

Top Down Excavation

Top down is an innovative method of excavation that has been slowly gaining acceptance throughout the industry. In principle, this method of excavation allows the above grade construction to proceed simultaneously with the below grade work. This removes the foundation from the “critical path” at the earliest possible phase, resulting in an accelerated project schedule compared to conventional temporary shored methods.

► Steel Sheet Piles

Sheet piles are installed about the perimeter footprint while the deep foundation piles and internal support columns are installed. These concurrent phases get the site construction off and running in high gear. Prefabricated steel or drilled shaft columns can be designed for the structure.

The ground floor slab is cast into the top of the sheet piles, structurally tying the perimeter walls and column components together. At this stage, the foundation is load capable, allowing above grade construction to commence. Glory holes are cast in the slab allowing access for below grade excavation.

Comparable to a mining operation, excavation equipment is small. Health and safety issues such as air entrainment and removal of spoils have to be considered. This method will not compete with the speed of bottom up excavation, but the schedule benefits of having the superstructure on the construction path simultaneously, overshadow those extra measures.

► Additional Benefits

The sheet pile walls are supported at the top by the ground floor slab. As excavation proceeds downward, the P1, P2, P3... slabs are cast in place and serve as the lateral load transfer mechanism.

Shoring tiebacks, bracing or anchors are eliminated, further increasing time and material savings.

► The Right Choice

Although there are significant benefits with top down construction, it is not for every project. Site and project criteria determine if it is feasible.

- Foundation Footprint: If the site footprint is large and requires an extended excavation schedule, the option to get this phase off the critical path is there.
- Depth of excavation: If the design requires going more than one level below grade, top down costs start to swing the construction economics pendulum back in favor.
- Surroundings: When existing adjacent structures or neighbors prohibit the use of external bracing like tiebacks or anchors, top down offers a solution with savings.
- Building Height: For mid to high rise property development, code restrictions limit building height. From a schedule perspective, getting above grade construction underway and complete months ahead of conventional methods provides early return on investment.



Phase 1: Sheet pile installation



Concurrent: Pile Foundation Installation



Phase 2: Base slab construction



Access for below grade excavation



Phase 3: Below grade excavation



Finished parking structure

Skyline Hybrid Top-Down™ Excavation

Skyline Hybrid Top-Down™ offers some very attractive benefits, benefits that come with a degree of risk and difficulty. Many times, the sheet pile construction estimates show top down can offer significant savings, but the unfamiliarity proves to be a deterrent. Skyline Hybrid Top-Down™ is the evolution of an already innovative concept. Contractors and engineers have advanced top down construction methods by striving for continuous improvement. This method reduces the complexity of top down construction without reducing the savings.

► Bargain Basement Pricing

Although many mixed used developments are designed with the foundation extending the entire property, the building footprint is often smaller. The trend to incorporate at grade recreational and architectural living features for all tenants is the driving force. This design scenario creates a unique opportunity for top down construction. When you have an open minded owner, creative architect, and both innovative structural and geotechnical consultants, it does not take much effort to sell the benefits of sheet piling. Throw in a can-do general contractor, and you have a project team primed to revolutionize the construction industry. The question on this project was not whether to use sheet piles - the real issue was how far they could take the savings.

This thirty one story tower high rise was designed with three levels of below grade parking, the perfect scenario for top down construction. The hybrid option is suitable when one side of the excavation can be accessed. Because the tower is a podium so to speak, the south end could be exposed. This offered all the material and schedule savings of top down, while reducing construction and safety issues. Not to mention a much faster excavation in comparison to its top down predecessor.

► Deep Impact

Overall, the Skyline Hybrid Top-Down™ method with permanent sheet piles is estimated to reduce the project schedule by six months compared to conventional shoring and excavation timelines. Because of the reduced schedule, over \$3 million in savings was realized just in liability insurance and loan interest. Not included in those savings, early return on capitol from revenue realized by early construction.

Only Skyline Steel combines the engineering and material resources to offer this innovative solution from conceptual design through delivery and construction. We are changing the way Owners, Contractors and Designers think about the economics of below grade construction. We can do it for you, too.



Site footprint of early foundation construction



Concurrent above and below grade construction



Aerial view of construction progress