

Groundhog



From the President

Welcome back to our annual publication of the Groundhog! In this issue we bring you news from the local geotechnical community as well as information on the ASCE Seattle Section Geotechnical Group, including our upcoming dinner meetings and the March 12, 2005 Spring Seminar on "Tunneling in the Pacific Northwest."

I would like to begin by thanking this year's outstanding officer team for keeping me on my toes and developing ideas to better serve our membership. **Mark Rohrbach** (LACHEL FELICE), our President-Elect, is coordinating this year Spring Seminar. **Mike Harney** (University of Washington), our Secretary / Treasurer, put this publication together and greets everyone at our monthly dinner meetings. **Scott Zajac** (Golder), our Program Chair, organized last year's spring fieldtrip and has put together an excellent set of dinner meeting speakers including two Terzaghi lecturers. **Wendy Mathieson** (Shannon & Wilson), our Technology Chair, is getting our organization into the 21st Century with improved payment options and a group-controlled website. **Keith Ward** (City of Seattle), our Past-President, has led our past presidents through a series of strategic planning meetings for our group.

Through our strategic planning we created mission and vision statements for our group. "The ASCE Seattle Section Geotechnical Group's mission is to advance geotechnical practice in the Puget Sound Region by providing leadership on public issues, sharing professional

experience, and promoting education." Our vision is that: "The ASCE Seattle Section Geotechnical Group will be the recognized leader of geotechnical practice throughout the Puget Sound Region." As part of this planning we identified four areas that we intend to focus on: education, membership, public awareness, and cultivating relationships with other organizations.

Modifications of the roles of the officer positions also came out of the strategic planning. We modified the group leader's title from "chair" to "president" to avoid confusion with our other chair positions. The succession of officer positions has also been modified such that the President-Elect succeeds the President and one of the committee chairs or the Secretary/Treasurer succeeds the President-Elect. This allows for people who are interested in a one-year commitment to have a part of our group's leadership.

In May 2004, we presented our pledged \$25,000 donation to the University of Washington geotechnical remodeling effort. Our balance sheet is in good standings, however, we have been posting losses at all of our monthly dinner meetings. To limit our dinner meeting losses while continuing to bring in top speakers at quality venues, we are raising the dinner meeting rates from \$25 to \$30 with advance RSVP.

Our group has much to offer our members, and I encourage each of you to be active participants by attending our programs or becoming an officer. Contact any officer if you would like to get more involved in our group or to be added to our email list. I look forward to seeing you soon at one of our monthly dinner meetings and the 2005 Spring Seminar.

Thank you for your continued support of our group!

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This issue is the culmination of approximately 75 submittals. The geotechnical group would like to thank those professionals who were able to take time from their schedules to submit content for this newsletter.

NEWS AND COMMENTS

Planning Committee Meetings

Geotechnical Group planning meetings are typically scheduled the third Wednesday of each month (September through June). These meetings are used to improve existing programs, develop new programs, coordinate community outreach, and to propose topics for consideration by the board. Some of the topics addressed at this year's planning committee meetings included: nomination of Professor Bob Holtz to Honorary Membership in ASCE, the use of credit cards or online payment for meetings, Begnt Felleius' short course, and potential field trips.

We encourage all Seattle area geotechnical firms/agencies to have a representative at each monthly planning meeting. The planning committee is looking for your help in selecting topics of interest and identifying potential speakers for the upcoming 2005-2006 year.

Please contact **Mike Harney** or one of the other officers if you have any suggestions, would like to participate, or if you would like to attend a planning committee meeting. Lunch is provided at planning committee meetings.

ASCE Membership Information

If you are not a member of ASCE or are not current, we encourage you to join and help

support the Seattle Section and the Geotechnical Group. In addition to joining ASCE we encourage you to join the Geo-Institute (at no additional cost!) and you will receive a free Geo-Strata publication. The Geo-Institute is a full-service, discipline-oriented, and semi-autonomous institute within ASCE. It strives to be the premier organization for a wide range of geo-professionals. For more information on how to become an ASCE member, please refer to our website at: www.asce.org/membership.

Seattle's 22nd Annual Spring Seminar



"TUNNELING IN THE PACIFIC NORTHWEST"

March 12, 2005

The ASCE Seattle Section Geotechnical Group will hold its 22nd Annual Spring Seminar on the topic of **"Tunneling in the Pacific Northwest"** on **Saturday, March 12, 2005**, at the University of Washington in the Husky Union Building (HUB) Auditorium. The seminar will bring together some of the top professionals in the field of tunneling with general and project-specific presentations.

The morning session will begin with presentations by **Red Robinson** of Shannon and Wilson and **Raymond Sterling** of The Trenchless Technology Center at Louisiana Tech University, who will provide an introduction

to the design, construction, and research issues of microtunneling. After a morning break, **Edward Cording** of The University of Illinois will speak on ground improvement and control during tunneling and **Harvey Parker**, newly elected president of the International Tunneling Association, will speak on subsurface exploration issues. **Don Gonzales** of Northwest Boring Construction Company will follow with a perspective on the contractor's role in microtunneling. In the afternoon, case histories of tunneling in the Pacific Northwest will be presented. **Judy Cochran** of King County Waste Water Treatment Division will speak about applying the Denny CSO experience to the Brightwater Conveyance project, **Joe Gildner** of Sound Transit—Link Light Rail will discuss the Beacon Hill tunnel and subway station contract and **Greg Colzani** of Jacobs Associates will speak on the West Side Willamette River CSO project. The final session will include a presentation on the contractor's perspective in tunneling by **Bob Pond** of Frontier-Kemper Constructors followed by a panel discussion moderated by **Peter Douglass**.

As always, volunteers are needed to help make the spring seminar a continuing success for the Geotechnical Group and the University of Washington. Please contact the seminar chair, **Mark Rohrbach** of LACHEL FELICE, by email mrohrbach@lachel.com or phone 425-820-0800 for details on how you can participate in this year's spring seminar. Registration information is available at <http://geotech.seattleasce.org> by clicking on the "Geotechnical Group" link.

Geotechnical Group Strategic Planning Update

Since its inception almost 30 years ago, the Geotechnical Group has been a leader in geotechnical engineering in the Puget Sound Region primarily through monthly dinner meeting presentations and the well attended spring seminar. However, without a multi-year plan and goals for the organization, it has been difficult to focus on multi-year programs, to decide where to direct the group's resources, and to maintain planning continuity from year to year. Therefore, for a little over a year 15 of the 24 Past-Chairs and the current officers have met on five occasions to develop a strategic plan for the organization.

So far the leadership team has developed mission and vision statements for the Group which are:

Mission

The ASCE Seattle Section Geotechnical Group's mission is to advance geotechnical practice in the Puget Sound Region by providing leadership on public issues, sharing professional experience, and promoting education.

Vision

The ASCE Seattle Section Geotechnical Group will be the recognized leader of geotechnical practice throughout the Puget Sound Region.

The team has also established three areas for the organization where the group will focus its resources in the coming years. The three focus areas include:

- Educational opportunities
- Membership development
- Public relations

In the coming months, the team will finish work on a new organizational structure to help develop these areas and will be seeking volunteers for new committees. Keep an eye out for new programs in the coming year. If you're interested in helping or have any ideas, please contact **Doug Lindquist**.

By Keith Ward

In Memoriam: Bob Kenly

It is with great sadness that we inform you that our friend and colleague Bob Kenly passed away Saturday night. Bob had been with Slope Indicator since September 1985. We have all benefited from his wisdom and expertise. He could always be counted on for sound advice and a kind word. He will be deeply missed by all.

Durham Geo Slope Indicator will have details of the funeral arrangements on our website when they are available.

By Ronda Benbrooks

Harvey Parker Elected President of the International Tunneling Association (ITA)

Harvey Parker, Ph.D., P.E., a Seattle-based consulting civil engineer, was elected in

Singapore to a three year term as president of the International Tunneling Association (ITA), an organization, composed of 53 Member Nations, based in Lausanne, Switzerland. ITA supports and represents the entire underground industry working to benefit the public, environment, and sustainable development. Parker is ITA's representative to the United Nations and ITA's spokesperson on sustainable development and tunnel security. He has consulted on major facilities for railroad, highway, water and waste, transit, hydroelectric, port, defense, mining, and development of underground schemes in over 15 countries, including transit projects in 12 cities, and over 150 railroad tunnels.



Harvey Parker: Newly-Elected President of ITA

Parker received his BSCE from Auburn (API), and his Masters (S.M.) in engineering from Harvard University. He received his Ph.D. from the University of Illinois in geotechnical engineering, with a minor in geology. He taught part-time at the University of Illinois and as an Adjunct at Columbia University. Parker has authored or co-authored over 30 publications, and is a Registered Professional Engineer in the states of California and Washington.

Parker has actively supported his profession. He has been involved with ITA for over 15 years. Formerly he served two terms as the Chairman of the United States National Committee on Tunneling Technology (USNC/TT) sponsored by the National Academy of Sciences. He also served the Underground Technology Research Council (UTRC) in various capacities, including two terms as Chairman. This organization is sponsored by The American Society of Civil Engineers (ASCE) and the Society of Mining Engineering. Parker is a Fellow and Life Member of ASCE and he is a Member of The Moles. He is currently the Subcommittee Chairman on Underground

Shotcrete for the American Concrete Institute Committee on Shotcrete (ACI 506).

Prior to commencing his private consulting practice, he was senior vice president at Shannon & Wilson in Seattle, and president of their international subsidiary. Previously, he was assistant vice president for Parsons Brinckerhoff in their New York office, responsible for geotechnical engineering worldwide.

Locally, during the last few decades, Parker has consulted on most of Seattle's major tunnel projects. These include the I-90 Mt. Baker Ridge tunnel, the Downtown Bus Tunnel, Denny Way CSO, Sound Transit, and several WSDOT projects such as the Alaskan Way Viaduct replacement. Nationally and internationally, Parker has consulted on many projects including Boston's Central Artery, New York City's water tunnel system, Hong Kong's Deep Sewer System, the Superconducting Super Collider in Texas, the Strategic Petroleum Reserve on the Gulf Coast, nationwide rehabilitation of railroad tunnels, railroad systems in Morocco and Sudan, and highways, ports, railroads, and hydro facilities worldwide.

Applications are Sought for ASCE 2004 Outstanding Project Awards

It is time to start thinking about what projects you might want to submit for Seattle Section's Outstanding Project Awards. Applications and rules for the "2004 Outstanding Project Awards" program are available on the Section's webpage, which is located at: <http://www.seattleasce.org/>. Awards will be given in the following categories: Geotechnical, Transportation, Water Resources, Ports & Waterways, Structures, Site Development, and Small Project.

Volunteers are also needed to help judge the submittals in these different categories. The application process is simple and straightforward. The submittal deadline is February 14, 2005. The small project category is for any project with a construction cost under \$1,500,000. Projects constructed in 2004, and projects that are almost complete are eligible. Project submittals are welcome from governments, clients, and consultants. For more information contact **Nimmy Gnanapragasam**, phone: 206-296-5522, email: nirmalag@seattleu.edu.

Dr. Bob Holtz: ASCE Honorary Membership Nomination

This past summer and fall the Geotechnical Group recognized the outstanding service, leadership, and technical contributions of local member, **Dr. Robert Holtz**, by nominating Dr. Holtz for the prestigious Honorary Membership designation in ASCE. Honorary Membership is the highest grade of membership in ASCE that recognizes individuals who have attained acknowledged eminence in engineering. Dr. Holtz has been an active leader in ASCE throughout his career including serving as the Geo-Institute President and the Geotechnical Group Chair. Dr. Holtz is a Professor at the University of Washington and is widely known for his research accomplishments and written contributions to the field of geotechnical engineering including his pioneering work with geosynthetics.

Geotechnical Group Field Trips

The ASCE Geotechnical Group responded to member requests and organized a one-day field trip to visit two projects of geotechnical interest in Seattle on Friday, May 14, 2004. Twenty-one members enjoyed the sunshine and visited the Sound Transit Maintenance Facility site at 6th Avenue and Forrest and the Washington Mutual/Seattle Art Museum Tower (WAMU/SAM) site at 2nd Avenue and Union Street.

Drilled shafts were being installed and soil grouting was underway during the visit to the Sound Transit Maintenance Facility. **Gordon Wellwood** of Sound Transit arranged for the group to visit the site, and **Robert Plum** led a discussion regarding the geotechnical design issues. **Allan Macleod** of Golder Associates led folks around the jobsite and discussed piling and drilled shaft installation issues.

Tiebacks were being installed and excavation crews were digging away at the WAMU/SAM site. At the time of the group's visit, the site was excavated to a depth of about 30 feet (of 90 feet). **Scott Amick** of Sellen Construction, **Brook Jacksha** and **Hans-Erik Blomgren** of Magnusson Klemencic Associates, and **Doug Lindquist** of Hart Crowser led a tour of the project site and discussed the construction, structural, and geotechnical issues associated with the project.

The Geotechnical Group received positive feedback from last year's attendees and is planning another field trip for May 2005. Suggestions for projects to visit are welcome and can be forwarded to any group officer. Additionally, we are looking for a volunteer to lead the field trip planning.

By **Scott Zajac**

ASCE Seattle Section and Geotechnical Group Website

The Geotechnical Group continues to improve the website it shares with ASCE Seattle Section. The Seattle Section website is located at www.seattleasce.org and the Geotechnical Group web site can be found by clicking the "Geotechnical Group" link located under the "Committee" heading on the left side of the page.

Our goal is to keep the website updated with a current list of activities, current and past issues of the **Groundhog**, and the planning committee meeting minutes. The Geotechnical Group would also like to include your firm's name, address, phone number, and URL on the website. To include your firm's contact information on the Geotechnical Group's website, send the information via email to **Wendy Mathieson** at wim@shanwil.com.

The Groundhog

The **Groundhog** is the Geotechnical Group's official newsletter. The 2004 **Groundhog** is used to inform the membership of past and planned activities, to provide information about other organizations that geotechnical engineers may find useful, and to provide member organizations the opportunity to inform others in the geotechnical community of new developments within the membership organizations. For more information about the **Groundhog** please visit our web site at <http://www.seattleasce.org>, then click "Geotechnical Group." Past editions of the **Groundhog** are at the bottom of the Geotechnical Group page.

If you are interesting in announcing news in future issues of the Groundhog please contact **Mike Harney** (contact information is on pg. 1).

UPCOMING EVENTS

ASCE Seattle Section Geotechnical Group

- January 27, 2005:** Dr. Victor Milligan – Co-Founder, Golder Associates, “Observations of the Performance of Some Dams on Karst Foundations” at the Sheraton in Bellevue.
- February 24, 2005:** Dominic Parmantier – Condon Johnson & Associates, “Geotechnical Specialty Construction for the Beacon Hill Tunnel Portals and Stations” Location TBD, in Seattle.
- March 12, 2005:** ASCE Seattle Section Geotechnical Group ANNUAL SPRING SEMINAR, “Tunneling in the Pacific Northwest” at the HUB on the University of Washington Campus.
- March 24, 2005:** C.B. Crouse (URS), Paul Grant (PanGEO) and John Hooper (MKA), “Seismic Design in Seattle – Codes and Practice” Silver Cloud Inn-Broadway, Seattle. *Joint Meeting with SEAW*
- April 28, 2005:** Dr. Harry Poulos, “Pile Behavior--Consequences of Natural and Construction Imperfections” at the Sheraton in Bellevue.
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ASCE Portland Section Geotechnical Group

- February 17, 2005:** Matt Brown and Brett Shipton – Portland Dept of Transportation and GeoDesign, respectively, “OHSU Overhead Tram Project” at the Sweetbrier Inn, Tualatin, OR (exit 289 on I-5).
- March 2, 2005:** Professor Steve Kramer – University of Washington, “Recent Research in Liquefaction” at the Sweetbrier Inn, Tualatin, OR (exit 289 on I-5).
- April 6, 2005:** Professor George Filz – Virginia Tech University, “Recent Research Findings Related to Deep Soil Mixing” at the Sweetbrier Inn, Tualatin, OR (exit 289 on I-5).
- May 10, 2005:** Dr. Harry Poulos – Virginia Tech University, “Recent Research Findings Related to Deep Soil Mixing” at the Sweetbrier Inn, Tualatin, OR (exit 289 on I-5).
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Association of Engineering Geologists (AEG) Washington Section

- February 17, 2005:** Dr. Brian Sherrod – U.S. Geological Survey, Seattle “Update on Puget Sound Lowland Paleoseismology” Location TBA.
- March 17, 2005:** Nick Salisbury – CRUX Subsurface, Inc., “Remote Drilling Methods and Case Histories” at the Sweetbrier Inn, Tualatin, OR (exit 289 on I-5). Location TBA
- April 21, 2005:** Dr. Richard Iverson – USGS CVO, AEG/GSA 2005 Jahns Lecturer, “Dynamics of Debris Flows and Avalanches” at the Sweetbrier Inn, Tualatin, OR (exit 289 on I-5). Location TBA
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Structural Engineers Association of Washington (SEAW)

- January 27, 2005:** Paul Diedrich SE, Principal and Todd St. George PE, KPFF. At College Club 505 Madison Street, Downtown Seattle
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UW Geo-Institute Graduate Student Society (UW-GIGSS)

- January 27, 2005:** Dr. Victor Milligan – Co-Founder, Golder Associates, “Uncertainties in Foundation Engineering”
- February 10, 2005:** Jack Tuttle – Founder of GeoEngineers, Inc., Lecture topic TBA.
- February 24, 2005:** Dr. Don Anderson – Principal Geotechnical Engineer, Ch2M Hill., Lecture topic TBA.
- April 7, 2005:** Cyril Leonoff – Executive Vice President (retired) of Klohn-Leonoff, Inc., Lecture topic TBA
- For more information about the UW-GIGSS meeting time and locations contact University of Washington Graduate Student David Maloney by email at david4_2@yahoo.com.
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Women’s Transportation Seminar (WTS)

- March 2, 2005:** The Puget Sound Women's Transportation Seminar (WTS) Chapter extends an invitation to all ASCE members to our March Program featuring a discussion on Commuter Rail Construction in the Greater-Seattle Area. Invited speakers include Walt Smith PE, General Director Commuter Construction, Burlington Northern Santa Fe Railway Company and DMJM+HARRIS/HNTB Commuter Rail Design Team. The program will take place at the Bay Pavilion Pier 57 on Seattle's Waterfront Wednesday March 2, at 5:30pm. Cost is \$35.00 for WTS members and \$45.00 for non-WTS-members and includes a full dinner and informative program. Register for the program at programs@wtspugetsound.org Please contact Debbie Driver at driverd@urbantrans.com for more information.
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OTHER

- February 18 and 19, 2005:** Short course on “Geosynthetic Reinforced Soil” Instructors: Prof. Jonathan Fannin (Univ. of British Columbia) and Prof. Bob Holtz (UW). Contact: geocourses@telus.net
- February 28, 2005:** Seattle Fault Scenario Conference. At Double Tree Hotel, Bellevue. Information: www.crew.org/conference/introduction.html

TECHNICAL ARTICLES

In response to requests made from members, detailed updates on some of the geotechnical research at the University of Washington were sought. The following two articles summarize some of the current research at the UW.

Collaborative Research: A Demonstration of The NEES System for Studying Soil-Foundation-Structure Interaction

One of the greatest challenges facing earthquake engineers is the paucity of data needed to quantify the performance of complete structural systems during strong ground motion. Although observations of damage after an earthquake provide information about deficient structural performance, numerous cases have been reported where one structure survived an event with modest damage while a nominally similar structure nearby collapsed or sustained extensive damage.

Earthquake engineers use laboratory experiments to understand the performance of the key components of structural and foundation systems under controlled loading conditions. Experiments and the data collected therein are used to calibrate and validate computational models of component behavior. Although a great deal of knowledge has been gained about the behavior of components from research to date, there are many open questions about the earthquake performance of complete structural systems. Experiments on systems are difficult to conduct with the current testing equipment available in the United States. One consequence of the lack of system experiments is that it has been impossible to validate computational models for system performance. The National Science Foundation's George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) promises to change modes of inquiry, research, and practice in earthquake engineering. NEES facilitates a major improvement in research by integrating experimental and computational simulation. Through unparalleled experimental, computational, and information technology resources, NEES has the potential to revolutionize the way that earthquake engineers conduct research and implement results into practice.

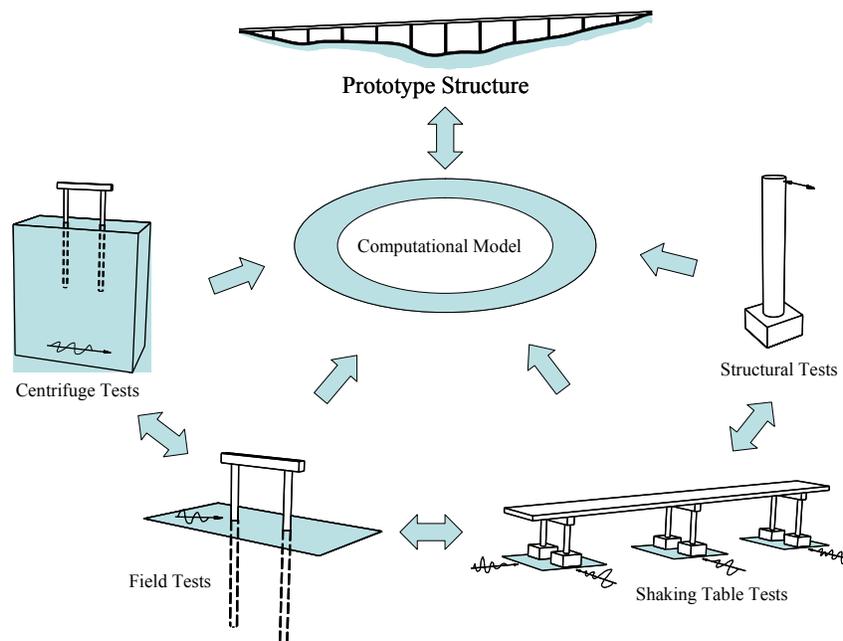


Figure 1. Overview of the Earthquake Engineering Components of the NEES Demonstration Project

As the George E. Brown, Jr. Network for Earthquake Engineering Simulation enters its final stages of deployment, we propose to demonstrate the use of new NEES facilities to increase knowledge in one of the most critical needs in earthquake engineering today, the performance of soil-foundation-structure systems, and to show how NEES will dramatically improve the environment for conducting research in a collaborative manner.

This project was developed by a multi-disciplinary team of eighteen researchers to take full advantage of the NEES infrastructure that is already operational. Three of these researchers are from the University of Washington; **Steve Kramer, Marc Eberhard, and Pedro Arduino**. The research program incorporates several key features of NEES-enabled research: (1) multidisciplinary research teams, (2) integrated computational and experimental models, (3) open, collaborative research environment, (4) a strong information technology component, and (5) synthesis of research and educational activities.

The prototype structure selected for investigation of soil-foundation-structure interaction (SFSI) is a continuous bridge structure (Fig. 1). Reinforced concrete, continuous bridges on drilled shaft foundations represent one of the most common types of bridge systems constructed in both high- and moderate-seismic zones. There are a number of questions about the seismic performance of bridge-foundation systems, both for new construction and existing bridges that do not meet current design standards. The dynamic response of a bridge system is influenced by the ground motion and the nonlinear characteristics of the soil, foundation, and structure. It is, however, impractical to test a single physical model of the prototype SFSI system at reasonable scale and reproduce all key aspects of the system performance. Therefore, a series of four, complementary physical models will be tested: centrifuge tests of individual bridge bents to evaluate the nonlinear response of the soil and foundation system; field tests of individual bents to evaluate the response of the soil, foundation, and structure in situ; shaking table tests of a three-span model to evaluate the nonlinear response of the structure subjected to bi-directional, incoherent support motion; and laboratory tests of large-scale individual columns to evaluate strength degradation in flexure and shear under cyclic loads. In particular, the

University of Washington researchers are part of the centrifuge and shaking table teams and are highly involved in the simulation aspects of the project.

As indicated in Figure 1, computational simulation has a central role in the project for relating the individual component and system experiments. Simulation is needed to design and interpret the individual experimental tests. An important deliverable of the project is improved computational models for SFSI, calibrated from the experiments, in a form available for community use. Finally, the computational simulation component will use and extend NEES system capabilities and resources, such as high-end computing, network distributed computing, and curated data repositories for experimental and computational data.

Prof. Pedro Arduino and Prof. Steve Kramer
University of Washington

Three-Dimensional Numerical Analysis of Drilled Shafts

Three-dimensional modeling is increasingly used in geotechnical engineering for the analysis of complex problems, for example, lateral loads on drilled shaft foundations. Three-dimensional analysis allows complex geometries and loading conditions to be considered, and it has the potential to fully capture problem nonlinearity and shaft-soil interaction. This research uses three-dimensional finite element analyses to model drilled shafts under lateral loading and the work also includes element and constitutive model development and implementation to enhance the capabilities of the open source finite element code OpenSees.

Analysis of laterally loaded piles is commonly done utilizing codes such as LPILE, which are based upon the p - y method and use beam-column elements for the pile and derived one-dimensional p - y springs to capture the response of the soil-pile interface. We believe that existing p - y curves for drilled shafts are overly conservative, and that this type of analysis may not fully capture the complex soil-pile load transfer mechanism. We feel that three-dimensional models will better model the interaction of the shaft and soil and general shaft behavior.

Three-dimensional modeling of drilled shafts can use either full three-dimensional continuum (brick type) elements for both the pile and soil, or the pile may be modeled using nonlinear beam-column elements connected to continuum soil elements. The beam-column elements can easily account for reinforcement and pile cross-sectional properties, and are generally efficient for modeling pile nonlinearity. The beam-column elements are a simplification of the full continuum element pile models, however, and therefore the two approaches will be compared in this research. The load-transfer mechanism along with model efficiency and performance are important factors in comparing the two approaches.

Preliminary analysis found the soil-pile interface to be a critical component of both modeling approaches. This created a need for improved modeling capabilities in OpenSees, and 2- and 3-dimensional contact interface elements were implemented into the code. These contact elements are of the node-to-segment and node-to-surface type and are based on Mohr-Coulomb frictional behavior. The cohesion and frictional properties are easily accounted for in the elements and can simulate sliding, sticking, and gapping behavior at the pile-soil interface. Further implementation work is underway for inclusion of more advanced nonlinear constitutive models.

This work is part of a larger effort to consider the effect of construction defects in drilled shafts using three-dimensional modeling. The current research is really the ground work for the project, and it is necessary to fully understand three-dimensional modeling of drilled shafts and pile behavior before considering the inclusion of defects or anomalies. This project brings together an interdisciplinary group including **Dr. Bob Holtz**, Geotechnical Engineering; **Dr. Pedro Arduino**, Computational Geomechanics; **Dr. Peter Mackenzie**, Computational Mechanics; and **Dr. Conrad Felice**, Drilled Shaft Specialist. This work has been supported in part by FHWA and ADSC.

Kathryn Petek
PhD Student, University of Washington

GEOTECHNICAL UPDATES

This section contains updates from professional organizations, public/ government agencies and public projects.

Association of Engineering Geologists (AEG)

The AEG Washington Section board members for 2004-2005 are **Fred Becker** (Secretary), **Steve Palmer** of WA DNR Geology (Treasurer), **Darrell Sofield** of GeoEngineers (Vice Chair), and **Mark Molinari** of URS (Chair). Anyone interested in joining or obtaining info on AEG or the WA section can contact **Mark Molinari** at mark_molinari@urscorp.com, visit the section web site <http://www.aeg-wa.org>, or the National AEG web site www.aeg.org.

Three members of the WA section, **Steve Evans**, **Mark Molinari**, and **Kathy Troost**, attended the AEG National Meeting in Dearborn, Michigan, in September 2004. Kathy presented a poster on "Application of a Geologic Database on the Greater Seattle Area, Western Washington" and won an award for the best student paper. She also won the 2004 AEG Norman Tilford Scholarship for graduate students for her ongoing PhD research at UW on the Quaternary geology of Puget Sound. **Mark Molinari** gave two talks on the November-December 2003, North Cascades Highway (SR-20) rock avalanche and one on applications of LiDAR on engineering geology projects.

AEG also hosted a short course on "Advanced Slope Stability Modeling" in conjunction with WSDOT. The instructors were **Dr. Erik Eberhardt** and **Dr. Oldrich Hungr** from the University of British Columbia and **Dr. Doug Stead** from Simon Fraser University. The course had very good attendance despite the short notice. If others are interested in taking a future course, let AEG WA representatives know and we may be able to persuade the instructors to do a repeat performance.

Section meetings were held on a monthly basis from January-May and September-November 2004, typically on the third Thursday of each month. Joint section meetings were held with the ASCE Geotechnical Group in March and September, 2004. For 2005, the

February meeting will be **Dr. Brian Sherrod** from the U.S. Geological Survey who will be presenting an "Update on Active Faults and Paleoseismology in the Puget Lowland." **Nick Salisbury** from Crux Drilling will give a talk on "Remote Drilling Methods and Case Histories" in March. The April meeting will feature the AEG/GSA Jahns Distinguished Lecture by **Dr. Dick Iverson** of the USGS Cascades Volcano Observatory on "Dynamics of Debris Flows and Rock Avalanches." He will also likely be giving one of the two Jahns lectures on debris flows/rock avalanches at UW Quaternary Research Center, University of British Columbia, and possibly Western Washington University the same week. The topic of the May meeting is TBD.

We are in the planning stages for a field trip in late May or early June that will most likely focus on various areas of geologic hazards and engineering geology in southwestern Washington. Let us know if you have a good candidate site, especially if you want to be the presenter at the stop!!!

By Mark Molinari

City of Seattle

Geotechnical engineers within the City's various departments have been busy and continue to tackle challenging projects.

The Seattle Department of Transportation (SDOT) constructed the first Joint-Executive Team (JET) landslide mitigation project with a three-tiered reinforced Keystone Wall in the northeast Burke Gilman area. The wall was designed by SDOT engineers and contracted through small construction roster program. SDOT engineers and operations crews also designed and constructed a soldier pile wall in west Queen Anne.

Seattle Public Utilities (SPU) Drainage, Wastewater and Solid Waste Division (including the Landslide Group) and Water Engineering Division (including the Dam Safety Group) merged this year to form the SPU Engineering Division. The Landslide Group is continuing to identify potential projects through the City's Asset Management process. The group constructed seven steep-slope drainage improvement projects, numerous smaller landslide-prone areas drainage projects, and

completed or are currently working on several preliminary engineering studies throughout the City, mainly in West Seattle, northeast Burke Gilman area, and Golden Gardens Drive. Work with the WPA subsurface landslide control drains is continuing.

The Dam Safety Group has been managing a number of projects related to dams, reservoirs, and water supply infrastructure. Projects include the West Seattle Pipeline reinforced earth seismic upgrade, Landsburg dam flood passage study, Cedar Moraine safety study, and Morse Lake pumping facilities studies.

The SPU Materials Laboratory Geotechnical Group continues to provide geotechnical services to many City departments. Some of the more interesting projects include a slide repair at the Gorge Dam and the Tolt Penstock foundation stabilization project for City Light; the South Lake Union Park redevelopment, Luna Park pier, and Jefferson Park Community Center and Golf Driving Range for the Parks Department; and preliminary engineering projects for reservoir covering projects and slope stability studies in West Seattle and Golden Gardens Drive for SPU. The Group is also active in development of the new stormwater code and providing technical expertise on infiltration and other natural drainage issues. **Jeff Fowler** is working on a technical presentation for the 2005 Puget Sound Georgia Basin Conference, discussing infiltration issues for applications in urbanized areas like Seattle.

By Nils Lindwall

Also Note the New Address for Seattle DPD:

Attn: Site Development Section
City of Seattle
Dept. of Planning and Development
700 Fifth Avenue, Suite 2000 - Floor 22
P.O. Box 34019
Seattle, WA 98124-4019

Lake Union / Denny Way Combined Sewer Overflow Control Project, An Update

The Denny Way project, <http://dnr.metrokc.gov/WTD/dennyway/index.htm> is a joint effort of King County and the City of Seattle to control combined sewer overflows (CSOs)

into Lake Union and Elliott Bay. The project was separated into five design and construction contracts: Mercer Street Tunnel, Elliott West Pipelines, Marine Outfalls, South Lake Union Pipelines, and Elliott West Control Facility. The construction phase of the project began in late 2000 with construction of the Mercer Street Tunnel that was completed in 2002. The Marine Outfalls and Elliott West Pipelines were completed in 2002-2003, and the South Lake Union Pipelines were recently completed in December 2004. Construction of the Elliott West Facility is underway with completion in early spring 2005.

The past two years was difficult for tunneling on the South Lake Union Pipelines (SLUP) project. The SLUP contract consisted of three separate 72 inch ID micro-tunnel drives totaling over 2,400 LF and two 50-foot-deep structures. The Lake Union Tunnel was the first of the three tunnel drives and mostly very successful. The Lovat TBM was launched from the East Portal shaft previously constructed under the Mercer Street contract and located at 8th Avenue North and Roy Street. The TBM mined over 700 LF south through glacial marine and glacial lacustrine sediments. Retrieval of the TBM was made at the recently completed Lake Union Tunnel Regulator (LUTR) shaft located in the intersection of 8th Avenue North and Republican Street. The tunneling effort was successful although the first two concrete pipes had significant cracking and were replaced.

The second tunnel drive was the South Lake Union tunnel driven east from the East Portal to a temporary shaft located near the intersection of Valley and Terry. Numerous timber piles and some fill debris were expected along the 970 LF drive. At times during tunneling, the TBM seemed to mine through more timber than soil with shredded wood piling up at the slurry separation plant. In addition to the wood, fill debris including glass, railroad spikes, nails and other metal were also observed in the separation plant. All forward progress was halted as the TBM encountered the jet grout improved soil at the shaft. The retrieval of the TBM was made via hand mining horizontally from the shaft to the TBM and removing jet grout and timber piling from the remaining 12 feet. The TBM cutter face was destroyed, likely by an earlier boulder, and required substantial repair prior to mining the third tunnel run.

Following repairs, the third tunnel drive was driven about 760 LF east toward the retrieval shaft located at Valley and Fairview. At about

200 LF, granite fragments were observed in the separation plant and once again forward progress was halted. A TBM rescue shaft was placed over the TBM and quickly excavated through sandy soils down to 35 feet below grade. Sure enough, right in front of the TBM was a cluster of three boulders with the largest 40 inches in diameter. At no where else in the excavation was a rock larger than 3-6 inches. Following replacement of the cutterhead, mining resumed and retrieval was successful.

The tunnels of the SLUP project intersect with existing County and City trunk lines to capture storm overflows and route them for storage into the Mercer Street Tunnel.

By Joe Clare

Washington State Division of Geology and Earth Resources

The Division has recently released statewide liquefaction susceptibility and site class maps based on 1:100,000-scale digital geologic mapping. These hazard maps are provided separately for each of the thirty-nine counties in Washington state as both Postscript plot files and ESRI shapefiles. The liquefaction susceptibility mapping for much of the state was based on surficial geology, with previously published liquefaction susceptibility mapping in the Puget Sound region incorporated into the final maps. Over 500 separate shear wave velocity measurements were collected in nearly 40 different Quaternary units to support development of the site class maps. A statistical analysis of these data was made to determine the mean and lower bound (mean minus one standard deviation) shear wave velocities for these Quaternary units. Site classes were assigned based on the surficial geology and the statistical characterization of shear wave velocities. A more sophisticated approach was used in developing the earthquake hazard maps for Clark County. A detailed liquefaction susceptibility map was developed for the county using 1:24,000-scale geologic mapping, quantitative analysis of a large database of geotechnical borings, and incorporation of a shallow groundwater model in the hazard analysis. We developed a three-dimensional geologic model for Clark County using water well and geotechnical boring logs, and acquired

a large dataset of shear wave velocities for the geologic units occurring in this area. The final site class map was then based on computation of the average shear wave velocity in the upper 100 feet using the 3-D geologic model and the mean and lower bound shear wave velocities for the various geologic units in the study area. These maps can be accessed at <http://www.dnr.wa.gov/geology/hazards/hmgrp.htm>.

The Division continues to participate in the StateMap program, which provides federal support for 7.5-minute geologic mapping. Current mapping projects are located in Spokane, Port Townsend, and Olympia, and in the Coupeville-Oak Harbor area where the Devil's Mountain fault is projected to cross Whidbey Island. These new maps will be completed and released in early July 2005.

Other ongoing projects include publication of tsunami hazard maps for a Cascadia interface earthquake, location and evaluation of abandoned metal mines, and regulatory functions including enforcement of the Surface Mine Reclamation Act and oversight of oil and gas drilling. The Division is also producing landslide hazard zonation maps to be used by foresters and land managers in the identification of unstable landforms during both timber harvest layout and permitting processes.

By Steve Palmer

Washington State Department of Transportation (WSDOT) Geotechnical Division

The Geotechnical Division of the Washington State Department of Transportation (WSDOT) continues its work on many exciting and challenging projects of local and national interest.

Of principal interest to the geotechnical community is our recent completion of the WSDOT *Geotechnical Design Manual*. This "how-to" manual covers virtually every topic of geotechnical design from Anchors to Zero-air-voids and provides policy-level design methodology to engineers and geologists engaged in state highway work. The manual generally follows LRFD. Pending FHWA and internal-DOT review, the Manual should be available for public consumption in mid-2005.

Nationally, WSDOT continues to provide both staff and funding for a variety of research

studies. **Dave Jenkins** recently completed his chairmanship on the National Cooperative Highway Research Program (NCHRP) 24-11 project that produced guidelines for geofoam applications in embankments. The research report for this project provides valuable design information on the usage of geofoam blocks in embankments and can be downloaded at http://trb.org/news/blurb_detail.asp?id=4075.

Tom Badger has been working on a pool-funded research project to develop design guidelines for draped rockfall protection systems and continues to chair the TRB Committee on Engineering Geology. And, **Tony Allen** continues his involvement with AASHTO, recently finishing Chapter 10 of the LRFD Bridge Design Specifications, which should be issued by AASHTO in late 2005 or early 2006.

And finally, the Geotechnical Division continues to provide support on many exciting projects, a list that includes the final leg of the SR-18 widening project (Issaquah-Hobart Road to I-90), the North Spokane Corridor project, multi-modal ferry terminal projects at Anacortes and Mukilteo, Sound Transit HOV direct access projects, and a myriad of construction projects, including a few which didn't have any changed conditions claims.

By Dave Sowers

UNIVERSITY OF WASHINGTON GRADUATE STUDENT RESEARCH

Lindsay Baynes, a Master's student working with Professor Arduino, has just finished calibrating the parameters of a pressure-dependent material for the finite element analysis program OpenSees. She is now using the material to model free field liquefaction.

Changho Choi, has finished his PhD research to characterize three-dimensional behavior of gravelly soils. He now works with GeoEngineers in Tacoma.

Brian Collins, a Master's student working with Professor Holtz, investigated the influence of different geotextile separators on the long-term performance of pavement systems. He defended his thesis in August, and now works with the Montana Department of Transportation.

Michael Harney, a Doctoral Candidate working with Bob Holtz and Pedro Arduino, is studying the effects of stress path and soil properties on the deformation behavior of

cohesionless soils. He expects to graduate in June 2005.

Roy Mayfield will continue working on his PhD with Steve Kramer. Roy is developing a performance-based approach to liquefaction hazard evaluation that will integrate the seismic hazard over all return periods rather than limiting consideration to one or two return periods as is commonly done now. It will also improve the approach to ground motion characterization that will reduce the uncertainty and overconservatism that is often embedded in the commonly used "simplified" method.

Sarah Paulsen, a Doctoral student working with Steve Kramer, is looking at site response from a probabilistic viewpoint, specifically at the effects of aleatory and epistemic geotechnical uncertainties on damage to various types of structures. Her research includes the identification of intensity measures that correlate well to damage, and on new methods for expressing those intensity measures.

AREA FIRMS

AMEC

We are pleased to have **Deborah Ladd** recently join us at AMEC. Deb has been diving into review of ongoing hydrogeologic and slope stabilization projects, and starting some new ones. We were sorry to see **Jon Rehkopf** move to friendly competitors across the lake to shorten his commute; maybe two kids and a dog will make the suburbs look better! **Jess Abed** leads our geotechnical group, focusing on business management and marketing. **Steve Siebert** is working hard buttoning up housing projects for the season (paving in the rain). He is also working on the new Aberdeen High School. **Bill Lockard** started out the year characterizing borrow sources for the Sea-Tac Third Runway project. These days, he is residing at the Roosevelt High School renovation project. **Carolyn Anderson** and **Rob Richardson** mostly keep busy along the I-90 corridor, with projects from Seattle to Mercer Island to Issaquah Highlands. AMEC has completed design studies and is looking forward to providing construction support for Sound Transit, for the 5-mile Tukwila segment of the Central Link Light Rail project. Drilled shafts, driven pipe piles, spread footings with rock anchors,

stone columns, some artesian pressures. In addition to managing the Sound Transit work, **Jim Dransfield** has been working on that "interesting variety" of roadway, sewer, storm drainage, and landfill projects. **Jerry Ladd** has been our field geologist extraordinaire, getting to see a wide variety of Puget Sound soil and rock. **Todd Wentworth** has been busy with Sound Transit-related improvements to Southcenter Boulevard in Tukwila, Cama Beach State Park, roadways, retaining walls, and school projects. Todd and Jerry ran the Kirkland Triathlon in September, along with **Meg Strong** from our environmental department. Despite the cool temperatures, everyone finished with smiles and style. **Henry Brenniman**, our Alaska geologist, was last seen driving to a mine outside of Fairbanks. A few waterfront pile jobs await his return; we are sure he will be in a good mood. **Keith Schembs** and **Marlea Haugen** are busy with south-end projects from our Fife office. Keith started the year running borrow source studies for the Sea-Tac Third Runway. Correctional facilities, roads, and schools now fill their days. **Brad Hupy** and **Greg Rollins** keep busy in southern Washington out of our Portland office, with slope stability projects, piles inside and outside of buildings, evaluation of deep fill, the Vancouver Convention Center, and extension of TriMet Light Rail.

Anchor Environmental, L.L.C.

During 2004, the geotechnical group at Anchor Environmental was active in support of many projects for our Port and private sector clients around North America. The Anchor geotechnical group, consisting of **John Verduin**, **Michael Whelan**, **John Laplante**, **Rebecca Desrosiers**, and **Paul LaRosa**, has provided geotechnical support for clients in the Puget Sound, California, Great Lakes, Gulf Coast, and Northeast Coast regions. Locally, Anchor geotechnical engineers completed plans and specifications for landfill closures in Ferndale, a boardwalk and slope stabilization project in Bellingham, pier/bulkhead design and construction monitoring in Tacoma, and dredging and redevelopment projects for the Ports of Seattle and Tacoma. Verduin, Whelan, Laplante, and Desrosiers are located in Anchor's Seattle headquarters, while LaRosa provides engineering services for Anchor's Boston outpost. To learn more about Anchor projects,

services, and what's going on in the company, please visit us at <http://www.anchorenv.com>.

Associated Earth Science, Inc.

Associated Earth Science, Inc., (AESI) would first like to wish everyone a Happy New Year. 2004 was an exceptional year for AESI with many new exciting events occurring. We began the year by promoting **Jon N. Sondergaard** to Senior Associate Geologist. Mr. Sondergaard was also named to the Board of Directors for AESI. This year also produced a branch office, located in Everett, WA, headed up by our newest addition **Charles S. Lindsay**. Mr. Lindsay joined AESI as Principal Geologist/Hydrogeologist, and will be working mostly in northern Washington. **G. Aaron McMichael** and **Matthew A. Miller** have both been promoted to Associate this year as well. Associated Earth Sciences Inc. has a corporate office located in Kirkland, WA, with a branch office in Everett, WA. **Ronald A. Parker** is President, COO, and Principal Geologist, as well as on AESI's Board of Directors. Also on the Board of Directors is **Bruce L. Blyton**, Principal Engineer, **Curtis J. Koger**, Principal Geologist/Hydrogeologist, and **Kurt D. Merriman**, Principal Engineer.

Aspect Consulting

Aspect Consulting's staff continues to grow and enjoy easy access to the greater Seattle and eastside areas following the opening of their downtown Seattle office in 2002. The Bainbridge Island group has continued to see growth of their practice, which specializes in evaluation and development of geologically hazardous areas and shorelines. The Seattle office has been providing engineering geologic and hydrogeologic solutions for large civil municipal projects.

The geotechnical staff has been busy for the last two years with the Brightwater Conveyance and Treatment Plant Projects. **Dave McCormack** has been leading the geologic analysis for the 13-mile-long Brightwater Conveyance tunnel as part of the CDM team and working with the CH2M HILL treatment plant team on fault trenching and seismicity. **Tim Bartholomaeus** has provided geologic logging and aquifer testing on many of the 200 plus explorations and test wells completed for the

tunnel, and recently completed an analysis of boulder frequency in the tunnel geologic units using field studies and historical records. **Doug Hillman** is leading the groundwater program for the Brightwater tunnel project and is working closely with local water districts to address impact concerns. Doug has been assisted with evaluation of aquifer properties by **Ingrid Ekstrom** and **Joe Lubischer**.

Aspect has been improving the City of Bainbridge Island's critical areas ordinances and maps, and their ability to use the information to streamline their permit reviews. After compiling new information related to geologic hazards, GIS specialist **Greg Cocks** incorporated LiDAR topography with geologic maps to develop high-resolution delineation of steep slopes and geologic hazard areas. **John Peterson** used these improvements to draft revised critical areas ordinances and a decision matrix for City planners.

John Peterson and **Rob Cousins**, a specialist in development of steep slope and shoreline sites, just completed a landslide remediation that utilized a 60-foot-high vertical and sloped MRE buttress. Rob is also completing a law degree and plans to begin practicing geotechnical and water rights-related law. **Andy Peterson** has been performing geotechnical evaluations of sites throughout the West Sound area, as well as continuing his ongoing monitoring of groundwater conditions on the San Manuel Reservation in California. Monitoring is being conducted to evaluate impacts of the 6-mile-long Arrowhead East water supply tunnel under construction near the reservation. **Mark Shaffer** has been modeling impacts of the tunnel on the fractured rock aquifer and working to devise solutions to excessive groundwater inflow into the tunnel.

Boart Longyear

Boart Longyear continues to strengthen its position as an environmental and geotechnical leader in the Pacific Northwest with the acquisitions of Geo-Tech Explorations in January and Holt Drilling in October of 2004.

With immediate effect, Boart Longyear has merged the Washington operations of Geo-Tech Explorations with Holt Drilling in their new facility located in Fife, WA. The two are now operating as Holt Drilling, a Division of Boart Longyear.

"Holt Drilling adds a new dimension to our northwest operations and its integration with

Geo-Tech now makes us a full-service provider in this region,” says **Denis Despres**, Boart Longyear’s Drilling Services VP.

Serving the states of Washington, Oregon, Idaho, and Montana, as well as Alaska, Holt Drilling specializes in: mud rotary, hollow-stem auger, direct push, sonic, and pump services for the environmental and geotechnical markets. It also has cable tool, air rotary, dual rotary, pump, and development crews to meet the needs of the municipal and residential water well markets, to complete deep well and well point dewatering systems.

Owner and founder **Randy Holt** continues to lead the group as Division Manager. He says, “We’ve become a big company, but we still operate like a small one. Our drillers are prepared to go anywhere, any time.”

“We have more than 143 years combined drilling experience and can solve just about any problem in the field. Our drillers know how to get maximum production out of every rig, can operate around the clock, using the latest equipment, and are backed by a staff mechanic and a large stock of parts.”

“We look forward to the added drilling services resources, expertise, and support that Boart Longyear brings to the Northwest so that we can continue to meet our customers’ drilling needs.”

For further information, please contact:
Holt Drilling, a Division of Boart Longyear
253 883-5200 phone 253 883-5201 fax
www.boartlongyear.com
www.holtdrilling.com
www.geotechinc.com

CH2M HILL

CH2M HILL geotechs continue to support a wide variety of projects performed by our company, including transportation, clean and dirty water, waste cleanup and storage, industrial design, information systems, and planning.

Our proposed early 2005 operation of the firm wide Engineering/Procurement/Construction (EPC) Group, is evidence of the growing opportunities we are seeing to participate in design-build projects.

In our Seattle office, we’ve added Michel Bouchédid as a junior staff member. Steve Hunt, who has worked with us on the Milwaukee and various other tunnel projects, will be joining

our Milwaukee office as a nationwide tunneling resource in January 2005.

While a majority of our business continues to come from relatively small jobs (<\$100,000) some of the larger or more technically challenging projects include:

- Completion of the construction phase of the Cedar Water Treatment Facility, which we designed, built, and will operate for 25 years
 - EIS and design work on the 54 MGD Brightwater Wastewater Treatment Plant, which has included plans to reuse almost one million cubic yards of excavation on site and collaborative work with the USGS and several subconsultants to define new lineaments of the South Whidbey Island Fault.
 - Design and construction oversight of the Rocky Reach Fish Bypass (winner of the 2004 ACEC National Grand Award)
 - Design and construction assistance with the last segments of the Tacoma Second Supply, a 33-mile-long, 78- to 48-inch-diameter welded steel pipeline that includes 10 microtunnels as well as bore-and-jack crossings, buried pile-supported pipe, open-cut stream crossings, slopes as steep as 1:1, and construction of a large bentonite-amended mitigation wetland.
 - Innovative siting of an earthen dam and reservoir for the Sunnyside Valley Irrigation District, part of a \$60 M water conservation project
 - Dike removal to allow tidal flooding of over 500 acres on Smith Island in Snohomish County and other salmon habitat improvements.
 - Design of waste containment cells at the Hanford Reservation.
 - Project management for AASHTO NCHRP 12-70, a project involving the development of guidelines for the seismic design of retaining walls, slopes and embankments, and buried structures.
 - Senior oversight of energy facility siting projects for Exelon and TVA in Illinois and Alabama.
 - Participation in the PEER (Pacific Earthquake Engineering Research Center) on scientific advisory board, as well as on the board of directors for CUREE (Consortium of University for Research in Earthquake Engineering)
-

Condon-Johnson & Associates

Condon-Johnson & Associates (CJA) is a multi-disciplinary geotechnical contractor. Approximately 50 % of CJA's volume involves work as a specialty subcontractor in areas of its specific expertise. The remainder of its volume is made up from General Contracting but always on projects emphasizing its core competencies. These include Earth Retention (Shoring, Sheet Piling, and Soil Nailing), Drilled Shafts, Micropiles, Deep Mixing, Stone Columns, and Jet Grouting.

During 2004, CJA completed several major projects including Missile Silos at Ft Greeley AK, Drilled Shafts on Contract C700-Sound Transit, Drilled Shafts at Zig Zag, OR-ODOT, an Earth Retention project at Howard Hanson Dam – USACE, and a Test Section of Secant Wall for WSDOT at Blaine, WA.

In 2004, CJA welcomed several new employees. **Rowland (Rolly) Stow** joined us from AECOM to act as a senior project manager. Some of you may remember Rolly from his days as project engineer on the 76th to Island Crest Way project on Mercer Island in the late 1980s early '90s. In addition, we have taken on two newly minted UW engineers Todd LaVieille and Guy Fielding. Todd worked on our C700 project and now both he and Guy are involved in Contract C710 at Beacon Hill.

Current projects underway include a large Drilled Shaft Project at Maple Valley, WA administered by WSDOT, and a Micropile Project at Canyon Creek, ID - IDOT's first micropile project. In addition CJA is in Joint Venture with Soletanche, Inc. in undertaking Contract C710, a Sound Transit project on Beacon Hill with General Contractor – Obayashi. This project includes Slurry Walls, Conventional Shoring, Tiebacks, and Jet Grouting for the East and West Portals as well as the mined stations on top of Beacon Hill.

In 2005, CJA will start work on the Earth Work trade package of the 100% Baggage Handling Facility at SeaTac.

The Seattle Office continues to be managed by **Eric Dybevik** with assistance from **Ray McCorkle** and **Leo Stapleton** and **Rolly Stowe**. **Dominic Parmantier**, CJA's Geotechnical Manager, works out of the Seattle office and is currently seconded to the Seattle Office for the Beacon Hill Project. **Alan Macnab** is responsible for business development for all four of CJA's offices (San Diego, Los Angeles,

Oakland, and Seattle) and maintains his office in Seattle.

For additional information please feel free to contract us at: Condon-Johnson & Associates Inc, 651 Strander Blvd, Tukwila, WA 98188; 206-575-8248.

Or check out our new website at www.condon-johnson.com.

DBM Contractors, Inc.

Happy New Year to all and welcome to 2005! Here are some of DBM's highlights from the year passed and a look ahead for the year to come...

Lawrence Berkeley National Laboratory Molecular Foundry, Berkeley, CA-DBM completed permanent earth retention and drilled shaft foundations for Rudolph & Sletten at the new Department of Energy building located on the University of California at Berkeley campus. The earth retention system supported almost 23,000 square feet of excavation and the foundation system included 59 drilled shafts.

WYNN Resort and Casino, Las Vegas, NV-Marnell Corrao Associates contacted DBM to complete permanent soil nail walls for support beneath the nearly 120-ft-high MSE structure built to create a mountain on the property of one of Las Vegas' newest and largest hotel and casino complexes. The design of the mountain and soil nail walls was completed by Golder Associates Bellevue, WA office.

Washington Mutual Tower, Seattle, WA-Contracting with Sellen Construction of Seattle, DBM completed the nearly 90-ft-deep excavation support system for the below grade parking structure of the new tower. The shoring system spanned nearly 62,000 square feet, including supporting the area way walls in the basement of the existing building, and provided underpinning support of the existing Seattle Art Museum foundations.

2200 Westlake, Seattle, WA-DBM contracted with Turner Construction to complete the temporary excavation support system for the new building. The shoring system supported 54,000 square feet and extended up to 53 ft. deep.

In 2005, DBM is working with Kiewit Construction on drilled shaft foundations at Hood Canal Bridge near Poulsbo, WA; and the H1-H3 Bridge Retrofit in Honolulu, HI. In Portland, OR, DBM is completing a micropile retaining wall for Mowat Construction on the US

26-Cornell Road project. The micropile wall concept is a design/build value engineering alternate to the secant pile wall designed by Oregon DOT.

This year, DBM is scheduled to provide drilled shaft foundations and temporary excavation support on Sound Transit contracts C710 and C510, respectively. We will also be completing large micropile projects at the Laguna Honda Hospital Replacement in San Francisco, CA, and at The Venetian Hotel and Casino in Las Vegas. Our design/build services will be taking us to Southern California for installation of temporary and permanent earth retention systems.

From our family here at DBM, we wish you all a healthy and prosperous year to come!

Durham Geo Slope Indicator

Durham Geo Slope Indicator continues to provide Geotechnical and Environmental products throughout the US and abroad. We welcome 3 new additions to our domestic sales staff: Lisa Miller in the Central US, David Stein in the Midwest, and John Pecha in the Northeast region.

Simon Cornwallace has been promoted to Director of Operations of our Geotechnical division in Mukilteo, Washington. Ronda Benbrooks remains the technical and customer service contact. She can be reached at the factory at (425) 493-6200.

The Slope Indicator family would like to thank everyone for their support during the loss of our dear friend Bob Kenly.

Earth Consultants, Inc.

Earth Consultants, Inc. (ECI) is looking forward to its 30th anniversary in 2005. Therefore, this year's Groundhog submission will begin with a short summary of ECI's history. ECI was founded in August 1975 when **Robert (Bob) Levinson** purchased the assets of GEOLABS Washington. By 1999, ECI had grown to about 30 employees and was approached by U.S. Laboratories for acquisition. In 2001, Bob retired and minority owner, **Kyle Campbell**, took over as Principal in Charge. Since our acquisition by US Laboratories, ECI has grown to more than 45 employees.

Kyle Campbell has been very busy overseeing the company's daily operations and is currently working on several large warehouse

developments in Kent and Sumner. **Ray Cogas** is continuing to function as Manager of Geotechnical Engineering Services and is overseeing several large residential tracts in Snohomish County, the Bellevue Marriott, and completion of the INS Building in Tukwila. In May, **Scott Dinkelman** was promoted to Principal. Scott continues to work on many geotechnical and hydrogeologic projects, including the Kent Station retail development, large residential tracts in Snohomish, Pierce, and King Counties; the Seattle Costco No. 1 rebuild; and a large warehouse development in Sumner. **Kris Weller** worked on a variety of residential projects including the development of housing units at the Rainier Vista Hope VI development for Seattle Housing Authority, which will start renting units in early 2005. She also oversaw the geotechnical aspects of the construction of the Muckleshoot Clinic and Wellness Center on the Muckleshoot Reservation south of Auburn, scheduled to open in 2005. In March, **Steve Swenson** and **Eric Woods** were promoted to staff geologist and along with **Mitch McGinnis** and **Scott Riegle**, provide excellent field exploration and support on all of our projects.

Although ECI has offered environmental/hazardous waste services for the past 15 years, this division has predominantly been a support service for our geotechnical division. In 2004, we implemented a plan for growth, and ECI began actively seeking environmental personnel who could maintain and develop future opportunities. **Richard N. Simpson** and **Amanda Cote** were brought on in June to take on this challenge. Richard has been involved in several independent cleanup actions including the cleanup of soil and groundwater impacted by a substantial release of gasoline from a leaking, unregulated farm tank. Amanda has been responsible for large and small-scale Phase 1 and Phase 2 investigations of commercial, light industrial, and residential properties. Recent projects included the Laurelhurst residential development in Renton and a soil characterization study at Othello Station in Seattle. Thus far, they have more than doubled our environmental division billings and continue planning for future growth.

GeoEngineers

GeoEngineers continues to grow and diversify its staff with exciting new hires and

expansion of its offices and services. In October 2004, GeoEngineers acquired Advantage Professional Services, Inc. (APSI) of Springfield, Missouri, which specializes in horizontal directional drilling. The acquisition brings a strong client base in oil and gas markets and positions GeoEngineers in the Midwest. By acquiring this firm, GeoEngineers continues a dedicated drive to enhance services to its clients and expand to national and international markets.

We are experiencing continued success and recently hired several new geotechnical employees. They include: **Andrew Fiske**, Tacoma, Staff 2; **Ian Hunter**, Redmond, Staff 1; **Changho Choi**, Tacoma, Staff 1; **David Lauder**, Spokane, Staff 2; **Slobodan Zemva**, Bellingham, Project 2; and **Byoungjae Mun**, Tacoma, Staff 1.

GeoEngineers also is pleased to announce the following geotechnical employee promotions: **Teresa Dugger**, Tacoma, promoted to Project 2; **Dave Phelps**, Tacoma promoted to Senior 2; **Tracy Drury**, Bellingham, promoted to Associate; **Kimball Olsen**, Redmond, promoted to Staff 3; **Gordon Denby**, Redmond, promoted to President; **Eric Heller**, Tacoma, promoted to Staff 2; **David Winter**, Seattle, promoted to Regional Manager; **Aaron McCain**, Bellingham, promoted to Project 1; **Matt Smith**, Redmond, promoted to Senior 2; **King Chin**, Seattle, promoted to Project 1; and **Bob Metcalfe**, Everett, promoted to Associate.

Congratulations to our newly registered engineers: **Tracy Drury**, Bellingham; **Boyd Benson**, Redmond; and **Mark Miller**, Redmond.

We are proud to provide geotechnical engineering services for major clients in Puget Sound including U.S. Navy, U.S. Air Force, Army Corps of Engineers, U.S. Coast Guard, WSDOT, Puget Sound Energy, State of Washington Department of Fish and Wildlife, local cities, counties, and ports and many more. GeoEngineers' staff wishes you a happy and prosperous 2005.

Geopier Foundation Company Northwest

Geopier Foundation Company Northwest worked closely with local geotechnical and structural engineers this past year on numerous projects in Washington. The Geopier soil reinforcement approach was used in applications to support building foundations,

floor slabs, tanks and MSE walls. Projects completed in the Puget Sound area consisted primarily of schools, retail, hotels, industrial, and healthcare.

The Geopier approach was used to support foundations and floor slabs for a large manufacturing building at the Delta Marine facility on the Duwamish. The site is underlain by highly compressible organic soils. Geopier elements were placed on a grid spacing of about 7 feet on-centers beneath the slab area to support the heavy wheel loads (300 kips). Finite element studies were conducted to evaluate the distribution of the stress through the floor slab and base rock section to the Geopier elements. About 900 Geopier elements were installed within a 2-week period.

The Geopier approach was recommended by Associated Earth Sciences for support of an athletic field constructed on an elevated deck at Mt Si High School in Snoqualmie. The elevated deck was required to establish the field above flood levels. The Geopier reinforced soils supported moderate column loads in deep alluvial soil deposits, and replaced the need for long piles.

Geopier Foundation Company Northwest completed projects outside of the Washington area including a hotel in Salt Lake City, where the Geopier approach provided foundation support and was used to mitigate liquefaction, a large retail facility in Boise, and a Nevada State Office Building in Carson City.

Geopier Foundation Company is a subsidiary of Tensar Earth Technologies and has teamed with Tensar on many wall and geogrid applications. Geopier soil reinforcement beneath an MSE wall reduces settlement and enhances the global stability.

Golder Associates

Golder Associates Inc. had a very productive 2004 and we are looking forward to a busy 2005. Golder continues to grow and has added 20 new staff members to our Redmond office. The additions to the engineering staff include: **John deLaChapelle**, Project Geologist; **Chris King**, Project Engineer; **Scott Zajac**, Project Engineer; **John Zarling**, Staff Engineer; **Marketa McGuire**, Water Resources Engineer; **Dave Bennett**, Field Technician; and **Kirsi Longley**, Field Technician. In addition, **Tim Martin**, Associate Geotechnical Engineer, joined our Coeur d'Alene office from Golder's

Richmond, Virginia office, and **Aaron Fox**, Project Geologist, returned part-time as he completes his master's thesis. Staff was also added to our geophysics, geomatics (CAD/GIS/Graphics), and environmental groups.

Golder was honored with several awards this year, including: ACEC Washington Gold Award for Sculpting with Shotcrete Along Provo Canyon SR 189, Provo, Utah; Washington CEO 7th Place for Best Companies to Work For in Washington State in the medium-size companies category; Northwest Construction, 16th Place in Top 50 Design Firms; CE News 25th Place in Top 50 Best Firms to Work For; and ENR (Engineering News-Record) magazine 25th Place in Top 200 Environmental Firms. Golder has also had two submissions accepted to the 2004 ACEC Washington Outstanding Project Awards, and we are eagerly awaiting the results.

Golder has had lots of people in the news this year, including **Andreas Kammereck**, who published an article on channel migration and redefining floodplain hazards titled "Changing Course" in the June 2004 Civil Engineering magazine, and **Colby Caywood**, who published "State-of-the-art Technology Meets Wet Season Erosion Control" in the November 2004 Buildernews magazine. **Scott Zajac** was named Program Chair for the ASCE Seattle Section Geotechnical Group and he organized the 2004 Geotechnical Group Field Trip.

Golder is pleased to announce the following promotions: **Steve VanShaar**, promoted to Staff Engineer; **Joe Schrank**, promoted to Project Engineer; **Cathy Smith**, promoted to Senior Engineer and made an Associate; **Hank Swift**, promoted to Senior Engineer; and **Andrew Walker**, promoted to Senior Consultant. **Cathy Smith**, has also recently taken over Group Leader responsibilities for the engineering group, which gives **Jim Johnson** more time to develop clients and manage projects. Congratulations to **Mike Mengelt** on getting his Professional Engineering License, and we wish him well while he is on a leave of absence in Finland.

Golder's action-packed year included a variety of challenging projects. These included: extensive construction and design support on the Le Reve Mountain for the new Wynn Resorts Hotel and Casino in Las Vegas; the HDD geotechnical feasibility evaluation, geohazards investigation and stream crossing erosion and scour assessments for the Capacity Replacement Project for Northwest Pipeline

Corp.; investigations and design for the cleanup of the White King Superfund site in Lakeview, Oregon; investigation of channel migration on the Methow River in Okanagon County, Washington; continued construction and design support for Sound Transit; geotechnical support for PSE pipelines and transmission lines; continued construction and design support for the Talus Project in Issaquah; and many CEVP projects for our risk analysis group, including Phoenix Light Rail, Ground Zero in New York City, Magnolia Bridge, and continued support for WSDOT.

Golder is proud of our accomplishments during 2004 and we expect a great 2005. Our entire staff wishes you a happy and successful New Year.

Hart Crowser

Hart Crowser's geotechnical group enjoyed a busy and successful year in 2004 while celebrating our 30th anniversary. We continue to be involved with a number of high profile projects throughout the Puget Sound area. Recent projects include deep excavations, high-rise buildings, seismic studies, embankments, bridges, dams, peer review, expert witness, and mine closures.

Jeff Wagner, the geotechnical division manager, is the project manager for the Port of Seattle's design study for the recently announced roadway segment to Sea-Tac Airport, and has also been the lead on a number of projects in Bellevue. **Doug Lindquist** has been busy as this year's President of the ASCE Seattle Section Geotechnical Group and was the project manager for the Washington Mutual – Seattle Art Museum office tower, which included one of the deeper building excavations in Seattle (90 feet deep). **John Bingham** led the geotechnical design work for the Seattle Art Museum's Sculpture Park, which used the soils from the office tower excavation to achieve the design grade. **Reda Mikhail** continues to lead our California design work and was the geotechnical project manager during construction of the 2200 Westlake mixed-use development. **Matt Gibson**, a California transplant at the senior staff level, has been critical to our design work in California and has been doing FLAC and soil nail design locally.

Garry Horvitz continues to secure and manage a variety of interesting projects with private developers, local ports, and the military.

Mike Bailey is heavily involved in a number of multidisciplinary projects including Holden Mine and the Josephine Mill Site, while he continues to lead our Third Runway construction support team. Mike and Jeff have also led our mine reclamation efforts in a very busy year for us with the Office of Surface mining. **Alison Armstrong** has been instrumental to completing a number of those mine reclamation projects.

Hart Crowser has continued to hire top University of Washington geotechnical students with this year's addition of **Ben Upsall** and **Armin Stuedlein** at the senior staff level as no exception. We also welcome the addition of **Angela Michniewicz** out of the University of Illinois as a staff level engineer. With our new additions, we have a great group of 12 geotechnical engineers including CEO **John Crowser**.

Our workload looks very strong and we're excited about the prospects for the upcoming year.

Jacobs Associates

Underground engineering and tunneling specialists Jacobs Associates' Seattle office saw another technically challenging, professionally fulfilling year in 2004. Less than a year after establishing our office, first in temporary space at HDR in Bellevue, and then on 1st Avenue in Seattle, we were awarded a firm-wide milestone design project: In a joint venture with MWH, we signed a contract with King County DNRP, Wastewater Treatment Division, for final design and services during construction for the Brightwater Conveyance. Previously, we led the shaft and tunnel design as a sub to HDR Engineers during the pre-design process. The Brightwater project consists of some 15 miles of various-diameter wastewater conveyance system that will connect the new Brightwater Treatment Plant to an ocean outfall. The construction costs for the conveyance tunnels are estimated to be \$365 million.

We opened the office with Principal **Dan Adams** and Staff Engineer **Jeremy Johnson**; subsequently, our staff expanded to include Senior Associate **Carl LaFraugh**, who rejoined Jacobs Associates to lead the office's construction claims services, and **Monica Stary**, who brought us experienced project administrative support and is the exuberant voice of JA Seattle. Next, Senior Engineer **Gregg Davidson** joined us from the massive

Lesotho Highlands Water Project in Africa; and **Ben Constable** joined us from Kiewit Pacific Construction Co. Principal **Bill Edgerton** relocated from San Francisco to be project manager for Brightwater. **Ben Piermattei** joined as a staff engineer and Senior Engineer **Mark Tilley** and Senior Engineering Geologist **Isabelle Lamb** relocated from San Francisco. Associate **Mark Havekost** relocated from San Diego after completing an assignment on a previous JA-wide milestone project, the San Vicente to Second Aqueduct Tunnel. During the second half of 2004, Engineering Geologist and the Portland West Side CSO Tunnel CM Project Photographer **Sue Bednarz** joined the Pacific Northwest staff. She and **Mark Havekost** work from the recently established Portland office. In September, Structural Engineer **Andrew McGlenn** joined us from KPFF, and Senior Engineer **John Giaudrone** joined the JA staff on the Brightwater project.

Jacobs Associates personnel in Seattle and Portland are currently providing engineering services on the following representative projects: Port of Seattle Fisherman's Terminal Utilities; Second Narrows Water Tunnel - Burrard Inlet Crossing in Vancouver, BC; Port of Tacoma's Blair Waterway HDD project; Sain Creek Tunnel, HDR Engineering; Northern Diversion Sewer, Melbourne, AU; RAV Rail Transit Extension, Vancouver, BC; and Portland's West Side CSO Supplemental CM, for the Bureau of Environmental Services.

Kleinfelder

Kleinfelder's Washington Geotechnical group experienced significant growth in 2004. Squire and Associates, of Portland, joined Kleinfelder's family and increased our Washington and northwest geotechnical groups by more than 20 staff. Kleinfelder's Bellevue office grew with the addition of: **Kevin Roth**, Staff II Geologist; **Ian Lavielle**, Geotechnical Professional II; **Richard Howard**, Geotechnical Professional; **Charles Mlodzik**, Construction Services Manager; **Mary Ann Carlson**, Business Development; and **Gee Haire**, Project Manager.

We have been fortunate to be a part of many very exciting local projects including The Seattle Monorail, South Bellevue Community Center, Sound Transit Central Link and Tacoma Light Rail, WSDOT Unstable Slopes On-Call,

Safeway Distribution Center, Saint Anthony's Hospital, Sammamish City Hall and Commons, York Bridge, Auburn C Street Realignment, Paine Field Improvements, Whatcom County Bridge 115, to name a few.

Other exciting changes include our local office growth into Canada, which currently involves seven projects from private clients throughout BC and Alberta. As part of this initiative, **Jim Schmidt** (Senior Engineer) and **Bill Gates** (Principal) have obtained their P. Eng. licensure in the western provinces. Management of the Department of Homeland Security's Infrastructure Improvements contracts continue to be managed locally by **Jim McElroy** (Geotechnical Division Manager), which involves our local staff on numerous projects throughout the U.S.-Mexico border states. Recent promotions include **Brendan Fisher**, Project Engineer, and **Frank Reinart**, Staff Engineer.

Have a wonderful and successful 2005!

Krazan & Associates, Inc.

Krazan & Associates, Inc. has seen growth in all aspects of our business during 2004 and based on what we are seeing during the final days of the year we are anticipating an equally promising start to 2005. Krazan's primary focus of services, since starting operations in the Puget Sound Region during the early to mid-1990s, has been in the construction testing and inspection realm. Our firm also provides the full scope of geotechnical and environmental services and we have begun to see these divisions blossom during the last one to two years.

Our geotechnical/environmental division manager for Seattle and the east side is **Sean Caraway**. The geotechnical/environmental division manager for the Kitsap Peninsula area is **Wes Johnson**. Our senior geotechnical and environmental staff include **Chris Behrens**, **Don Balmer**, and **Phil Haberman**. Chris and Phil manage many of our geotechnical projects and **Don Balmer** manages our environmental studies. Our principal engineer, **Dean Alexander**, from our corporate office in Clovis, California, is also involved with many of our geotechnical and environmental projects in Washington and Oregon. Mr. Alexander is a registered professional engineer in California, Washington, Oregon, and several other states.

Our construction testing and inspection division continues to grow, as well. This division

includes WABO/ICBO-licensed inspectors who can cover all aspects of the construction process from the geotechnical special inspections through completion of the structures. Our construction testing and inspection services division is managed by **Jeff Mercer** in our Woodinville, Washington office.

In addition to our traditional geotechnical, environmental, and construction testing and inspection services, we have developed a division devoted to specialty testing and forensic evaluations. This division is managed by **Mark Liebman** who joined Krazan in October of this year. Mark specializes in non-destructive testing for forensic evaluation of structural distress.

We have definitely witnessed expansion of our local personnel in 2004 and we look forward to another successful year and continued growth during the coming year.

LACHEL FELICE & Associates

C. Felice & Co., a Seattle-headquartered geotechnical consulting firm specializing in structural foundation engineering for bridges, merged with Lachel & Associates. Lachel is a geotechnics and underground structures firm based in Golden, CO, and has been in business for nearly three decades. The new firm is LACHEL FELICE & Associates (LF&A). **Dennis Lachel** is chief executive officer and is based in Golden. **Dr. Conrad Felice** is president and is based in Seattle.

LF&A is an underground engineering, deep foundation, and geotechnical design firm headquartered in Golden, CO, with offices in Atlanta, GA; Morristown, NJ; Occoquan, VA; Columbus, OH; Las Vegas, NV; and Kirkland, WA. The company specializes in tunnel design, drilled shaft design, advanced structural and geotechnical designs, numerical modeling services, and construction engineering.

LF&A named **Ken Faught** area manager in our Seattle office. Ken works on drilled shaft integrity testing, construction engineering, and marketing. He has 35 years experience and has completed projects in 6 countries and 30 states.

Congratulations to **Tim Kovacs** who recently became a professional engineer in the state of Washington. Tim is the firm's expert in finite element analysis and cross-hole sonic logging testing and analysis.

LF&A's current projects include the Big Walnut Augmentation Rickenbacker Interceptor (BWARI) Tunnel Project and the Big Walnut

Outfall Augmentation Sewer Part II in Columbus, Ohio; the I.H. 635 (LBJ Freeway) West Section - Managed HOV/Toll Lanes in Dallas, Texas; the Little Walnut South & Shoal Creek Tunnels in Austin, Texas; numerous Cross-hole Sonic Logging (CSL) testing projects for state transportation departments; as well as Expert Witness Testimony for construction claims.

LF&A staff continues to strengthen with the recent addition of **Mark Rohrbach**. Mark has more than 5 years of engineering and site assessment experience. Mark is a registered professional engineer in both Washington and California and is the president-elect of ASCE's Seattle Section Geotechnical Group. Recently, Mark was appointed an officer (Second Lieutenant) in the US Army Reserve and will be assuming command of an engineering company in Yakima, WA. Mark brings strength to the firm in the areas of site assessment, slope stability analysis, deep foundations, marine foundations, construction engineering, geosynthetics, and earth-retaining systems.

LF&A had a very productive 2004. Looking forward, 2005 promises to be even busier for LF&A as we continue to serve our clients, pursue new work, and experience steady growth.

Landau Associates

At Landau Associates, we experienced continued growth and enjoyed working on some challenging and exciting projects in 2004. We also welcomed staff additions in each of our offices. **Michelle Ramos**, senior project geotechnical engineer, and **Dana Olcott**, staff geotechnical engineer, joined our Edmonds office, and **Dwight Smith**, geotechnical technician, helped our staff as a summer intern. In Spokane, **Ryan Reich**, staff hydrogeologist, returned to the firm after pursuing construction management studies at Eastern Washington University. **Robert Bennion**, assistant geotechnical engineer, joined our Portland office, and **Brian Bennetts**, staff geotechnical engineer, transferred from our Edmonds office to our Tacoma office. **James Wilson**, senior staff engineer in Tacoma, successfully passed his P.E. exam.

Ongoing work on the King County Brightwater Conveyance System geotechnical engineering services contract has kept several of our geotechnical engineering personnel busy

including **Ed Heavey**, **Brian Christianson**, **Dennis Stettler**, **James Wilson**, and **Mike Buckley**. Work continues for **Paul Ford** and others on Seattle Public Utilities' Cedar Moraine safety studies. **Steve Wright** kept busy working on the Granite Falls alternative route and a variety of other transportation projects. **Dave Pischer** continued work on the Gate 2 Boatyard project in Bellingham and the North Bay Development Plan in Seattle. In Portland, **Dave Thielen** completed the construction observation for the Peterkort Center III, and continues to support projects for clients such as Home Depot and PacifiCorp. Our Tacoma staff have been busy with a wide variety of projects throughout the area, including new sewer pipelines for the City Tacoma, one with a microtunnel beneath I-5; a major utility crossing of the Blair Waterway to be constructed by HDD; several roadway improvement projects in Tukwila, Thurston County, and Pierce County; and an infiltration study for WSDOT for the I-405 project. **Tom Briggs, P.E.**, in our Spokane office continues to perform geotechnical and environmental on-call services within the North South Freeway (SR 395) corridor for WSDOT.

Looking ahead in 2005, we are excited to work with some of the best clients in the northwest and strive to continue challenging our technical staff with interesting work in a collegiate, congenial environment. We are seeking to add more excellent staff to our group at all levels and encourage you to contact any of the staff listed to discuss your potential employment with Landau Associates.

Milbor-Pita & Associates

Milbor-Pita & Associates, based in Woodinville, WA, is celebrating 10 years of geotechnical and tunnel engineering service to our clients in the western United States. Our key clients include national and regional railroads. We have major tunnel rehabilitation projects in Los Angeles, San Francisco, Wyoming, Oregon, and Washington State, and embankment stabilization projects in Utah and Nevada. Locally, we are working on projects associated with Sound Transit; the Cities of Kent, Seattle, and Bellevue; and dewatering and shoring design. We currently have a professional staff of six having chosen to remain 'lean and quick'. Recently we have added WSU graduate, **Scott Pita**. Scott is currently monitoring the installation of soldier piles in

Tacoma and will be resident engineer on several scheduled tunnel rehabilitations.

In September, **Gerry Millar** presented a paper at the AREMA conference in Nashville on the upgrade and repairs to Tunnel 26 on the Metrolink line in Southern California. This work involved the installation of tieback anchors to control lateral movement in the tunnel wall and the complete track structure overhaul to improve track stability. To control water, sumps were installed every 100 feet through the majority of the tunnel. It has been in service for over 2 years and is performing well.

Matt Needles has been Resident Engineer for the re-mining of the collapsed tunnel at Siskiyou Summit, OR. The 3107-foot-long, wood-lined tunnel began burning 17Nov03, resulting in a near total collapse of the tunnel. The site geology is complex, requiring a combination of shotcrete and steel sets to advance. 'Hole through' is scheduled for Feb05.

Carol Ravano, geotechnical engineer, has been working both locally and traveling extensively. Carol, a San Francisco native and Berkeley graduate, is spending two days a week monitoring the shotcrete and grouting operation on a tunnel rehabilitation project in her hometown. Carol says, "Mom is so glad to have me come home for short visits and proud that I am finally using my engineering education."

Maureen Kwolek and **Frank Pita** are both saving the world from 'wet basements', and they continue to monitor the condition of the Great Salt Lake Causeway from both a hydraulic and geotechnical standpoint.

Milbor-Pita has had a great year and anticipates the same for 2005.

MWH Americas

MWH wishes everyone a happy and successful New Year! The MWH construction management team is looking forward to the early 2005 completion of King County's Lake Union / Denny Way CSO project. December marked the completion of the South Lake Union Pipeline (SLUP) contract. The SLUP contract consisted of three 72-inch ID micro-tunnel drives totaling over 2,400 LF, five below grade structures, and 240 LF of open cut 60-inch ID pipeline. Tunneling in the South Lake Union neighborhood was found to be difficult at best with timber piling, fill, and boulders. Nearing completion is the pump station contract, Elliott West CSO Facility, representing the final of five

construction contracts. Three other contracts previously completed included the Mercer Street Tunnel, Marine Outfalls, and Elliott West Pipelines. The system should be online early spring in time to accept, store, and treat storm overflows. The CM team consists of **Joe Clare**, **Mario Serra**, **Scott Radford**, **Kristina McLean**, and **Alisha Langston-Bond**.

The design of King County's Brightwater Conveyance system is underway with the MWH / Jacobs Associates Joint Venture. The conveyance system is split into the West, Central, and East Tunnel segments for design and construction. Currently the East Tunnel, routed from North Creek to the Treatment Plant, is at the 60% design stage. **Bill Edgerton** of Jacobs is the Project Manager and **Bill Cranston** of MWH is the Deputy Project Manager for the JV.

MWH is looking forward to the reservoir-covering project for Seattle Public Utilities. The phased project will consist of covering existing open-air reservoirs located at Maple Leaf, West Seattle, Beacon South, Myrtle and Roosevelt. **Greg Harris** is the project manager.

Last year marked the completion of the Clearview pipeline project for the Alderwood Water District. The pipeline consisted of a 60-inch ID micro-tunnel under the Snohomish River. Construction Management of the pipeline was lead by Dan Williams.

MWH Constructors was recently chosen as the builder for Tacoma's wastewater treatment plant expansion. The project will be lead by **Garry Wohlgemuth**.

In 2004, MWH welcomed **Michael Bruen** as the Business Unit Leader for the Seattle office. Mike comes from the Chicago area where MWH worked on the Chicago CSO Tunnel and Reservoir project (Tarp).

Northwest Cascade

The Geotechnical Division of Northwest Cascade (NWC) enjoyed a busy and successful year. Projects in Nevada, Alaska, and Montana combined with the Pacific Northwest and California put NWC drilling crews in seven western states during 2004.

After almost a year of construction, NWC moved into a new building, constructed on the same 30-acre property that the company started on in 1970. This expanded facility helped provide room for two new employees to join **Spark Johnston** and **Doug Watt** in the

geotechnical branch. **Tyson Welker**, a civil engineering graduate from St. Martins College, is now in the office full-time as a Project Engineer. **Paul Rodriguez**, a business major from Central Washington University, has been added as an Assistant Project Manager after two years of field training.

Some of the interesting projects performed in 2004 included:

- Children's Hospital Ambulatory Care Building – Micropiles, Drilled Shafts, Soldier Piles and Tiebacks in Seattle
- Swan Lake to Lake Tyee Intertie – 2200 Micropiles for Power Line Foundations in Ketchikan, AK
- Portland Art Museum – Micropiles, Underpinning, and Temporary Shoring in Portland
- Shaw Island Ferry Terminal – Micropiles and High Capacity Tiedowns in the San Juan Islands
- Friday Harbor Ferry Terminal – Micropiles in the San Juan Islands
- Rieschel Residence – 110-foot-long Rock Anchors in Big Sky, MT
- Olympic Pipeline – Permeation Grouting in Arlington, WA
- University of Washington, Johnson Hall – Micropiles in Seattle
- Portland Center Stage Armory – Design Build Soldier Pile Tieback Shoring and Micropiles in Portland
- Henderson ML King CSO Project – Soil Nailing and Compaction Grouting in Seattle
- East Valley Lateral – Permeation Grouting ahead of Tunnel Boring Operations in Las Vegas, NV
- Rock Island Sloop Stage 2 – Permanent Soil Nail Shotcrete Wall in Wenatchee
- White Pass Fill Erosion – Permanent Ground Anchors on White Pass
- Bellevue Direct Access – 480 Temporary Tiebacks and 210 Permanent Tiebacks in Bellevue

NWC looks forward to another busy and exciting year in 2005.

PacRim Geotechnical Inc.

PacRim Geotechnical Inc. is pleased to announce that **Barry S. Chen** recently joined our Seattle office as a principal. **Gary Sandstrom** joined the Portland office as a

senior geologist, and **Mary Stiehler** joined the Seattle office as a project geologist. PacRim currently has a total staff of 13 and is working on City of Seattle Joint Training Facility, Sound Transit Federal Way Transit Center, Sound Transit Beacon Hill Tunnel Instrumentation Installation, City of Portland Eastside CSO, and ODOT Sutherlin-Roseburg Design-Build Bridges.

PanGEO

PanGEO enters its sixth year following a very successful and productive 2004. The company continued the trend of steady and consistent growth and the year 2005 promises more of the same. As we begin the new year, we are excited to announce the addition of **Jon Rehkopf** to the PanGEO family. Jon comes to PanGEO after more than six years at AMEC's Kirkland office. Jon completed a Master of Engineering Degree in Geotechnology from the Massachusetts Institute of Technology in 2001, and has functioned as a design engineer on projects of varying size and complexity, including the Sound Transit Light Rail segment D755. With the addition of Jon, PanGEO now has a staff of eight, including five registered professional engineers, one licensed engineering geologist, and one staff-level engineer.

PanGEO is pleased to recognize the accomplishments of **Tiffany Adams**. Tiffany is a Project Engineer at PanGEO and was one of five engineers nationwide to share the Edmund Friedman Young Engineer Award for Professional Achievement. The Friedman award is bestowed on younger members of ASCE (35 years of age or younger) who are judged to have attained significant professional achievements by virtue of their technical competence, high integrity, and service to the public. Tiffany is the outgoing President of the ASCE Seattle Section YMF.

PanGEO is also pleased to recognize our company President and one of our Principals, **Paul Grant**. In addition to his responsibilities at PanGEO, Paul is the 2005 President-Elect of the Seattle Section of ASCE.

PSI

PSI is proud to announce that we made three additions to our geotechnical and environmental services staff during 2004. **Terry**

Parks recently joined PSI as our Senior Vice President, overseeing operations in the Pacific Northwest. Terry is a geological engineer specializing in remediation of soil and groundwater contaminated by hazardous substances. He has more than 17 years of experience providing environmental services at a variety of sites throughout the Pacific Northwest, including rail yards and fueling facilities, service stations and bulk fuel facilities, former explosive plants, aerospace manufacturing facilities, military bases, and other industrial sites. **Tom Records** is also a new addition. He graduated in 2002 from Central Washington University with a Bachelor of Science degree in geology with a minor in geography. He is currently working as an environmental specialist on the Howard Hansen Dam project. Terry and Tom operate out of our Tacoma office. Transferring from our Portland office to Seattle is **Wayne Wolfe**. Wayne is a civil engineering assistant and special inspector with over 6 years of geotechnical experience. He has Associates degrees in civil engineering technology and building inspection.

PSI saw continued growth in our geotechnical, environmental, and special inspection services throughout 2004 and expects even greater growth in 2005 and beyond. Some of the more challenging projects that we have worked on this past year include an addition to the First Savings Bank of Renton, renovations to Totem Lake Mall, a new television antenna on Orcas Island, a mixed use project in Ballard, and a new Costco Warehouse in Woodinville. PSI is also looking forward to ground breaking on the Seattle Monorail project.

Finally, the Seattle office is starting the New Year in new surroundings. We recently moved to 24113 56th Avenue West, Seattle, WA 98043-5503. Our new phone numbers are V: 425-248-2400 and F: 425-248-2401. Our geotechnical testing capabilities in our new laboratory include triaxial compression, hydraulic conductivity by flexible wall permeameter, Los Angeles degradation, direct shear, and consolidation.

Shannon & Wilson, Inc.

Shannon & Wilson reached a milestone this year – as the firm celebrated 50 years providing geotechnical services from its Seattle office, 2004 proved a year of reflection.

In the course of fifty years' work on projects, Shannon and Wilson's contributions have benefited both the economy and the actual physical shape of the city. Pan across the Seattle skyline or sail alongside the waterfront, our geotechnical footprints are at the base of many notable landmarks – Safeco Field, Seahawks Stadium, Columbia Seafirst Center, the new Seattle Civic Campus (Justice Center and City Hall), the Seafirst Bank Building, Rainier Tower, One & Two Union Square, the Convention Center and its recent expansion, Pacific Place, EMP, Terminal 46 (and nearly every other Port of Seattle facility), Colman Dock, the Seattle Seawall – these are but a few of the projects we've been involved in over the years, and the most visible evidence of our work.

But it's not only buildings that shape our city, and from the earliest studies in the 1950s for the Seattle-Tacoma Toll Road (precursor to I-5), to design of retaining walls holding back Capitol Hill from the I-5 corridor running through downtown, to our current work on the team developing alternatives for the replacement of the Alaskan Way Viaduct, Shannon & Wilson geotechnical and environmental studies and design have influenced and supported transportation design. All over the city, bridges, overpasses, and roadways feature foundations, seismic strengthening, and embankments influenced by our recommendations. We're currently working with Sound Transit and Seattle Monorail Project, involved in future transportation solutions for the city.

Shannon & Wilson has contributed to other city infrastructure as well, working with SPU, Seattle City Light, Puget Sound Energy, and King County on water and wastewater facilities and pipelines, and dams and reservoirs that help support the city's workings. Last year our innovative instrumentation system went on-line at Boundary Dam, providing Seattle City Light with the information they need to efficiently monitor movement and maintain the dam.

100% employee-owned, Shannon & Wilson has retained local ownership in the face of increased industry mergers and acquisitions by national and international with roots and headquarters outside the city. For 50 years Shannon & Wilson has provided local employment opportunities for a broad range of engineers, scientists, clerical support, marketing specialists, accounting, field and laboratory workers, and librarians. The Seattle office currently employs around 100 people.

A highlight of our 50th year, Shannon & Wilson was honored to host Dr. Ralph Peck, this year's Stanley D. Wilson Memorial lecturer. Dr. Peck spoke to a packed house, reminiscing about Stan Wilson and his contributions to the field, in the annual lecture co-sponsored with the University of Washington's Civil Engineering Department.

URS Corporation

The URS geotechnical workload in 2004 saw quite a few infrastructure projects including an emergency pipeline repair in the Ebey Slough where project manager **Sri Rajah** needed long hours on four separate barges by new engineer **Becca Loveday** and veteran **Dick Clark** to oversee pile driving, fish protection, structural cradle installation by divers, and many other critical activities to meet a tight schedule. **Todd Parkington** worked on a variety of pump station projects for municipal clients, and together with **Bill Kuck** and new hire **Ben Angel** continued to serve Transalta in a variety of ways at the Centralia Coal Mine. Other mine work was active, as **Cecil Ulrich** provided tailings facility engineering and dam inspection services at the Red Dog Mine in Alaska, **Charles Masala** worked on the closure plan for the Midnite Mine Superfund Site near Spokane, and the Coeur d'Alene River Basin cleanup work with the EPA never seems to end for **Chuck Vita**. Work also continues for **Rik Langendoen** and **Bob Burk** at the Holden Mine near Lake Chelan. **Carlos Chapparo** recently joined the Seattle office from the Chicago area, and along with **Chris Castro** assisted URS National Solid Waste Practice Leader **Bob Wallace** with a closure design for the Ordot Landfill in Guam. **Marty McCabe** and **Erich Lenz** have been handling various Pacific Northwest petroleum refinery upgrades. **Dan Hawk** helped the URS Construction forces in planning dewatering and contaminated soil excavation at a Port of Tacoma property. Haliburton needed seismic hazard analysis consultation from **C.B. Crouse** for a proposed new pipeline in Trinidad Tobago. **Mark Molinari** provided similar seismic hazard services to ExxonMobil for their proposed LNG facility in Qatar on the Arabian Gulf. **Greg Burgess** focused on groundwater quality issues faced by the US Navy in Bremerton and the EPA at the Palermo Wellfield Superfund Site near Olympia.

Zipper Zeman Associates, Inc.

2004 has been a very busy year for Zipper Zeman Associates, Inc. (ZZA). We continue to experience an increase in workload throughout all three of our offices (Lynnwood, Seattle, Tacoma). Accordingly, our staff continues to grow. Newcomers to our Lynnwood office include senior environmental geologist **Jon Einarsen**. **John Zeman** has joined our Seattle office and will assist **Dave Baska** on projects and client development. **Yen-Vy Van** (Senior Geologist) relocated to our Tacoma office. We say goodbye to **Al Zeman** who has now officially retired from the firm, but still occasionally performs some consulting services from his retirement digs in Arizona.

Our two principals, **John Zipper** and **Jim Thompson**, have had their hands full managing projects in our Lynnwood office and keeping the troops in line. Jim continued work on evaluating and upgrading rockeries for the City of Bellevue. Jim was also involved in the several City of Everett water line projects. John was principal geotechnical engineer for the new Lynnwood convention center and continues his work with insurance companies. Associates **Tom Jones** and **Sean Donnan** found themselves faced with an increase in geotechnical and environmental work for retail development throughout the west. **Dave Williams** (Associate) had his typical busy year on a wide range of projects and as a reviewer for the City of Newcastle.

Dave Baska (Seattle office) has been occupied with both public and private development in the Northgate area. The community center and branch library will start construction early in 2005 and the mall expansion is projected to begin in 2005 as well.

Our Tacoma office completed its' second full year in operation and witnessed a variety of new municipal and private sector projects. Expansion of the Capital Mall in Olympia, the new City Hall in Port Townsend, new retail and residential development, and continued road and utility work throughout Kitsap, Lewis, Pierce, and southern King Counties has kept **Tim Roberts** hopping this year.

The firm looks forward to a successful 2005 and plans on adding staff in all of our offices.

Positions Available

Geotechnical Engineer

Immediate opening for **Geotechnical Engineer**. **AESI** is a warm, casual, 53-person engineering/geology consulting firm in Kirkland. 2-15 years local experience in the industry. Projects range from residential, industrial, schools mid-rise commercial buildings and municipal work. Will be responsible for all aspects of a project from the proposal phase to the field explorations, engineering report completion, client maintenance, invoicing, and overall project management. Candidate should be able to communicate verbally and in writing, knowledgeable, friendly, helpful, and willing to take charge of a project to completion.

Permanent salary position. Benefits include vacation, sick time, holidays, medical, short-term and long-term disability, 401K-retirement plan. Please send cover letter and resume to Ronald A. Parker, President and COO at ronparker@aesgeo.com, or fax to 425-827-5424.

Geotechnical Engineer / Engineering Geologist

Aspect Consulting is recruiting a **Mid- to Senior-Level Engineering Geologist** or **Geotechnical Engineer** for our growing practice, working in either our Bainbridge Island or Seattle office location. Aspect's geologic/geotechnical practice includes regional and site-specific geologic analysis, sensitive slope and shoreline evaluation, design and regulatory assistance, and geotechnical engineering on interesting projects for municipal, civil, and private clients. Please see the Case Studies posted on our website (www.aspectconsulting.com) for a sampling of project types.

Preferred qualifications include 8 + years of professional experience, license or registration in appropriate field, applied experience in regional geology, geologic hazards analysis, and /or geotechnical engineering solutions, and preferably an advance degree in engineering geology, geological engineering, or geotechnical engineering. Candidate must be a client-focused thinker and proven project manager

with ability to manage multiple projects simultaneously. Clear writing and communication skills are essential. Please respond to geo@aspectconsulting.com.

Geotechnical Engineer

CDM is seeking a **Geotechnical Engineer** who has the ability and desire to work on a wide variety of projects, including: tunnels, pipelines, excavations, deep foundations, dams, and landslides. The candidate must be able to work within multi-disciplinary teams and should have experience in subsurface exploration methods and in situ testing; laboratory testing methods and interpretation; geotechnical engineering analyses; and construction observation.

B.S. Civil Engineering required; M.S. in Civil Engineering with geotechnical engineering emphasis and 0-3 years experience preferred. Washington State EIT required. Experience with geotechnical engineering software, such as Slope/W, Seep/W, and Sigma/W is desired.

Excellent verbal and written communication skills are required. Knowledge of Central Puget Sound geology would be helpful. Some travel is required.

Please send resume to:

Michaela Carroll

CDM

E-mail: carrollmm@cdm.com

Fax: (617) 452-8791

EOE/AA

www.cdm.com

Geotechnical Engineer

Earth Consultants, one of the Northwest's leading multi-discipline consulting firms is seeking registered **geotechnical engineers** for our Bellevue office. MS and PE in geotechnical engineering preferred. Candidates should have 4-10 years working experience; excellent communication skills, and be highly motivated. Salary DOE. We offer a competitive compensation and benefits package and a casual workplace. Please send resume to: Human Resource Manager, 1805 – 136th Place NE, Suite 201, Bellevue, WA 98005. Or by FAX: 425-746-0860



Kleinfelder, an engineering services firm named by CE News as the #3 "Best Civil Engineering Firm to Work For", is seeking the following professional staff to participate in exciting projects from their growing Bellevue (Seattle), Washington, office. We have many fantastic projects on the horizon in 2005, including The Seattle Monorail Design Build Project, development projects in Vancouver, B.C., Edmonton, and Calgary, Alberta. Our Rock Mechanics group is enjoying leading design project in Baja, Mexico, Southern California, Arizona, and Texas this winter.

Principal Geotechnical Engineer

Requires 20 years in Geotechnical or Geological Engineering. Strengths must include strong leadership, solid communication and negotiation skills, client and financial management, and a track record of successful business development.

Senior Geotechnical Engineer

Requires 10 to 15 years in Geotechnical or Geological Engineering. Strengths must include solid leadership skills, effective communication skills, client management, project financial understanding, and business development strength. Must be able to obtain PE registration in Washington and MS in Geotechnical Engineering preferred.

Project Geotechnical Engineer

Requires 4 to 8 years related professional experience. Professional Engineer (P.E.) in Civil Engineering required. Candidate must have excellent field, verbal and writing skills, must be organized and able to manage projects with some supervision. B.S. in Geotechnical or Civil Engineering; M.S. preferred.

Geotechnical Engineer / Geologist

Requires 1 year related professional experience performing and developing scopes of work for site characterization. Conducts field exploration, sampling, inspection, analysis, and technical support under supervision. Manages small tasks with on-going review and interaction from senior staff. B.S. in Civil Engineering or Geology required; M.S. preferred

These positions require candidates who are highly motivated, committed to superior client service & professional Growth. This is a great opportunity to Grow with an expanding, employee-owned, people-first, dynamic Team.

Send resume to cdwyer@kleinfelder.com.

Tunnel / Structural Engineer

LACHEL FELICE & Associates, Inc. a firm that specializes in geotechnical engineering and underground structures is seeking **tunnel and structural foundation engineers** at the Project through Principal levels. Positions are available in our Golden, CO, Seattle, WA, and Washington DC offices. A qualified candidate must be a registered Professional Engineer and have at least a M. S. in Geotechnical/Geological Engineering or Civil Engineering with a minimum of 8 years of practical experience. A candidates experience must include design and field construction assignments, preferably on tunnels, long span bridges, dams, and other major earth work projects. Some domestic and international travel will be required. All positions will have business development, client contact, and proposal preparation responsibilities. Candidates must have excellent communication and organizational skills and be able to lead or be part of a project team as required. All candidates must be U.S. citizens and willing to undergo a federal background security investigation. LACHEL FELICE & Associates, Inc. offers an excellent compensation and benefits package including medical, dental, vision, insurance, retirement plan, and paid holidays. For more information on LACHEL FELICE & Associates, Inc. please visit our web site at www.lachel.com. Interested candidates should forward a cover letter and detailed resume to gweaver@lachel.com.

Geotechnical Engineer

PanGEO is seeking qualified **geotechnical engineers**. Ideal candidates have solid background in applied geotechnical engineering. Masters degree in civil (geotechnical) engineering, or equivalent, and minimum 2 years relevant work experience required. More experienced candidates encouraged to apply. PanGEO is an EOE and offers excellent benefits. Resume and letter of interest in confidence to Robert Kimmerling; rkimmerling@pangeoinc.com.

Geotechnical Engineers

Landau Associates, a leading regional environmental, natural resource, and geotechnical engineering consulting company, is recruiting for **geotechnical engineers** for our offices in Edmonds and Tacoma, Washington, and Portland, Oregon. We are interested in qualified applicants who value client service, employee satisfaction, and profitable growth. For company information, position qualifications, and responsibilities, please see our web site at www.landauinc.com. Please email your resume to HR@landauinc.com, or Fax: 425.778.6409. ETP-GE-1204-DRS. EOE.

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