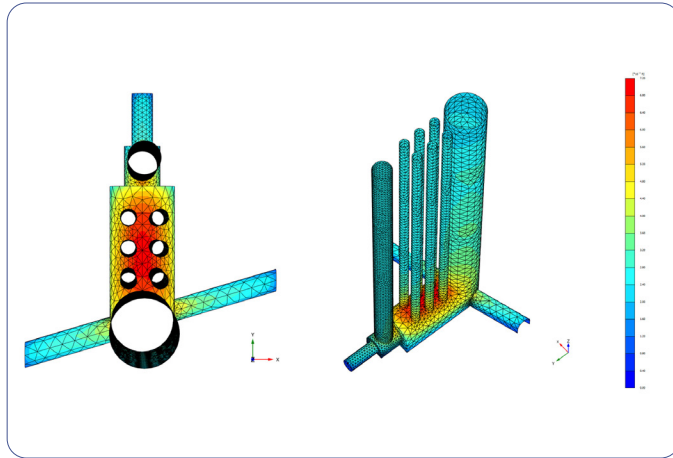


Advanced Numeric Modeling

SERVICES / TUNNEL AND UNDERGROUND



BCRUA Deep Water Intake Project, Phase 2



Plateau Creek Pipeline Tunnels

DAM AND LEVEE
GEOPROFESSIONAL
STRUCTURES AND FACILITIES
TUNNEL AND UNDERGROUND
WATER SUPPLY, CONVEYANCE,
AND DISTRIBUTION
CONSTRUCTION PHASE SERVICES
ENVIRONMENTAL
INFRASTRUCTURE MONITORING
SERVICES (IMS)
RISK

Schnabel Engineering DC, Inc. is an affiliate of Schnabel Engineering, Inc.

Engineering services in the following states are performed by Schnabel's respective affiliated entity: Michigan: Schnabel Engineering of Michigan, Inc.; New York/Connecticut: Schnabel Engineering of New York; North Carolina: Schnabel Engineering South, P.C.

Schnabel has significant expertise in using advanced numerical tools to study the interaction of structures with soil/rock and groundwater, under static or dynamic conditions, providing our clients with a better understanding of the behavior of various complex structures in projects around the world.

We're experienced in the use of techniques such as the Finite Element Method (FEM) and the Finite Difference Method, which are essential tools to model and evaluate potential impacts on infrastructure and the natural environment. Our numerical assessment experience includes evaluation of excavation and tunneling effects in urban areas, stress and deformation analysis of dams, and design optimization of ground improvement under static or seismic conditions. We've successfully used these numerical techniques to quantify time-dependent ground movement and stress redistributions due to soil consolidation, creep, soil heave, and dynamic loads.

Examples of our application of these numerical tools include:

- Excavation and construction-induced ground movement
- Staged construction analysis
- Retaining wall and excavation support design
- Foundation settlements
- Extent and effects of ground Improvement
- Lateral resistance of deep foundations
- Complex slope stability analysis
- Seepage and dewatering analysis

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SERVICES / TUNNEL AND UNDERGROUND

- Thermal analysis
- Dynamic soil structure interaction
- Time-dependent behavior
- Structural analysis
- Settlement due to tunneling

Numerical modeling programs we use that are widely accepted in the industry include:

- PLAXIS 2D (with dynamics module)
- PLAXIS 3D
- PLAXIS 3D Tunnel
- PLAXIS 3D Foundation
- PLAXFLOW
- FLAC
- SAP 2000
- STAAD Pro
- STRESS/W and SEEP/W