Risky Design Deviations and Design Exceptions

Session 1-2

Presented by:
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Departments of Transportation go to great lengths to create and maintain design standards for the features that make up their highway systems. But it is impossible to anticipate every possible situation, and exceptions to these design standards are necessary to meet the needs of the highway system.

FHWA is responsible for oversight and regulation of these design standards, and has delegated approval of exceptions to the design standards to ODOT. ODOT handles exceptions to design standards for Roadway features such as lane widths, curve parameters, and bridge rails, with "Design Exceptions". Other features such as structural design criteria or geotechnical design criteria are handled with "Design Deviations."

Design Exceptions and Design Deviations are an important element of Practical Design or Context-Sensitive Design, where we may adjust design standards in order to do the best thing for a particular situation. The Design Exception or Design Deviation provides documentation (i.e. "make the case") and approval for departing from Design Standards and satisfies ODOT's regulatory obligations.

It is important for design professionals to understand these processes, since public safety, their personal liability and the liability of their employer depends on the processes being followed correctly.

Bio: Susan C. Ortiz, P.E., G.E. is ODOT's State Geotechnical Engineer at Technical Leadership Center where she is responsible for oversight of standards, quality control and quality assurance of the Geotechnical Engineering, Engineering Geology, and Hazardous Materials. Susan has worked for the Oregon Department of Transportation for the past 19 years. Prior to working for ODOT Susan worked for the US Forest Service for 14 years. Susan is a licensed Professional Engineer and Geotechnical Engineer in the State of Oregon.

Bio: Ray Bottenberg, PE, SE is the State Bridge Engineer at Oregon Department of Transportation. A 1986 mechanical engineering graduate of Oregon State University, Ray worked as an aircraft structures engineer for The Boeing Company in Seattle, Washington from 1986 to 1997 and worked as a project manager/engineer in HVAC before joining ODOT in 1999 and Bridge Engineering Section in 2001.

Emergency Replacement of the Crystal Creek Structure

Session 1-3

Presented by:
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Miami-Foley Road runs parallel to US 101 and serves as the only detour route when US 101 is closed. The December 2015 Presidentially Declared Disaster blew out the Crystal Creek Culvert. This event caused significant damage throughout Tillamook County. A culvert was installed to replace the failed culvert and the road was reopened. FHWA Emergency Relief funds were secured to begin the design of a permanent solution. The plans for a 50-ft bridge were completed and awarded to a contractor in the fall of 2023. Heavy rains fell on December 5, 2023 and overwhelmed the capacity of the temporary culvert and subsequently blew out Miami-Foley Road at this crossing.

This presentation discusses the decisions made that culminated in the construction of a new 60-ft bridge on H-piles over Crystal Creek and how the new bridge was built in 10-days. The presentation further discusses elements that were in play that allowed the work to transpire so quickly. What were the benefits of moving so fast and what were the negatives.

The presentation will conclude with proactive steps Tillamook County is taking to address futures disasters.

Bio: Chris Laity has been serving as the current Public Works Director and County Engineer for Tillamook County since the day of the eclipse in 2017. He previously worked as a consultant for 19 years beginning as a bridge designer and rotating through various transportations disciplines. He finished his time as a consultant managing multidisciplinary transportation projects, serving as an on-call county engineer and performing QA/QC reviews. Chris was a land surveying crew chief and served in the military prior to earning his engineering degree.

Rock Creek Bridge Replacement

Session 1-4

Presented by:
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The existing bridge between Condon and Heppner on Highway 206 in Region 4 has a history of the approaches washing out during heavy rain. The existing four-span bridge was built in 1934. It is 100 feet long, with a 24' roadway width. The bridge has a 45 degree skew, matching the streamflow. The 42 foot long primary span has rolled steel girders. The other three spans are composed of timber stringers bearing on pile caps on concrete pedestals, except where a steel cap was placed in a 2014 repair. The west end of the existing bridge does not have a typical abutment. The girders are seated on a notch in the native rock or on a built-up stone wall. The main creek flow is against this rock face. Concrete pedestals with a timber pile cap are also used at the east end, rather than a typical abutment. These existing foundations were determined to be unstable for the calculated scour conditions.

The site is located in a narrow basalt gorge with a highly variable bedrock surface. To make things more difficult the bedrock is extremely hard and presents significant challenges during design and construction. These challenges include: the need to blast a 30 foot high "rock knob," a hybrid drilled shaft/spread footing supported abutment, and managing the variable bedrock during construction.

The bridge is in a remote location, and sees an ADT of 60 vehicles. However, the roughly 30 mile detour route makes quick construction a priority. Working with the rock excavation will take a significant portion of the in-water work window. To expedite bridge assembly, the selected bridge type is a WSDOT section Deck Bulb-T, with Ultra-High Performance Concrete joints.

Bio: Tom Grummon became ODOT's State Foundation Engineer in 2023 after working as the Region 4 Geotechnical Engineer for 3 years. Before joining ODOT, Tom worked in consulting on a variety of projects from large scale mining infrastructure to transportation design-builds. An alum of Colorado School of Mines in Geological Engineering, Tom has always straddled the line between geologist and engineer; often making other engineers uncomfortable with the uncertainty inherent in soil, rock, and earth systems.

Bio: Jennifer Pearce, PE, is licensed in OR and CA. She earned her BS & MS from Purdue University. She's been an Oregonian since OTIA III, working as a consultant on bridges across the state. She designed retaining walls for Trimet's Green Line Light Rail along I-205, then joined Trimet to design structures, perform design oversight, and inspect 8000 lineal feet of wall and 5 bridges constructed for the Orange Line Light Rail, East Segment. In 2017, Jennifer joined ODOT as an Assistant Resident Engineer in Portland, where she was responsible for bridge projects, including the grind/overlay of the four I-5/I-84 Interchange ramps and the replacement of joints on the Fremont Bridge. Jennifer returned to her design roots in 2020, bringing her construction experience to bear on her designs.

Center Street Bridge: A Collaborative Approach to Seismic Retrofit Design

Session 2-1

Presented by:
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In the realm of design, there are two different realms to consider: performance and code compliance. Strict code compliance will generally achieve the intended performance. But is strict code compliance the most efficient way to achieve your clients' goals?

Working with an informed client affords opportunities to discuss how a project's goals can be achieved. The ODOT Bridge Design Manual and the documents it references marks the starting point for seismic retrofit design for bridges in the ODOT inventory. The journey from start to finish is anything but clear when a seismic retrofit project starts.

The seismic retrofit of the Center Street Bridge project recently passed through the DAP Phase Gate. The journey started with a business case which defined the desired performance and the Bridge Design Manual which defined the standards to be met. The BDM and referenced codes led to development of a project specific, but rather standard, seismic retrofit criteria for the project – which analysis indicated would be difficult to meet.

Always keeping an eye on the performance goals defined in the business case, the design team collaborated with Bridge Section to refine the project. The process included open discussions about acceptable performance of earthquake resisting systems, the elements within those systems, and how to most economically and reliably achieve the performance goals.

This presentation will walk through ERS development, identification of desirable deviations from the BDM, and the coordination required to gain approval of these Design Deviations. It will highlight Agency performance priorities, how the priorities guided ERS development, and the value of the technical discussions that led to Design Deviations which were ultimately approved.

Bio: Mike McNulty, PE, received his BS in Civil Engineering from the University of Alaska-Fairbanks in 2006, and he joined OBEC (now DOWL) in 2007. He has since worked on dozens of bridge projects. Mike brings a unique background in both construction engineering and design with a focus on bridge engineering and seismic resiliency. He is designing the retrofits of the river span frame on the Center Street Bridge project.

Bio: Paul Strauser, PE, Paul is a Senior Structural Design Engineer at Oregon DOT with 15 years' experience in transportation projects focusing on maintaining and modernizing Oregon's bridge inventory. As of January 2024, Paul leads ODOT's Agency Bridge Review team; the team responsible for review and acceptance of ODOT Consultant partners' design work on Oregon bridges. Paul lives in Bend with his wife, Erika, and three daughters. When not at work, Paul enjoys his family, Central Oregon's active lifestyle, playing bass on his church's worship team, and volunteering as an assistance wrestling coach at Bend Senior High School.

Liquefaction Mitigation: Design of Deep Soil Mixing Ground Improvement

Session 2

Presented by:
Jason Bock, PE
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Ongoing changes to our understanding of seismic hazards and corresponding research has led to significant changes to applicability of various techniques for mitigating these hazards, specifically liquefaction and lateral spreading. At the forefront of mitigating seismic hazard has been the use of deep soil mixing ground improvement. In this presentation, we will explore the use of deep soil mixing (DSM) for seismic hazard mitigation. This will include an overview of what DSM is, how it is installed, and important design considerations such as design approach (FHWA, Sliding Block/Newmark, and FLAC). Lastly, we will review several case histories of DSM use for seismic mitigation including liquefaction and lateral spreading.

Bio: Jason has 20 years of experience in all phases of investigation, design, reporting, construction specifications, and contract administration for challenging projects with a focus on seismic hazard evaluation and mitigation. Through this background, he has developed a strong understanding of dynamic soil behavior of our local silt soils and how ground improvement can be utilized to achieve project performance guidelines. Jason currently is a principal at GRI and a member of the ASCE 7 Seismic Subcommittee.

Use of Ground Improvement to Provide Seismic Mitigation and Foundation Support for OR38 Scottsburg Bridge

Session 2-3

Presented by:
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Bob Grubbs, PE
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The OR38 Scottsburg Bridge Replacement project involved the replacement of the existing OR38 bridge over the Umpqua River with a new seven-span, 1,280-foot-long bridge. The seismic hazard evaluation at the bridge site found that the riverbank slopes and bridge approach embankments would fail during a seismic event due to liquefaction, which would apply additional loads to the bridge foundations and result in unacceptable settlement of the approach embankments. Ground improvement using deep soil mixing methods was selected as the most cost-effective and technically preferred alternative to stabilize the riverbanks at the bridge abutments and approaches. The deep soil mixing ground improvement at the bridge abutments was designed to mitigate liquefaction and limit seismic displacements so the abutments could be supported on spread footings founded on the ground improvement instead of costly deep foundations.

This presentation will detail how the geotechnical and bridge engineer worked together to design the ground improvement and spread footing, including the post-seismic settlement criteria that was developed for the bridge abutments. The goal of the presentation will be to provide geotechnical and bridge engineers an understanding of the processes used to design the ground improvement and benefits that it provided by reducing foundation costs.

Bio: Eric Paslack, PE, is a project manager with 15 years of experience in geotechnical engineering for landslides, earthquake engineering, bridge foundations, retaining walls, and pavement design. He joined Shannon & Wilson in 2009 after completing his BS and MEng degrees in Civil Engineering at Oregon State University. As project manager for ODOT and local agency transportation projects, Eric has experience on more than 40 ODOT projects with Shannon & Wilson including the OR38: Scottsburg Bridge Replacement project, OR217 Auxiliary Lanes project, and the I-205 Abernethy Bridge project.

Bio: Bob Grubbs, PE, is one of the ODOT Regional Bridge Lead Engineers, stationed in the Region 3 Roseburg office. He is an Oregon Tech graduate that has been with ODOT since 1997, with most of his time in bridge design. Bob has led the bridge design for countless ODOT bridges in Region 3 during his time with ODOT, including the OR38: Scottsburg Bridge.

ODOT Overview

Session 2-4

Presented by:
Tova Peltz
ODOT
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This presentation will provide an overview of ODOT and the recent changes and where ODOT is headed.

Bio: Tova Peltz, a distinguished civil engineer, earned her Bachelor of Science in Geology from MIT and later completed a Master's in Geotechnical Engineering at UC Berkeley. Her career took off in 2007 when she joined the Oregon Department of Transportation (ODOT) as a Geotechnical Engineer. Over the years, she transitioned to roles such as Construction Project Manager and Geo-Environmental Unit Manager for ODOT's Region 1, showcasing her adaptability and leadership. From 2018 to 2023, Tova served as a Project Delivery Manager in Region 1, overseeing complex projects. Today, she holds the prestigious position of Deputy Division Administrator for Delivery + Operations, a testament to her journey from geologist to a distinguished leader in transportation and civil engineering. She was awarded ASCEs 2023 Engineer of the Year award. Her educational background reflects her commitment to professional growth, making her a trailblazer in the field.

Bridge Program Updates

Session 3A-1

Presented by:
Bert Hartman
ODOT Bridge Engineering Section
Bridge Program & Standards Managing Engineer
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This presentation will provide a current status of the State Bridge Program.

This presentation will provide an update to the Timber Bridge Replacement program that is currently being developed. There will be a brief discussion of the status of the Seismic Program, and considerations for continuing to show progress on the highest priority routes. Finally, an early look at the Bridge portion of the 2025 Legislative Package will be shared.

Bio: Bert Hartman has been an engineer with ODOT for the past 25 years the last 17 as a unit manager in Bridge. In addition to the Bridge Program, he has managed the Load Raters, and more recently the Standards Engineers. His first years at ODOT were divided between Load Rating and Bridge Management. Bert has a BS in Mechanical Engineering from Oregon State University. He is a licensed Mechanical Engineer in Oregon. He did some of the first LRFR load ratings in Oregon and has led the bridge project selection effort for the past 6 cycles. The Bridge Program & Standards Unit is responsible for bridge design standards and project support, CAD drafting standards and project support, the Major Bridge Maintenance program, the State Bridge Program, and the Local Bridge program.

Grade 100 Rebar in Near Surface Mounted Strengthening And Longitudinal Tension Check Deficiency Mitigation

Session 3A-2

Presented by:

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Bridge strengthening to resolve a load restriction is becoming a more widespread issue for highway agencies. Mobility concerns and posting for SHV's and EV's can impact some residents and businesses disproportionately and can be difficult and costly to overcome. Owners need solutions for bridge strengthening that can improve durability and service life, as well as allow legal and permit loads to utilize the most efficient routes. New materials have recently been developed to facilitate strengthening that can be placed with minimal disturbance to the structure and traffic during construction. The process of near surface mounted (NSM) bars has been in use for years with FRP rods. And more recently, Oregon led the effort to make use of titanium in NSM strengthening. This presentation will describe the first proposed use of high strength 100 ksi steel rebar in a NSM application.

The use of NSM 100 ksi rebar was selected after an alternatives study considering FRP wet layup, various materials for NSM strengthening, post & beam, and member enlargement. The project includes positive and negative flexure, and shear strengthening of RCDG spans and CIP slab spans. The bridges also had numerous deficiencies in the longitudinal tension check that did not require load restrictions, but in a strengthening project were required to be mitigated. The work will be done on four bridges in Salem, Oregon. The project is currently at the 90% PS&E stage.

The presentation will cover the benefits of using 100 ksi steel rebar, the design process, and detailing challenges. The presentation includes a discussion of issues such as materials characteristics, materials delivery procedures, special construction requirements, design lessons learned, and the estimated cost implications when using 100 ksi NSM strengthening. The presentation will also describe the extent of longitudinal tension check deficiencies and show how that issue was resolved in the strengthening design process.

Bio: Scott Nettleton For 34 years, since April 1, 1990, Scott has provided bridge designs throughout the Pacific Northwest. He is an accomplished Bridge designer, engineer and manager on a wide range of structures sizes and types, for new, replacement and repair. Now that the kids have all moved out, in his free time he skis, sometimes golfs, enjoys some travel around the west and cooks Sunday dinner for his wife of 36 years, Claire.

Bio: Giovanni Villa, As an Engineer-in-Training, Giovanni's most prominent project is the NSM Strengthening for the City of Salem on four RCDG and CIP Slab bridges. After obtaining a BS in Civil Engineering from PSU, Giovanni enrolled in OSU's Master of Engineering program to expand his knowledge of structural theories and principles. With an interest in both building and bridge engineering, Giovanni looks to expand his expertise in the structural engineering field.

Changes to Guide Specs for Bonded FRP Systems, 2nd Edition

Session 3A-3

Presented by:
Tanarat Potisuk
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The presentation will include discussions of the following:

- Comparison to 1st Edition and ACI 440.2R-17
- Key revisions
- Design examples
- Calculations to plan sheets
- Construction specifications
- Future ODOT FRP strengthening design
- Forthcoming revisions

Bio: Tanarat Potisuk, PE, SE is the technical resource for reinforced and prestressed concrete design, seismic design, and bridge strengthening for ODOT, since 2013.

Fast-tracking Bridge Deck Rehabilitation with High Early Strength Overlays

Session 3A-4

Presented By:
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The following abstract comes from the Problem Statement of SPR-847 ALTERNATIVE HIGH EARLY STRENGTH CONCRETE (HESC) STRUCTURAL OVERLAYS:

ODOT's bridge inventory is continuing to age, and with that, ODOT needs to be proactive in its approach to bridge maintenance. With increasing traffic volumes and public/political involvement, bridge projects have been put into tighter and tighter constraints. ODOT cannot afford to construct diversion structures for every structural overlay project, and traffic volumes have gotten to the point where long-term closures or lane restrictions are nearly impossible.

As bridge decks continue to wear, there will be a need to replace the existing structural overlays. There is also a need to strengthen some bridges due to higher demands, which can include increasing deck thickness through a structural overlay. Considering the scheduling constraints aforementioned, a high early strength overlay that can be performed in a single night could help solve this issue. Polyester polymer concrete (PPC) overlays are an alternative, but these do not address decks in poor condition.

ODOT has been pressured by mobility issues to truncate construction times, leaving less time for traditional materials to be used. This had led to instances of using inappropriate materials in lieu of the preferred materials simply due to rapid traffic turnaround.

When our structural overlays wear out after 30 years we would like to replace with another structural overlay to maintain structural capacity. Designers have been forced to place expensive PPC overlays over worn out structural overlays simply because the PPC sets up very fast, allowing a fast traffic turnaround. Other options, like adding diversion structures, are often too costly to implement. High Early Strength Concrete (HESC) Overlays have the potential to be placed in a single overnight lane or bridge closure, with either no wet curing or wet cure times as short as an hour as opposed to days with traditional methods (Weiss, Zavattieri et al. 2019).

SPR-847 investigated HESC technologies, primarily focused on CSA cements as the primary solution. This study investigated cement technologies, mix design optimization, curing properties and techniques, and durability analysis. SPR-847 is scheduled to be published in Q2/3 of 2024. Along with the publishing of SPR-847, Section 00558 has been developed and can now be integrated into designs as a HESC structural overlay solution.

BIO: David Dobson is the Statewide Structural Materials Engineer for the Oregon Department of Transportation. He has experience in welding inspection, corrosion engineering, and structural materials. He has been with ODOT for 10 years, working on various projects to improve the service life of bridges, with an emphasis on bridge decks. David has a bachelor's degree in civil engineering from Oregon State University. In his spare time, he enjoys walking his dogs, backpacking, and golfing.

BIO: Jason H. Ideker is the Eric H.I. and Janice Hoffman Professor in Civil and Construction Engineering at Oregon State University. He is an international leader and expert in durability of cementitious materials particularly alkali-silica reaction (ASR) including reaction mechanisms, preventive measures, and test methods and standards development. He is an internationally recognized expert in hydration, early-age properties, and cracking risk of cement-based materials, particularly calcium aluminate cements and ettringite based-systems.

Ideker is passionate about education and mentorship and recently lead an effort to overhaul the entire first-year engineering curriculum at Oregon State University into what is now known as “ENGINEERING+”. Ideker is Co-Director of the Green Building Materials Laboratory, Editor-in-Chief of CEMENT, Co-Editor-in-Chief of ASTM’s Advances in Civil Engineering Materials, Chair of RILEM TC 301 ASR and Secretary of ASTM C09.50.

Protect Grants: A Rare Opportunity for Landslide and Rockfall Mitigation Funding

Session 3B

Presented by:
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This presentation will provide an overview of Protect Grants and funding opportunities for statewide unstable slope projects.

Bio: Curran is presently the Engineering Geology Program Leader for the Oregon Department of Transportation. The Engineering Geology Program at ODOT encompasses site characterization, subsurface exploration, slopes and embankments, geologic hazards, groundwater, geotechnical instrumentation, and planning and research activities. In this role, he has also implemented elements of Geotechnical Asset Management including the Unstable Slopes (Landslide/Rockfall) program for ODOT.

Curran is a Registered Geologist and Certified Engineering Geologist in Oregon with over 30 years of experience in Oregon and the Western States. He has been the Engineering Geology Program Leader since 2004. Prior to this, he has been a Staff and Project-level geologist for Consulting firms and the Mining Industry as well as for ODOT. He is a graduate of the Geology program at Portland State University. During his professional career, he has been involved in the investigation, design, and mitigation of literally hundreds of landslides and rockfalls.

Seismically Resilient Landslides – ODOT Southern Oregon Seismic Slopes Project

Session 3B

Presented by:
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As part of the State Seismic Resilience efforts, ODOT has undertaken a program to improve resiliency of critical lifeline infrastructure routes in western Oregon. Seven landslide sites in SW Oregon were identified that could impact emergency response following an earthquake. These locations are known landslide were identified through ODOTs unstable slopes program. Cornforth Consultants, along with Consor Engineers, performed site investigation, seismic hazard analysis, stability, and deformation analyses to quantify deformations expected during a major earthquake along the Cascadia Subduction Zone. The team worked with ODOT to identify deformation criteria suitable for the route. The criteria considered: criticality of the route, impacted travel lanes, and materials and time needed to repair road in determining design criteria. Target seismic deformation for landslide mitigation were used in conjunction with traditional static factor of safety to design mitigation strategies. Mitigations included earthwork mitigations (i.e., shear key and buttresses) and drainage mitigation (i.e., trench drains, horizontal drains, and relief wells) that provide flexible systems that would not lose effectiveness following an earthquake. Special considerations were included in the design to identify required staging and sequencing to prevent destabilizing the highway during mitigation. The project is currently under construction and provides an example of right-sizing landslide mitigations with ODOT's target for rapid response following a Cascadia Subduction Zone Earthquake (CSZE).

Bio: Chris has 22 years of geotechnical engineering experience with Cornforth Consultants, Inc.-Landslide Technology working in the Pacific Northwest, Mountain West, and Alaska. His areas of expertise include design of landslide stabilization measures, seismic site response, slope stability and deformation analyses. Chris' landslide mitigation design experience ranges in size and scale from small earthwork mitigations to address shallow instability to large-scale structural solutions. He has extensive experience developing reasonable and cost-effective mitigation concepts that balance tolerable risk with construction cost. A significant portion of his geotechnical background is associated with transportation including preparation of plans, specifications, and engineering cost estimates with Local Agency, State DOT, and Federal Highway design standards. Chris holds an M.S. degree in Geotechnical Engineering from the University of California at Berkeley, and is a registered Professional Engineer in Oregon, Washington, and California.

Mitigating Naturally Occurring Asbestos in Landslide Debris

Session 3B

Presented by:
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This presentation will provide an overview of NOA in a recent ODOT landslide mitigation project.

Bio: Michelle has been working as a hazmat geologist for almost 30 years. For the last 5 years, she's been supporting ODOT Region 5, but prior to that she spent more than two decades in environmental consulting. She's worked on a wide range of projects throughout the western US, including Alaska, and has supported local, state, and federal government agencies with a wide range of environmental issues.

She held an Asbestos Hazard Emergency Response Act (AHERA) certification during the early years of her career when she was responsible for conducting asbestos surveys on a wide range of structures for various development projects. She renewed her AHERA certification when she came to ODOT in 2018 and now provides support to address and manage asbestos-containing materials (ACM) on ODOT infrastructure and along ODOT ROW.

Estimating Probability, Risk, and Mitigation Costs within a GAM Program

Session 3B

Presented by:
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Geotechnical Asset Management (GAM) programs are being studied and implemented in several state DOTs. A few states are making multimillion dollar decisions based the results of their programs while others are using it to guide the planning process in challenging terrain. Early versions of GAM programs started with Oregon's Rockfall Hazard Rating System (RHRS), developed in the early 1990s. The RHRS still serves as the backbone and data source of most GAM programs that include rock slopes and rockfall hazard as a component.

The RHRS has a component that focuses cost-benefit analysis for some of the highest rated (worst) slopes. However, recent research projects have provided further insights on estimating the probability of an adverse event at a network scale, the associated user and non-user event costs, and programmatic cost estimates for a large inventory of rock slopes. This presentation will describe the recent research outcomes, their applicability to existing inventories, and how they can be utilized to help guide decision making for DOTs.

Author Bios:

Darren Beckstrand (planned speaker)

Mr. Beckstrand is a Senior Associate Geologist with Cornforth Consultants. He has 24 years of experience working on geohazard, landslide instrumentation, and geotechnical asset management projects throughout the United States. Representative projects include Pioneer Mountain to Eddyville Landslide Monitoring Program, Montana DOT's Rock Slope Asset Management Program, and the Beach Road Landslide Investigation and Monitoring Emergency Response.

Aine Mines (coauthor)

Aine Mines is an Associate Engineer with Cornforth Consultants. She has 13 years of experience working on levees, embankments, geohazards, and geotechnical asset management projects throughout the US. Representative Projects include Missouri DOT Geotechnical Asset Management Program, Montana DOT's Rock Slope Asset Management Program, and Alaska 2020 Emergency Response Repairs.

Updates on Pile Embedment Details, Bridge Repair, and Concrete Anchors

Session 4A-1

Presented by:
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Motivation, objectives, and work for the following BDM updates will be explained and discussed:

- 1.5.11 Concrete Anchors
- 1.10.5.4.2 Piling Details
- 1.15.2 Repair of Bridges
- And other select BDM articles

The presentation will end with a Q&A session. Feedback from designers is welcome.

Bio: Tanarat Potisuk, SE, PE is the technical resource for reinforced and prestressed concrete design, seismic design, and bridge strengthening for ODOT, since 2013.

Construction Challenges and Suggestions from Rick Creek Bridge Project

Session 4A-2

Presented by:
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This presentation examines the use of Ultra-High Performance Concrete (UHPC) joints in prestressed deck-bulb tee bridge projects. Challenges, best practices, and lessons learned from the 2023 Rice Creek Bridge project in Douglas County are highlighted.

Bio: Dan Serra has a bachelor's and master's in civil engineering from Oregon State University. He is a Senior Engineer at Knife River prestress, where he has been working for 11 years on both building and bridge projects.

Case Study of Nevada's First Ultra-High-Performance Concrete Project

Session 4A-3

Presented by:
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Ultra-High-Performance Concrete (UHPC) has been gaining attention from the bridge industry but had never been used in the state of Nevada. The Nevada Department of Transportation (NDOT) collaborated with Jacobs Engineering to seismically retrofit and rehabilitate 8 bridges along Interstate 80 (I-80) near Fernley, Nevada. Early in the design process, the design team investigated the feasibility of using UHPC link slabs to relocate the existing pier expansion joints on two of the bridges in the project (I-717 E and W).

The I-717 E/W bridges carry eastbound and westbound I-80 over Main Street and serve as the primary access to Fernley from I-80. The parallel existing bridges were constructed in 1963 and are each comprised of four simple-span, deck bulb-tee precast/prestressed concrete girders. The bridge spans are supported by short-seat abutments and non-integral multi-column piers. The bridges have a skew of approximately 10-degrees and use precast/prestressed deck bulb-tee girders. To accommodate this, the design for the existing structures incorporated sawtooth bridge joints at each of the supports. This resulted in bridge expansion joints that have leaked over time, leading to concrete and reinforcing steel deterioration at the piers. The bridges are also in an area where de-icing salts are frequently used, which has exacerbated the issue due to high chloride concentrations in the concrete; requiring NDOT to replace the expansion joints 5 times between 1963 and 2010.

As part of seismic retrofit and bridge rehabilitation work, NDOT and Jacobs decided that utilizing UHPC link slabs to relocate some of the bridge joints was necessary to effectively address joint leakage and extend the bridge service life up to 50 years. Jacobs designed the UHPC link slabs and coordinated with NDOT to develop a UHPC performance specification for the project. As part of the project, NDOT required UHPC with Buy America-compliant steel fibers. The design resulted in link slabs at the piers that extend full width, with a length of 5 feet and a thickness that varies between 4.5-inches to 5.5-inches. The link slab construction required removal of an existing asphalt overlay, removal of an existing polymer concrete overlay, removal and reconstruction of a portion of the bridge barriers, and installation of new elastomeric bearings. At the abutments, a portion of the abutment backwall was reconstructed and UPHC was used to build new headers and joints.

The project is complete at this point. The two bridges were worked on separately with one bridge remaining open during construction of the other. This presentation will discuss the research, design development, construction, and lessons learned from the project.

Bio: Mr. Coomes is a Senior Bridge Engineer and Project Manager for Jacobs. He has 14 years of experience in bridge design, retrofit, and construction. His work experience includes 2 years at the Nevada Department of Transportation and 12 years at Jacobs. Experience includes planning, type selection, final design, component design, modeling, cost estimating, and construction inspection for various bridge types. Mr. Coomes has worked in Nevada, California, Texas, Colorado, Ohio, Illinois, Oregon, Washington, and Dubai. He earned both his Bachelor of Science in Engineering and his Master of Science in Engineering degrees from the University of Nevada, Reno.

Upcoming Changes to Section 10 of the AASHTO LRFD Bridge Design Specifications

Session 4B

Presented by:
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Section 10 of the AASHTO LRFD is in the process of being revised to reflect the uncertainty in site characterization by accounting for the reliability of different subsurface investigation and design methods. Benefits of this revision include improved design efficiency, reduced subjectivity in site characterization, more consistent reliability in design parameters, and an adaptable and objective framework for incorporating new or different practices; most resistance factors will vary based on coefficient of variation for design parameters. It will take a conscientious effort to effectively implement but, in the end, designers will be able to achieve more consistent and reliable results.

Most engineers would agree that more subsurface data is better, and, that higher quality data is better. But, in the current AASHTO LRFD bridge code, the uncertainty in the site characterization and design parameters is not quantified or explicitly accounted for in the design. The new code will account for which subsurface investigation and design methods have less risk and are therefore more reliable. So, we should incorporate that reliability into the design in a methodical way.

Bio: Tom became ODOT's State Foundation Engineer in 2023 after working as the Region 4 Geotechnical Engineer for 3 years. Before joining ODOT, Tom worked in consulting on a variety of projects from large scale mining infrastructure to transportation design-builds. An alum of Colorado School of Mines in Geological Engineering, Tom has always straddled the line between geologist and engineer; often making other engineers uncomfortable with the uncertainty inherent in soil, rock, and earth systems.

The Soil Nail Launcher – A Retrospective & Local Project Examples

Session 4B

Presented by:
Bryan Wavra, PE
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The Soil Nail Launcher is a military canon originally developed by the British to launch chemical weapons canisters. The cannon has been repurposed to accelerate 1.5-inch diameter, 20-foot long galvanized steel tubes to 250 miles per hour in a single shot for shallow slope and erosion repair. Dynamic installation results in distinct benefits over conventional nailing techniques. First, given that the soil nails are launched instead of drilled, spoils are significantly reduced. Second, over 100 launched soil nails can be installed in one day with immediate soil reinforcing benefit which is up to 2 times faster than drilled installations. The Soil Nail Launcher is mounted on an excavator chassis and has full articulation, allowing it to work around overhead wires, underground utilities, and guard rail.

The Remote Soil Nail Launcher is GSI's most recent iteration of the tool which decouples the compressor and control unit from the chassis allowing the canon to be mounted to all terrain, "spider excavator" units. This platform enables transport of the Soil Nail Launcher on slopes as steep as 40 degrees and overall maneuverability has been increased relative to conventional tracked excavators.

Lastly, project examples for both the City of Portland (Springwater Corridor Bike Path) and ODOT (HWY 101 near Warrenton) will be presented. Each project will illustrate the unique capabilities of the Soil Nail Launcher for shallow slope stabilization and erosion mitigation.

Bio: Bryan has represented GeoStabilization International and Access Limited Construction's northwest operations for the past 14 years. During his tenure, Bryan has been involved in over 250 geohazard mitigation projects throughout Oregon, Idaho, and Montana. Prior to joining GSI, he completed 10 years of geotechnical consulting services in Pacific Northwest. Bryan graduated from Oregon State University with both Bachelor and Master of Science degrees in Civil Engineering with a geotechnical engineering emphasis. He is a professional Civil Engineer in Oregon and Washington and holds a specialty geotechnical engineering registration in Oregon.

Rockfall Risk Reduction: Investigation, Design, & Construction Across OR, WA, MT, and AK

Session 4B

Presented by:
Rachel Hunt, PG/RG
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Ben George, PE, CEG, RG
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Rock cuts along roadways have long presented risks for rockfall and other slope instabilities. While reactionary rockfall risk reduction is still common, reduction of risk associated with rockfall and slope failure events has shifted from reactionary cleanup to a more programmatic approach with many Transportation Agencies. The programmatic approach to address rockfall involves five crucial stages. **Project initiation** is the first stage that identifies and prioritizes the needs for rockfall mitigation based on previous rockfall history, safety concerns, and infrastructure protection. This could be conducted on a programmatic or emergency basis. This stage is initiated by the Transportation Agency. The next stage, **site reconnaissance** includes a detailed geological assessment to characterize rock slope conditions and geohazards. This stage is either completed by the Transportation Agency or a consultant who is contracted to provide either a supporting or leading role. **Data analysis and modeling** is the third stage of project development, where site characterization data (i.e., geologic mapping, geohazard delineations and evaluations, discontinuity data, photogrammetry, LiDAR, slope monitoring, etc.) are compiled and analyzed. During this stage, conceptual rockfall mitigation options are developed based on field observations and analysis results. **Mitigation design**, the fourth stage, includes development of final designs so that construction documents (i.e., plans, specifications, and an engineer's estimate) can be prepared for preferred risk reduction measures. **Construction** of rockfall risk reduction measures is the last stage in addressing rockfall concerns. Successful construction often relies on support from the design engineer that includes technical guidance, documentation, and engineering support to construct the measures in accordance with the design intent.

This presentation describes our approach to rockfall risk reduction along roadways highlighting our methods for site reconnaissance, data analysis and modeling, and construction support. Several mitigation case histories from Oregon, Washington, Montana, and Alaska will be discussed featuring our approach to rockfall risk reduction.

Bios:

Rachel Hunt, PG

Rachel has 10 years of geotechnical and engineering geology experience in the Pacific Northwest and Alaska with expertise in complex rock and soil slope stability assessments, mitigation design, and construction support. She graduated from University of Hawaii at Hilo in 2008 with a B.S. in Geology, and from Central Washington University in 2012 with a M.S. in Geology. She holds a certified registered/professional geologist license in 5 states. Rachel is a part of the CCILT rope access team and assists with on-slope efforts for rock slope reconnaissance, mitigation design, and construction support.

Ben George, PE, CEG, RG

Ben has over 20 years of geotechnical and geological engineering experience in the Pacific Northwest including numerous projects in Alaska. He graduated from the Colorado School of Mines in 2002 with a B.Sc. in Geology and Geological Engineering, and in 2004 with a M.Sc. in Geological Engineering. He holds professional engineer licensure in six states, certified engineering geologist licensure in two states and registered/professional geologist licensure in three states. He has spent the majority of his professional career at Cornforth Consultants, Inc./Landslide Technology. His has expertise in slope stability evaluations for both rock and soil, geohazard risk reduction design, and rock cut slope design. As a trained rope access Level II technician from the Society of Professional Rope Access Technicians (SPRAT, he has extensive experience conducting and managing on-slope work efforts for both design and construction of rockfall and rock slope mitigation efforts. He has extensive experience with preparation of plans, specifications, and engineer’s estimates along with providing construction observation services.

Gopher Valley Bridge – ABC Case Study

Session 5A-1

Presented by:

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Co-Author:

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Located in rural Yamhill County, the Gopher Valley Bridge carries Gopher Valley Road over Deer Creek. Due to the load posting of the existing structure, the County elected to replace the bridge. As a historic logging road that is over a hundred years old, the public right of way limits are not clearly defined and potential detours are close to 20 miles in length, a long drive on a gravel road for nearby residents. These constraints made long-duration closures, staged construction, and road realignment unpalatable for this site. To avoid these impacts, a short duration closure and rapid construction of a new bridge using Accelerated Bridge Construction (ABC) methods was chosen.

Accelerated Bridge Construction introduces different risks to a project, notably schedule-based challenges associated with unexpected field conditions, bad weather, or other unplanned events that are difficult to fully predict in advance. For this project, the consultant team worked collaboratively with Yamhill County to consider the site's suitability for ABC. This included completing supplemental detailed geotechnical investigations and engaging construction contractors when developing design concepts to assess potential construction challenges and limit surprises during construction.

This presentation will cover the project goals, constraints, and alternatives considered. A summary of the selected ABC methods, including efforts taken to mitigate the risk and overall impact of the short-duration closure will be highlighted. Many photos of the site during design and construction will be provided to illustrate topics. The presentation summary will include lessons learned and things to consider from both an owner's and designer's perspective when evaluating an ABC alternative.

Bio: Josh Goodall is a Senior Bridge Engineer at David Evans and Associates. His engineering career has offered many opportunities to identify creative solutions to problems, and this project is no exception.

Bio: Greg Haffner is the Engineering Manager at Yamhill County. In his role as the bridge owner, he led many key elements of the public interaction and construction oversight process.

Bio: Eric Paslack is an Associate at Shannon and Wilson. Eric conducted the geotechnical analysis for the project, including the detailed soil strata mapping used to clarify anticipated bedrock depth.

Bend North Corridor Project
(US20 and US97)

Session 5A-2

Presented by:
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Joe Stith, PE
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The Bend North Corridor Project (US20 and US97) is the first Design-Build project administered by ODOT in over a decade. This project realigns one of the most congested portions of U.S. 97 in Bend and improves a section of U.S. 20. The U.S. 97 Bend North Corridor project includes a realignment of U.S. 97 with grade separated crossings, improved intersections, new ramp connections at critical locations to improve local and highway traffic, and pedestrian and bicycle facilities. This project includes 2 new single-span precast girder bridges, 1 single span cast-in-place post-tensioned box girder bridge, 1 bridge retrofit including a high-early strength concrete overlay, over a dozen walls (MSE and CIP), and various other sign, traffic, and illumination structures.

This presentation will provide a project overview, review of innovative design/details of the structures, and include a look into the design-build delivery process such as alternative technical concepts, accelerated design schedules, and collaboration with Agency and Contractor personnel. Additionally, the presentation will include construction progress to-date, and a discussion of benefits and lessons learned during the project.

Bio: Paul Strauser is a Senior Structural Design Engineer at Oregon DOT with 15 years' experience in transportation projects focusing on maintaining and modernizing Oregon's bridge inventory. As of January 2024, Paul leads ODOT's Agency Bridge Review team; the team responsible for review and acceptance of ODOT Consultant partners' design work on Oregon bridges. Paul lives in Bend with his wife, Erika, and three daughters. When not at work, Paul enjoys his family, Central Oregon's active lifestyle, playing bass on his church's worship team, and volunteering as an assistance wrestling coach at Bend Senior High School.

Bio: Joe Stith is a bridge engineer, project manager, and group lead for Jacobs Oregon bridge staff. He graduated with a Bachelor of Science from Oregon State University and has spent the last almost 20 years with Jacobs, the last 17 within the bridge group. Joe has led the load rating of over 1200 bridges and been involved in a wide range of bridge design projects including analysis, rehabilitation, and construction services.

BIM For Bridges: A Case Study in Denali National Park

Session 5A-3

Presented by:

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Devin Altman, PE
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Since late August 2021, a portion of the Denali Park Road has been displaced by the Pretty Rocks Landslide, cutting off vehicular access to popular visitor destinations and facilities. The Federal Highways Administration, Western Federal Lands Division, in collaboration with the National Park Service (NPS), developed the Polychrome Area Improvements plan to restore reliable road access to the western half of the Park. The plan addresses several geologic hazards in the Polychrome area that threaten public safety and infrastructure and includes a 475-foot long, 50-foot tall, and 24-foot-wide steel Warren Truss Bridge to span the Pretty Rocks Landslide. Because of the urgency to restore access to large portions of a National Park and the short construction season at the site, acquiring steel and beginning fabrication was paramount to progress rapidly for the project's success. Therefore, an integrated design and detailing (IDD) task force was implemented to accelerate the schedule through simultaneous delivery of design and fabrication detailing with BIM for Bridges.

Building Information Modeling (BIM) has gained significant attention and adoption in the construction industry due to its potential to improve efficiency, collaboration, and decision-making throughout the project lifecycle. While BIM has been widely implemented in various building projects, its application to bridge infrastructure is a relatively emerging field. By creating a 3D virtual model of the bridge, designers, fabricators, contractors, and owners can visualize the entire structure, identify clashes, and optimize the layout for constructability and efficiency. Within a short period of time, the Pretty Rocks Slide Bridge design was advanced from 30% concept to 100% plans and specifications with the bridge modeled in Tekla and Trimble Connect, the shop detailing plans developed, and the steel material ordered and purchased. Amazon WorkSpaces was also used for virtual model approval by various parties for quality control. The presentation will discuss the benefits and drawbacks of this approach to BIM implementation in the design process.

Bio: Benn Oltmann is the Bridges & Structures Functional Manger for the FHWA, Western Federal Lands Division located in Vancouver, WA. Upon graduating from Oregon State University in 2004 with Bachelor of Science in Civil Engineering, Benn came directly to FHWA-WFL and has 16 years' experience in Bridge/Structures, spending 6 years in the Eastern Federal Lands Bridge Department in Virginia. Benn has been back with Western Federal Lands since 2013 and leads a team of 8, focusing on Bridge Design (new and rehab for variety of Federal and State Partners) and Bridge/Tunnel safety inspections for other Federal Agencies from Alaska to Wyoming.

Bio: Devin Altman is a Senior Bridge Engineer and Project Manager for Jacobs out of the Corvallis office. He has 20 years of bridge industry experience working on a wide range of projects including design, load rating, rehabilitation, complex analysis, and construction engineering services on a wide variety of bridge structure types, including simple and complex steel bridges, located in the USA and internationally. Devin earned his Bachelor of Science in Mathematics from The Evergreen State College, and his Masters in Structural Engineering and Construction Engineering Management from Oregon State University.

TriMet Red Line Improvement Project

Session 5A-4

Presented By:
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The TriMet Red Line Improvement Project, known as A Better Red, adds a second track extending south from an existing tunnel below I-205 to the Gateway Transit Center. The project incorporates station improvements including reconstruction of the station at PDX. The addition of the new track requires two new bridges that pose unique construction challenges. The first bridge is a multispan 471.5-foot-long steel plate girder bridge spanning over I-84, UPRR, and fitting underneath the Halsey Street ramp. The steel girder erection was performed successfully under strict site constraints and planned closures of I-84. The second bridge, the Gateway Green overcrossing, is a multispan 342.5-foot-long prestressed concrete girder bridge spanning over the existing light-rail Red Line, which was required to remain active during construction. To accommodate the active light-rail line, a unique design solution incorporating a cross beam constructed with a partial depth precast bottom and cast-in-place upper closure was designed. This project was delivered using construction manager/general contractor (CM/GC) procurement. This presentation will focus on the following topics:

- Design and construction challenges
- Design of the unique partial depth precast cross beam
- Design and construction with CM/GC

Bio: Shane Brown is a Sr. Structural Engineer at Parametrix with over two decades of experience specializing in the design, construction, and evaluation of highway, railroad, and light-rail structures. He is a proud father and a lucky husband. He enjoys camping, hiking, fishing, and hunting with his family and friends.

Bio: Steven Zychla graduated from Carroll College in 2016 with a BS in Civil Engineering, and a MS in Engineering and Technology from Ohio University in 2022. Steven has been working for Parametrix in the bridge and structures department since 2019. He recently passed the PE exam and is currently applying for his professional engineering license.

ODOT Material Source Updates

Session 5B

Presented by:
Michelle Wright, CEG
ODOT Engineering and Technical Services Branch
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This presentation will provide an update on the ODOT Material Source Program.

Bio: Michelle is a senior engineering geologist with ODOT ETSB and is the Material Source Program Manager.

Arizona Inn Remobilization, Emergency Response, and Phase 1 Remediation

Session 5B

Presented by:
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The Arizona inn landslide is large, deep-seated landslide crossed by US101 that has adversely impacted the highway since it was constructed in the 1930s. It is part of a larger slide complex located between port Orford and Gold Beach on the south coast of Oregon. The slide is nearly 2000 feet long and the landslide toe daylights to the west in the ocean. Movement of this slide has included slow creep as well as episodic large scale movement in response to rainfall events. The landslide is located within a complex block in matrix mélange with blocks ranging to hillslope scale. Attempts to stabilize this slide include regrading in the 1980s and a dewatering program in the 1990s. The dewatering design included an extensive horizontal drain network in the upper portion of the slide and a 200-foot-deep drainage shaft in the lower portions; from which additional horizontal drains were installed. This system successfully reduced pore water pressures and slide movement for over 20 years.

In January 2023, the lower portion of this slide mobilized and moved over 20 feet downlsope and to the west in response to weeks of heavy precipitation. This movement completely sheared the shaft at approximately 140 feet below ground surface. Subsequent investigations included reestablishing the groundwater and movement monitoring network. Based on the results of the subsurface investigation and past performance of the drainage system, it was decided that the most appropriate approach was to re-establish the drainage system. The initial phase of the drainage system, consisting of supplemental horizontal drains in the upper portion of the landslide, was completed in the summer of 2023. The performance of the horizontal drains was used to develop the Phase 2 drainage design which includes a new shaft and drain arrays.

This presentation will discuss the landslide history, the unique geology of the site, development of a 3D model of the landslide, the Phase 1 design and performance of the newly installed horizontal drains.

Bios:

Jamie is a Principal engineering geologist in the Bend office of Delve Underground. Jamie has 27 years of experience in the practical application of the geological sciences to both large- and small-scale engineering, permitting, and environmental projects for both the public and private

sectors. He has expertise in detailed site characterizations as well as broad general surveys for projects involving landslides, tunnels, unstable rock slides, dams, transportation, pipelines, industrial facilities, and power generation sites. He is the lead engineering geologist and project manager for the Arizona Inn Landslide Mitigation Project. Mr. Schick holds geology degrees from the University of Oregon (M.S.) and Middlebury College (B.A.).

Jill is a senior engineering geologist at the Oregon Department of Transportation in Region 3, Roseburg, Oregon. Jill has 18 years of experience with field, design, and project management experience in the areas of geologic hazard mitigation, geotechnical investigations, and aggregate quarry management. She works in geologically diverse Region 3, which is southwestern Oregon (accretionary terrains - mélange, volcanics, sedimentary basins) with a team of exceptional geologists and geotechnical engineers. Together they work to provide creative, effective, and economical solutions for project related geo-deliverables and urgent/emergency geo-hazards for the state transportation system.

Arizona Inn Landslide Mitigation: Deep Drainage Shaft Design Approach

Session 5B

Presented by:
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Tomsen Reed, PE, GE, CEG
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The Arizona Inn Landslide Complex is located between mile points 311.8 and 312.4 on US Highway 101, between Port Orford and Gold Beach, Oregon. The landslide has experienced persistent movements since the initial road construction in the 1930s. In the late 1990s, a vertical drainage gallery was installed in the landslide as means to reduce groundwater pressures in the landslide mass. The gallery consisted of an approximate 200-foot deep shaft with arrays of horizontal drains installed at three different elevations. In January of 2023, a large movement of the landslide deformed and sheared the shaft and compromised the system's functionality. Delve Underground and ODOT are collaboratively developing a new mitigation system to replace the existing system. As part of the investigation phase, a lidar scan of the existing shaft was completed that provided a detailed record of the displacement and loading caused by the landslide movement. Based on review of the performance of the original shaft and the observed geotechnical conditions, it was decided to relocate the shaft outside of the landslide boundaries. The new shaft will consist of a 20-foot diameter, 210-foot deep shaft that will collect discharge from 62,000 linear feet of horizontal drains. This presentation discusses the performance of the original shaft under landslide loads, mitigation alternatives analyses, dewatering and stability evaluations, and design/construction approach for the new shaft.

Bios:

Bryan is a Principal Engineer at Delve Underground. He has 25 years of geotechnical, design, and construction engineering experience encompassing a wide breadth of projects, including tunnels, shafts, unstable slopes, and excavation support across the United States. Much of his experience has focused on ground characterization and development of underground excavation support systems. He is the lead design engineer for the Arizona Inn Landslide Mitigation Project. Mr. Duevel holds degrees in Geological Engineering from the University of Wisconsin (M.S.) and University of Minnesota (B.S.).

Jamie is a Principal engineering geologist in the Bend office of Delve Underground. Jamie has 27 years of experience in the practical application of the geological sciences to both large- and small-scale engineering, permitting, and environmental projects for both the public and private sectors. He has expertise in detailed site characterizations as well as broad general surveys for projects involving landslides, tunnels, unstable rock slides, dams, transportation, pipelines, industrial facilities, and power generation sites. He is the lead engineering geologist and project manager for the Arizona Inn Landslide Mitigation Project. Mr. Schick holds geology degrees from the University of Oregon (M.S.) and Middlebury College (B.A.).

Tomsen is a geotechnical engineer at the Oregon Department of Transportation in Region 3, Roseburg, Oregon. Tomsen worked for Gerhart Cole, a geotechnical consulting firm in Utah for 7 years before coming to ODOT, working on a variety of geotechnical projects from data collection through design and construction. His main professional interests include landslides, rock slopes, and other projects with a significant engineering geology component. Tomsen came to ODOT in January of 2023 and has since been involved with emergency response to geologic hazards, as well as programmed geotechnical design in Region 3.

1200-CA Compliance: Background and ODOT's Approach to EMP Requirements

Session 5B

Presented by:
Kyle Roslund, RG
ODOT Region 2
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In 2022, the Oregon Department of Environmental Quality updated requirements for the 1200-CA stormwater general discharge permit. Many of ODOT's projects in Region 2 trigger the 1200-CA permit and compliance during the rollout of new requirements have created confusion with some of ODOT's contractors. This first such update since 2003 includes additional required EMP and, under certain circumstances, a Contaminated Media Management Plan to maintain permit compliance. This presentation will discuss 1200-CA permit background, EMP triggers and requirements, and Region 2's approach to EMP preparation and compliance.

Bio: Kyle has been with ODOT for over 3 years and serves as the Region 2 Senior Hazmat Geologist. Prior to ODOT, Kyle worked in consulting for 15 years throughout the Pacific Northwest focusing on site remediation, mine site cleanups and asbestos work. Kyle is a graduate of Albion College in Michigan and is the recipient of the J Harlan Bretz Award. Kyle completed graduate coursework at Western Michigan University with an emphasis in glacial geology and hydrogeology. In his spare time, he volunteers in his community and runs a local pollinator education non-profit.

NWEII: Steel Tubs Over I-17 in Downtown Phoenix AZ

Session 6A-1

Presented by:
Devin Altman, PE
Jacobs Engineering Group
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The Northwest Extension Phase II project extends light rail in downtown Phoenix, AZ. The project adds three new light rail stations and includes a series of "firsts" for Valley Metro and the community including the first elevated station and pedestrian platform that included a structural canopy truss bracing system, a curved dual track rail-only bridge over I-17, a four-story parking garage and a multi-modal transit center. The extension is expected to service 1,400 new daily riders. In addition to federal grants, the project was funded through Phoenix Transportation and regional proposition local residents supported.

The superstructure primarily consists of prestressed tub girders in the station regions of the elevated transit center, and curved steel tub girders over I-17 along with the adjacent longer spans. The substructure consists of architectural finished tapering blade columns, a hammerhead pier that supports both tracks together, drilled shafts, footings, and MSE walls. The project featured different design codes for various structural elements/systems and required a dynamic structural rail interaction analysis to determine frequency of deflections with highspeed light rail. On January 27, 2024, the Northwest Extension Phase II light rail project opened for service. The opening of the 1.6-mile extension expands the Valley Metro Rail system to 30 miles, while opening new connections to the West Valley. Residents can now travel from Mesa, Tempe, and downtown Phoenix to new areas of northwest Phoenix. This project builds upon the success of the Northwest Extension Phase I, which opened in 2016. The Northwest Extension Phase II is anticipated to further stimulate community investment, fuel economic growth, and serve thousands of new riders each day. The presentation will discuss the design and construction challenges and lessons learned on this CMGC project.

Bio: Devin Altman is a Senior Bridge Engineer and Project Manager for Jacobs out of the Corvallis, Oregon office. He has 20 years of bridge industry experience working on a wide range of projects including design, load rating, rehabilitation, complex analysis, and construction engineering services on a wide variety of bridge structure types, including simple and complex steel bridges, located in the USA and Internationally. Devin earned his Bachelor of Science in Mathematics from The Evergreen State College, and his Master of Engineering degree in Structural Engineering and Construction Engineering Management from Oregon State University.

OR217 Auxiliary Lanes:
Bridge Widening Design Considerations

Session 6A-2

Presented by:
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Bob Grubbs
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The OR217 Auxiliary Lanes project is currently in construction and seeks to improve safety and reduce bottlenecks on OR 217 by adding auxiliary lanes, or ramp to ramp connections, between Beaverton-Hillsdale Highway and OR 99W. Work began in December 2021 and continues through 2025.

This presentation focuses on bridge widening design work for the Allen Road and Denney Road complexes. The existing reinforced concrete box girder structures were widened with a combination of prestressed and cast-in-place concrete elements. New foundations were needed to support the widened superstructures.

Design topics:

- Use of existing plans, survey data and 3D modeling
- Methods for concrete widening attachment, resin-bonded bars and mechanical splices
- Determining where to draw the line with retrofit, strengthening, seismic resiliency design
- Specific details and oddities of widening work
- Conveying widening work in a plan set

Bio: Fred Gomez is a Professional Engineer with 14 years of experience in transportation related engineering: roadway design, bridge maintenance, bridge design and bridge preservation. He is currently the Lead Bridge Preservation Engineer for ODOT.

Bio: Bob Grubbs is one of the ODOT Regional Bridge Lead Engineers, stationed in the Region 3 Roseburg office. He is an Oregon Tech graduate that has been with ODOT since 1997, with most of his time in bridge design.

Sun River Bridge Replacement

Session 6A-3

Presented By:
Michael Pyszka, PE
Parametrix
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The Sun River Bridge project consists of replacing the existing two-span 250-foot-long single-lane structurally deficient steel truss that was built in 1916. Originally constructed to carry a large-diameter wood-stave siphon across the river, the bridge was converted to carry only vehicles in the mid-1940s when the siphon was relocated below the river. The proposed replacement structure is a three-span 460-foot-long prestressed, post-tensioned concrete girder bridge with the deck elevation 90 feet above the river surface. Located in the Rocky Mountain Front 19 miles west of Augusta, Montana, the project is in a remote location, complicating material availability and delivery. This presentation will focus on the following topics:

- Inspection of the 10-foot-diameter siphon under the Sun River
- Use of a post-tension girder design to accommodate shipping constraints
- Use of ODOT precast concrete deck panels
- Site constraints and construction challenges

Bio: Michael Pyszka, PE is a senior engineer and has been with Parametrix for 19 years. Prior to that, he was a general contractor and then worked in the Bridge Maintenance Department at Clackamas County for 6 years as a bridge maintenance worker. He currently leads the bridge and structures group for Parametrix in the Portland-Vancouver region. Michael is the Deputy Structures Lead for the Interstate Bridge Replacement Program and is also active in bridge projects throughout the Northwest, including Alaska and Montana. When not working, he enjoys spending time with his family, biking, rafting, and home renovation.

A Phased Approach to Delivering Emergency Landslide Repairs

Session 6B

Presented by:
Christopher K. Ell, PE, GE
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This presentation focuses on the delivery of two emergency landslide repair projects located in the foothills of the coast range and along the scenic Rogue River in Curry County, Oregon. Following the impacts of atmospheric river storm events and other environmental factors that caused the collapse of each of the roadways, immediate action was necessary to shore the slopes to avoid total loss and complete closure of the roadway. The presentation will discuss the phased approach to restoring the roadways to original lane width. The initial emergency response included short term temporary measures to prevent complete collapse of the roadway using available resources and local contractors, and to provide a single lane for traffic at sites with very long detours or no alternative route. The final phase of the project implemented the use of specialty geotechnical landslide repair contractors with innovative and cost-effective solutions to rebuild the roadway to full width over steep erosional scarps. The presentation discusses the subsurface investigations performed for each of the sites, a discussion of selecting the preferred landslide repair alternative, and the roles of the geotechnical engineer and the design-build specialty contractor. The selected landslide repair for each site utilized two similar approaches consisting of a micro-pile supported wall fascia with hollow-bar grouted soil nails and low strength or lightweight cellular concrete wall backfill.

Bio: Chris is a Principal with 24 years of experience, 12 of those being completed with GRI. He has a strong background in shallow and deep foundation design, seismic analyses, and considerable experience with heavy earthwork projects including construction of driven piles, drilled shafts, secant piles, micropiles, drilled and socketed piles, and soldier pile tied-back retaining walls, slope stability and settlement analysis.

Albany RR Spill: Mitigating Risks Following a Fuel Spill Impacting a Bridge Footing

Session 6B

Presented by:
Sarah Hunt, RG
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This presentation will examine the challenges and strategies involved in responding to a fuel spill that occurred beneath an ODOT highway overpass. A railroad engine leaked about 1,300 gallons of red dye diesel at the base of a bridge pier under Highway OR99E/ US20 in Albany Oregon. As delineation and clean-up efforts were unfolding, the ODOT Geotechnical, Bridge, and Hazmat groups collaborated to ensure the stability and safety of the bridge structure during the clean-up.

Bio: Sarah has over a decade of experience at ODOT, beginning as an intern in the geology department. She found her niche in hazardous materials and is also involved in the material source (quarry) program. She holds a degree from the University of Oregon. In her spare time, she is an event designer for the Eugene Environmental Film Festival and enjoys playing music, kayaking, and spoiling her pets.

gINT Update

Session 6B

Presented by ODOT gINT Advisory Committee Members Including:

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Micah G. Lederer, CEG
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This presentation will provide an update on ODOT's transition from gINT to a new subsurface data management software program.

Bios:

Jeff is an engineering geologist in ODOT's Region 1 and has been with the agency since late 2019. Prior to joining ODOT, Jeff worked in consulting for about 20 years, with a variety of project experience throughout Oregon and Washington. He has many fond memories of working with gINT during that time, and looks forward to seeing what the future holds with regard to geotechnical logging software.

Larry is a highly skilled data scientist who has worked for nearly a decade for the Oregon Department of Transportation as the Region 2 Engineering Geologist. Educated at Portland State University, his skillset includes ArcGIS, Rockfall analysis, complex multivariate data analyses, and multilanguage programing with Artificial Intelligence enhancement. Mr, Robinson has led the geotechnical unit in developing and incorporating the use of Artificial Intelligence in our data analysis and processing methodology.

VanBuren Bridge Build

Session 7A-1

Presented by:
Jared Trowbridge
DOWL
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While beloved by the community, the Van Buren Bridge in Corvallis, OR was aging infrastructure that was neither seismically resilient nor capable of carrying modern freight loads. Replacement of the bridge took decades to plan due to the unique challenges of the project site, funding constraints, and community interest in preserving the original structure.

Project design needed to be sensitive to the cityscape, an active multi-modal transportation community, and existing navigational clearances for the Willamette River. Decision points included where to connect to the existing city grid, how to minimize impacts to Riverfront Commemorative Park, and how to maintain bike path connectivity. A geotechnical setting of seemingly bottomless fine alluvium in the river and a steep western riverbank complicated design.

This presentation will provide an overview of the constraints that guided the development the new bridge carrying Van Buren Avenue over the Willamette River in Corvallis. Discussion will include vertical profile, span layout, superstructure type selection, aesthetic concerns, and the seismic design complications resulting from these decisions.

A brief overview of construction progress to date will be included.

Bio: Jared Trowbridge graduated from Oregon State University with a Master of Civil Engineering in 2011 and joined DOWL directly afterward. Since then, he has served as construction and bridge inspector, bridge designer, and project manager. He is now DOWL's Bridge & Structures Business Leader. His construction, bridge inspection, and bridge design background help him guide his teams and lead projects from design through construction. Jared was the Assistant Project Manager for the Van Buren Bridge project.

Aerodynamic Induced Flutter and the Megler Bridge

Session 7A-2

Presented by:
Steve Lovejoy
ODOT Bridge Engineering Section
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Agency bridge 07949C carries US 101 over the Columbia rive between Astoria, Oregon and Megler, Washington. When constructed in 1961 it was the longest cantilevered thru truss in the US with a span of 2464 feet. The wind loads on this structure can cause various truss members, the verticals in particular, to torsionally vibrate, which is easily observed by people driving across the bridge.

Additional bracing was added to selected vertical truss members in 1986. The author was introduced to this problem in 1997 and applied more bracing for corrective actions to reduce the undesirable torsional vibrations on vertical members. From 2011 to 2013 ODOT and OSU Civil Engineering conducted a study of this aerodynamic induced flutter of the vertical members. The research identified the direction and magnitude of wind that causes these vibrations and quantified the induced stresses in the truss members concluding that fatigue damage could occur in the future.

This presentation reviews these efforts, discusses a recent repair of flutter induced fatigue cracking and pays respect to a previous Bridge Section engineer, Dexter Smith, who predicted the collapse of the Tacoma Narrows bridge.

Bio: Steve Lovejoy is a Senior Engineer with the Oregon Department of Transportation Bridge Engineering Section where he has worked since 1991. His wealth of knowledge is astounding.

Aerodynamic Induced Flutter and the Megler Bridge

Session 7A-3

Presented by:
Andrea Mather
ODOT
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Andrew Blower
ODOT Structures Coatings Engineer
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This presentation will discuss the construction challenges and opportunities on the Yaquina Bay CP project.

Bio: Andrea Mather is an Assistant Resident Engineer (ARE) at ODOT in the Area 4 Construction office in Corvallis, a role she has held for the last 3 years. As ARE, she manages a wide variety of construction contracts including Yaquina Bay Bridge, Moolack Landslide Repair, Ellsworth and Jefferson Bridge rehabilitations, and the Halsey reconstruction project.
Andrea graduated from Oregon State University with a Bachelors and Master's Degree in Civil Engineering and acquired her Civil Engineer license in the State of Oregon. During college she interned at ODOT for 4 summers in the Construction and Planning offices which included working on the Pioneer Mountain to Eddyville project. In her free time, she enjoys gardening and hiking.

Bio: Andrew Blower has been serving with ODOT's Construction Section as the Statewide Structure Coatings Engineer providing coatings quality assurance since 2021. Previously Andrew served with ODOT's Bridge Engineering Section as a Corrosion Engineer and Electrical Designer providing cathodic protection, bridge lighting, and movable bridge electrical design; material testing, service life analysis, and non-destructive evaluation since 2009.

Quality in ODOT Project Design

Session 7A-4

Presented by:
Kristie Gladhill
ODOT Project Delivery
QA/QC Sr. Program Engineer
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This presentation will provide an overview of the quality program, where to access quality standards of practice, and how we are using them now that ODOT has Region Technical Center quality plans in place alongside the statewide discipline quality plans.

- Quality Control, Quality Assurance, and Quality Verification.
- How the discipline, Region, and consultant quality plans work together: the importance of statewide discipline plans

QA reviews: discipline, project, programmatic, and consultant quality

Bio: Kristie Gladhill is the Project Delivery QA/QC Program Manager in the Statewide Project Delivery Branch of the Oregon Department of Transportation. Kristie has been with ODOT since 2012, working in traffic safety, traffic analysis, and quality. Kristie has a MS in Transportation Engineering from Portland State University and is a registered Professional Engineer in Oregon. She enjoys hiking, music, gardening, and paying with her grandson.

Emergency Response, Mitigation, and Design of Rock Cuts 1-9, SH-55, Smiths Ferry, ID

Session 7B

Presented by:

James R. Struthers, CEG, LG, PG
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The Idaho Transportation Department (ITD) District 3 has been overseeing the widening of SH-55 between Smiths Ferry and Round Valley, approximately 60 miles north of Boise, Idaho. At this location the highway follows a deep incised canyon formed by the North Fork of the Payette River. The goal of ITD's project was to improve roadway geometry and site distance by widening and realigning the roadway using a series of rock cuts and downslope wall systems. Within the one-mile project limits, work included are nine major rock slopes ranging between 60 feet and 200 feet high. When construction began in September 2020, Delve's role on the project was as the blasting consultant, with geotechnical design supported by others.

On March 15, 2021, Rock Cut 9 failed catastrophically, damaging several pieces of heavy equipment, and closing the road. Fortunately, no human casualties were incurred. ITD immediately contacted Delve to mobilize to the site, to assess the circumstance that caused the rockslide at Rock Cut 9, and assess and redesign rock cuts 1 through 9. To facilitate assessment of the rock cuts, the team used rope access safety techniques and drone/UAV technology to characterize the geology and develop plan view and cross-sections of the rock cuts. Based on the analysis and on-site assessment for potentially adverse dipping joints, the team redesigned the rock cut inclinations (typically 0.5:1) and identified locations for pattern and spot rock dowel anchors for each lift before excavation of the next lift. The team provided blasting consulting for over 80 blasting plans; developed plans, specifications, and estimates (PS&E) for the rock-cut designs; and oversaw installation of rock dowels, mesh drape, pinned mesh stabilization systems, and drains.

This talk will discuss the project history, slope failures and emergency response efforts, kinematic and mechanical constraints on design, and redesign and construction efforts over the three-year construction period, culminating with completion of the project in Summer of 2023.

Bio: Jim is a Principal Engineering Geologist at Delve Underground with a practice that focusses on rock mechanics and slope stability issues, primarily for transportation facilities. He has worked as a geotechnical professional in the Pacific Northwest for more than 28 years and enjoyed a varied career that includes work on landslide and rockfall mitigation projects as well as on the SR 520 Bridge Replacement and Alaskan Way Viaduct Programs. Prior to joining Delve, Jim was the Chief Engineering Geologist for the Washington State Department of Transportation. Jim has a BS degree in geological sciences from the University of Washington with an emphasis on structural geology and tectonics. Jim recently served as Chair of the Washington State Geology Licensing Board.

HazMat Considerations for the I-205 Abernathy Bridge Project

Session 7B

Presented by:

Teresa Nowicki, RG
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The I-205: Abernethy Bridge Project is a portion of the larger I-205 Improvements project. This talk will present the hazmat work generated by the project. This will include studies prepared in anticipation of the larger project, responses to changing regulatory approaches, reactions to unforeseen field conditions during construction, mitigation of future issues and ongoing concerns.

Bio: Teresa is a hazmat geologist in ODOT's Region 1. She has 20 years of experience in environmental consulting in California, Oregon and Washington including 6 years at ODOT. Teresa is a registered geologist in Oregon and licensed hydrogeologist in Washington. She has an undergraduate degree in toxicology from Northeastern University and a masters degree in hydrology from New Mexico Institute of Mining and Technology.

Management of Coastal Transportation Infrastructure in Changing Times: A Practical Example from Beverly Beach, OR

Session 7B

Presented by:

Rory “Tony” Robinson
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Larry Robinson
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Coastal transportation infrastructure is continuously threatened by unique design risks associated with high energy littoral environments. As the effects of climate change continue to manifest, these unique set of risks are becoming more acute, highlighting the need for effective and adaptive management techniques. The purpose of this discussion is to present an example of these new approaches to managing these mounting challenges from a current real-world example, Beverly Beach, Oregon.

Beverly Beach consists of a 2.6-mile-long section of US101, located between Otter Rock on the north and Yaquina Head on the south. Previously, the Region 2 Geotechnical Unit provided a scoping-level design for a global repair of the Beverly Beach area as 2124_00576: US101 Beverly Beach Slide Repair, in September 2022.

In brief, the study area was divided into 22 roadway segments, based on the underlying geologic conditions. After performing a field reconnaissance, a review of maintenance history and a historical review of aerial imagery, each of these segments was ranked by risk to the highway and ultimately reduced to 7 individual segments judged to be the most critical. The single most critical section includes a 0.31 mile stretch of US101 extending from MP 133.94 to MP 134.25, which we anticipate will lose travel lanes first and within the next few years.

An application to the Protect Grant Program has been made to fund an Advanced Investigation (A.I.), intended to begin the design effort for the most endangered section of this important transportation corridor. Unlike other A.I. efforts, the danger to US101 is not driven by landsliding

alone; rather, the slippage or coastal bluff collapse results directly from aspects of coastal erosion. While the underlying and problematic geology greatly contributes to the overall problem, the triggering factors for the bluff collapse are entirely oceanic in origin. Resultantly, any substantial repair must include some manner of coastal revetment. Though, we acknowledge that such a revetment is not possible without a waiver from the Goal 18 Criteria, which is managed by the Oregon Department of Land Conservation and Development.

Accordingly, this project would greatly benefit from a coastal engineering study to understand the complex engineering aspects for the effective design and development of such a revetment. These aspects include: a study to determine maximum tidal elevations, wave uprush height and energy, design elevations needed to address potential sea-level rise as well as effective design strategies (i.e. shape and configuration) for any such revetment. Any A.I. efforts for this project would of course also include a geotechnical component; however, with limited funds available, the primary effort should focus on the potential revetment design, with a secondary effort to supplement the collection of additional geotechnical data. It is anticipated that any such A.I. study, would also likely provide the additional benefit of assisting in the effort to justify the needed and incredibly critical waiver from the Goal 18 Criteria.

Author Bios:

Rory "Tony" Robinson is a highly experienced senior design engineer with four decades of demonstrated work history on complex multidisciplinary projects. Skilled in Geotechnical Engineering, Engineering Geology, Geo-Mechanics, and Geo-Hydrology; Educated at the University of Southern California with a Master of Science and a Doctor of Philosophy (Ph.D.) focused in Engineering Geoscience.

Brian J. Cook has over a decade of experience working in geotechnical consulting within Oregon. He is a professional with strong leadership and team building skills, educated at Portland State University with both a Bachelor of Science and a Master of Engineering focused in Geotechnical Engineering.

Michael Tardif is the Senior Engineering Geologist for ODOT with approximately 25 years of experience. He has been with the Region 2 Geotechnical Unit in Salem for over 15 years. He is specialized in subsurface investigations for complex highway and bridge projects, as well as geohazards, with a specialty in landslide investigation and monitoring. Prior to joining ODOT, Mr. Tardif worked in consulting for two years in southern California and seven years in Portland, Oregon. He is a graduate of California State University of Long Beach.

Larry Robinson is a highly skilled data scientist who has worked for nearly a decade for the Oregon Department of Transportation as the Region 2 Engineering Geologist. Educated at Portland State University, his skillset includes ArcGIS, Rockfall analysis, complex multivariate data analyses, and multilanguage programing with Artificial Intelligence enhancement. Mr, Robinson has led the geotechnical unit in developing and incorporating the use of Artificial Intelligence in our data analysis and processing methodology.

Oceanfront Revetment Design and Construction, Gleneden Beach, OR

Session 7B

Presented by:

George Freitag, CEG
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Oregon has 362 miles of Pacific Ocean coastline which for centuries was used by First Nation people. Settlers used sections of coastline for wagon traffic and eventually motor vehicles. In 1913, and before establishment of the State Transportation Commission, Governor Oswald West successfully promoted legislation designating Oregon beaches as the first state 'public highway' and allow vehicles access between the low and high tide lines. In 1967, after conflict between private landowners and the public regarding beach access, Governor Tom McCall successfully promoted the "Beach Bill" which provided public beach access as zoning easements extending to the vegetation line rather than as "takings" from landowners. Oregon's statewide planning goals and guidelines (Goal 18: Beaches and Dunes), which are meant to conserve and protect coastal beaches and dunes, do not allow development built after January 1, 1977, to use protective structures like seawalls, riprap revetments, and breakwaters as erosion control measures. A multifamily residential project at Gleneden Beach was subject to substantial beachfront erosion (30+ ft between 1994 and 2019). Because the project was constructed after 1977 Goal 18 limitations were applicable. The design team reviewed site and area erosion conditions and established a technical approach for a stone revetment and the project was eventually approved by the local planning authority. The project was constructed in 2023 and site constraints required the use of a construction staging area 1/3 mile south of the project. Construction traffic required access to the project along the beachfront, thus again utilizing one of Oregon's original 'public highways".

Bio: George is a Principal with GRI in Tigard, Oregon. He has practiced engineering geology and environmental management for over 35 years in Oregon, Washington, Nevada, and California for a variety of public and private projects. Much of his work involves the never-ending challenge of siting new improvements or maintaining existing improvements on sloping marginally stable ground in places that measure rainfall in feet per year.

WSDOT's Development of Standard Plans for Buried Structures in Support of Fish Passage

Session 8-1

Presented by:
Amy Leland
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State highways cross streams and rivers in thousands of places across Washington State, many of which have substandard pipes or culverts impeding fish migration. The Washington State Department of Transportation (WSDOT) has worked for nearly three decades to improve fish passage and reconnect rivers and streams to help keep our waterways healthy. Fish barrier correction, as a priority, has created an opportunity to employ precast reinforced concrete Buried Structures as an economical solution without requiring a full-scale typical bridge. Once the utilization of precast Buried Structures became a common State practice, especially for spans twenty feet and greater, the need for Standard Plans quickly became paramount. This presentation explores the State's efforts to develop Standard Plans for Buried Structures in support of fish passage restoration projects. From developing a basis of analysis, incorporating hydraulic and geotechnical parameters, to working with a consultant, a software developer, and the precast industry in generating the published Standard Plans, the entire process will be packaged into a concise synopsis of the State's development efforts.

Bio: Amy Leland is the State Bridge Design Engineer for the Washington State Department of Transportation. Amy graduated with her Maters of Science in Engineering degree from the University of Washington, and is licensed as a Professional Engineer and a Structural Engineer. Amy has been working in the WSDOT Bridge Design Office since 1999. Her bridge design experience includes structural analysis and design for reinforced concrete, prestressed concrete, post-tensioned concrete, and steel bridges. Amy has participated in establishing policy and overseeing research for WSDOT.

Interstate Bridge Replacement

Session 8-2

Presented by:
Ray Mabey
ODOT
raymond.mabey@odot.oregon.gov

Provide an update on the progress and status of the Interstate Bridge Replacement from a technical bridge perspective.

Bio: Ray Mabey is an Assistant Program Administrator for the IBR program. He briefly served as the State Bridge Engineer for ODOT. He has over 30 years of experience as an engineer, administrator and manager with ODOT, where he has worked on hundreds of different bridge programs of various sizes. He has extensive experience with combined project delivery, engineering and program and project management experience.

Ray might be a small-town guy at heart, but he loves nothing more than making a big-time impact on the world around him. As Assistant Program Administrator for the IBR program, Ray is perfectly positioned to do exactly that. In this role, he is supervising and directing much of the day-to-day work of the program, bringing his three decades of experience and expertise with ODOT into play.