

From kindergarten to continuing education, the overall California student body has grown by more than 1,000,000 during the past ten years to about 7,500,000 at present. Most of this increase is due to population growth, with the remainder due to the general increase in educational needs.

In a state with 8,761 public schools and 275,000 classrooms (75 percent of which are more than 25 years old), school facilities bear the brunt of inadequate funding. School districts provide funds for facility projects through a combination of several sources, including state and local bonds, special taxes, developer fees, and new federal bonds.

New construction and deferred maintenance needs for California public schools in the next five years are projected to total about \$22 billion. Most of the private sector faces similar funding challenges.

Treadwell & Rollo has provided geotechnical, geological, earthquake, and environmental consulting services to more than 70 educational institutions and school districts throughout northern California. We are also providing campus-wide consulting services in both the private and public sectors.

The work of Treadwell & Rollo adds value to the process by which school structures move from concept to reality.

SCHOOLS



Photograph by Stephen Wong, Corlett, Skaer & Devoto Architects

San Domenico School, San Anselmo

These structures include university and research facilities, student activities centers, libraries, and elementary school buildings.

Our typical geotechnical scope of services during design of school structures consists of evaluating potential geologic hazards at the site, performing a geotechnical investigation for each building, and developing foundation and

earthquake design criteria. During construction, we provide quality assurance during site grading and foundation installation.

Our studies for public schools are performed in conformance with the California Geological Survey Checklist for the Review of Geologic - Seismic Reports for California Public Schools, Hospitals, and Essential Services Buildings.

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Aspire Public School

The Aspire educational program is designed to give all students access to opportunities for success in life, work, and citizenship. The program calls for small schools and small class sizes where individual students are known personally and multi-age classes where teachers stay with students for years.

Treadwell & Rollo performed the geotechnical investigation for the proposed Aspire Public School at 1100 77th Avenue in Oakland, California. The project site, which encompasses an area of about 1.75 acres, is currently occupied by two vacant buildings, an interior courtyard, and paved parking areas.

The main building, built in 1923, is a two-story, L-shaped brick building with maximum plan dimensions of about 120 by 270 feet. The second building, at the southwest corner of the site, is a four-story reinforced concrete building built in 1947. Both buildings are supported on spread footings and have concrete slab-on-grade floors.

Project plans include seismic strengthening of the two existing buildings by constructing concrete shear walls and steel braced-frames. New foundations will be installed to resist seismic loading from the shear walls and frames. In addition, two small two-story, reinforced-concrete additions are planned at the southwest and southeast corners of the main building.

Our subsurface investigation indicated that the school site is blanketed by a 5- to 6-foot-thick layer of very stiff, highly expansive clay that is underlain by interbedded layers of stiff to very stiff clay and medium dense to very dense sand. Groundwater was measured at depths of 7 to 10 feet below the existing ground surface.

We recommended supporting the proposed shear walls and braced-frames on conventional spread footings. To resist high uplift forces, we recommended using either drilled, cast-in-place piers or high-capacity soil anchors. For the two building additions, we recommended using deep perimeter footings to mitigate the effects of the expansive clay.



Rendering by Robert Frank, Case Architects

Sacred Heart Cathedral Preparatory School

The roots of Sacred Heart Cathedral Preparatory School in San Francisco are deep, going back more than 130 years. Owned by the Archdiocese of San Francisco, the school is committed to quality education and the preparation of students for enriching careers in such fields as business, education, religion, and labor.

Sponsored by the Christian Brothers and Daughters of Charity, Sacred Heart Cathedral Preparatory School was the first high school to offer Catholic coeducation to the youth of San Francisco. This was achieved in 1987 when two of the City's oldest Catholic high schools, Sacred Heart High School and Cathedral High School, culminated twenty years of active cooperation by officially merging.

Treadwell & Rollo performed the geotechnical investigation for the Student Life Center that is being constructed at the campus. The location of the proposed improvements was occupied by outdoor basketball courts, a grass field, and a portion of the existing gymnasium and cafeteria building. Following demolition, the remaining portions of the gymnasium and cafeteria building will be remodeled and seismically strengthened and interconnected with the Student Life Center.

The Student Life Center includes a cafeteria, gymnasium, and a circulation collector. The building is at plaza grade with the cafeteria below the gymnasium. The overall project plan dimensions are approximately 115 by 185 feet. The center is approximately 60 feet high and consists of a two-story, steel-framed structure. We recommended a drilled pier foundation gaining support in bedrock approximately 40 feet below the ground surface. In addition, we provided shoring recommendations to support the adjacent buildings and streets during construction.

Treadwell & Rollo provided consultation during final design, including review of project plans and specifications. We also provided quality assurance services during construction, including observation and testing during shoring installation, drilled pier construction, site grading, and utility placement.

University of California, San Francisco

Built in 1897 on land originally contributed by Adolph Sutro, the University of California, San Francisco includes the 107-acre Parnassus Heights campus that is home to graduate professionals in dentistry, medicine, nursing, and pharmacy; a graduate division for predoctoral and postdoctoral scientists; UCSF Medical Center; and Langley Porter Psychiatric Institute. UCSF encompasses several more sites in San Francisco, including UCSF Mount Zion. For more than a decade, Treadwell & Rollo has provided engineering consulting services for many of these facilities.

UCSF is the only UC campus dedicated exclusively to the health sciences. And, by virtue of the quality of its faculty, the excellence of its patient care, the scope of its many outreach programs and the many discoveries of its scientists, UCSF is considered one of the nation's premier health sciences teaching, training and research centers.

As the new century begins, UCSF is playing a major role in 303-acre Mission Bay residential and business development being

planned by Catellus Development Corporation. On 43 acres of this development, UCSF is creating an additional and entirely new campus, which will include 2.65 million square feet of biomedical laboratory space and other instructional and support facilities.

The UCSF Mission Bay campus presents a unique and challenging environment. Originally a shallow bay, Mission Bay was reclaimed in the late 1800s and early 1900s. Subsurface conditions consist of heterogeneous fill over weak, compressible clay, known as Bay Mud. Dense sand, stiff clay, and bedrock typically underlie the Bay Mud. Geotechnical issues include liquefaction, settlement, shallow groundwater, and the presence of rubble in the fill and existing foundations. We are proud to be the geotechnical and environmental consultants to UCSF for many of their proposed structures at Mission Bay.

CAMPUS HOUSING

Treadwell & Rollo performed the geotechnical investigation for the proposed Campus Housing project which will contain 335

residential units and a child care facility. The complex, planned for completion by the fall of 2004, will have three podium levels and four residential towers. The footprint of the structure has plan dimensions of more than 200 by 400 feet.

Our engineers investigated the subsurface soil and groundwater conditions and developed recommendations for the geotechnical design criteria. We recommended supporting the building on end-bearing piles driven to refusal in the dense Colma formation. Site-specific seismic spectra and time histories were developed for use in the structural design.

DEVELOPMENTAL BIOLOGY AND GENETICS RESEARCH

The development will include a new five-story steel-framed building with research, laboratory, and educational facilities (see below).

Treadwell & Rollo performed a geotechnical investigation, a probabilistic seismic hazard analysis, and a Maher (Article 22A) Environmental Study for the project. Additionally, a vibration

study was conducted to evaluate the effects of heavy truck and bus traffic on sensitive laboratory equipment.

We provided recommendations regarding pile foundations, below-grade walls, seismic design, vibration isolation, utilities, and earthwork. Piles were driven to refusal in the dense sand or bedrock. Because of the variability in thickness of the dense sand layer and depth to bedrock, an extensive indicator pile program was developed to evaluate tip elevations for production piles.

During construction, our engineers observed indicator and production pile installation, and performed observation and density testing during final site grading and utility placement.

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Rendering by Bohlin Cywinski Jackson



Photograph by Christian J. Divis



San Domenico School

The oldest independent Catholic school in California, San Domenico traces its beginnings to Monterey in 1850 and has been at its 512-acre San Anselmo campus since 1965. Today, San Domenico serves about 450 day students through the eighth grade and about 150 day and boarding students in the high school. The next decade will see a substantial expansion in facilities at the campus in accordance with its Master Plan.

Treadwell & Rollo performed the preliminary geologic and geotechnical assessment study for the Plan as well as subsequent geotechnical investigations. The Plan contemplates several buildings, including athletic and performing arts centers and associated parking area improvements. Other proposed improvements on the campus include administrative, academic and dormitory buildings, a swimming pool, and various playing fields. The primary geologic and geotechnical issues at the campus site include the presence of uncompacted fill and weak, compressible alluvium and colluvium, and the potential for ground shaking, landslides, soil creep, and erosion.

The first phase of the new development consisted of a two-story wood-framed building designated as the Science and Technology Center. Subsurface conditions at the site consist of sloping bedrock; where bedrock is not at the ground surface, it is covered by fill and colluvium. We provided recommendations for a shallow stiffened foundation system bearing on rock and recompacted fill. We also provided geotechnical services during construction, including observation during grading, excavation and engineered fill placement for the building pad, excavation of the building foundation, and compaction of subgrade and baserock for paved areas. The second phase of the development will consist of the Athletic Center and the Hall of the Arts.



Stanford University

In October 1891, Stanford University opened its doors after six years of planning and building. In memory of their only child, Jane and Leland Stanford were determined to use their wealth to do something for "other people's" children. They created a great university, one that, from the outset, was untraditional: coeducational in a time when most private universities were all male; nondenominational when most were associated with a religious organization; and practical oriented, producing "cultured and useful citizens" when most were concerned only with the former.

A world class teaching and research institution, Stanford University occupies about 8,200 contiguous acres of land in six different governmental jurisdictions. As an owner and operator of non-transportation related, fixed facilities that could possibly discharge oil into or upon the navigable waters or adjoining shorelines, the university is subject to various EPA requirements.

Treadwell & Rollo is assisting Stanford in major portions of their campus-wide environmental compliance efforts. Our work includes the development and review of Spill Prevention, Control, and Countermeasure Plans and Hazardous Material Business Plans. We are working cooperatively with Stanford personnel, conducting detailed site visits, and interfacing with regulatory agencies. The challenge for our environmental project team is to produce plans that meet these requirements while also being flexible enough to meet the specific needs of the campus. We are also working with the university to develop an efficient site reconnaissance plan as well as an internal audit system to facilitate and ensure regulatory compliance.

The Treadwell & Rollo project team assisting Stanford University with environmental issues includes Rhonda R. Richards, Brian K. Moore, Timothy P. Becker, and Ellis A. Wallenberg III.

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