

# BULLETIN

News from **SubTerra, Inc.**<sup>®</sup>

## ***Goat Hill Tunnel Design - Build Seattle, Washington***

**SubTerra, Inc.** provided tunnel design services for the Goat Hill Tunnel that was constructed under 5<sup>th</sup> Avenue in Seattle, Washington under a Design-Build contract. Northwest Boring was the Tunnel Contractor working under subcontract to the General Contractor, Turner Construction, Inc.

As the projects designer **SubTerra, Inc.** was responsible for:

1. Assembling geotechnical and existing infrastructure data.
2. Designing the primary steel liner and secondary, bonded and reinforced concrete lining.
3. Preparing drawings and specifications for Owner review and approval.
4. Preparing design criteria for the jacking shaft.
5. Designing the alignment to meet spatial requirements and facilitate shield retrieval, and
6. Engineering services during construction.

A 12-ft diameter, 1-in thick steel pipe was jacked behind a breasted digger shield in glacio-lacustrine and transitional soils to complete the primary lining.

Studs were then welded to the inside of the steel casing and used to position reinforcement in the floor and walls of the tunnel. Conduits were embedded in the floor to carry utilities beneath 5<sup>th</sup> Avenue.

Concrete was then placed in the floor and finished. The final step involved completing the reinforced wall using concrete placed behind custom forms.



The photograph above shows the lined completed tunnel with utility conduits embedded in the slab.

Left: The 1,400-ton jacking frame and breasted digger shield installed in the jacking shaft.