



Revitalizing Design-Bid-Build for Tunnel Projects

Published February 2026

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* The author is very appreciative of the assistance provided by Bridget Araldi, MG+M The Law Firm, in the preparation of this paper.

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Introduction

The tremendous and unprecedented proliferation of tunnel projects in North America, coupled with increasing interest, utilization, and experience with alternative delivery methods, provide the occasion to probe: **Are there any specific procurement and contractual respects in which the traditional Design-Bid-Build (DBB) method can be improved for the delivery of tunnel projects?**

The intent is not to compare or promote DBB relative to other available alternative delivery methods, nor to universally criticize or commend any particular delivery method. Rather, the focus is aimed at specific procurement and contractual respects in which DBB may be improved on a project-specific basis to enhance delivery of tunnel projects.

DBB Tunnel Projects: Opportunities For Improvement in Procurement and Contracting

The starting question of this discussion is, what are we trying to improve in the DBB method as traditionally utilized on tunnel projects? Many alternative delivery methods, such as Conventional Design-Build, Progressive Design-Build, and CM/GC, are intended and implemented in the expectation that they will address perceived inherent shortcomings experienced in the DBB method.¹

Those shortcomings derive from the independent and sequential nature of the design and construction processes in DBB and the prevalence of disputes arising out of the following principal sources:

- + Differing subsurface conditions
- + Imbalanced risk allocation
- + Disagreements and misunderstandings as to the roles, responsibilities, and risks of project participants concerning
 - (a) the adequacy, suitability, constructability and compatibility of permanent works design in expected and encountered subsurface conditions;
 - (b) whether specifications are performance or design (prescriptive) in character, with the differing risk and responsibility implications;
 - (c) the appropriateness design and implementation of construction means/methods selections in expected and encountered subsurface conditions.

¹ Hatem, D.J. 2023. [Early contractor involvement: Rethinking and recalibrating delivery methods for subsurface projects](#). *MG+M The Law Firm*. Risk factors are relevant to selection of project delivery methods on infrastructure projects. Critical factors in the evaluation and selection of DBB are the scope and quality of geotechnical investigation and the constructability of design in the anticipated and encountered subsurface conditions. Tran, D., and Molenaar, K. 2012. Critical risk factors in project delivery method selection for highway projects. In H. Cai, A. Kandil, M. Hastak, and P.S. Dunston (Eds.) *Construction Research Congress 2012*. ASCE.

(d) contractual and commercial implications of modifications to planned design and construction approaches due to subsurface conditions encountered during construction.²

Delivery methods alternative to DBB have, in their own respects, spawned other challenges in their implementation on tunnel projects.³

These circumstances provide a context and opportunity to investigate whether the DBB method may be meaningfully revitalized in a manner that improves its utilization on tunnel projects by addressing the shortcomings in that method. Certainly, it is recognized that some of these improvements may need to be legally authorized by procurement laws at the state and federal levels.

Procurement

Contractor Pre-Qualification

Within legal constraints, consideration should be given to pre-qualifying Contractors using criteria relevant to project-specific factors, requirements, and expectations.⁴ This is an important consideration given the number of disputes and failures on tunnel projects attributable to perceived deficient capabilities, experience, resources, and performance of the prime and specialty trade subcontractors. Equally important considerations are realistic Owner cost and schedule estimates, budgets and A&D contingencies; and A&D qualifications and experience of Owners and their Consulting Engineers in the planning, design, and delivery of tunnel projects.

Escrow Bid Document Requirements

Historically, Owners have underutilized Escrow Bid Document (EBD) requirements in DBB procurement and contractual risk allocation practices. The prescribed contents of EBDs should be conscientiously developed by the Owner's Engineer of Record (EOR) and other consultants to ensure that the Bidder's submission will evidence a prudent and realistic review and understanding of anticipated subsurface conditions and project-specific design and construction considerations. The EBD should also show that the Bidder has planned and priced the cost of

² Hatem, D.J. 2025. [Disputes on major subsurface projects: Sources, and the promise of early contractor involvement](#). *MG+M The Law Firm*.

³ Goodfellow, B., 2025, Designing with moving goalposts, *North American Tunneling*, June/July 2025; Goodfellow, B., 2025, Building while the goalposts move, *North American Tunneling*, Oct./Nov. 2025; Bart Silicon Valley Phase II Extension Independent Peer Review, Final Report (Sept. 25, 2025); Spillane, R., 2025, [A long wait for Calgary's green line: What went wrong?](#), *Outpost Recruitment*. See also, Kondrachova, T. and Gaspari, G.M., 2021, Design build and design-bid-build – What is most efficient?, *Canadian Tunneling*, Sept. 2021; *supra* note 2; ACEC Design-Build Steering Committee: Progress design-build research.

⁴ Wilson, S.H. (ed.), 2019, Recommended Contract Practices for Underground Construction (2d ed.), SME, pp. 143-45; Del Nero, D., 2015, Contractor prequalification – an (in)effective risk management tool, *Tunnel Bus. Mag.*; ITA, 2023, Code of Practice (3d ed.).

achieving the project requirements in accordance with realistic and appropriate construction means and methods and equipment selections suitable to the reasonably anticipated subsurface conditions. Baselines stated in the GBR should be based on data, tests, and analyses typically included in the GDR.

If properly defined and submitted, EBDs should provide an important—perhaps determinative—context for the evaluation and resolution of entitlement and quantum of post-award differing site conditions (DSC) and other disputes. As such EBD requirements in procurement documents must be conscientiously aligned with risk allocation provisions in the (eventual) Contract Documents.

The procurement documents should require that the EBDs include a tender risk register demonstrating that the Bidder has identified, assessed, planned, and priced for subsurface conditions risks indicated in the Contract Documents and baselined in the Geotechnical Baseline Report; that the Bidder has planned to address those risks by its anticipated construction means/methods and other measures and has developed appropriate contingency plans to address the consequences of the materialization of those risks.⁵

The EBDs should also require the inclusion of specialized reports of independent consultants retained by the Bidder. These reports should address the evaluation of subsurface conditions, including groundwater impacts during construction. In addition, EBDs should include quantity take offs, anticipated production rates, and vendor proposals, such as those demonstrating the ability and suitability of the planned TBM utilization in anticipated subsurface conditions.

The contents of EBDs do not necessarily establish that the Bidder's planning and pricing assumptions; contemplated construction means/methods and equipment selections; or interpretations or expectations as to subsurface conditions—based on indications in the Contract Documents, including baselines in the GBR—are objectively reasonable or in conformance with the requirements of the Contract Documents. Nor do EBD contents supersede the Contract Documents including risk allocation terms.⁶ The EBDs however, should provide transparency regarding the Bidder's pricing and planning bases and expectations contemporaneous with bid so as to inform and provide an objectively reasonable baseline for the evaluation of any post-award disputes.

⁵ ITA, *supra* note 4 at 9.5

⁶ Wilson, *supra* note 4 at pp. 166-67.

Contractual

Risk Allocation: Subsurface Conditions Information Disclosure

Reasonable, fair, and balanced contractual risk allocation provisions for subsurface conditions on tunnel projects are essential for project success.⁷ Available data and other information should be disclosed to Bidders and, in most instances, be encompassed in the definition of the Contract Documents with an expectation of reasonable Contractor reliance. While, in certain circumstances, it may be prudent to qualify or limit the accuracy, completeness or other factors affecting the reliability of that information, use of disclaimers should be avoided or minimized and, if necessary, be clearly and specifically articulated and limited in scope and effect on risk allocation.

DSC Provisions

On most public projects, the terms of DSC provisions are prescribed and mandated by statutes and regulations. However, even within those legal constraints, there are meaningful opportunities to augment the standard DSC provisions in several important respects. For example, consider the following:

+ EBDs

EBD requirements should be integrated into the DSC provision by mandating that the EBD contents minimally be considered in the evaluation and determination of both DSC entitlement and quantum. Some Owners may elevate this requirement and render the EBDs as having determinative impact on DSC entitlement.

+ Reasonable Reliance Upon Indications in Contract Documents

DSC provisions may be augmented with requirements that the Contractor must identify the specific affirmative indications in the Contract Documents that were relied upon in planning and pricing the bid and to demonstrate the objective and causal reliance upon those indications by explicit reference to the EBD contents. Contractors should be required to accept DSC risk if bid expectations were not objectively reasonable, were more optimistic than reasonably indicated in the Contract Documents, or not supported by EBD contents.

+ Geotechnical Baseline Reports

Geotechnical Baseline Reports (GBRs) are frequently and appropriately utilized on tunnel projects.⁸ However, there are potentially significant opportunities to improve GBR

⁷ Hatem, *supra* note 1; Mellors, B., 2025, Contracting practices for tunneling and underground works, *Society of Constr. Law: Summer 2025*.

⁸ Essex, R., 2022, Geotechnical baseline report, ASCE; Davis, J., Essex, R., Farooq, I., and Drake, A., 2023, Geotechnical baseline reports: a guide to good practice (C807D), *CIRIA*.

alignment and integration with DSC and other risk allocation provisions. In the DSC provision, explicit reference should be made to the GBR and its priority in the contractual hierarchy as the source of contract indications relevant to baselined conditions. It is important to recognize that GBRs reasonably are not expected to baseline all anticipated subsurface conditions nor the behavior of those conditions due to interactions with the Contractor’s selected means and methods.⁹ The Contract Documents should explicitly state that the fact that a GBR does not baseline a particular condition does not imply, much less warrant, that the condition will not be encountered.¹⁰ GBRs should contain clear, objectively articulated and realistic interpretations of data so as to provide a balanced framework for bidding, eventual contractual risk allocation, and dispute resolution. The purpose of the GBR is **risk allocation**, not the prescription or detailing of design or construction criteria or requirements. These admonitions as to GBR preparation and utilization are considered essential to effective risk allocation.¹¹

+ Causation

DSC claims often involve disputes about whether the alleged cost or time impacts are due to DSCs or some other cause such as the Contractor construction means/methods, equipment selection, operation and maintenance, and related issues. The DSC provision should explicitly require that any cost or time adjustment be caused by the claimed DSC.

+ Equitable Adjustment Provisions

The DSC provisions should be aligned with relevant (more generic) contractual adjustment or variations provisions such as those addressing payment, unit prices, quantity variations, and changes and time adjustments. In particular, quantity variation provisions should be conscientiously drafted to align with the equitable adjustment terms of the DSC provision, in order to avoid ambiguities in the interpretation and application of those provisions that may create redundant, inconsistent, or conflicting avenues for entitlement to, or measurement of, equitable adjustments arising from DSCs.

Construction Means/Methods Submittals

As a general matter, construction means/methods are the exclusive responsibility of the Contractor unless designed or otherwise specifically designed, detailed, or prescriptively

9 Hatem, D.J. 2022. *Should geotechnical baseline reports by the universal and exclusive contractual basis for subsurface conditions risk allocation?* *Donovan Hatem LLP*.

10 *Id.*; Essex, R., 2022, Geotechnical baseline report, ASCE.

11 Essex, *supra* note 10.

mandated by the Owner.¹² Effective and efficient tunnel construction necessarily depends upon the appropriate design and implementation of construction means/methods and equipment selections suitable in the reasonably expected subsurface conditions.¹³ Failures to realistically assess the achievability and suitability of construction means/methods and equipment selections in the project-specific reasonably anticipated subsurface conditions has proven to be a major and frequent source of disputes on subsurface projects. Also, the failure to adequately assess permanent works design requirements relative to anticipated suitable subsurface conditions and construction means/methods—and their interactions, interdependencies, and influences upon each of them—is yet another major source of disputes in tunnel projects. In fact, those observations have been cited as reasons for interest in early contractor involvement delivery approaches, such as progressive design-build and CM/GC.¹⁴

In DBB tunnel projects, some of these concerns could be mitigated by increased use of construction means/methods submittal requirements. Contract Documents would need to clearly define the scope of submittal reviews, and explicitly state that review and comments on those submittals do not result in responsibility of the Owner, its EOR, or other consultants for construction means/methods.¹⁵ Use of methods statements improves transparencies and mutual understandings in construction means/methods planning and execution, as well as their evaluation relative to conformance with planning expectations included in EBDs.¹⁶

Contractor Design-Related Proposals or Involvement

Permanent works design conventionally has been considered the exclusive province of the Owner and its EOR in DBB. Recognition of the interfaces and interdependencies among subsurface conditions, permanent works design, and

12 Wilson, *supra* note 4 at p. 73. In DBB, there may be circumstances in which the Contractor’s discretion in selection, design and implementation of construction means/methods may need to be constrained; or in which the Owner or its EOR may have valuable input and thus should have a meaningful opportunity to be involved (to varying and appropriate degrees in providing recommendations, criteria and standards for the design of construction means/methods. In those situations, it is important that the respective roles, responsibilities and risks of project participants be clearly defined and understood. See Reilly, J., 2021, *TBM procurement and contract processes*, *TunnelTalk*; Hatem, D.J. and Corkum, D. (eds.), 2010, *Megaprojects: Challenges and Recommended Practices*, ACEC, ¶ 6.4, pp. 520-538; Del Nero, D. et al., 2012, Means and methods, in M. Najafi (Ed.) *Trenchless Technology: Planning, Equipment & Methods*, (1st ed.), ¶ 3.4, McGraw-Hill; Del Nero, D., 2012, The means and methods dilemma, *Tunnel Bus. Mag.*; Brierley, G. and Hatem, D.J., 2022, Contractor submittals for tunneling projects, *Tunnel Bus. Mag.*; Tirolo Jr., V. and Almeraris, G., 2005, Suggested and prescriptive means and methods – Are they really in the owner’s interest, in J.D. Hutton and W.D. Rogstad (Eds.), *Rapid Excavation and tunneling Conference: 2005 Proceedings*, SME.

13 *Supra* note 2.

14 Hatem, *supra* note 1; *supra* note 2.

15 Hatem and Corkum, *supra* note 12, at ¶ 5.1.4.

16 Brierley and Hatem, *supra* note 12.

construction means/methods raises the important question of whether the DBB method could be improved by contractual provisions that invite and encourage increased opportunities for (post-award) Contractor proposals for or other involvements in modifications to permanent works design, (i.e., value engineering proposals, substitutions, design delegation or alternative design submittals).

The answer is a qualified “yes”, subject to clear understandings as to

- (a) the Owner (and its EOR) limited and defined scope and role(s) in the review of the proposal;
- (b) any specified or delegated responsibility of the Contractor (and its EOR) for design modifications;
- (c) assigned responsibilities for any interfaces and coordination required between Contract Documents design and the Contractor-proposed design modifications;
- (d) any significance and implications in the Owner’s acceptance of the Contractor’s proposed design modifications on otherwise governing contractual risk allocation terms.¹⁷

In certain instances, a Contractor may propose design modifications in permanent work (e.g., segmental lining) to accommodate its construction means/methods approaches or equipment selections. In that context it is important that contract terms clearly address design responsibility, risk allocation and cost and schedule implications of those modifications.¹⁸

Observational Method

The importance of the Observational Method (OM) in underground design and construction is well-accepted, albeit underutilized, in DBB. The OM provides opportunities to reevaluate and validate anticipated subsurface conditions and

¹⁷ Hatem and Corkum, *supra* note 12, at ¶ 5.1, 5.1.1 – 5.1.3. The failure to clearly define these understandings in DBB tunnel projects has produced disputes between Owners, Contractors and their respective EORs. For example, see *Kiewit-Atkinson-Kenny, Joint Venture v. Massachusetts Water Resources Authority*, 2002 WL 31187691 (Mass. Superior Court, No. 011920 BLS, Sept. 3, 2002), Memorandum and Order (involving dispute as to whether the contractor merely proposed an “or equal” tunnel lining substitution system or an alternate design; if the former the Owner retained design responsibility; if the latter, the Contractor assumed responsibility); *Guy F. Atkinson Construction Co., ENG BCA 6145, 98-1, BCA ¶ 29582* (ruling that a Contractor who provides an alternative design for the concrete tunnel liner, which was approved by the Owner, assumes responsibility for that design). Disputes arising out of design assist, substitutions, value engineering, proposals, and delegated design may be avoided in DBB by clear contractual provisions that define roles, responsibilities and risks of the Contractor and Owner. See Hatem, D.J. and Gary, P., 2020, *Public-Private Partnerships and Design* (3d ed), n. 208, ACEC; Heusinger, J.D., 2017, *Ambiguity breeds conflict: The importance of defining “Design-assist” in the construction industry*, *Journal of the American College of Constr. Lawyers*, 11(1), pp. 117-138.

¹⁸ The failure to address the design responsibility, risk allocation, and cost/time implications of design modifications results in otherwise avoidable disputes. See *Sehulster Tunnels/Pre-Con v. Traylor Bros., Inc./Obayashi Corp.*, 111 Cal. App. 4th 1328 (Cal. App. 4th Dist. 2003).

planned design and construction approaches in the context of actual subsurface conditions encountered during construction.

There are intrinsic limitations and uncertainties associated with pre-construction subsurface investigations and judgmental evaluations of the data produced. During design development, reasonably probable parameters of variations in encountered subsurface conditions and the potential for design approach and construction methods modifications should be anticipated, evaluated, and included in contingent planning.¹⁹ Final design in subsurface projects is often more realistically considered as a **plan** that is subject to confirmation and validation during construction and is likely subject to modified approaches due to interactions of the ground and tunnel structure and construction means/methods, and the monitoring and assessments of those interactions.²⁰ Subsurface (physical and behavioral) conditions encountered during construction may necessitate modifications to planned design and construction approaches. Contracts should anticipate those modifications and provide a framework for risk allocation and cost/time adjustments.

It has been observed that the OM has been underutilized in all delivery methods, including DBB.²¹

The challenges to effective OM implementation in DBB traditionally arise from how those modifications impact adjustments to cost, time, and contractual and commercial risk allocation terms; the degree of contractual flexibility of effectuating those adjustments; and whether adjustments in those terms are warranted (and, if so, on what bases). These implementation challenges have resulted in significant disputes on DBB projects.²²

¹⁹ Brierley, G.S. 1998. Subsurface investigations and geotechnical report preparation. In D.J. Hatem (Ed.) *Subsurface Conditions: Risk Management for Design and Construction Management Professionals*. Wiley.

²⁰ Antiga, A. and De Luca N. 2015. Observational approaches in tunneling: some thoughts. *ITA WTC 2015 Congress*.

²¹ *Supra* note 2; Powderham, A., 2004, *The Observational Method – Learning from Projects, Int’l Conf. on Case Histories in Geotechnical Engineering*; other sources in D.J. Hatem; Kadefors, A. and Brochner, J., 2008, *The Observational Method for underground excavations: contracts and collaboration*, SveBeFo Rapport K28, *Swedish Rock Engineering Research*, Stockholm; Powderham, A., 2004, *The observational method – Learning from projects, International Conference on Case Histories in Geotechnical Engineering* (8), Scholars’ Mine; Tidlund, M., Spross, J., and Larsson, S., 2022, *Observational Method as risk management tool: the Hvalforour Tunnel Project, Iceland, in Georisk: Assessment and Management of Risk for Engineered Systems and Geohazards* 17(2), Taylor & Francis 2023.

²² Hatem, *supra* note 1, sources cited in footnotes 26M, 27A, and 28D; Effective utilization of the OM approach requires clear and mutual understandings in any delivery method of the respective roles, responsibilities and risks of all project participants. The Supreme Court of New South Wales’ decision in *Theiss Pty Ltd. & John Holland Pty Ltd. v. Parsons Brinckerhoff Australia Pty Ltd.* (2016) NSWSC 173—which involved a dispute arising out of the OM approach on a DB project—demonstrates the importance of that admonition. This aspect of the *Theiss* decision is discussed in M. Graham, 2016, *Theiss Pty Ltd and John Holland Pty Ltd v. Parsons Brinckerhoff Australia Pty Ltd* [2016] NSWSC 173, *Kreisson Constr.*, <https://kreisson.com.au/wp-content/uploads/2016/03/Theissand-JH-v-Parsons-Brinckerhoff.pdf> and Burman, B. et al., 2018, *Lane Cove Tunnel Collapse and Sinkhole, A Forensic Review – 3: The Legal Aftermath, Australian Geomechanics Journal*, 53(4), pp. 51-57 (Dec. 2018). As discussed in this paper, ECI increases the opportunities for more transparent understandings as to roles, responsibilities

DBB contractual pricing and risk allocation approaches have been noted to constrain the utilization of the OM.²³ Generally, and to a significant extent, DBB lacks the requisite collaborative framework that supports more receptive and adaptive contractual approaches—approaches that allow planned design and construction means/methods approaches to be valued during construction and that anticipate required modifications arising from reasonably anticipated and probable parameters of variations in encountered subsurface conditions.

As discussed, DBB is based on commercial and contractual structures that result in intolerances, inflexibility in, and resistance to modifications in planned design and construction approaches. As has been observed:

In the design-bid-build contracts, there is typically a separation between the designer and the contractor, which may create obstacles to modifying the design during construction and, consequently, a barrier to the use of the observational method. Similar problems may arise in a design-and-build contract if the client keeps the right to approve all modifications of the design and has no incentives to do so. This separation can lead to disputes and confrontation between the actors involved. This must be avoided when implementing the observational method, where high-quality communication and cooperation are essential.²⁴

Specific to DBB, receptivity to the OM is confronted by constraints, as noted by Powderham and O'Brien:

“Under a conventional [DBB] contract, a contractor bids on a project based on a fixed design specified in the contract documents and on the premise that it will be built as designed. The introduction of the OM within such a contract immediately presents commercial risks from the need to allow design changes during construction. Such risks tend to fall predominantly upon the contractor who can consequently be exposed to the double disadvantage of less return but more ownership of the design. Risk allocation is reasonably well defined in a conventional [DBB] contract where most of the design risk is taken by the client and most of the construction risk is carried by

and risks that enhance OM utilization. The importance of clarity and accountability in the delineation and assignment of design responsibility in the OM approach is addressed in Clark, P., 2024, Improvements to the observational method in New South Wales Road Tunnel construction, in H. Khabbaz et al. (Eds.), *Geotechnical Lessons Learnt – Building and Transport Infrastructure Projects, Lecture Notes in Civil Engineering*, Springer, pp. 121-138.

23 Powderham, A.J. and O'Brien, A.H. 2021. *The Observational Method in Civil Engineering: Minimising Risk, Maximising Economy* (1st ed.). CRC Press, ¶ 14.2.

24 Tidlund, M. 2021. *Geotechnical risk management using the observational method*. (Ph.D. dissertation, KTH Royal Inst. of Tech., Dept. Civ. & Arch. Eng.). ¶ 4.7, 4.7.1.

the contractor.”²⁵

To some extent, underutilization of the OM in DBB has been attributed to the failure to include in Contract Documents (a) contingencies as to design or other modifications due to probable ranges or parameters of material variations between reasonably anticipated (as defined in Contract Documents) and actually encountered subsurface conditions, and (b) unit pricing or other agreed methods to facilitate and manage cost and time adjustments necessitated by the occurrence of those contingencies.²⁶ For example, the cost and time impacts resulting from work performance and materials quantities increases that may be required due to design or other modifications triggered by the OM should and could be addressed in the Contract Documents by unit price and allowance provisions. In tunneling, pre-excitation probing and grouting ahead of TBM progression could be a good candidate for such an approach.²⁷ Addressing these considerations in DBB Contract Documents provides a significant opportunity for improvement. The flexible contracting approach embodied in NEC4 Engineering and Construction Contracts facilitates risk allocation and commercial (payment and quantities measurements) adjustments that may be required in the implementation of the observational approach on DBB tunnel projects. Under that approach, bidders may be required to submit methods of data collection regarding variations in encountered conditions and characterization methods to be utilized during construction that correspond with baselines contained in a GBR.²⁸

The independent and sequential character of the design and construction processes in DBB presents challenges and complications in the implementation of the OM. Why? From procurement and contracting perspectives, Owner-furnished design is expected to be final and complete at the point of construction contract award, and the Contractor has a reasonable right to expect that the contract document design upon which it bases its bid will be suitable for construction. The OM inherently recognizes the reality that Contract Document design may not be final and complete (i.e., will need to be

25 Powderham and O'Brien, *supra* note 22 at pp. 327-29. CIRIA has established a committee to develop an updated guidance document for the use of the OM, with an expected publication date in 2027. See CIRIA P3295 Observational Method Update.

26 The implementation, during construction, of extensive instrumentation and monitoring, is an important component of the observational method. Bauer, G. and Courtland, S. 2016. *Employing a unique procurement process for the City of Ottawa Combined Sewage Storage Tunnel*. SME.

27 See di Prisco, C. et al. 2022. Assessment of excavation-related hazard and design of mitigation measures, § 10.3. In E. Bilotta, R. Casale, C. Giulio di Prisco, et al. (Eds.) *Handbook on Tunnels and Underground Works, Volume 1: Concept – Basic Principles of Design*. CRC Press (2024), pp. 297-98.

28 Gomes, A., Ertl, H., Marulanda, A., Neuenschwander, M., and Newns, B., 2025, ITA Guidelines for the preparation of the GBR for the NEC4 engineering and construction contracts – Options B and D with bill of quantities, *Tunneling and Underground Space Technology* 163; NEC-ITA, 2025, NEC-ITA Guidance on NEC and Underground Works.

validated during construction and may need to be modified based on encountered subsurface conditions). That reality may appear to contradict the fixed price and standardized risk allocation procurement and contractual regimes underlying the DBB method. The potential of design modification raises several questions: Who bears the risk, cost, and schedule consequences of those modifications? How do and should contract provisions allow for variations in risk allocation, terms, and cost and schedule adjustments due to such modifications? Do and should Contract Documents contemplate and contingently provide for those variations and modifications due to reasonably defined parameters of potential design revisions?²⁹

In an excellent ASCE paper, C. Farnsworth observed:

Effective risk analysis and development of recommended strategies regarding the observational approach to construction are essentially the same thing and require the expertise of the same parties. Since there is typically not a construction expert involved during the design phase of DBB project, the DBB delivery framework simply lacks the ability to provide effective risk analysis and likewise observational approach strategies ... [T]his can affect the constructability of the design within the context of significant change.³⁰

Farnsworth recommended that the implementation of the OM in DBB could be improved by including explicit provisions in Contract Documents regarding anticipated probable ranges of encountered subsurface conditions and their design and construction means/methods implications and by providing for particular contingent design modifications based on those encountered subsurface conditions, including provisions to address any potentially indicated risk allocation and cost and schedule adjustments due to those modifications.³¹ As to the pre-construction reporting of subsurface conditions, Farnsworth recommended that investigation and ground conditions classifications and parameters “be communicated more in terms of risk and variance, rather than just a standard geotechnical data report”.³² Potential and contingent design modifications should be defined in Contract Documents, derivative of and correlated with reasonably predicated probable ranges of

29 Contractual Terms to facilitate adjustments in price and risk allocation due to design modifications implemented in the OM are explored in A. Antiga, M. Chiorboli, and N. DeLuca’s “The potential for use of the observational method in tunnel lump sum contracts.” Antiga, A., Chiorboli, M., and DeLuca, N. 2019. The potential for use of the observational method in tunnel lump sum contracts. In Peila, Viggiani, and Celestino (Eds.) *Tunnels and Underground Cities: Engineering and Innovation meet Archaeology, Architecture, and Art*. Taylor & Francis, pp. 4360–62. The authors recommend that these contractual terms be aligned with baselines defined in a GBR.

30 Farnsworth, C. 2016. Challenges with managing risk when using the observational method of construction with design-bid-build delivery. In J. Perdomo-Rivera, A. Gonzáles-Quevedo, C. López del Puerto, et al. (Eds.) *Construction Research Congress 2016*. ASCE, pp. 2740, 2745.

31 *Id.* at 2747.

32 *Id.* at 2748.

specified variations in encountered subsurface conditions from those assumed as the basis of initial design assumptions.

Farnsworth summarized his recommendations as follows:

“The use of the observational method of construction is a useful technique for projects that lend themselves to change. If the potential for change is great and the geotechnical risk is high, using this technique with design-bid-build project delivery becomes more difficult, as demonstrated with the Provo Canyon widening project. Alternative project delivery methods are more favorable for utilizing the observational method, allowing more effective risk sharing across design and construction. However, for future use with design-bid-build delivery, the following lessons should be incorporated: 1) the observational method needs to be explicitly implemented during the design phase, including developing the potential risk and response; 2) all parties must understand the use of the observational method, and it should be clearly communicated in the contract documents, especially the plans for response; 3) appropriately incorporate a risk analysis and risk management plan, beginning in design and extending through construction; 4) provide clear contract documents, especially with regard to differentiating soil and rock conditions; 5) utilize a strong approach for communicating uncertainty; and 6) ensure that the backup plans can be incorporated within the construction sequencing, staging and phasing plans.”³³

Performance Specifications

In DBB tunnel projects, performance specifications are frequently utilized by Owners to require an end result in design or construction objectives while not prescribing the details of achieving those objectives.³⁴

Disputes on subsurface projects often arise from disagreements as to whether a contractual provision is a performance specification—that is, a specification requiring achievement of a particular performance objective or result and delegating responsibility and risk for design and other execution details to the Contractor—or a design specification detailing, in a prescriptive and mandatory manner, the design or other details that a Contractor must follow to achieve a particular performance or other result, with explicit or implied responsibility of the Owner for the adequacy of that specification.³⁵ In many disputes, the focus is whether the particular specifications are, in reality,

33 *Id.* at 2749. CIRIA 1999, ¶ 6.2.2 contains similar recommendations to improve OM utilization on DBB projects.

34 Loulakis, M. 2013. Legal Aspects of Performance-Based Specifications for Highway Construction and Maintenance Contracts, *Legal Research Digest* 61. NCHRP, III(C).

35 *See* No. 61, VIII, B; *Fruin-Colnon Corp. v. Niagara Frontier Transp. Auth.*, 585 N.Y.S. 2d 248 (App. Div. 1992); Hatem and Gary, *supra* note 17 at ¶ 12.3; Hatem, *supra* note 1; *supra* note 2.

purely performance specifications or, in contrast, actually either “design specifications” or “hybrid specifications” that prescribe design details or other requirements that significantly constrain the Contractor’s discretion and ability to achieve the defined objectives.³⁶ The risk of these disputes may be significantly mitigated in DBB tunnel projects through more conscientious and precise articulation of specifications intended to be purely performance-based.³⁷

Interface Roles, Responsibilities, and Risks

Tunnel contracts are at times procured and contracted as a component of other independent scope contract packages, such as stations and systems packages. Disputes frequently arise as to the respective roles, responsibilities, and risks among the various individual contract packages especially as to scope and work involving interfaces, coordination, and interdependencies among the design and construction of those packages. Inevitably, the Owner and its Consultant team are implicated and drawn into those disputes.

These are significant opportunities to improve DBB clarity in the definition, allocation, and management of these interface risks. The importance of effectively and proactively addressing these risks is especially important in the context of megaprojects: a designation appropriate for the characterization of most tunnel projects.³⁸

Risk Management and Insurance Programs

Tunnel projects pose significant complexities and risks for all participants due to the inherent uncertainties associated with subsurface conditions and the efficacies and suitability of planned design and construction approaches when conditions actually encountered materially differ from those reasonably anticipated in the design and construction means/methods planning. Interfaces and interdependencies among subsurface conditions, permanent works design and construction means/methods heighten the potential and consequences of the materialization of those risks.

The megaproject characteristics of tunnel projects further elevate risk concerns.³⁹ Never before have there been more

³⁶ See *PCL Constr. Servs. v. U.S.*, 47 Fed. Cl. 745 (2000).

³⁷ Under a performance specification approach, the Contractor is required to retain a qualified design professional to prepare and stamp the delegated design. See Downey, T., Edden, K., McAndrew, S., et al., 2019, Tunneling contracting practice: One owner’s state of the art, in C.D. Hebert and S.W. Hoffman (Eds.) *Rapid Excavation and Tunneling Conference: 2019 Proceedings*, SME; Brierley, G. and Corkum, D., 2018, Procurement of and contracting for underground construction projects in North America, in L. Falco, S. Dube, A. Kerr, et al. (Eds.) *North American Tunneling 2024 Proceedings*, SME.

³⁸ Munfah, N., 2025, Avoiding and resolving multi-party disputes arising from multidisciplinary underground projects, in S. Sadek and B. Hagan (Eds.) *Rapid Excavation and Tunneling Conference 2025 Proceedings*, SME, pp. 54; Kondrachova and Gaspari, *supra* note 3.

³⁹ Hatem and Corkum, *supra* note 12 at Chapters 14-18; Kondrachova and Gaspari, *supra* note 3.

infrastructure megaprojects in various stages of study, planning, design, procurement, and construction.

Certainly, not all risks are transferable to coverages under insurance policies. Robust project-specific risk management programs are, therefore, essential.⁴⁰ Many underwriters evaluate the insurability of risk on tunnel projects based on assessments of project-specific risk management projects proactively prescribed and implemented by the Owner.⁴¹ In DBB tunnel projects, it is critically important that insurance requirements and programs be conscientiously developed and monitored through project execution.

The underwriting of project-specific insurance on a tunnel project involves, to say the least, a challenging process. Traditional underwriting approaches which focus on (a) the capabilities, qualifications and experience of the project participants and (b) the technical challenges posed by the Project, are necessary and appropriate. However, the focus in the underwriting needs to be broader in focus and more flexible, pragmatic, and continuous in nature.

More specifically, the underwriting process should take into account the project-specific risk factors involved in the tunnel project. As such, the focus of underwriting should include an assessment of

- (a) the Owner’s funding availability;
- (b) project planning and managing approaches, capabilities and experience;
- (c) the extent to which project cost estimates and schedules have been subjected to a rigorous and independent validation and evaluation;
- (d) the extent to which risk will be reevaluated as the project progresses, and cost estimates and schedules revised to take into account those risk factors and other developments;
- (e) the roles and responsibilities of the various project participants and the extent to which those roles and responsibilities may transform or evolve over the duration of the project;
- (f) evaluation of the reasonableness of proposed risk allocation among the project participants and the insurance coverage implications of those risk allocation

⁴⁰ See *e.g.*, ITA, *supra* note 4; Mellors, B., 2025, Contracting practices for tunneling and underground works, *Society of Constr. Law*, pp. 30-41.

⁴¹ ITA, *supra* note 4; DAUB – Working Group, 2022, Recommendations for Project Risk Management in Underground Construction, *ITA-AITES; Tunnels & Tunneling, 2023, The insurer’s role in project risk management*; Konstantis, T. and Towers, A., 2023, Tunnel and underground works: Managing insurance particulars in a well-structured and risk-averse environment, in Anagnostou, Bernardos, and Marinos (Eds.) *Expanding Underground. Knowledge and Passion to Make a Positive Impact on the World*, Taylor Francis; Wilson, *supra* note 4 at Ch. 13.

decisions; and

(g) consideration as to appropriateness of the Owner's delivery method and the contractual practices, including risk allocation approaches, that the latter intends to utilize in the implementation of the selected delivery method.

While all of these factors should be understood and evaluated in the initial underwriting process and monitored over the typically, and continuously over the relatively, long duration of a tunnel project, those factors and considerations, and their potential impact on liability exposure are dynamic and likely to evolve. As such, prudent underwriting must be both dynamic and continuous in nature so as to provide periodic opportunities for the identification and evaluation of the liability risk implications of that evolution. Accordingly, some professional liability and other insurers providing project-specific and wrap-up coverage on tunnel projects have developed underwriting approaches designed to allow for periodic evaluation of the variability and evolution of dynamic risk factors that may impact liability risk or other relevant exposures.⁴²

⁴² Hatem and Corkum, *supra* note 12, Chapter 18, ¶¶ 1.0, 2.0, pp. 595-62, and sources cited in footnotes 12-17 therein; Hatem and Gary, *supra* note 17, at Chapter 12, ¶ 12.6.2; Hatem, D.J., 2012, Recalibrating and improving design-build on public infrastructure projects, *ABA Forum on the Construction Industry*; Dix, A., 2010, Insurance and the code – where are we now? *Tunneling Journal*, Aug/Sept. 2010; Dix, A., 2010, Tunneling – the insurers' perspective, *Tunneling Journal*, Oct/Nov. 2010; Konstantis and Towers, *supra* note 39; DAUB, *supra* note 39.

Procurement and Contracting Approach Modifications in DBB Subsurface Projects: A Case Study

A recent decision of the Armed Services Board of Contract Appeals, Appeals of Skanska USA Civil Southeast, Inc., ASBCA Nos. 61220, 61347 (April 3, 2025) (Skanska), demonstrates a number of the primary sources of disputes in DBB subsurface projects. Skanska entered into a fixed-price DBB contract with the Department of the Navy (Navy) for the demolition of two existing piers at the Norfolk Naval Shipyard. Skanska claimed that it incurred costs arising from the removal of the interior timber bearing piles that were buried in soil. Skanska based entitlement for its claim due to defective specifications (prepared by the Navy's EOR) and differing site conditions (DSCs). The Board denied entitlement on both grounds.

Relevant Background

The project solicitation included a complete and final design of permanent works prepared by the Navy's EOR. The successful Contractor was required to retain

a licensed engineer to design the means, methods and procedures for demolition of the existing piers and pile extraction. During procurement, the EOR met with three prospective contractors, including Skanska, early in design development to solicit input on the Project and the construction approach to pier demolition and pile extraction. There was also a site visit during procurement; however, the interior bearing piles supporting the piers were not visible or able to be inspected because the piles were under the piers and obscured behind concrete sheet piles.

Each bidder was required to submit a Technical Approach with a "narrative that describes the construction means and methods" for demolition of the existing piers. Skanska submitted its Technical Proposal highlighting its prior experience with projects at the subject Norfolk Naval Shipyard and that included a detailed sequence of construction and methodology for pier demolition prepared by a Skanska Engineer. During proposal evaluation, the Navy identified as a strength of the Skanska Technical Approach its inclusion of several alternatives for pier demolition dependent upon potential construction issues encountered particularly pertaining to methods for removing piles.

The Navy awarded the Contract to Skanska and the Technical Approach was incorporated into the Contract. The Contract included a standard DSC clause.

The Contract required Skanska to design a complete demolition procedure and submit a demolition plan that

- + Was based on information contained in the drawings, specifications, reference drawings, geotechnical data report, hazards materials reports
- + Was prepared and sealed by a licensed professional engineer
- + Was approved by the Contracting Officer prior to commencement of work

The Board ruled that the Contract requirements for a Demolition Plan constituted a performance specification.

The Contract required Skanska to completely extract and demolish all piles, and included requirements for handling, transportation, and disposal of hazardous waste. During design, the Navy's EOR was unable to definitively determine from the historical documents whether the timber piles were treated with creosote. As

such, a note on a Contract Demolition Drawing stated that all piles “shall be assumed to be creosote treated.” Creosote-treated materials must be disposed of as hazardous waste.

Proposed Change Orders (PCOs) and Request for Equitable Adjustment (REA)

Skanska requested an equitable adjustment and time extension PCOs on the basis that the interior bearing piles were not treated with creosote; and that as a result conventional extraction methods had proven unsuccessful as the pile tops were rotten and broke off with minimal force. Skanska contended that this situation resulted from a changed condition and that it would need to develop alternative methods to extract the interior timber piles. The Navy rejected the PCOs. While acknowledging that the piles were not creosote-treated, the Navy disagreed that creosote-treated piles had an indefinite life span.

Skanska then submitted a REA claiming additional cost and delays on the basis that the lack of creosote treatment was a DSC or defective design specification and, in either case, the Navy was responsible.

More specifically, Skanska contended on appeal that it was entitled to prevail due to either DSCs or because the Navy’s specifications were defective “because they mistakenly instruct bidders to assume that the timber piles had been treated with creosote; and that because the piles were assumed to be so treated Skanska anticipated that the timber piles would be in sound condition and, as such, accordingly planned and priced its means and methods.⁴³ Skanska claimed that the defective specifications breached the Navy’s implied warranty obligation to Skanska that satisfactory performance would result from adherence to the specifications. Alternatively, and additionally, Skanska contended that the lack of creosote treatment constituted a Type 1 DSC in that the interior piles differed materially from what the Contract indicated. (Note, Skanska asserted other contentions including impossibility of performance and Type II DSC).

The Navy rejected the REA and Skanska appealed to the Board.

⁴³ The combination of DSC and defective design/specifications claims occurs on many subsurface projects. Hatem and Gary, *supra* note 17 at ¶ 12.4.3; *supra* note 32 at VIII(B).

The Board’s Decision

The Board ruled that neither the defective design (or specification) or DSC claim had merit.

+ Defective Design Specification Claim

The Board ruled that since both the defective design specification claim and DSC claim were based on the Navy’s instruction in the Contract Documents to assume that the timber piles were creosote-treated, the two claims are so intertwined that they constitute a single claim and collapse into and are governed by the specific contractual remedy provided for DSCs. (*Note, the Board’s Ruling on this point is well-supported by established judicial precedent*).⁴⁴

The Board ruled that the contractual requirements regarding the demolition plan obligating Skanska to exercise ingenuity in its approach to demolition work and pile removal was a performance specification, **not** a design specification. The requirements do not prescribe how Skanska should extract the timber piles—rather, they required Skanska to select and design the methods that it planned to use and Skanska’s Technical Approach submittal and Demolition Plan, describing the removal methods that it planned to use. The alternative methods presented by Skanska were noted as a strength in the Navy’s evaluation and selection of Skanska. For those reasons, the Board ruled that the contractual requirements do not provide the basis for an implied warranty by the Navy as to methods of pile removal.

+ DSC Claim

The Board rejected Skanska’s Type I DSC which was premised on the contention that the interior bearing piles were not creosote-treated and that the as-encountered conditions of those piles differed materially from the indications in the Contract (i.e., the instruction that the contractor must assume that the piles were creosote-treated).

The Board ruled that the required assumption was one of several notes on the Drawing (produced by the Navy as part of the Contract) regarding disposal of potentially hazardous contaminants

⁴⁴ Hatem and Gary, *supra* note 17 at ¶ 12.4.3.

encountered during demolition. The notes were provided in the context of disposal and were intended to put Skanska on notice that various components of the Timber structure may contain creosote, requiring special handling and disposal.

The Board based its denial of the Type 1 DSC on the following grounds:

- The actual conditions of the piles should have been reasonably foreseeable to Skanska based on its prior knowledge and experience at the Project site, information contained in as-built drawings and general knowledge and the expectation that the piles would be degraded due to their prolonged exposure to conditions under the Pier.
- Skanska bid the Project based on performance specifications and Skanska was responsible for the design of alternative methods of pile extraction suitable and appropriate in the reasonably expected conditions. Skanska's Technical Approach submittal (a Contract Document) evidenced that Skanska was aware of and accepted those obligations and was an important consideration in the Navy's evaluation and selection of Skanska.
- The Board stated: "Skanska knew or should have known that the bearing piles were untreated." The Board questioned Skanska's asserted reliance upon the note regarding instructed assumption as to creosote as that note was provided in the context of proper disposal, not representations or indication as to anticipated site conditions.
- The Board concluded that the totality of the evidence failed to establish that the encountered pile conditions were materially different from those reasonably indicated in the Contract Documents.

Commentary⁴⁵

In tunnel and other major subsurface projects utilizing the DBB method, disputes typically arise out of

⁴⁵ The Board's Decision in *Skanska* is the subject of commentary in other sources. See, e.g., 49 No. 15 Construction Contracts Law Report NL 2 (Jul. 25, 2025); ¶ 97,237 *Skanska Usa Civil Southeast, Inc.*, Cont. Cas.Fed. (CCH) P 97237 (Apr. 3, 2025); 46 No. 6 Construction Litigation Reporter NL 3 (Jun. 2025); ASBCA, 25-1 BCA ¶ 38,804 *Skanska Usa Civil Southeast, Inc.*, Cont. App. Dec. P 38804 (Apr. 3, 2025).

DSCs, alleged defective design (or specifications), Owner breaches of implied warranty obligations, and disagreements as to whether contract requirements are design specifications or performance specifications. The *Skanska* case involved all these diverse dispute sources.

The procurement process on the Project allowed for Contractor-proposer input regarding design and required a Technical Approach submittal to be submitted as part of the proposal. This process allowed the Navy's EOR to solicit and obtain input from the proposers on their demolition design and contemplated alternative design and implementation approaches means, methods, and procedures of pile extraction. The Technical Submittal of the awarded Contractor became part of the Contract Documents.

Although the delivery method was fixed price DBB, the procurement process as summarized above allowed for some of the advantages of early contractor involvement approaches.⁴⁶ The Technical Approach submittal also served as an important and probative contractual "baseline" in evaluating and determining Skanska's Type 1 DSC claim. It was particularly relevant in assessing the reasonableness of Skanska's reliance upon contract indications, the reasonable foreseeability of the encountered conditions, and the contemplation that alternate extraction methods may be required based on those conditions. This evaluation was especially significant in the context of Skanska's planned pile extraction methodologies, as defined in the Technical Approach. In the latter respect, the Technical Approach somewhat functioned akin to an Escrow Bid Document as well as a Contract Document.

Skanska demonstrates that utilizing the DBB delivery method—with modest variations in conventional DBB procurement and contracting practices—Owners may obtain the benefit of Contractor input and technical submittals during design development, improve clarity in risk allocation, and thereby facilitate dispute resolution. While it is unrealistic to expect all disputes be eliminated, the respective understandings and expectations—including contemplated construction means, methods, and procedures—may be more transparent and objectively defined at the point of contract formation in DBB.

⁴⁶ *Supra* note 2.

Conclusion

These are significant opportunities to improve DBB procurement and contracting practices on tunnel projects. Perceived inherent shortcomings in the DBB method on tunnel (and other major subsurface) projects, to a degree, have prompted an increased interest and utilization of alternative delivery methods. The objective of this article is to constructively probe and advance ideas and opportunities to improve procurement and contractual practices in DBB which should serve to promote that method as an effective and successful approach for Owners.

Certainly, no delivery method is proven—nor expected—to be a panacea. Success in all methods requires conscientious project-specific focus, prudent planning, budgeting, and procurement practices, as well as fair contractual risk allocation, effective risk management programs, and insurance support.

Owners are encouraged to consider these ideas and opportunities in evaluating and deciding as to delivery method selections on tunnel projects and, particularly, in procurement and contractual approaches in DBB. For many traditionalists, the hallmarks of DBB delivery are its independence and sequential characteristics and discrete contractual roles, responsibilities, and risks boundaries of the design and construction processes. In many respects, however, those hallmarks contradict the levels of interaction and interdependence in design and construction processes required for effective delivery of tunnel projects, compelling the increasing utilization of early contractor involvement approaches to delivery of those projects. However, there are significant opportunities to revitalize DBB delivery on tunnel projects and—while appropriately and prudently respectful to traditional hallmarks—allow for meaningful opportunities to embrace and implement opportunities for more flexible and adaptive interactions of design and construction processes, while simultaneously achieving effective risk allocation. Achieving those opportunities is the essence of DBB revitalization.

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