Appendix

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Alternative Project Delivery Methodology Analysis

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TECHNICAL MEMORANDUM

CH2MHILL

Alternative Project Delivery: Procurement and Delivery Methodologies Analysis

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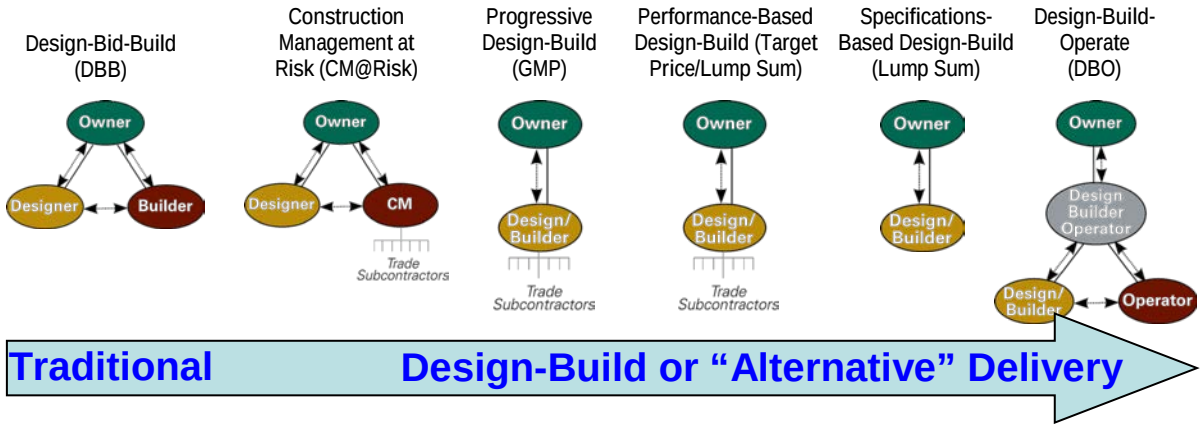
Implementing an effective project procurement and project delivery system for a complex infrastructure project requires an understanding of a wide spectrum of proven contracting methodologies and accompanying insight to how varying methodologies can align with specific project needs and risk allocations. This Technical Memorandum provides an overview of these procurement and delivery methods and summarizes the strengths, weaknesses, and risk allocation methodology typical of each model. Next, the City of Winnipeg's specific procurement and project objectives are outlined in the context of these procurement options. Finally, a methodology for defining a preferred procurement approach, including several specific contracting mechanisms, is proposed.

The Spectrum of Alternative Project Delivery Methodologies

Procurement methods can take numerous forms, ranging from standard design-bid-build techniques through construction management-at-risk to full at-risk alternative delivery, including many variants of design-build and beyond. This "spectrum" of methodologies is illustrated in Exhibit 1.

Exhibit 1: Project Delivery Spectrum



Moving from left to right on the spectrum, project delivery methods generally evolve from the traditional design-bid-build approach implemented by most public entities until the emergence of a variety of alternative delivery methodologies over the last 15 years. Note that the lines in Exhibit 1 take two forms: direct connections indicate firm *contractual* relationships between the giving entities and arrows represent *collaborative* relationships necessary to make the given model a success. While recognizing that, in practice, there is an almost infinite variation on the specific methodologies and relationships represented by this spectrum, the commonly recognized procurement and delivery models include:

Design-Bid-Build, where an owner contracts separately for engineering and design services that are completed prior to issuing a separate request for bid from contractors. The construction scope is handled by a separate contract directly with the owner and the relationship between engineer and builder is ideally collaborative in the resolution of Requests for Information (RFIs) and verification of compliance with the design.

Construction Management At-Risk, where an intentional overlap is created between the engineer and the contractor, allowing the contractor to bring construction insight to bear as early as practical in the design process. Sometimes referred to as "design-build-light" this methodology maintains two separate contracts, but encourages collaboration during design to reduce risk once the contractor proceeds to construction in the field.

While in conformance to most traditional procurement processes (the engineer is selected using traditional professional services criteria), this method introduces the concept of contractor selection without a hard bid of the construction cost. Instead, contractors are generally selected based on their qualifications in combination with their proposed scope of services and fee for service prior to construction as well as their fee and overhead costs for construction services. The ultimate construction cost is developed during the design period, typically in an open-book

fashion, and ultimately agreed upon as a "guaranteed maximum price" (GMP) prior to authorizing the start of construction.

Where agreement on a GMP cannot be reached or construction pricing competitiveness cannot be verified, owners often maintain the option to convert the construction scope to a hard bid request. In many instances, owners convert GMPs to lump sum pricing.

While promoting collaboration early in the design process, the formal contract vehicles with separate agreements between the Owner and Engineer and the Owner and Contractors are essentially unchanged compared to traditional design-bid-build delivery. During construction delivery, traditional practices for managing contractor change orders, RFIs from the designer, and verification of construction performance remain unchanged.

Design-Build, where the entire project is contracted with a single entity (or a consortium of entities acting together as one entity) with a single-point of responsibility to the owner. In practice, design-build can be procured using a number of different methods, often tailored to meet local procurement regulations and practice as well as to align with project complexity and the level of design completion anticipated to be undertaken prior to the procurement.

The various forms of design-build procurements differ largely in the type of pricing requested of proposers and in the degree of problem definition developed for the project in advance of a procurement and subsequently provided to the design-builder in the request for qualifications (RFQ)/request for proposals (RFP). The industry recognizes three basic design-build models as follows:

Progressive design-build. In a progressive design-build procurement, a design-builder is selected based primarily on qualifications and, where local practice requires it, limited pricing information generally similar to the construction management at-risk model with an added component of cost for design services (either in a lump-sum for or on a not-to-exceed basis). As the design-builder develops the design, a construction cost estimate is progressively developed, often in conjunction with the 30- and 60 percent levels of design detail. Once the design is well advanced (beyond 60 percent and often up to 90 percent), a GMP is defined for approval by the owner. (As with Construction Management At-Risk, some owners convert GMPs to lump sum pricing.) If the design-builder and the owner cannot reach agreement on an acceptable GMP or lump sum, the owner can use the completed design as the basis for a hard construction bid procurement.

Progressive procurements are often preferred when a project lacks definition or when an owner prefers to remain involved in the design process while leveraging the schedule, collaboration, and contractual advantages provided by design-build. This model is also valuable when regulatory permitting requires well-developed design solutions, or when an owner believes that they can lower cost by participating in design decisions and in managing risk progressively through the project definition phase.

Owners do not generally use the progressive procurement method when a project's definition is well advanced prior to the procurement or when a lump sum construction price is preferred (or required) to select a design-builder.

Performance-based design-build. In a performance-based design-build procurement, the RFQ/RFP generally includes a conceptual design as a minimum and a 15 percent design as a maximum. Requirements are stated as measurable performance objectives

of the completed project rather than the specific approaches or processes the design-builder should follow to achieve those objectives.

A performance-based procurement gives design-builders' the flexibility to propose how they will meet the owner's objectives while requiring proposers to provide a lump sum price for completion of the project. Alternatively, owners may ask for a "target price" for construction that establishes a not-to-exceed construction price basis, while allowing the owner to collaborate on and adjust scope during detailed design definition. In this case, the "target" lump sum can be adjusted after award, but only as directed via owner-approved scope changes. Except for these explicitly approved owner changes, the design-builder must conform to their originally proposed price.

Performance-based procurements are often preferred when an owner has a clear vision for how a facility must perform, with limited resources, time, interest in the specific method for gaining required performance. This model is used to prompt industry's most innovative and cost-effective solutions through what is essentially a design competition, typically in combination with a need to accelerate schedule.

Prescriptive design-build. In a prescriptive design-build procurement, the RFQ/RFP typically includes at least a 30 percent design completed by an owner's consultant prior to the procurement, often referred to "bridging documents." Requirements are stated in terms of specific approaches or processes the design-builder must follow.

Prescriptive procurements are often preferred when owners are very clear on their preferences and want to use design-build to accelerate the schedule while allowing selection of a design-builder based on a combination of qualifications and a lump sum price. While a design-builder may offer a variation or alternative concept to the bridging documents, procurement procedures are often established to require owner review and approval of these exceptions or "alternative technical concepts" in advance of the proposal submittal. With this method, the lump sum price in the design-builder's proposal is only adjusted for specific owner-initiated scope changes, generally due to unforeseen conditions or a change in law or regulatory practice.

Design-Build-Operate (DBO) and Design-Build-Maintain (DBM), anchors the end of the alternative project delivery spectrum, providing owners with a whole-life solution for project implementation. Typically, DBO/M procurements are developed from the basis of a performance-based design-build model with the added component of requiring the proposer to operate the facility for an extended period of time (typically no less than 5 years and often as long as 15 or 20 years). The operations component ensures that the performance commitments of the design-build proposal are indeed met as the design-build must deliver on them during its tenure – or alter or repair the facility accordingly. Depending on the type of infrastructure, long-term operations can focus on maintenance and repair or replacement of critical components (typical for transportation projects) or on day-to-day operations with permanent staff (as is typical of water/wastewater projects). In either case, DBO/M entities are typically formed by a consortium of designers, builders, and operators, often led by operators as the majority value of DBO/M contracts can often be in the operations scope versus the capital construction.

DBO/M procurement models allow proposers to evaluate true lifecycle costs of a project while requiring them to operate facilities for an extended period of time, transferring risk to the DBO/M entity. Owners typically select this alternative when whole-life (lifecycle) is of greatest

concern, often when they do not currently have a fixed operations staff in place for the given facility. Also, owners prefer DBO contracts when selecting new or unproven technology that requires long-term, hands-on demonstration of performance.

The DBO methodology is less preferred when an owner already maintains an operations staff in place, particularly if their operators work under public union contracts that are administratively or politically difficult to transfer to the private sector.

DBO/M Finance (DBOF or DBMF), models that include financing are most common in context of public-private-partnerships (P3) in Canada. For example, the Canada P3 Infrastructure fund requires a long-term operations component or a finance component to be considered as a qualified P3 infrastructure project (and, in practice, both operations and financing are preferred. In Manitoba, P3 projects general contain both a financing and operations component. For the purposes of this analysis, P3 considerations are generally considered separately from alternative delivery methodology analyses. Conclusions as to applicability of an alternative delivery method are applicable to a project no matter where its ultimate funding is obtained.

As noted, there are numerous variations on all of these primary delivery types. For example, projects with extremely specialized technical needs or with unusual risk profiles, such as tunnelling, often require a hybrid procurement and delivery approach that blends many of the concepts defined here. Given a defined set of common traditional and alternative delivery models, the next step is to define specific project goals and, if necessary, identify specialized project drivers that require the development of a tailored procurement approach.

Goals for Successful Alternative Project Delivery Procurements

Evaluating the benefits of a given procurement and project delivery models rests on the City of Winnipeg's overarching goals and mission. For this analysis, we identified several goals that are essential to defining a successful procurement and follow-on project:

Transparent. All procurement processes, methodologies, and selection criteria must be fair, objective, and transparent to the professional services and construction community. No work should be awarded outside of a well advertised and fairly administered competitive process.

Cost effective. Any procurement methodology should ensure that the City of Winnipeg is receiving best value for the services and construction they are purchasing. To the extent possible, services should be priced and price should be evaluated as part of the selection methodology. Generally, this goal supports target, GMP, or lump sum pricing when possible, although fee-based pricing may be acceptable if the contracting methodology provides an "off-ramp" for hard-bidding construction work to ensure cost competitiveness.

Objective-Focused. Procurement selection strategies should be based on clearly defined evaluation criteria that mirror project challenges and opportunities for project success. In turn, the evaluation criteria will support overall project success.

Efficient. The cost to the City of Winnipeg for implementing the procurement process should be minimized in favor of using funding to maximize delivery of actual project scope.

Similarly, the bidding community's resources should be respected by minimizing to the extent practical the cost to propose on work.

Timely. Duration of procurement processes should be minimized, allowing for sufficient response time from bidders in conjunction with a reasonable amount of time to evaluate proposals without other undue delays. Valuable time should be conserved and made available for execution of project scope.

Inclusive. The overall procurement process should ensure that local subconsultants and subcontractors have equal access to project scope for which they are qualified. Projects should be packaged to ensure wide participation, especially for alternative delivery models which might otherwise preclude local firms from at-risk work.

Compatible. Procurement methodologies must remain consistent with existing Winnipeg statute and procurement policy unless specific changes are approved to accommodate identified benefits of alternative delivery. Required modifications to procurement process and practice should be clearly identified as part of the alternative delivery analysis. Similarly, alternative project delivery options specific to wastewater should be aligned with the City's Strategic Partner concept and accommodation for the Strategic Partner's participation in the determination and implementation of procurement methodology must be accommodated.

Tailored Approach to Alternative Project Delivery

Recognizing that each project has specific needs, each of the goals identified above should be addressed by the City's menu of potential procurement methodologies. Alternative delivery is not applicable or beneficial to all infrastructure projects. However, alternative delivery's potential benefits should be considered on the merits at the outset of most projects with a focus on:

Single-Point Responsibility. The benefits of contracting with a single entity for both design and construction are well understood. The most important is avoidance of finger-pointing. If problems arise, the designer cannot blame the builder for not adhering to the design, and the builder cannot blame the designer for a faulty design. With the designer and builder working together from the outset, constructability problems are less likely to arise, and if they do arise, the owner can hold the design-builder responsible for dealing with the problems. In contrast, the arms-length relationship between the designer and the builder in a design-bid-build procurement effectively puts ultimate responsibility for the design on the owner.

Value-Based Selection. In public infrastructure procurements, many owners prefer to select based on some form of detailed pricing to protect rate- or taxpayer interests. However for design-build procurements, factors in addition to price can be considered when awarding a contract – factors such as prior experience with similar projects, innovative ideas for meeting project objectives, overall lifecycle costs, and ability and willingness to work as a team with your staff.

Time Savings. Design-build delivery has proven to be particularly effective for water and wastewater projects with strict schedule constraints because construction often begins before the design is completed.

Early Understanding of Total Project Costs. Alternative delivery infrastructure projects are typically priced using a GMP or lump sum approach. The quoted price includes design and construction. This price is arrived either at the initiation of the project or at an early stage of the design effort. This avoids the potential problem in design-bid-build projects of a design that is only constructible at a prohibitive cost.

Based on these recognized advantages of each common delivery method as shown in Exhibit 2 (next page), there is a clear value in *considering* alternative project delivery for a given project.

Exhibit 2: Advantages and Disadvantages of Procurement and Alternative Project Delivery Methodologies

Methodology	Advantages to Owner	Disadvantages to Owner
Design-Bid-Build	Well understood and time-tested process and procedures. Ability to select subconsultants by qualifications and cost in the traditional manner. Limited at-risk exposure to local professional firms. Bids to full plans and specifications. Full going-in construction price known at bid time.	Linear process takes time. Little or no designer/contractor collaboration. Limited job size/scope may not attract best potential technologies/best practices. Relies on engineer's estimates until very late in the project. Hard bids subject to design omissions and resulting change orders. Little opportunity to select contractor on qualifications and past performance in addition to price. Separate contracts for design and construction creates multiple points of contact for owner and does not align business interests.
Construction Management At-Risk	Relies on proven, accepted method for selecting professional engineering services based on qualifications/price. Integrates constructibility earlier in the design process. Provides contractor-led estimates earlier and allows scope revision during design to meet project budget. Can reduce overall project risk and contingency. Can reduce design misunderstandings and resulting potential for change orders. Allows qualifications and past performance to be taken into account when selecting a contractor.	Still relies on engineer's estimate for initial cost characterization. Creates a "forced marriage" between designer and contractor that may – or may not – work. Final construction scope still subject to change order potential. Added cost to owner for contractors pre-construction phase services (although may be offset with construction savings due to early collaboration). Requires selection of contractor based on fees without knowing full construction price. Separate contracts for design and construction creates multiple points of contact for owner and does not align business interests.
Progressive Design-Build with GMP	Maximum control over project design, construction, and O&M costs because final contract is not signed until a large portion of the design is complete Single straightforward and inexpensive procurement process can be completed in short timeframe. Increased marketplace interest due to relatively low proposal preparation cost. Allows selection of designer and contractor based on past performance, qualifications, and ability to work as a	Requires selection based on fee, full construction cost is not known at the time of initial contract. Existing project design investment may not be of value or use to design-builder. May not be as fast to deliver as other design-build methods due to potential for extended design/estimate development period, including involvement of numerous stakeholders in the design process. May not be perceived as being "competitive" for construction pricing.

APPENDIX C: ALTERNATIVE PROJECT DELIVERY METHODOLOGY ANALYSIS

Methodology	Advantages to Owner	Disadvantages to Owner
	single-entity team with aligned interests for project success. Provides progressively accurate, contractor's estimates of total project costs from earliest point in project through GMP definition. Provides maximum opportunity for designer, contractor, and owner collaboration to define scope, meet schedule and budget, and tailor subcontracting plan. Provides an "off-ramp" to hard-bid construction if GMP is not competitive or cannot be agreed upon. No contractor-initiated change orders. Requires little or no design to be completed by owner in advance of procurement. Single contract and point of contact with owner.	Requires significant owner staff involvement and resources during design. May limit local/small subconsultant participation due to at-risk nature of the work.
Performance-Based Design-Build with Target Price or Lump Sum	Maximum potential for design-build cost savings through design innovation during competitive procurement. Maximum transfer of design-related performance risk to design-builder. Minimal design work by owner required prior to procurement, resulting in relatively low cost to prepare RFP. Fastest possible procurement and project delivery schedule. Perceived as "competitive" construction pricing, providing full contract cost at bid time. Allows selection of designer and contractor based on past performance, qualifications, and ability to work as a single-entity team with aligned interests for project success. No contractor-initiated change orders. Single contract and point of contact with owner.	If lifecycle cost is not analyzed or operations not included in scope, may result in higher O&M costs or undesirable project features. Proposal evaluation and selection is relatively complex. Limited ability to predict what will ultimately be proposed. Lump sum pricing may include excess risk and contingency cost due to undefined project scope. Limited opportunity for owner and design-builder collaboration on design during procurement process. Limited ability for owner to adjust proposed design, scope without resulting in owner-initiated change orders and resulting price adjustments. May limit local/small subconsultant participation due to at-risk nature of the work.
Prescriptive-Based Design-Build with Lump Sum	Substantial control over project design and O&M costs. Proposal selection can emphasize project design-build cost. Allows selection of designer and contractor based on past performance, qualifications, and ability to work as a single-entity team with aligned interests for project success. Perceived as very "competitive" construction pricing, providing full contract cost at bid time. High level of project definition when the	Procurement schedule is prolonged and RFP preparation is costly due to high level of design required to be developed by owner prior to procurement. Design risk not clearly assumed by the design-builder. Very complex and staff intensive evaluation of proposals. Does not promote as much innovation, or results in design-builder "alternative" proposals requiring additional evaluation. Limited opportunity for owner and design-builder collaboration on design during

Methodology	Advantages to Owner	Disadvantages to Owner
	design-build contract is signed. No contractor-initiated change orders. Single contract and point of contact with owner.	procurement process. Limited ability for owner to adjust proposed design, scope without resulting in owner-initiated change orders and resulting price adjustments. May limit local/small subconsultant participation due to at-risk nature of the work.
Design-Build-Operate	Opportunity to include long-term operations and lifecycle cost. Provides for numerous turn-key delivery options. May provide method for obtaining project financing not otherwise possible.	Requires long-term commitment to contract mechanism and future payments. Can be complex to implement and controversial. May encounter public employee union resistance.

To better define these methodologies and the best path forward for the City of Winnipeg, we propose to expand the evaluation of each procurement and project delivery methodology via an interactive workshop.

Workshop Methodology to Refine Preferred Project Procurement and Delivery Approaches

Developing and implementing a procurement and project delivery methodology that meets all of the City of Winnipeg's goals and specific project needs will require continuing dialogue and refinement. Experience has shown that one of the most efficient and useful methods for identifying and documenting owner requirements and input is via a workshop format. Workshops provide an opportunity to communicate concepts, define terminology and common industry practice, and identify issues and potential solutions. They also provide ample opportunity for dialogue, posing questions, and identifying key issues for future resolution. Finally, workshops are very effective at establishing documented action items and a path forward for refining a preferred project delivery evaluation methodology.

To expand on this Technical Memorandum and document City of Winnipeg's initial preferences and preferred path forward, we recommend a 4- to 6-hour workshop facilitated by our project management team and our design-build professionals and attended by key members from the City of Winnipeg.

The workshop content will be based on similar efforts previously conducted by CH2M HILL, but adapted as per this memorandum to meet the expected needs and desires of the City of Winnipeg. The workshop agenda begins with a structured presentation, but provides for full interaction and discussion by all participants. A typical 4- to 6-hour workshop agenda is as follows:

Introductions and Safety Moment .....15 minutes
Brief Overview of Relevant Project Issues to Date .....15 minutes
Definition of Common Project Procurement and Delivery Method Terminology .....45 minutes
Discuss and rank overall program procurement and project delivery goals .....45 minutes
(may use short survey)
Overview of Each Primary Delivery Method .....45 minutes
Procurement sequence and pricing methodology
Workshop survey: rank pros and cons, identify additional issues for each method

Break .....20 minutes
Overview of competitive landscape .....30 minutes
Who is likely to bid?
Who has the ability to successful deliver?
Alternative Project Delivery Comfort Zones .....30 minutes
Identify key areas of risk/concern in adopting Alternative Project Delivery
Survey: Comfort Zones Exercise
Break20 minutes
Impact to Procurement Processes/Procurement Lessons-Learned.....60 minutes
Procurement Document Development Scope .....20 minutes
Action Items/Path Forward.....15 minutes
Workshop Assessment .....10 minutes

The above agenda provides a framework for gaining the City of Winnipeg input to identify a preferred and tailored procurement and project delivery approach. It also provides an opportunity to discuss alternative delivery's impact on existing procurement processes for our subsequent preparation of Selection Guidelines.

A follow-on activity that will be required by the City is development of effective templates to be used for preparation of procurement documents. We will introduce this discussion, based on our lessons-learned from participating in hundreds of these procurements as they have evolved over the last decade, as discussed below.

Alternative Project Delivery Procurement Procedures Development

The follow-on tasks to defining preferred subcontracting and procurement approaches that meet City of Winnipeg goals, conform to established procurement policies and Strategic partnership commitments, and encourage broad competition by qualified firms relate to the development of procurement procedures and documentation. Processes to integrated alternative project delivery Requests for Qualifications, Requests for Proposals, and draft Contracts must be developed.

The first key to efficient procurement process development is to refine the preferred procurement and project delivery methodologies to as few options as possible to reduce the overall number of document formats that must be produced. For example, it will be much more efficient to create a master template for construction management at-risk (perhaps for conveyance tunnel projects) in conjunction with a single tailored hybrid design-build approach than to develop procurement packages for all of the methods discussed here.

We also suggest a modular approach to these procurement packages, developing a standardized set of submittal requirements and evaluation criteria. These would be supplemented on a per-project basis with specific criteria weighting, performance requirements, and design detail. In addition, a package for pre-selection of subconsultants and prequalification of subcontractors would need to be developed.

In developing procurement processes and packages, we recommend applying numerous lessons-learned on design-build projects throughout Canada and North America. These lessons relate specifically to the adjustments in procurement processes required to make design-build successful, including one-on-one meetings with proposers to aid collaboration during the procurement, adjustments to small business program requirements, proposal formats and addressing technical inquiries during the proposal process.

Another critical aspect of implementing the procurement methodology is the development of a transparent scoring methodology that drives proposers to solutions that meet the city of Winnipeg's needs at the best lifecycle cost, yet with an understanding of the available capital budgets for individual projects. It is essential that the selected scoring methodology be tested to ensure that highly rated qualifications are effectively scored in relation to price, reaching an optimized balance that does not force a high-price selection while avoiding the necessity to always accept a low price proposal. Numerous examples of scoring methods are available for consideration and these need to be discussed in detail and tested prior to implementation.

As noted above, we will introduce these scoring issues as well as broader procurement impacts as part of the procurement and project delivery methodologies workshop to provide guidance for their subsequent development by the City.

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