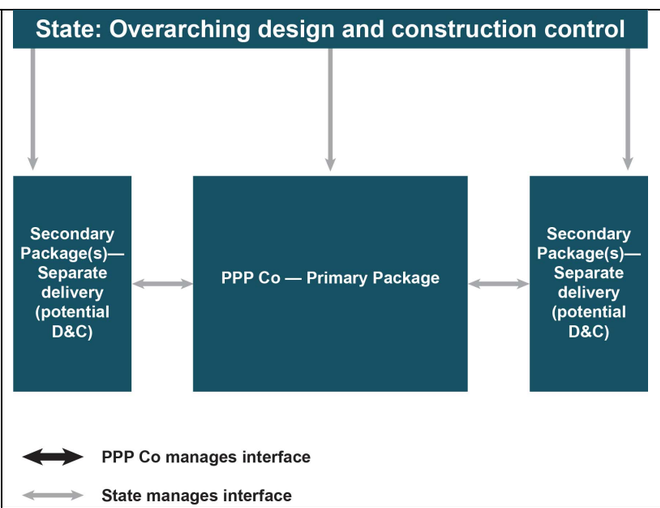
Source: North East Link Project Business Case

Based on the selected Availability PPP model and the market sounding activity, it was decided that collection of toll revenues by a private entity was not to be included as part of the project. The reason stated during the market sounding activity was the uncertainty in the initial "ramp-up" phase of the project. Hence, the State would retain the toll revenue risk, initially during the ramp-up phase or for long-term, through a separate tolling entity and would consider the options of sale of the tolling entity once enough data on demand has been obtained.

Delivery Framework Assessment

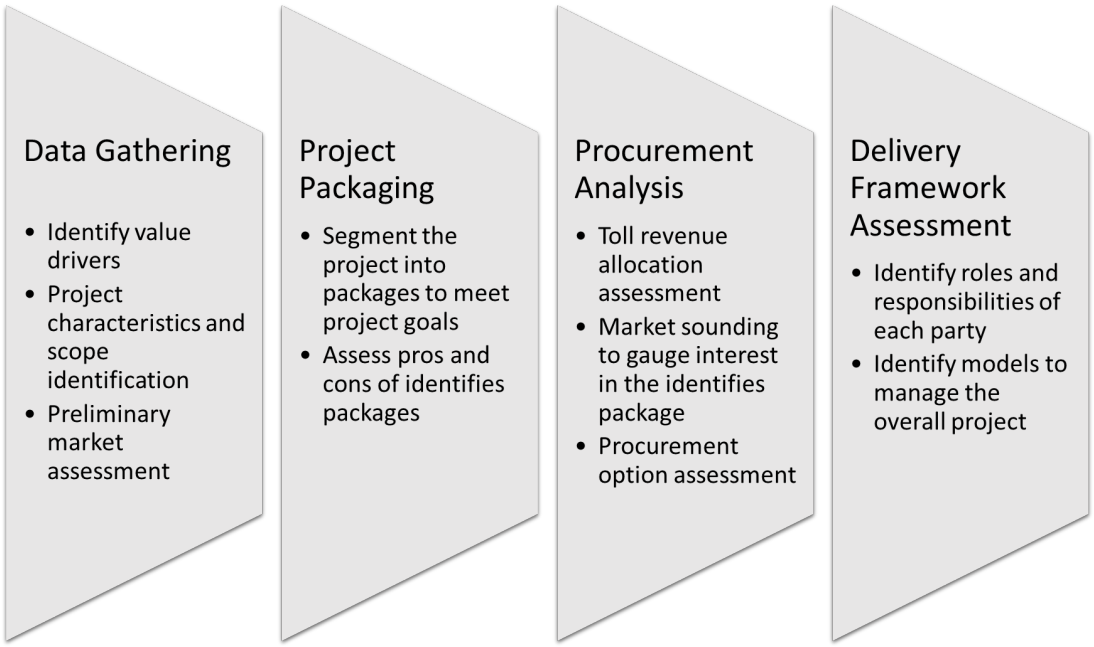
With the primary package being a PPP, the roles and responsibilities of the Government and the private player still needed to be decided. As described previously, three management/delivery frameworks were identified as feasible options for this structure, and option 2 was selected as the most suitable framework to maximize the project objectives. Table 44 compares the three frameworks.

Table 44. Delivery framework assessment summary.

Framework	Option 1	Option 2	Option 3
			
Description	PPP company undertakes the end-to-end reference design for the project while the State manages the separate delivery packages	PPP company undertakes the overarching reference design as well as management of the interfaces between the separate packages and operation of the project	State undertakes the overarching reference design as well as managing the interfaces between the separate packages
Advantages	Maximizes innovation in the initial design.	Maximizes innovation in design and operations. The interface risk is shared/transferred to PPP company.	There is some room for innovation in design undertaken by the State.
Disadvantages	The interface risk remains with the State, which may not be the most appropriate party to manage this risk. The State or future toll company must manage operational interfaces over the life of the project.	PPP company must take over works constructed by other parties. This innovative delivery model may not be fully embraced by the market, with more risk retained by the State than desirable, including completion risk and a level of interface risk.	This option would require a delayed procurement and delivery, as the State needs to spend more time developing a more detailed reference design. The interface risk for design, construction, and operations remains with the State. The State or future toll company must manage operational interfaces over the life of the project.

Source: North East Link Project Business Case

During the selection process, the agency generally followed the National Public Private Partnership Guidelines set by the Department of Infrastructure and Regional Development. However, the evaluation matrices and checklists were adopted for the current analysis to capture more details. Figure 5 illustrates the process followed.



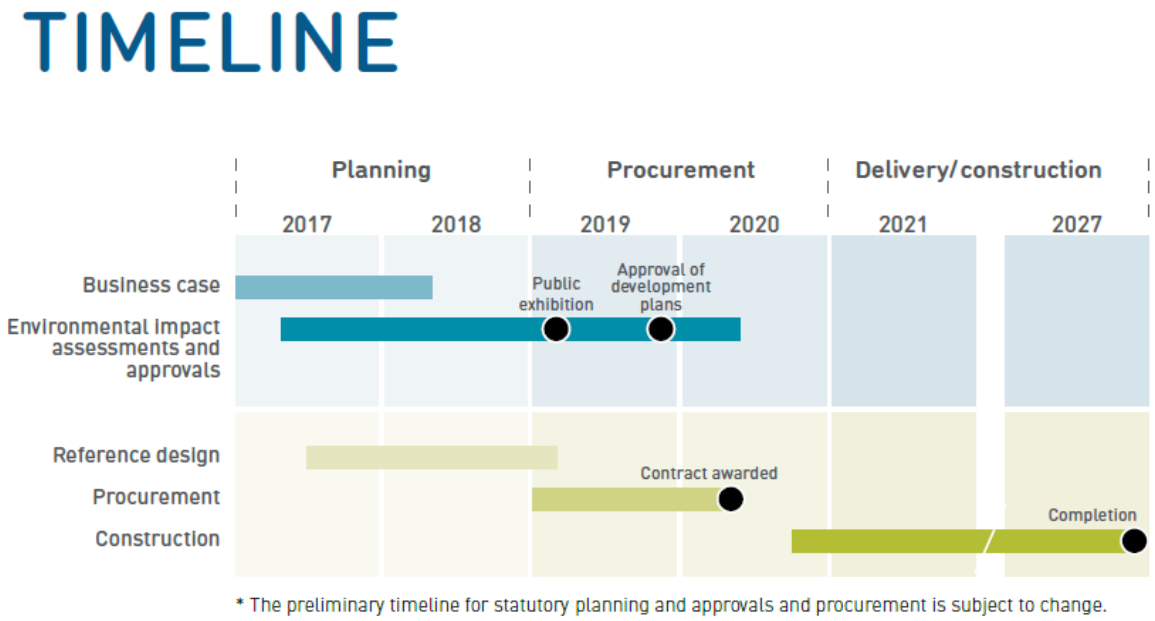
Source: North East Link Project Business Case

Figure 5. Process followed to select contracting method and delivery approach for the North East Link Project.

Project Timeline

In 2017, specialist engineering, environmental, and social investigations were carried out to determine the alignment of the project. Community feedback was solicited to determine the most suitable option to meet the project objectives.

In April 2018, the North East Link Authority publicly released the business case for the project. Other specialist studies required for approvals, like an environment effects statement (EES), are being carried out with the first update to design released in April and second in September. In November 2018, the project went out to market for expression of interest for AU$200 million early works (tender closing on Feb. 1, 2019) and AU$7-9 billion primary packages (tender closing on May 10, 2019). The procurement process is being carried out in two steps: generate a shortlist of qualified bidders based on the expressions of interest, and then select the preferred bidder/concessionaire from the shortlist. It is expected that the EES report will be submitted to the Ministry of Planning and will be released for public display by early to mid-2019. Final approvals are expected by the end of 2019. The project construction would commence in 2020, subject to receiving the approvals. Figure 6 summarizes the expected timeline for the project.



Source: North East Link Project Business Case – Key Findings

Figure 6. Expected timeline for the North East Link Project.

Summary

The NELP has received enough support to complete the project in this decade. Completion of the project will relieve the arterial road network in Melbourne's northeastern suburbs.

The process to select a procurement option illustrates important lessons that could be implemented in the United States to determine the appropriate project structure and contracting method:

- Identifying the value drivers for the project.
- Identifying the possible risks in the delivery of the project during design, construction, and O&M phases.
- Identifying the possible mitigation measures for the risks.
- Assessing the implementing agency's capabilities for executing the project to determine the possible contracting methods.
- Assessing the optimal project size for available contracting methods.
- Assessing the market capabilities and interests for all the available contracting methods.

Even though the most seasoned project managers and decision makers could perform these tasks intuitively while determining aspects like project size, contracting method, funding methods, and so on, formalizing the process helps in passing the knowledge to successors. The approach adopted for the NELP is consistent with the Procurement Options Analysis Guidelines in Australia. Notably, judgments by key decision makers were used to eliminate inappropriate contracting methods and to determine the preferred method, supplemented by an evaluation of market interests and perspectives. The practice of developing the business case for particular infrastructure projects provides a systematic and transparent approach for making such decisions.

Scoring Rationale for Procurement Option Analysis

Table 45. Scoring rationale: maximize market interest.

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Maximize Market Interest				
The market is familiar with the traditional model, given that it is the most common form of procurement. Form of procurement model currently implemented by transport agencies in Australia. The scale of works should raise interest and enable a competitive field. It is expected that the market would respond positively to a D&C procurement.	The market is familiar with the alliance procurement model. Form of procurement model currently implemented by transport agencies in Australia. This procurement model is currently implemented for projects of similar nature. The scale of works should raise interest and enable a competitive field. It is expected that the market would respond positively to an alliance model.	The market is familiar with the DBOM procurement model, although it has not been utilized for a project of this scale before and, historically, has not been utilized to any great degree by the State of Victoria. The scale of works should raise interest and enable a competitive field. Noting that utilization of this model would be new in Victoria, it is still expected that the market would respond positively to a DBOM model.	The market is familiar with the availability PPP model. The market sounding exercise conducted in August 2017 confirmed interest and appetite of key market participants for the project to be delivered as an availability PPP. Form of procurement model currently implemented by transport agencies in Australia (most notably in Victoria for the Peninsula Link Project and the Suburban Roads Upgrade (Western Package). It is expected that the market would respond positively to an availability PPP model.	The market sounding exercise conducted in August 2017 demonstrated limited interest due to the performance of recent road projects transferred risk to the private sector in Australia. Limited traffic forecasting capacity in the market was noted as a key constraint to accepting toll revenue risk in an economic PPP model. Participants also noted the uncertainty relating to systemic changes to the way roads are used and priced. Participants considered raising fully committed financing would be challenging under an economic PPP because financiers are reluctant to be exposed to any degree of Greenfield traffic revenue risk. It is expected that the market would respond in a manner that would unduly constrain competition under the model and therefore not optimize value for money outcomes to the State.
3	3	3	3	1

Source: North East Link Project: Business Case Business Case Appendix S: Procurement Options Assessment

Table 46. Scoring rationale: transport network integration.

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Transport network integration				
The D&C model offers flexibility to the State by limiting contractual barriers that could impact its ability to manage the project as part of the existing transport network over time. The contractual framework provides the State with greater discretion. This model offers flexibility for the State to change toll prices in the future, as it is not locked into the largely fixed toll price profile regulated by a concession deed, which improves the State's ability to manage demand across the transport network over time as volume and use change.	The alliance model has similar characteristics to the D&C model.	This model offers flexibility for the State to change toll prices in the future, as it is not locked into the largely fixed toll price profile regulated by a concession deed, which improves the State's ability to manage demand across the transport network over time as volume and use change. During the operating phase, the ability to introduce operational or technical change to the network will depend on the terms of the contract and its ability to allow for variations. DBOM models are "whole-of-life" models whereby contractors commit up-front to a fixed construction, operations, and maintenance cost profile. The DBOM model is considered less effective in this regard than the D&C and alliance models.	The availability PPP model has similar characteristics to the traditional, alliance and DBOM models in relation to toll price flexibility. However, an availability PPP does not offer the same degree of flexibility in relation to network augmentation or implementation of operational changes to the network over time as the D&C and alliance models. During the operating phase, the ability to introduce operational or technical change to the network will depend on the terms of the concession deed and its ability to allow for variations. The current PPP standard contracts issued by the Department of Treasury and Finance incorporate greater flexibility with regard to modification and augmentation regimes than earlier availability PPPs. Availability PPP models are "whole-of-life" models whereby a PPP company commits up-front to a fixed construction, operations, and maintenance cost profile. The availability PPP	The economic PPP model has similar characteristics to the availability PPP model, insofar as it is a "whole-of-life" model whereby the PPP company commits up-front to fixed construction, financing, operations, and maintenance in exchange for rights to toll users. Given that the PPP company relies on toll revenue as compensation for its investment in constructing and operating the toll road, comparatively the economic PPP model imposes more contractual limitations on the State in regards to future changes to the network, and the toll road itself that may adversely impact traffic volumes (and toll revenues) on the tolled road link. However, on more recent toll road concession (such as the East Link), the State has obtained greater flexibility to make changes. While the State always reserves the right to make changes to its network, such

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Transport network integration				
			model may be considered slightly less effective in regard than the D&C and alliance models, where the State retains full control of the network.	changes are more likely to require negotiations with the concessionaire and may result in financial compensation to a concessionaire (if adversely affected) under this model.
3	3	2	2	1

Source: North East Link Project: Business Case Business Case Appendix S: Procurement Options Assessment

Table 47. Scoring rationale: price and budget certainty.

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Price and budget certainty				
The traditional D&C model is typically tendered on a fixed time and cost basis, which makes this model suited to projects where the State's requirements are tightly specified before tender and risks well understood. While there may be scope to vary the provisions in the contract to account for required changes to the scope or design from the public sector, this will lead to substantial claims for cost and time overruns which will be priced on a non-competitive basis and, therefore, much higher than the tendered costs. While risks are often transferred under fixed time, fixed cost contracts, experience suggests that the State's direct involvement in project funding (and the difficulty associated with recovering that funding when projects are not completed) means the State still has residual exposure to support the project should budget	In an alliance model, price and budget certainty is limited during the construction period since the target outturn cost may need to change as the project develops, exposing the State to overrun risk. The risk and cost sharing mechanisms reduce incentives to achieve on budget outcomes compared to other contract models. From an O&M perspective, this model offers a level of budget and price certainty comparable to the D&C model. From a budget certainty perspective the alliance model is comparatively the weakest. The average increase from business case cost estimate to actual outturn cost was 45 to 55%.	A DBOM model offers a lower risk of cost overruns, as the price is determined up-front for the period of the contract, including capital and O&M costs. This risk is transferred unless there are changes in scope from the State. Despite these strengths, the DBOM model remains publically funded and does not have the benefit of a private investment discipline and controls for managing cost outcomes. This means the State still has residual exposure to support the project, should budget overruns occur (once other forms of contractual protections have expired).	In an availability PPP model, the O&M risks are transferred unless there are changes in scope from the State. In absolute terms, whole-of-life delivery models' cost advantage was found to be economically and statistically significant. This model offers greater certainty of cost given equity and debt at risk, which creates a buffer (for the State) for cost overruns. A private finance discipline is brought to the project by virtue of its investors and their due diligence throughout the project's life cycle. Where the State decides to undertake a modification or augmentation, current PPP contracts offer stronger cost compensation controls compared to other models and therefore offers greater budget certainty.	From a cost and risk transfer perspective, the economic PPP model offers similar levels of effectiveness to an availability PPP. Given that toll revenue risk is transferred to the private sector under an economic PPP model, it offers arguably greater budget certainty to the State than models in which the State retains toll revenue risk.

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Price and budget certainty				
overruns occur (once other forms of contractual protections have expired). The O&M contracting model offers limited opportunity to provide price and budget certainty during the maintenance period, as the budget remains subject to Government funding and tendered in accordance with short-term schedule of rates maintenance contracts as per the majority of existing maintenance contracts deployed by State authorities.				
1	0	1	3	3

Source: North East Link Project: Business Case Business Case Appendix S: Procurement Options Assessment

Table 48. Scoring rationale: risk transfer.

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Risk transfer				
The majority of D&C risks are generally transferred to the constructor, but given the separation of construction and maintenance contracts, there is a lower level of consideration given to whole-of-life approaches to risk management. Under this model, the State retains procurement, commissioning, interface, operating, and toll revenue risks related to the tolling system (equipment, software, back-office systems).	The alliance model is suitable where material delivery risks cannot be identified, allocated, and priced up-front on an efficient basis and risks are therefore best managed collectively. Construction risks are expected to be reasonably well known; therefore, this model is deemed comparatively less applicable. A key feature of this model is the ability to share risks (and consequences) between the public and private parties. Therefore, the ability of this model to provide long-term financial savings (via a robust transfer of risk to the non-owner participant) is considered comparatively limited. The State retains procurement, commissioning, interface, operating, and toll revenue risks related to the tolling system (equipment,	The long-term, whole-of-life focus of this model is likely to allow for a more robust allocation of risks to the DBOM contractor. However, as the D&C cost is paid in full during the delivery phase, the extent of the financial incentives for the contractor to ensure that the project's capital elements continue to perform as expected is limited to the value of any performance security and the O&M payments at risk (which is expected to be immaterial relative to the proportion of the capital works). Under this model, the State retains procurement, commissioning, interface, operating, and toll revenue risks related to the tolling system (equipment, software, back-office systems).	The long-term, whole-of-life focus of the availability PPP model allows for a more robust allocation of design, construction, and O&M risks to the private sector. The introduction of private finance and long-term financial exposure for the operator introduces higher levels of discipline and scrutiny of risk, which creates additional incentives for the contractor to deliver on performance specifications and outcomes. Under this model the State retains procurement, commissioning, interface, operating, and toll revenue risks related to the tolling system (equipment, software, back-office systems).	An economic PPP has similar characteristics to an availability PPP, from a D&C, O&M, and whole-of-life approach to managing risk perspective. Under this model, the private sector retains procurement, commissioning, interface, operating, and toll revenue risks related to the tolling system (equipment, software, back-office systems), which mitigates the State's risk exposure. The introduction of private finance and long-term financial exposure for the operator introduces higher levels of discipline and scrutiny of risk, which creates additional incentives for the contractor to deliver on performance specifications and outcomes.

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Risk transfer				
	software, back-office systems).			
1	0	1	3	3

Source: North East Link Project: Business Case Business Case Appendix S: Procurement Options Assessment

Table 49. Scoring rationale: innovation.

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Innovation				
The material opportunity for innovation relates to the design and construction methodologies for the construction works. Variations related to innovations following contractual close are likely to be costly and may result in construction delays. Once competitive bidding tension is removed from the process, there is less incentive for the D&C contractor to competitively price innovations. As the O&M services are separately contracted, opportunities for the State to drive innovation that delivers whole-of-life benefits are expected to be limited (noting, however, that construction innovation is likely to be a critical factor, given the value of the capital works relative to the O&M services).	The alliance model has a similar rationale to the D&C model in this aspect.	As a result of a greater emphasis on achieving an efficient whole-of-life costing, the DBOM model provides an improved scope for design and construction innovation over the D&C and alliance models. Flexibility for future scope changes related to innovation is similar to a D&C model during the construction phase.	The nature of an availability PPP offers greater scope and incentive for the private sector to bid innovative solutions, which can deliver the required infrastructure and services at a lower whole-of-life cost. However, as the State retains toll revenue risk, there will exist a misalignment of incentives between the party operating the road and the party collecting tolls. This means the private operator will have less incentive to develop innovative solutions to improve the customer experience of the toll road to optimize throughput.	The economic PPP model drives enhanced innovation, as investors are incentivized to maximize throughput, maximize operational efficiency, and optimize the customer experience by delivering a high-quality service.
1	1	2	2	3

Source: North East Link Project: Business Case Business Case Appendix S: Procurement Options Assessment

Table 50. Scoring rationale: time.

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Time				
In the D&C model, the procurement timeframe is expected to be shorter than in the other models examined, due to the compara-tively simpler contracting requirement, which excludes operations and private financing considerations. However, a D&C model can be sensitive to construction completion delays in circumstances where construction is complex. Furthermore, the D&C model does not offer the same level of incentives for on-time completion (such as accessing toll revenues). However, noting that payment arrangements could be structured on a milestone completion basis and/or a portion of any milestone, payments could be retained until final completion.	The alliance model is well understood and has precedent in the Australian market, decreasing the risk of time delay in relation to the procurement phase. However, on a comparative basis, the alliance model's risk sharing scheme reduces incentives of the private sector to achieve on time outcomes (compared to other models).	Under a DBOM model, the procurement timeframe is expected to be marginally shorter than under a PPP (due to the absence of private finance) but longer than a D&C due to the inclusion of O&M considerations. In terms of meeting construction completion timing, the risk allocation regime and contractual structure associated with this model provide reason-able incentives to achieve on-time completion, comparable to a D&C.	In the case of the availability PPP model, given the complexity of the contracting arrangement which com-bines construction, operations, and private finance, the procurement timeframe is generally longer than for other models. While procurement may take longer than other options, a PPP offers the most robust contractor incentives to complete on time through a payment mechanism linked to asset availability (i.e., payment at completion).	The economic PPP has a similar rationale to an availability PPP in terms of the time criteria, with the added incentive of completing construction to begin generating operations and toll revenue.
2	2	2	3	3

Source: North East Link Project: Business Case Business Case Appendix S: Procurement Options Assessment

Table 51. Scoring rationale: operational performance.

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Operational Performance				
Under the D&C model, when infrastructure is completed and handed over to the public sector, the O&M of the assets can be implemented using public sector staff or through a separate contract with a private sector provider subject to an O&M agreement. Under a D&C model with separate maintenance contract outsourced to the private sector, the amount of payment "at-risk" to an operator is limited to its fixed and variable operating costs and its profit margin. These amounts at risk are lower than in other models.	The alliance mode is similar to D&C model with a separate maintenance contract.	Given the emphasis on whole-of-life operational considerations, this model is expected to be more effective than the D&C and alliance models. During the term of the DBOM contract, adequate provisions need to be put in place to incentivize the performance of the maintenance contractor.	The main differentiator of the availability PPP model is that capital payments to debt and equity investors are at risk in addition to the operator's profit margin. This payment structure provides a direct incentive to the private sector to have the road fully operational at the required standards at all times to minimize abatement risk to the service payments.	In the economic PPP model, asset utilization efficiency is enhanced as investors are incentivized to maximize throughput, maximize operational efficiency, and optimize the customer experience by delivering a high-quality service. Commercial incentives are therefore aligned between toll collection and operational performance.
1	1	2	2	3

Source: North East Link Project: Business Case Business Case Appendix S: Procurement Options Assessment

Table 52. Scoring rationale: simplicity.

D&C	Alliance	DBOM	Availability PPP	Economic PPP
Simplicity				
The D&C model presents a low degree of complexity associated with implementation, which is well understood by the market.	The alliance model presents a low to medium degree of complexity associated with implementation, which is well understood by the market.	The DBOM model presents a medium degree of complexity associated with implementation. However, this model is well understood by the market and, given the lack of private financing required, is therefore ranked on an equal basis with the D&C and alliance models.	The availability PPP presents a medium degree of complexity associated with implementation.	The economic PPP model is considered comparable to an availability PPP.
3	3	2	1	1

Source: North East Link Project: Business Case Business Case Appendix S: Procurement Options Assessment

Purple Line Light Rail Transit System

Maryland Transit Administration

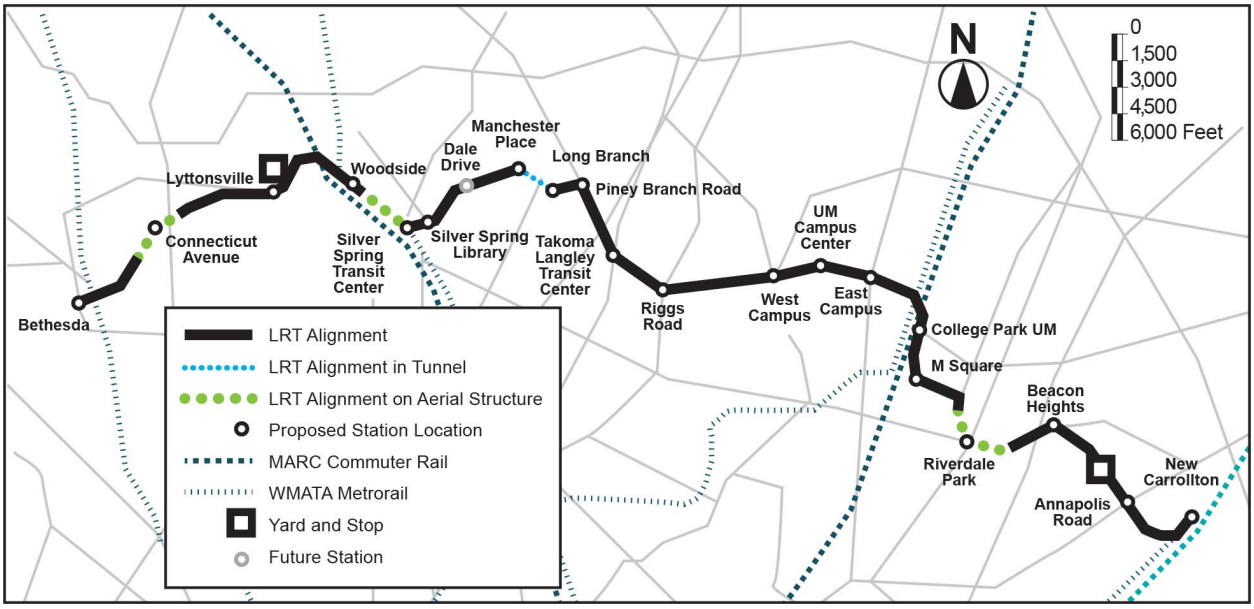
Summary of December 2012 Value-for-Money (VfM) Analysis for the Maryland Transit Administration for a pre-solicitation assessment.

The Maryland Transit Administration Purple Line Light Rail Transit System was selected as a recent example of public transit that utilizes the VfM process. This provides a transit alternative case study to round out the project-specific discussions that most DOTs provided in the case studies. As part of its assessment of delivery options for the Purple Line light rail transit project, the Maryland Transit Administration (MTA) performed a qualitative screening and a quantitative Value-for-Money (VfM) analysis. This case study is a synopsis of the VfM December 2012 analysis.

As a first step, an initial screening of the project was conducted under a range of public and P3 delivery alternatives. It was concluded that delivering the project under a design-build-finance-operate-maintain (DBFOM) approach could offer significant opportunities for cost savings through risk transfers, risk mitigation, and life cycle cost efficiencies. The VfM analysis presented in this document provides an assessment of the potential value to the State of delivering the project under this structure versus a traditional DBB alternative.

Project Overview

The Purple Line project consists of a 16.2-mile at grade light rail transit (LRT) line between Bethesda, MD, in Montgomery County and New Carrollton, MD, in Prince George's County, with a half-mile underground section. It includes 21 stations, 2 maintenance facilities, and would run on exclusive or dedicated right of way providing service at 7-minute headways during the peak period and 10-minute headways during off-peak periods. A graphic of the location and planned stations is shown in Figure 7.



Source: Maryland DOT/MTA

Figure 7. Purple Line Light Rail project location and planned stations.

Options Reviewed

The MTA evaluated a number of delivery options, ranging from DBB, DB with various funding options, to DBFOM. The following is a discussion of the results of the two options at the ends of the spectrum (DBB and DBFOM).

The two options that were the primary focus of the analysis were:

- DBB with public sector operation: DBB is the prevalent delivery option for LRT systems in general and for the MTA. This model serves as the baseline public-sector delivery alternative (called Public Sector Comparator or PSC), against which other options are compared.
- DBFOM concession: A private developer, also referred to as the concessionaire, is responsible for the design, construction, rolling stock and systems delivery and integration, and the operation and maintenance of the system for 30 years after the end of construction. In addition, the private developer provides equity and raises debt to finance the project.

Under an availability payment (AP) scheme, the MTA compensates the private developer for its performance of these services through fixed payments upon achieving milestones during the construction period (milestone payments or MPs) and fixed, semi-annual AP payments, subject to deductions for poor performance during the operating term. Under such arrangement, the project would be publicly owned and publicly controlled.

VfM Methodology and Main Assumptions

Risk is central to the understanding of P3 delivery. Project risks are defined as potential adverse events that may have a direct impact on project costs or schedule. Project risks can be retained by the public sponsor or transferred to and mitigated by the private sector. The extent to which a specific project risk can be transferred depends on the choice of the delivery method. Whether risks are retained by the public sponsor or transferred, they are included in the estimated project costs when comparing different delivery methods.

Transferring risks to the party (public sponsor, private sector partner, or a combination) best able to manage them is central to achieving best value in P3. One of the main objectives of this analysis is to identify, allocate, and quantify risks between the public sponsor and private sector partner under each project delivery alternative to achieve cost savings. This is done by comparing the expected net present value of the risk-adjusted, life cycle costs to the State (extending during the design and construction period and 30 years after the end of construction) for delivering and operating the project under the PSC and the DBFOM alternatives.

Risks were categorized as 1) project-specific risks and 2) systematic risks. Project-specific risks were accounted for by adjusting the project cash flows while systematic risks are reflected in the assumptions underlying the discount rate that is used to determine the net present cost.

This analysis focuses on a relative comparison among project delivery alternatives rather than identifying absolute project costs. In particular, the methodology used for estimating the relative risk between the public-sector DBB project delivery and the DBFOM alternative is not intended to modify or replace the minimum levels of contingency required under the Federal Transit Administration (FTA) New Starts process. This analysis is consistent with domestic and international best practices for VfM analysis and follows the following steps:

1. **Establish the PSC assumptions**
    a. Develop realistic life-cycle costs for the PSC alternative reflecting the expected, final, as-built costs of the project given the available information at the time. This means that the PSC should include the risks and expected costs of scope changes, cost overruns, and schedule delays associated with the type and size of project and delivery method selected.
    b. For purposes of the analysis, it was assumed that the 2012 base year cost and contingency developed for the FTA New Starts submission are an accurate evaluation of the project risk-adjusted capital costs. Capital cost estimates are categorized using the FTA's Standard Cost Categories (SCC):
        - SCC 10 to 30 Guideway, Stations and Facilities
        - SCC 40 Sitework & Special Conditions
        - SCC 50 Systems
        - SCC 60 ROW, Land, Existing Improvements
        - SCC 80 Professional Services
        - SCC 90 Unallocated Contingency

   c. The operations and maintenance (O&M) cost estimates for the PSC rely on the same forecasting methodology and inputs as in the 2012 Purple Line New Starts financial plan, which is based on the unit O&M costs for the MTA's existing light rail system as reported to the National Transit Database in 2009. Estimates of rehabilitation and replacement costs are based on expected replacement cycles.

2. **Assess allocation of risks under PSC and DBFOM alternatives**
   a. Develop a risk register to inventory the major project-specific risks that could be transferred and/or mitigated using a DBFOM (when compared to DBB) and quantify the likelihood of occurrence and magnitude of these risks under each delivery alternative using expert opinions and numerical simulations.
   b. The resulting general allocation of delivery risks between parties is assumed in the VfM.
3. **Estimate the Shadow Bid, the expected outcome of a private bid for a DBFOM concession**
   a. Adjust PSC costs to estimate the likely cost to the State as a result of a private bid for the DBFOM concession, reflecting risk allocation and mitigation measures, efficiencies, and private sector financing costs. The likely cost to the State under a DBFOM delivery method is called the Shadow Bid.
   b. Shadow Bid-related cost adjustments to the PSC **(**positive and negative) result in life-cycle cost efficiencies, risk transfers and mitigations, private financing costs, and adjustment for scope retained by the State as defined below:
      i. Cost efficiencies that a private developer can bring to bear when design, construction, financing, operation, and maintenance responsibilities are allocated to a single party, including whole life-cycle management, increased managerial and financial discipline, and greater use of technology to optimize investment and spending, such as:
         1. Managerial and financial discipline, such as investors (debt and equity) keep management spending on target to achieve performance standards and investment return; contractual performance specifications limit the tendency to over-design; and optimization of labor resources across functions.
         2. Use of technology and innovation by exposure to new technology from other transit systems and other industries; systemic use of technology to increase productivity and optimize costs and performance across project asset and functions.
         3. Efficiencies in the delivery of operation, maintenance, and rehabilitation (OMR) services.
   c. Improved risk mitigation resulting from having a single entity responsible for the integration of design, construction, operation, and maintenance activities, combined with oversight from private capital providers. Some risks are fully transferred to the private developer (such as design and construction risks, systems integration risks, commissioning risks) while other risks are shared between public and private partners (such as site conditions, geotechnical risks).

d. Adjustments for scope and risks retained by the State (such as right-of-way costs, cost of the solicitation process, oversight costs).
e. Financing costs incurred by the private developer are added to the Shadow Bid.

4. Establish funding and financing assumptions for the PSC and Shadow Bid alternatives

a. The following revenues accruing to the State are assumed under the PSC and the Shadow Bid alternatives:
    i. Fare revenues accruing to the State are the same under each alternative and are netted out from project costs. Fare revenue assumptions are consistent with those presented in the 2012 New Starts financial plan for the project. The State retains fare policy decision-making and fare revenue in both the Shadow Bid and the PSC.
    ii. New Starts funds are assumed to be available to the PSC and Shadow Bid alternatives. The PSC is 100 percent funded with State and Federal funds on a pay-as-you-go basis.
    iii. In the Shadow Bid the private developer is assumed to receive publicly funded MP during construction and AP during operations. Overall, State, local, and Federal funds are used to pay for approximately 79 percent of the Shadow Bid capital costs (these funds would be used for project expenditures undertaken by both the State and the concessionaire).
    iv. The remainder of the capital costs is financed privately. The private financing structure, based on recent comparable transactions, includes short-term tax-exempt Private Activity Bonds (PABs) at an estimated 5 ¾ percent interest rate (backed by the portion of the MP that extend into the operating period), long-term tax-exempt PABs at an estimated 5 ½ percent interest rate (backed by AP), a subordinated loan from the U.S. DOT Transportation Infrastructure Finance and Innovation Act (TIFIA) program at an estimated 3 percent interest rate (backed by AP), and direct equity investment representing 7 percent of total project costs with an 11 percent equity return on investment.

5. Conduct VfM comparison of NPC to the State

a. The VfM test compares the PSC with the Shadow Bid:
    i. PSC: The NPC to the State of the risk-adjusted, life cycle, public sector costs under traditional DBB project delivery with MTA operation.
    ii. Shadow Bid: The NPC to the State if the project were carried out under the DBFOM concession as may be expected to result from a competitive solicitation process (i.e., the net present value of the stream of MP and AP). The Shadow Bid also includes any State-retained direct costs and risks.
b. In this comparison, State taxes are added to PSC to reflect the opportunity cost to the State for self-performing project services, i.e., the cost of foregone taxes the State would otherwise collect if the project were operated privately.

c. The discount rate used in the calculation of NPC for each alternative is 6.5 percent and is estimated using the Capital Asset Pricing Model, consistent with the treatment of risk in this analysis. Recognizing that other approaches have been used in some jurisdictions, the VfM is tested under a range of discount rates.
d. The difference between the NPCs of the two alternatives indicates the potential value to the State in choosing one alternative over the other.

Results: Project Costs

The estimated capital, O&M, and rehabilitation costs were developed under the DBB/PSC and DBFOM/Shadow Bid delivery approaches respectively. The efficiencies in design, construction, and delivery/integration of systems and rolling stock in the Shadow Bid are estimated at 5 percent of the PSC base capital cost. The efficiencies in O&M costs in the Shadow Bid are estimated at 12 percent in the first year of operation and 28 percent cumulatively over the 30-year operating term compared to the PSC. Rehabilitation costs are lower for the DBFOM than for the PSC by approximately 7 percent.

The results of the risk analysis outlined above indicate that the total risk premium on capital costs (or risk contingency) is anticipated to be 13 percent for the Purple Line under a DBFOM/Shadow Bid alternative compared to 25 percent under a DBB project delivery with MTA operations. The lower risk contingency estimated for the Shadow Bid alternative is indicative of anticipated improved risk management by the concessionaire.

In summary, risk-adjusted capital costs, as well as the O&M costs and rehabilitation costs over the 35-year concession term, are expected to be lower under a DBFOM as a result of the improved risk management and efficiencies noted above.

Results: Value-for-Money Analysis

Traditional VfM analysis requires that the PSC cash flows be paid for by the State on a pay-as-you-go basis (for a consistent treatment of risk). The estimate of VfM is calculated as the difference between the discounted cash flows of the PSC and the discounted stream of MP and AP the State would have to pay as a result of the Shadow Bid (combining private sector efficiencies and higher cost of private finance) plus any State-retained direct costs and risks.

For this analysis, the difference between the NPC of the DBB/PSC and the DBFOM Shadow Bid is 20 percent, which indicates the Shadow Bid is the more favorable alternative.

Normalized Sensitivity Analysis

The results of the VfM were subject to a normalized sensitivity analysis. The primary driving variables were varied independently (i.e., regardless of any existing correlation among variables) by a fixed percentage value or a fixed amount to identify the impact on the VfM:

- The following variables were varied by +/-20 percent to evaluate their impact on VfM: Capital Base Cost, Capital Risk Premium, OMR costs, size of the TIFIA loan; and
- Discount rate return on equity, interest rates on debt (TIFIA and PABs) were increased and decreased by 100 and 200 basis points. All sensitivity runs yield a positive VfM and

the difference between the NPC of the PSC and the Shadow Bid/DBFOM remains greater than 10 percent of the PSC NPC.

VfM Results with Alternate PSC Scenarios

While the alternate PSC scenarios with public sector financing described below represent realistic financing options for the State, it is worth noting that the inclusion of public-sector debt in any PSC scenario represents an inconsistent treatment of risk within a VfM framework. Some jurisdictions however have considered the inclusion of public financing in the definition of PSC. Given Maryland's recent successes with both DB and public financing (including TIFIA, such as with the Intercounty Connector), other PSC scenarios were evaluated relative to the Shadow Bid, including PSC – DB with pay-as-you-go funding, PSC – DB with 15-year Maryland Consolidated Transportation Bonds financing, PSC – DB with 30-year TIFIA financing.

To support the comparison of the Shadow Bid to these alternate PSC scenarios, adjustments in DB capital costs were incorporated into the PSC to reflect project delivery risk transfers to the private sector and cost savings/efficiencies relative to DBB solicitation.

The results from these three additional cases were then compared to the DBB/PSC. Potential cost savings for these alternatives ranged from 8 to 16 percent of the DBB/PSC alternative. None of these alternatives was as potentially cost effective as the DBFOM option.[3]

Limitations of VfM analysis relative to final decision making

There are no guarantees that savings of this magnitude will ultimately be realized by the State. While the VfM analysis provides a likely estimate of the value that may be generated under a given project delivery method, actually achieving this return on investment for the public sponsor requires sound contractual structuring, a competitive and transparent solicitation process, and active management of the partnership over the contract term.

VfM is but one element in the decision-making process. In deciding how to choose among the project delivery options for the project, the State must further evaluate how each alternative aligns with the project goals and verify the fiscal impacts of each alternative.

[3] Note, however, that such alternate PSCs with public financing do not value the residual risk to the State for assuming the direct financing of the projects and the associated liability for any cost overruns above what is estimated in the risk analysis.

Chapter 4. Summary and Conclusions

This chapter summarizes the case study research team findings on the ACM selection methods of select State DOTs, as well as on an Australian agency's ACM evaluation methods and a Maryland agency's use of VfM to compare delivery options for a public transit project, and identifies key elements that will contribute to development of an ACM selection toolset.

All participating State DOTs were queried on project aspects and preconstruction services to gain expert opinions on each contracting method's ability to add value to the department's capital project delivery process. This included agency opinions on how each contracting method affects the quality of project aspects for typical projects, as well as how each alternative project delivery method impacts the value of preconstruction services for typical projects.

Once this data was gathered for all seven State DOTs, the mean, median, and standard deviation were calculated for each area to analyze trends across all States. It should be noted that not every State utilizes every ACM:

- All seven States (California, Florida, Michigan, Texas, Utah, Virginia, and Washington State) utilize DBB and DB.
- California, Michigan, and Utah utilize CM/GC.
- California, Florida, Michigan, and Virginia utilize P3.
- Florida and Michigan utilize ID/IQ.

Table 53. Summary of ACM selection, risk assessment, and evaluation activity by State.

DOT	ACM Selection Process	Risk Assessment	Post-Performance Evaluation	Remarks
CA	Formal process using ACM selection tool.	Done after ACM selection. Must validate selected ACM.	Key performance indicators tracked.	Caltrans would like to consider/make the ACM decision earlier than it currently does, which is at some time during the planning phase.
FL	Informal & decentralized. Mostly DB by pre-approved criteria.	Done after ACM selection. Most of the time, projects do not go through a risk analysis until after the process of selecting an ACM is finished. FDOT requires a formal risk analysis for projects greater th $100 illi	DB cost & schedule data available. No formal evaluation process.	The agency relies on the experience of its staff to decide the best delivery method for a project.

DOT	ACM Selection Process	Risk Assessment	Post-Performance Evaluation	Remarks
MI	Informal process. The ICC reviews all projects that have been screened by the ICU, and second, the EOC, which is composed of senior MDOT management, must approve all ACM use. The MDOT Director becomes involved if either P3 or CM/GC is proposed.	Once the decision is made to use an ACM, a risk assessment is performed. This includes assessing project scope, schedule, cost, and contracting risk. It involves both qualitative and quantitative risk analyses. The outcome of the risk workshop must validate the ACM selection decision.	MDOT does not have a formal process for evaluating ACM performance. The ICU is a small unit with offices in close proximity, so they track ACM performance and lessons learned informally among each other. There is no formal database.	MDOT would like to have a formal ACM selection tool. Staff is currently working on a spreadsheet and is looking forward to seeing the outcome of this project.
TX	TxDOT uses a selection tool for two iterations, then administrative staff in TxDOT districts work in conjunction with a committee of upper leadership, including the Chief Engineer, the Director of Transportation Planning and Programming, the Director of District Operations, etc., to make ACM decisions.	Formal risk analysis is conducted on project scope, project schedule, project cost, and contracting risk (performed using a Monte Carlo risk assessment).	In terms of performance measurements, monthly updates provide tracking that is compiled at project completion into a lessons-learned session. Safety data is also included in monthly reports.	By State statute, only three DB projects are allowed in Texas per year, and these projects must be larger than $150 million.
UT	UDOT does not have a formal policy or procedure to determine which projects is potential ACM candidates. The decision on whether to use an ACM and which ACM to use is mostly an informal one made by experienced professionals, usually regional directors with consultation from the Office of Innovative Contracting. There is no formal selection tool.	During the process of selecting an ACM, all projects go through a risk analysis. This includes assessing project scope, schedule, cost, and contracting risk. It involves both qualitative and quantitative risk analyses and may include brainstorming, scenario planning, expert interviews, and Monte Carlo simulations.	UDOT does not have a formal process to evaluate ACM performance. The Office of Innovative Contracting collaborates with other UDOT staff to informally track ACM performance and lessons learned.	UDOT has not identified a need for a formal ACM selection tool, but the staff seemed open to evaluating one for potential use if it were available.

DOT	ACM Selection Process	Risk Assessment	Post-Performance Evaluation	Remarks
VA	Formal process only for P3 projects.	Once the decision is made to use an ACM, a risk assessment workshop is convened that includes stakeholders from the district and the central office. It must validate the ACM decision.	VDOT has dashboard performance measures for ACM cost and schedule performance. It also conducts a formal evaluation of the design-builder's performance, which may be used for future selection processes (this implementation tool has not yet been approved for use).	VDOT does not want a formal ACM selection tool. The staff believe that the development of a one-size-fits-all model is impossible.
WA	During the ACM selection process, all projects go through Project Delivery Method Selection Guidance, which WSDOT created based on the University of Colorado and Colorado DOT selection process and tailored to its program.	A formal cost-risk assessment is performed for large projects and does not have to validate the ACM decision, while more informal assessments, such as task force meetings, are done for smaller projects.	For the most part, project goals are met by ACMs. The State has had very few unfavorable performance evaluations for DB, but the assessment process could still be improved.	WSDOT staff like the agency's current decision-making tool and feel it is well understood by the WSDOT Regions using it.
Australia	During the selection process, the agency generally follows the National Public Private Partnership Guidelines set by the Department of Infrastructure and Regional Development.			
MTA	The Maryland Transit Administration Purple Line Light Rail Transit System was selected as a recent example of public transit that utilizes the VfM process.			

As can be seen in Figure 8, due to limited data for ID/IQ, the data is relatively uniform as compared to the other ACM selections. Ratings used by States when completing these data tables are provided as notes in Figure 8 and Figure 9.

An analysis of the response data provided only weak trends. If this were employed to weigh the various ACMs based on project objectives and requirements, it would appear that CM/GC should get the highest weight if cost/schedule certainty is a major objective, and if the DOT sees a need for extensive precondition services.

For example, in Tool 1, if certainty is a major objective, CM/GC would be preferred over P3, and that would trickle down to Tool 2. It may also be possible to use the output to determine default weights in Tool 2, which could be adjusted by DOTs for each project.

Project Aspects	DBB Mean	DBB Med.	DBB StDev	CMGC Mean	CMGC Med.	CMGC StDev	DB Mean	DB Med.	DB StDev	P3 Mean	P3 Med.	P3 StDev	IDIQ Mean	IDIQ Med.	IDIQ StDev
Completeness of final design deliverables	4.43	5.00	0.73	4.67	5.00	0.47	3.57	3.00	0.73	3.50	3.00	0.87	3.50	3.50	0.50
Accuracy of design calcs	3.86	3.00	0.99	4.33	5.00	0.94	3.43	3.00	0.73	3.50	3.00	0.87	4.00	4.00	1.00
Accuracy of quantities	4.14	4.00	0.83	5.00	5.00	0.00	3.17	3.00	0.37	3.00	3.00	0.00	4.00	4.00	1.00
Acceptance of design deliverables	4.33	5.00	0.94	5.00	5.00	0.00	3.67	4.00	0.94	3.25	3.00	1.09	4.00	4.00	1.00
Accuracy of specifications	4.43	5.00	0.73	4.33	5.00	0.94	3.57	3.00	0.73	3.50	3.00	0.87	4.00	4.00	1.00
Accuracy of as-built documents	4.14	4.00	0.83	3.67	4.00	0.47	4.14	5.00	0.99	4.00	4.00	1.00	4.00	4.00	1.00
Accuracy/applicability of O&M manuals, etc.	3.00	3.00	0.00	3.00	3.00	0.00	3.33	3.00	0.47	3.00	3.00	0.00	3.00	3.00	0.00
Implementation of approved QA/QC plans	3.57	3.00	0.90	3.33	3.00	0.47	4.29	4.00	0.70	4.00	4.00	1.00	4.00	4.00	1.00
Accuracy of preconstruction cost estimates	3.57	4.00	0.49	4.67	5.00	0.47	3.17	3.00	0.37	3.33	3.00	0.47	3.50	3.50	0.50
Ability to achieve post-award budgets	3.00	3.00	0.93	5.00	5.00	0.00	4.14	4.00	0.64	4.00	4.00	1.00	4.00	4.00	1.00
Accuracy of preconstruction schedules	3.57	3.00	0.73	4.00	4.00	0.82	4.14	4.00	0.64	3.50	3.50	0.50	3.50	3.50	0.50
Ability to achieve post-award schedules	3.43	3.00	0.73	4.33	5.00	0.94	4.57	5.00	0.49	4.00	4.00	1.00	4.00	4.00	1.00
Material quality	4.33	5.00	0.94	4.00	4.00	1.00	4.00	4.00	0.82	4.25	4.50	0.83	4.00	4.00	1.00
Workmanship quality	4.17	4.00	0.69	5.00	5.00	0.00	3.67	3.50	0.75	4.25	4.50	0.83	4.00	4.00	1.00
Aesthetics	3.57	3.00	1.40	3.67	4.00	1.25	3.57	3.00	0.73	3.50	3.00	0.87	4.00	4.00	1.00
Maintainability	4.00	4.00	1.00	4.00	4.00	1.00	3.50	3.50	0.50	4.50	4.50	0.50	4.00	4.00	1.00
Operability	4.20	5.00	0.98	4.00	4.00	1.00	3.80	4.00	0.75	4.50	4.50	0.50	4.00	4.00	1.00
Maintenance of traffic	4.33	4.00	0.47	5.00	5.00	0.00	4.67	5.00	0.47	4.00	4.00	0.82	5.00	5.00	0.00
Interest to potential bidding community	4.29	5.00	0.88	3.33	3.00	0.47	4.14	4.00	0.83	4.00	4.00	1.00	4.00	4.00	1.00

Key: 1= worst, 2 = worse, 3 = neutral, 4= better, 5 = best

Figure 8. Project aspects data analysis.

Preconstruction Service	DBB Mean	DBB Med.	DBB StDev	CMGC Mean	CMGC Med.	CMGC StDev	DB Mean	DB Med.	DB StDev	P3 Mean	P3 Med.	P3 StDev	IDIQ Mean	IDIQ Med.	IDIQ StDev
Conceptual estimating	2.83	3.00	0.69	4.67	5.00	0.47	3.20	3.00	0.40	3.33	3.00	0.47	1.00	1.00	0.00
Value analysis/value engineering	3.43	3.00	0.49	3.67	5.00	1.89	3.67	3.50	0.75	4.25	4.00	0.43	3.50	3.50	0.50
Design charrettes	2.17	1.50	1.46	4.00	4.00	0.82	2.50	2.50	0.96	2.75	3.00	1.09	3.00	3.00	0.00
Design reviews	3.86	4.00	0.83	4.67	5.00	0.47	3.67	3.50	1.11	3.75	3.50	0.83	4.00	4.00	1.00
Regulatory reviews	3.14	3.00	0.99	3.00	2.00	1.41	3.33	3.50	1.11	3.50	3.50	1.12	4.00	4.00	1.00
Security impact studies	2.00	2.00	0.89	1.00	1.00	0.00	1.75	1.50	0.83	1.00	1.00	0.00	1.00	1.00	0.00
Environmental studies	3.29	3.00	1.03	3.67	4.00	0.47	4.00	4.00	0.82	3.75	3.50	0.83	4.00	4.00	1.00
Early contractor involvement	1.29	1.00	0.70	5.00	5.00	0.00	4.17	4.00	0.69	4.25	4.50	0.83	3.50	3.50	0.50
Design alternates	2.43	3.00	1.05	5.00	5.00	0.00	3.83	3.50	0.90	4.00	4.00	0.71	4.00	4.00	0.00
ATCs	1.57	1.00	0.90	1.00	1.00	0.00	5.00	5.00	0.00	4.50	4.50	0.50	2.00	2.00	1.00
Cost engineering reviews	3.00	3.00	0.82	5.00	5.00	0.00	2.80	3.00	1.17	3.00	3.00	1.63	3.00	3.00	0.00
Constructability reviews	3.14	3.00	0.64	5.00	5.00	0.00	3.67	4.00	0.94	3.75	4.00	1.30	3.50	3.50	0.50
Biddability reviews	3.71	3.00	0.88	4.33	5.00	0.94	2.67	3.00	0.94	2.33	3.00	0.94	4.00	4.00	1.00
Operability reviews	3.00	3.00	1.29	2.00	2.00	1.00	2.60	3.00	1.02	4.00	4.00	0.71	3.50	3.50	0.50
Life cycle cost analysis	3.75	3.75	1.07	3.25	3.25	0.25	3.10	3.00	0.66	4.33	4.00	0.47	4.00	4.00	1.00

1= not valuable, 2 = some value, 3 = valuable, 4= very valuable, 5 = highest value

Figure 9. Preconstruction services data analysis.

General, overall observations from the case studies:

- What we did not find is most important.
  - There is a lack of data utilized in the decision-making process; none of the agencies interviewed are using a quantitative tool.
  - There are no performance measures (key performance indicators); we did not discover any systematic post-project analysis of the ACM decision.
  - No uniform ACM evaluation method was present among the State DOTs.
  - ACM evaluation processes are typically not formal; agencies view their programs as successful.
  - No direct ACM comparator versus P3 comparison.
  - Most States do not evaluate the full range of ACMs; they are limited by authority for delivery types.
- Agencies typically have an office dedicated to innovative contracting/ACMs. These offices are typically small, and collaboration among staff department-wide allows them to track ACM successes and challenges informally.
- A process/tool that allows for an ACM decision early in the project development process is preferred to allow for most efficient use of resources.
- There is interest in a national database of performance data.
- Flexibility in the toolset and ability to use engineering judgment is critical.
- The primary reasons for selecting ACMs are similar: project size, schedule, technical complexity, risk management, and innovation potential.
- A toolset that would provide a ranking of procurement methods is generally desired.
- There is a level of skepticism for current VfM approaches and practices; primary concern is the assumptions that are necessary.
- State DOTs are comfortable with the tools they have; they prefer simpler tools. Some skepticism exists that a supportable qualitative tool can be developed (since each project is unique).
- State DOTs have evolving policies on evaluation methods and documenting decisions.
- There is interest in reviewing the tools and supporting documentation that result from this project's effort.

The State DOTs interviewed, and detailed case studies prepared for, were California, Florida, Michigan, Texas, Utah, Virginia, and Washington State. In addition, an international case study was prepared for Australia's North East Link Authority and a transit case study was prepared for the Maryland Transit Administration. A summary of the major observations from each case study follows.

California DOT (Caltrans)

- Caltrans uses a formal ACM selection tool (Design-Build Project Selection Tool). The agency believes that it is in need of an update to capture the experience gained since implementing ACMs.
- Caltrans would like to consider/make the ACM decision earlier than it currently does, which is at some point during the planning phase. Since nearly all projects pass through the project development process, assuming DBB delivery with design being completed

with in-house assets, determining that a project will be delivered using DB would reduce the amount of design that is done during the preliminary engineering phase.
- More education is needed for decision-makers at the district level to manage expectations. The Caltrans OIDD asks the following questions to vet projects nominated for ACM delivery: 1) What is your goal for using an ACM? and 2) Can benefits actually be realized through ACM delivery?
- Caltrans invests in the training of all ACM project team members. The agency believes this has paid dividends in terms of increasing the overall success rate of its ACM program.
- The ACM projects that did not go according to plan were judged to have been the wrong project for the selected ACM. Hence, there is a high emphasis by OIDD and the central office steering group in vetting the ACM selection decision and ensuring that the selected ACM matches the project's characteristics.

Florida DOT

- FDOT does not have a formal ACM selection tool. The agency relies on staff experience to decide the best delivery method for a project.
- FDOT has a long history of successful ACM projects. It primarily uses DB for highway infrastructure. There was reluctance to use CM/GC due to the success of the DB program.
- FDOT does not use a formal risk analysis to help decide which delivery method to use. When preparing an RFP, however, staff members try to remove risk by clearing ROW, getting permits, and beginning coordination with utilities prior to advertising.
- FDOT does not have a formal process to analyze the success of its ACM projects. The staff does have a grading system for contractors and consultants that is used when evaluating proposals on future projects.
- FDOT staff said they were open to evaluating a tool if it was available. Given the agency's long history of success with its current methods, the tool would have to be flexible enough to fit into FDOT's current system.

Michigan DOT

- MDOT would like to have a formal ACM selection tool. Staff members are currently working on a spreadsheet and are looking forward to seeing the outcome of this project. Additionally, they would like to see a quantitative result but are skeptical that it is possible. They did express that any tool must have flexibility in interpreting the results so that professional judgments can be made based on external factors not in the model.
- MDOT would welcome a tool that would provide a ranking of procurement methods for a given project to assist in making the selection decision.
- MDOT is interested in a database that would help document past ACM performance and predict future ACM benefits.
- MDOT believes that any tool is only as good as the inputs, and therefore it is critical that all proposed ACM projects be evaluated by the agency's ICU for consistency in the decision results.

Texas DOT

- TxDOT's Project Delivery Selection Tool contains 12 tabs for different project characteristics, and these are populated at the outset with details including project

characteristics, project information, designer and contractor information, and associated costs.
- The first run-through of the tool is for internal use among district SMEs.
- The second run-through is completed to incorporate feedback from upper management, which results in a final scored answer.
- Additionally, one of the tabs includes project goals, which uses a scoring method to select between DB and DBB.
- The project goals tab also includes graphics such as heat maps, which are documented as part of the selection process.
- By State statute, only three DB projects are allowed in Texas per year, and these projects must be larger than $150 million.

Utah DOT

- UDOT has not identified a need for a formal ACM selection tool, but the staff seemed open to evaluating one for potential use if it were available.
- Staff expressed that any tool must have flexibility in interpreting the results so that professional judgments can be made based on external factors that are not in the model.
- UDOT has had an incredible amount of success with ACM use based on using past experience to make ACM selection decisions.
- If available, UDOT would welcome a tool that would track project success and better help the agency tell its story.

Virginia DOT

- VDOT does *not* want a formal ACM selection tool. The staff believes that the development of a one-size-fits-all model is impossible. Additionally, if one were adopted, the agency would lose the flexibility to make professional judgments based on external factors that are not in the model.
- VDOT would welcome a tool that would provide a ranking of procurement methods for a given DB project to assist staff in making that decision.
- VDOT is beginning to look into "resiliency" as a design and/or construction criterion for DB and P3 ACM selection and contract award. It has nothing formal yet, but the interviewee sees the possibility for this to become a reality in the near future.
- If a tool were available that somehow assessed potential ACM cost, time, quality, etc. benefits, VDOT would not believe it nor use it.
- The P3 Office has a well-established process for identification and selection of P3 projects. This process has evolved over time and, in its current state, reflects recent attention on how VDOT selects and implements projects of this nature so that they meet multiple stakeholder interests and sustain some level of legislative oversight.
- The P3 Office's transition to its PSAC approach is a consequence of the lack of executive and legislative confidence in VfM studies. At this point, it is difficult to judge how effective the PSAC process will be.
- The P3 Office is subject to significant scrutiny, which influences how it does its business.

Washington State DOT

- WSDOT's team is very comfortable with the DB process.
- The legislature in the State is strongly supportive of ACM usage and has embraced it.
- Results have been broadly positive, and DB use is growing to include smaller regional offices.
- WSDOT staff like the current decision-making tool being used (Project Delivery Method Selection Guidance) and feel it is well understood by the regions using it. The team is also open to learning from other States' experiences, as this is how they developed their guidelines.

North East Link Authority (Victoria, Australia)

- The Australian case depicts a systematic approach for selection of a contracting method for a large-scale, complex project.
- The selection decision was part of the project's overall business case development process.
- Its decision-making process relies on structured judgments by key project personnel to determine the preferred contracting approach.

Maryland Transit Administration

- The VfM analysis presents an approach for assessing the potential value of delivering a public transit project under a number of delivery options from DBB, to DB with various funding options, to DBFOM.
- The financial value from the P3 alternative was derived from several factors, including risk transfer efficiencies, life-cycle planning, and innovation opportunities.
- The analysis concluded that the DBFOM alternative could provide up to 20 percent cost savings compared to DBB, given the assumptions used.
- Potential cost savings for alternate scenarios based on DB with various public financing options ranged from 8 to 16 percent of the DDB alternative.
- This analysis focuses on a relative comparison among project delivery alternatives, rather than identifying absolute project costs. There are no guarantees that savings of this magnitude will ultimately be realized by the State, and VfM is only one element in the decision-making process.

In summary, current practices indicate the need for a more structured, comprehensive, and data-driven decision-making toolset for ACM selection. In particular, there is no known tool for a public sector comparator versus a P3. The toolset must be flexible to meet the needs of individual agencies—this includes being customizable to address an agency's specific legal authority and organizational structure for ACMs. The ability to use, or expand to incorporate future data, into the decision-making process would be beneficial.

References

Australia Department of Infrastructure and Regional Development. (2008). *National Public Private Partnership Guidelines: Volume I - Procurement Options Analysis*, Canberra, Australia.

Maryland Department of Transportation. (2013). *Public-Private Partnership (P3) Presolicitation Report for the Purple Line Light Rail Transit project*. Hanover. Retrieved from http://dlslibrary.state.md.us/publications/Exec/MDOT/MdTA/SF10A-201_2013(8).pdf

North East Link Authority. (2018). *North East Link Project: Business Case*, Government of Victoria, Melbourne, Australia.

North East Link Authority. (2018). *North East Link Project: Business Case – Executive Summary*, Government of Victoria, Melbourne, Australia.

North East Link Authority. (2018). *North East Link Project: Business Case – Key Findings*, Government of Victoria, Melbourne, Australia.

Towell, N. (2018). "North-East Link: Superhighway through Melbourne's east." <https://www.theage.com.au/national/victoria/north-east-route-revealed-20180909-p502nd.html> (Jan. 15, 2019)

Appendix A: Interview Protocol and Questionnaire

Interview Protocol

CONDITIONS: Preferably, the interview is conducted in person; if an interviewee is unavailable, then it may be done by telephone. The following protocol shall be followed during its administration:

- The questionnaire shall be sent to the respondent preferably 2 weeks, but at least 1 week, prior to the interview via email.
- Two days prior to the interview, a follow-up message with the questionnaire attached will be sent to confirm the date and time of the interview.
- To maximize the quality and quantity of information collected, the primary respondent should be encouraged to invite other pertinent members of his/her organization to be present during the interview. Thus, a single "ACM unit" response can be formulated and recorded.
- The interviewer will set the stage with a brief introduction that emphasizes the purpose of the research, the type of information expected to be collected, and the ground rules for the interview.
- Once the interviewees indicate that they understand the process at hand, the interview will commence.
- The interviewer will read each question verbatim, and then ask if the interviewee understood the question, before asking the interviewee to respond.
- Each question contains a specific response that must be obtained before moving to the next question. Once that response is obtained, the interviewer can record as text additional cogent information that may have been discussed by the interviewees in working their way to the specific response.
- Upon conclusion of the interview, the interviewer will ask the interviewees if they have additional information that they would like to contribute and record those answers as text.
- The interviewer will assemble a clean copy of the final interview results and return them to the interviewee for verification.

Relevant Definitions

The basic purpose of the interview is to learn more about how your unit or office selects an ACM for a given project as well as to better understand the procurement methods employed. For this interview, the following contracting method definitions apply:

- **Design-bid-build (DBB):** A project delivery system in which the design is completed either by in-house professional engineering staff or a design consultant before the construction contract is advertised. (The DBB method is sometimes referred to as the traditional method.)
- **Design-build (DB):** A project delivery system in which both the design and the construction of the project are simultaneously awarded to a single entity. (The main advantage of the DB method is that it can decrease project delivery time.)
- **Construction manager/general contractor (CM/GC)**, also called **construction manager-at-risk (CMR):** A project delivery system that entails a commitment by the construction manager to deliver the project within a guaranteed maximum price (GMP), in most cases. The construction manager acts as consultant to the owner in the development and design phases and as the equivalent of a general contractor during the construction phase.
- **Public-private partnership (P3):** A government service or private business venture that is funded and operated through a partnership of government and one or more private-sector companies.
- **Indefinite delivery/indefinite quantity (ID/IQ):** A multi-project contract for an undetermined number of projects to be completed as required over the term of the contract. (Also called job order contract, task order contract, on-call contract, and other terms).

I. General Information:

1. Jurisdiction of DOT/Highway Agency:
2. City and State where respondent is employed:
3. Name of unit or office within DOT/Agency:
4. Number of staff in unit or office:
5. Annual construction budget:
6. Average annual number of projects:
7. Project monetary size range: $ to $
8. Average monetary size of a typical project $

Contracting Method Experience

Contracting Method Experience	DBB	CMGC	DB	P3	IDIQ
1 Has your unit/office awarded a project under one of these alternative contracting methods?	*Yes No*	*Yes No*	*Yes No*	*Yes No*	*Yes No*
▪ A. If yes, how many projects?	A. 1-5 6-10 greater than 10	A. 1-5 6-10 greater than 10	A. 1-5 6-10 greater than 10	A. 1-5 6-10 greater than 10	A. 1-5 6-10 greater than 10
▪ B. If yes, what percentage of your total construction budget?	B. less than 10% 11-25% 26-50% greater than 50%	B. less than 10% 11-25% 26-50% greater than 50%	B. less than 10% 11-25% 26-50% greater than 50%	B. less than 10% 11-25% 26-50% greater than 50%	B. less than 10% 11-25% 26-50% greater than 50%
▪ C. If no, what are primary reasons your unit/office has not used the contracting method?					

Contracting Method Experience	**DBB**	**CMGC**	**DB**	**P3**	**IDIQ**
2 In general, does your unit/office use each contracting method for one of the following reasons? ▪ A. To accelerate a project's schedule?	A. *Yes* *No*	A. *Yes* *No*	A. *Yes* *No*	A. *Yes* *No*	A. *Yes* *No*
▪ B. To improve cost performance?	B. *Yes* *No*	B. *Yes* *No*	B. *Yes* *No*	B. *Yes* *No*	B. *Yes* *No*
▪ C. To achieve better quality?	C. *Yes* *No*	C. *Yes* *No*	C. *Yes* *No*	C. *Yes* *No*	C. *Yes* *No*

II. Unit ACM Decision-making Information

- Who are the key personnel involved in the decision to use ACMs? Are external personnel/firms used to augment agency staff? If so, what roles do external personnel/firms take?

- Who ultimately makes the majority of the decisions about the ACM to use for a particular project:
  ☐ Unit/office personnel ☐ Higher-level management in department/agency

  ☐ Entity outside the department/agency; Explain:

- What project-specific factors are considered when making the decision to use ACMs?

Project Factor	Considered in decision	Drives use of ACM
Project monetary size		
Project budget control issues		
Project schedule issues		
Project technical complexity		
Project level of design		
Project type (new build vs. enhancement/improvement)		
Project location (urban, suburban, rural)		
Project environmental issues		
Project third party interface issues		

Project Factor	Considered in decision	Drives use of ACM
Project quality assurance requirements		
Project life cycle issues (maintenance/operations)		
Obligate funding		
Incentives for obtaining Federal or State funding		
Project has revenue generation potential		
Project amenable to performance-based specifications		
Project stakeholders (range and level of interest)		
Project financing options		
Other (Identify:)		

Revisions based on VDOT pilot:

"Project stainability issues" was deleted from the list of project factors.

"Obligate funding" was added to the list of project factors.

- Which of the following factors does your unit/office consider to select each of the following ACMs? Check all that apply. Which of the below is the **single** most significant reason for selecting each delivery method? (circle the check box)

Item	CM/GC	DB	P3	ID/IQ
Reduce/compress/accelerate project delivery period				
Establish project budget at an early stage of design development				
Get early construction contractor involvement				
Encourage innovation through performance requirements				
Encourage innovation through ATCs				
Facilitate value engineering				
Encourage price competition (in procurement process)				
Compete different design solutions through the proposal process				
Redistribute or transfer risk				
Complex project requirements				
Flexibility needs during construction phase				
Reduce life cycle costs				
Increase scope by bundling requirements/tasks				
Provide mechanism for follow-on operations and/or maintenance				
Innovative financing				
Project is a revenue generator				

Item	CM/GC	DB	P3	ID/IQ
Procurement time				
Procurement cost (internal and/or external)				
Unit/agency experience				
Political and agency support				
Statutory issues				
Availability of qualified service providers/contractors				
Other (explain below)				

Revisions based on VDOT pilot:

"Encourage sustainability" was deleted from the list of most significant items in delivery method selection.

- Please explain the process followed to choose an alternative contracting method for a typical project. Probe for specific methodology or tools used.

- When does your unit/office typically consider funding and financing options for a project? How does this affect decision-making about ACMs?

- On average, have ACMs met stated project goals? Can you describe a project that did so and one that did not? Why did one achieve its goals while the other did not?

- What would improve your decision-making during ACM selection? Possible probes follow:
  - Better definition of project goals and stakeholder alignment
  - Access to decision-support tools for ACM selection
  - Identification and tracking of performance metrics relative to goals; provide some examples
  - Access to internal or external data about ACM outcomes and performance
  - Access to best practices about ACM selection and implementation
  - Informal/formal assessment of lessons learned

- Does your unit/office track performance of ACMs? If so, what metrics are used? If not, what metrics would be useful to have? Possible probes follow:
  - Preconstruction: procurement time, procurement cancellations, project preparation costs (staff and consultants)
  - Implementation: time growth, cost growth, change orders, disputes/claims, safety incidents, community complaints
  - Service/O&M: usage (expected to actual), customer service, availability, incident management, travel times (trip reliability), roadway safety, asset management, financial metrics

- Has implementation of an ACM changed the unit's/office's perspectives of the method? If so, how?

- How has your decision-making process changed/evolved over time?

- What are barriers to selection or use of ACMs? (similar to 8 but asked differently)

- What are your primary concerns about ACMs? Possible probes follow:
  - Unit/office experience
  - Availability of qualified service providers/contractors
  - Sociopolitical scrutiny
  - Clarity of benefits/costs
  - Stakeholders concerns/issues

- What features/elements would your unit/office: (a) add to (or delete from) your ACM selection tool/process OR (b) like to see in an ACM selection tool/process?

- Is a formal risk analysis conducted on a typical project in any of the following areas?
  ☐ Project Scope
  ☐ Project Schedule
  ☐ Project Cost
  ☐ Contracting Risk

- Do your project cost estimates involve an analysis of uncertainty (i.e. was a range cost estimate developed)?
  ☐ Yes ☐ No

- Do you employ any of the following risk identification techniques during the alternative contracting method selection decision process? Check all that apply.
  - ☐ Brainstorming
  - ☐ Scenario planning
  - ☐ Expert interviews
  - ☐ Delphi methods
  - ☐ Influence or risk diagramming
  - ☐ Monte Carlo simulation
  - ☐ Other risk identification techniques Explain:

- Do you employ either of the following?
  - ☐ Qualitative risk assessment techniques - If yes, please describe.
  - ☐ Quantitative risk analysis techniques - If yes, please describe.

  Examples include: Monte Carlo simulation, expected values, etc.

- Do you use any of the following risk management techniques?
  - ☐ - Risk register or risk charter
  - ☐ - Risk management plan
  - ☐ - Risk mitigation plan
  - ☐ - Other risk tracking techniques Explain:

- Do you employ any formalized risk allocation techniques to draft the contract provisions?

  ☐ Yes ☐ No If yes, please describe:

Revision based on VDOT pilot:

"Monte Carlo simulation" was added to the list of possible responses to question 17.

III. Case Study Procurement Process Information:

This project will deal with three fundamental procurement processes. A procurement process is different from a contracting method decision in that it primarily deals with the way the department/agency must select service providers and the basic commercial conditions associated with capital projects. The general procurement processes are defined as follows:

- Low Bid: The services required are awarded on a basis of price alone. There is no other consideration, except financial responsibility, which is usually defined by the ability to furnish a performance bond.
- Best Value: The services required are awarded on a basis of OTHER THAN price alone.
- Qualifications-based: The services are awarded based on qualifications or comparable factors but NOT PRICE.
- Negotiated/Reimbursable: This is the ability to negotiate or use reimbursable terms for contracts for project services such as design, construction, operations, and maintenance OR for task or job order contracts.

The following questions will break up the procurement process for the case study of the department into the following three categories:

- Procurement constraints: These are items such as legal or regulatory barriers to being able to use specific procurement processes such as a requirement that all projects must be awarded to the low bidder. This will also include any local policies or political constraints that ultimately impact the department's flexibility to award design and construction projects.
- Procurement preferences: These deal with the department's past experience and institutional comfort level with the different procurement processes. These also may deal with external stakeholders such as airlines that influence the decision made on procurement processes.
- Procurement method award components: These deal with the mechanics of how and award for design and/or construction services are made.

Procurement Constraints:

Which of the following constrain the use of each of the procurement processes?

Constraint	Low-bid	Best Value	QBS	Neg-Reimb	Remarks
Local law					
State law					
Need to obtain federal funding					
Procurement regulations					
Commission rules					
Process used to obtain funding					
Political need to ensure local firms are utilized					
Requirement to comply with the DBE Program					
Third party stakeholder policies					
Security requirements					
Operations requirements					
Maintenance requirements					
Sustainability requirements					
Other: Specify					

Procurement Preferences:

Which of the following department preferences drive the use of the procurement processes?

Constraint	Low-bid	Best Value	QBS	Neg-Reimb	Remarks
Local law					
State law					
Need to obtain federal funding					
Procurement regulations					
Commission rules					
Process used to obtain funding					
Political need to ensure local firms are utilized					
Requirement to comply with the DBE Program					
Third party stakeholder policies					
Security requirements					
Operations requirements					
Maintenance requirements					
Sustainability requirements					
Other: Specify					

Procurement method award components

Which of the following award method algorithms are used during award for each type of procurement method?

Component	Low-bid	Best Value	QBS	Neg-Reimb	Remarks
Short-list					
Financial prequalification					
Evaluation of qualifications					
Alternative design concepts					
Evaluation of design approach					
Schedule evaluation					
Quality management plan evaluation					
Environmental plan evaluation					
Security plan evaluation					
Safety plan evaluation					
Price evaluation					
Bonding requirements					
DBE goals					
Other: Specify					

Revisions based on VDOT pilot:

The topic "**Alternative Contracting Method Issues**," which included a list of project-level issues that interviewees were asked to identify as either a "pro" or "con" in a given project delivery method, was eliminated following the VDOT pilot case interview.

Achieving Value through Contracting Method Selection

This section's purpose is to collect expert opinions on each contracting method's ability to add value to the department's capital project delivery process. If more than one person in the interview, the interviewer should require the group to achieve a consensus opinion for the impact of each contracting method on the department's final constructed product.

1. In your opinion, how does each contracting method impact the quality of the following project aspects for typical projects at your department?

For each method, assign one of the following ratings based on the department consensus: Worst= 1; Worse = 2; Neutral= 3; Better = 4; Best = 5					
Project aspects	**DBB**	**CMGC**	**DB**	**P3**	**IDIQ**
Completeness of final design deliverables					
Accuracy of design calculations					
Accuracy of quantities					
Acceptance of design deliverables					
Accuracy of specifications					
Accuracy of as-built documents					
Accuracy/applicability of O&M manuals, etc.					
Implementation of approved QA/QC plans					
Accuracy of preconstruction cost estimates					
Ability to achieve post-award budgets					
Accuracy of preconstruction schedules					

For each method, assign one of the following ratings based on the department consensus: Worst= 1; Worse = 2; Neutral= 3; Better = 4; Best = 5					
Project aspects	**DBB**	**CMGC**	**DB**	**P3**	**IDIQ**
Ability to achieve post-award schedules					
Material quality					
Workmanship quality					
Aesthetics					
Maintainability					
Operability					
Interest to potential bidding community					
Other (specify:)					

Revision based on VDOT pilot:

"Sustainability" was deleted from the list of project aspects.

2. In your opinion how does each alternative project delivery method impact the value of the following preconstruction services for typical projects at your department?

For each method, assign one of the following ratings based on the department consensus: Not valuable = 1; Some value = 2; Valuable = 3; Very valuable= 4; Of highest value = 5					
Preconstruction service	**DBB**	**CMGC**	**DB**	**P3**	**IDIQ**
Conceptual estimating					
Value analysis/value engineering					
Design charrettes					
Design reviews					
Regulatory reviews					
Security impact studies					
Environmental studies					
Early contractor involvement					
Design alternates					
ATCs					
Cost engineering reviews					
Constructability reviews					
Biddability reviews					
Operability reviews					
Life cycle cost analysis					

V. Additional Observations/Notes of the Researcher

Record any additional observations made during the interview.

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