

DR. ERIC S. LINDQUIST, P.E.

DIVISION MANAGER

Dr. Lindquist has sixteen years experience in the design of heavy construction facilities for owners, engineers, and contractors, with an emphasis on underground structures. In addition, he has four years experience performing research in geotechnical engineering and rock mechanics. His design experience includes excavation shoring, slope repairs, tunnels, shafts, trestles, retaining walls, cofferdams, shallow and deep foundations, and pipelines. He has designed a variety of primary supports for tunnels and shafts, including steel ribs, liner plates, jet grout, rock bolts, and shotcrete. Additionally, he has been involved in the design of permanent tunnel liners using cast-in-place concrete, shotcrete, steel pipe, and concrete pipe. He has also analyzed and designed structural rehabilitation systems for pipelines. His excavation support design experience includes tied-back and cross-lot braced systems using sheet piles, deep-soil-mix walls, concrete secant piles, soldier piles and lagging, tremie concrete seals, and dewatering systems. He has also designed artificial ground freezing, soil-nailed, and rock-bolted systems for excavation support. His deep foundation design experience includes drilled piers, driven concrete and steel piles, augercast piles, displacement piles, and micropiles. His above-ground design experience includes the design of temporary railroad bridges, heavy equipment support decking, and falsework for new concrete placement and the support of existing concrete structures.

Dr. Lindquist completed his Ph.D. dissertation on the strength and deformation properties of melange (complex rock bodies made up of stronger blocks embedded in a weaker matrix material). Through his research, he gained detailed knowledge of geotechnical testing and rock characterization techniques. Dr. Lindquist's dissertation was nominated for the Rocha Medal, the annual award presented to the top dissertation in the field of rock mechanics in the world. He was awarded the 1991 Harry Bolton Seed Award as the top graduate student in the U.C. Berkeley Geotechnical Engineering Department. In 1990 he was one of only six U.C. Berkeley undergraduates awarded a Certificate of Distinction for his academic work. In 1995 and 1996 he returned to U.C. Berkeley as a visiting lecturer, teaching a course in geological engineering and rock mechanics.

While working for PBQ&D, Dr. Lindquist was a part of the Yucca Mountain High-Level Nuclear Waste Repository design team. His responsibilities included thermal analyses of the rock mass to study the effects of various nuclear waste emplacement schemes (in conjunction with scientists at Sandia National Laboratory) and excavation stability studies.

Years of Experience: 16

Years with Brierley: 1

Education

University of California, Berkeley:
Ph.D., Geotechnical Engineering,
1994

University of California, Berkeley:
M.S., Geotechnical Engineering, 1991

University of California, Berkeley:
B.S., Civil Engineering, 1990

Professional Registration

Civil Engineer, California

Structural Engineer, Utah

REPRESENTATIVE DESIGN EXPERIENCE

EXCAVATION SUPPORT AND UNDERPINNING

Contra Costa Water District Alternative Intake Project – Victoria Canal Conveyance Pipeline, Discovery Bay, California:

Designed a 30-foot diameter, 95-foot jacking shaft and a 20-foot diameter, 70-foot deep receiving shaft for a microtunnel crossing under Old River. Shoring was provided by cutter soil mixing (CSM) soil-cement panels acting in ring compression supplemented by a shotcrete lining installed as the excavation was advanced. Also designed the structural elements required at the microtunnel break-out and break-in locations and the thrust block to resist the tunnel jacking forces.

Metro Eastside LRT Project – Tunnel and Station Excavations, Los Angeles, California

Designed cross-lot braced and tied-back soldier pile and lagging excavation shoring systems supporting temporary street decking for excavations up to 60 feet deep in a crowded urban environment for two new subway stations and tunnel portal structures.

Kalaheo Avenue Reconstructed Sewer - Phase 1, Kailua, Oahu, Hawaii:

Designed over 20 jet grouted shafts for launching and retrieving an MTBM. Soil conditions were highly permeable clean sands overlying coralline limestone. The groundwater table was within a few feet of the ground surface. Dewatering was infeasible due to high inflow rates. Overlapping jet grouted columns were used to create a compression ring to support ground and water loads in the circular shafts and to provide a low permeability bottom seal.

Perris Valley Pipeline - North Reach, San Bernadino, California:

Designed the ground support for a 55-foot deep tunnel launch shaft excavated through residual soil overlying variably weathered granite. The upper portion of the excavation is a shotcreted sloped cut and the lower vertical cut is being supported using rock bolts with shotcrete or chain link fabric surface protection.

LNWI New Natomas and South River Pump Stations, Sacramento, California

At New Natomas designed tied-back sheet pile shoring for a 55-foot deep excavation for a new pump station structure. At South River designed tied-back deep-soil-mix shoring for a 45-foot deep excavation for a new pump station structure. Project challenges included a high groundwater table.

Santa Clara Station Platform and Pedestrian Underpass Project, Santa Clara, California

Retained by the general engineering consultant (Parson Brinckerhoff) to prepare contract plans and technical specifications for the excavation shoring systems that will be required to construct a new pedestrian underpass at Caltrain's Santa Clara Station. Project challenges include shoring active commuter rail lines and the presence of a high groundwater table.

South CTX – Lawrence Station Pedestrian Underpass, Sunnyvale, California

Retained by the excavation shoring sub-contractor to provide value engineering for the contract-specified deep soil mix (DSM) excavation shoring system that was required for the construction of a pedestrian underpass at Caltrain's new Lawrence Station. Worked with the shoring sub-contractor and the general contractor to make the shoring system lighter and more constructible. The revised design reduced the weight of the shoring wall steel by about 300,000 pounds (approximately 25%) and reduced the number of bracing levels from a maximum of four to a maximum of two. Also, performed structural analysis and designed temporary foundations for an existing pedestrian overpass that was relocated to serve the temporary station platforms during construction.

Diridon Station – Ramp, Platform and Track Improvements, San Jose, California

Prepared contract plans and technical specifications (contract documents) for temporary excavation shoring required to reconstruct the existing platform access ramps at the main San Jose Caltrain station for ADA compliance. Shoring consists of cantilever and braced soldier piles and lagging and braced tangent piles. Project complexities include limited overhead clearance (less than 18 feet) for shoring installation, the requirement that a portion of the existing ramp structure be temporarily underpinned and retained, and the close proximity of the closest active railroad track to the shored excavation (approximately 11 feet from centerline of track). Also, prepared technical specification for temporary support of the existing platform canopy as required for the demolition and replacement of the existing canopy foundations.

San Francisco Municipal Railway – Third Street Light Rail Transit – Donner Avenue to Hester Avenue, San Francisco, California

Prepared an excavation shoring design employing cross-lot braced and cantilevered soldier piles and lagging for a grade separated light rail line along Third Street in a congested urban environment. Designed temporary rock bolting for near vertical cuts up to 20 feet high in highly fractured Franciscan Formation sandstone and shale, including an excavation less than 5 feet from a restaurant that remained open during construction. Designed shoring for miscellaneous bridge and retaining wall foundation excavations. Performed stability analysis for staged soil nail wall construction

PCJPB Engineering Standards for Excavation Support Systems

Authored the manual entitled “Engineering Standards for Excavation Support Systems” on behalf of the Peninsula Corridor Joint Powers Board (PCJPB). Document presents the design and construction monitoring requirements for all shored excavations to be constructed within the PCJPB’s Zone of Influence.

Vasona Light Rail – Diridon Tunnels, San Jose, California

This complex project involves the construction of a cut-and-cover light rail tunnel and a pedestrian tunnel extension beneath the existing rail yard (12 tracks) at the main San Jose train station. Prepared detailed designs for the excavation shoring systems and a temporary rail bridge required for the construction of the cut-and-cover tunnels. These designs were included in the project’s contract documents. Cross-lot braced, deep-soil-mix walls were used to shore and cut-off groundwater inflows into the 30-foot deep cut-and-cover tunnel excavations.

Uptown Development, Oakland, California:

Designed over 8000 square feet of cantilevered soldier pile and lagging excavation shoring for the shoring subcontractor. The depth of excavation was up to 14 feet. Wide flange soldier piles were installed using the deep soil mixing method.

Emery Station East, Emeryville, California:

Designed over 15,000 square feet of cantilevered soldier pile and lagging excavation shoring for the shoring subcontractor. The depth of excavation ranged from 15 and 18 feet. Wide flange soldier piles were installed using the deep soil mixing method.

The Sequoias Health Services Facility, Portola Valley, California

Designed tied-back hand dug piers and slant drilled piles to underpin the existing Lodge Building at The Sequoias Health Services Facility. Also designed tied-back and cantilevered temporary soldier pile and lagging excavation shoring. The shoring and underpinning was required to construct the basement level of the new Health Services Building adjacent to the Lodge Building. The design was performed for the shoring and underpinning contractor.

Reclamation District No. 108 Combined Pumping Plant and Fish Screen Project, Grimes, California:

Designed the cross-lot braced, sheet pile cofferdam for a new pumping plant and fish screen structure on the Sacramento River for the general contractor. The 47-foot by 106-foot cofferdam was designed to resist up to 42 feet of differential water pressure using a single level of cross-lot bracing.

Cannery Row Hotel - Monterey, California:

Designed temporary soil nail shoring to support excavations for the new hotel basement. Challenges included protecting a historic building immediately adjacent to the planned excavation and the need to accommodate extremely heavy surcharge loads from a large crane.

BART-to-SFO Line Contract, Millbrae & San Bruno, California

Reviewed all excavation shoring designs for the BART extension to the San Francisco Airport project that were within the influence of the main line Caltrain railroad tracks on behalf of the Peninsula Corridor Joint Powers Board (PCJPB). Excavation shoring types reviewed included cross-lot braced sheet pile and deep soil-mix wall cofferdams below the water table and adjacent to the live railroad tracks. Excavations were up to 45 feet deep.

Caltrans' Seventh Street Seal Slab, Oakland, California

Supervised the design of over 7500 lineal feet of cantilever and tiedback deep-soil-mix wall for the soil-mix subcontractor. The shoring walls provided support for excavations up to 28 feet deep, some of which were very close to existing spread footings supporting the elevated BART rail line in West Oakland. Provided analysis and design improvements for a shaft support system used to install 8-foot diameter, 50-foot deep caissons within 8 feet of the existing BART footings, and designed a 40-foot deep cross-lot braced cofferdam for the construction of the seal slab pump station. This project received the ASCE Golden Gate Chapter Project of the Year Award.

Jefferson Avenue Underpass, Redwood City, California

This project involved the construction of a grade separation along the main line JPB tracks at Jefferson Avenue. Designed tied-back and cross-lot braced excavation shoring, foundations for a temporary prestressed concrete railroad trestle, and falsework for a new railroad bridge for the general contractor. Deep-soil-mix, sheet pile, and soldier pile and lagging shoring walls were used for temporary support. Shoring for excavations up to 27-feet deep was required to be installed as close as one foot from existing structures, including a 4-story masonry apartment building.

Mallard Slough Pump Station, Baypoint, California

Designed a sheet pile cofferdam in very weak Bay Mud for the construction of a new pump station for the general contractor. The need to support very weak clay and peat soils, significant unbalanced cofferdam loading, and the need to support very large construction surcharges were the key design issues. Support for the cofferdam sheet pile walls was provided by the combination of a sheet pile deadman wall and cross-lot bracing.

Clean Water Islais Creek Contract "B" and "E", San Francisco, California

Responsible for contractor submittal review and provided engineering inspection and redesign during construction for this portion of the transport/storage system for the City of San Francisco Clean Water Program. Engineering challenges on these sewer jobs included deep cuts in very poor soils below the groundwater table, tunneling underneath a commuter rail line through soils that had been pre-treated by jet grouting, and the replacement of an existing railroad bridge during two weekend single track outages.

Fries Avenue Force Main, Port of Los Angeles, California

The Fries Avenue Force Main Project involved the construction of the new pipeline between Terminal and Mormon Islands at the Port of Los Angeles. Microtunnelling was utilized to install the pipe. Became involved in this project after the 85-foot deep driving shaft, supported using frozen ground, failed during excavation. Provided an analysis of the failure and worked on the design of the remedial ground support scheme that was utilized to successfully excavate both the driving and receiving shafts.

Aerojet Cast Bell Project, Folsom, California

Designed liner plate and steel rib support for two 15-foot diameter, 35-foot deep shafts within an existing building at the Aerojet facility for the general contractor. The shafts were required for the installation of pre-fabricated steel "bells" that will be utilized in missile fabrication.

Horse Creek Lift Station, Vacaville, California

Designed a 30-foot diameter, 32-foot deep shaft supported using liner plates and steel ribs for the construction of this new lift station for the general contractor. Excavation was performed successfully in sandy soils below the groundwater table.

TUNNELS

EBMUD Claremont Tunnel Seismic Upgrade Project, Berkeley, California

Designed steel rib and lagging and shotcrete initial ground support systems for the tunneling contractor (Atkinson Contractors). Difficult ground conditions related to the highly sheared bedrock of the Franciscan Melange had to be addressed by the initial support of this water supply tunnel.

Inland Feeder Arrowhead East and West Tunnels, San Bernadino, California

Dr. Lindquist was a member of the tunnel design team on this major water supply tunnel project. He assisted in developing the methodologies used to design the plain and stiffened steel tunnel liner alternates for this project. The tunnel lining was required to resist up very high external pressures (up to 1100 feet of hydrostatic head). Dr. Lindquist also assisted with the seismic analysis and design of the steel and concrete pipe lining alternates.

Contract I-10A, 66-inch Ellis Avenue Trunk Sewer, Fountain Valley, California

Dr. Lindquist was retained by the contractor to design the initial support for this TBM driven tunnel. Initial support consisted of steel ribs and wood lagging in better ground or a fabricated steel tunnel liner in poor ground conditions. Also designed hold-downs to prevent pipe flotation during backfill grouting.

Magenta Drain Access Tunnel, Empire Mine State Park, Grass Valley, California

The Magenta Drain Access Tunnel, located near the Empire Mine State Park in Grass Valley, California, collapsed during the heavy rains in January 1997. Developed the repair scheme, consisting of a combination of open-cut work for corrugated metal pipe installation, and re-mining of the collapsed tunnel. Directed production of the contract drawings and specifications for the repair work for competitive bidding, and managed the inspection of the work during construction.

Pipeline 5 Extension, San Diego County, California

Designed the primary support for three tunnels in an urban setting that cross under roadways, numerous utilities, and a creek with minimal cover for the tunneling contractor. Final tunnel support consists of 9-foot diameter steel pipe backfilled with cellular concrete. The project included a 600-foot long hard rock tunnel and a 70-foot long weak rock tunnel

excavated by the drill-and-blast technique, as well as a 450-foot long soft ground (soil) tunnel excavated with a digger shield. Initial support types included rock bolts and steel ribs. Additionally, provided pipe flotation and ovaling analysis for the contractor's cellular concrete pipe backfill operations.

Pipeline 2A, San Diego County, California

Project manager for the design of initial support for a 650-foot long hard rock tunnel crossing beneath Interstate-15 north of Escondido, California, into which a 5.5-foot diameter pipe was installed. The original design called for steel rib support; however, refinements of the design were made as drill-and-blast excavation exposed ground conditions capable of being supported using Split Set friction stabilizers. Also designed a 60-foot deep shaft and analyzed pipe flotation and ovaling for backfill concreting operations.

Yerba Buena Island – Utility Tunnel, San Francisco, California

Designed temporary steel rib supports for a hand-mined tunnel under the I-80 freeway where the eastern span of the San Francisco-Oakland Bay Bridge meets Yerba Buena Island. The tunnels were excavated to install utility lines under the freeway. The project was completed with no disruption to traffic.

Bradshaw Interceptor Section 6B, Sacramento, California

Provided technical support for Mitchell Engineering's value engineering (VE) proposal to change the tunneling method at the roadway and creek pipeline crossings from a closed-face earth pressure balance machine to an open face tunnel shield with ground improvement (grouting) in advance of tunneling. The owner accepted the contractor's VE proposal and the tunnel crossings were uneventfully completed.

The Rio Piedras Contract of Tren Urbano, San Juan, Puerto Rico

The Rio Piedras Station portion of this project is one of the largest soil tunnels ever constructed. Dr. Lindquist developed the specific soil-structure interaction concepts that were utilized in a beam-spring finite element model used to design the station tunnel support, which consisted of 15 concrete-filled drifts forming a compression arch. Dr. Lindquist also worked on the foundation design for the arch.

Lake Mead Intake Project, Lake Mead, Nevada

Designed primary tunnel support for the 2600-foot long, 13-foot diameter, horseshoe-shaped East Tunnel for the general contractor. Ground support types included steel ribs and rock bolts with wire mesh. Also designed temporary pipe supports and blocking for a 109-inch inside diameter steel pipe that was installed in the excavated tunnel.

Wine Caves, Napa, Sonoma, Santa Barbara, San Luis Obispo & Los Angeles Counties, California

Has provided tunnel consulting services to wine cave contractors and winery owners on over 20 wine cave projects throughout the state. Consulting assignments have included feasibility evaluations, initial and permanent ground support designs (e.g., steel ribs, plain fiber- and wire mesh reinforced shotcrete, lattice girders and rock bolts), and a blast vibration study.

DEEP FOUNDATIONS/MICROPILES/TIE-DOWN ANCHORS

Oxnard Headworks Project, Oxnard, California

Designed permanent ground anchors to resist hydrostatic uplift on a large, buried concrete structure for the ground anchor subcontractor. Also responsible for structural observation during ground anchor installation and field verification of ground anchor testing.

Various Micropile Design Projects: Prepared working drawings and design calculations for micropile foundations on the following projects:

- ConocoPhillips San Francisco Refinery ULSD/SR – U200 Coking Cooler/Exchanger Structure Foundation, Rodeo, California
- University of San Francisco Lone Mountain Auditorium, San Francisco, California.
- 555 Market Street Seismic Retrofit, San Francisco, California.
- Oakland International Airport In-Line Explosive Detection System, Oakland, California.
- Olympic Club Expansion and Alterations, San Francisco, California.
- Marvel Semiconductor Buildings 1 and 2, Sunnyvale, California.
- 2850 Telegraph Avenue Seismic Improvements, Berkeley, California.
- 722 Montgomery – Belli Building Renovation, San Francisco, California.
- San Francisco International Airport Airtrain and Pedestrian Bridge, San Francisco, California.
- Ghiradelli Square Renovation – Seismic Upgrade, San Francisco, California.
- 450 Sansome Street, San Francisco, California.
- Metropolitan Club – 640 Sutter Street, San Francisco, California.
- 1 Kearny-710 Market Street Alterations and Addition – San Francisco, California.
- UCSF Institute for Regeneration Medicine – San Francisco, California.
- St. Mary's Cancer Center – 2250 Hayes Street, San Francisco, California.
- University Mound Reservoir Upgrades – San Francisco, California.

North CTX – Aqueduct UC Extension MP 26.77, Redwood City, California

Retained by the foundation contractor to re-design the contract-specified foundation for the extension of the Hetch Hetchy water pipeline undercrossing at the Caltrain tracks. Designed an auger pressure grouted (APG) pile alternate for the contract-designed cast-in-drilled hole (CIDH) piles. The re-design allowed the permanent foundation piles to be utilized as the temporary excavation shoring wall adjacent to the active Caltrain tracks.

Cypress Semiconductor Seismic Retrofit, Philippines

Designed 36-inch drilled piers capable of resisting 150 kips of lateral load each. The piers are designed to support buttresses being installed as a part of the seismic retrofit for this critical semiconductor production facility.

Hilton Garden Hotel, Oakland, California

Due to the proximity of this new hotel to the existing underground 12th Street BART Station in downtown Oakland, special design details were required for the hotel's drilled pier foundations. BART required that the drilled piers be designed and detailed in a manner that would assure that no significant additional loading would be imparted on their existing station structure, which is located only a few feet clear of the closest drilled piers. Developed special cased pier details capable of satisfying BART's design requirements. Also designed micropiles to retrofit the foundations of an existing building that is incorporated into the new hotel structure.

Valero Day Tank Retrofit, Rodeo, California

The foundations of six existing day tanks at the Valero refinery needed to be upgraded to resist overturning in a seismic event. The new foundations required high-capacity rock anchors. Designed and prepared the contract documents for the rock anchors.

Jefferson Avenue Underpass, Redwood City, California

Designed the driven pipe pile foundations for temporary rail bridges on this grade separation project. Also prepared an analysis of alternate driven precast concrete piles that were utilized to support the project's retaining walls in lieu of the contract-specified CIDH piles.

199 Fremont, San Francisco, California

A temporary work trestle was required as a part of this high-rise building project. The trestle was designed to support a Manitowoc 4000W crane over a 40-foot deep excavation. Designed the drilled pier foundation for the trestle.

OTHER MAJOR PROJECTS

Avalon Canyon Slope Repair, Daly City, California

Avalon Canyon was severely damaged during the 1997-1998 winter rains. Severe erosion from a broken storm drain outlet pipe caused major slope failures that threatened numerous homes. Managed the fast-track design of this multifaceted repair project. The repair design included massive regrading (400,000 cubic yards of fill) to stabilize the existing canyon slopes, a new high-density polyethylene (HDPE) storm drain outlet pipe with appurtenances, surface and subsurface canyon drainage systems consisting of geotextile and shotcrete lined ditches and corrugated aluminum pipe, erosion control and revegetation, and cured-in-place pipe rehabilitation of existing reinforced concrete pipes. The bid-ready contract package was prepared in less than 3 months. Also supervised complete construction management and inspection during construction.

Peninsula Corridor Joint Powers Board (PCJPB) Independent Design Review, California

Provided independent review of structures to be constructed within the PCJPB (previously Southern Pacific) zone of influence. Reviewed excavation shoring, concrete falsework plans or permanent structure designs for conformance with PCJPB requirements on the following projects:

- Caltrans I-280 earthquake retrofit at Galvez Avenue in San Francisco for Dillingham Construction
- Arch Culvert Extension in San Mateo for the City of San Mateo
- Caltrans I-280 earthquake retrofit at China Basin for STV Inc.
- Santa Clara Junction Overhead for William P. Young Construction
- East Mountain View Overhead for California Engineering Contractors

I-80/980/24 Seismic Retrofit, Oakland, California

Designed spread footing supported, temporary structures to support an existing elevated freeway viaduct for the general contractor. The temporary bents were required to support the open freeway during the retrofit of the existing viaduct supporting structure. The temporary support needed to be designed for both the live and dead loads as well as seismic loading. Specific lateral stiffness requirements also had to be met to satisfy seismic design requirements. Detailed structural computer analysis of the support structure was performed to justify the proposed design.

PAPERS & PUBLICATIONS

- “Construction of Two Microtunnel Access Shafts Using the Cutter Soil Mix (CSM) Method in the San Joaquin Delta, California,” with F.W. Gerressen, R.A. Lopez, and J. Morgan, Deep Foundations Institute, 35th Annual Conference on Deep Foundations (in press).
- “Evaluation of Shear Strength of Melange Foundation at Calaveras Dam”, with J.W. Roadifer and M.P. Forrest, United States Society on Dams, 2009 Annual Conference and Meeting, April 2009.
- “Effect of High In-Situ Stress on Braced Excavations”, with W. Roth, B. Su, and J. Vanbaarsel, presented at the 6th International Conference on Case Histories in Geotechnical Engineering, August 2008.
- “Deep Freeze”, with D.J. Berti and L. Roesner, Civil Engineering Magazine, February 2002.
- “The Foundation of PG&E’s Scott Dam: Introduction and Overview”, with R.E. Goodman and C. Ahlgren, Waterpower 1999.
- “Cementing the Future”, with D.J. Berti and D.C. Koutsoftas, Civil Engineering Magazine, December 1998.
- “Buckling of Steel Tunnel Liner Under External Pressure”, with D.J. Berti, R. Stutzman and M. Eshghipour, ASCE Journal of Energy Engineering, December 1998.
- “The Engineering Significance of the Scale-independence of some Franciscan Melanges in California, USA”, with E. Medley, Rock Mechanics, Proceedings of the 35th U.S. Symposium, June 1995
- “Strength and Deformation Properties of Melange”, Ph.D. dissertation, University of California at Berkeley, 1994.
- “The Mechanical Properties of a Physical Model Melange”, Proceedings of the 7th Congress of the International Association of Engineering Geologists, 1994.
- “The Strength and Deformation Properties of a Physical Model Melange”, with R.E. Goodman, Proceedings of the First North American Rock Mechanics Symposium, 1994.
- “The Engineering Characterization of Some Franciscan and Physical Model Melanges”, with E. Medley and R.E. Goodman, abstract, 36th Annual Meeting of the Association of Engineering Geologists, 1993.
- “Strength of Materials and the Weibull Distribution”, Probabilistic Engineering Mechanics, 1993.