State of the Division

Session 1-2

Presented by:
Amy Ramsdell
ODOT
amy.j.ramsdell@odot.oregon.gov

This presentation will provide updates to recent and upcoming changes in the ODOT Delivery and Operations Division of ODOT.

Bio:

Amy was appointed Delivery & Operations Division administrator in August 2024 and was previously the Commerce and Compliance Division administrator for over seven years. She oversees ODOT's capital program as well as the maintenance and operations programs.

Amy has been with ODOT since 1997 and has served in a variety of positions in both divisions, delivering projects, standing up programs and leading a variety of teams. She worked in banking prior to joining the agency. Amy holds a Bachelor of Science in Business Economics from Willamette University.

Seismic Ground Improvement Design Considerations, Myths, Misunderstandings, (and Hopefully Useful Clarifications)

Session 1-3

Presented by:

Scott Schlechter
GRI
sschlechter@gri.com

Tom Grummon
ODOT
Tom.Grummon@odot.oregon.gov

This presentation will highlight some common challenges and misunderstandings in the consideration and implementation of ground improvement in bridge design and construction. The talk will discuss considerations associated with the ODOT BDM and GDM language and common design, contracting, construction considerations and constraints. A series of case histories will be presented to contrast design approaches between varying types of site conditions, structure types, and contracting approaches.

Bio:

Scott Schlechter is a Principal with GRI and has 24 years of geotechnical experience. He has focused his career on the seismic design aspects of projects including challenging soil-structure interaction; deep foundation design; settlement evaluation and monitoring; and ground improvement considerations.

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.

ODOT Seismic Update

Session 2-1

Presented by:
Albert Nako
ODOT
Albert.Nako@odot.oregon.gov

Current and upcoming seismic updates to the ODOT BDM and GDM.

Bio:

Albert is the Seismic Standards Engineer for the Oregon Department of Transportation (ODOT). One of his main responsibilities is to maintain and update the Seismic Design Section of ODOT's Bridge Design Manual (BDM). Albert has also been heavily involved with the seismic vulnerability assessment of the Oregon state highways and resiliency planning. The latest results of this work have been incorporated in the Seismic Plus Reports and other documents published by ODOT. Albert has been with ODOT for 22 years.

Albert is a Registered Professional Engineer in the state of Oregon.

A Fully Precast Solution for ABC in Seismic Regions: From Concept to Validation, Implementation, and Post-Earthquake Retrofit Strategies

Session 2-2

Presented by:
Mustafa Mashal
Idaho State University
mashmust@isu.edu

Accelerated Bridge Construction (ABC) offers many advantages compared to cast-in-place construction. However, ABC applications in seismic zones have been limited. A new precast pier system for ABC applications in seismic zones is proposed. The precast pier system uses hollow structural tubes filled with concrete in plastic hinge locations. Extensive testing on precast cantilever and bent piers was conducted to investigate seismic performance under quasi-static cyclic loads. Results were compared against benchmark cast-in-place specimens. Testing showed superior performance of the precast pier compared to cast-in-place. The Idaho Transportation Department (ITD) recently implemented the research in the design and construction of the Fort Hall Interchange bridge over I-15 in Southeast Idaho. As a follow up to the first phase of the research, ITD funded a second project at Idaho State University to investigate post-earthquake retrofit strategies for the precast pier using Ultra-High Performance Concrete (UHPC). ITD has already utilized UHPC in more bridges than any other state in the Western United States, primarily for closure-pour between precast superstructure elements. In the second phase of the research, a novel use of UHPC as a concrete jacket for retrofitting of plastic hinge zones in the precast piers was proposed. Large-scale cantilever pier specimens from the first phase of the research were retrofitted with UHPC in their plastic hinges and re-tested under cyclic quasi-static loading to the failure point. The design philosophy for retrofitting was to shift the plastic hinge above the damaged region of a pier, thus re-instating capacity, stiffness, and ductility to the piers. It was shown that UHPC is indeed an effective solution for retrofitting of concrete piers subjected to severe earthquake damage. Experimental results from testing of the piers along with guidelines on retrofitting and construction techniques will be presented.

Bio:

Dr. Mustafa Mashal is a Professor of Structural and Earthquake Engineering and Director of the Structural Laboratory and Disaster Response Complex at Idaho State University. He is a Fellow of the ASCE's Structural Engineering Institute. Dr. Mashal has been part of 150 scholarly publications, 4 patents, and has served on national committees for developing building/bridge standards, including ASCE/SEI 7 & 41, TRB AKB50, PCI Bridges & Industry Handbook, and other committees in the United States.

US97 Seismic Retrofit of Seven Bridges in Klamath Falls

Session 2-3

Presented by:

Jeff Olson
Consor Engineers
jeff.olson@consoreng.com

Paul Strauser
ODOT
Paul.J.STRAUSER@odot.oregon.gov

This project constructed phase two retrofits on six bridges and replaced one bridge. This completes upgrades to US97 and provides a seismically resilient corridor from I-84 to the California border. The Pelican City Bridge was replaced using Accelerated Bridge Construction techniques.

Bio:

Jeff Olson is a Principal Bridge Engineer with Consor and the project manager for the US97 Seismic Retrofit project in Klamath Falls.

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.

Seismic Design and Retrofit of Three Bridges: Seismic Vulnerabilities, Challenges, and Solutions

Session 2-4

Presented by:
Saeed Javidi
Niroman
sjavidin@gmail.com

Seismic retrofitting of bridges is a critical aspect of infrastructure resilience, particularly in regions with high seismic activity. This presentation will focus on three significant bridge projects in Vancouver, BC that involved complex seismic design and retrofitting challenges and innovative engineering solutions to address seismic vulnerabilities. The case studies include the Port Mann Highway 1 Bridge, Cypress Creek Bridges, and Granville Bridge.

The Port Mann Highway 1 Bridge project involved the design of a 27-span steel girder bridge with a base isolation system. A key aspect of this project was detailing the substructure for a top-down construction system in a wetland area and conducting non-linear time-history and pushover analyses to ensure a seismic performance-based design was met. The Cypress Creek Bridges project was a seismic retrofit and rehabilitation of a 430 ft-long concrete bridge with 80 ft-high pier tables over the Cypress Valley. A link slab was utilized to reduce the seismic displacement to avoid unnecessary seismic retrofit of concrete substructure elements.

The seismic retrofit of the Granville Bridge, a 2600 ft-long steel truss structure, included the replacement of bearings with a base isolation system and the application of response spectrum analysis (RSA) and non-linear time-history analysis to meet the project design criteria.

This presentation will discuss the site-specific challenges encountered in each of these projects and the innovative engineering methodologies implemented to address seismic vulnerabilities. The discussion will highlight key design considerations, analysis techniques, and retrofitting strategies that contributed to enhancing the seismic resilience of these essential infrastructure assets.

Bio:
Saeed Javidi is a Sr structural engineer with 20+ years in consulting, specialized in bridges, rapid transit systems, and underground structures. Saeed's experience includes design, analysis, seismic retrofit and rehabilitation, and detailing of steel/concrete bridges and underground stations.

Renting Acrow Bridges for Accelerated Bridge Construction

Session 2-5

Presented by:

Tom Pinder
Acrow Bridge (Retired)

Deon Lourens
Acrow Bridge
dlourens@acrow.com

Acrow Bridge: From a single span to a large-scale bridge development programs, Acrow bridges are built to last – versatile, easy to assemble and cost-effective. Precisely fabricated with components made of sustainable, high-strength U.S. steel. We provide bridges for temporary, emergency, or permanent applications. Acrow connects you to durable bridging worldwide.

Bio:

Tom Pinder, BS Metallurgical Engineering, Michigan Technological University 1977. Worked in Steel manufacturing, Chemical and Environmental fields, Combustion engineering and finally with Acrow Bridge for the last half of his career as a Sales Manager and then Sr. Business Development Manager. Tom is now retired but still helping the company with training new employees and presenting at technical seminars like this one.

ODOT BDM & Bridge Rail Update

Session 3A-1

Presented by:
Emily Clyburn
ODOT
Emily.CLYBURN@odot.oregon.gov

This presentation will cover recent and upcoming changes to the ODOT Bridge Design Manual related to bridge rail and other structures.

Bio:
Emily is the Bridge Design and Practices engineer for ODOT. She manages the Bridge Design Manual and is the technical resource for Bridge Rail, Bridge Approach Systems, and Bridge Decks. She started her career with the Delaware DOT in 2005 but came on to her native state of Oregon in 2012.

Load Rating: Manual Update & Changes from New NBIS Rules

Session 3A-2

Presented by:
Jon Rooper
ODOT
jonathan.w.rooper@odot.oregon.gov

Will provide a brief description of the latest update to the ODOT LRFR Manual (to be published in April 2025), load rating tools, and examples. Will then discuss some of the changes to load rating procedures as required from the new National Bridge Inspection Standards.

Bio:

Jon graduated in 1996 from Texas A&M University with a B.S. in Maritime Systems Engineering and began working for ODOT that same year. At ODOT he has worked as a project inspector, a bridge designer, and load rater. In 2010, Jon promoted to his current position as the Senior Load Rating Engineer at ODOT. As the head of the five-person load rating unit, he provides technical management of the load rating program with a $6M biennial budget for the load rating of state and local agency bridges.

Fast-track Hydrodemolition: Rapid Rehabilitation of Concrete Bridge Decks

Session 3A-3

Presented by:

Dave Dobson
ODOT
David.DOBSON@odot.oregon.gov

Matthew Stucker
ODOT
Matthew.STUCKER@odot.oregon.gov

New 2023 bridge deck overlay specs allow "Fast-Track" hydrodemolition with high early strength concrete. This rapid method removes/replaces deck material, potentially in one shift. 2024 projects yielded valuable lessons. This presentation highlights best practices for design and implementation.

Bio:

David is the Statewide Structural Materials Engineer for the Oregon Department of Transportation.

Matthew Stucker has provided structural design services at ODOT for over 26 years and has led bridge design teams in successfully delivering several large, moderately-complex projects with multiple structures. He has also implemented unique structural and corrosion-resistant solutions for several of Oregon's coastal bridges in marine environments. Currently, he serves as a Bridge Design Lead Engineer for a team of structural designers delivering structural design services for ODOT Region 2.

Survival Guide for Bridge Preservation Projects

Session 3A-4

Presented by:
Fred Gomez
ODOT
Fred.M.GOMEZ@odot.oregon.gov

The objective of ODOT Bridge Preservation projects is to preserve historic structures while making discrete modifications to the structures to achieve modern-day design standards. These structures were not originally designed and detailed for the load magnitude and dimensions of today's loads. Getting these structures to pass structural analysis checks, both for the temporary construction and permanent conditions, can be a challenge.

This presentation covers topics related to structural analysis, design, detailing, and load rating. Additional constraints, including historic resource considerations and temporary traffic impacts, further complicate feasible solutions.

Due to the complex nature of these projects a high degree of critical thinking and risk management is required. There is not a well-defined step-by-step procedure for this work, but this presentation will provide various project examples and resources for survival.

Bio:
University of Idaho alumni. A Professional Engineer with 16 years of experience in transportation related engineering: roadway design, bridge maintenance, bridge design and bridge preservation. Currently the Lead Bridge Preservation Engineer for the Oregon Department of Transportation.

Hood River BR Emergency Response & Repair from Over Height Vehicle Collision Damage

Session 3A-5

Presented by:
Eric Rau
HDR
Eric.Rau@hdrinc.com

On June 27, 2024, an overheight vehicle collided with the overhead portal bracings of the lift span of the existing Hood River – White Salmon Interstate bridge ("Hood River Bridge"). The Port of Hood River ("POHR") contacted HDR for an immediate recommendation. Based on an initial briefing and photographs provided by the POHR, HDR recommended that the POHR close the bridge until additional field investigations and structural assessments could be performed to further investigate the extent of the structural damage and impact on the bridge's capacity. The Hood River Bridge is a 1924 steel truss with a vertical lift span that is a vital Columbia River crossing connecting Hood River, Oregon with the communities of White Salmon and Bingen in Washington. The bridge closure on June 27, 2024, significantly impacted the local community including commuters, freight transport, farmers hauling produce from orchards to market, cruise liners, vacationers, and others. The bridge closure also resulted in loss of tolling revenue to the POHR. Repairing and safely opening the bridge was critical. HDR's recommendation to close the Hood River Bridge initiated a 24-day accelerated endeavor to first evaluate the bridge's capacity to carry traffic in the damaged state and then design and install bridge repairs so it could be reopened to all roadway and Columbia River traffic. The presentation will cover the incident response, accelerated assessment and design, and construction of bridge repairs.

Bio:
Eric Rau is a Senior Bridge Engineer and Professional Associated at HDR. Eric was the Engineer of Record and technical lead for the project, participating in the initial on-site inspection of the bridge while providing oversight to the installation of the permanent repair work.

Changes in the ODOT Geotechnical Engineering, Engineering Geology and HazMat Organization

Session 3B-1

Presented by:
Susan Ortiz
ODOT
Susan.C.ORTIZ@odot.oregon.gov

Recent strategic review of ODOT recommended organizational changes in ODOT for the right-of-way, hydraulic, and geotechnical engineering, engineering geology, and hazmat disciplines. This presentation will outline the process that has centralized the GEEGH organization, the organization of the newly centralized GEEGH Section, next steps, and how this will impact you.

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 quality assurance, and project delivery for the Geotechnical Engineering, Engineering Geology, and Hazardous Materials disciplines. Susan has worked for the Oregon Department of Transportation for the past 20 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.

Cyclic Testing of Soils: What it Can Mean For Your Project

Session 3B-2

Presented by:

Tom Braibish
ODOT
Thomas.E.BRAIBISH@odot.oregon.gov

Jason Bock
GRI
email

Traditionally, liquefaction is assessed using empirical relationships known as the "simplified procedures". These relationships have been refined and expanded over the last 20+ years to account for many of the uncertainties we find in liquefaction evaluations. However, it should be noted that these relationships were primarily developed within relatively clean, shallow, sandy soils. As the seismic hazard in the northwest has increased, utilization of this method has been commonly used in evaluating our local soils. The results often indicate a relatively large liquefaction hazard. In recent years, universities, agencies, and consultants have begun to implement the use of cyclic direct simple shear (CDSS) testing to evaluate our local soils on a site-specific basis. The CDSS test is a laboratory test procedure that measures the cyclic strength and liquefaction characteristics of soils and is used to evaluate the dynamic behavior of soils under cyclic loading conditions, simulating scenarios like earthquakes. This presentation will explore the results of this site-specific testing and the benefit it can have on often challenging bridge projects; review a collection of cyclic data that was compiled for ODOT by PSU, New Albion Geotechnical, and others; and give some guidance on best practices for acquiring high quality soil samples and conducting CDSS testing.

Bio:

Tom Braibish, PE is a Senior Geotechnical Engineer with Oregon the Department of Transportation, Region 1. He has 28 years of geotechnical engineering experience working on projects across Oregon, of which 22 years have been with ODOT. While at ODOT, Tom has led or coordinated geotechnical design teams on variety of projects throughout northwest Oregon ranging from landslide and rockfall mitigation to major bridge replacements. Tom has also served as a consultant project manager and as the Geo/Hydro/HazMat unit manager for ODOT, Region 1. Tom earned his BS in Geology and MSCE from Portland State University.

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.

2023 Sandlake Road Landslide: Geotechnical Evaluation and Emergency Repair

Session 3B-3

Presented by:
Micah Hintz
Haley & Aldrich
mhintz@haleyaldrich.com

In early December 2023, a landslide undermined and damaged an approximately 140-foot-long section of Sandlake Road, a two lane rural highway in Tillamook County that runs roughly parallel to the Oregon coastline. The day following the slide, Tillamook County Public Works engaged Haley & Aldrich to provide emergency geotechnical engineering consultation and emergency repair services, with an initial goal of restoring at least one lane of traffic to the public as soon as possible.

Haley & Aldrich performed an expedited geotechnical assessment of the slide and concluded that failure was induced by heavy rainfall in late 2023, resulting in elevated groundwater levels in the slope. The slide scarp was observed to roughly coincide with the road centerline – the western half of the road that had experienced failure was found to be underlain by fill prism, older landslide deposits, and weathered siltstone, while the relatively intact eastern half was underlain primarily by residual soil and siltstone bedrock. The study also included an assessment of the extensive history of coastal landslides and repairs in the vicinity of the slide.

The emergency repair services completed in February 2024 included construction of a soil nail wall to temporarily stabilize the exposed landslide scarp, as well as installation of temporary traffic lighting to allow for two-way traffic along the single operational traffic lane. Development of a permanent remedy is underway, which will likely consist of a mechanically stabilized earth (MSE) embankment or MSE wall to restore two-lane service to the road.

Bio:

Micah Hintz, PE, GE, is a Geotechnical Engineer and Senior Project Manager with Haley & Aldrich in Portland. He has accrued 17 years of geotechnical consulting experience serving private clients and public agencies throughout the western United States.

Programmatic Landslide Mitigation at Hagg Lake Perimeter Rd

Session 3B-4

Presented by:
Chris Carpenter
Cornforth Consultants Inc.
chris.carpenter@ccilt.com

This presentation will discuss Washington County's approach to mitigating five landslides on the Hagg Lake perimeter road. It will describe the challenges the team navigated as they prioritized projects, sought funding, implemented a design approach, and coordinated with multiple federal agencies.

Bio:
Mr. Carpenter has spent 23 years practicing geotechnical engineering in the Pacific Northwest focused on design of geotechnical hazard mitigation.

ODOT Concrete Bridges Update

Session 4A-1

Presented by:
Tanarat Potisuk
ODOT
tanarat.potisuk@odot.oregon.gov

This presentation will cover recent and upcoming changes to the ODOT Bridge Design Manual related to concrete.

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

North Spokane Corridor Prestress Spliced Girder Fabrication

Session 4A-2

Presented by:

Dan Serra
Knife River
Dan.Serra@kniferiver.com

Jordan Pelphrey
Pelphrey Prestress Partners
jordan.pelphrey@pelphreyprestress.com

The North Spokane Corridor is a 10.5-mile section of US 395 in Washington State. As part of the route, The Spokane River Crossing consists of two side by side 1211-foot-long post tensioned, precast, prestressed, concrete girder bridges. Each bridge consists of eight spans of concrete girders. Spans 1, 2, 3, 7, and 8 consist of seven lines of precast, pretensioned concrete wide-flange bulb-tee girders (WF83Gs). These girders are 83 in. deep and weigh up to 163,000 lb, with spans ranging from 113 ft 4 in. to 148 ft 4 in. Spans 4, 5, and 6 consist of seven lines of girder segments, with each line made of five precast, post-tensioned concrete segments (WF83PTGs): two end segments, two hammerhead pier cap segments weighing almost 200,000 lb each, and one center drop-in segment. Spans 4, 5, and 6 make up 540 ft of the total bridge length, with end spans 4 and 6 measuring 155 ft each and center span 5 measuring 230 ft. The presentation will focus on the fabrication and delivery of the girders.

Bio:

Dan Sierra 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 12 years on both building and bridge projects.

Jordan is the Director of Engineering for Pelphrey Prestress Partners located in Grand Rapids, Michigan, where he specializes in providing solutions to prestressed concrete bridge beam producers across the country. He has over 20 years of prestressed concrete experience, including 10+ years working at Knife River Prestress in Harrisburg, Oregon, and ~3 years working at Kerkstra Precast in Grand Rapids, Michigan. He has both a master's and a bachelor's degree in civil engineering from Oregon State University and is an active member of the Precast/Prestressed Concrete Institute.

Design of the 3rd St Flyover Bridge in Bend

Session 4A-3

Presented by:

Henry Wolf
Kiewit
henry.wolf@kiewit.com

Thanh Phan
Kiewit
Thanh.Phan@kiewit.com

This presentation covers the 3rd Street Flyover Bridge in Bend, Oregon. The bridge is a post-tensioned concrete box-girder rigid frame that demonstrates the continued effectiveness of this structure type. Designed to address a challenging 318' radius curve, it outperforms chorded precast girders by avoiding excessive deck overbuild. The greenfield site facilitated the use of falsework, making a cast-in-place (CIP) concrete structure economical and practical.

Aesthetically, the bridge aligns with existing structures in the corridor by featuring a variable depth box design, meeting the owner's desire for a consistent visual theme. The rigid frame effectively utilizes the deeper superstructure section at the bents to reduce demand at the shallower midspan. This structure type is rare today, as simple span bridges often use precast prestressed concrete (PSC) girders, adding a unique aspect to the project.

To minimize the need for periodic inspection and maintenance, the rigid frame to footing connection utilizes chromium reinforcement. This eliminates the need for elastomeric bearings and a thrust block. The integral diaphragm connecting the substructure to the superstructure also negates the need for bearings, enhancing long-term performance.

Bio:

Henry Wolf is a Structural Engineer at Kiewit. He is a licensed Professional Engineer with over 9 years of experience. Past projects include post-tensioned concrete segmental bridges utilizing a variety of construction methods (precast cable-stayed, balanced cantilever, and span-by-span), prestressed concrete I-girder bridges, and steel plate girder bridges.

Thanh Phan has 13 years of experience, all at Kiewit Engineering Group, providing structural design and engineering services for a wide variety of structures. He provides the full spectrum of engineering services to clients, including conceptual through final designs, construction engineering services, and the design of temporary structures.

Thanh has worked on both simple and complex structures, serving under a variety of roles including engineer-of-record, design engineer, peer reviewer, and engineering services during construction. Outside of work, Thanh enjoys spending time with his wife and working on Legos with his son, with the occasional round of tennis as time allows.

A Roadmap to Commercial-Scale Carbon Capture, Utilization, and Storage in Oregon

Session 4B-1

Presented by:
Ruarri Day-Stirrat
DOGAMI
Ruarri.Day-Stirrat@dogami.oregon.gov

The Pacific Northwest (PNW) is set to become a thriving, carbon-negative economy, leveraging Oregon's Climate Protection Program and Washington's pioneering cap-and-invest policy, a robust renewable energy grid, and widely distributed geologic storage system, attracting innovative technologies like direct air capture (DAC), point source removal, and geologic carbon sequestration (GCS). The State of Oregon has established ambitious climate goals aimed at significantly reducing greenhouse gas emissions by 2035, and achieving net zero carbon emissions by 2050. Realizing those goals hinges on establishing regional carbon-management hubs across the PNW, capable of safely and permanently storing CO2 from these and other anthropogenic sources. Here we outline the current steps being taken in Oregon to move toward CCUS deployment, with emphasis on GCS in the Columbia River Basalt Group (CRBG), from geologic characterization, to regulatory framework development, and stakeholder.

The CRBG, which covers much of the PNW, offers a promising solution, with storage potential exceeding twenty times the annual US CO2 emissions. Notably, the CRBG has demonstrated capacity to mineralize and permanently trap injected CO2 within its pore space in under a decade, potentially reducing the burden of long-term stewardship and multi-generational monitoring, a significant advantage over conventional sedimentary basins. Despite this potential, CRBG development and characterization within Oregon remain in their early stages.

CCUS in Oregon will require dedicated electricity generation upstream, together with adaptation or build-out of infrastructure for carbon processing and potential transportation, for utilization of carbon in useful end-products or sequestration in the CRBG. The scale and distribution of GCS targets in the CRBG are currently based on pilot-scale testing in Washington, hence a new program of geologic and hydrologic characterization of the potential reservoir system, together with subsurface and surface monitoring, is needed prior to deployment. Community and engagement and workforce development will be critical to successful CCUS deployment, and with active collaboration essential in understanding the impacts on local communities, and implementing their needs.

Bio:

Dr. Day-Stirrat is Oregon State Geologist and Executive Director of the Oregon Department of Geology and Mineral Industries who surveys the geology of Oregon and regulates Mining, Geothermal, Oil & Gas, and all exploration activities in those areas. Prior to leading an executive agency, Dr. Day-Stirrat spent 16 years in geoscience research solving problems related to mineralogy, water, and developing technologies for exploration. He has published more than 30 peer-reviewed publications crossing method development, clay mineralogy, machine learning, and fluid flow in porous media. He is an expert in lithium in claystones.

Quarry Resources:
Tempering Short Term Impulse with Long Term Vision

Session 4B-2

Presented by:
Michelle Wright
ODOT
Michelle.F.WRIGHT@odot.oregon.gov

Aggregate resources are facing unprecedented challenges, as the relentless drive for access to aggregate collides with conversations on sustainability, land use permitting, large scale energy corridor sitings and multi-use pressures on state and federally held lands. The complexity of maintaining the Agency's material resources network, dedicated for use on the federal aid highway system, is increasing. At the same time, for transportation infrastructure, access to aggregate products, of specified quality and quantity, is critical to construction of capital improvements projects, maintenance and operations activities and emergency response. Yet, overall availability of aggregate resources, at a given location, and the influence of this on fostering bidding competition, enabling specification compliance, and promoting construction schedules often is overlooked. The inclination to acquiesce to the short-term complexity of maintaining material resource assets must be tempered by the long-term vision of what is provided by a network of resources reserved specifically for the federal aid highway system. This presentation will discuss these challenges and the Agency's vision of the future of the material resources network.

Bio:

Michelle is a Oregon Certified Engineering Geologist and has worked for the Oregon Department of Transportation (ODOT), in NE Oregon, since 1999. Michelle has served as a member of technical design teams, in local agency construction management and currently is that agency's Material Source (Quarry) Program Manager where her responsibilities include oversight of a network of approximately 1500 agency owned and controlled material sources. In this role, Michelle is the technical resource for practical working needs including long term material source network planning, gap analysis of the network, development, entry design, and blasting for material extraction. Additional responsibilities include leading responses to state and federal initiatives affecting ODOT's material source network. Prior to ODOT, Michelle worked in consulting in Washington and Oregon. When not at work, she enjoys spending time with her husband and their children, their dogs, horses and menagerie of other farm critters.

ODOT Statewide Beneficial Use Determination for Highway Shoulder Soil – 2025 Renewal and Expansion

Session 4B-3

Presented by:

Kirsten White
GeoEngineers
kwhite@geoengineers.com

Shawn Rapp
ODOT
Shawn.R.RAPP@odot.oregon.gov

Soil near roadways is commonly impacted by several traffic-related contaminants, including lead and polycyclic aromatic hydrocarbons. The presence of contaminants poses soil management challenges during road construction projects. After a statewide study in 2017, ODOT was issued a Beneficial Use Determination (BUD) for highway shoulder soil by Oregon Department of Environmental Quality (DEQ) in 2019. Approved beneficial reuses were assigned by physiographic province and included non-residential fill and mine reclamation fill. The 2019 BUD significantly reduced costs for roadside soil management.

ODOT's goal is to renew and expand the BUD in 2025. The 2025 shoulder soil study for this work is ongoing. The study includes collection of shoulder soil samples at several distances from pavement and depths, across several physiographic provinces in Oregon, on highways with varying average annual daily traffic loads. As during the 2017 study, soil data will be evaluated with random forest classification tree models, using the R programming language, to develop a predictive model of lead and benzo(a)pyrene concentrations in soil. The results will be compared to regulatory limits, including DEQ Clean Fill Criteria and Risk-Based Concentrations. Proposed soil beneficial reuse options will be submitted to DEQ.

The ongoing BUD renewal and expansion process will be discussed in this presentation, including inter-agency communication challenges, a summary of the 2017 shoulder soil study and 2019 BUD, data gaps and goals for the 2025 BUD, and the 2025 shoulder soil study sampling program design and implementation.

Bio:

Kirsten White has over 18 years of environmental consulting experience. Kirsten's work has been focused on environmental assessment, source control, remedial investigation/feasibility study, and remedial design involving a wide range of contaminants. Kirsten holds bachelor's and master's degrees in civil engineering from Purdue University and is a licensed Oregon professional environmental engineer. Kirsten has supported ODOT as a project manager on several hazmat projects since 2017. In her spare time, Kirsten enjoys traveling, gardening, and fostering rescue dogs.

Shawn Rapp is the Statewide Senior HazMat Geologist and the HazMat Program Lead in the Geotechnical Engineering, Engineering Geology and HazMat Section. He is responsible for Hazardous Materials and Environmental Geology standards, acts as the lead on larger statewide projects and permits, and provides technical support to ODOT Regions. Shawn has worked for the ODOT for just under 10 years. Prior to working for ODOT, Shawn worked for the DEQ for over 6 years. Prior to his public service, Shawn worked for several environmental consulting firms as a Staff Geologist and Project Manager for 7 years in Oregon and Ohio. Shawn is a licensed Registered Geologist in the State of Oregon.

ODOT Steel Bridges Update

Session 5A-1

Presented by:
Alex Lim
ODOT
Alex.K.LIM@odot.oregon.gov

Provides updates on recent changes to ODOT Bridge Special Provisions, including new guidance for diversion bridges, temporary containment requirements, and bolt specifications—along with the background and rationale behind each revision. Additionally, key updates to the Bridge Design Manual Section 1.6 (Structural Steel) will be discussed, highlighting material specification changes, industry practices, and lessons learned from recent projects that informed these updates.

Bio:
Alex Lim, PE is the technical resource for steel bridge design and new concrete decks at ODOT.

Basalt Creek Lean-on Bracing Design

Session 5A-2

Presented by:
Bernard Frankl
DOWL
bfrankl@dowl.com

Basalt Creek bridge is a new structure being constructed in Tualatin, OR. This structure is a 720-foot long bridge consisting of seven, 160-foot, 200-foot, 200-foot, 160-foot continuous, four span steel plate girders. This straight and square bridge presented DOWL with the opportunity to reduce fabrication and erection costs using lean-on bracing. Lean-on bracing is gaining popularity across the country; however, largely un-tested in the Pacific Northwest.

The Basalt Creek bridge cross-bracing uses a double and mirrored "S" patterned configuration for the braced cross-frames. This transforms 14-percent of the cross-frames from traditional cross-frames to lean-on braces. The double-S layout configuration was employed to manage the unbraced length during girder erection and eliminate the need for temporary cross-braces. DOWL employed a three-dimensional analysis in addition to girder stability forces to evaluate and design the cross-bracing and lean-on bracing. This allowed DOWL to perform side-by-side, three-dimensional analysis of full cross-bracing and the lean-on bracing system. DOWL observed the increased distortional stresses developed in the lean-on bracing system and noted the increased cross-frame forces imparted into the traditionally braced frames. DOWL will present lessons learned, the resulting design, and provide a comparison to an equivalent fully-braced system.

Bio:

Bernard A. Frankl, Ph.D., PE., has designed and rated a multitude of highway structures, including steel girder bridges, tied arch bridges, steel truss bridges, prestressed girder bridges, and movable steel bridges. Bernard has extensive experience in advanced modelling of bridge and tunnel structures with an array of structural analysis software. He is an expert in analysis and design of steel plate girders through his extensive design experience and in-depth research.

Fatigue Evaluation of Bolted Connections

Session 5A-3

Presented by:
Steve Lovejoy
ODOT
Steven.C.LOVEJOY@odot.oregon.gov

I will discuss the basic principles of fatigue failure of bolted connections as they apply to steel highway bridges and compare this will the more general applications of stress life fatigue analysis.

Bio:
Senior Mechanical Engineer and Fracture Control Engineer. Bridge Engineering Section since 1991.

SR305 Sam Snyder Creek Fish Barrier Removal

Session 5A-4

Presented by:
Shane Brown
Parametrix
sbrown@parametrix.com

The Washington State Department of Transportation (WSDOT) initiated a project to replace two concrete pipe culverts approximately 60 feet beneath SR 305 at Sam Snyder Creek with a fish passable structure. The highway is a key route for people traveling between Kitsap Peninsula, Poulsbo and Bainbridge Island, with views of the surrounding Puget Sound area. The route also provides access to Seattle by the Bainbridge Bridge Island/Seattle Ferry route. Through a rigorous evaluation of bridge types and span configurations, a 239-ft long single span steel plate girder bridge was selected as the preferred structure type. The new bridge is supported by abutments walls with drilled shaft foundations. The bridge was designed and built using a staged construction-approach, to ensure SR305 remained open to traffic during construction. Unique design challenges for this project included:

- Designing Soldier Pile Walls with Low Density Cellular Concrete Backfill to resolve Slope Instability for Widened Roadway Approaches.
- Designing Partial Top Flange Lateral Bracing to resolve Global Displacement Amplification in Narrow I-Girder Bridge Units.
- Designing Drilled Shaft Foundations with Permanent Casing to Limit Foundation Lateral Movements for Serviceability.
- Designing for 100-year service life with weathering steel and special coatings.

This presentation will provide an overview of the project and highlight the designed solutions to address the unique challenges and lessons learned from construction.

Bio:

Shane is a senior structural engineer and project manager with a BS in Civil Engineer from OSU and 25 years of diverse experience in the design of new bridges and load rating analysis of existing bridges. His experience includes single and multi-span bridges of various types including prestressed concrete, post-tensioned concrete, single and curved steel plate girders, steel truss, and timber bridges.

Infrastructure Upgrades & Ecological Uplift: Environmental & Engineering Geology of the Kellogg Creek Restoration & Community Enhancement Project

Session 5B-1

Presented by:
Gregory Martin
GRI
gmartin@gri.com

Kellogg Dam, constructed in the 1850s and obsolete by the 1890s, underlies a 1930s-era bridge on Highway 99E in Milwaukie, Oregon. It blocks upstream fish passage to over 17 miles of habitat and forms an approximately 14-acre reservoir impoundment, largely filled with accumulated sediment. The North Clackamas Watersheds Council, American Rivers, the Oregon Department of Transportation (ODOT), and the City of Milwaukie are primary project partners in the Kellogg Creek Restoration & Community Enhancement Project (KCRCEP). The KCRCEP will remove Kellogg Dam and upgrade critical infrastructure by constructing a channel-spanning highway bridge; increase accessibility and public safety with a new multi-use pathway; re-establish fish passage to the upstream watershed and connectivity at the lower Kellogg Creek-Willamette River confluence; and restore ecological functionality to several acres of currently submerged or buried riparian habitat. On-water work in summer 2024 included 31 machine-drilled borings, 8 cone penetration test (CPT) probes, 21 sediment sampling locations, and 16 limited-access explorations. A combination of barge-mounted, amphibious/difficult access drilling equipment and hand exploration tools were used. GRI's geotechnical exploration program was designed with input from ODOT, project restoration design engineers, and biologists. Sediment sampling and analysis was completed under multi-agency Portland Sediment Evaluation Team (PSET) oversight. Data acquired during this field campaign informed the project environmental sediment management approach including excavated soil handling and disposal options of contaminated sediments; provided critical geotechnical data informing design details for bridge replacement, dam removal, and post-restoration channel and floodplain features; and supplied essential engineering information for critical slope stability evaluations.

Bio:

Greg Martin is a Senior Geologist with GRI in Tigard, Oregon, and a resident of the Kellogg Creek watershed. His professional work includes oversight and support of environmental and engineering geology and geotechnical projects in Oregon, Washington, and California.

HazMat Cleanup at Remote Geotechnical Drill Site

Session 5B-2

Presented by:
Michelle Peterson
ODOT
Michelle.L.PETERSON@odot.oregon.gov

A hydraulic fluid release occurred from a track-mounted drill rig during demobilization of the drill rig at a remote location along Oregon Highway 86 in Baker County, Oregon. Geotechnical drilling was being conducted in support of a culvert replacement project planned at Fish Creek, above Pine Creek. The project will construct an appropriately-sized culvert, improve the Fish Creek channel alignment, and provide for fish passage. A drilling access route was established in collaboration with multiple disciplines to minimize impacts to archeological sites and the riparian zone. The upper portion of the access route used an existing gravel road, while the lower portion of the access route was a temporary road constructed through a riparian zone along Fish Creek. Construction of the temporary portion of the access road required brush clearing and construction of three temporary wood bridges to cross the Fish Creek channel. Drilling equipment was staged near the transition of the gravel road to the riparian zone approximately 600 feet away from the drill hole locations. As the drill rig was demobilized from the drill hole locations to the staging area, small quantity of hydraulic fluid was released slowly from a loose fitting. ODOT requested the drilling company to conduct a cleanup using methods that would cause the least harm along the temporary access road. Hand tools were used to conduct the cleanup over a period of two days. The release was successfully remediated.

Bio:

Michelle has been working as a hazmat geologist for more than 30 years. For the last 6 years, she's been supporting ODOT Region 5, but prior to that she spent more than two decades in environmental consulting. She has investigated and remediated a wide range of sites on behalf of local, state, and federal government agencies throughout the western US, including Alaska. She now uses her skills to support investigations on behalf of ODOT to identify and mitigate hazards for transportation construction projects throughout Region 5.

Regional Rockfall Mitigation Strategy: Where the Rocks Land in ODOT Region 1

Session 5B-3

Presented by:
Michael Zimmerman
ODOT
Michael.J.ZIMMERMAN@odot.oregon.gov

Rockfall along the highway system elevates safety hazards, decreases system reliability because of closures and restrictions, and results in increased maintenance efforts. When it comes to deciding where to prioritize rockfall mitigation efforts using a limited budget, ODOT Regions face some difficult questions: How will we prioritize and select projects? Is there work we can contract through Maintenance instead of relying on STIP projects? Are there proactive mitigation methods we can use? How can we build upon the work of the statewide Unstable Slopes Program managed by the ODOT Engineering & Technical Services Branch? Region 1 Geo/Hydro/Hazmat unit (R1 Geo) is concluding a study to develop a Region 1 rockfall mitigation strategy to address these questions. After sifting through decades of rockfall incident reports and evaluating the current condition of rockfall sites across Region 1, we have recommendations.

This presentation will discuss conclusions from this study. The value of keeping photographs and written narratives is paramount. These records are the starting point of this study and will be the information we leave for our successors. A Rockfall Closure Index scoring system to evaluate risks to traffic mobility will be introduced. Use of this index to supplement the ratings provided by the ODOT Unstable Slope Program will be discussed. The significance of rockfall catchment area designs and consequences of legacy infrastructure will be emphasized. The effects of rock slope deterioration processes will be justified as reasons to prioritize slopes that aren't causing problems (yet). Recommendations for proactive maintenance practices, corridor planning and continued work, and compelling questions without answers will all be discussed.

Bio:

Michael Zimmerman, CEG, PE, GE came to ODOT in 2018 after 21 years in local geotechnical consulting. He brings expertise in applying understanding of geologic history and processes to engineering design and the built environment. He earned his Bachelor of Science in Geological Engineering from the University of Missouri-Rolla and his Master of Science in Geological Engineering from Michigan Technological University.

Goodbye gINT. The Fun is Over, BoreDM Will Ensue

Session 5B-4

Presented by:
Curran Mohney
ODOT
Curran.E.MOHNEY@odot.oregon.gov

Since its introduction in 1986, generations of Engineering Geologists and Geotechnical Engineers have regaled their clients with the stirring prose of soil and rock descriptions alongside their corresponding graphical representation comprised of the many whimsical patterns available from the gINT libraries. The forging of every Geo Professional has included hundreds if not thousands of hours of keyboard toil: entering data from mud-smeared field logs, rounds of edits from indecisive project managers and contradictory lab data, and innumerable attempts to successfully export stick logs into some form of graphic display. In 2014 GCA, the parent company of gINT was assimilated by Bentley. The Geo community rejoiced. Finally, graphic depiction of subsurface conditions would be seamless. The megabytes of geotechnical data would flow effortlessly from the data tables of gINT forthwith to whatever cross-section, profile, or diagram desired. Many even dared to dream of the effortless construction of structure contours and isopachous maps. Alas, no. And in the tradition of corporations everywhere when faced with a difficult technical challenge, decided to sunset the existing system and replace it with something harder to use and more expensive. A team of ODOT specialists assembled, and with great determination evaluated potential replacements. The potential replacements all have good qualities along with drawbacks. The team considered many aspects of geotechnical data management. Data entry to graphical depiction of the subsurface conditions, and organization of data geographically. The team considered the primary aspects of how this software should function and selected the product that best meets the needs of the agency. Every Geo Professional recognizes that there will always be some amount of boredom that accompanies the tasks previously carried out with gINT. For the geotechnical practice at ODOT, it's now BoreDM.

Bio:

Curran Mohney, R.G., C.E.G. 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.

Other Structures

Session 6A-1

Presented by:
Zach Beget
ODOT
Zach.BEGET@odot.oregon.gov

In January 2022 ODOT decided to update and clarify how the "Other Structures TS&L" was handled. The committee of all disciplines that are part of the other structure process came up with a form and for internal processes defined the roles and responsibilities for other structures. The new process is complete and will be coming out in the latest version of the Project Delivery Manual.

Bio:

With over 20 years of experience in both the private and public sectors, Zach has spent all of his career in bridge design and inspection. He's currently serving as the State Bridge Design Engineer for ODOT, he leads the statewide design unit which resides in all five Tech Center locations. Based in Central Oregon, Zach and his wife are raising four energetic boys who keep the family busy with 4-H activities, soccer, and their hobby farm.

OR47: Messing Creek (Mist) Structural Plate Arch

Session 6A-2

Presented by:

Josh Beattie
ODOT
Joshua.BEATTIE@odot.oregon.gov

Alex Keenan
Contech Engineered Solutions
alex.keenan@conteches.com

On January 5, 2022, severe flooding caused Messing Creek in Mist, Oregon, to rise and wash out a culvert on OR47 at MP 11.6, leading to highway failure. As an emergency measure, three six-foot culverts were installed to restore functionality. However, these culverts did not meet fish passage requirements. ODOT Region 2 Tech Center initiated a project to enhance stream passage and design a compliant structure.

Existing Conditions: Roadway: OR47 is a two-lane highway with a posted speed limit of 35 mph near the project site. The area includes multiple driveways, timberland access, and an elementary school.

Traffic: 2022 AADT was 538 vehicles, projected to increase to 570 by 2042. Trucks make up 23% of traffic. One fatal crash occurred in the project area between 2012 and 2022.

Geology & Utilities: Soil tests showed no excessive corrosive minerals. Overhead power lines, underground gas, and communication lines may require relocation.

Environmental Factors: Messing Creek is a critical fish habitat with a restricted in-water work period (July 1 – August 31). A small wetland is present near the project site.

Future Condition & Selected Alternative: The project considered a Structural Steel Plate Open Bottom Arch and a Precast Slab Bridge. The buried arch structure was selected due to: Lower cost: $543,672 vs. $1.77M for the bridge, faster construction timeline to meet emergency funding constraints, sufficient compliance with hydraulic and structural requirements.

The selected design features a 40’-7” span, 9’-6” rise, and 85’ length, ensuring proper stream passage. The project balances cost, efficiency, and environmental compliance while improving long-term infrastructure resilience.

Bio:

Josh Beattie has dedicated nine years to ODOT. He began as a Construction Inspection Intern before transitioning to Bridge Inspection. In 2018, he moved into Bridge Design, where he earned his Professional Engineering License. For the past 2.5 years, he has served as a Licensed Structural Design Engineer, contributing to projects in new bridge design, buried structures and various bridge preservation efforts.

Alex Keenan is a Regional Bridge Consultant with over 10 years of experience in the design and implementation of prefabricated bridge structures. Alex specializes in buried bridge structures, modular truss bridges and permanent scour protection. A graduate of George Fox University with a Bachelor of Science in Civil Engineering, Alex brings a strong technical foundation and a collaborative approach to every project, helping public agencies streamline bridge replacement and new construction efforts through proven prefabrication methods.

Seattle Waterfront Overlook Walk

Session 6A-3

Presented by:
Gary Conner
Jacobs
gary.conner@jacobs.com

Overlook Walk, a new elevated park connecting Seattle's waterfront to downtown, officially opened in October 2024. This project – which is part of the broader Waterfront Seattle Program – reconnects the city with its waterfront, providing stunning views and accessible pathways for residents and visitors alike. Jacobs served as overall Program Manager for the Seattle Waterfront redevelopment and led the structural design of the Overlook Walk project.

Bio:

Gary is a bridge engineer and transportation business manager for Jacobs with 35 years of experience. He has a master's degree from Oregon State University and spent the first 11 years of his career working in Seattle and Olympia before moving back to Oregon. His work has included design and seismic retrofit of many bridges in the Seattle area and in recent years is frequently the lead bridge engineer on projects in Oregon, Washington, and Alaska.

Cornell Road Tunnel Rehabilitation: Design & Construction

Session 6B-1

Presented by:

Bryan Duevel
Delve Underground
duevel@delveunderground.com

Ryan Roe
PBOT
Ryan.Roe@portlandoregon.gov

Northwest Cornell Road includes two tunnels as it passes through Portland's west hills. The tunnels are 491 feet and 247 feet long, respectively and convey two lanes of traffic. The tunnels were constructed in 1940 and completed with cast-in-place concrete linings. Maintenance issues have grown progressively in both tunnels over time, primarily due to the age of the structures and have manifested as cracking, delamination and spalling of the concrete lining. In addition, a predominant zone of tunnel distress was present in Tunnel #2 which included a network of long, transverse cracks in the quarterarch with up to 5/8-inches of offset. In 2019, the Portland Bureau of Transportation initiated a rehabilitation project address structural defects and reduce future maintenance in the tunnels. A unique construction approach was selected for the rehabilitation which included hydrodemolition of portions of the existing lining and replacing it with reinforced shotcrete. Several repair types were developed depending on the defect type and condition of the lining. As is often the case with rehabilitation of aging structures, unexpected conditions were encountered during construction which required flexibility and rapid changes to the design. This presentation discusses key aspects, observations and lessons learned during the design and construction of the Project completed in 2022.

Bio:

Bryan Duevel, P.E., G.E. is a Principal Engineer at Delve Underground in Portland, Oregon. He has 25 years of geotechnical, design, and construction engineering experience encompassing a wide breadth of projects, including tunnels, unstable slopes, excavation support and trenchless technologies across the United States. His experience includes geotechnical characterization, GBR development, tunnel condition assessments, rehabilitation, new development and construction. Bryan is a registered Professional Engineer in 6 states and a registered Geotechnical Engineer in Oregon. He holds degrees in Geological Engineering from the University of Wisconsin (M.S.) and University of Minnesota (B.S.).

Ryan Roe has been with the Portland Bureau of Transportation since 2018 in the Bridges and Structures division. Originally from New Jersey, Ryan has a degree in Civil Engineering Technology from the Rochester Institute of Technology and is a licensed professional engineer in Oregon. He has worked on a variety of projects in his career including design, construction, inspection and maintenance of various structures.

Design and Specification Considerations for Transportation Trenchless Crossings

Session 6B-2

Presented by:
Jamie Schick
Delve Underground
schick@delveunderground.com

The application of trenchless methods for crossing beneath roadways can provide significant benefits relative to open cut for both cost and mobility considerations. However, poorly designed and specified projects can result in negative outcomes such as excessive settlement, grade control issues or even a failed bore. This presentation will provide an overview of trenchless design and specification considerations for the consideration of transportation planners and designers. This will include a review of applicable trenchless methods commonly used for these types of crossings as well as key limitations / risks associated with these methods. Subsurface investigations should be designed specifically for trenchless crossings and ground conditions adequately communicated to contractors to reduce project risks. Design considerations such as drive length limitations, launch and receiving pits geometries, laydown areas as well as roadway settlement criteria will be reviewed. Development of contract drawings and specifications is critical to project success as they are the primary communication vehicle to the contractor. Design drawings will be reviewed and examples provided for future project consideration. Specifications should clearly convey project requirements for contractor experience, mitigation plans, grade control performance and monitoring, and settlement criteria. In addition to providing perspectives for future project designs, this information is also applicable for transportation staff asked to review trenchless crossings beneath roadways proposed by others.

Bio:

Jamie Schick, C.E.G. 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.).

Engineering Properties and Liquefaction Potential of Diatomaceous Earth

Session 6B-3

Presented by:
Jintai Wang
Oregon Institute of Technology
jintai.wang@oit.edu

The increasing interest in studying diatomaceous earth stems from the challenges posed by their presence in various engineering projects, such as the US 97 at Wickiup Junction project in Oregon. Diatomaceous earth consists of fossilized remains of diatoms, which have a highly varied and interlocking shape, giving the impression of strength until the skeletons crush under excessive stress. The engineering properties and cyclic behavior of diatomaceous earth are not well understood. This presentation discusses the results of geotechnical laboratory tests conducted on diatomaceous earth at Oregon Institute of Technology, including grain-size distribution, Atterberg limits, specific gravity, direct shear, and 1-D consolidation. The soil's performance under cyclic stress is evaluated through a series of cyclic triaxial shear tests. The required number of cycles to liquefy the diatomaceous earth sample under two confining pressures are presented. The results are used to calibrate an advanced constitutive model. The design parameters of the constitutive model are discussed.

Bio:

Jintai Wang is an assistant professor of civil engineering at Oregon Tech. He received his bachelor's and master's degrees from Tongji University and Ph.D. in Civil Engineering from Pennsylvania State University. Prior to joining Oregon Tech, he spent three years working in geotechnical design and instrumentation in Virginia. Jintai is a licensed Professional Engineer in California and Texas. His research focuses on liquefaction evaluation, non textbook soil, and Mazama ash.

I-5 over 26th Ave Bridge - Value Through Creativity

Session 7A-1

Presented by:

Joel Tubbs
DEA
joel.tubbs@deainc.com

Travis Kinney
DEA
travis.kinney@deainc.com

The I-5 over 26th Avenue bridge in southwest Portland, Oregon was recently constructed to replace an existing bridge that was a public safety risk due to the existing, heavily-worn, cracked and delaminated concrete bridge deck, and the lack of seismic resiliency for the regionally-critical Interstate 5 corridor. Early design development focused on traditional methods of construction that would have resulted in five stages of construction and over two years of freeway traffic impacts. During the project, the Oregon Department of Transportation elected to implement a value engineering study from which stemmed a unique combination of innovative methods that maximized both corridor mobility and work zone safety. The approach was to build the new bridge and retained approach fill under the existing bridge without ANY impacts to I-5 traffic. Then in a single weekend closure, the existing bridge was demolished and the new bridge was buried under roadway fill and pavement. Multiple aspects of the project required specialized materials and techniques due to the overhead restriction of the existing bridge carrying live traffic, including: micropile foundations, lateral translation of the precast, prestressed concrete slabs under the existing bridge on temporary supports; and mechanically stabilized earth walls filled with self-leveling/self-consolidating low-density cellular concrete. The 56-hour weekend closure of I-5 required careful planning, hour-by-hour scheduling, resource contingencies to mitigate delays, and a tremendous amount of public involvement. This innovative approach eliminated any traffic from traveling through an active I-5 construction work zone for all of the major bridge construction activities.

Bio:

Joel Tubbs is a senior bridge engineer, project manager, and Portland office bridge group lead for David Evans and Associates. He has been with DEA for 26 years. On the I-5 over 26th Avenue project, Joel was the DEA project manager for the Enhanced Scoping phase that confirmed the project's primary objective, and was the bridge task lead for Project Development.

Travis is a senior bridge engineer at David Evans and Associates with 16 years of experience in bridge design, preservation, load rating, inspection, and program management. Before joining DEA, Travis was responsible for overseeing ODOT's bridge maintenance program.

OR217 – Construction of a Major Urban Corridor Widening

Session 7A-2

Presented by:
Eric Paslack
Shannon & Wilson Inc
eric.paslack@shanwil.com

The Oregon Department of Transportation (ODOT) is substantially through construction of a major urban corridor widening of OR217 in Beaverton, OR. The scope of the project includes several ramp widenings, new alignments, retaining walls, sound walls, and multiple new bridge structures to allow for a 3-mile continuous auxiliary lane in the southbound direction and a 1-mile continuous auxiliary lane in the northbound direction. Geologic conditions and site constraints dictated use of varying foundation types for bridge support including drilled shafts, micropiles, and driven pile as well various retaining wall types including soil nail walls, soldier pile tieback walls, MSE walls, and CIP gravity walls. The presentation will focus on the geotechnical and geological design and construction issues encountered by the hybrid team comprised of ODOT, Shannon and Wilson, and DOWL.

Bio:

Eric Paslack is a project manager with 16 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. Eric serves as project manager for ODOT and local agency transportation projects, including the OR217 Auxiliary Lanes project.

Denali National Park's Pretty Rocks Bridge

Session 7A-3

Presented by:

Gary Conner
Jacobs Engineering Group
Gary.Conner@jacobs.com

Devin Altman
Jacobs Engineering Group
Devin.Altman@jacobs.com

co-authors: Scott Anderson & Brian Collins, BGC Engineering

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. This is a bridge over a new chasm created in the last few years by thawing permafrost. It is an intimidating site and nearing the practical length limits for a single span. The plan addresses several geologic hazards 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. The urgent need to reopen the road, the remote location, and limited work space at the construction site required a design with modular elements and details to limit the duration of on-site construction activities. The bridge foundations and 40% of the truss were erected in last year's summer construction season with truss erection and launch planned to be completed this summer. An article on the project was published in the March-April issue of ASCE Civil Engineering Magazine.

This presentation will provide a project overview, show how the design progressed based on input from the stakeholder and the construction team, discuss the collaboration between bridge and geotechnical engineers, and review some of the foundation and superstructure design solutions with construction photos.

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.

Gary is a bridge engineer and transportation business manager for Jacobs with 35 years of experience. He has a master's degree from Oregon State University and spent the first 11 years of his career working in Seattle and Olympia before moving back to Oregon. His work has included design and seismic retrofit of many bridges in the Seattle area and in recent years is frequently the lead bridge engineer on projects in Oregon, Washington, and Alaska.

Emergency Response & Landslide Mitigation at OR-138 West, Mile Post 4.8

Session 7B-1

Presented by:
Tomsen Reed
ODOT
Tomsen.REED@odot.oregon.gov

Landslide movement at a roadway cut/fill transition on Highway OR138W M.P. 4.8A has resulted in repeated maintenance expense and concern since the highway's construction in the late 1950's, sometimes multiple times in the same year. Due to the emergency mitigation delivery timeline, subsurface data collection was not feasible; therefore, understanding of the site had to be based on lidar, historic observations, available geologic mapping, and site reconnaissance. In part to address the uncertainty and risk associated with the available data, a shear-key buttress was selected as a mitigation for this site, which allowed field modification of the design during construction and assessment of subsurface conditions during excavation. This presentation will discuss the risks associated with this approach, problems encountered during construction, how ODOT worked to address these risks to successfully deliver the project, and ongoing performance of the mitigation to date.

Bio:

Tomsen Reed, PE, GE, CEG, is a geotechnical engineer at ODOT in Region 3, Roseburg, Oregon. Tomsen worked in geotechnical consulting in Utah for 7 years before coming to ODOT. His main professional interests include landslides, rock slopes, and other projects with unique and interesting engineering geology components. Tomsen came to ODOT in January of 2023 and has since been involved with emergency response to geologic hazards and geotechnical design in Region 3.

Emergency Landslide Assessment & Mitigation, SH-64, Kamiah, ID

Session 7B-2

Presented by:
James Struthers
Delve Underground
struthers@delveunderground.com

During the week of April 14, 2024 a concentrated slow moving, high intensity storm dropped an estimated 2- to 2.5 inches of rain within a two hour period near the town of Kamiah, Idaho. The event severely impacted SH-64 between milepost (MP) 25.6 and 26.6 resulting in numerous landslides and significant damage to the roadway. Damage included scour and erosion of the road prism, undermining of existing retaining walls, plugging and damage to existing culverts, and generation of debris flows within ravines, that resulted in 12 identified discrete repair needs.

Delve Underground was retained to provide emergency response, geotechnical design, preparation of contract documents, and support during construction. Discussions with ITD management indicated that their preference was that mitigation designs for this emergency repair be prepared under a rapid delivery timeline. ITD's goal was to develop plans for emergency mitigation, advertise and award the work in the summer of 2024, and finish construction during the 2024 construction season. Because of this expedited schedule and the difficult site access constraints, detailed subsurface investigation (e.g., borings) was not conducted, and field investigation was limited to surface observation, excavation of shallow hand-dug test pits, and hand probing of soils in the failure areas.

During construction, ITD personnel and Delve worked in close collaboration with the contractor to coordinate the phasing of work and provide adjustments and field fitting based on variations of subsurface conditions. This was achieved by staffing the project with a licensed professional engineer with a strong understanding of geology and wall design that was able to convey the changes in field conditions and allow for adjusting grading and excavation and wall heights in real time. This case study provides an example of rapid development, contracting, and construction of landslide mitigation work within a constrained corridor.

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. 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.

Utilizing UAS LiDAR for Rockfall Detection

Session 7B-3

Presented by:

Audrey McHugh-Britton
ODOT
Audrey.MCHUGH-BRITTON@odot.oregon.gov

Casey Varnum
ODOT
Casey.VARNUM@odot.oregon.gov

Analysis of rockfall in roadcuts and Unstable slopes present a safety hazard to first responders, ODOT maintenance staff, field crews, and technical professionals required to work on or below slopes that are susceptible to rock fall. ODOT is currently working on two active rockfall sites in the Columbia River Gorge that will develop a systematic approach to acquiring data by UAS LiDAR and analysis that can be applied to other problematic sites and support ODOT's unstable slopes program. Employing quantitative remote rock slope assessment and modeling tools to accurately identify the pathways traveled by rock fall at Kaser Ridge, from the source area through the runout zone, will demonstrate how the innovative application of new technologies will aid in the development of rockfall mitigation design recommendations at similar sites across the state. Integrating these tools into the geologic hazard assessment workflow may improve the effectiveness of the prescribed mitigation strategy by narrowing the scope of the effort to focus on discrete problem areas, which can reduce construction costs while providing safety and maintenance benefits commensurate with less targeted, more costly solutions.

Bio:

Casey graduated from Oregon State University with a Bachelor of Science in Geology. In 2010, Casey started work with a remote sensing firm, Watershed Sciences, as a Field Technician. Since then, Casey has been invested in remote sensing and land surveying as a career in both office and field positions. In 2018 Casey started with the Oregon Department of Transportation and learned the fundamentals of traditional land surveying and used his technical background to leverage remote sensing within the agency. Casey obtained his Land Surveyor's license in 2023 and started as a Project Surveyor with the Engineering Automation group shortly after. In his free time Casey likes to go mountain biking, rafting and spend time with his wife and two young daughters.

I-84 WB over the Union Pacific Railroad Bridge (Hood River) Replacement – Design Challenges and Insights

Session 8-1

Presented by:

Palo Giscombe
ODOT
Palo.GISCOMBE@odot.oregon.gov

Jeff Jones
ODOT
Jeff.JONES@odot.oregon.gov

Michael Bunn
ODOT
Michael.D.BUNN@odot.oregon.gov

Aleyna Link
ODOT
Aleyna.LINK@odot.oregon.gov

The existing bridge carrying westbound I-84 lanes over the Union Pacific Railroad (UPRR) in Hood River, Oregon, was built in 1953 and requires replacement due to various structural deficiencies and expected poor seismic resilience. Replacement of the bridge will include widening the eastern approach embankment and re-aligning the highway to the north, thereby allowing the existing bridge to remain in service during construction of the replacement. This presentation will summarize the project's geotechnical investigation and early design challenges, including how the design team addressed the site's complex geology, seismic setting, and geometric constraints. Topics covered will include: geological interpretation, ground improvement design, embankment and retaining wall design, bridge foundation design, and the layout of the temporary and permanent earthwork that will facilitate construction.

Bio:

Palo Giscombe is a geotechnical engineer with the ODOT Region 1 Geo-Hydro-Hazmat (GHH) unit. He joined ODOT in 2012 after graduating from California State University – Chico (Go Wildcats!). Palo began his career at ODOT in the Graduate Engineering program and began permanently working with the GHH unit in 2014, first as a geotechnical designer and later as a geotechnical engineer. His primary responsibilities are geotechnical project design and review, and construction and maintenance support.

Recent Findings and Recommendations for Side Resistance of Permanently Cased Drilled Shafts

Session 8-2

Presented by:

James Walters
Shannon & Wilson Inc.
james.walters@shanwil.com

Rory "Tony" Robinson
ODOT
Tony.ROBINSON@odot.oregon.gov

Drilled shafts are increasingly constructed with permanent steel casing to help resist seismic lateral demands and to address constructability considerations. Permanent casing installed with an oscillator typically includes cutting teeth on the starter casing that may result in overcutting of the shaft sidewall. The overcutting may result in a loss of drilled shaft side resistance. Guidance by FHWA and WSDOT include limitations on shaft side resistance for permanently cased shafts constructed with an oscillator. The Oregon Department of Transportation recently completed two load test programs that included drilled shafts with permanent casing installed with an oscillator. This presentation will highlight results of the load tests, findings related to the effects on shaft side resistance, and preliminary recommendations for design.

Bio:

James has over 12 years of experience in ground characterization, seismic hazard analysis, shallow and deep foundation design, wall evaluation, slope stability, and ground improvement. His experience includes the design and construction of levee, dam, waterfront, and bridge structures located throughout the western US. James has worked on over 100 bridges and specializes in deep foundation design and testing.

Use of Geosynthetic Reinforced Soil – Integrated Bridge System (GRS-IBS) in Oregon

Session 8-3

Presented by:

Brett Karnes
DEA
Brett.Karnes@deainc.com

Carly Diehl
DEA
Carly.Diehl@deainc.com

Geosynthetic Reinforced Soil-Integrated Bridge System (GRS-IBS) is a substructure alternative that has been widely used across the United States but is less common in Oregon. First developed by the Federal Highway Administration, GRS-IBS has been implemented for single-span structures for over 25 years and is listed in the ODOT Geotechnical Design Manual in Section 16.6.15.4 as a suitable option for reducing bridge construction time and cost. GRS comprises of a well-compacted aggregate fill with tightly spaced (<12") geosynthetic fabric "reinforcement". This geometry creates a unique composite material that is just as durable as traditional steel or concrete substructures. In a GRS-IBS system, the bridge superstructure is supported directly on the GRS fill, eliminating the need for concrete caps or abutments.

GRS-IBS systems are incredibly fast to construct, and often require no piling, shafts, or cast-in-place concrete. They provide a jointless interface between the bridge system and the approach roadway, reducing cyclic maintenance from cleaning or replacing joints. Furthermore, GRS-IBS can be adapted to accommodate a variety of site constraints and provides an alternative to typical concrete abutments for single span systems.

ODOT's first implementation of GRS-IBS is the Sandy Creek Culvert Replacement in Coos County. Replacing a blown-out culvert, the project included stream restoration of the creek, making the GRS-IBS an efficient solution. Lessons learned from the project and helpful tips on implementing GRS-IBS systems in the future will be further discussed.

Bio:

Brett Karnes is a Senior Bridge Engineer at David Evans and Associates. He has worked on bridge projects in Oregon and throughout the West Coast for over 18 years. Brett has specialized in seismic design, steel design, ABC, and unique systems.

Carly Diehl is a bridge engineer at David Evans and Associates. She has worked on a wide range of projects, including new designs, bridge maintenance and rehabilitation projects, load ratings, and is a certified construction inspector. A graduate of Oregon State, she also serves as co-chair for the ACEC-Oregon Brown Bags and regularly volunteers for the MECOP program. When not at work, Carly enjoys spending time with her husband, Ben, volunteering at her church, and taking care of her four cows: Umpqua, Alpenrose, Tillamook, and Sir Loin.

Motivation for and Results of a Sacrificial Load Test on a Pacific Northwest Intermediate Geomaterial

Session 8-4

Presented by:

Sam Sideras
Shannon & Wilson
Sam.Sideras@shanwil.com

Eric Rau
HDR
Eric.Rau@hdrinc.com

The Earthquake Ready Burnside Bridge Project is in the midst of a multi-year effort to replace an approximately 100-year-old crossing over the Willamette River with a seismically resilient movable bridge. The design needs to account for site constraints, a moveable bridge structure, high seismic demands, liquefiable soils, and a variable bearing layer overlying a weaker geologic material. The bearing layer for the project consists of an intermediate geomaterial, the Lower Troutdale Formation, a predominantly granular unit with variable cementation. Due to the seismic demands and the soil conditions encountered at the site, the foundation design relies on high geotechnical resistance of the Lower Troutdale Formation. To confirm the design assumptions and to provide direct data to optimize the bridge foundations, a sacrificial load test on a 9.8-foot-diameter test shaft was conducted during the design phase. This presentation discusses the motivation and results of this load test program performed for the project.

Bio:

Sam Sideras is a project manager and seismic design lead at Shannon & Wilson, Inc., with over 12 years of experience in geotechnical engineering working on infrastructure projects throughout the Pacific Northwest. His technical expertise focuses on foundation and retaining wall design, landslide evaluations, seismic hazard analysis, numerical modeling, and soil-structure-interaction. His research experience includes experimental and numerical modeling of liquefiable soil deposits.

Eric Rau is a Senior Bridge Engineer and Professional Associated at HDR. Eric was the Engineer of Record and technical lead for the project, participating in the initial on-site inspection of the bridge while providing oversight to the installation of the permanent repair work.