Society for Industrial Archeology
39th Annual Conference Paper Abstracts

Gregory Anderson - Blue Coal: The Huber Breaker as a Case Study for Ecological and Industrial Heritage Conservation in Pennsylvania's Anthracite Region

Extractive industries are some of the most visually destructive human impacts on the environment, and anthracite coal mining is no exception. Two centuries of coal mining in Northeastern Pennsylvania have left an indelible mark on the natural and built environments there. In the past half-century, national, state, and local officials and advocates have realized the importance of remediation of abandoned mines and culm banks and acid mine drainage. Over the same period museums, mine tours, and history groups have begun to interpret and preserve the industrial heritage and history of the region. However, the preservation of large artifacts and the monumental architecture of industry has been remarkably lacking, and the fate of the few remaining large artifacts is uncertain.

The Glen Alden Coal Company's Huber Breaker, one remaining example of these monumental architectures, began processing coal in February 1939. At the time of construction it was an icon of modernist industrial architecture akin to Midwestern grain elevators and Walter Gropius' Fagus factory. The Huber had a number of technological improvements that put it at the forefront of anthracite processing throughout the region. Its power plant could produce hotter steam at a higher pressure than any other; it employed an aerial tramway for transporting refuse 3500 feet to its refuse piles; and it used innovative Menzies cones for separating coal from rock and waste. However, the shift in demand from coal to oil and gas and a number of poor business decisions by the Huber's owners – Glen Alden, the Blue Coal Company, and Great American – led to the final closing of the Huber in 1976.

This paper will tell the story of the recent history of the Huber Breaker and the nearby Ashley Planes, two sites caught in battles over their future preservation and public interpretation. The work of the Delaware and Lehigh National Heritage Corridor, Earth Conservancy, Eastern Pennsylvania Coalition for Abandoned Mine Reclamation, and Huber Breaker Preservation Society at these two sites demonstrates the potential for cooperation between the preservation of ecological and industrial heritages.

Richard Anderson - Mapping of Red Mountain Park, Birmingham, Alabama

In 2004, US Steel Corporation offered 1,100 acres of mining lands along Red Mountain within the city limits of Birimingham, Alabama to the Freshwater Land Trust for half its commercial value, subject to the Trust's raising funds to close the purchase. The prospect of making such a major addition to the city's parklands virtually guaranteed the funds would be found. The Philadelphia landscape firm of Wallace Roberts & Todd was hired to create the preliminary master plan for the park, which is expected to be developed over a 50-year period. The extent of surface and subsurface IA remains of iron mines, railroads and miners' housing at this long, narrow site required that a basic existing cultural resources map be created synthesized from an extensive collection of archival map resources, USGS and mineral maps, GIS data, aerial photos and other materials.

This paper will discuss how the author selected and assembled these sources in a CAD system and produced the resulting 3' x 15' map. The map is currently being ground-truthed by park rangers and volunteers, and archeological excavations are being conducted in areas that are the subject of more immediate conversion to parklands.

Ronald W. Anthony and Justin M. Spivey, P.E. - IA on the Ropes: Investigating the Hanging Flume at Uravan, Colorado

Suspended from the face of a sandstone cliff, sometimes hundreds of feet above the canyon floor, the Montrose Placer Mining Company's hanging flume is one of many layers of history in southwestern Colorado. It is a complex engineered structure constructed during a brief but important period of mining in the western U.S. Although other flumes were built to supply water for placer mining operations during the Gold Rush, no other flumes are known to remain in a condition suitable for preservation. For example, California had over 6,000 miles of flumes and ditches during the height of the hydraulic mining era, but none have been preserved for public benefit. The Uravan flume is not only unique for its relatively intact segments of flume, but these also retain significant evidence of evolving design and construction methodology as builders responded to varying conditions of access, geology, and cliff topography.

Constructed during the 1880s and abandoned several years later, the Montrose Placer Mining Company's ditch and flume extended for approximately 10 miles along (and at times high above) the San Miguel and Dolores Rivers, for the purpose of transporting water to gold-bearing placer deposits. Some of its easily accessible timbers were scavenged to line drifts in subsequent mining efforts, as well as for building the nearby town of Uravan in the 1930s. Named after the elements uranium and vanadium, Uravan was a company town for mines that supplied the Manhattan Project and early atomic bombs. While the town has largely disappeared, the region's gold-mining history has proven more durable as segments of the 120-year-old ditch and flume system remain today.

This presentation will focus on the challenges of documenting and preserving a structure on a cliff face in a remote location. A team of archeologists, engineers, industrial rope access technicians, a wood scientist, a geologist and historians used their skills and some innovative equipment to access and evaluate this 19th-century marvel. Findings from this limited survey include physical evidence of design details that evolved as construction progressed and indicate likely fabrication and assembly techniques. Unless remaining sections of the Hanging Flume are documented and stabilized while they are relatively intact, this unique structure will continue to deteriorate until evidence of its daring and often innovative construction is lost forever.

Jane Eva Baxter - Landscape and Labor: Multi- sited Archaeology in Chicago's Pullman Community

Industrial archaeology has long been concerned with documentation and analysis of landscapes, most often focusing on the above ground remnants of industrial sites and communities. The landscape of the planned community of Pullman (built 1880-1884

south of Chicago) including the Pullman Palace Car Factory, worker housing, and ancillary services and industries has been the subject of study for generations of scholars. These studies have emphasized how the built environment reflected dynamics of class, paternal capitalism, and utopian ideals that defined the early years of the community. A multi-year excavation project begun in 2004, has taken a parallel approach to the study of landscape in Pullman, and has focused archaeological investigations on multiple locations within the town. This "multi-sited" approach to the archaeology at Pullman stands in contrast to many excavation strategies that intensively focus on single sites for multiple seasons. The results of this multi-sited strategy are a series of analytical "vignettes" that demonstrate how landscapes of intentional design and deliberate construction became social spaces, filled with activities and imbued with meaning by the community residents. This paper will introduce the planned community of Pullman in its design and construction, and elaborate on how this multi-sited approach has yielded a greater understanding of how landscapes were experienced by Pullman workers, both in the years leading up to and after the famed labor strike of 1894.

Jamie Bricker and Richard A. Goddard, Ph. D. - Engineering the Frontier

Images of the West created by works like *Little House on the Prairie* and a myriad of Hollywood offerings about the "Wild West" have left us with an impression of frontier life as harsh, simplistic and crude. Investigations at Fort Garland, a 19th century frontier military outpost, have yielded a somewhat different picture. A comprehensive, coordinated, and carefully engineered system of head gates, canals, wells, ponds, cisterns, and pipes provided the fort and its individual features with a supply of fresh water, a sewage disposal system and even a year-round supply of ice. The system reflects functional considerations, formal and folk knowledge of hydraulic engineering, geographic realities, Victorian values, and local Hispanic tradition

Wade Broadhead - Pueblo's Steel City: Where Immigrants Forged Communities

The City of Pueblo grew out of four towns and by 1894 it was primed to be the industrial juggernaught of the Rocky Mountain West. Pueblo became a small piece of the dense industrial East nestled in the high plains. Fueled by the Colorado Fuel and Iron (CF and I) steel works which employed thousand Pueblo also housed many other industrial operations. These centers of industry created thousands of jobs and a large residential boom from the 1880s to 1982 when the steel industry collapsed. Unlike other rust belt cities Pueblo is using its industrial past to help frame its future. The City's Historic Preservation Commission has begun a Neighborhood Heritage Enhancement program to provide historic context studies for all of its original neighborhoods. City Historic Preservation Planner, Wade Broadhead, will utilize GIS maps and historic photos to show locations of early industrial facilities and their associated neighborhoods. The legacy of these early industrial facilities still influences identity in these working class neighborhoods. The discussion will then finish with a discussion of how the city is using historic preservation planning to understand its working class history as part of its neighborhood redevelopment.

John J. Daly - The Secret Lives of Railway Signal Towers: A Revised Narrative for the Development of Interlocking Technology

This paper presents working hypotheses concerning the technological and architectural development of railway interlocking machines and the towers that housed them, using data generated by a context study of the technology and accompanying architecture as it was employed by the New York, New Haven, and Hartford Railroad (the New Haven).

Until ca. 1950, interlocking machines were widely employed by the New Haven and other railroad companies at junctions, yards, crossovers, and movable bridges to provide protection against conflicting signals, switches, or other rail devices. Signal men, or tower operators, controlled interlockings from decentralized locations using mechanical, electro-pneumatic, electro-mechanical, and all-relay machines. After World War II, these various machines were gradually supplanted by Centralized Traffic Control (CTC) (a/k/a Train Control Systems, or TCS), that placed control of the interlockings in the hands of regional dispatching offices.

A review of the technological development of interlockings, as applied on the New Haven, reveals patterns of technological adoption and development that counter classical, monolithic models of railway history. These narratives typically privilege the agency of the railroad corporation and its employees in discussions of interlocking history: railways "installed" interlockings and towers. The author argues that interlocking technology developed through cross-pollination between signal engineering companies and railway companies, which often had frequent exchanges of personnel or patented technology. Examples of this narrative include the refinement of early controlled manual block systems prior to 1900 and the Type F electro-mechanical interlocking machine used widely by the New Haven.

Likewise, railway signal towers (a/k/a interlocking or switch towers) carry strong associative bonds with the companies that owned them. However, data indicates that this once common element of the railroad landscape was also a product of railway signal companies, who included such structures in their installation contracts. This conclusion applies to the New Haven's distinctive "pagoda" type concrete towers, which the author argues may have actually been developed by the Union Switch & Signal Company.

Eric DeLony - State of the Historic Bridge in America-2010

I started giving brief "state of bridge" updates at SIA's annual conference till I retired from HAER in 2003. This totaled 20 historic bridge symposiums. Bridge safety is mainly a matter of proper upkeep which depends on both funding and the training of maintenance personnel. Other considerations are age of the structures in question, possibilities of controlling traffic flow, various corrosion factors and even

environmental restrictions. It is the bridges built during the frenzy to complete the Interstate Highway System in the 1960s that are most at risk. indeed cyclycal maintenance is the key; poor maintenance afflicts the world's bridges.

We save more historic bridges than we did 20-years ago, but we're not out of the woods yet. Over half the historic bridges in the US were destroyed in the last four decades: three decades of the 20th-century and the 1st decade of the 21st century. This was a period in which awareness and capacity for preserving historic bridges was at its highest level. More work must be done to better protect historically-significant bridges. Until there is a national policy with specific legislative protection and funding incentives, bridges remain an engineering heritage at risk.

Richard Greenwood - Early Steel-framed Industrial Building: The Berlin Bridge Co. in Rhode Island

An examination of the industrial architecture produced by a regional leader in bridge design and fabrication, the Berlin Bridge Co., at the advent of steel framing. This presentation focuses on machine shops and gasworks buildings erected in Providence at the turn of the 20th century.

Craig Holstine (presented by Eric DeLony) - Miracle of Murray Morgan, Tacoma

Turning the Murray Morgan Bridge, “MM”, back to Tacoma from the State of Washington was approved by all parties the first of this year. The major parts of the agreement are that the City assumes ownership, operation, and maintenance of the bridge; the State will pay the City approximately $37.1 million toward the estimated $62 million cost of rehabilitation. The first phase of the project will focus on the waterway segment of the bridge, not the approaches.

MM, the second oldest (1913) vertical lift bridge in the Great Northwest, was designed by the engineering firm, Waddell & Harrington, Kansas City, that invented the bridge form for the US. Murray Morgan has gone by other names such as City Waterway, since it was designed to carry a water main supplying fresh water to this portion of Tacoma know as the tideflats, and 11th Street Bridge because it's a continuation of Tacoma's street layout.

Recorded by HAER during summer 1993, the gestation period between Tacoma and the State DOT for saving MM was about a decade. Both City and State conducted studies on replacing MM with a replica or a new high level bridge. Rehabilitation came in at about half the cost of new construction. Considering the City’s sustainability goals and the economics of a new *versus* rehabilitation, the City decided to rehabilitate. But most important, the bridge is a historic structure, has always has been an *icon* of the Tacoma skyline, and is one of the most important bridge saves of the early-21st century.

John Johnson & Christopher Marston - Reinventing the Waterwheel: HAER documentation of the Waterwheel Pit and Millwork at the Robbins & Lawrence Armory

With an SIA grant, the American Precision Museum in Windsor, VT engaged the Historic American Engineering Record (HAER) to document remains of the original waterwheel pit and millwork at the former Robbins & Lawrence Armory. Christopher Marston, Jet Lowe, and John Johnson prepared the documentation that was transmitted to the Library of Congress in December 2009.

This project consisted of an historical report, providing context for historical, technological and archaeological aspects of the site's significance, large format photographs of existing conditions and interpretative drawings to represent what may have existed of the original water power system at the Armory in 1846. The remains of the wheel pit and millwork are a case study in a water-power system of a mid-19th century factory in New England.

The Armory was constructed as a private factory for the manufacture of Government-contracted firearms and machine tools; the period of historical significance was 1846-1856. The 'American system of manufacture' was employed here by skilled machinists with a variety of machine tools necessary for the manufacture of interchangeable parts. Fieldwork and research indicated that the machinery was powered by a high, breast type, wood and metal waterwheel 14' wide and 18' in diameter.

In 1849, to supplement the waterwheel, a steam engine was added and a 2-story addition expanded machine tool operations. Robbins & Lawrence produced firearms for domestic and foreign contracts during this period, but ill-advisedly expanded into rail car manufacture. After the company failed in 1856, the building was adaptively reused as a machine shop and sewing machine factory, a cotton factory, a steam and hydroelectric station and a transmission substation. In 1966 it was converted into a museum.

The HAER drawings reveal the existing conditions of the factory, conjecture on the arrangement of the waterpower system and millwork, and illustrate the evolution of the site in 1846, 1853, 1884 and 2008. The American Precision Museum will use this documentation for planning future restoration to the site, and for exhibition purposes.

Carol Litchfield - Great Salt Lake, Utah: Its history and exploitation

Great Salt Lake (GSL), Utah is the second saltiest lake on Earth and the seventh largest lake in the Western Hemisphere. It is over 6000 square kilometers in size. It is part of the Bonneville formation from the Pleistocene era and was formed about 12,000 years ago. It is not surprising then that is has been a source of salt, first for the native Americans, later for the Mormon settlers, and is still in production today. In the 1950's a railroad causeway was built across the lake effectively creating two lakes: a North Arm

with salinity of 28 - 30% salt; and a South Arm with a salinity of about 12-15%. Salt (sodium chloride) production today occurs only in the South Arm. Since its discover the Lake has had a long and mystical history which will be described in detail in this paper.

Patrick Martin, Peter H. Stott, Patrick Malone - TICCIH, SIA and the Wider World of Global IA!

TICCIH is an international organization uniting IA organizations all over the world. Prof. Patrick Martin has recently become the President, and will lead a several presentations on the organization, the role of the SIA in it, and the recent meeting in Germany. Peter Stott is the SIA representative to TICCIH and will be contributing his thoughts. Patrick Malone also attended the meeting and will be sharing his impressions and ideas.

Jessica Montcalm - A Burning Question - Archaeology at the Davenport Pottery, Parowan, Utah.

The kiln of Thomas Davenport, a Latter Day Saint pioneer in southern Utah, was excavated during Michigan Technological University's 2009 field season. While Thomas was employed in the potteries of western Great Britain prior to his immigration to the United States, he was not involved in kiln operation or construction. This paper provides a summary of the kiln types Thomas might have encountered prior to building his own in 1855 and the ways in which the Davenport kiln demonstrates local adaptation and specialization.

Kaitlin O'Shea - The Lake Champlain Bridge: A Landmark Lesson

The Lake Champlain Bridge, a nationally significant engineering landmark listed on the National Register of Historic Places, was demolished on December 28, 2009. Replacement was favored over rehabilitation. The loss of the 1929 Lake Champlain Bridge represents the loss of an engineering and heritage resource, one that is an identity of a region. Demonstrated by the Lake Champlain Bridge, there are three important topics to discuss. First, preservationists need to address the issue of transportation department maintenance plans that fail to protect and respect historic bridges. In terms of the Lake Champlain Bridge, bearing houses were removed, causing unnecessary stress on the bridge. Second, the known design flaw of the concrete piers and the level of intensity for maintenance are related. Although the extent of the design flaw is unknown at this time, a more careful approach to maintenance could have identified and planned for structural concerns. Thirdly, preservation agencies and transportation agencies need to work together. Rehabilitation and preservation need to be viable considerations that the DOT takes seriously and understands. The preservation community faces an uphill battle for erasing the bias against rehabilitation. As the historic bridges age, the need for maintenance plans, communication, and level ground between engineers and preservationists becomes more important than ever, in order to prevent another loss as that of the Lake Champlain Bridge.

Daniel K. Perry - The Scranton Boys, Lackawanna Rail, and Westward Expansion

Pennsylvania's Lackawanna Ironworks is an exceptional example of one of the worst places an iron furnace was ever constructed. Founded in the early 1840s in a sparsely inhabited and isolated valley in the northeastern corner of the state, by the outbreak of the Civil War it was the second largest iron making complex in America. Lacking abundant supplies of essential raw materials, Lackawanna succeeded due to the determination and resourcefulness of a family and their ever expanding network of business associates. By the late 19th century the name "Lackawanna" appeared on wrought iron and steel rail laid from Mexico to the Yukon and most places in between including a narrow gauge railroad dubbed the Denver & Rio Grande.

This presentation will explore the ways that Lackawanna's management overcame the paucity of readily accessible ingredients, transportation links, and workers to create a business model that other industry leaders were to follow. Emphasis will focus on the role that Joseph Scranton played in developing and guiding the growth and success of this nationally significant ironworks, as well as the company's participation in building western railroads.

Crystal Robinson - History and Future of the Cripple Creek Mining District

The Cripple Creek Mining District in Teller County, Colorado has a rich, lively history and an extensive mining record that began when gold was first discovered by Bob Womack in 1890. Much of the district's history, including many historic relics related to mining, has been preserved, chiefly due to the efforts of the Cripple Creek and Victor Gold Mining Company. As current operator of the Cresson Mine, the largest mine in the district, the company has relocated and reinforced head frames from older operations and placed historical markers and overlooks near the mine to keep the district's rich mining past alive.

The potential for mining in the region was realized as early as 1873. Numerous events affected production over the years, including two failed gold rushes, the 1893 Silver Crisis, introduction of the railroad, the L-208 Act during World War II, and challenges related to mining at depth. Also, early miners in the region did not immediately recognize the majority of the gold, as it was chemically distinct from other gold deposits and appeared silver in color. The process for extracting gold has evolved substantially since mining began, allowing much lower grades to be profitable. In most cases, the gold presently mined is not visible to the naked eye. Despite all the ups and downs, the district continues to produce today. Current large-scale production focuses on a disseminated gold deposit known as the Cresson mine and utilizes heap leaching to recover gold from the ore.

The Cresson Mine is a large, low-grade, open pit gold mine. The author worked at this location during summer of 2009 and is intimately familiar with the region and the current operation of the Cresson Mine. Her Masters thesis focuses on the discovery of molybdenum in the Cresson open pit and the mapping of volcanic outliers. If molybdenum is present at depth in significant quantities, it may represent a future resource. The current mining operation is permitted until 2016 and CC&V maintains an active exploration program. Research is ongoing but appears to show promising results for the future of mining in the district.

This talk will be an overview of how a world-class mining district began, developed, and continues to operate today; specifically emphasizing the history of the district, how such a major gold deposit formed from a geologic standpoint, the processing techniques used to extract the gold, and the prospective future of the mine. Continued research and development, along with a strong gold price, will both contribute to extension of the mine life, ensuring the Cripple Creek Mining District will have consistent production for years to come.

Timothy James Scarlett - Archaeology of One Frontier Industry: Ten Years of Work on the Utah Pottery Project

In 1999, I held the first field season in the long-term survey of pottery and heavy clay production in the American West. The research initially centered upon the Great Basin, but quickly grew to include settlements throughout the Mormon Domain. The research design takes advantage of archaeology's entire intellectual tool kit by working through a series of small-scale studies. After the first decade of work, we are able to tell some exemplary biographical stores of life among the artisans and laborers, factories and shops. We have also set up sophisticated research designs to study networks of exchange, technology transfer, and landscape learning among the potters and clay workers. Much exciting work remains to be done.

Richard T. Steinbrenner - Preserving the Heritage of the American Locomotive Company in Schenectady, NY

After the close of operations of the American Locomotive Company (finally known as ALCO Products, Inc.) at Schenectady, NY, in 1970, its owners, Studebaker-Worthington, sold the plant to the City for One Dollar. ALCO had built its last of approximately 70,000 locomotives at this plant in January 1969. Under the City's Industrial Development Agency, an Industrial Park was established on the site, and a number of tenants have occupied various buildings ever since. However, in the past decade the major buildings have been unoccupied and have suffered some physical deterioration as a result.

In November 2008 a small group of devotees to this once-great company toured the site and considered the possibility of founding a museum that would collect archives and examples of steam, electric and diesel locomotives – as well as the Company's many other products, such as tanks and armored vehicles of WWII and Korean War vintage. In

January 2009 the ALCO Historical & Technical Society was formed with the express objective of preserving this heritage.

2010 is the pivotal year in this effort, as the Society is dealing with daunting issues of plant archeology, the environment, funding during trying financial times, city and state politics, and after four decades the possibility of demolition of classic buildings mostly erected in the first decade of the 20th Century.

This highly-illustrated talk shows the historic nature of this site and specifically considers the factors being faced by our Museum Project. Since this is an effort in real time, up-to-date progress will be included.

Katherine Scott Sturdevant - The Victor Miners' Union Hall: Bullet-Ridden Symbol of the Colorado Labor Wars

Built in 1901-2, the Victor Miners' Union Hall was a symbol of the Western Federation of Miners' (WFM) balance of power for hardrock miners with mine owners, business interests, and government in the legendary Cripple Creek gold mining district. It also became a community center for a spectrum of industrial unions and voluntary associations in the miners' town. It stood centrally on North Fourth Street, between Victor Avenue ("Main Street") and the great mining framworks on the hill, between the bank below and the Gold Coin Mine and Gold Coin Club above. In 1904, it became the center of a major strike and a literal target for the forces of industrial power.

The previous year, in 1903, the WFM declared a strike to support that of the smelter workers in Pueblo. Tired of the power that union miners had held since a successful 1894 strike, mine owners and businessmen formed a Citizens' Alliance and hired Pinkertons. Then when the nearby Independence Depot exploded, killing "scab" miners, the alliance and occupying troops responded with violent mob action intended to drive out or kill union men. Troops pursued the union miners into the Victor Miners' Union Hall, then riddled it with bullets, leaving permanent scars. Mobs also ransacked the WFM cooperative store across the street that had provided for the striking families when local businessmen refused them service.

Miners who had striven to succeed now faced arrest, torture, and deportation from the state. One such man was John Harper, president of WFM Victor Miners' Local No. 32, then manager of the WFM cooperative store. Harper was kidnapped by "whitecappers" with a lynching noose around his neck, beaten and left for dead, jailed without charge, "sweated" in a box, and deported on a train when he refused to give up his union card. John Harper was blacklisted from mining employment and told to leave Colorado. He moved to Arizona where he organized copper miners for the WFM.

Abandoned, stripped of its most attractive features, and subjected to occasional odd uses, the Victor Miners' Union Hall has stood, displaying its bullet holes, ever since. Its assault was the precursor of the infamous Ludlow Massacre and it is the only building

still standing from that part of the labor wars. Its survival has been threatened since 1904 and the National Trust for Historic Preservation has recently labeled the building as such in *Preservation* magazine. A campaign has begun, led by John Harper's great-granddaughter (the presenter) and embraced by a national and international netwwork of labor historians and labor advocates, to form a larger moevment and save the hall. The goal is to acquire, stabilize, and restore the 12,500-square-foot brick building, to make a living history exhibit and archive of mining and miners' history, as well as an educational and conference center. This illustrated presentation (and the planned article for *JSIA*) will include the exigencies of starting such an effort in a difficult economy.

Rick Sturdevant - Going Faster, Higher, and Farther: The Aerospace Industry's First Century on Colorado's Front Range

From one of the earliest efforts to build a helicopter to some of the most recent innovations in spacecraft design, Colorado has contributed significantly to aerospace technologies. Over the past hundred years, inventors and entrepreneurs have sought to perfect aircraft capable of excellent performance at higher altitudes. Others have concentrated on improving flight safety for pilots and crewmembers. For a brief time in the late 1920s, the world's largest producer of commercial aircraft called Colorado Springs home. Nearly a century later, Colorado's Front Range (i.e., the geographic corridor east of the Rocky Mountains running from Fort Collins southward to Pueblo) harbors administrative offices for production of some of the nation's largest space-launch vehicles and manufacturing facilities for various Earth-orbiting satellites and interplanetary spacecraft.

Attracted initially by the challenge of flying over 14,110-foot Pikes Peak, early aviation enthusiasts gained support from community boosters. Local officials quickly perceived the aircraft industry and, decades later, the spaceflight industry as good for community growth. They often helped arrange special deals to attract aerospace business to their locale. Substantial military and academic activity related to aerospace, especially during the cold war era, further encouraged commercial investments in aerospace manufacturing along the Front Range. By the end of the twentieth century, Colorado ranked first in the nation for commercial aerospace employment.

This presentation will highlight a century of aerospace history along Colorado's Front Range, giving particular emphasis to major turning points amidst persistent themes. It will introduce some of the region's earliest individuals to experiment with heavier-than-air flight, will explore the emergence and evolution of "aeroplane" manufacturing and related business activities, and will explain the industrial transition to rocket and spacecraft production. By focusing on companies like Alexander Aircraft, Lockheed Martin, Ball Aerospace, and their spinoffs, the enduring importance of the aerospace industry to Colorado's Front Range will emerge.

William Vermes - Design and Performance of Riveted Bridge Connections

From the late 1800s to 1960, riveted construction was the predominant connection method of both steel bridge fabrication and erection. Now, nearly a half-century since the general use of rivets ended, many American engineers, unfamiliar with riveted design, look at rivets with suspicion and as an inferior connection. However, review of past riveted construction practices, recent research and current field observations of riveted steel bridges show that riveted connections are indeed an enduring and premium fastener among existing bridge connections.

William Vermes - Wilbur Watson, Early 20th Century Bridge Architect

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 authored *General Specifications for Concrete Bridges* (1908, 1st Edition), 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 as a teen, but he pursued civil engineering because of better salaries. As a draftsman for the Lake Shore & Michigan Southern Railroad in 1893, Watson spent several months working in Chicago where he attended the Columbian Exposition, and was likely influenced by its architectural displays. Later, Watson collaborations 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).