



# **Contractor Submittals for Underground Projects**

**By: Dr. Gary S. Brierley**

# Contractor Submittals

How does the Contractor intend to create the openings inside of which the finished facility will be constructed?

- Design of the Temporary Structures
- Means and Methods for excavating and controlling the ground during construction.

# Contractor Submittals

Each of the above activities is highly dependent on one's knowledge of the ground conditions inside of which the underground openings will be constructed.

No other form of construction has such a huge interface between project design and project construction as compared to an underground project and Contractor submittals are required in order to explain how that interface will be managed on a project specific basis.

# Contractor Submittals

Underground openings must be made both safe and stable during construction:

- Safe for the workers
- Stable with respect to adjacent and/or overlying structures and utilities

Safety is the Contractor's responsibility.

# Contractor Submittals

Ground stability is also primarily the Contractor's responsibility but sometimes the temporary structures are designed based on design criteria provided in the contract document.

- Become part of the finished facility
- Necessary to safeguard adjacent and/or overlying structures and utilities

Contractor must either employ or retain the services of a professional engineer in order to prepare the above submittals; i.e. these submittal are stamped.

# Contractor Submittals

Unfortunately, almost all of the published literature about project submittals (i.e. shop drawings) is related to above-ground structures.

- Class 1 shop drawings are for the finished facility; i.e. highly prescriptive.
- Class 2 shop drawings are for manufactured components; i.e. also highly prescriptive.
- Class 3 shop drawings are for shoring, formwork, bracing, and scaffolding.

None of which has anything to do with anticipated ground conditions or ground behaviors which accounts for most of the cost and most of the risk associated with an underground project.

# Contractor Submittals

What does the Owner need to know about:

- The Contractor's knowledge of contract requirements.
- The types of temporary structures intended to provide safe and stable openings.
- The Contractor's proposed means and methods of construction.

# Contractor Submittals

Project submittals are a mechanism to facilitate Owner/Contractor communication during construction. Not every potential problem can be explained in the Contract Document. Hence, project submittals are intended to provide a mechanism for creating a meaningful and cooperative relationship between the Owner and the Contractor during construction.

# Contractor Submittals

## Contractor Submittals for Underground Projects:

- Class A submittals are for any project component that is intended to become part of the finished facility.
- Class B submittals are for any project component that will be used to support the ground surrounding the openings during construction.
- Class C submittals are for project activities associated with the “means and methods” of construction needed to excavate and control the ground during construction.

# Contractor Submittals

Upon completion, the Owner becomes responsible to review and approve each submittal as prepared by the Contractor and as defined by the AIA the Owner's **approval** is intended to establish that each submittal **conforms** to contract requirements:

- The Geotechnical Data and Baseline Reports,
- The Project Specifications, and
- The Contract Drawings

# Contractor's Submittals

For instance, Class A submittals relate to the finished facility and are based on highly prescriptive contract requirements. Hence, these submittals would be similar to the shop drawings utilized for an above-ground structures and if these submittals do, in fact, **conform** to contract requirements then they can be returned with the following notation:

# Contractor Submittals

Owner acknowledges that Submittal XYZ has been prepared in conformance with contract requirements. However, contractor is still responsible for the quantities, coordination, and dimensions needed to accomplish the above and for any deviation from contract requirements unless approved by the Owner in writing. The Contractor also remains completely responsible for performing all of the means and methods of construction in accordance with OSHA safety protocols and the Contractor's written safety program.

# Contractor Submittals

Class B submittals are for the temporary structures and are based on both performance and prescriptive contract requirements; performance as related to observed ground behaviors and prescriptive as related to design criteria provided in the contract document.

- All temporary structures must create openings that are safe.
- Some temporary structures must also be designed so as to protect adjacent and/or overlying structures and utilities.
- Some “temporary” structures may also be included in the finished facility.

Class B submittals are stamped by a professional engineer employed by the Contractor.

# Contractor Submittals

Class C submittals can be broken down into two broad categories:

- Quality Control Plans
- Highly Technical Submittals intended to explain how the Contractor intends to excavate and control the ground during construction.

# Contractor Submittals

Class C submittals for Quality Control Plans are intended to explain how the Contractor will conform to contract requirements relating to performance of the temporary support and to the specified means and methods for excavating and controlling the ground during construction.

- Tunnel and Shaft Work Plans
- Water Control Plan
- Inspection and Testing Plans
- Geotechnical Monitoring Plans.

These plans can be used by the Owner's CM team to oversee and manage the work being performed by the Contractor.

# Contractor Submittals

Class C Highly Technical Submittals are intended to explain how the Contractor will implement its intended means and methods of construction. Underground construction includes a wide variety of construction means and methods that are needed both to excavate and to control the ground during construction. For instance

## Excavation

- Hand Mining
- Open Face Shields
- Tunnel Boring Machine
- Pressurized Face TBM's
- Drill and Blast
- Roadheader

## Ground Control

- Construction Dewatering
- Ground Freezing
- Jet Grouting
- Consolidation Grouting
- Secant Piles
- Slurry Walls
- Etc.

# Contractor Submittals

Are the means and methods of construction being employed by the Contractor and its subcontractors actually producing the safe and stable underground openings inside of which the finished facility will be constructed?

Yes or no, and the answer to this question is dependent upon what was agreed to in the Quality Control Plans.

# Contractor Submittals

- Class A submittals relate to the finished facility.
- Class B submittals relate to the provision of safe and stable temporary structures as designed by the Contractor's professional engineer.
- Class C submittals relate to the means and methods of construction that are required in order to excavate and control the ground as explained by the Contractor in its Quality Control Plans and in its Highly Specialized Technical submittals.

# Contractor Submittals

No other form of construction has such a complex interface between design and construction as compared to underground construction. Probably 90% of what must be accomplished to construct an above-ground building is revealed by the project plans and specifications but the construction of the finished facility for a below ground project can not even begin until the underground openings are constructed and therein lies the risk, the cost, and the schedule for an underground project.

# Contractor Submittals

The Quality Control Plans and the Highly Technical Submittals are intended to work together in order to provide a successful project.

The big question, however, that we can discuss today is the following:

- Should any of these submittals be returned to the Contractor as a contract document?