

Time	Track 1: Industrial Facilities and Landscapes	Track 2: Documentation and Preservation	Track 3: 22nd Annual Historic Bridge Symposium
8:00-9:30	1A: Industry of the Pacific Northwest Moderator: Feliks Banel <ol style="list-style-type: none"> Lloyd B. Tepper and Jeffrey H. Tepper, "The Rise and Fall of the Tacoma Arsenic Industry" Rick Minor and Susanna Kuo, "The Oswego Iron Works: An 1866 Charcoal Iron Furnace near Portland, Oregon" Anthony Meadow, "Steel in the Northwest" Sandy Carter, "Stories from the Mill at the Falls – Insiders' Memories of the Evolution of Mill Work at Crown Zellerbach International" 	2A: Maritime Archaeology in the Pacific Northwest Moderator: Todd Croteau <ol style="list-style-type: none"> Todd Croteau, Welcome and Introduction Shelly Leavens, "Gig Harbor Net Sheds" Shannon Fitzgerald and Diana Hennick, "Historic Ships at the Northwest Seaport" Emmett Smith and Sam Johnson, "The Pacific Northwest Boat Documentation Project" 	3A: 22nd Annual Historic Bridge Symposium, Part I Moderators: Kitty Henderson and Eric DeLony <ol style="list-style-type: none"> Kitty Henderson and Eric DeLony, Welcome and Introduction Rex W. Meyer, "History of the Lacey V. Murrow Bridge: The World's First Concrete Floating Bridge" Michael Roberts, "Blue Bridge Blues in British Columbia's Capital City"
9:45-11:30	1B: Water and Power Moderator: Carol Litchfield <ol style="list-style-type: none"> Duncan Hay, "Get Pumped! Revitalization of Boston's Chestnut Hill Waterworks" William Hoffman, "Remaking History: Discoveries and Challenges in Reproducing a Worthington Steam Pump from the USS <i>Monitor</i>" Simon Litten, "Mercury Boilers for Electrical Generation and Chemical Process – A Forgotten Technology" 	2B: Recording Our Industrial Heritage: Challenges and Techniques Moderator to be confirmed <ol style="list-style-type: none"> Christopher Marston, "Western Maryland Railway: A Comprehensive Approach to HAER Documentation" Jeremy Mauro, "The Advantages and Limitations of Utilizing Laser Scanning for the Documentation of Large Engineering Structures" Richard O'Connor, "Mitigating the Destruction of Industrial Resources: What the Record Shows (and Does Not Show)" 	3B: 22nd Annual Historic Bridge Symposium, Part II Moderators: Kitty Henderson and Eric DeLony <ol style="list-style-type: none"> Sharon Wood Wortman and Ed Wortman, "Developments on Historic Bridges in the Portland Area" Marsha Tolon, "Evergreen Point Floating Bridge: Everyday Life of a Floating Bridge" Jet Lowe, "Alaskan Way Viaduct – An Old and New Departure Point for City Design in Seattle"
1:30-3:00	1C: Rural Industry and Industrial Landscapes Moderator: Katie Kemezis <ol style="list-style-type: none"> Brenda Barrett, "Conservation of Industrial Heritage on a Landscape Scale" Brad Botwick, "Archaeology of Rural Industries in the Carolina and Georgia Sand Hills" Robert Hutchison, "Timber Grain Elevators and Silos of the Palouse" Iva Stefanovski, "The Protected Industrial Complexes in Zagreb, Croatia" 	2C: Architecture of Industry, Industry of Architecture Moderator: David S. Rotenstein <ol style="list-style-type: none"> Royce M. Earnest, "Hides, Buildings, and Science: Milwaukee's Gallun Tannery at the Turn of the Century" Justin M. Spivey, "Early 20th Century Concrete Construction at the Hearst Greek Theater" Mary Habstritt, "A Paragon of Paint: The Story of a Long Island City Manufacturer" Matthew Hayes, "Glass Curtain Walls, Thin-Shell Concrete, Timber Domes, and Moveable Roofs: Fifty Years of Innovative Northwest Arena Building" 	3C: 22nd Annual Historic Bridge Symposium, Part III Moderators: Kitty Henderson and Eric DeLony <ol style="list-style-type: none"> Craig Holstine, "Scarcely Orthodox: Homer M. Hadley, Bridge Engineer Extraordinaire" Bill Vermes, "Wilbur Watson, Early 20th Century Bridge Architect" Charles Walker, "Rehabilitation of the Washington Avenue Bridge"
3:15-5:00	1D: Metals and Mining Moderator to be confirmed <ol style="list-style-type: none"> Thomas Leary, "Workplace Mapping: Interpreting Jobs Through Digital Records Linkages – A Case Study in Steel at the Youngstown Historical Center" Matthew Kierstad and Erin Timms, "Elizabeth Mine Superfund Site, South Strafford, Vermont: Data Recovery and Monitoring" Sean M. Gohman, "'A More Favorable Combination of Circumstances Could Hardly Have Been Desired': Documenting Michigan's Historic Cliff Mine" 	2D: LEED and Industrial Heritage Preservation Moderator: Jay McCauley <ol style="list-style-type: none"> Jay McCauley, "LEED 2012 and Historic Preservation" Brian D. Rich, "Sustainability Through Historic Preservation" Eric Stovner, "Seismic Evaluation and Rehabilitation Design for the Grand Canyon Powerhouse" 	3D: 22nd Annual Historic Bridge Symposium, Part IV Moderators: Kitty Henderson and Eric DeLony <ol style="list-style-type: none"> Todd Wilson, "The Pennsylvania Historic Bridge Inventory – Fifteen Years Later" Jason Smith, "The Attitudes of the Public toward Places of Historic Interest: A Comparison between the United States and Germany" Kitty Henderson and Eric DeLony, Closing Remarks

Track 1: Industrial Facilities and Landscapes

Session 1A: Industry of the Pacific Northwest (8:00-9:30 am)

- (1) Lloyd B. Tepper and Jeffrey H. Tepper, “The Rise and Fall of the Tacoma Arsenic Industry”
- (2) Rick Minor and Susanna Kuo, “The Oswego Iron Works: An 1866 Charcoal Iron Furnace near Portland, Oregon”
- (3) Anthony Meadow, “Steel in the Northwest”
- (4) Sandy Carter, “Stories from the Mill at the Falls – Insiders’ Memories of the Evolution of Mill Work at Crown Zellerbach International”

(1) The Rise and Fall of the Tacoma Arsenic Industry

Presenters: Lloyd B. Tepper and Jeffrey H. Tepper

Abstract: The rise of the arsenic industry in Tacoma and its demise about 75 years later reflect the commercial life of two separate but inter-related industrial sectors: copper smelting and the manufacturing of arsenic-based products. The Tacoma smelter, established in 1888 to process lead ores, was later acquired by the Guggenheims’ American Smelting and Refining Company (ASARCO) and converted to a copper smelter in 1911. It preferentially processed ores high in arsenic (average 3.8 percent, as high as 11 percent), and from the 1970s through 1985 was the only American producer of arsenic, with an output of about 1000 tons a month as the trioxide, As₂O₃.

The three principal arsenic-using industries – pesticides, herbicides, and wood preservation – found commercial expression in Tacoma. The Colorado-based Latimer-Goodwin Company established its primary pesticide plant in Tacoma in 1925 and produced 5 tons a day of lead and calcium arsenate, mainly for control of the boll weevil (cotton), codling moth (fruit trees) and gypsy moth. By 1927 the company was shipping 35 carloads a month, with additional allocations going by ship to the eastern U.S. market. The Tacoma facility was eventually acquired by E. I. DuPont and produced arsenical pesticides into the 1940s.

The Pennsylvania Salt Company (Pennsalt, later Pennwalt, later Atochem and variants) established a caustic soda-chlorine operation in Tacoma in 1929 to serve the local papermaking industry. In 1940 it added a line of arsenical herbicides for use as “permanent” weed killers, with uses such as on railroad rights-of-way and cotton defoliant; this line of product continued into the 1980s.

Cascade Pole and Lumber had its origin in a pole creosoting operation in 1916, adding chromated copper arsenate (CCA) preservation in the 1970s, a commercial line which exists to the present day, although for restricted uses.

The collapse of the Tacoma arsenic industry included both the smelter and the local arsenic-based industries. ASARCO closed the smelter on economic grounds in 1985. The low price of copper and the increasing cost of environmental controls and worker protection could no longer justify sustained operations. The arsenical pesticide and herbicide manufacturers were adversely affected by two factors: the discovery of organic compounds that were at least as effective as arsenicals, and the publication in 1974 of Rachel Carson’s *Silent Spring*, which energized the environmental movement, with a special focus on persistent toxins, such as arsenicals.

The ASARCO smelter has been demolished, and the property, one of the first in the nation to be designated a “Superfund” site by the EPA (1982), has now been sufficiently remediated to permit alternate commercial land use. The DuPont and Pennsalt/Atochem sites are now occupied by manufacturing operations totally unrelated to arsenic. McFarland Cascade impregnates poles and lumber

with CCA but only for specific industrial and marine applications. The principal remaining arsenic enterprise in Tacoma is “environmental remediation.”

Bios: Lloyd B. Tepper is a graduate of Dartmouth College and holds the degrees of Doctor of Medicine and Doctor of Science in Hygiene from Harvard University. He has served as Professor of Environmental Health at the University of Cincinnati (Kettering Laboratory) and was Associate Commissioner of Food and Drugs before working in the chemical industry. Dr. Tepper has been Editor of the *Journal of Occupational and Environmental Medicine* and is currently Adjunct Professor of Occupational and Environmental Medicine at the University of Pennsylvania School of Medicine.

Jeffrey H. Tepper received his A.B. from Dartmouth College and his M.S. and Ph.D. degrees in geology from the University of Washington. He is currently Professor and Chair of the Geology Department at the University of Puget Sound. His research interests focus on inorganic geochemistry, in particular as applied to the study of the origin and evolution of magmas and the analysis of lake sediments as a means of reconstructing environmental history. He and his students have conducted numerous studies of heavy metals contamination related to the former ASARCO smelter in Tacoma.

(2) The Oswego Iron Works: An 1866 Charcoal Iron Furnace near Portland, Oregon

Presenters: Rick Minor and Susanna Kuo

Abstract: The first iron furnace on the Pacific Coast was constructed in 1866 and 1867 in the small town of Oswego on the Willamette River, 8 miles (13 km) south of Portland. The furnace produced pig iron intermittently until 1885 when a larger furnace was built half a mile (0.8 km) north. Marketed as “Oregon Iron,” the furnace’s pig iron was sold to foundries in Portland and San Francisco. It was used in much of the cast-iron architecture in Portland and Salem, as well as in the 1879 San Francisco City Hall, later destroyed in the 1906 earthquake. The founders and investors in the Oswego iron works included some of Portland’s most influential figures. Controlling the means of iron production on the West Coast was part of their vision for a commercial empire in the Pacific Northwest. The ore came from two local mines and waterpower from Oswego Lake. Chinese laborers made up a large portion of the workforce.

The furnace was modeled on the furnaces of the Barnum Richardson Company in the Salisbury Iron District in Western Connecticut. As a result, the furnace has all the hallmarks of a Salisbury iron furnace: fine ashlar masonry, Gothic arches of red brick, and a heat exchanger on top of the stack. The superintendent of construction, George D. Wilbur, was a protégé of the celebrated furnace builder Isaac Newton Bartram of Sharon, Connecticut.

Plans to restore and stabilize the deteriorating masonry of the stack provided an opportunity for archaeological investigation of the site. Investigations were conducted in 2005, 2006, and 2009. The archaeology exposed the stack’s foundation, details of the hearth, and the footprint of the heat exchanger and chimney on top. A portion of the foundation was exposed 10 feet (3 m) down to bedrock, providing a look at part of a stack that is rarely seen.

Investigation revealed that the foundation was built in two tiers. At the bottom is the largest section consisting of dry-laid rough basalt stones. On top of this is another tier about 32 inches (81 cm) high. The upper tier is X-shaped and consists of diamond-shaped platforms supporting the four piers of the stack. At the center of the “X” is the firebrick hearth. The excavation also uncovered some enigmatic features: two brick-lined channels covered with cast iron plates running into the east and south arches of the stack. Their function remains a mystery, but they may have been part of the furnace’s water-cooling or drainage system. The archaeology also recovered a large number of branded firebricks from England, Scotland, and America. Furnace products that were recovered include a bar of pig iron, two “salamanders,” and many samples of slag, the byproduct of iron smelting.

Restoration work was completed in early 2010 and a formal celebration marking completion of the project was held by the City of Lake Oswego on July 24, 2010. The Oswego Furnace is the only surviving nineteenth century iron furnace west of the Rocky Mountains and Oregon's most important industrial archaeological site.

Bios: Rick Minor, Ph.D. in Anthropology from the University of Oregon, is Senior Archaeologist and co-founder of Heritage Research Associates in Eugene, Oregon. He was the principal archaeological consultant to the City of Lake Oswego during the restoration and stabilization of the Oswego Iron Furnace. In addition to fieldwork at prehistoric and historical archaeological sites in the Pacific Northwest, Rick serves as an adjunct instructor in the Historic Preservation Program at the University of Oregon.

Susanna Kuo, an independent scholar with a Ph.D. from Indiana University, helped lead the eight-year effort to preserve the Oswego Iron Furnace. She was a member of the Furnace Restoration Task Force and served as a consultant during the project. Her current projects include researching and writing nineteen interpretive signs for the City of Lake Oswego's Iron Heritage Trail.

(3) Steel in the Northwest

Presenter: Anthony Meadow

Abstract: The Pacific Northwest is not the first place that comes to mind when we think of the steel industry; however, steel is necessary metal for many aspects of modern industrialized life. This presentation will look at the steel industry in the Northwest including the history of this industry, its customers, and the surprising preservation of two steel sites.

Although the steel industry has played a minor role in this region, there are some interesting stories to tell. For example, there have been – and are – some surprisingly global connections for the steel business, in the early days and in the recent past. These provide a snapshot of what has happened to the steel industry in this country.

The steel industry in this region has faced a variety of constraints that have limited its growth and expansion including: (a) economic (Pittsburgh Plan also known as the Basing Point pricing model), (b) limited market for steel in the region, and (c) entry of national steel companies into the region. Nevertheless, a small steel industry still exists in the Northwest.

To understand steel in Washington and Oregon we need to also understand the customers for this metal. The more important steel consuming industries in the Northwest were the agricultural and fishing industries (canning and implements), the lumber and mining industries (production of equipment), the building of ships, bridges and buildings. There are two preserved steel industry sites – one in Washington and the other in Oregon. This presentation will look at these sites and how they came to be preserved.

Bio: Anthony Meadow is the founder and president of Bear River Associates, Inc., a small software company started in 1985 with headquarters in Oakland, California. Bear River's software customers include Cisco Systems, Google, Oracle, Sprint, Qwest, Merrill Lynch, the Federal Reserve, AIG, the Pentagon, and Chevron. He has written two computer books published by Addison-Wesley and edited a series of computer books. He has also written two dozen articles for computer and trade publications.

(4) Stories from the Mill at the Falls – Insiders’ Memories of the Evolution of Mill Work at Crown Zellerbach International

Presenter: Sandy Carter

Abstract: West Linn’s paper mill has been in production on the shoulder of the mighty, 42-foot (13 m) Willamette Falls since 1895, which is quite significant by West Coast standards. Seventeen people hired during the reign of Crown Zellerbach between 1927 and 1972 shared their memories with the presenter – stories that are alternately grim, funny, and touching. These include stories about floods, fires, strikes, equipment breakdowns, and the horseplay that brightened their years at the West Linn mill, which once employed 2,000 workers. The picture painted by these stories is the human side of industrial production and mill work as it evolved in the Pacific Northwest through the great midsection of the 1900s. It is a chronicle of the dangerous equipment and heavy, challenging jobs that built middle-class neighborhoods, and educated many generations of children in the communities that surround the falls. It is meant to humanize the history of the paper industry, to put the flesh on the corporate history of the company, and to illustrate the near-heroic scale of the workers’ role in production.

Told by the “Greatest Generation”-era men who lived it, the presentation will illuminate work in Oregon heavy industry, from sorting snow-covered logs on the wide Willamette River to tending the giant machines that produced paper for America’s favorite magazines of the day – using Willamette Basin forests and the power of mighty Willamette Falls. These people made paper when the Crown Zee symbol dominated the west coast market in household paper products. The company experimented with coffee filters and with floating mills on the Amazon. Their machines ran paper towels, cash register tape, Crezon backing paper for construction, thousands of tons of newsprint and telephone directory stock, and mulch paper for Hawaiian planters. J. D. Zellerbach, the charismatic leader of the company, was a liberal corporate giant who was appointed Ambassador to Italy by President Eisenhower.

This presentation will first provide a very brief overview and timeline of the growth of the company itself during its 60-year run, then introduce the people (through a short DVD), and then, through selected excerpts, look back at a working environment before safety committees, environmental consciousness, and equal rights. The presentation will focus on how paper was made, the scale and characteristics of the mill and its machines, as well as the workers and their work environment. The West Linn mill is still producing 700 tons a day of high-quality paper in 2011, on three of its original ten machines (now modified), but with only 240 employees.

Bio: Sandy Carter is a University of Oregon Journalism graduate and descendant of 1845 Oregon Trail pioneers. She retired from her grant-writing job in 2003 to become the creative force behind the Willamette Falls Heritage Foundation. She is a contributing scholar for the Oregon Historical Society Quarterly (January 2005), produces an intermittent history column for West Linn Tidings and continues to generate grants and publicity for the Foundation’s innovative projects. She produced two oral history documentaries on papermaking in West Linn under Crown Zellerbach from 1928 to 1986, which air on cable access and Oregon Public Broadcasting’s public affairs channel. Her documentaries, entitled “Grindstones, Boomsticks, Tattletales and Nips – The People and the Stories of Crown Zellerbach International, West Linn Division, 1928-1986,” and “Friends, Fish, and \$1.09 an Hour,” are available in Oregon public libraries and at the Oregon History Center research library. She recently completed a Foundation-published oral history reference book for future researchers, entitled “\$1.09 an Hour and Glad to Have It – Conversations with Seventeen Mid-20th Century Crown Zellerbach Millworkers.”

Session 1B: Water and Power (9:45-11:30 am)

- (1) Duncan Hay, “Get Pumped! Revitalization of Boston’s Chestnut Hill Waterworks”
- (2) William Hoffman, “Remaking History: Discoveries and Challenges in Reproducing a Worthington Steam Pump from the USS *Monitor*”
- (3) Simon Litten, “Mercury Boilers for Electrical Generation and Chemical Process – A Forgotten Technology”

(1) Duncan Hay, “Get Pumped! Revitalization of Boston’s Chestnut Hill Waterworks”

Presenter: Duncan Hay

Abstract: Boston’s High Service Pumping Station has been a landmark at the western edge of the city ever since it was constructed in 1887. The Romanesque confection of red sandstone and pink granite stands across from Chestnut Hill Reservoir and contains three massive steam pumping engines. The oldest and most ornate of those machines, an 1894 Leavitt-Riedler triple expansion, is a National Mechanical Engineering Landmark.

After a high-pressure water supply tunnel was completed in 1872, the Chestnut Hill complex reverted to standby service and the engines fell silent soon thereafter. Despite visits and strong words of support by SIA, TICCIH, ASME, the Newcomen Society, the National Trust, and a host of state and local organizations, preservation and ongoing maintenance of the site’s buildings and machinery became a growing matter of concern, especially when the Massachusetts Water Resources Authority (MWRA) declared the buildings surplus in 2007 after re-routing mains, building a new underground emergency pumping station, and disconnecting the historic structures from the rest of the system.

No one questioned the site’s significance or remarkable degree of historical integrity. Everyone agreed that the place was special and that the public deserved access. The question at Chestnut Hill, as at many of the industrial and engineering properties that SIA members care passionately about, was how to pay for the upkeep of a large ornate building and the equipment within.

The answer came through real estate development, sharp negotiation, careful exploitation of preservation easements embodied in land transfer documents, and a recognition that some things had to be sacrificed in order to preserve the most significant elements in their original settings. Friends of the Waterworks, a preservation advocacy group that had promoted preservation and reuse of the complex for more than 15 years, and the Boston Landmarks Commission helped broker an agreement between the Commonwealth of Massachusetts and real estate developers that ensures the long-term preservation, public access, and interpretation of the High Service building. Capitol costs were paid for, in large part, through proceeds from development and sale of 162 condominiums in new and adaptively reused buildings elsewhere in the complex.

On March 27, 2011, the Metropolitan Waterworks Museum opened in the engine room of Chestnut Hill’s High Service Station and welcomed more than 1,500 visitors during its first four hours of operation. New exhibits, computer animations, and an audiovisual show help interpret the building and engines within broader contexts of urban growth, public health, technology, architecture, and politics during a period that some have dubbed “Boston’s Golden Age.”

Now, while some who fought for years to preserve the site are still pinching themselves to confirm that this really happened, we are also coming to terms with new responsibilities that come with the shift from advocacy to operation and with the curious role as museum tenant in a condo association.

Bio: Duncan Hay is SIA's Vice President, a member of the board for the Metropolitan Waterworks Museum, and works for the National Park Service as historian for Erie Canalway National Heritage Corridor and as hydropower licensing specialist for the Northeast Region. He became involved with the Chestnut Hill project in 1994 when Friends of the Waterworks asked for SIA's support in their preservation advocacy efforts. Before joining the Park Service and moving to Boston, Duncan was curator of industrial history at New York State Museum and worked at the National Building Museum and Museum of American Textile History. He has a M.A. and Ph.D. in the History of Technology from the University of Delaware's Hagley Program in the History of Industrial America and a B.A. in Geography from the State University of New York at Oneonta.

(2) Remaking History: Discoveries and Challenges in Reproducing a Worthington Steam Pump from the USS *Monitor*

Presenter: William Hoffman

Abstract: On December 31, 1862, the USS *Monitor* sank off the coast of Cape Hatteras, North Carolina, taking to the ocean floor a complex mechanical steam system, which included two direct acting simplex steam pumps designed and built by the H. R. Worthington Company in Brooklyn, New York.

In 1973, the *Monitor's* wreck site was discovered in 230 feet (70 m) of seawater and in 1975 the site fell under the jurisdiction of the National Oceanic and Atmospheric Administration (NOAA), which currently oversees, protects, and studies the wreck. Over the past three decades NOAA, with the assistance of the U.S. Navy, has recovered over 200 tons of material from the site. A major recovery of large mechanical components in 2001 included the two Worthington pumps.

Since 1987, when it was designated as the repository of all *Monitor* artifacts, the Mariners' Museum in Newport News, Virginia, has been conducting conservation on recovered objects to stabilize and preserve the artifacts for eventual display and curation. Before any treatment could commence on the Worthington pumps, a detailed understating of how they were assembled and operated as well as their physical condition after 140 years on the sea floor was undertaken. Historical documentation was soon collected and included a variety of pump patents, plans, and 19th century engineering literature. Nondestructive technology (NDT) such as X-radiography was employed to determine both the current physical condition of the pumps and aid in identifying internal components within them. As disassembly and conservation treatment began, loss due to years of corrosion as well as a structural weakness to some of the surviving components soon became apparent; however, both pumps were in remarkably good condition overall.

As the conservation treatment of the pumps has progressed, discussion on final display has also begun, which has led to further dialogue on how to visually convey to public the pumps' movement. By conservation ethical standards and from structural loss and weakness, operation of either original pump is not possible, so the use of a 3-D model has been suggested. However, it is felt that a computer-generated pump can never fully convey the true grandeur of a live running steam pump. Therefore, in the spring of 2009, a pilot project was begun to reproduce several pump components in cast iron to ascertain the possibility of creating a fully working replica. The initial project proved quite successful, which led to the expansion of the project and the reproduction of a variety of additional components using multiple molding methods, laser scanning, computer-aided drafting (CAD), 3-D printing technologies, and several casting techniques.

This presentation will discuss the methods and challenges of reproducing a variety of simple and more complex parts using both modern and traditional casting methods in bronze and iron. It will also include what was learned about how the original parts were made though identifying marks left on the artifacts from the casting process.

Bio: Will Hoffman is an object conservator currently residing in Norfolk, Virginia. He received his Master's degree in art conservation from Queen's University in Kingston, Ontario, in 2009 specializing in the conservation of objects. He received Bachelor's degrees in Anthropology (concentrating in North American and historic archaeology) and Fine Arts (concentrating in sculpture) at the State University of New York at Buffalo in 2005. Presently, he is an assistant conservator at the Mariners' Museum in Newport News, Virginia, treating objects recovered from the wreck of the USS *Monitor*.

(3) Mercury Boilers for Electrical Generation and Chemical Process – A Forgotten Technology

Presenter: Simon Litten

Abstract: Beginning in 1912 the General Electric Company developed and marketed central power stations based on boiling metallic mercury as an operating fluid. Dense mercury vapor permitted efficient operation at low pressures. Mercury vapor was less erosive to turbine blades than steam. Because of its low freezing point, mercury boilers needed less protection from the elements during down times, a saving in construction costs. These stations were phenomenally thermodynamically efficient. Mercury vapor exiting turbines was hot enough to boil water and run a second set of steam turbines. However, the technology raised challenges that were never completely resolved. These stations were expensive to build and subject to excessive down-times. Mercury-iron amalgamation eroded the steel in the hotter zones of the boiling tubes and re-deposited in cooler regions. Mercuric oxide scum interfered with contact between the liquid mercury and boiler tube walls. The weight and cost of mercury limited the size of power plants. GE invested heavily in developing the technique. An alloy was found to resist amalgamation and numerous design and operational tweaks reduced air ingress. GE also developed mercury vapor detectors to alert operators to large emissions of expensive mercury up the stacks. Losses of mercury to the atmosphere were substantial.

GE sold mercury vapor boilers to electric utilities in Kearney, New Jersey; Hartford, Connecticut; and Portsmouth, New Hampshire. GE also built experimental and in-house mercury vapor power plants in Schenectady, New York, and in Pittsfield and Lynn, Massachusetts. GE failed to persuade the builders of the French luxury ocean liner SS *Normandie* to use marine mercury boilers.

The technology reached its apogee at the same time that it became obsolete. After World War II utilities wanted to build increasingly huge central power plants; mercury boilers couldn't be scaled up. The last utility mercury boiler went on line in 1950. Gas turbines, capable of quick starts for peak loads, replaced smaller power plants. Industrial users turned to utilities rather than generate electricity on site. Utilities were also becoming reluctant to use an inherently toxic operating fluid even though they were turning to nuclear power. The toxicity of mercury was well known but earlier industrial attitudes discounted environmental and occupational hazards.

In the 1950s NASA developed a mercury boiler powered by polonium for spacecraft. Soviet engineers experimented with mercury boiler powered airplanes. Mercury vapor heat exchangers served the dye industry and the Sun Oil Company (Sunoco) used them in their Marcus Hook, Pennsylvania, refinery. Sunoco advertised its motor oil as "Mercury Made." Mercury was also employed as an intermediate cooling fluid between liquid sodium and water in breeder reactors.

As a forensic environmental chemist, Dr. Litten ran into the residuum of a mercury vapor heat exchanger while investigating a site in Niagara Falls. Industrial chemical history can provide important clues to the sources of toxic substances long after the particular application has been all but forgotten.

Bio: Simon Litten is now retired but for more than 30 years he was a research scientist working for the New York State Department of Environmental Conservation. He holds a Ph.D. from the

Syracuse University Department of Civil Engineering, a M.S. from the Upstate Medical Center Pharmacology Department, and a B.A. in history from the University of Oregon.

Session 1C: Rural Industry and Industrial Landscapes (1:30-3:00 pm)

- (1) Brenda Barrett, "Conservation of Industrial Heritage on a Landscape Scale"
- (2) Brad Botwick, "Archaeology of Rural Industries in the Carolina and Georgia Sand Hills"
- (3) Robert Hutchison, "Timber Grain Elevators and Silos of the Palouse"
- (4) Iva Stefanovski, "The Protected Industrial Complexes in Zagreb, Croatia"

(1) Conservation of Industrial Heritage on a Landscape Scale

Presenter: Brenda Barrett

Abstract: Industrial processes are often best understood in the context of larger regional systems. This presentation reviews efforts by enthusiasts, organizations, and governmental agencies to conserve and interpret not just individual industrial sites, but whole industrial landscapes. Pioneering work to identify and protect linear resources such as canals and historic roads has expanded to new kinds of designations and scaled up programs that encompass large industrial complexes, interconnected supply chains, the labor force, and even the sources of raw materials. Nonprofit associations, regional partnerships, and both state and federal agencies have developed strategies to identify, designate, plan, and implement preservation projects on an a landscape scale. This presentation will review the history of these efforts including historic highway associations dedicated to building awareness of the Lincoln Highway and the National Road, the role of the National Park Service in preserving early industrial sites, and a special emphasis on the innovations presented by the Park Service's work in Lowell National Historic Site, the Illinois and Michigan Canal National Heritage Corridor, and the Blackstone River Valley National Heritage Corridor.

The National Heritage Areas in particular with their partnership approach and their broad geographic scale have been able to tackle industrial themes significant to the story of the nation such as the automobile industry (Automobile National Heritage Area), industrialized agriculture (Silos and Smokestacks National Heritage Area), and the steel industry (Rivers of Steel National Heritage Area). Special attention will given to the instrumental role of state heritage areas programs in New York and Pennsylvania that have played a leadership role in efforts to manage industrial heritage on a large scale. Other multi-jurisdictional strategies such as trail designations, scenic byways and the role of investment schemes focused on community development or heritage tourism will also be touched upon. While the focus will be on the United States, reference will be made to landscape-scale redevelopment schemes in Europe such as Emscher Park in Germany, the Lobregat Valley in Spain and some of the French Parc Regionaux.

In conclusion, the presentation will offer an analysis of the elements that are common to many of these efforts such as valuation, designation, public engagement, and regional planning and multi-party investment. It also will review both the successful outcomes and the major challenges that many of these initiatives face particularly in the current economic climate. Recommendations will be made for the need to continue the evaluation of this work, to build a community of practice, and to advocate for a national strategy that supports the preservation and interpretation of iconic industrial heritage of the United States.

Bio: Brenda Barrett serves as the Bureau Director for Recreation and Conservation at the Pennsylvania Department of Conservation and Natural Resources. From 2001 to 2007 she was the National Coordinator for Heritage Areas for the National Park Service in Washington, D.C. Prior to that position, she worked for 22 years at the Pennsylvania Historical and Museum Commission, serving as the

Director of the Bureau for Historic Preservation and the Director of Historic Sites and Museums. Her research and writing focus on cultural landscapes, conservation and historic preservation policy, and heritage development strategies.

(2) Archaeology of Rural Industries in the Carolina and Georgia Sand Hills

Presenter: Brad Botwick

Abstract: The Sand Hills of Georgia and the Carolinas is a unique physiographic region that had an important role in the industrial development of the Southeast. It has also been closely associated with the Department of Defense and the six Army and Air Force installations located in the Sand Hills have compiled extensive inventories of industrial archaeological sites. Under a grant from the Department of Defense Legacy Program, a historic context was prepared to assist cultural resource managers in locating and evaluating rural-based industrial sites in the Sand Hills. Industries identified for this study ranged from craft work to large-scale manufacturing and formed integral parts of rural economies or centers of communities. Particular industries or site types covered by the study included grist and sawmills, forestry products, clay industries, blacksmithing, distilling, mineral industries, cotton ginning, and cottonseed oil. Most of these industries were not distinctive to the Sand Hills, but in some instances the region's physical characteristics contributed to the shape and development of industry. Certain industries, though, were truly unique or saw their greatest development in the region. One of these was the kaolin industry of Georgia and South Carolina, which was – and remains – important in these states, and which had significant impacts on regional society and landscapes.

The historic context covered the historical, technological, economic, and labor developments related to collecting and processing natural products, farm produce, and metals into commodities. This paper describes the industries that were important in the rural Sand Hills region and discusses the guidelines for identifying and evaluating archaeological sites and resources associated with them.

In addition, this presentation presents an overview of the kaolin mining industry in the Sand Hills. The discovery and industrial exploitation of natural kaolin beds in the early twentieth century significantly altered the region's landscape as well as its economy, patterns of land use, and society. Excavated from massive open pits, and processed at increasingly larger and more elaborate refining plants, the industry had severe impacts on the region. Kaolin mining was not only harsh on the land, it was also exploitative of local residents who sold mineral rights to large mining companies and in the process relinquished their ability to use land in traditional ways. This presentation describes the processes used to extract and process kaolin, the archaeological manifestations of this industry, and prospects for future study.

Bio: Brad Botwick is a Principal Investigator at New South Associates, Inc. He has worked extensively throughout the eastern United States on numerous industrial and urban sites and has been involved recently with the archaeological aspects of industry in the Southeast.

(3) Timber Grain Elevators and Silos of the Palouse

Presenter: Robert Hutchison

Abstract: For the last three years, the presenter has been working on an ongoing project involving the documentation of abandoned and/or partially dismantled grain elevators and silos located throughout the Palouse region of southeastern Washington State. The Palouse is known for its fertile rolling hills, which were settled during a wheat-growing boom during the 1880s. Numerous timber grain elevators and silos were built in the Palouse region up through the 1950s to provide storage for harvested grain.

Timber grain elevators and silos are a building typology unique to North America's agricultural regions. The first timber grain elevators were built using grain transfer methods developed by the inventor and

millwright Oliver Evans. As settlers moved westward, the timber grain elevator became a building type that appeared in the landscape throughout the Midwestern and Western states. By the 1950s, construction methods had changed from wood to steel and concrete, materials which permitted larger structures to be built, and which were less susceptible to fire.

It is estimated that there are approximately 100 of these timber grain structures still remaining in the Palouse region. Due to maintenance and fire concerns, many if not most of these structures have been abandoned and are beginning to deteriorate. Yet, due to the quality and quantity of the wood in these structures, many are being dismantled at a rapid pace by lumber companies to be sold as reclaimed lumber. Until recently, these towers in the Palouse landscape have remained in limbo, stripped of their original function and difficult to adapt to new purposes, yet resistant to the detrimental effects of time and weathering. As they stand derelict and in a partial state of decay awaiting pending demolition, there appears a brief yet timely opportunity to record the architectural and industrial qualities of these unique utilitarian structures.

Bio: Robert Hutchison is a Principal at Seattle-based Hutchison & Maul Architecture and a part-time faculty member at the University of Washington Department of Architecture. Before becoming an architect, Hutchison practiced as a Staff Structural Engineer for a small historic preservation firm located in Media, Pennsylvania, where he worked as Project Manager and/or Staff Engineer on numerous historic timber structure projects. In 2008 Hutchison taught a graduate design studio at Washington State University's School of Architecture and Construction Management with a focus on the documentation and reuse of timber grain elevators. Hutchison's architectural firm is currently providing architectural services for the non-profit Artisan Barn arts organization in Uniontown, Washington, involving the conversion of an existing timber grain silo adjoining an old dairy barn into an art gallery.

(4) The Protected Industrial Complexes in Zagreb, Croatia

Presenter: Iva Stefanovski

Abstract: In all of Croatia, there is one re-utilized factory, a leather factory from the 19th century that, after a fire and subsequent closure, was transformed into a glyptotheque. In the middle of the 19th century, Zagreb was the focal point for the industrialization of Croatia and many factories that were built since that time in the city's center have been abandoned. This rich industrial heritage was recognized and protected but the story did not go further.

What are the reasons for the neglect of industrial heritage in the city of Zagreb and why do the local authorities not see its value as a way of urban revival, as has been the case in other cities (London, Barcelona, Madrid, Lisbon, Rome, etc.)? People in Zagreb are not surprised by this neglect, especially when they know that protected modernist villas are being demolished so that private investors can build new houses on the property. The same can be said about industrial heritage, when one factory collapsed due to new construction by a private investor.

Today there are three protected industrial complexes and few remaining factories under protection but there is no management plan for their future use. What is the meaning of protecting industrial heritage without its conservation or plans for its future use or reuse? This presentation reviews three protected industrial complexes, two owned by the city and one by the state, and focuses on the Paromlin flour mill complex from the middle 19th century. The mill was built in 1862, shortly after the railway came into Zagreb, and includes the city's first steam-powered machinery. The complex suffered a fire in 1906 and was rebuilt. It acquired protected status in 1989, after it suffered a second fire and was badly damaged.

In the meantime two architectural competitions were made, one for European and the other a private initiative together with the architectural magazine *Oris*. Neither award-winning project brought interest from the local authorities. Today the complex is under the threat of collapse due to fire damage and needs

conservation and reutilization. This presentation will focus on the Paromlin complex and alternative management plans for its reuse.

Bio: Iva Stefanovski, born in Zagreb, Croatia, received a degree in management and tourism in 2001, an M.A. in art history and philosophy in 2007, and a Master's in history from the Sorbonne University in Paris in 2010. Currently enrolled into Erasmus Mundus TPTI (Techniques, Patrimony, Territories and Industry), she is writing her Master's thesis on the Paromlin protected industrial complex in Zagreb.

Session 1D: Metals and Mining (3:15-5:00 pm)

- (1) Thomas Leary, "Workplace Mapping: Interpreting Jobs Through Digital Records Linkages – A Case Study in Steel at the Youngstown Historical Center"
- (2) Matthew Kierstad and Erin Timms, "Elizabeth Mine Superfund Site, South Strafford, Vermont: Data Recovery and Monitoring"
- (3) Sean M. Gohman, "'A More Favorable Combination of Circumstances Could Hardly Have Been Desired': Documenting Michigan's Historic Cliff Mine"

(1) Workplace Mapping: Interpreting Jobs Through Digital Records Linkages – A Case Study in Steel at the Youngstown Historical Center

Presenter: Thomas Leary

Abstract: This presentation highlights two evolving programmatic initiatives: archival collections digitization and permanent exhibit reinterpretation. Specifically, this presentation discusses plans under which different categories of digitized images and documents are linked into portfolios which, in turn, illuminate the technology and daily work that characterized discrete stages of steel production.

The facility known as the Youngstown Historical Center of Industry and Labor (YHCIL) includes a museum and an archives/research library. Opened by the Ohio Historical Society in 1992, the site was part of the 2006 SIA Fall Tour. Faculty associated with Youngstown State University's Applied History Program now operates YHCIL under a partnership agreement with OHS that took effect in 2009.

In conjunction with the technical expertise of the Archives and Special Collections Department at YSU's Maag Library, several professors initiated digitization of selected images and documents in 2008 using summer student research assistants; that undertaking has expanded by virtue of funding through Ohio Americorps. The complementary goals remain twofold: to deploy collections resources online and to enhance visitors' experiences in existing static museum displays.

One phase of the project involves synthetic presentation of information from an array of two-dimensional materials. Photographs, engineering drawings, and job descriptions all illuminate diverse aspects of ecologies historically specific to the differing departments of integrated steel works. Such sources reinforce the perspectives of scholars who have analyzed steel sites in terms of technological change, work experiences, and labor relations as well as industrial archaeology. At YCHIL the digitized products will be linked within online visual essays to acquaint patrons with the essentials of by-product coking, blast furnace operations, steelmaking techniques, and the principal types of rolling mill practice.

A similar approach informs the grafting of digitized resources onto the interpretation of existing exhibits. The first phase of redesign targets the lower gallery in YHCIL's two-story display space. Prominent among the artifacts on this lower level are large models of rolling mills, including the 79-inch (200 cm) hot strip mill at Youngstown Sheet & Tube's Campbell, Ohio, Works. These models were crafted for use

at trade shows during the 1930s, but their current value is underutilized due to insufficient interpretation. Addition of interactive text rails represents one option for upgrading the 79-inch mill model, which is intact and operable. However, computer work stations providing access to the digitized collections previously discussed would greatly facilitate contextualization of the model. Its full story represents the transition from hand sheet rolling to the continuous wide hot strip mill which revolutionized steel production for the consumer goods sector during the second quarter of the 20th century.

In summary, YHCIL is employing an approach to collections digitization and exhibit reinterpretation that emphasizes the ecology of specific workplaces within steel plants. Thus, public history presentations about industrial work environments may use their own resources more intensively in supplementing academic approaches to the study of technology and work.

Bio: Thomas E. Leary received his Ph.D. from Brown University and his B.A. from St. John Fisher College in Rochester, New York. He is an Associate Professor of Applied History at Youngstown State University and has published several articles on the history of steel industrial processes and facilities, as well as historic preservation issues related to industrial sites, in publications such as *IA* and *The Public Historian*.

(2) Elizabeth Mine Superfund Site, South Strafford, Vermont: Data Recovery and Monitoring

Presenters: Matthew Kierstead and Erin Timms

Abstract: In 2009 and 2010 Public Archeology Laboratory (PAL) completed data recovery investigations and archaeological monitoring at the Elizabeth Mine copperas factories in Orange County, Vermont. The archaeological investigations were conducted in support of the Non-Time-Critical Removal Action (NTCRA) on Tailings Pile 3 (TP 3) of the Elizabeth Mine being performed by the U.S. Army Corps of Engineers-New England District (USACE) for Region 1 of the Environmental Protection Agency (EPA) through Interagency Agreement.

Copperas is a fourteenth-century term for crystalline green hydrous iron sulfate, an important early industrial chemical compound derived from processing iron sulfide ores. Copperas had a multitude of uses over the centuries. Copperas production was a simple process that is well documented in sixteenth- and seventeenth-century accounts, and changed little until the late nineteenth century. The process manipulated the landscape through extraction, various stages of lixiviation, concentration and crystallization. The process was a “cascading” one that made use of water and took advantage of gravity, with successive manufacturing steps typically located on a hillside. The manufacture of copperas from natural materials ended in the 1880s when large, inexpensive sources of iron sulfate became available as a by-product of the steel industry.

Elizabeth Mine was established in the early nineteenth century and operated into the mid-twentieth century. After the failure to produce iron, attention shifted to copperas production. Copperas was produced on the east slope of Copperas Hill from 1809 until the 1880s. The owners of the South Strafford copperas works expanded and improved their works several times. Innovative methods employed to accelerate the ore decomposition and lixiviation process contributed to higher yields making them one of the largest producers in the country. Historical accounts and company records describe some of the methods as well as arrangement of the works. Elizabeth Mine is one of two copperas works excavated in the world. The integrity of the site created a rare opportunity to study the archaeological remains of the constructed landscape. The data recovery of Elizabeth Mine Copperas Factories and construction monitoring of Copperas Hill documented extensive features that correspond to the historical accounts. The results of the 2009 and 2010 field seasons identified key activity areas as well as features that give insight into copperas production at Elizabeth Mine.

Bios: Matthew Kierstead has worked in cultural resource management since joining PAL in 1995. He has completed numerous projects involving historic industrial and engineering resources, including surveys, HAER documentation, National Register nominations and determinations of eligibility, public interpretive programming, and archaeological project technical assistance. Prior to joining PAL, he served as a project historian on industrial site documentation projects in Alabama and Pennsylvania for the National Park Service's Historic American Engineering Record (HAER). Mr. Kierstead is a member and past president of SIA's Southern New England Chapter. Mr. Kierstead's areas of expertise include mining, metallurgy, power generation, and transportation infrastructure. Mr. Kierstead received his M.A. in Public History from West Virginia University, where he was involved in industrial site research and documentation through the Institute for the History of Technology and Industrial Archaeology. He received his B.A. in Art History from Framingham State College, where he studied architectural history and studio art.

Erin Timms has over seven years experience in cultural resource management. In 2005, Ms. Timms received a M.S. in Industrial Archaeology from Michigan Tech University and a B.A. in Art History with a certificate in Historic Preservation from Youngstown State University in 2003. Prior to joining PAL in 2009, Ms. Timms worked for Terracon Consulting, Inc., Public Archaeology Facility at Binghamton University, and Cultural Resource Analysts, Inc. Ms. Timms conducted various phases of archaeological investigation on a range of projects throughout Georgia, South Carolina, Massachusetts, Missouri, Mississippi, Oklahoma, New York, New Hampshire, Indiana, Ohio, Vermont, and Rhode Island. Ms. Timms was the chair of the SIA 2010 Vermont Fall Tour, featuring tours Elizabeth and Ely Mines. Ms. Timms has given various presentations for public outreach and professional societies on her work at the mines that have included local, regional, and national venues.

(3) "A More Favorable Combination of Circumstances Could Hardly Have Been Desired": Documenting Michigan's Historic Cliff Mine

Presenter: Sean M. Gohman

Abstract: The Cliff Mine, an archaeological site situated on the Keweenaw Peninsula of Michigan, is the location of the first successful attempt to mine native copper in North America. Under the management of the Pittsburgh & Boston Mining Company from 1845 to 1879, two-thirds of the Cliff Mine's mineral output was in the form of mass copper, some pieces of which weighed over 5 tons when removed from the ground. The unique nature of mass copper and the Cliff Mine's handling of it make it one of the best examples of early mining processes in the Keweenaw District. Mass copper only constituted 2 percent of the entire product of the Lake Superior copper districts, and the story of early mining on the Peninsula is generally overshadowed by later, longer running mines such as the Calumet & Helca and Quincy Mining Companies. Operating into the mid-20th century, the size and duration of these later mines would come to define the region, though they would not have been possible without the Cliff Mine's early success.

Research on the Cliff Mine has previously focused on social and popular history, neglecting the structural remains. However, these remains are physical clues to the technical processes that defined early mining on the Keweenaw Peninsula. Through archaeological investigations, these processes and their associated networks were documented as part of the 2010 Michigan Tech Archaeology Field School's curriculum. The project's continued work will focus on creating a visual representation of these processes utilizing Geographic Information Systems (GIS) software. This map will be a useful aid in future research, community engagement and possible future interpretive planning.

The paper presented will discuss the history of the Cliff Mine, plus provide broad overviews of the 2010 and 2011 field seasons. Research projects resulting from those field seasons will be highlighted including the interpretation of QuickBird satellite imagery, the creation of two- and three-dimensional maps of the mine's surface and underground workings.

Bio: Sean M. Gohman is currently entering his fourth year in the Industrial Archaeology program at Michigan Technological University. His first two years in the program were spent working towards a Master's Degree, which he completed in the summer of 2010. His Master's research focused on the built environment of the Keweenaw Peninsula's historic copper mining industry, and specifically on fieldwork at the Cliff Mine. Sean's current Ph.D. research interests are building off his first field season at Cliff Mine, and growing to include more a more holistic understanding of the mine and its historic industrial landscape. This summer, a second field season is underway at Cliff Mine, with the hope for many more to come. Sean is a native of Minnesota, but has called the Upper Peninsula of Michigan home for nearly seven years. His interest in the local history and community has led him towards an active involvement in local industrial heritage issues. Sean is currently taking part in a multi-party steering committee dedicated to the preservation of the Quincy Smelter, one of the last surviving historic copper smelters in the world.

Track 2: Documentation and Preservation

Session 2A: Maritime Archaeology in the Pacific Northwest (8:00-9:30 am)

- (1) Todd Croteau, Welcome and Introduction
- (2) Shelly Leavens, “Gig Harbor Net Sheds”
- (3) Shannon Fitzgerald and Diana Hennick, “Historic Ships at the Northwest Seaport”
- (4) Emmett Smith and Sam Johnson, “The Pacific Northwest Boat Documentation Project”

(1) Welcome and Introduction

Moderator: Todd Croteau

Bio: Todd Croteau is the Maritime Program Coordinator for the Historic American Engineering Record. A graduate of the Industrial Design Program at the Rhode Island School of Design, Mr. Croteau has worked for HAER since 1989.

(2) Gig Harbor Net Sheds

Presenter: Shelly Leavens

Abstract: From its early beginnings, the City of Gig Harbor served as homeport to many vessels fishing in Puget Sound, the Pacific Ocean, and Alaskan waters. To facilitate the commercial fleets, waterfront structures sprang up along the harbor’s edge to supply vessels and tend their nets. Of the many net sheds built, seventeen remain today and several are threatened by commercial development. HAER prepared drawings, photographs, and written documentation of the net sheds. This presentation will highlight the net sheds and the people who worked in them.

Bio: Shelly Leavens is an independent historian. She has worked on a variety of maritime heritage projects in the Pacific Northwest.

(3) Historic Ships at the Northwest Seaport

Presenters: Shannon Fitzgerald and Diana Hennick

Abstract: A remarkable collection of historic vessels are maintained at the Northwest Seaport, located on South Lake Union in Seattle. The diverse fleet includes four National Historic Landmark vessels – tugboat *Arthur Foss* (1889), lightship *Swiftsure* (1904), fireboat *Duwamish* (1909), and the passenger steamer *Virginia V* (1922) – and several regionally significant boats, including the fishing trawler *Twilight* (1933) and other visiting watercraft. Another significant ship, the schooner *Wawona*, recently succumbed to age, the elements, and lack of funding and was dismantled in 2009. This presentation will provide a background on the historic ships and the ongoing preservation work associated with them. Additionally, the speakers will discuss the interpretive programs being developed to educate the public and provide meaningful hand-on experiences working with marine engines, radio equipment, and maritime life.

Schooner *Wawona* is a three-masted, fore-and-aft schooner that sailed from 1897 to 1947 as a lumber carrier and fishing vessel based in Puget Sound. The 165-foot (50 m) schooner was built near Eureka, California on Humboldt Bay by Hans Ditlev Bendixsen, who was one of the most important West Coast shipbuilders of the late 19th century. From 1897 to 1913, she carried lumber from Grays Harbor and

Puget Sound ports to California. One of her captains, Ralph E. “Matt” Peasley, inspired a series of popular novels. She was berthed at South Lake Union Park in Seattle adjacent to the Center for Wooden Boats. She was listed on the National Register of Historic Places, the Washington State Heritage Register, and the vessel was an official city landmark. However, after efforts to restore the decaying ship failed, she was dismantled in March 2009. HAER documentation was prepared prior to the deconstruction and this presentation will discuss the use of LIDAR scanning to record its features in addition to a team of nautical archeologists from East Carolina University preparing a field report on the vessel.

Bios: Shannon Fitzgerald volunteers as the ships manager for the Northwest Seaport. He works full-time with the Seattle office of the National Oceanic and Atmospheric Administration (NOAA).

Diana Hennick is the curator for the Northwest Seaport and oversees the interpretive programs on the vessels.

(3) The Pacific Northwest Boat Documentation Project

Presenters: Emmett Smith and Sam Johnson

Abstract: A plethora of boat types developed on the West Coast of the United States, from dugout canoes to factory fishing ships. Although a handful of these types are still plying the waters today, many more have been laid up, destroyed, or are rotting away slowly along the shorelines. The Pacific Northwest Boat Documentation Project hopes to identify the remaining historic vessels in the region, document the various types, and preserve the best examples. This presentation will discuss the various types of vessels found throughout the Pacific Northwest and highlight some pilot projects documenting the watercraft.

Columbia River gillnet boats are a regional boat type developed to harvest the great runs of salmon that swam up the Columbia River to spawn. Evolving from sail to power and from bow pickers to stern pickers, the vessel type was widely used by the commercial fishing industry to supply the canneries that spanned the shoreline in Astoria. HAER, The Columbia River Maritime Museum, and the Clatsop Community College began a long-range cooperative program to document the many variations of the type. This presentation will present the findings of the pilot project.

Purse seiner *Shenandoah* was built in 1925 at the Skansie Ship Building Company in Gig Harbor. She was built for Pasco Dorotich, a pioneer Gig Harbor fishing boat owner and skipper. The vessel was originally powered by a 65-horsepower (48 kW) Atlas Imperial diesel engine. *Shenandoah* fished the San Juan Islands for salmon until her retirement. She now serves as a museum exhibit at the Harbor History Museum in Gig Harbor.

HAER documented the ship prior to its move to the museum.

Bios: Emmett Smith is an independent museum curator and boat builder who has worked on a variety of maritime heritage projects throughout the U.S. His family also operates a small scale hydroelectric plant in upstate New York.

Sam Johnson is the Director of the Columbia River Maritime Museum in Astoria, Oregon. He is also a wooden boat builder and teaches bronze casting workshops with The Wooden Boat Foundation.

***Session 2B: Recording our Industrial Heritage: Challenges and Techniques
(9:45-11:30 am)***

- (1) Christopher Marston, “Western Maryland Railway: A Comprehensive Approach to HAER Documentation”
- (2) Jeremy Mauro, “The Advantages and Limitations of Utilizing Laser Scanning for the Documentation of Large Engineering Structures”
- (3) Richard O’Connor, “Mitigating the Destruction of Industrial Resources: What the Record Shows (and Does Not Show)”

(1) Western Maryland Railway: A Comprehensive Approach to HAER Documentation

Presenter: Christopher Marston

Abstract: HAER recently completed documentation of the Western Maryland Railway, Cumberland Extension for the Chesapeake and Ohio Canal National Historical Park (CHOH). This scenic but remote linear resource includes 35 miles (56 km) of roadbed, six Potomac River crossings, three tunnels, and related railroad features. This presentation will detail the multidisciplinary approach taken by a combination of experienced HAER staff and talented interns using both traditional and high-tech methods to record this challenging site to the Secretary of the Interior’s Standards.

The Western Maryland Railway (WM) was originally conceived as the eastern link of George Gould’s quest to create a true transcontinental railroad. After inheriting several lines stretching from Utah to Ohio, Gould invested heavily in newly purchased lines such as the Western Maryland to connect the Pacific to the Port of Baltimore. The Cumberland Extension was one of these improvement projects, built 1904-06. The 60-mile (100 km) link ran through the rugged Paw Paw Bends, which required extensive earthwork, tunneling, and several Potomac River crossings while maintaining low grades, representing state-of-the-art railroad engineering. Although well-built and well-maintained, the WM was a redundant and expensive line from the start, and following railroad consolidation, was abandoned in 1975.

CHOH took ownership of the 35-mile (56 km) section between Pearre and North Branch in 1980. While NPS originally mothballed structures, by 2009 the park began HAER documentation as part of the environmental assessment of the property. There were several challenges: inaccessible, overgrown, and unsafe structures; 35 miles (56 km) of remote, unmaintained roadbed; bridges ranging from 30 to 50 feet (9 to 15 m) high and from 150 to 1,300 feet (46 to 400 m) long; and incomplete engineering drawings and records.

The solution was to use multiple phases of fieldwork, including a Cumberland-based summer team, followed by HAER staff working in the fall and spring. The summer architects began work using a traditional combination of hand measuring and working from original drawings. HAER mandated fall protection training prior to field work. Once the leaves fell, HAER could take advantage of newer technologies. Using a Park Police helicopter, HAER completed a 70-mile (110 km), day-long aerial photographic survey from Williamsport to Cumberland, recording over fifty remotely located structures in context. HAER also used a Leica ScanStation 2 to measure the bridges, tunnels, and culverts, and used GIS and LIDAR for producing maps, which Jeremy Mauro will discuss in further detail.

After completing the scanning and large format photography in the spring, HAER processed the data to produce an integrated report. Along with the drawings and photographs, the report details the reasons and methods of the Western Maryland’s construction, describes the structures and the entire roadbed (giving both original and current conditions), as well as the corporate history of the WM, its equipment and operations, and reasons for decline.

The Western Maryland Railway project produced 38 maps and drawings, an 120-page history (including an appendix of 20 historic images), and over 150 large-format photographs for a comprehensive documentation package transmitted to the HABS/HAER/HALS Collection at the Library of Congress, and to assist CHOH in planning and interpretation of this historic example of railroad engineering.

Bio: Christopher H. Marston is an architect with the Historic American Engineering Record of the National Park Service. He started by documenting steel mills in the Monongahela Valley in Pittsburgh in 1989, and has been in HAER's Washington, DC, office since 1994. He has led teams on a variety of transportation and industrial sites such as railroads, historic roads, canals, and covered bridges to waterpower, irrigation, mining, and aviation sites. He is co-editor of the award-winning book, *America's National Park Roads and Parkways: Drawings from the Historic American Engineering Record*, and served as associate curator for the traveling exhibition, *Covered Bridges: Spanning the American Landscape*, produced by the Smithsonian Institution. He has also taught summer courses on documentation of historic resources along U.S. Route 66 for the University of New Mexico. He also chaired the 7th biennial Preserving the Historic Road conference last year in Washington, DC, and was recently appointed to be a Member of the Committee on Historic and Archeological Preservation in Transportation for the Transportation Research Board. An active member of SIA since 1991, he chaired the Pittsburgh and Washington, DC, conferences, coordinated the Scotland and Sweden study tours, and served on the Board of Directors and Nominations Committee.

(2) The Advantages and Limitations of Utilizing Laser Scanning for the Documentation of Large Engineering Structures

Presenter: Jeremy Mauro

Abstract: The Historic American Engineering Record (HAER) recently completed a project documenting historic railroad bridges, tunnels, culverts, and earthworks located along a 35-mile (56 km) section of the Western Maryland Railway. Using several structures from the project as examples, the presentation will illustrate the process of field recording using the relatively new technology of Light Detection and Ranging (LIDAR) that has gained wide spread use in the documentation profession.

Employing the Leica ScanStation 2 at several Warren-truss bridges that cross the Potomac River, HAER took advantage of the technology's ability to measure long distances, reach areas of substantial height, and record a site of considerable overall size. Without this technology, documenting these structures would have taken much more time and may have posed safety risks to the field team. Scanning offers many impressive benefits, yet it has some limitations in the field and requires a great deal of processing after the field visit to transform the scan data into drawings. While laser scanning produces valuable data in the form of a point cloud, a point cloud is not suitable as a stand-alone representation of the historic resource. Well-composed measured drawings are still the most effective means for representing historic resources in a clear and comprehensible way. This presentation will include concrete examples of how HAER undertakes the process of turning scan data into final drawings.

This presentation will also provide a brief discussion of how aerial LIDAR offers the heritage documentation professional new possibilities for depicting historic structures within their surrounding terrain. For the Western Maryland Railway project, HAER combined GPS data with aerial LIDAR to create a 3-D map that effectively shows how railroad engineers in 1904 responded to the rugged landscape of the Paw Paw Bends. While seeking to make clear the benefits of laser scanning and the new possibilities it poses for HAER, this presentation will also illustrate the process HAER uses to make laser scanning an effective tool for creating documentation.

Bio: Jeremy Mauro is an architect with the Historic American Engineering Record, developing measured drawings, GIS maps, and 3-D CAD models based on data collected during site visits employing laser scanning, hand measuring, and photography. He has worked on a variety of HAER and HABS documentation projects, including Gilpin Falls Covered Bridge, North East, Maryland; Whittier Covered Bridge, West Ossipee, New Hampshire; the Flight Center (an Aviary), National Zoological Park, Washington, DC; Erie Canal (Original) Locks 37 and 38, Cohoes, New York; and Western Maryland Railway, Cumberland, Maryland. He also worked at Wrangell St. Elias National Park in Alaska preparing

drawings of Kennecott Copper Mill. Jeremy received his Master of Science in Historic Preservation from the University of Oregon and his Bachelor of Fine Arts in Industrial Design from Rochester Institute of Technology.

(3) Mitigating the Destruction of Industrial Resources: What the Record Shows (and Does Not Show)

Presenter: Richard O'Connor

Abstract: Under the provisions of the amended National Historic Preservation Act of 1966, historic sites and structures threatened with adverse action (demolition or alteration) from federally funded initiatives, and listed or eligible for listing on the National Register of Historic Places, should be recorded to the Secretary of the Interior's Standards for Architectural and Engineering Documentation. The extent of that documentation – whether the resource is recorded with photographs, drawings, and a historical report, or some combination of the three – is a stipulation generally determined by the Federal agency in consultation with the State Historic Preservation Officer (SHPO). But industrial and engineering resources pose challenges for these parties: often, SHPOs have skilled architectural historians on staff to review and stipulate documentation levels, but rarely have the funds to hire industrial archeologists or others knowledgeable in these specialized resources. Federal agencies, while cognizant of their responsibilities, often are dealing with sites ancillary to their mission, lack the required expertise, and would prefer to spend scarce funds elsewhere. Staffing and cost issues have led to substandard documentation deposited in state and local collections that meets neither the spirit nor the letter of the NHPA. Consequently, the NHPA has not lived up to its promise to see that at least a record remains should these important industrial and engineering sites disappear.

What has this meant for the long-term record of our industrial resources? This presentation takes a closer look at mitigation documentation produced on industrial and engineering sites and submitted to the HAER collection at the Library of Congress (LoC). Two topics are of particular interest: what has been selected for recording and inclusion in the LoC, and the extent of the documentation effort. Not surprisingly, some resource types, such as historic bridges, receive more attention than others, even though, as the case of the Champlain Bridge demolished last December illustrates, they are not immune from demolition without proper documentation. Similarly, relatively few industrial resources are documented to the extent intended by the NHPA, while most receive cursory treatment in digital format with little thought given to the long-term preservation of the documentation. On balance, the long-term record is more extensive than it would have been without the NHPA, but not nearly as robust had the Federal and state agencies more closely followed the letter and spirit of the Act.

Bio: Richard O'Connor is Chief of the National Park Service's Heritage Documentation Programs (HABS, HAER, HALS, and CRGIS) and Acting Chief of the Historic American Engineering Record. Prior to assuming his current positions he served as a historian for the HAER program, preparing historical studies on a wide variety of historic industrial sites, including glass manufacturing, brick making, cotton gins, iron pipe foundries, and water delivery systems. His current interests involve the history and restoration of historic wood and metal working machinery.

Session 2C: Architecture of Industry, Industry of Architecture (1:30-3:00 pm)

- (1) Royce M. Earnest, "Hides, Buildings, and Science: Milwaukee's Gallun Tannery at the Turn of the Century"
- (2) Justin M. Spivey, "Early 20th Century Concrete Construction at the Hearst Greek Theater"
- (3) Mary Habstritt, "A Paragon of Paint: The Story of a Long Island City Manufacturer"

- (4) Matthew Hayes, “Glass Curtain Walls, Thin-Shell Concrete, Timber Domes, and Moveable Roofs: Fifty Years of Innovative Northwest Arena Building”

(1) Hides, Buildings, and Science: Milwaukee’s Gallun Tannery at the Turn of the Century

Presenter: Royce M. Earnest

Abstract: Between 1860 and 1890, the A. F. Gallun & Sons Tannery in Milwaukee, Wisconsin, grew to be the fourth largest tannery in the United States. The company and its facilities were transformed from a local craft operation to a modern, science-based corporate entity. They did this by being at the forefront of the developing field of industrial chemistry, and by participating in developments in scientific management. This study examines the impact of those efforts on the physical plant, and how the plant embodied changes in the corporate culture and reified changing attitudes about the relation between labor and management.

In a period from 1890 to 1910, the company’s facilities tripled in area, to over 420,000 square feet (39,000 m²) of space. While the company grew, the changes were partly in the technology of tanning, but more in the corporate culture that managed the process and the scientific research that supported it. A. F. Gallun & Sons began to sponsor on-site and university-based research in the chemical engineering process of tanning, forming a research institute in conjunction with Columbia University. Along with this shift, the physical work space was reconfigured. This accompanied the shift from the first generation of ownership by A. F. Gallun, a working tanner, to his American-educated and research-focused sons. The company changed their facility to reinforce the distinct worlds of the management and research staff from that of the working force, implying not only separateness, but also control and surveillance. During a period of labor unrest regionally and in Milwaukee, the company tempered the insidious side of Taylor’s scientific management with a more benign form of corporate paternalism.

The presentation will focus on the building fabric, based on archival building records, and will reconstruct models of the sequence of buildings. It will use building records, company records, and graphic reconstructions of the plant to illustrate the way that the buildings embodied social and corporate changes. Through this investigation it shows the implications of science-based ideas on the relation of management to labor, addressing issues of the separation of the two realms and the attendant surveillance of the labor force. This will show how a local, craft-based industry participated in, and contributed to, larger issues of the role of science in industry and the relationship between corporate management and the labor force working on the tannery floor.

Bio: Royce Earnest is currently a Ph.D. student at the University of Wisconsin, Milwaukee, and received his Master’s in Architecture from North Carolina State University and Bachelor’s in Architecture from the University of Virginia. He is a former Associate Professor at Judson University in Elgin, Illinois, teaching courses in design, landscape history, sustainability, and professional practice. He also has over 15 years experience in professional practice in design firms in Wilkes-Barre, Pennsylvania, Baltimore, Maryland, and Racine, Wisconsin.

(2) Early 20th Century Concrete Construction at the Hearst Greek Theater

Presenter: Justin M. Spivey, P.E.

Abstract: The William Randolph Hearst Greek Theater is a landmark on the University of California’s Berkeley campus, and the setting for a wide variety of events including concerts, speeches, theatrical performances, graduation ceremonies, and a bonfire rally before the annual “Big Game” against Stanford. Its design was adapted from the ancient Greek amphitheater at Epidaurus and executed in cast-

in-place concrete on a very tight schedule for its time, nine months from December 1902 to September 1903.

This presentation will discuss how evidence of original concrete formwork and placement practices was discovered through a range of techniques, both invasive and non-destructive. The investigation was guided by UC Capital Projects, who wisely chose to include “structural discovery” as the initial phase of a seismic retrofit design project, so that the design team could better understand the existing structure before proceeding. The design team’s efforts focused on the 40-foot (12 m) tall Doric colonnade that forms the backdrop for the stage.

The accelerated pace of the theater’s construction is well documented in UC archives, which include drawings and correspondence by architect John Galen Howard and his assistant Julia Morgan. However, surviving ink-on-linen drawings only partially record the layout of internal voids used to reduce the volume of concrete in the colonnade. Furthermore, penciled marks on the drawings hint at design adjustments made during construction. The goal of the investigation was to confirm as-built conditions, especially at the colonnade’s hidden interior.

The design team successfully used ground-penetrating radar (GPR) to locate voids and a video-recording borescope to confirm that they had not been filled with debris. UC Capital Projects also retained a contractor to excavate test pits and to perform a prototype “column coring.” The coring operation connected horizontally aligned voids from top to bottom, permitting a view into voids at each level. This revealed that, among other measures taken to expedite construction, voids drawn with arched tops were actually formed flat to simplify carpentry work.

The primary products of the investigation were as-built void layout and concrete compressive strength data to inform seismic retrofit design. The design team also gained significant insight into early twentieth-century concrete construction practices: beyond “lost” formwork left inside the colonnade, the completed structure itself can be seen as an artifact bearing evidence of the processes used to create it. Most importantly for the client, the increased understanding of the Greek Theater will be reflected in design documents, reducing uncertainty and risk during future construction.

Bio: Justin M. Spivey, P.E., will join Wiss, Janney, Elstner Associates in Princeton Junction, New Jersey, as a Senior Associate in June 2011. He has more than a decade of experience in the investigation of existing structures and the design of structural repair, renovation, and restoration work. His research interests include timber and metal trusses and the history of reinforced concrete design. Mr. Spivey has also documented bridges for the Historic American Engineering Record and led an as-built structural study of the New York State Capitol. He presented his first paper at SIA’s 1999 Annual Conference in Savannah and now serves as the Society’s Secretary and Membership Committee chair.

(3) A Paragon of Paint: The Story of a Long Island City Manufacturer

Presenter: Mary Habstritt

Abstract: The factory of Paragon Paint and Varnish Corporation still stands in Long Island City, Queens, New York, although manufacturing ceased there in 1998. Research into the company, its founder, the building, its equipment, and its industrial and geographical context revealed a fascinating history. Paint and varnish was one of the earliest and most important components of the East River neighborhood known as Hunter’s Point, developed specifically for industry by Union College. This factory appears to be the last of its kind in the area and is somewhat unusual in having been enlarged by a professional architect who otherwise designed only restaurants and institutional buildings. These facts led to its nomination to the National Register of Historic Places. Discussion of the project will share the story of this factory as well as illustrating the manufacturing process it once housed and describing sources of

information. By the time of the conference presentation, a new owner will have taken possession of the building and an update on its future will be provided.

Bio: Mary Habstritt is Museum Director and Vice President of the Lilac Preservation Project, which is returning steam to the Hudson by restoring the former Coast Guard Lighthouse Tender *Lilac*. She is also a freelance consultant researching and interpreting industrial heritage at Archive of Industry. Mary is Past President of SIA and was SIA's Events Coordinator for several years. She has held several positions with SIA's Roebling Chapter, including as Preservation Chair advocating for historic industrial sites in New York and New Jersey. Her devotion to history and preservation follows a career as an academic librarian, working at such institutions as the University of Minnesota and Pace University. She has a Master's degree from Columbia University's School of Library Service.

(4) Glass Curtain Walls, Thin-Shell Concrete, Timber Domes, and Moveable Roofs: Fifty Years of Innovative Northwest Arena Building

Presenter: Matthew Hayes

Abstract: In communities across the United States, stadia and arenas represent significant elements of the twentieth-century built environment. Unfortunately, these unique architectural and engineering landmarks often suffer from a lack of positive public support and understanding. Not unlike historical industrial facilities, the sheer size and scope of large-scale stadia and arenas often precludes them from rehabilitation and reuse.

Portland's Memorial Coliseum, the Tacoma Dome, Seattle's (demolished) Kingdome and Pittsburgh's soon-to-be demolished Civic Arena offer unique case-studies of these often-overlooked building types. The Memorial Coliseum's innovative structural system, supported by four cruciform-shaped reinforced concrete columns, made it possible for a free-standing concrete seating bowl to be fully enclosed by glass curtain walls on four sides of a box-shaped building. The Tacoma Dome is one of the largest clear-span timber domes in the world, made from Oregon old-growth Douglas fir. Seattle's Kingdome was a pioneering example of thin-shell concrete construction. It would later become the largest structure ever demolished by implosion. Outside of the Pacific Northwest, there is Pittsburgh's Civic Arena, which features the world's first retractable stainless steel roof. Conceived by Amman and Whitney, the structural engineers responsible for the Verrazano Narrows Bridge connecting Staten Island and Brooklyn, Pittsburgh's Civic Arena was considered an engineering marvel in its day. Interestingly, the moveable roof of Seattle's Safeco Field would use similar technology nearly forty years later.

This presentation provides an overview of the evolution of stadia and arena building technology in the United States, focusing specifically on the architectural and engineering marvels of the Pacific Northwest. In addition to highlighting the technological innovations involved in the conception and construction of these highly-visible urban landscape features, this presentation also examines nationwide efforts to document, evaluate and repurpose America's rapidly disappearing inventory of historic stadia and arenas. Strategies aimed at documenting and analyzing the above-ground – and, in the case of demolition – below-ground remnants of these innovative resources are also explored.

Bio: Matthew Hayes is a Masters of Historic Preservation Candidate at the Savannah College of Art and Design. Before moving to Washington State, he served for seven years on the Historic Resources Committee of Oregon's fourth-largest city. He has published several architecture and preservation-related articles, and completed five National Historic Register nominations.

Session 2D: LEED and Industrial Heritage Preservation (3:15-5:00 pm)

- (1) Jay McCauley, “LEED 2012 and Historic Preservation”
- (2) Brian D. Rich, “Sustainability Through Historic Preservation”
- (3) Eric Stovner, “Seismic Evaluation and Rehabilitation Design for the Grand Canyon Powerhouse”

(1) Hides, Buildings, and Science: Milwaukee’s Gallun Tannery at the Turn of the Century

Presenter: Jay McCauley

Abstract: The LEED standards have been viewed as unsupportive of historic preservation. “You get as many credits for a bike rack as you do for preserving an historic building” is a common, factually accurate, view. However, the LEED standards are continuing to evolve, and the latest drafts for the 2012 release have significant changes that improve the significance of historic preservation. This presentation will look at the proposed changes and their impact. SIA and the National Trust for Historic Preservation are working together to better address industrial heritage preservation and to influence the evolution of the LEED evaluation criteria.

Bio: Jay McCauley is President of SIA and has been active in seeking alliances between the historic preservation movement and the green movement. To better connect on the green side, Jay is a LEED Accredited Professional, a credential from the U.S. Green Building Council. He has a Ph.D. in Computer Science and is an advocate for increased use of the social media for the historic preservation to connect with the next generation.

(2) Sustainability Through Historic Preservation

Presenter: Brian D. Rich, AIA

Abstract: The King County Landmarks Commission doesn’t just do historic preservation. The organization works with all different types of project involving older buildings including adaptive reuse, renovation, restoration, reconstruction, and remodeling. No matter what you call the project, the King County Landmarks Commission encourages building owners and managers to come to the organization because the best way to keep our heritage is to use it. This presentation will focus on local historic preservation projects viewed through the lens of sustainability and on the emerging changes in the LEED evaluation criteria as they apply to preservation projects.

Bio: Brian D. Rich, AIA, NCARB, is a LEED Accredited Historic Preservation Architect. He is Vice-Chair of the King County Landmarks Commission and Past Chair of the King County Landmarks Commission’s Design Review Committee. Brian has also served on the Washington State Heritage Barn Advisory Committee, 4 Culture’s Historic Preservation Advisory Committee, and is a member of several preservation related organizations. His passionate interest in historic preservation and sustainable design strategies intersect in his work, starting with the restoration of the Oriental and Palace Theatres in Chicago. Brian’s interests continue most notably in his recently completed work on the University of Washington Guggenheim Hall Renovation and his current work on the Washington State Sustainable Protocol (WSSP) compliant Lakota Middle School in Federal Way, both with Bassetti Architects.

(3) Seismic Evaluation and Rehabilitation Design for the Grand Canyon Powerhouse

Presenter: Eric Stovner, S.E.

Abstract: The Grand Canyon Powerhouse was built by the Atchison, Topeka and Santa Fe Railway in 1926 to provide electrical power and steam heat to the National Park facilities on the South Rim. It is a

National Historic Landmark and a wonderful large industrial structure of unique combined reinforced concrete and limestone construction.

A case study of the seismic evaluation and conceptual rehabilitation design, completed in 2003 under the author's management at a previous employer, will be presented. Protocols for evaluating the historic building to modern standards will be discussed, as will the insightful application of investigating the building's inherent strengths which is not described in modern standards. Techniques for creative rehabilitation design will be presented to illustrate the ability to significantly improve Life Safety performance levels while successfully adhering to *The Secretary of the Interior's Standards for the Treatment of Historic Properties*. The presentation will include numerous photographs of the building's original construction process, industrial equipment, and extant conditions.

Bio: Eric Stovner, S.E., LEED AP, has over 20 years extensive experience in responsible charge of very diverse projects, from conceptual design to construction documentation, peer review and investigation, managing people positively to suit their strengths delivering projects on schedule and within budget. He has a reputation for innovation, responsiveness, and trustworthiness, having unparalleled expertise in structural systems and materials. He is passionate about historic preservation and has deep experience with a wide variety of notable structures. Mr. Stovner was directly involved in the work presented as the Project Manager consulting to the National Park Service.

Track 3: 22nd Annual Historic Bridge Symposium

Session 3A: 22nd Annual Historic Bridge Symposium, Part 1 (8:00-9:30 am)

- (1) Eric DeLony and Kitty Henderson, Welcome and Introduction
- (2) Rex W. Meyer, “History of the Lacey V. Murrow Bridge: The World’s First Concrete Floating Bridge”
- (3) Michael Roberts, “Blue Bridge Blues in British Columbia’s Capital City”

(1) Welcome and Introduction

Moderators: Kitty Henderson and Eric DeLony

Bio: Kitty Henderson is the Executive Director of the Historic Bridge Foundation, the national advocacy organization for the preservation of historic bridges in the United States. Kitty works to provide technical assistance to local groups working to preserve their historic bridges and serves as a consulting party on bridge projects at the request of state and federal agencies. Prior to the Historic Bridge Foundation, Kitty worked for the Texas Historical Commission as assistant project manager for the Texas Travel Trails program and also served as the Heritage Education Coordinator for these regional trails and developed workshops for primary and secondary school teachers and educational materials for students.

Bio: Until his retirement in October 2003, Eric DeLony worked with the Historic American Engineering Record (HAER), a federal program established in 1969 to create a national archive of America’s engineering, industrial and technological heritage. His tenure extended for 32 years, half that time as senior program manager. He administered the program in such a manner that the act of documentation not only created a permanent record of drawings, photographs and histories for the national collection at the Library of Congress, but also promoted the physical preservation of that technological heritage and the way people worked. As Chief, he served as the departmental and Park Service authority on engineering and industrial heritage, representing the United States at national and international conferences and symposia. He helped establish a national ethic and awareness of America’s technological heritage, promoting the redevelopment potential of historic industrial buildings and engineering and technological resources. In recognition of his work, he has received numerous awards including a career achievement citation from the American Society of Civil Engineers (ASCE) and SIA’s General Tools Award for sustained, distinguished service to the cause of industrial archeology. Author of numerous articles on industrial archeology, particularly bridges, including a book, *Landmark American Bridges* (ASCE and Little, Brown, 1993), he is considered one of the world’s leading authorities on the history of bridges. In retirement, he continues working with engineers, transportation authorities, individuals, and communities to save the historic bridges of the United States.

(2) History of the Lacey V. Murrow Bridge: The World’s First Concrete Floating Bridge

Presenter: Rex W. Meyer, P.E.

Abstract: The Lacey V. Murrow Memorial Bridge was the largest and longest floating bridge and the first to be constructed of reinforced concrete when it opened in 1940. This project pioneered the first design of a floating concrete pontoon draw span. It proved that a concrete floating bridge could be a cost-effective and practical solution for situations in which conventional bridge piers would have to be made unreasonably deep. It paved the way for future construction of other floating bridges throughout the world. The large-diameter, 1,446-foot (440 m) long, twin soft-bore tunnels through Mount Baker were the largest attempted in their day.

In 1937, Homer M. Hadley, who had been a designer in a Philadelphia concrete shipyard, proposed a reinforced concrete pontoon bridge floating across Lake Washington from the northern end of Mercer Island across Lake Washington to a tunnel under Mount Baker Ridge into the heart of Seattle. Director of Highways Lacey V. Murrow accepted the challenge.

The bridge was built by Puget Sound Bridge and Dredging Co. of Seattle, Parker-Schram Co. of Portland, J. H. Pomeroy and Co. of San Francisco and Clyde B. Wood of Los Angeles. The tunnel was constructed by Bates and Rogers Construction Company of Chicago.

The 6.5-mile (10.5 km) project included 25 floating pontoons that reached over 1.5 miles (2.4 km) and included 1,446 feet (440 m) of twin-bore tunnels. It was one of the largest single developments ever by a highway department. It employed over 3,000 people. The project was funded by the U.S. Public Works Administration furnishing \$4,000,000, with the rest financed through bonds issued by the Washington Toll Bridge Authority for an original cost of \$8,854,400. The project was a financial success when the tolls were removed just nine years later and 19 years ahead of the time when it was expected to be clear financially.

Nine pontoons were replaced in 1990; the original the approaches and tunnels remain today. The Lacey V. Murrow Memorial Bridge and Mount Baker Ridge Tunnel serve the community today as a major gateway to Seattle.

Bio: Rex W. Meyer, P.E. is a Transportation consultant with 26 years of experience. He is a Project Manager/Senior Civil Engineer at AECOM Transportation and a member of the Seattle Section of the American Society of Civil Engineers History and Heritage Committee. Rex led the ASCE National Historic Civil Engineering Landmark proposal for the Lacey V. Murrow Memorial Floating Bridge dedicated on June 4, 2010.

(3) Blue Bridge Blues in British Columbia's Capital City

Presenter: Michael Roberts, P.E.

Abstract: The Johnson Street Bridge, on the picturesque Inner Harbor of Victoria, British Columbia, links its historic downtown to Victoria West, a former industrial area now rapidly filling with condominiums. Opened in 1924 and known locally as "The Blue Bridge," it actually consists of two parallel structures, each incorporating a 150-foot (45.7 m) Warren-truss, heel-trunnion-type, bascule lift span. One span carries three lanes of car traffic; the other carries the tracks of the Esquimalt and Nanaimo Railway.

The bridge's steel superstructures are only one of seven built in Canada by Chicago's Strauss Bascule Bridge Company before 1925. Historians believe it is the only parallel-span Strauss bridge in the world.

Located in one of the most seismically active regions of Canada, the bridge is also subject to a marine climate. Only 12 feet (3.7 m) separate the high water mark of the salt-water harbor and the steel superstructure. Relatively harsh environmental conditions and the failure to regularly paint and replace parts of the bridge over the past decade left it vulnerable to rapid deterioration.

In April 2009, a condition assessment declared that the bridge's coating system had failed, that its electrical and mechanical systems would break down if not immediately replaced, and that the bridge would collapse in a major earthquake. On that basis, the council of the City of Victoria (the bridge's owner) voted to replace the bridge, and pursue federal and provincial infrastructure stimulus funding for the project.

However, the replacement became the subject of considerable debate. Some residents considered the existing bridge a local icon, and others opposed the city's replacement plans after its initial application for stimulus funding was rejected. Petitions signed by nearly 10,000 residents forced a referendum on the bridge's fate. However, in November 2010, a majority of residents voted for replacement, believing a new bridge would cost less and last longer than a repaired structure, and that it would provide better facilities for cyclists and pedestrians.

Some say the replacement has proceeded without proper public consultation, appreciation of the existing bridge's heritage value, or keen exploration of rehabilitation options. Victoria's experience and the impending demolition of this heritage bridge offer cautionary lessons for those who want to save similar bridges elsewhere.

Bio: Michael Roberts is a professional engineer currently working and living in Vancouver. His 10 years of technical and practical experience include a wide range of both signature bridge and building projects including the Vancouver Convention Centre, the new self-anchored San Francisco-Oakland Bay Bridge, and the lift, retrofit, and rehabilitation of the historic 100-year-old, four-span "Million Dollar Bridge" in Alaska. He is passionate about bridges, the application of emerging technology and innovations, and is a growing advocate for the education and public awareness of British Columbia's unique existing bridges and their associated heritage and significance that is overlooked by both the public and the engineering profession. Michael is actively involved in his profession as a member of APEGBC, the CSCE's National Heritage Committee, and the Association for Preservation Technology, and participates in non-engineering based committees such as the BC Historical Federation, and Heritage BC events and conferences.

Session 3B: 22nd Annual Historic Bridge Symposium, Part 2 (9:45-11:30 am)

- (1) Sharon Wood Wortman and Ed Wortman, "Developments on Historic Bridges in the Portland Area"
- (2) Marsha Tolon, "Evergreen Point Floating Bridge: Everyday Life of a Floating Bridge"
- (3) Jet Lowe, "Alaskan Way Viaduct-An Old and New Departure Point for City Design in Seattle"

(1) Developments on Historic Bridges in the Portland Area

Presenters: Sharon Wood Wortman and Ed Wortman

Abstract: Starting in the 1990s, several significant historic bridges in and around Portland, Oregon have undergone or are about to undergo major developments. These developments fall into two categories: rehabilitation and replacement. This presentation will illustrate and discuss examples of both types. For each example, comments will be made on factors that led to a decision to rehabilitate or replace. These factors include: structural capacity as originally designed and built; capacity for carrying present and future traffic volumes; physical condition; ability to accommodate multiple travel modes; cost of upgrading to present-day standards; and historic value.

Bios: Ed Wortman is a semi-retired civil engineer with many years of experience on construction and rehabilitation of bridges, offshore oil platforms, and other large structures. His last full-time job was with the Multnomah County Bridge Section in Portland, Oregon. He continues working part-time for Multnomah County and consults on bridge projects in the western U.S. and Canada. Ed has been involved in rehabilitation or replacement of several historic bridges in the Portland area. He is the co-author of *The Portland Bridge Book*, 3rd edition revised and expanded (Urban Adventure Press, 2006). Sharon Wood Wortman, primary author of *The Portland Bridge Book*, is known as the Bridge Lady for her bridge walks and educational programs involving the historic bridges in the Portland-Vancouver area.

Sharon is currently at work on a book about bridges for third graders. Ed and Sharon live and work in Portland.

(2) Evergreen Point Floating Bridge: Everyday Life of a Floating Bridge

Presenter: Marsha Tolon

Abstract: The Governor Albert D. Rosellini/Evergreen Point Bridge, built in 1963, is the second floating bridge built to span the depths of Lake Washington in to link Seattle with eastside suburban areas of Bellevue, Kirkland, and Redmond. Washington State's first floating bridge, the Lacey V. Murrow Memorial Bridge, located 4 miles (6 km) to the south on the lake, proved the permanent capacity for concrete pontoon bridge construction. The Evergreen Point Bridge took the stage as the largest floating span at 1.4 miles (2.2 km) long and as the most expensive in the world at \$24,972,000, with the floating span at \$10.9 million. When the Lacey V. Murrow Bridge sank in 1990, the Evergreen Point Bridge became the oldest floating bridge spanning across the lake and is now determined eligible for listing in the National Register of Historic Places. Construction of the floating bridge was an innovative engineering feat met by turbulent public controversy that has resurfaced with current proposals to rebuild the aging bridge. This section of State Route (SR) 520 cut through upland glacial till plains of a Puget Lowland basin to cross the lake surface lowered in 1916 by a navigation ship canal. SR 520 severed communities established early in Seattle's history, broke a link of the Frederick Law Olmsted-designed park and boulevard system, and erased features significant to Native American tribes of the region. As it was in the early 1960s, public interests force issues of environmental sustainability to compete with solutions for congestion relief of the daily commute. The bridge must not only connect areas east and west of the lake, but also balance structural measures to reunite communities and to rejuvenate natural and built resources.

Bio: Marsha Tolon is a Historic American Engineering Record alumnus as the landscape architect for the Elwha and Glines Canyon Dam documentation team in 1995 while a National Park Service employee. At the Washington State Department of Transportation, she has held positions in planning, design, and environmental documentation and permitting. She retains state registration as a professional landscape architect.

(3) Alaskan Way Viaduct—An Old and New Departure Point for City Design in Seattle

Presenter: Jet Lowe

Abstract: The Alaskan Way Viaduct, a major highway superstructure built along Seattle's waterfront bordering Puget Sound in the 1950s, has nearly come to the end of its service life. How the city of Seattle replaces this structure will have a major impact on downtown development for the next 100 years. Employing photographic results from large-format aerial and land-based photographic documentation conducted two years ago, this presentation will illustrate the visual impact of this structure on the current city of Seattle and how tunnel replacement may impact this same area in the years to come.

Bio: Jet Lowe has been the staff photographer of the Historic American Engineering Record for 33 years. In that time he has compiled a record of more than 40,000 large-format images housed in the HAER collection at the Library of Congress. During his time with HAER he has conducted numerous photographic projects in this region: Georgetown Steam Plant, Elwha and Glines Dam, Skagit and White River hydroelectric projects, Washington state bridges and most recently the Alaskan Way and SR 520 bridges. One of his proudest accomplishments is completion in 2001 of an M.S. degree at Michigan Tech with a study of Guitar building at Martin Guitar Company in Nazareth, Pennsylvania.

Session 3C: 22nd Annual Historic Bridge Symposium, Part 3 (1:30-3:00 pm)

- (1) Craig Holstine, “Scarcely Orthodox: Homer M. Hadley, Bridge Engineer Extraordinaire”
- (2) Bill Vermes, “Wilbur Watson, Early 20th Century Bridge Architect”
- (3) Charles Walker, “Rehabilitation of the Washington Avenue Bridge”

(1) Scarcely Orthodox: Homer M. Hadley, Bridge Engineer Extraordinaire

Presenter: Craig Holstine

Abstract: Homer M. Hadley, undoubtedly Washington State’s most innovative bridge engineer of the twentieth century, conceived the designs for many outstanding historic bridges. As a Portland Cement Association regional engineer, Hadley promoted the use of concrete wherever and whenever he could. Some of his inspirations, like the through-truss McMillin Bridge built in 1935 over the Puyallup River, are truly unique in the world. Others were prototypes, such as the Lacey V. Murrow Bridge on Lake Washington in Seattle, the world’s first floating concrete pontoon bridge, and the Benton City-Kiona Bridge spanning the Yakima River, a structure anticipating the cable-stayed bridge type by two decades. He is perhaps best known for using materials in ways that would become widespread in the U.S., particularly in concrete and steel box girders. Historians are still discovering bridges he either inspired or actually designed himself in his second career as a consulting engineer. Homer Hadley influenced bridge engineering through creative designs and via his extensive writings in the country’s leading engineering publications. His legacy is unequalled in Washington and is formally recognized in the third Lake Washington floating bridge, named for this remarkable engineer.

Bio: Craig Holstine is the Washington State Department of Transportation’s “bridge historian,” a title acquired during his eleven years maintaining the agency’s historic bridge inventory. He co-authored, with Richard Hobbs, *Spanning Washington: Historic Highway Bridges of the Evergreen State* (Washington State University Press, 2005). Prior to his current employment, Craig was Program Director of Archaeological and Historical Services and taught cultural resources management at Eastern Washington University. His career in that field began at Washington State University, where he received a Master’s degree in history. Craig was born in Walla Walla and is the great-grandson of Washington homesteaders.

(2) Wilbur Watson, Early 20th Century Bridge Architect

Presenter: Bill Vermes

Abstract: Wilbur Watson (1871-1939) was a Cleveland, Ohio, bridge engineer nationally renowned for his insights in both bridge design and the development of reinforced concrete design. Beginning with the founding of his consulting engineering firm Wilbur Watson and Associates in 1908 to his sudden death in 1939, Watson’s bridges contained architectural features that ultimately made them local landmarks. Though much of his company’s work was located in Ohio, he gained a national reputation from the books he authored: *Bridge Architecture* (1927), *A Decade of Bridges: 1926-1936* (1937) and *Bridges in History and Legend* (1937, co-authored with his daughter Sara Ruth). Watson developed and published *General Specifications for Concrete Bridges*, 1st edition (1908), demonstrating his expertise for concrete construction which was still in its infancy. Recent examination of Watson’s files located in the Cleveland State University Library Special Collections has provided fresh insight to events and decisions that led to Watson’s successes as an engineer and entrepreneur. Watson’s writings in his informal diary indicate his initial interest in architecture during his early adulthood. As a draftsman for the Lake Shore & Michigan Southern Railroad, Watson spent several months working in Chicago in 1893, where he and his colleagues worked late during the week so that they could attend the Columbian Exposition on Saturdays.

Later, in collaboration with his employee Wendell Brown, an engineer and architect, Watson and Associates designed numerous aesthetic concrete bridges and buildings. Following Brown's departure in 1921, Watson joined forces at times with Cleveland architect Frank Walker, leading to the magnificent construction of the Lorain-Carnegie Bridge in Cleveland (1932) and Lorain-Central Bridge in nearby Lorain, Ohio (1940).

Bio: Bill Vermes is a bridge engineer for the consulting engineering firm Jones-Stuckey in Akron, Ohio. He specializes in historic bridge rehabilitation and bridge inspection. Bill has presented papers regarding various bridge topics such as rehabilitation, aesthetics, riveted connections and past bridge design practices, and has co-authored *Cleveland's Historic Bridges: Architectural and Engineering Masterpieces* with Dr. Dario Gasparini of Case Western Reserve University. Bill serves on the Watson Publication Committee of the Cleveland State University Library, which is developing projects promoting bridge engineering heritage. He is currently working on separate books regarding the *Bridges of the Cuyahoga River* and the *Bridges of Oklahoma*.

(3) Rehabilitation of the Washington Avenue Bridge

Presenter: Charles Walker, P.E.

Abstract: This presentation describes the 2009 rehabilitation of the Washington Avenue Bridge in Waco, Texas, by the Texas Department of Transportation (TxDOT), Bridge Division, under the Federal Highway Bridge Program (FHBP). The bridge is owned by the City of Waco and was built in 1901 over the Brazos River next to the historic 1870 Waco Suspension Bridge. Upon its completion, it became the first free highway bridge in the area, resulting in the subsequent donation of the private toll suspension bridge to the City as the second publicly owned free bridge in the area. Today the pair of bridges are the central features of a public space defining the northern boundary of historic Waco. The river span of the Washington Avenue Bridge is a 450-foot (137 m) long, pin-connected, Pennsylvania Petit truss, a type of sub-divided truss developed to maximize the length of a simple truss span. It was fabricated by the Penn Bridge Company and erected by John H. Sparks of St. Joseph, Missouri. When it opened, the bridge was described as the longest simple span bridge in the United States. Today it remains one of the longest of its type in existence. The bridge was repeatedly subjected to severe flooding until river improvements finally brought the Brazos River under control. After 100 years of vehicular service, the discovery of fractured eyebars in one of the main trusses put the continued serviceability of the bridge at risk. Federal funding to rehabilitate the bridge was also at risk after structural analysis revealed that several members, as originally designed, were under-strength for modern loading. In response to the strong local desire to keep the bridge and the historic setting intact, TxDOT evaluated the structure, and consulted with the State Historic Preservation Officer to develop a strategy for restoring and strengthening the bridge so as to be eligible for funding under the FHBP. The presentation describes the structural problems, the preservation strategy, and the balance achieved between function and historic preservation. It also discusses the construction process, the method of replacing eyebars, and a number of other condition problems that were discovered and resolved during construction.

Bio: Charles Walker, P.E., is a Senior Bridge Design Engineer in the Bridge Division at TxDOT. He was born in Corpus Christi, Texas, and grew up in Austin. He received a B.S. in Civil Engineering from the University of Texas at Austin in 1984. He became a Registered Texas P.E. in 1989. Charles has been with TxDOT's Bridge Division since September 1984. He is currently a structural designer in the Bridge Design Section. Through his work, the Bridge Division has received national recognition in the field of historic preservation, including the 2007 National Steel Bridge Alliance, Merit Award (Beveridge Suspension Bridge Rehabilitation), the 2005 Preservation Texas Trust Latimer Award (for sustained commitment to historic preservation as a working professional), the 2004 FHWA Excellence in Highway Design, Award of Merit (Oak Forest Bridge Relocation), the 2002 Associated General Contractors of America Design Award (for exemplary cooperation and performance, Maury-Maverick Bridge), the 2002 FHWA Excellence in Highway Design, Award of Merit (Regency

Suspension Bridge Restoration), and the 2001 Preservation Texas Building Award (Regency Suspension Bridge Restoration).

Session 3D: 22nd Annual Historic Bridge Symposium, Part 4 (3:15-5:00 pm)

- (1) Todd Wilson, “The Pennsylvania Historic Bridge Inventory – Fifteen Years Later”
- (2) Jason Smith, “The Attitudes of the Public toward Places of Historic Interest: A Comparison between the United States and Germany”
- (3) Kitty Henderson and Eric DeLony, Closing Remarks

(1) The Pennsylvania Historic Bridge Inventory – Fifteen Years Later

Presenter: Todd Wilson

Abstract: Commencing in 1996, A. G. Lichtenstein and Associates, Inc., evaluated the approximately 12,000 bridges in Pennsylvania constructed before 1958 for their historic significance. Though some historic structures have been rehabilitated, many have since been replaced. This presentation highlights significant bridges that have been rehabilitated, have been demolished, or are at risk of demolition. This summary includes factors that led to the rehabilitation or demolition of each bridge. This presentation goes into an analysis of the status of the evaluated bridges in the 26 western Pennsylvania counties. Out of approximately 5,000 evaluated bridges, 380 were determined to be historically significant. Twenty-three of these bridges are listed on the National Register of Historic Places. The presentation analyzes these statistics on a county-by-county basis. The presentation concludes with a discussion of the future of Pennsylvania’s historic bridges. This includes a summary of historic bridge policy, how it is applied to bridges in Pennsylvania, and questions what else can be done to encourage retention of these historically significant structures.

Bio: Todd Wilson, EIT, is a nationally recognized civil engineer, named one of the American Society of Civil Engineers (ASCE) Ten New Faces of Civil Engineering in 2010. Todd graduated with a B.S. in Civil Engineering with an additional major of Engineering and Public Policy from Carnegie Mellon University in 2006. Todd is actively involved with the university, serving on the department head’s Advisory Council. Todd has served as a project coach for the junior-level civil engineering project course. In 2009 he taught an award-winning project in which students performed a study to determine the feasibility of converting a historic bridge into a pedestrian facility. He also serves as one of ASCE’s practitioner advisors to the CMU student chapter. Todd is the author and photographer for www.bridgemapper.com, a site documenting over 1,000 bridges across America. In 2009, he founded the Historic Bridge Weekend, an annual conference devoted to historic bridges. Todd currently works as a transportation engineer in Pittsburgh, Pennsylvania, specializing in traffic and intelligent transportation systems.

(2) The Attitudes of the Public toward Places of Historic Interest: A Comparison between the United States and Germany

Presenter: Jason Smith

Abstract: The question involving the effectiveness of the current preservation laws in the United States has been long standing, for in the past 30 years. Over half of the artifacts representing the fabric of American culture and history and in many cases, an identity to one’s community, have become victims of modernization, consisting of demolishing them in favor of structures having little aesthetic value to the public – in spite of the attempts of grassroots organizations and the public to preserve them. This ever

progressing movement has led to questions such as (1) How interested and informed is the public as a whole regarding preserving places of historic interest, (2) What factors have influenced our decision to either preserve or destroy historic artifacts, (3) What measures can be taken in order to better inform the public on the importance of preserving historic places, let alone provide the groups with the necessary tools needed to preserve them for future generations, and (4) How can the preservation laws be better reinforced and what can we learn from other countries, like Germany and the rest of the European Union, whose laws are much stricter than in the U.S.? Using Germany as an example, this presentation will present a background on the preservation laws in Germany compared to the existing preservation laws in the U.S., discuss a questionnaire conducted by the author and involving the public's input on historic preservation in both countries as a whole, and conclude with solutions as to how to bring together the public's interest in historic places, ways to improve the historic preservation laws, and ways to better disseminate the information on historic places.

Bio: Jason Smith is a lecturer of English at the University of Applied Sciences in Erfurt in Thuringia, focusing on English in the technology sector – namely civil engineering, architecture, building and renewable energy technology, and city planning. He previously taught at the University of Bayreuth in Bavaria. He is a major contributor of photos and commentaries for three different bridge websites since 2003, which includes the Historic Bridges of the U.S. (managed by James Baughn), historicbridges.org (managed by Nathan Holth) and Structurae: International Database and Gallery of Structures (managed by Nicolas Janberg and based in Ratingen, Germany, near Cologne). Since November 2010, he has been a columnist for the Bridgehunter's Chronicles, an online column dealing with the tourist aspect of historic bridges with a focus on bridges in the U.S. and Europe.