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Resume of
Allen Jones, PE, PhD

ALLEN JONES, PE, PHD

PROFILE

Allen Jones, PE is unique among consultants because of the breadth and diversity of his private and public project experience. He has more than 18 years of geotechnical and environmental engineering experience and is an experienced project manager. Allen's role in projects has progressed from field studies and construction observation to technical studies, project management, senior-level review, and expert witness.

Allen has been a project engineer and manager on hundreds of facility developments and redevelopments—from preliminary siting through final design and construction. His expertise includes offshore and near-shore construction, deep excavations, high-rise buildings, bridges, roadways, landfills, landslide stabilization, slope and embankment design, engineering for pavement and roads, piers, probabilistic seismic hazard studies, abandoned mine land remediation, and foundation design for a wide range of industrial, commercial, and infrastructure projects.

Allen's area of expertise also includes geotechnical earthquake engineering and probabilistic analyses. His experience includes probabilistic seismic hazard assessments, site specific ground response analyses (both equivalent linear and nonlinear), liquefaction assessment, seismic slope stability, in-situ seismic measurements, and geostatistics. He completed his Ph.D. in geotechnical engineering at the University of Washington.

Allen's focus is to provide clients with extensive experience in the field and office to help deliver solutions to the many challenges they face.

PROFESSIONAL HISTORY

South Dakota State University

Brookings, South Dakota

Associate Professor for College of Engineering, Department of Civil and Environmental Engineering. Responsible for developing/ teaching undergraduate/graduate geotechnical, geoenvironmental, and design engineering courses. Conducting research in areas of probabilistic seismic hazard assessments, liquefaction induced ground damage, paleoliquefaction, probability and spatial statistics, abandoned mine lands (AML) reclamation, AML data integration, and mine subsidence. (2003 to present).

Jones Earth Technologies, LLC

Brookings, South Dakota

Senior Engineer for earth technologies consulting firm. Allen's role is to conduct geotechnical investigations and provide engineering solutions to various clients. Allen's expertise is at the service of his clients to carry out a great variety of geotechnical services including field exploration programs, engineering evaluations, plans and specification, monitoring of contractor performance, and a wide range of special studies. Projects include major public and private both nationally and internationally (2003 to present).

University of Washington

Seattle, Washington

Pre-Doctorial Associate for College of Engineering, Department of Civil and Environmental Engineering. Instruction of graduate course work in lateral earth pressures and earth retaining systems (CEE 564). **Research Assistant** focusing on geotechnical earthquake engineering (1999 to 2003).

Hart Crowser, Inc.

Seattle, Washington

Senior Associate Engineer/Senior Project Manager for earth and environmental technologies consulting firm. Responsibilities include business development, proposal writing, complete project tracking and management, review and performance of technical analyses, and review and production of reports related to geotechnical and environmental projects. Responsibilities also include construction management, management of engineering observation, and providing on-site review and engineering. Projects include major public and private both nationally and internationally. Other responsibilities include: personnel training, implementation, and management of a company wide CADD system; member of technology committee; and introduction and guidance of a corporate Total Quality Management program (1988 to 2003).

University of Idaho

Moscow, Idaho

Instructor for College of Engineering. Instruction of engineering graphics and AutoCAD emphasizing three dimensional visualization and graphics representation. Also, substitute teaching for numerical analysis and mechanics of materials classes. **Research Assistant** focusing on earthquake engineering research associated with the thesis (1987 to 1988).

Geo-Hydro Engineers, Inc.

Atlanta, Georgia

Staff Engineer for geotechnical and civil engineering consulting firm. Responsibilities included field inspection/observation of fill placement and foundations, concrete sampling, surveying, and laboratory testing of soils, concrete, and asphalt (1987).

EDUCATION

Doctor of Philosophy (PhD) in Civil Engineering (Geotechnical)

University of Washington. Graduate studies in geotechnical engineering and probability and statistics. Allen's dissertation focused on three aspects of geotechnical earthquake engineering: a probabilistic approach to estimating ground motion parameters from liquefaction features, a rational method by which the initiation of liquefaction below the ground surface and the potential for ground damage can be evaluated, and uncertainty analysis for a seismic warning system of a major bridge structure. These procedures will represent an important advance in the geotechnical profession's ability to predict liquefaction hazards.

An additional project focused on evaluating the uncertainty in geotechnical soil properties. Allen's minor area of study focused on statistics including geostatistics, time series analysis, and probability theory.

Master of Science in Geological Engineering (Geotechnical)

University of Idaho. Thesis focused on earthquake engineering and geostatistics (1988). Thesis title: *Spatial and Temporal Analysis for Idaho Earthquake Hazard Assessment*.

Bachelor of Science in Geological Engineering

University of Idaho (1986).

PUBLICATIONS

Jones, A.L., and Uckert, R.S. (2006). "The investigation of the use of coal mine refuse for subbase materials and embankment fill in South Dakota." *Proceedings of the 2006 Billings Land Reclamation Symposium and American Society of Mining and Reclamation*, Billings, MT, June 5 - 8, 2006.

Jones, A. L., Arduino, P., Kramer, S. L., Eberhard, M. O. (2002) "Uncertainty analysis for a seismic warning system" *Transportation Research Record No. 1808, Soil Mechanics 2002*. Washington, D.C., pp. 112-121.

Kaldenbach, G., Swayne, M., Jones, A. L., Jones, A. J. (2000) "Abandoned Mine Information (AMI) and Mapping," Presented at the Annual Conference of the National Association of AML Programs, Steamboat Springs, Colorado.

Kramer, S.L. and Jones, A.J. (2000). "Implications of Great Cascadia Subduction Zone Earthquakes for Liquefaction and Landslides," Proceedings, Penrose Conference (invited paper), Seaside, Oregon, June.

Jones, A. L., Bailey, M. J. (2000) "Case Study: Prediction of coal mine subsidence below clubhouse," in Proceedings of the Fourth North American Rock Mechanics Symposium, Seattle, Washington, July 31 – August 3, pp. 449-455.

Winter, D. A., Jones, A. J., Jones, A. L. (1999) "Shoring and Dewatering Design and Performance, King Street Center, Seattle," Spring Seminar on Excavation Support and Dewatering, sponsored by the ASCE and the University of Washington, 26 p.

Miller, S. M., Jones, A. L. (1988) "Probabilistic estimation of earthquake ground shaking intensities in Idaho and Western Montana," in Proceedings of the 24th Symposium on Engineering Geology and Soil Mechanics, Coeur d'Alene, Idaho, February 29 – March 2, pp. 375-389.

Jones, A., Kramer, S., Arduino, P. (2001) "Spatial Uncertainty of Geotechnical Soil Properties", Pacific Earthquake Engineering Research (PEER) Center, University of California, Berkeley. 100 p.

Kramer, S., Arduino, P., Eberhard, M. Jones, A., (2001) "Seismic Instrumentation System for Warning and Rapid Recovery", Washington State Department of Transportation. 128 p.

Authored over 250 technical reports for engineering projects while employed as a design engineer. Authored and was in responsible charge for over 40 plan and specification sets. Examples of reports, and plans and specifications include:

1. Engineering Report, Storm Water Management Plan for Birmingham Steel Corporation, West Seattle Facility, Seattle, Washington, 1994, 300 pp. (est.)
2. Design Analysis, Replace Berm Liners, Fleet and Industrial Supply Center, Manchester, Washington, 1996, 100 pp. (est.)
3. Geotechnical and Environmental Study, Navy Community Support Complex, Naval Station Everett, Everett, Washington, 1992, 200 pp. (est.)
4. Perkins County Reclamation Plans and Specification, United States Department of Interior, Office of Surface Mining, 2005, Six plan sheet and 100 pages of specifications.

5. Safeco Insurance World Data Center Plans and Specifications, Safeco Insurance Company, Six plan sheets and 75 pages of specifications (est.).

PRESENTATIONS

Invited Speaker for the Billings Land Reclamation Symposium. This paper was presented at the Billing Land Reclamation Symposium (held every 3 years) held by the Society of Mining and Reclamation and Montana State University (2006).

Invited Speaker for Case Studies in Geotechnical Engineering. This paper was presented at the Bi-annual Geotechnical Seminar held by the American Society of Civil Engineers and South Dakota State University (2004).

Uncertainty Analysis of a Seismic Warning System. This paper was presented at the Annual Transportation Research Board Annual Conference (2002) on a probabilistic warning system for the Alaskan Way Viaduct in Seattle, Washington. The paper was subsequently published in the Transportation Research Record in 2002.

Abandoned Mine Information (AMI) and Mapping. This paper was presented at the Annual Conference of the National Association of AML Programs (2000) on a information system that was developed to track and analyze AML hazards in the State of Washington.

Case Study: Prediction of Coal Mine Subsidence Below Clubhouse. This paper was presented at The Fourth North American Rock Mechanics Symposium (2000) and discussed several analytical methods that were developed to predict mining subsidence using a field case study.

Shoring and Dewatering Design and Performance, King Street Center, Seattle. This paper was presented at Spring Seminar, Excavation Support and Dewatering, ASCE and University of Washington (1999) and discussed the unique aspects of a case study in soft soil conditions

Structural Engineers Association of Washington. This was a presentation on the structural and geotechnical aspects of seismic base isolation of structures in Washington State (1998).

Probabilistic Estimation of Earthquake Ground Shaking Intensities in Idaho and Western Montana. This paper was presented at the 24th Symposium on Engineering Geology and Soil Mechanics (1988).

REGISTRATIONS AND CERTIFICATIONS

Registered Professional Civil Engineer.

State of South Dakota (2003), Washington (1991) and California (1996).

Registered Professional Geotechnical Engineer.

State of California (1998).

Registered Professional Geologist.

State of Washington (2001).

Registered Professional Engineering Geologist.

State of Washington (2001).

Health and Safety at Hazardous Waste Sites Certification.

Satisfies requirements set forth in 29 CFR, Prezant and Associates, Inc., (1991).

AHERA Asbestos Abatement Project Designer Certification.

Satisfies requirements of 40 CFR Part 763, Environmental Health Sciences, Inc., (1996).

PROFESSIONAL MEMBERSHIPS AND AFFILIATIONS

Pacific Earthquake Engineering Research Center
Earthquake Engineering Research Institute
The Geo-Institute
American Society of Civil Engineers
Society of American Military Engineers
Association of Engineering Geologists
The International Association of Foundation Drilling
American Society of Engineering Educators
American Society of Testing Materials

CONTINUING EDUCATION AND TECHNICAL DEVELOPMENT

Geotechnical Conference. (2006) South Dakota State University and the Mountain Plains Consortium. Sioux Falls, South Dakota.

Billings Land Reclamation Symposium. (2006) American Society of Mining and Reclamation. Billings, Montana.

The Governor's Restoration Forum. (2006) Economic and Public Benefits of Restoring Western Landscapes. Billings, Montana
54th Annual Geotechnical Engineering Conference. (2006) Department of Civil Engineering, University of Minnesota, Minnesota Geotechnical Society, and the Geoinstitute of ASCE. St. Paul, Minnesota.

Structural Seminar. (2005) American Society of Civil Engineers and South Dakota State University. Sioux Falls, South Dakota.

Legal Issues for South Dakota Professional Engineers. (2005) Continuing Education Short Course, Half Moon Seminar, LLC, Sioux Falls, South Dakota.

Countermeasure Design for Bridge Scour and Stream Instability Short Course. (2005) National Highway Institute and the Federal Highway Administration, NHI Course 135048. Fort Pierre, South Dakota.

Geotechnical Seminar. (2004) American Society of Civil Engineers and South Dakota State University. Sioux Falls, South Dakota.

Recent Advances in Geotechnical Earthquake Engineering. (2002) American Society of Civil Engineers and the University of Washington, Seattle, Washington.

National Association of AML Programs Annual Conference. (2000) Steamboat Springs, Colorado.

Geotechnical Field Instrumentation. (2000) American Society of Civil Engineers and the University of Washington, Seattle, Washington.

EERI Annual Conference. (2000) St. Louis, Missouri.

Excavation Support and Dewatering. (1999) American Society of Civil Engineers and the University of Washington, Seattle, Washington.

Specialty Conference on Geotechnical Earthquake Engineering and Soil Dynamics. (1998) University of Washington, Seattle, Washington.

Landslides in the Puget Sound Region. (1998) American Society of Civil Engineers and the University of Washington, Seattle, Washington.

Seismic Short Course on *Evaluation and Mitigation of Earthquake Induced Liquefaction Hazards.* (1997) San Francisco State University, San Francisco, California.

Seminar on New Developments in Earthquake Ground Motion Estimation and Implications for Engineering Design Practice. (1994) Applied Technology Council, Redwood City, California.

Total Value Management Principles Course. (1993) The Institute for Quality Service, John Inman and Associates, Portland, Oregon.

Value Improvement Projects Course. (1993) The Institute for Quality Service, John Inman and Associates, Portland, Oregon.

RCRA Compliance Training Course. (1993) Hart Crowser, Inc., Seattle, Washington.

Ground Modification Applications in Geotechnical and Geoenvironmental Engineering Course. (1993) American Society of Civil Engineers and the University of Washington, Seattle, Washington.

Preliminary Environmental Assessments Course. (1992) Hart Crowser, Inc., Seattle, Washington.

Seismic Design of Structures: Dynamic Analysis and Lateral Load Determination Course. (1992) University of Washington, Seattle, Washington.

Soil Nailing and Reinforced Walls Seminar. (1992) University of Washington, Seattle, Washington.

Project Management Course. (1992) Clive Shearer, PE, CMC, Seattle, Washington.

Communication, Persuasive Negotiation, and Handling Difficult Situations Short Courses. (1992) D'Angelo & Associates, Seattle, Washington.

Second International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics. (1991) University of Missouri, St. Louis, Missouri.

Client Oriented Writing Short Course. (1991) Gardner David Seminars, Seattle, Washington.

Geotechnical Aspects of Earthquake Engineering Seminar. (1990) University of Washington, Seattle, Washington.

Design for Piles and Pile Groups - Current Engineering Short Course. (1990) University of British Columbia, Vancouver, B.C., Canada.

REPRESENTATIVE PROJECTS

Representative projects consist of geotechnical and environmental.

SPECIALTY CONSTRUCTION

Bixby Road Embankment Rehabilitation, Bison, SD. Allen served as the project engineer and project manager to provide remediation to a failing highway embankment. A highwall associated with historic coal mining in South Dakota was encroaching on a roadway leading to failure of the embankment. Allen provided a remedial solution that incorporated the needs of the land owner, county engineer and federal government who was responsible for impacts from historic coal mining. Construction plans and specifications were produced that the federal government will use to solicit national bids and eventual rehabilitation of the embankment.

King Street Station, Seattle, WA. Allen served as project manager for construction of a mid-rise building. Highlights of this project include construction of below-grade parking below static groundwater using a cut-off shoring wall. Shoring was accomplished using a combined groundwater cut-off system of sheet piles, a secant wall, and a soldier pile wall while protecting adjacent historic structures and utilities. Dewatering of the excavation was accomplished using deep pressure relief wells and well points both internal and external to the site. An extensively designed vibration monitoring plan was used to establish installation criteria for sheet and driven pre-cast pile installation and to protect historic structures and utilities adjacent to the site. Contaminated soil and unanticipated USTs were efficiently disposed of by close coordination with the owner and contractor.

SR100 Tire Fill Emergency Response, Fort Canbey State Park, Ilwaco, Washington. Allen served as project manager for emergency response services to contain, extinguish, and remove hazardous materials which were generated as a result of a subterranean tire fire along State Route 100 on the coast of Washington State. Lightweight roadfill, consisting of about 10,000 cubic yards of shredded tire chips, began burning by spontaneous combustion. The site of the fire was adjacent to a protected salt-water marsh. The combustion process generated gaseous hazardous materials that discharged into the atmosphere and oily liquids that discharged into the marsh. Allen provided project management assistance in this emergency response in the following ways:

- Provided site health and safety consulting services. These activities included writing a site health and safety plan; performing air, soil, and water monitoring to evaluate risk to site workers; conducting worker training; and documenting the health and safety activities performed at the site;

- Performed initial emergency response to contain liquids near the site of the discharge. Berms and sumps were used to recover the oily materials by skimming and the use of sorbent pads;
- Formulated plans to extinguish the fire. These plans were used by subcontract and local fire fighters;
- Represented the client's position in the Unified Command Structure and interacted with federal, state, and local regulatory agencies. Information and recommendations were provided to the client to assist in public and media relations;
- Developed environmental engineering solutions for containment for both the catastrophic release of contaminants to the marsh and short-term storage of contaminated material once the fire was extinguished and the remaining fill was removed; and
- Continued environmental sampling and analysis to delineate contaminant concentration in soil and water once the emergency was over.

Over 15 on-site scientists and task managers, and 35 support personnel provided over-all services

The Golf Club at Newcastle, Newcastle, WA. Allen served as project manger for the design and construction of the Golf Club at Newcastle, two 18-hole golf courses developed in an area of abandoned underground coal mines and a former landfill. The site's history as a former coal mine created engineering challenges because of the risk of active subsidence over workings which in some areas are less than 100 feet deep. An engineering and geologic investigation was combined with information on historical mine operations at the site to identify specific mined areas, critical to positioning of the clubhouse site. Over 5 million cubic yards of soil was moved to accommodate golf course construction.

Additionally, the new 44,000-square-foot clubhouse sits on top of a former construction debris landfill and historic coal mine workings. To address those conditions, Allen teamed with the owner and contractor to identify and estimate the costs of alternative approaches to providing foundation support for the classically designed masonry structure. In the end, a combination of overexcavation and support on structural fill, with deep foundation elements was selected: a 65-foot-deep hole was excavated to remove debris and 160,000 cubic yards of clean fill were brought in and compacted. Grade beams were selected for the building's basement and slab areas, and 117 augercast piles were installed outside of the basement foot-print.

Other design elements included roads and utilities subject to settlement; structural closure of mine openings; foundation support for a turf maintenance building and other structures; design of high, steep fill slopes; and pond embankment. Construction

management services included assessment of on-site borrow material suitability; compaction control; and foundation construction inspection. The course designer is Bob Cupp, and PGA Tour professional, Fred Couples, is providing consultation.

Egglemont Golf Course and Residential Development, Mount Vernon, WA.

Allen served as project engineer to provide geotechnical engineering for the 27-hole Egglemont Golf Course and residential development covering more than one square mile. Work began with a preliminary site reconnaissance/feasibility studies, followed by more than 200 explorations during the design phase of the project. Allen addressed several miles of paved roadway, more than two dozen reinforced earth retaining walls, concrete retaining walls, culverts, water tanks, and miles of pipeline. In addition, he provided geotechnical design recommendations for slope stability issues, berms, ponds, and 11 storm water control weir walls for the golf course. He worked closely with the owner and the design team so that the desired elements could be included within the complex topography and site conditions.

TRAINING

Digital Mine Mapping for the Abandoned Mine Information (AMI) Database, Seattle, WA.

This training was sponsored by The United States Department of Interior, The Office of Surface Mining (OSM). The training was oriented towards applying digital mine mapping to the Abandoned Mine Information (AMI) Database. The first day of training was focused towards familiarizing the trainee with comfortably using AutoCAD as it pertains to the AMI. The next two days of this training was focused towards familiarizing the trainee with the process for importing digital maps into the Abandoned Mine Information (AMI) database/mapping system. Allen served as developer and instructor for this 3 day short course.

BRIDGES

Four Bridges in Pacific County, WA. Allen served as project manager for engineering design and construction recommendations for four bridge sites in Pacific County: Wesley King Bridge; Nyberg Bridge; Moose Bridge; and Doyle Bridge. The work included subsurface explorations at each site, followed by recommendations for design and construction of both shallow and deep foundations, estimates of settlements, and recommendations for seismic design of the bridges, and recommendations for scour protection. Allen also provided recommendations for design and construction of sheet pile coffer dams to construct the bridge piers.

Green River Interchange Modifications at Interurban Avenue and Southcenter Boulevard, Tukwila, WA. Allen served as project manager providing geotechnical engineering services for Green River Interchange modifications at Interurban

Avenue and Southcenter Boulevard for the Washington State Department of Transportation. This project was required to reroute Southcenter Boulevard from around the Green River to over the river, making a straight connection to Grady Way. Consequently, two river overcrossings, one interchange overcrossing, retaining walls, rockeries, and pavement sections were required.

Allen's role in this project was to assess subsurface site conditions, assist the structural engineer in establishing foundation design criteria, and provide geotechnical and seismic recommendations related to design and construction of the bridges. Design work included deep pile foundations combining the use of drilled shafts and driven H-piles for various project components. Allen also provided recommendations for site preparation, as well as construction recommendations for preloading and settlement monitoring in the embankment area.

GEOTECHNICAL/ENVIRONMENTAL

Diagonal Avenue CSO Control Project, Seattle, WA. Allen served as project manager and engineer to provide geotechnical engineering services and environmental assessments along proposed pipeline rights of way for the Diagonal Avenue South, Combined Sewer Overflow (CSO) Control Project. The geotechnical work included evaluating trench dewatering requirements, earth loads on shoring, earth loads on pipelines from 8 to 48 inches in diameter, pavement replacement, and geotechnical design for cut and cover flow control structures. Geotechnical consultation also included minimizing construction vibrations and other impacts on the area during work on the buried utilities.

Design of Secondary Containment Upgrade, Navy Fleet and Industrial Supply Center, Manchester, WA. Allen served as project engineer and manager for completing design and providing construction support services to the Seattle District Corps of Engineers and the Navy. The project included construction of secondary containment liners and improvement of existing secondary containment berms for 13 tanks in three above-ground storage tank areas at the Navy's Manchester Fuel Depot. The project also included design of improved storm water drainage and conveyance modifications, and relocation of an oil/water separator.

Work included a feasibility study of liner alternatives, and comparison of structural concrete dike walls, reconstructed earth berms, and use of shotcrete to improve earthen berms. Regulatory compliance issues were also assessed, and an environmental assessment of potential soil contamination in the existing containment areas was completed. The final construction plans incorporated removal and disposal of contaminated soils into the secondary containment construction.

Design of Above-Ground Storage Tank Containment Systems, Navy Fleet and Industrial Supply Center, Manchester, WA. Allen served as project engineer for the design of impermeable containment basins at three separate tank farms for the U.S. Army Corps of Engineers. A site assessment was also conducted to define contaminated soils within the containment basins. The final design included remediation of contaminated soils.

Feasibility Study, Pilot Study and Design of Groundwater Remediation System, Former Dry Cleaning Facility, Seattle, WA. Allen served as project engineer for site remediation of site containing a former dry cleaning facility concurrent with site redevelopment activities. Based on the pilot study results, a remediation system that combined soil vapor extraction and groundwater air sparging was designed, and biddable plans and specifications and permit applications for the system were produced. Working closely with the contractor, the remediation system is being installed beneath the foundation of the new commercial building. The approach of combining source control and remediation with new construction has enabled redevelopment of the still-contaminated site and avoided the long delays usually associated with site remediation, allowing an otherwise vacant site to be put back into productive use.

Utilities and Site Improvements, Naval Submarine Base, Bangor, WA. Allen served as project manager for environmental and civil services for a multi-faceted project that includes borrow studies, earthworks, slope stability, pavement design, and wetlands creation. Wetland design includes subsurface explorations, liner design, storm water analyses, soil analyses, earthworks, and water budgeting. Designed and implemented the placement of cover soils on active ordnance magazines to satisfy minimum cover requirements.

Land Acquisition and Demolition, PSNS, Bremerton, WA. Allen served as project manager for environmental and geotechnical services for land acquisition of residential, commercial, and industrial properties. Once the land was acquired, disposal options were delineated for hazardous waste included metals-based paints, asbestos-containing materials, petroleum-contaminated soils, PCBs, and other environmental issues at each property. This work has been oriented toward evaluating the extent of site contamination which would influence the cost of construction. In addition, plans, specifications, and construction cost estimates were prepared for demolition of all existing structures.

U.S. Coast Guard Support Center, Seattle, WA. Allen served as project engineer for the design of a new operations, administrative, and medical building. Generated plans, specifications, and cost estimates associated with demolition pertaining to lead-based paint, PCBs, underground storage tanks, and a contingency plan for removal and disposal of contaminated soils.

Navy Community Support Complex, Marysville, WA. Allen served as project engineer for civil and environmental engineering services, including: site history compilations, agency file reviews, exploratory drilling and sampling, physical and chemical soil analyses, regulatory negotiations pertaining to heavy metal contamination, and civil engineering and military facility design.

Oily Bilge Water Separator NUWES, Keyport, WA. Allen served as project engineer for constructing a new structure and storage tank. Included in the work was an environmental study of existing conditions that would impact the cost of construction.

U.S. Navy Fire Station Replacement, Navy Fleet and Industrial Supply Center, Manchester, WA. Allen served as project manager and engineer for providing environmental services for a new fire station at the Navy's Manchester Fuel Depot. The 50-year-old existing station was to be demolished, requiring environmental assessment of lead-based paint and asbestos. Asbestos was surveyed by collecting representative samples of suspect materials and having them analyzed for asbestos content by PLM. Lead-based paint was measured using a hand-held x-ray fluorescence analyzer (Niton XL 309).

Section 106 compliance requirements under the National Historic Preservation Act was also addressed regarding both the existing fire station and potential archeological sites in alternative areas that were being considered for construction of the new fire station. In addition to asbestos and lead-based paint assessment, the potential for petroleum contamination on site was also assessed, resulting from large USTs at this fuel storage facility.

Rangeland Fire Protection Reservoirs, Yakima Firing Range, Yakima, WA. Allen served as project manager for conducting subsurface explorations and providing environmental engineering recommendations for the design and construction of water reservoirs and pump house structures for fire fighting activities.

PORTS AND HARBORS

Naval Station Everett Carrier Pier, Everett, WA. Allen served as project and field engineer for geotechnical design, testing, and construction services for the 1,600-foot-long Carrier Pier. Design services included dredge design and slope stability analyses; pile type, length, and capacity calculations and recommendations; installation and testing requirements; and predicted post-construction performance. Testing services included developing a full-scale load testing program for 20 piles, on-site observation and review of the tests, and interpretation of the results. Construction services

included review of installation practices and pile installation results, assessment of capacities of questionable piles, and review of stability conditions for the slope.

Naval Station Everett, Everett, WA. Allen served as project engineer for the geotechnical tasks associated with developing an industrial complex and adjacent homeport for Navy ships. The site lies in an area of dredged fill material over tidelflat deposits. Provided engineering for design and construction of two 1,600-foot-long berthing piers; 1,000 linear feet of marginal wharf; major utilities and roadways; offshore slopes and slope protection measures; 15-foot-high preload fills to preconsolidate 120 feet of compressible soil; deep and shallow foundation systems for eleven industrial and support buildings; full-scale onshore and offshore pile load tests; and assessment of methane gas migration potential and protection requirements.

Port of Seattle Terminal 91, Seattle, WA. Allen served as project engineer for redevelopment of this facility including analysis of new pier foundations, stability of large partially submerged embankments, and the effects on adjacent structures of placement of large quantities of new fill over compressible soils.

James Hardie Berthing Facilities, Seattle, WA. Allen served as project manager and engineer for design and construction of berthing facilities including wharf expansion and mooring upgrades for James Hardie on the Duwamish River.

Delta Pier Drydock Caisson Moorage, Naval Submarine Base, Bangor, WA. Allen served as project manager and engineer for caisson and mooring additions to Delta Pier (Trident Submarine Moorage). Work included offshore exploration and sampling, geotechnical engineering design, and construction observation and consultation for a new pier for moorage of a second drydock caisson for Delta Pier. Work also involved dredging of the area to provide sufficient draft in front of the new pier. The exploration program was oriented toward providing the necessary geotechnical information for design as well as to implement the Sampling and Analysis Plan required by the Corps of Engineers under the Puget Sound Dredge Disposal Analysis Program for assessing the suitability of dredged material for open water disposal.

Service Pier Upgrade, Naval Submarine Base, Bangor, WA. Allen served as project manager and engineer for design and construction of a 250-foot-long pier, and mooring and camel facilities to Service Pier (Parche Deployment Group) at Naval Submarine Base Bangor, Washington. The upgrade included geotechnical design for high-capacity pier extension piles and high-capacity mooring piles for both vertical and lateral loading conditions. Also provided design of lateral support for heavily loaded

underwater specialty platforms. An essential aspect of this project was evaluating options for demolition and disposal of timber treated with hazardous substances.

Port of Seattle Pier Expansion, Seattle, WA. Allen served as project engineer for design and construction of the Pier 51 expansion project.

Port of Tacoma Thea Foss Waterway Pre-Remedial Design, Tacoma, WA. Allen served as project engineer serving as the task manager responsible for developing a design to remediate contaminated sediments within the 8,000-foot-long Thea Foss Waterway while at the same time incorporating redevelopment plans. Assessments included upland sites, CAD site, and other disposal options including cost estimating.

TUNNELS

Nooksack Diversion Tunnel Inspection, Bellingham, WA. Allen served as project engineer for performing an inspection of the Middle Fork Nooksack River Diversion Tunnel. Constructed in 1960, the 8,900-foot-long tunnel is a 7-1/2- by 8-foot concrete-lined horseshoe shape. Its function is to divert water from the river to a downstream power generating station. Prior to the inspection, a comprehensive work and safety plan was developed that detailed procedures for the inspection. During the inspection, areas in the tunnel were identified that exhibited structural damage such as cracks and spalled concrete.

Lake Whatcom Tunnel Inspection, Bellingham, WA. Allen served as project engineer for providing a pre-inspection safety plan for an approximately 7,560- foot-long tunnel. The concrete-lined tunnel serves as a major link between Lake Whatcom and the City of Bellingham, and is the primary water supply line serving the Georgia Pacific plant. Services included identifying areas in the tunnel which had structural damage (cracks or voids, inflow, and piping). This information was documented, and some locations were photographed and videotaped. A written report summarized the tunnel liner conditions and presented geotechnical engineering conclusions and recommendations.

SEISMIC/SHORING DESIGN

Geotechnical Engineering and Seismic Design, Bachelors Enlisted Quarters (BEQ), PSNS, Bremerton, WA. Allen served as project engineer for geotechnical engineering recommendations for shoring and foundation design of the structure, and preliminary environmental studies to assess the impact of environmental issues on overall construction costs. Follow-on work included recommendations for seismic design criteria including site-specific response spectra, characteristic site period, and recurrence intervals for a design seismic event.

Safeco Seismic Hazard Analysis, Redmond, WA. Allen served as project engineer and manager for a probabilistic seismic hazard analysis (PSHA) for Safeco Insurance Company's world wide data center. The importance of this facility required the use of a base isolation system, thus requiring geotechnical input for linear and nonlinear structural analyses. The first part of the work included delineating subsurface conditions by advancing deep borings and performing down-hole testing to delineate the damping and modulus reduction characteristics of the site soils.

A regional data base was then developed to determine site-specific seismicity by performing a probabilistic site hazard assessment (PSHA). Deterministic studies (DSHA) were also initiated for comparative purposes. Estimated peak ground accelerations, earthquake durations and site-specific response spectra were produced from the PSHA. Follow-on studies produced empirical and synthetic acceleration time histories for the non-linear structural analysis.

Additional work also included preparation of design/build plans and specifications for soil nail walls (top-down construction) of the "seismic moat" surrounding the data center. The results of the PSHA were used as input for the shoring system.

Microsoft Corporate Campus Expansion, Redmond, WA. Allen served as project engineer and manager for the expansion of Microsoft's Corporate Headquarters in Redmond. The project has involved 25 buildings to date, with parking facilities and other appurtenant facilities. Allen provided environmental site assessment services, foundation design studies, and construction observation of all geotechnical and environmental aspects of the project. Foundation design and construction involved shallow foundations on glacially overridden soils and structural fill. Shoring design has included recommendations for soldier pile and lagging systems, and soil nail system.

SEISMIC DESIGN

Seismic Instrumentation For the Alaskan Way Viaduct, Seattle, WA. The recent Nisqually earthquake has shown that the Alaskan Way Viaduct is highly susceptible to damage from earthquakes. Previous studies have shown that extensive soil liquefaction could cause collapse of sections of the Viaduct through a complex mechanism that involves the seismic performance of a nearby seawall. Occurrence of such collapse events would be expected to occur at some time after the initiation of earthquake shaking, thereby providing some period of time in which motorists could potentially be kept from entering the Viaduct. The purpose of the project was to evaluate the feasibility of instrumenting the Viaduct to (a) provide warning of potentially unsafe situations, and (b) reduce post-earthquake closure times by speeding the process of evaluating the condition of the Viaduct following earthquake shaking.

Because of the numerous and significant sources of uncertainty in the prediction of collapse, a probabilistic approach to the warning system problem was adopted. This procedure accounted for, to the extent possible given available information, uncertainties in Viaduct foundation behavior, and uncertainties in structural response. The results were expressed in estimated collapse probabilities for various warning system triggering levels. Selection of triggering levels are based on balancing the costs and benefits of successful and unsuccessful collapse predictions.

Structural analyses of specific sections of the Viaduct were used to develop recommendations for performance monitoring instrumentation. Proposed response levels for inspection and inspection/closure were also presented.

ODS Mid-Rise Office Tower, Portland, OR. Allen served as project engineer for generation of site-specific seismic response spectra, geotechnical engineering recommendations for shoring (below-grade parking), and foundation design for a mid-rise office structure. Follow-on work included a probabilistic seismic hazard assessment of the site including regional and site-specific seismicity, site-specific accelerations, and site-specific response spectra.

Seismic Upgrades, Tacoma Union Station, Tacoma, WA. Allen served as project engineer for the rehabilitation of the historic Tacoma Union Station for seismic design and construction of the adjacent Federal Courts Building. Design criteria was generated for seismic design of the structures, earth retention systems for deep cuts adjacent to city streets, and drainage systems for artesian conditions.

ABANDONED MINE LANDS (AML)

Coal Creek V Reclamation Project, Bellevue, WA. Allen served as project engineer for design of a flood protection berm around the entry of a previously closed mine to prevent flooding. Preparation of plans and specifications included a grading plan and other design figures produced using CADD.

Taylor Mine Reclamation Project, Hobart, WA. Allen served as project engineer for closure design for four abandoned coal mine-related features. Reclamation was complicated because the site was within the Cedar River Watershed. Prepared plans and specifications and observed construction.

Eureka-Hyde Reclamation Project, Cumberland, WA. Allen served as project engineer for designing closures for nine abandoned coal mine features. Prepared plans and specifications for closure of the mine features.

OSM Contract, Multiple Locations, WA. Under an ongoing contract with the U.S. Department of Interior, Office of Surface Mining (OSM), Allen has been involved with mitigating dozens of abandoned coal mine features. Mine-related elements have included acid mine drainage, subsidence features (often beneath structures or roads), steeply dipping mine entries, vertical air shafts, and near horizontal drainage tunnels or entries. The work involved site investigations, conceptual design work, plans and specifications, and construction support. Projects have included:

- Reinforced concrete wedge type plugs in vertical or steeply dipping entries;
- Reinforced concrete bridge deck type closures;
- Steel grills (horizontal and vertical);
- Concrete plugs using shallow constructed bulkheads;
- Openings that were backfilled with soil or cementitious material; and
- Covers, berms, and grouting operations.

During the course of project design and construction, he has also dealt with construction access issues, wetlands, permitting, safety, environmental concerns, and other issues. This has required him to work closely with private land owners as well as numerous government agencies.

ENVIRONMENTAL

Multiple Site Assessments, Various Sites, Washington and Oregon. Allen performed preliminary environmental assessments on several separate properties in a 60-day period throughout Washington State. These properties were part of a large property acquisition between Pacific First Bank and West One Bank. Each preliminary

environmental assessment consisted of a historical background search, agency file review, personnel interviews, site reconnaissance, and a written detailed report. The properties varied in size and type, and included, auto repair shops, office buildings, apartment buildings, and industrial parks.

Environmental issues associated with these operations involved PCBs, asbestos-containing material (ACM), lead-based paint, wastewater/storm water discharge, underground storage tanks (USTs), petroleum hydrocarbons, and air emissions. The fast track schedule was met and the merger completed with reliable environmental information.

Environmental Services, Physical Fitness Center, Puget Sound Naval Shipyard, Bremerton, WA. Allen served as project manager and engineer to conduct a comprehensive, pre-demolition asbestos survey of a swimming pool and gymnasium. The work included conducting an AHERA asbestos survey and reporting the results, and producing plans and specifications for abatement prior to demolition of one structure and renovation of another. Other services also included identifying painted surfaces that could potentially be designated as hazardous waste based on the lead content of painted components, and cataloging other hazardous building materials with special abatement and handling requirements.

U.S. Navy Fleet Support Buildings Pre-Demolition Survey of Asbestos and Other Hazardous Materials, PSNS, Bremerton, WA. Allen served as project engineer and manager providing surveys for asbestos, lead-based paint, PCBs, and other environmental issues. Allen also prepared plans, specifications, and construction cost estimates for pre-demolition abatement.

As part of work for the fleet support expansions at Puget Sound Naval Shipyard (PSNS), Allen performed environmental and geotechnical services for land acquisition of residential, commercial, and industrial properties. Once the land was acquired, disposal options were delineated for hazardous waste included metals-based paints, asbestos-containing materials, petroleum-contaminated soils, PCBs, and other environmental issues at each property. Asbestos work included conducting a pre-demolition AHERA survey. This work was oriented toward evaluating the extent of site contamination, which would influence the cost of construction. In addition, Allen prepared plans, specifications, contingency plans, and construction cost estimates for demolition of all existing structures.