



**PNW BRIDGE
INSPECTORS
CONFERENCE**

THE WIDE WORLD OF BRIDGE INSPECTION

April 19-21, 2011

**Red Lion Hotel on the River, Jantzen Beach
Portland, Oregon**

WASHINGTON STATE
 UNIVERSITY

CONFERENCE MANAGEMENT

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PINW BRIDGE INSPECTORS CONFERENCE SCHEDULE

TUES, 4.19.11

1:00 pm Opening Session
Moderator: Gary Bowling, Oregon DOT

Welcome & Opening Remarks
Gary Bowling, Oregon DOT
Tim Rogers, FHWA Oregon Division

Keynote Speakers

1A National Perspective on Bridge Inspection Program Developments
Tom Everett, FHWA Headquarters

1B New AASHTO Bridge Elements and Conditional State Description
Matt Farrar, ID Transportation Dept / AASHTO T-18 Chair

1C AASHTO'S New Guide Manual for Bridge Element Inspection -
Michael Johnson, Caltrans

3:00 pm Break— Visit Exhibits

3:30 pm Session 2: Bridge Inspection
Moderator: Tim Rogers, FHWA, Oregon Division

2A FHWA's New NBIS Performance Metrics
Barry Brecto, FHWA HQ, Western Divisions

2B Recent Innovations in Bridge Inspection Techniques
Matthew Lewellyn, and Edward Cinadr, Burgess & Niple, Inc.

2C Inventory Inspection of the Mike O'Callaghan—Pat Tillman Memorial Bridge
Craig Smart, HDR Engineering, Inc. & David Severns, Nevada DOT

5:00 pm Adjourn for the Day

5:15 pm Ice Breaker— Visit Exhibits

WED, 4.20.11

7:00 am Continental Breakfast

8:00 am Session 3: Tunnel Inspections
Moderator: Matt Farrar, Idaho Transportation Department

3A Overview of Tunnel Operations, Maintenance, Inspection, and Evaluation (TOMIE) Manual
Brian Leshko, HDR Engineering, Inc.

3B Overview of Oregon DOT's Tunnel Inspection Program
Jeff Swanstrom and Jamie Schick, Oregon DOT

3C Glacier National Park Tunnel Inspections
Matthew Miller & Evan Garich, Parsons, Brinckerhoff

9:30 am Break— Visit Exhibits

10:00 am Session 4: Bridge Management
Moderator: Paul Jensen, Montana DOT

4A Utilizing Software to Improve Bridge Inspection, Management, and Preservation
Jeremy Shaffer, InspectTech

4B Plans of Action and Bridge Alert System for Scour Critical Bridges
John Woodroof and Don Newkirk, Oregon DOT

4C Updates and Revisions to NHI - FHWA Bridge Inspection Training Class
Tom Ryan, Michael Baker Jr., Inc.

4D Implementing the State-of-the-Art Load Rating Method
Lubin Gao, FHWA HQ, WA DC

12:00 Lunch— Provided

1:30 pm Session 5: Underwater/ Foundations Inspections
Moderator: Dave Severns, Nevada DOT

5A Simpson Avenue Bridge Pier Settlement Investigation
Shawn Plichta and Jim Harding, Washington DOT

5B New Advances in Underwater Inspection Technologies for Bridges Over Water
Daniel Stromberg and Emmanuel "Manny" Bautista, Collins Engineers, Inc.

5C Advanced Underwater Acoustic Imaging: How to Inspect Bridges Underwater When Diving Cannot Be Performed Safely
Dave Reser, Infrastructure Engineers

3:00 pm Break— Visit Exhibits

3:30 pm Session 6: In-Depth Inspections
Moderator: Roman Peralta, Washington State DOT

6A Lessons Learned From Texas DOT Fracture Critical Bridge Inspection Project
Brian Leshko, HDR Engineering Inc.

6B In-Depth and Fracture-Critical Inspectino of the Historic Steel Bridge Complex
Thomas Howell & Nick Clark, HDR Engineering, Inc.

6C In-Depth Inspection of the Oregon City Arch
Chris Leedham, Oregon DOT and Jason Kelly, OBEC Consulting Engineering

THURS, 4.21.11

7:00 am Continental Breakfast

8:00 am Session 7: Load Rating
Moderator: Glen Scroggins, Washington DOT

7A Load Rating for the SR 191 Colorado River Bridge - Past and Present
Ron Pierce, David Evans & Associates

7B Oregon DOT's Gusset Plate Inspection / Load Rating Strategy
Gary Bowling & Jon Rooper, Oregon DOT

7C Steel Gusset Plate Detail Imaging Project
Christopher Higgins, Oregon State University

9:30 pm Break— Visit Exhibits

10:00 am Session 8: Special Bridge Challenges
Moderator: Drew Sielbach, Alaska DOT&PF

8A Emergency Inspection of the Beebe Bridge Due to Collision Damage
Glen Scroggins, Washington DOT

8B Fatigue Retrofitting on the Fremont
Steven Lovejoy, Oregon DOT

8C North Carolina's Experience with Load Testing Bridges
Thomas Drda, FHWA HQ, Southern Divisions

11:30 pm Closing Remarks and Door Prize Drawings
Moderators: Harvey Coffman, Washington DOT and Debbie Lehmann, FHWA Washington Division

Noon— Conference Adjourned



Session Abstracts

Tuesday, 4.19.11

FHWA's New NBIS Performance Metrics

Barry Brecto, FHWA HQ, Washington Division

This presentation will introduce and summarize FHWA's ambitious effort to strengthen the National Bridge Inspection Program through a new inspection oversight process. Development work and a demonstration pilot were completed in 2010, resulting in full implementation in 2011. The intent of the new oversight process is to better identify states' performance in complying with the NBIS through well defined performance metrics based on the Federal NBIS regulations. This presentation will provide an overview of the metrics, and how they will be assessed. FHWA implementation and state participation will be addressed.

Recent Innovations in Bridge Inspection Techniques

Matthew Lewellyn and Edward Cinadr, Burgess & Niple, Inc.

This presentation will include a wide variety of topics within and related to bridge inspection. The main topics will include the following:

- 1) The utility and efficiency gained through the use of inspection photographs in CADD drawings in bridge rehabilitation construction plans.
- 2) The use of photographs for checking field-measured gusset plate dimensions.
- 3) Innovative access techniques used during the inspection of the New River Gorge Bridge, the highest vehicular bridge in the Americas.
- 4) The evolution of rappelling devices and their applicability to rope access inspection.
- 5) Other specialized inspection devices utilized during climbing inspections.

Inventory Inspection of the Mike O'Callaghan-Pat Tillman Memorial Bridge

Craig Smart, HDR Engineering, Inc. and David Severns, Nevada DOT

The Mike O'Callaghan-Pat Tillman Memorial Bridge officially opened to traffic on Tuesday, October 19th 2010. Prior to the opening of one of the most high visibility transportation structures in recent history, NDOT was provided with a short window of opportunity to perform an inventory inspection of this landmark bridge. This initial inspection would evaluate the as-built condition of the structure and establish a baseline for future inspections. This presentation will focus on the inventory inspection of this signature bridge.

The presentation will outline the challenges encountered while planning and performing the initial inspection of the highest concrete arch bridge in the world and the longest concrete arch bridge in North America. In the case of this project, early coordination, thorough planning, and executing as a team were crucial in overcoming multiple obstacles including:

- inspection access
- security
- coordination with other state and federal agencies
- inter-agency Agreements
- simultaneous, multiple inspection modes (rope-access, concurrent, multiple "snooper" operations, NDT, and conventional)
- Environmental constraints (wind, lightning, and high temperatures)

The presentation will discuss the project from the preparation of the bridge inspection access plan, through the coordination between multiple agencies, to the actual inspection execution. The coordinated, team-focused approach implemented on this project resulted in a timely, safe, thorough, and efficient inventory inspection of this unique bridge.

Wednesday, 4.20.11

Overview of Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual

Brian Leshko, HDR Engineering, Inc.

This presentation will outline and discuss the contents of the forthcoming FHWA TOMIE Manual, which will provide necessary technical information and guidance that will allow tunnel owners, operators, maintainers and inspectors to properly operate, maintain, inspect and evaluate tunnels. The comprehensive manual will promulgate recommended Best Practices for inspection procedures for structural elements and functional systems, including: mechanical, electrical, hydraulic and ventilation systems; qualifications for inspectors; inspection frequencies; etc. The presenter is the Lead Investigator for FHWA Task Order 006/ Technical Directive 003: TOMIE Manual, under Contract DTFH61-07-D-00004, Engineering and Technical Support Services for the FHWA Office of Bridge Technology.

Overview of Oregon DOT's Tunnel Inspection Program

Jeff Swanstrom and Jamie Schick, Oregon DOT

This presentation will provide an overview of how the Oregon Department of Transportation performs tunnel inspections, the establishment of a Statewide multidisciplinary "Tunnel Committee" for overseeing the tunnel program and, featuring the history of the Arch Cape Tunnel (including original construction, inspection, maintenance, rehabilitation). The Arch Cape tunnel is a good example showing that knowing construction history can alert inspectors of areas to watch. Progressive inspections of Arch Cape tunnel demonstrate changing conditions over time.

The FHWA is proposing a National Tunnel Inspection standard (NTIS) for the nations approximately 350 highway tunnels. The program will be modeled after the National Bridge Inspection Standards (NBIS) and will mandate uniform tunnel inspections codes. The exact form is unclear, but it will change the way we inspect tunnels. State Agencies may be required to develop their own elements and condition states as well as ensure that all highway tunnels within state borders be inspected per the NTIS. These challenges will be discussed.

Glacier National Park Tunnel Inspections

Matthew Miler and Evan Garich, Parsons Brinckerhoff

Going-to-the-Sun Road (GTSR) in Glacier National Park traverses some of our nation's most spectacular scenery as it winds through the Rocky Mountains in northwest Montana. The road was dedicated in 1933 and is designated as a National Historic Landmark. The bridges, major culverts, and tunnels along the GTSR are contributing structures to the National Historic Landmark. GTSR is currently under-going an extensive multi-year rehabilitation overseen by the Federal Highway Administration Western Federal Lands Highway Division. As part of the rehabilitation, Parsons Brinckerhoff was selected to perform structural inspections of several structures, including the two tunnels along the GTSR.

The West Tunnel is a 200-foot long horseshoe tunnel built in 1934. The tunnel was widened in the 1960s and a reinforced concrete liner constructed. The tunnel is 30-feet wide with 20-foot vertical clearance at the crown. Two 18-foot wide, full height windows within the tunnel constructed as part of the original construction offer stunning views.

The East Tunnel is a 400-foot long horseshoe tunnel built in 1934. The tunnel is 25-feet wide with 19-foot minimum vertical clearance at the crown. In 1942 a reinforced concrete liner was constructed to prevent excessive water seepage into the tunnel. Prior to construction of the liner, dripping water from inside the tunnel had caused the formation of ice coating over the roadway up to several feet thick. During the following spring, ice had to be broken up by blasting and picking and hauled out of the tunnel.

The tunnel inspections were performed to investigate the structural soundness of the tunnel lining. Inspections were led by staff with tunnel inspection expertise and conducted over a multi-day period. A phased approach was utilized in order to maximize the efficiency of the inspection effort.

This presentation will focus on the procedures followed in identifying and documenting areas of distress and assessing structural soundness during the inspection of the tunnels along GTSR.

Utilizing Software to Improve Bridge Inspection, Management, and Preservation

Jeremy Shaffer, InspectTech

This presentation will provide attendees with an understanding of best practices that are being implemented in software for bridge management, inspection and preservation across the United States. Structure inspection and management programs need to be designed to meet key organizational goals and allow for data to be easily entered, retrieved, and analyzed. Information related to annual inspections, condition and deficiency photographs, maintenance plans, schematics, drawings, and other documents need to be accessible to all stakeholders to allow a seamless process and ensure that problems are quickly identified and resolved.

Specific focus will be given to federal agencies approach toward the topic (especially related to facilities in the Northwest) and also other state DOTs.

Some of the examples presented will be:

- Risk Based Maintenance Need Prioritization (U.S. Fish and Wildlife Service)
- Integrated Field and Web Software for inspection and QA/QC Process (U.S. Navy)
- Developing Plans of Action for Scour, Seismic, and Fracture Critical Bridges (Indiana DOT)
- Fracture Critical Bridge Inspection Module (Minnesota DOT)
- Integrated Channel Profile Plotting and Monitoring (Iowa DOT)
- Utilization of new CoRE Elements (Iowa DOT and Minnesota DOT)

The agencies selected have a mixture of solutions from those using Pontis to their own custom systems and approaches. Numerous examples will be used from federal agencies, state DOTs, counties/cities, and even international approaches highlighting successful techniques from data collection to management reporting and implementation. Those of federal agencies and international organizations are of particular interest since they are often free of constructing programs that are not affected by FHWA funding streams such as those tied to Structurally Deficient and Functionally Obsolete status.

Plans of Action and Bridge Alert System for Scour Critical Bridges

John Woodruff and Don Newkirk, Oregon DOT

A Bridge Alerts System has been developed as part of the ODOT Plan of Action Database. It is presently in use in ODOT Region 3 monitoring rainfall and gauging station data every 20 minutes for trigger events. The trigger events are set by district maintenance supervisors and specific actions to be taken during these events are being added to each bridge's specific plan of action. The specific actions to be taken at each bridge during a trigger event are determined by the maintenance personnel responsible for each bridge.

Once a storm event trigger is reached, bridge maintenance personnel are automatically notified of bridges that could be affected by the storm event. The database can be edited to conform to the district's needs by local maintenance personnel as determined by the Bridge Maintenance Supervisor for each district.

The database can be viewed by all maintenance personnel throughout the state but can only be changed by designated people working in each specific district. Once a plan meets the district needs and the proper actions have been entered in the plans of action they can then be submitted to headquarters for review and publishing to become the official plan of action to be used in an emergency.

Headquarters will not be involved in any decisions made by districts unless requested. Every two years the plans will be reviewed at the district and those that are revised will be sent to headquarters for review and then published as the official plans of action.

Updates and Revisions to HHI—FHWA Bridge Inspection Training Class

Tom Ryan, Michael Baker Jr., Inc.

This presentation outlines on-going and recent changes and updates to Bridge Inspection Training curriculum by NHI, FHWA, AASHTO and their consultants. These revised bridge inspection courses were developed to meet the high expectations established by FHWA, NHI and the State DOTs. Course revisions include:

- FHWA-NHI Course No. 130055, "Safety Inspection of In-Service Bridges"
- FHWA-NHI Course No. 130078, "Fracture Critical Inspection Techniques for Steel Bridges"
- FHWA/NHI is currently developing a Computer Based Training (CBT) module.
- FHWA-NHI Course No. 130053, "Bridge Inspection Refresher Training"
- FHWA-NHI Course No. 130099, "Bridge Inspection Non-Destructive Evaluation Showcase"
- FHWA-NHI Course No. 130091, "Underwater Bridge Inspection"

Implementing the State-of-the-Art Load Rating Method

Lubin Gao, FHWA HQ, Washington DC

FHWA is currently promoting the state-of-the-art load rating method – LRFR. It is required that, all bridges designed with the LRFD after 10/1/2010 will be rated and reported using the LRFR method. Bridges, which were designed prior to that date and have a valid LRFR rating, are also required to be rated with the LRFR. States are striving to be in compliance with the FHWA's requirements. In this presentation, we will discuss why the FHWA is promoting the LRFR, summarize the current status of the LRFR implementation, present the difficulties and challenges faced by the load rating engineers in applying this new method, and introduce the resources in the FHWA that can provide policy and technical assistances.

Simpson Avenue Bridge Pier Settlement Investigation

Shawn Plichta and Jim Harding, Washington State DOT

In late July, 2010, one of the main Bascule Piers on the Simpson Avenue Bridge, over the Hoquiam River in Hoquiam Washington exhibited unusual pier movement, resulting in full bridge closure. This presentation will cover the initial emergency inspection, subsequent forensic investigation, and on-going repair and rehabilitation.

The presentation will describe in detail, inspection findings and lessons learned which will be valuable for all personnel involved in Bridge Inspection, construction, or design

New Advances in Underwater Inspection Technologies for Bridges Over Water

Daniel Stromberg and Emmanuel "Manny" Bautista, Collins Engineers, Inc.

The inspection of submerged substructure elements and the channel bottom surrounding those elements is essential for ensuring safety and promoting the long-term serviceability of our Nation's bridges over water. Although various underwater technologies have been used to supplement underwater bridge inspection by divers for many years, recent advancements, including newly developed equipment using acoustic principals, have resulted in new and improved underwater inspection, support, and documentation methods. This presentation will serve to discuss the latest in various underwater inspection technologies that can be used to supplement and augment the efforts of inspection divers, as well as to discuss case study examples where those technologies were used: in advance of physical diving during flood conditions; to assess levels of scour and foundation undermining; to establish baseline channel bottom conditions; to document before and after conditions related to repair/rehabilitation operations; and to promote improved safety and accuracy for underwater inspections by divers.

Advanced Underwater Acoustic Imaging: How to Inspect Bridges Underwater When Diving Cannot Be Performed Safely

David Reser, Infrastructure Engineers, Inc.

In 1968, several highly publicized bridge collapses occurred, including the Silver Bridge in Mt. Pleasant, West Virginia. The Federal Highway Administration (FHWA) bridge inspection program was mandated as a part of the Federal-Aid Highway Act as a result of these bridge failures. This act required that the National Bridge Inspection Standards (NBIS) be established to require states to identify bridge deficiencies and protect the traveling public. Various modifications to the NBIS were made over the next two decades, including the Surface Transportation and Uniform Relocation Assistance Act of 1987, which required states to perform underwater bridge inspections at intervals not to exceed five years.

Lessons Learned from Texas DOT Fracture Critical Bridge Inspection Project

Brian Leshko, HDR Engineering, Inc.

This presentation will outline and discuss the lessons learned from this first work authorization: detailing the logistics involved in coordinating staff from various offices nationwide; environmental issues; access equipment challenges; inspection tool shortcomings and NDT successes; confined space entry protocols; typical fracture-critical members and fatigue-prone details inspected; report formats; and the QC Review process for the field inspections and deliverables.

In-Depth and Fracture-Critical Inspection of the Historic Steel Bridge Complex

Thomas Howell & Nick Clark, HDR Engineering, Inc.

HDR's contract to perform in-depth, fracture-critical, and fatigue-prone inspections of the historic Steel Bridge Complex constituted one of the most complex inspection projects undertaken by the company. During the period from May 4-12, 2009, HDR deployed a total of 19 personnel supported by five agencies to perform inspections on three approach ramps and main river span. This presentation will address the planning, access methods, unique problems overcome, and execution of the in-depth, fracture-critical, and routine inspections of the 800' long river span and associated interchange ramps. This presentation will also highlight the value and direct, tangible benefits to this project resulting from open communication and collaboration between the Oregon Department of Transportation and the consultant inspection team.

In-Depth Inspection of the Oregon City Arch

Chris Leedham, Oregon DOT and Jason Kelly, OBEC Consulting Engineering

The historic Oregon City Arch Bridge, designed by Conde B McCullough and built in 1922, is presently undergoing a complete rehabilitation. In order to facilitate the design phase, extensive inspection (including destructive and non-destructive testing) had to take place to ascertain the condition of the structural members, specifically the steel arch ribs. This presentation details the inspection and findings of the non-destructive testing and unique confined space access methods used to ascertain the condition of the steel arch ribs. Also included will be a discussion of the history of the bridge and rehabilitation project background.

Thursday, 4.21.11

Load Rating for the SR 191 Colorado River Bridge—Past and Present

Ron Pierce, David Evans and Associates

The bridge crossing the Colorado River on SR 191 outside of Moab, Utah is currently under construction. The original Bridge was a Fracture Critical two girder system, and is the only bridge that required overload permitting analysis in the State of Utah. David Evans and Associates, Inc. (DEA) team members have processed the overload crossing of the previous structure and are in the process of establishing the load rating and overload rating practices for the new Segmental Box Girder Bridge. This presentation will review the previous posting and overload ratings for the original Fracture Critical Bridge using LFR methods and provide an update on the LRFR load rating model for the new bridge crossing the Colorado River

Oregon DOT's Gusset Plate Inspection/Load Rating Strategy

Gary Bowling & Jon Rooper, Oregon DOT

Will review the issues related to inspecting and load rating gusset plates. A quick overview will be provided on the strategy, procedures, and tools being used by ODOT to inspect, measure, and analyze gusset plates on truss bridges. Will explain ODOT's progress, lessons learned, and tools being developed to measure and load rate gusset plates.

Steel Gusset Plate Detail Imaging Project

Christopher Higgins, Oregon State University

Gusset plate connection performance has become an important topic after the recent collapse of the I-35W Bridge in Minneapolis, Minnesota. Due to this failure, gusset plate connections must now be evaluated. Connection evaluations require accurate as-built drawings and typically use simplified specification-based design methods for analysis. A new technique was developed that permits rapid collection of accurate field measurements, production of as-built CAD connection drawings, and direct finite element (FE) modeling and analysis of as-built connections. The method uses close-range photogrammetry techniques to rectify field-collected digital images taken with consumer-grade cameras to produce scaled orthographic photographs (orthophotos) of the bridge connections. From these orthophotos, users can collect true-scale measurements and export plate and fastener geometric information. The geometric data are used directly to create CAD drawings thereby limiting data entry errors and these as-built drawings can be compared with design drawings or used in simplified analysis and ranking methods. The same geometric data are ported to ABAQUS using scripts that generate finite element models of the gusset plates. When combined with member forces applied at the fastener locations, the FE analysis can be performed (including buckling and nonlinear analyses), and the results can be used to assess the connection capacity.

The approach enables rapid and accurate collection of field measurements and allows direct assessment of the connection

Steel Gusset Plate Detail Imaging Project (continued from Page 7)

behavior as compared to traditional simplified *design* methods. The implementation procedure is straightforward and does not require specialized knowledge of photogrammetry or finite element methods. It can be practicably employed under field conditions using current technology and personnel. Integration of the techniques allows seamless data flow and sophisticated evaluation of the complex plate stress interactions to enable bridge ratings of existing steel gusset connections.

Emergency Inspection of the Beebe Bridge Due to Collision Damage

Glen Scroggins, Washington State DOT

The Beebe Bridge is a major crossing carrying SR97 over the Columbia River near Chelan, WA. The main unit of the Beebe Bridge is a 3-span (260'-520'-260') continuous steel truss with through-truss side spans and arched-truss main span. On August 31, 2009 a fully loaded truck-trailer veered sideways and crashed through the bridge superstructure, resulting in 2 fatalities and inflicting extensive damage to primary bridge components including the complete loss of a fracture-critical vertical, extensive bending in a compression diagonal, and a wide range of connection damage throughout the area. The nearly critical damage necessitated an extended bridge closure with an 80-mile detour until repairs could be developed and safely implemented. The presentation will cover the damage to the bridge and the multi-phase, multi-office emergency effort needed to stabilize, inspect, and repair the bridge until reopening to unrestricted traffic on October 16, 2009.

Fatigue Retrofitting on the Fremont Bridge

Steven Lovejoy, Oregon DOT

ODOT and Wiss, Janney, Elstner Inc have finished over \$900k worth of fatigue repairs and retrofits to the tie girders and flooring system on the Fremont Bridge. This work resulted from a 1996 in-depth inspection performed by WJE which developed a list of recommended repairs and retrofits. The work began in 2007 and was completed in 2010. This presentation will briefly cover many of the fatigue problems that were identified and the corrective actions taken. In addition, a long term Structural Health Monitoring (SHM) system was installed by EMS Inc. which is being used to monitor the performance of the tie girder and assess the effectiveness of the current and future fatigue retrofits. A brief description of the SHM system, its uses and results will be presented.

North Carolina's Experience with Load Testing Bridges

Thomas Drda, FHWA HQ, North Carolina Division

North Carolina Department of Transportation (NCDOT) was faced with legislative increases in legal loads which would have resulted in load posting of numerous bridges on primary routes. Concerns for the safety of the traveling public and the detrimental impact on the movement of goods, crops and products required investigating alternate methods for bridge analysis over the traditional load rating procedures. NCDOT hired a consulting firm to perform diagnostic load testing of sample of bridges to assist in the refined analysis of structures which would likely require load posting. This presentation will discuss the impacts of the change in legal loads to the Bridge Inspection Program and the finding of the load tests.

Presenter Biographies

Emmanuel (Manny) Bautista, P.E.

Manny Bautista is the Regional Manager for the Washington Office of Collins Engineers, Inc. As Regional Manager, Manny is responsible for providing quality engineering services to a diverse clientele in the Pacific Northwest. Prior to joining Collins, he served 22 years of active duty service in the US Navy as a Civil Engineer Corps Officer, retiring at the rank of Commander. His career took him around the world, giving him tremendous US and international experience in leading large engineering and facilities management organizations and directing complex design and construction programs. He is experienced and educated in all aspect of Facilities Program Management including planning, design, construction, budgeting, organization, personnel management, operations, logistics and maintenance. He is on the Board of Directors for the Seattle Post of the Society of Military Engineers, and is also a member of numerous professional organizations including ASCE Ports and Harbors, Washington Public Ports Association, and the American Council of Engineering Companies. Manny holds a BSCE (Structural Analysis) from San Diego State University and an MSCE (Construction Management) from the University of California, Berkeley. He is a licensed Professional Engineer in the States of California and Washington.

Gary Bowling

Gary Bowling started working for the Oregon Department of Transportation in 1983 as a construction project inspector, a bridge inspector, a bridge district manager, the bridge maintenance engineer, and currently is the ODOT Bridge Operations Engineer. Prior to ODOT, Gary managed the Baker County Road Department for 8 ½ years. The majority of Gary's experience was focused on bridge inspection, bridge maintenance, and bridge design. As the bridge inspection program manager for the State of Oregon, Gary has published the ODOT Bridge Element Coding Guide, the ODOT Bridge Inspection Manual, and developed the ODOT Bridge Emergency Response Plan. In this capacity, Gary has also been involved with the development of and delivering National Highway Institute Bridge Inspection training courses and participating in the Western States Bridge Preservation Partnership, as well as, leading the steering committee for the Pacific Northwest Bridge Maintenance and Bridge Inspection Conferences. Gary graduated from Portland State University and is Licensed in the State of Oregon as a Civil Engineer and Land Surveyor.

Barry Brecto

Barry Brecto has over 25 years of experience with the Federal Highway Administration. This experience has been centered on all aspects of highway transportation structures- design, construction, maintenance and inspection. Work assignments in the States of California, Oregon, Colorado, Utah, Illinois, Idaho, Alaska and Washington have given Mr. Brecto an understanding of regional and state capabilities and practices. In his current position, Mr. Brecto provides oversight of the National Bridge Inspection Program working with the Division Offices in the 12 western States. He is also actively involved with delivering National Highway Institute training courses, revising and updating national bridge inspection manuals, and developing proposed tunnel inspection standards.

Mr. Brecto earned a Bachelor of Science in Civil Engineering from Washington State University. He is a registered professional engineer in the State of Oregon.

Ed Cinadr

Edward Cinadr is a bridge engineer, project manager, and supervisor at Burgess & Niple, Inc. with 14 years of bridge design, rating, and inspection experience. His design and inspection experience includes work throughout the United States, including Oregon, Alaska, Montana, Oklahoma, and Ohio. Mr. Cinadr holds a Master of Science degree in Civil Engineering from Ohio University. He is a registered professional engineer in Ohio, Oregon, and Oklahoma.

Nick Clark

Nick Clark is a structural/geotechnical engineer and bridge inspector with HDR Engineering, Inc. in Portland, OR. Nick completed his bachelor's degree in Civil Engineering from Oregon State University and his Master's degree in Civil Engineering from Portland State University. Nick has inspected numerous bridges throughout the United States as well as steel spillway gates on several dams throughout Oregon, Idaho and Georgia. Nick is a registered professional engineer in Oregon, Washington and Alaska, and bridge inspection team leader in Oregon, Washington, Nebraska, Nevada and Alaska.

Harvey Coffman

I have been an engineer with WSDOT for the past 27 years the last 13 as the Bridge Preservation Engineer and 12 years as a bridge designer. I have a BSCE and an MSCE from the University of Washington. I'm a licensed civil and structural engineer in Washington and a civil engineer in California. I have worked on numerous bridge projects all over the state. I currently manage the Bridge Preservation office responsible for the safety inspection of the 3200 state bridges. I'm also the Program Manager for the bridge inspection programs in Washington state. The Preservation office is responsible for submitting all bridge data (county and cities) to the national data base..The Preservation office has 60 engineers and technicians that are dedicated to bridge inspections state wide.

Tom Drda

Tom graduated from Penn State University with a BS degree in Civil Engineering in 1990. For the first seven years of his career, he worked for the Maryland State Highway Administration as a Team Leader in the Office of Bridge Development where he provided bridge inspection, design, and management services. During this period, he obtained his professional engineer's license in Pennsylvania. In 1997, he joined a private consulting firm where he served as a project manager/engineer for four years and was responsible for various bridge rehabilitation, replacement and inspection projects. In 2001, he joined the FHWA Pennsylvania Division Office as the Assistant Bridge Engineer, and in 2004, advanced into the Division Bridge Engineer position in North Carolina. Over his 20 year career, he has been exposed to bridge design, load rating, inspection, maintenance, and management from the perspectives of a state, a consultant, and the Federal government. He has been involved in several national activities including the OIG load rating audit action team in 2006 and served as the chair of the FHWA Bridge Leadership Council. In 2007, he participated in an international scan dealing with bridge safety.

Tom Everett

Tom Everett is the bridge programs team leader in the FHWA Office of Bridge Technology in Washington, DC. Mr. Everett manages the Federal bridge program, which includes the Highway Bridge Program, Discretionary Bridge Program, National Historic Covered Bridge Preservation Program, and the National Bridge Inspection Standards. Before joining the Office of Bridge Technology, Mr. Everett served as a structural engineer in the former Regional Office for Structures in Baltimore, a Division Office bridge engineer in Tennessee, and as a Bridge Management and Inspection Engineer in the Resource Center in Baltimore. Mr. Everett is a graduate of Rutgers University and holds a master's degree in civil engineering from Johns Hopkins University. He is a licensed professional engineer in Rhode Island and Tennessee.

Matt Farrar

Matt Farrar is a bridge engineer with over 30 years of experience and is a licensed professional engineer in the State of Idaho.

He is currently the State Bridge Engineer for the Idaho Transportation Department. He has worked in bridge design, construction and bridge preservation/bridge restoration program management. He is also chairman of the technical committee T-18 Bridge Management, Evaluation, and Rehabilitation for the AASHTO Subcommittee for Bridges and Structures. Matt Farrar earned his Bachelors and Masters of Science Degrees in Civil Engineering from the South Dakota School of Mines and Technology.

Lubin Gao

Lubin joined FHWA in 9/2010, bringing to FHWA more than 24 years of experience in bridge engineering. At his current position, he is responsible for providing leadership in bridge technology research, deployment and education, technical assistance and support in load rating and evaluation, and bridge program and project reviews. Before joining in FHWA, Lubin had worked as a Principal and Senior Bridge Engineer at Lawrie and Associates and T. Y. Lin International for more than 13 years. He was involved in the design and construction engineering services of different types of bridges including segmental, cable-supported and short/medium-span conventional bridges in the US and overseas. He was also responsible for load rating several bridge structures in VA, WV and NY.

Prior to coming to the United States 15 years ago, Lubin worked as an Associate Professor and senior engineer in China. He performed extensive researches on the nonlinearity of long-span cable-supported railway bridges and steel fiber reinforced concrete and its application to bridge repair. He also worked on a number of long-span bridge projects in China.

Lubin has a B.S. degree in Civil Engineering, M.S. degree in Solid Mechanics, and Ph.D. degree in Bridge Engineering. He is a registered professional engineer in VA.

Evan Garich

Evan Garich is a geotechnical engineer with Parsons Brinckerhoff in Portland, Oregon. Evan received his bachelor's degree in civil engineering from Portland State University and his master's degree from Texas A&M University. He has been with PB for four years and is a registered Professional Engineer. Evan has design and construction experience with conventional, TBM, and immersed tube tunnels as well as the inspection of roadway and transit tunnels and dam intake structures.

James Harding

James Harding is a Lead Underwater Structural Inspector with the Washington State Department of Transportation. He holds a B.S.C.E. from Washington State University (Class of 2004) and is a registered Professional Engineer. James is a certified master diver and has completed over 200 working dives in conditions varying from swift current to zero visibility.

Christopher Higgins

Christopher Higgins is a Professor and the Slayden Construction Faculty Fellow in the School of Civil and Construction Engineering at Oregon State University. He is also Associate Director of the Oregon Transportation Research and Education Consortium. His field is structural engineering and he holds a B.S.C.E. from Marquette University, M.S. from The University of Texas at Austin, and Ph.D. from Lehigh University. He is a registered Professional Engineer.

Dr. Higgins has been at Oregon State University since 2000 where he teaches graduate and undergraduate courses and conducts research in Structural, Earthquake, and Bridge Engineering.

Dr. Higgins' research expertise is in experimental mechanics and he has extensive experience testing and evaluating structures subjected a wide range of loading conditions including: seismic, wind, ocean waves, static, fatigue, and dynamic loads. He has conducted research on steel, concrete, composite, hybrid, and polymer structural materials. Dr. Higgins and his research teams have successfully conducted experimental and analytical studies on hundreds of full-size laboratory and in-service bridges and their components. His research findings have been implemented into practice and adopted into design specifications.

Tom Howell

Tom Howell is a structural engineer and bridge inspector with HDR Engineering, Inc. in Portland, OR. Tom received his bachelor's degree in Civil Engineering from the U.S. Military Academy at West Point. Following 6 years of military service in the U.S Army Corps of Engineers, Tom earned his master's degree in Civil Engineering from the University of Pittsburgh. During Tom's tenure at HDR, he has inspected numerous structures throughout the Midwest, Northeast, and Northwest United States. Tom has led inspection projects in Nebraska, Oregon, and Washington and is a licensed professional engineer in Pennsylvania, Oregon, and Alaska.

Paul Jensen

Paul Jensen is a bridge management systems engineer for the Montana Department of Transportation in Helena, Montana. He develops and administers the State's bridge inspection standards, policies, and procedures. His work includes developing and updating MDT's *Bridge Inspection Manual* and updating the policy and procedures in the quality control/quality assurance area. Since joining DOT in 1995, he has developed and implemented automated checking procedures for DOT's electronic bridge inspection inventory data. He is a licensed professional engineer in Montana and serves on several TRB technical committees, AASHTO's BRIDGEWare Task Force and is on the external advisory board for the Long-Term Bridge Performance Program.

Mike Johnson

Mike Johnson is supervising bridge engineer working for the California Department of Transportation Division of Structures Maintenance and Investigations in Sacramento, Ca. Mr. Johnson holds a Bachelors and Masters degree in Civil Engineering from the California State University at Sacramento. Mr. Johnson is a registered professional civil engineer in California. Mr. Johnson is the current Vice Chair of the AASHTO BridgeWare Task Force, the chair for the Transportation Research Board's Bridge Preservation Committee, and a member of several technical advisory groups relating to bridge management. Mr. Johnson has authored or co-authored papers and presentations on various topics related to bridge management.

Jason Kelly

Jason graduated from Oregon State University in 2003 with degrees in Civil and Forest Engineering. He immediately began working for OBEC Consulting Engineers in Eugene Oregon. Jason is a licensed in Engineer in Oregon, Washington and California and a FHWA Bridge Inspection Team Leader. He divides his time between performing in-service structure inspections and resident engineer for heavy civil projects. He currently works out of the Portland Area office for OBEC.

Chris Leedham

Chris Leedham has worked for the Oregon Department of Transportation, Bridge Section since joining ODOT in 1983. Along with designing bridges, he has been involved with developing design and analysis programs, computer and program support, and historic bridges. His involvement with historic bridges includes administration of Oregon's covered bridge program since 1989. And, as a member of the Preservation Unit, he has been involved with preserving some of the large historic bridges on the coast. Currently, a lot of his time is spent working closely with the Project Manager of the Oregon City Arch Bridge rehabilitation project, the topic of this presentation. In his spare time, he enjoys scanning ODOT's historic construction photographs so they can be preserved and easily available. He received his bachelor degree in Civil Engineering from the University of Portland where he graduated with honors in 1983. Prior to joining the Department, Chris worked his way through college as a journeyman carpenter on heavy construction projects.

Debbie Lehmann

Debbie D. Lehmann, PE is the FHWA Washington Division Bridge Engineer. She has experience as a bridge inspector along with designer from both the consulting and Federal perspectives. Prior to WA she was the Assistant Bridge Engineer for the FHWA Missouri Division and a Structural Engineer at Eastern Federal Lands. As Division Bridge Engineer, her current duties include technical assistance and oversight of the National Bridge Inspection Standards within Washington, tunnels, geotechnical, hydraulics, and major structures.

Brian Leshko

Brian J. Leshko is a Vice President, Professional Associate and HDR's National Bridge Inspection Program Leader based out of Pittsburgh, PA. He received his B.S.C.E. from the United States Air Force Academy in 1985, an M.S. in Structural Engineering from the University of Connecticut in 1990, and a Master of Civil Engineering with an emphasis in Structural Dynamics from The Johns Hopkins University in 1994. Following his regular commission in the U.S. Air Force, Brian served 7 years on Active Duty as a Civil Engineering Officer with assignments as a Construction Engineer, Quality Assurance Evaluator, and Instructor of Civil Engineering. He has devoted the last 15 years of his career as a bridge engineer and inspector. His experience includes in-depth bridge condition inspections, rehabilitation designs, and ratings by working stress and load factor methods. He is a Certified Bridge Safety Inspector and a SPRAT-Certified Level I Rope Access Technician with extensive rope access and assisted-climbing experience inspecting large and complex structures, including plate girder, box girder, arch, suspension, segmental concrete and various truss bridges (highway and railroad). Brian has been a Professional Engineer since 1992, and he is registered in 13 states. Married to Debra Bogen for 21 years, they have two daughters, Shana (14) and Talia (11).

Matthew Lewellyn

Matthew Lewellyn is a bridge engineer at Burgess & Niple, Inc. with 14 years of bridge design, rating, and inspection experience. His experience as a project manager includes the in-depth inspection of the New River Gorge Bridge and several other bridges over the Kanawha and Ohio Rivers. Mr. Lewellyn holds an MBA and a Bachelors of Science degree in Civil Engineering from West Virginia University. He is a registered professional engineer in Ohio and West Virginia.

Steve Lovejoy

Steve is a senior engineer in the Bridge Engineering Section of the Oregon Department of Transportation where he has worked since 1991. His primary responsibilities are fracture and fatigue control, movable bridges, weld engineering and structural health monitoring.

Matt Miller

Matt Miller is a lead bridge engineer and project manager with Parsons Brinckerhoff in Portland, Oregon. He has been with PB for 12 years, specializing in structural applications for transportation infrastructure design and construction projects. Matt received his bachelor's degree in civil engineering from the University of Portland and has completed graduate studies from Oregon State and Portland State University. He is also a Professional Engineer in four states. While with PB, Matt has been responsible for the inspection for over 2,000 structures including major bridges, local agency bridges, culverts, walls and tunnels while working in ten States and the United Kingdom.

Don Newkirk

Don's current position at ODOT rounds out a career spanning over 30 years, mostly in the private sector, as a software engineer and theoretical linguist. He has been with the Bridge Engineering Section for the last 6 years, as a part of Bruce Johnson's Admin staff. Over the last 3 years, he has worked closely with State Hydraulics Engineer John Woodroof. To John's specifications, he has been developing the computerized aspects of our Scour-Critical Bridges program. His part of the program includes designing, programming, and administering a large SQL Server database. In parallel, he has designed and implemented our client applications, which cover *plans of action*, *scour analysis*, and *weather event monitoring*. Whenever there is too much regional rainfall or stream flow, we notify selected authorities with automatic alert messages via e-mail and mobile phone text messaging.

Roman Peralta

Roman G. Peralta is one of two Regional Bridge Inspection Engineers in the WSDOT Bridge Preservation Office. He is responsible for the development and maintenance of the bridge inspection program statewide, including scheduling, coordinating, equipping, and verifying the accurate completion of all routine, fracture critical, special, and short span inspections for all WSDOT owned bridges, and all "high cost" local agency bridges in accordance with FHWA and WSDOT requirements. He has been with state for 12 years and has been in the bridge office for the last 10. Roman is married with four children.

Ron Pierce

Ron is technical practice leader for Bridge Operations Services at David Evans and Associates. He has 24 years of experience and holds Bachelor's from University of Idaho and Master's Degree from Arizona State University both in Civil Engineering. He is a Professional Civil Engineer in Oregon, Idaho, Arizona and Nevada as well as Professional Structural Engineer in Arizona and Utah. He is also a certified bridge inspection team leader. He has managed load ratings projects for Arizona, Oregon, Utah, New Mexico, Tennessee, Alabama, Nebraska and, Illinois.

Shawn Plichta

Shawn Plichta is a Senior Lead Structural Inspector with the Washington State Department of Transportation. He is responsible for the structural inspection of moveable bridges, ferry terminals, floating bridges, microwave towers, and sign structures. As an integral part of the Special Structures Unit of the Bridge Preservation Office he is certified as a NOAA Working Diver and has completed ComTrain Tower Climbing Safety and Rescue training. He holds a B.S.C.E. from Washington State University (Go Cougs!) and is a registered Professional Engineer.

David Reser

David Reser is the founder and CEO of Infrastructure Engineers. He is a graduate of Oklahoma State University, and is a registered professional engineer in 30 states. He is a former US Army diving officer, and has received extensive commercial diver training from the US Navy, as well as several NATO countries including Great Britain, The Netherlands, Belgium, and Germany. His 18 year long civilian career has been dedicated to the bridge inspection industry, with an emphasis on underwater bridge inspection. He is a FHWA/NHI Certified Bridge Inspection Instructor, and routinely teaches the Bridge Inspection Refresher Training Course for NHI nationwide.

Timothy Rogers

Tim graduated from the University of Washington with a Bachelors and Masters in Civil Engineering. He signed on with the FHWA in 1991 as a Highway Engineer Trainee. Upon graduation from the training program Tim was assigned to the FHWA's Washington State Division Office as an Assistant Bridge Engineer. After 6 years he relocated with FHWA to the Federal Lands Highway Bridge Office in Lakewood, Colorado where he performed the duties of bridge designer and bridge team leader. In 2005, Tim moved to Oregon where he performs the duties of the FHWA Oregon Division Office Bridge Engineer. Tim's current duties include oversight of Oregon's Highway Bridge Rehabilitation and Replacement Program, the National Bridge Inspection Program, bridge construction inspection, PS&E preparation, and performing bridge related program reviews.

Jon Rooper

Graduated Texas A&M University at Galveston in 1996 with a B.S. degree in Maritime Systems Engineering, which is structural engineering with an emphasis in offshore and coastal environments. Being born and raised in Oregon, decided to leave Texas and pursue work closer to home. Entire career and experience has been from climbing the ranks within ODOT. From 1996 through the end of 2001 worked as a bridge / structural inspector for construction projects out of The Dalles Project Manager's Office. From 2002 through 2005 worked as a bridge designer in ODOT's Bridge Section in Salem. From 2005 through 2010 worked as a Load Rater. Became ODOT's Senior Load Rating Engineer in November 2010. Is married with 2 children, and enjoys spending free time going hunting and fishing with family and friends

Tom Ryan

Tom. Ryan a registered Professional Engineer and is currently involved in the FHWA and PennDOT Bridge Safety Inspector Training and Certification Program. He has served as the Project Manager for the development of the FHWA *Bridge Inspector's Reference Manual* and the NHI's two-week Bridge Inspector Training Course, Bridge Inspector Refresher Training Course and Fracture Critical Inspection Course and PennDOT's Bridge Management System, Refresher Course and the Inventory and Assessment of CoRe Elements.

He has presented bridge inspection training in 40 states, Puerto Rico and Saudi Arabia. Mr. Ryan is also assisting the Pennsylvania Turnpike Commission implement CoRe Element Inventory for their bridges and incorporating NTSB recommendations after the I-35W Bridge Failure to revise gusset plate inspection.

Jamie Schick

Jamie Schick is a senior engineering geologist in the Geo-Environmental Section of Technical Services with over twenty years experience in the practical application of the geological sciences to both large and small-scale engineering, permitting, and environmental projects. Over the past four years Mr. Schick has worked on the Unstable Slopes program for the Oregon Department of Transportation and provided geological input on statewide environmental permitting efforts and rockfall projects. He is also on the ODOT Tunnel Committee in charge of overseeing the management and inspection of tunnels on State highways.

Glen Scroggins

Glen is Supervisor in the Bridge Preservation unit of the WSDOT Bridge & Structures Office. He has 9 years experience with WSDOT in two stints sandwiched around 15 years experience with a leading bridge design consulting firm. His primary current roles at WSDOT are supervising the Statewide Bridge Inspection crews and providing guidance for statewide bridge repair recommendations and repair detail development. Mr. Scroggins earned a Bachelor of Science in Civil Engineering from the University of Minnesota and a Master of Science in Civil Engineering from the University of Washington. He is a registered Structural Engineer in the State of Washington.

Dave Severns

Dave Severns has been inspecting bridges above and below water for over 25 years. He is a Registered Civil Engineer and Commercial Diver, and is a past Chairman of the Engineering Diving Committee of the Association of Diving Contractors International. Dave has earned ASNT Level II NDT inspector in several disciplines as well as NICET Level IV certification in Bridge Safety Inspection. Mr. Severns' past work experience includes time in private industry as well as the governmental sector. Dave is currently the Assistant Chief Structures Engineer with the Nevada Department of Transportation, where he administers Nevada's Bridge Inspection Program. In his spare time, Dave enjoys flying sailplanes and sea kayaking, and spending time outdoors with his family.

Jeremy Shaffer

Jeremy Shaffer is one of the original founders of InspectTech. He has Bachelor's degrees from Tulane University and his Master's and Ph.D. in Electrical and Computer Engineering from Carnegie Mellon University. He has been directly involved in the successful planning, design, and delivery of over 70 inspection and management systems, covering tens of thousands of bridges in all service areas: international, federal, state, city, county, transit and consultant. Jeremy is the Project Manager leading InspectTech's efforts in developing the next generations of AASHTO's Pontis Bridge Management system.

Craig Smart

Mr. Smart is HDR's Nevada Structures Business Class Leader and works in HDR's Las Vegas office. He has 15 years of bridge design, engineering task leader, and project coordination experience. He has specialized in design and inspection of bridges and other transportation related structures. His engineering experience also includes bridge rehabilitation, bridge inspections and ratings, bridge scour evaluations, shop drawing review, and construction inspection.

Daniel Stromberg

Daniel Stromberg is the Chief Structural Engineer for Collins Engineers, Inc., where he has worked for the last 23 years. At Collins, Daniel is also the Lead Engineer Diver overseeing a majority of the Company's underwater inspection work. During his time spent with Collins, Daniel has performed more than 4,000 underwater bridge inspections for structures of all construction types and materials. Daniel is a certified ADC diver and has been a co-author and presenter for the Federal Highway Administration's Manuals on Underwater Bridge Inspection and Underwater Repair of Bridges. Most recently, he was one of the developers and is a principle instructor for the Underwater Bridge Inspection Course that is required by the National Bridge Inspection Standards for diving inspectors. Daniel also serves as the chairman of the Transportation Research Board's committee on Underwater Structure Inspection and Maintenance. Prior to joining Collins, he was with the Atchison, Topeka and Santa Fe Railway, where he worked for almost five years as a Bridge Engineer. Daniel holds bachelors and masters degrees in structural engineering from the Illinois Institute of Technology, is a licensed Structural Engineer in the State of Illinois, and a licensed Professional Engineer in some 25 states.

Jeff Swanstrom

Jeff Swanstrom is the Senior Bridge Inspector for the Oregon Department of Transportation's Bridge Operations unit. He has a B.S. in Civil Engineering Technology and an A.E. in Structural Engineering from Oregon Institute of Technology. Jeff is a registered professional engineer in Oregon and has 20 years of experience performing "in-service" inspections of bridges, tunnels, culverts, and sign structures throughout the state of Oregon.

Jeff is married and he and his wife Katie have two children, Erik, 20 and Ella, 16.

John Woodruff

John Woodruff graduated from Oregon State University in 1984. He has been a Registered Professional Civil Engineer since 1989. He has worked over 20 years for the State of Oregon; the last 15 years in the Hydraulics Unit. John is presently the Bridge Hydraulics Engineer for ODOT. He enjoys spending time with his two grown children and three wonderful grandchildren



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