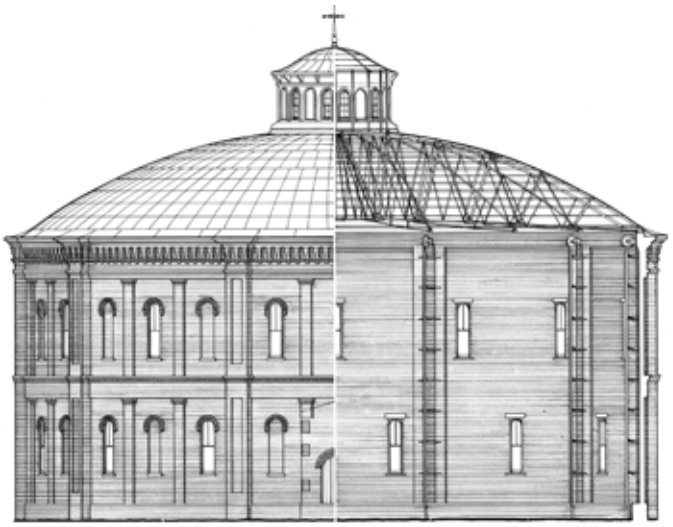

SOCIETY FOR
INDUSTRIAL
ARCHEOLOGY

SIA 2008
37th Annual Conference
San José, CA
May 29 – June 1, 2008

Paper Abstracts

Contents

Paper Abstracts

The Paper Sessions and Annual General Meeting will be held on the campus of San José State University. The Paper Sessions will be held in Rooms 227 and 229 of the Dr. Martin Luther King, Jr. Library, at the corner of 4th Street and San Fernando Street, starting with a continental breakfast at 9:00 AM followed by paper presentations and symposia starting at 9:30 AM. Free parking is available at the 4th Street Garage across from the library, although there is a charge of $2 after 6:00 PM. The library is a joint venture between the San José Public Library and SJSU.

The Annual General Meeting and luncheon will be held in the Loma Prieta room at the Student Union starting at 12:30. Paper Sessions will resume at the library at 3:00 PM, and are scheduled to conclude at 4:30 PM.

Time	*Room 227*	*Room 229*
9:30 - 10:50	**Heavy Metal: Bridges and Rails**	**Raw Materials of Industry, Mining, and Shipping**
	Jonathan Pera *Rehabilitation of Historic Lenticular Elm Street Bridge*	**Symposium: *Ciao Industria*: Technological and Landscape Transformation Amid the Advent and Departure of Industry in America**
	William Vermes *Understanding Condition Ratings and Bridge Management Policies Applied to Historic Bridges*	Cameron Hartnell *Stories in the Streets: Expansion and Change in Charleston's Historic Wharfing Area*
	Thomas Leary *Work in Progress: The Saga of a Rolling Mill-From Tredegar Iron Works to Cleveland Track Material*	Dan Trepal *Evolution in Iron: The West Point Foundry Casting House 1817-1912*
	Richard Brandi *Searching for the "Lost" Southern Pacific Line*	Paul J. White *Technological Senescence on the Mining Frontier: The "Golden Years" of the Skidoo Stamp Mill*
		Bode Morin *Urban Ghost Town: When Industry Left Detroit*

10:50-12:30

Historic Bridges Symposium – Eric DeLony, Chair, location TBA

Eric DeLony, *Bridge Cities with a Focus on Los Angeles*
Matt Roth, *Whittier Boulevard, Sixth Avenue Bridge, and the Origins of Transportation Exploitation in East LA*
Andrew Hope, *Spanning the Golden State: Caltrans' Statewide Historic Bridge Surveys*
Sharon Wood Wortman & Ed Wortman, *Historic Bridges of Portland*

(abstracts not available at time of publication)

10:50-12:30

Symposium: Railroad Preservation: Principles and Practice

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Steam Boilers in Historic Preservation

Efstanhios I. Pappas
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Architecture, Heritage and Legacy

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Kimberly Wooten
The Future of Knight Foundry

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Ethnicity Underground: Intersections of Race and Technology in the New Almaden Mines, 1845-1890

Lloyd Tepper
Industrial Mercurialism: Agricola, the Danbury Shakes, and New Almaden

Wesley Thompson
Research on the Commercial and Industrial Architecture of George Mason

12:30-2:50

Annual General Meeting and Luncheon - Loma Prieta Room, SJSU Student Union

3:00-4:30

Craft and Production

Amy Roache
Taking a New Approach to Crafts: Examining the Socio-Economic Role of the Blacksmith on the Fur Trade Frontier

R. Scott Baxter
Beer: Pioneer German Families in California

Marco Meniketti
Shadow Industry: Illicit Folk Production in an 18th Century Lime Kiln

Patricia Paramoure
Henry Cowell, Lime Baron of Santa Cruz County: His Private and Public Life

Architecture, Heritage and Legacy (continued)

Maryellen Ficker
Reinventing Reinforced Concrete: Post-war Bridges in Texas

Rachael Greenlee
The Denied Nomination of the Silver Fox Airport Hangar: Why Industrial Landmarks are Losing the Historic Preservation Battle and How We Can Stop It

Amanda Gronhovd
Public Archaeology at the Cataract Mill Complex, Minneapolis, MN

Carl Calvert
Felsdspar Mines in San Diego and Its Use in Manufacturing Plumbing Fixtures in Richmond, California

9:30 – 10:50 Rm 227 - Heavy Metal: Bridges and Rails

REHABILITATION OF HISTORIC LENTICULAR ELM STREET BRIDGE

Jonathan Pera, P.E., P.P.
Senior Project Manager
Keller & Kirkpatrick

Lenticular Truss Bridges.

The Elm Street Bridge is the *last* surviving lenticular truss bridge in New Jersey. The lenticular truss is also known as an elliptical truss, parabolic truss, cats eye, or Pauli truss. In America, the truss design was developed by William O. Douglas and became known as a lenticular truss because of its lens shape. In 1887, the Corrugated Metal Company of East Berlin, Connecticut joined with Douglas to develop the bridge line. A patent for the design was issued to William O. Douglas in 1878. Marketing of the bridge type was so successful that the company changed its name to the Berlin Iron Bridge Company in 1883.

The Berlin Iron Bridge Company was the exclusive fabricator and builder of the lenticular truss bridge. The Berlin Iron Bridge Company manufactured and erected over 1,000 lenticular truss bridges across the United States.

Project Background.

The Elm Street crossing consists of two (2) single span lenticular through trusses over the South Branch of the Raritan River between Branchburg and Hillsborough Townships, Somerset County, New Jersey. The bridge was constructed in 1896 by the Berlin Iron Bridge Company. The bridge consists of wrought iron pin connected lenticular through trusses, steel stringers, steel floor beams, and an asphalt filled corrugated metal pan deck.

The trusses are supported on stone masonry abutments and center pier. The wingwalls are stone masonry. The Elm Street crossing is approximately 282 feet with each span approximately 141 feet long. The lenticular through trusses are comprised of nine (9) panels. The trusses are spaced at 19'-2" centerline to centerline providing for a curb to curb clear width of 13'-0".

The bridge has been determined by the New Jersey State Historic Preservation Office (HPO) to be individually eligible to be listed on the National Register of Historic Places and is a contributing element of the Neshanic Mills Historic District (Hillsborough) and Neshanic Station Historic District (Branchburg). In 1983, the Elm Street Bridge was documented as part of the Historic American Engineering Record (HAER) program.

Severe deterioration of the main components of the trusses had reduced the rating of the bridge. The truss bridge was posted at the lowest posted weight limit allowed (3 tons) to keep the bridge open to traffic. The structure is considered fracture critical due to the non-redundant truss member configuration. Continued use without remedial action may result in structural failure due to condition. Replacement or rehabilitation was necessary

because of the poor structural condition of the bridge and of inadequate load carrying capacity.

Bridge Rehabilitation.

The historical significance of this structure type and its contribution to the adjacent historic districts warranted the bridge to be rehabilitated instead of replaced. Interactive meetings with the bridge owner, engineer, HPO, and the public were held to determine the proper design philosophy. The project advanced through the National Environmental Policy Act (NEPA) process.

The project required special inspections and structural analysis for the unique trusses. The rehabilitation of the truss bridges consisted of member strengthening and various repairs as needed to upgrade the bridges for continued vehicular use. The rehabilitation of the existing structures provides a safe crossing and preserves the historic trusses in service. The existing truss bridge were strengthened to a minimum H15 design live load capacity in accordance with the AASHTO design loading for bridges to remain in place.

Typical rehabilitation details included eyebar head repairs, u-bolt and tie rod assemblies for bottom chord, supplemental strengthening of bottom chord, top chord repair, bridge truss pin replacements, and a new lighter deck system.

The construction phase consisted of precise disassembly of the lenticular trusses, removal from the field, rehabilitated / strengthen in a shop, and re-assembled in the field. This procedure is very unusual for this type of structure, and it is the first time that it was successfully accomplished. A time-lapse video of the disassembly and re-assembly of the trusses will be available for the presentation. The video provides a glimpse of the extreme effort required to rehabilitate this historic structure.

The design and construction work complied with the *Secretary of the Interior's Standards for the Treatment of Historic Properties, Standards for Rehabilitation.* The historic integrity and function of the structure was maintained consistent with the original design and workmanship.

The success of this project was based on the collaborated effort all parties; Somerset County (owners), New Jersey State Historic Preservation Office (HPO), North Jersey Transportation Planning Authority (funding), Keller & Kirkpatrick (engineers), Ferreira Construction (contractor), Kupper Associates (construction inspectors), and the public.

Understanding Condition Ratings and Bridge Management Policies Applied to Historic Bridges

William Vermes
Euthenics, Inc

Historic bridges are often condemned due to claims of functional obsolescence and structural deficiency, but what do these statements actually mean and how are they measured? With recent concerns for bridge safety, these terms have taken on an increased awareness in the media. However, cursory discussion of FHWA condition ratings and sufficiency ratings in the media have been both overall correct yet somewhat misleading regarding what they mean. Understanding such terms as structural deficiency, functional obsolescence and sufficiency rating and their applications will significantly aid in the preservation of historic bridges.

Physical condition ratings of all bridges follow a FHWA scale that range from *0* (Bridge Failed) to *9* (Excellent). A structurally deficient bridge is one that is evaluated as a *4* (Poor Condition) or worse. Despite the ominous tone of poor condition, this is not a structure that is on the verge of collapse, but instead it is deemed as requiring repair to extend its longterm service.

The measure of a bridge's function for traffic is determined through the lowest ranking of geometric parameters, again on a scale of 0 through 9. Much like the threshold for structural deficiency, a bridge possessing any one geometric parameter of 4 or less is considered as functionally obsolete.

Furthermore, the sufficiency rating has been developed to measure the serviceability of a bridge and it is used to help identify maintenance, rehabilitation and replacement needs for bridge owners. A bridge's sufficiency rating is a composite of three factors: physical condition (55%), conformance to current geometric and traffic parameters (30%) and importance for public use (15%). Sufficiency ratings range from a 0 (entirely insufficient) to 100 (entirely sufficient). Sufficiency ratings below 80 suggest that a bridge may be eligible for rehabilitation and sufficiency rating below 50 suggest that rehabilitation ***or*** replacement is needed.

Of serviceability, factors that affect include number of lanes, deck width, approach width, average daily traffic (ADT), vehicular vertical clearance on and below the structure. Rating points are deducting based on the interaction of this data. For example, a bridge with two-eleven-foot lanes is much more serviceable for a 1,000 ADT than a 50,000 ADT.

Sufficiency ratings are often addressed in Section 106 and 4(f) reviews of threatened historic bridges as evidence that a structure must be removed. However, sufficiency ratings may contain errors or subjective ratings that adversely lower the rating, and thus

improperly lead an owner away from preserving a historic bridge. Thus it is recommended that any physical condition rating or statements of functional obsolescence of historic bridges should be independently verified.

Visual descriptions of physical condition ratings, functional obsolescence, structural deficiency and application of sufficiency ratings of representative historic bridges will be provided.

Work in Progress: The Saga of a Rolling Mill – From Tredegar Iron Works to Cleveland Track Material

Thomas E. Leary

Members of the SIA's Northern Ohio Chapter (NOCSIA) are engaged in documenting a significant industrial survival: a rolling mill from the former Tredegar Iron Works in Richmond, VA that is still operating at the plant of Cleveland Track Material. This historic equipment provides an excellent opportunity to examine an industrial process and the job skills associated with it. Authors such as Katherine Bruce (Virginia Iron Manufacture in the Slave Era, 1931) and Charles B. Dew (Ironmaker to the Confederacy: Joseph R. Anderson and the Tredegar Iron Works, 1966) have scrutinized Tredegar's antebellum development; more recently, Patrick M. Malone, Michael Raber and Greg Galer (all SIA) have surveyed the cultural resources associated with the water-powered Tredegar site as the facility adapted to niche markets during the later 19th and 20th centuries. The Cleveland end of the story lacks comparable coverage. However, a combination of material evidence, documentary sources and oral informants holds the potential to fill the gap. While a certain amount of industrial folklore enveloped Tredegar's role in Confederate munitions production and warship construction, disassembly of the surviving mill by Cleveland Track disclosed a date of 1898 inside the housings. The three-high mill now rolls proprietary trackwork sections from scrap rail car axles heated in a furnace acquired from a Canadian manufacturer. Many members of the current crew followed the mill when it was relocated from Richmond to Cleveland. Their work practices and occupational culture form a link with past generations of iron and steel workers; as they manipulate hot steel through the roll passes using hand tongs (comparable in some respects to mills in Johnstown, PA and McDonald, OH), their actions and understanding of the process reveal knacks mastered by predecessors that include the industrial artisans of whom Robert Gordon and Patrick Malone (both SIA) have written. It is anticipated that interviews with these crew members will tap a rich vein of first-hand experience as yet unrecorded by scholars of steel technology and labor processes. The management of Cleveland Track Material (purchased in 2007 by the German firm, Vossloh) has accommodated NOCSIA by hosting two tours of their facility, located in the former Wellman-Seaver-Morgan plant which fashioned heavy capital goods for the metallurgical industries and other sectors. Chapter members will also avail themselves of the opportunity to discuss with company decision-makers the

factors underlying Cleveland Track's acquisition of the Tredegar mill. The co-existence of this landmark rolling mill with exacting contemporary design and production standards forms another dimension of this story of survival on the edge of the changing America steel industry. This progress report of Northern Ohio activities to date will acquaint SIA members with an important specimen of U.S. industrial heritage.

Searching for the "Lost" Southern Pacific Line

Richard Brandi

The rail line from San Francisco to San Jose opened in 1863 by the San Francisco & San Jose Railroad, a predecessor of the Southern Pacific Railroad. Most of the original right of way through the San Francisco peninsula is still in use, but the line that entered San Francisco at Daly City (now the location of the Daly City BART station) was abandoned in stages after 1907. The original single track line ran on city streets through the Mission and Oceanside districts of San Francisco. The twisting line had a 3% grade at Oceanview, requiring the use of helpers in both directions. By 1901, 18 passenger trains and additional freight trains squeezed over the single-track line each day. Residents objected to the noise and soot and defeated a proposal to double track the line.

The Bayshore cutoff (1904-1907) opened in 1907 along the shore of San Francisco bay and bypassed the built up parts of San Francisco. The original Mission district alignment continued as a branch line (San Bruno line) until the mid 1940s and sidings were still extant during the late 1950s. Traces of the old right of way are still visible and its course can be seen in the odd angles of houses that were built along the right of way.

The double track Bayshore alignment was shorter and faster but required several tunnels (extant). A 200-acre freight terminal was built at Visitation Cove with the tailings from the tunnels. This 8,400 feet long yard once contained a roundhouse, numerous machine and car shops, and a hump. The stretch of track between Bayshore and Redwood City was once the busiest in the entire SP system. Today the line is in regular use by the Caltrain peninsula commuter train and an occasional freight. However, the Bayshore yard has been cleared for redevelopment except for the round house, which remains in heavily damaged condition.

The Southern Pacific Railroad had an important influence in the development of post Civil War San Francisco and California. By comparing historical maps and photos with the existing remnants of the old Mission alignment and the Bayshore yard, I will show how the railroad affected industrial and residential development patterns in San Francisco. I also will highlight plans to redevelopment the former rail yard and the potential impacts on historic structures and landscapes.

Southern Pacific main line on Harrison Street at 21st Street in 1905.

Car #802 passes underneath old Southern Pacific Colma line trestle on Guerrero between 25th and 26th Street. *Guido collection.*

Trestle of old SP Line crossing Guerrero Street between 25th and 26th Streets before 1940. The trestle and the Market Street Railway #10 Sunnyside streetcar line are no longer extant.

Traces of the old right of way through the Mission District 2007. Arrow marks the intersection of Guerrero and 26th Streets.


Ruins of the roundhouse at Bayshore Yard, 2007.

9:30-10:50 Rm 229 - Raw Materials of Industry, Mining and Shipping

Symposium: *Ciao Industria*: Technological and Landscape Transformation Amid the Advent and Departure of Industry in America

Industry is associated with the broadest changes to society in the modern period. Today it relates with all aspects of our lives: the tools we use, the ways we interact, and in the places we live and work. This session brings together different perspectives from up and coming researchers on the introduction and impacts of industry on America. The session will draw on the life-cycle of industry, from the introduction of new technologies, to industrial adaptation, and deindustrialization. The papers will focus on specific technologies [Trepal, White] and on the relationship of industry and landscape [Hartnell, Morin].

Stories in the Streets: Expansion and Change in Charleston's Historic Wharfing Area

Cameron Hartnell

Historians and tourists have celebrated Charleston's history for centuries. With Charleston's integral role in major historic events and the most notable antebellum urban landscape in the country, it's easy to see why. This paper considers a place often left out of historical perspectives on the city but central to its past prosperity, the historic wharfing area. Hartnell will present the results of a historical analysis and heritage survey that found the remains of a complex historical landscape with evidence of changes made over Charleston's long history. He will pair the major development phases with the predominant economic, social and environmental forces that shaped them.

Charleston's historic wharfing area exists on land entirely reclaimed from the Cooper River. At the earliest stages of settlement in the 1670s, merchants used lighters to transport goods and people between ships in Charleston Harbor and the shoreline. As trade volume increased, so did the need for expanded storage and wharfing facilities. Charlestonians expanded the waterfront in three stages, each related with a period of major economic growth. The first step out was made after the Treaty of Paris in 1763, which secured the Atlantic coast under British control and allowed Charleston's merchants to thrive. The second step came in the early nineteenth century with the cotton boom, initially dominated by Charleston. The final step came with the recent economic upsurge in Charleston and the construction of a new waterfront park over the remains of the wharves once lying there.

Hartnell's research brought together maps and aerial images, historic research, and the findings of a historical survey onto a GIS (Geographical Information System.) Researchers are increasingly using GIS for historical analysis because it enables them to unite spatial with historical data. In this case, using GIS allowed the comparison of the built landscape from different historic periods with today's landscape. Hartnell will show that the street layout in the historic wharfing area developed through incremental change

made by countless small developments and adjustments over the entire history of the city. This layout remains mostly intact, including the survival of several historic street constructions, and is the most tangible evidence of the area's past. Hartnell will also show that numerous historic buildings also survive in the area. These buildings are somewhat scattered in the landscape and blend with modern construction and adaptation.

Evolution in Iron: The West Point Foundry Casting House 1817-1912

Dan Trepal

The West Point Foundry Preserve, an archaeological site and nature preserve located on the Hudson River in upstate New York, occupies the site of the historic West Point Foundry, an iron and brass foundry active during the period 1817-1912. Primarily known for the production of Parrott rifled artillery pieces during the Civil War, the West Point Foundry's shops were also responsible for the first steam locomotive (the *Best Friend*) and possibly the first iron-hulled ship (the Revenue Cutter *Spencer*) built in the United States. The foundry also produced cast iron building façades, sugar milling equipment and a variety of steam engines (including those installed in the *CSS Virginia*, ex-*USS Merrimac*). The archaeology of this important site is currently in the process of being interpreted for the public by the site owner, Scenic Hudson Land Trust. Public interpretation of the site's history is based in a large part on historical and archaeological research undertaken by graduate students at Michigan Technological University since 2002.

This paper will discuss the results of historical and archaeological research undertaken in 2007-2008 concerning iron casting technology at West Point Foundry and the use history of the focus complex**.** During the summer of 2007, Michigan Tech archaeologists investigated the 1817 casting house of the foundry, a structure that forms a part of the oldest building complex on the site. Excavation focused on an iron furnace, a casting pit, a masonry smoke stack, and a doorway. The archaeological data, coupled with historic sources, indicate that the casting house served as the foundry's primary iron-casting facility for over 60 years before being used to prepare large molds for casting in a newer nearby casting house. In addition, various previously unexplored historical documents detailing foundry activities within the casting house augment archaeological data collected in 2007 and further elucidate the use history and industrial processes housed within the complex. This research is also designed to provide Scenic Hudson and its partners with information directly applicable to the design and execution of both long and short-term interpretive planning for the site.

Technological Senescence on the Mining Frontier: The "Golden Years" of the Skidoo Stamp Mill

Paul J. White

When the Skidoo gold mill began operation in California's Panamint Range in 1908, hard-rock mining in the western United States was a well-established industry. In California, the working of lode gold deposits had increased steadily since the discovery rushes of the mid-nineteenth century and, by the turn-of-the-twentieth century, was evident to some extent in every county in the state. These five decades of activity also witnessed the creation and widespread dissemination of a technical system for processing gold ores effectively. In outward appearance, as in equipment selection, milling at Skidoo closely followed the model of the California Gold Mill. When the company ended operations in 1916, the gravity stamp—the centerpiece of the mill—was widely considered an obsolete technology. Yet, the Skidoo Mill ran intermittently and with limited modification to its three stamp batteries for the next four decades.

This paper tracks the longer and lesser-known later history of the Skidoo Mill through documents and through a detailed inspection of physical evidence. Burned, reconstructed, partially scrapped, and now deteriorated, the milling facility still offers unique material insights into the character of later milling practice. Gravity stamps include replacement components not in keeping with the idealized practices emulated in the original facility. Differences in stamp drop orders also suggest a lesser concern with perfecting recovery rates that once seem to have preoccupied millwrights. Other equipment selections indicate a variety of salvage activities and a governing pragmatism to find local solutions for maintaining an increasingly antiquated technology in changing circumstances.

Taken as a whole, the Skidoo Mill's longer history contributes directly to a deeper understanding of the traditions and transformations of California's gold mining industry. Quite apart from historical accounts, which have tended to emphasize increasing scale and capital investment, the Skidoo Mill provides one inroad into a more complex picture of regional development, in which mining operators selected not only from an expanding array of new technologies, but also from the remains of forsaken and mothballed ventures ever present on the western landscape.

Urban Ghost Town: When Industry *Left* Detroit.

Bode Morin

Several factors contribute to deindustrialization. Among these are the not unfamiliar effects of foreign competition, high labor costs, corporate diversification, and degraded infrastructure. Many of the "rust belt" cities of the United States have suffered similar fates and are beset with landscapes reflecting population loss and economic decline. While certain landscape features of deindustrialization are quite compelling to this Society, as a whole, they are more reflective of forces that exist in post-industrial decline, a topic seldom explored by industrial archaeology outside of remote, extractive sites, and

environmental studies. This paper will examine the context of decline in one of the fastest growing industrial cities of the 20th century: Detroit. Motown added more people between 1900 and 1950 than nearly any other city on the planet, then from 1950-2000, proceeded to loose the greatest population of any North American City ever. Yes, there are global economic factors that clearly impacted the automobile industry in the second half of the 20th century and accelerated deindustrialization, but the region surrounding Detroit continued to grow. Its rapid, wide spread growth aided by the car itself, in the early part of the century prevented the kind expansion needed by technologically evolving auto factories forcing highly automated plants and their employees and suppliers, to regions outside and away from the city. As the "other" economic factors of deindustrialization began to pull industry from Detroit, the city's population collapsed leaving an empty landscape of faded houses, abandoned churches, and collapsing factories ghosting the imprint of its rapid rise on the encroaching return of the Midwestern prairie.

10:50 - 12:30 Rm 227 - Symposium: Railroad Preservation: Principles and Practice

Organizer: Efstathios I. Pappas, MS

Historic preservation of industrial artifacts is fraught with many difficulties not encountered with other historic resources. In particular, museum professionals and volunteers engaged in the preservation of railroad equipment are faced with a variety of conflicting problems. Exposure to weather, mechanical stress, design flaws, material decay, government regulation, and industry standards complicate this task. Preservation of these artifacts is never assured, and the process and philosophies employed by individuals make for a truly living history. This session highlights the interdisciplinary nature of the railroad preservation community, and provides case studies of how successful preservation may be achieved.

The Eureka Project

Daniel Markoff

My area concerns the restoration to full operation the steam locomotive "Eureka" that was built in 1875. It is one of only three (3) left of the American Standard 4-4-0 narrow gauge wheel configuration and the only one that is operational. The other two are static in the California State Railroad Museum and the Smithsonian Institution in Washington DC. The Eureka came from the Eureka & Palisade Railroad in Nevada. When I acquired it in 1986 it was a burned out hulk having been destroyed in a fire the previous year. Therefore, in order to properly restore it, I had to locate the original blueprints, and learn manufacturing techniques in iron, steel, brass, pattern making, foundry work, wood work, boiler work, and sheet metal fabrication. Perhaps the greatest challenges were in maintaining focus on getting the project done, and doing it all on a shoestring personal budget at my home. It is said necessity is the mother of invention. I had enough necessity to prove that anyone can complete a project of this size on their own and still survive, providing the moon, planets and stars all align themselves just right and also be a little inventive in the process.

Steam Boilers in Historic Preservation

Christopher Dewitt

The boiler, as a power source for driving machinery, was ubiquitous in the later part of the 1800's. There were as many designs as there were manufacturers and understandably some were poorly designed and cheaply made. NSRM has an operating locomotive with just this type of boiler. When the inherent design flaw was discovered a project was conceived to correct the issue and bring the boiler up to a safer standard. This lecture will discuss what the rules of construction were and are, why the design was fundamentally

flawed, how the modifications were designed and performed and why it is a valid undertaking.

Porter #4390: Experimental Industrial Archaeology

Efstathios I. Pappas

Historic preservation is often focused on artifacts with extraordinary characteristics such as size, material, craftsmanship, age, historicity, or rarity. Less frequently are artifacts preserved and exhibited which were mundane, common, or less than remarkable. Porter steam locomotive #4390 is an example of such an artifact. Built in 1909 for obscure industrial haulage, this locomotive labored outside of the public's scrutiny at the Santa Cruz Portland Cement Company's quarry in Davenport, California and was later sold to the Kaiser Rock Company gravel operation in Oroville.

This locomotive was obtained in order to recreate the everyday processes used in steam locomotive maintenance and document these techniques. Over the course of the last two years, the author has found that a unique community of practitioners exists which hold this information. Far from being an end in itself, Porter #4390 has proven to be a vehicle for understanding a unique occupational subculture, as well as a glimpse into the technologies and systems of the past while resurrecting an artifact for the future.

State Belt #4: Historic Preservation in a Changing World

Cris Hart

800 miles from its home port of San Francisco, an artifact of the City's past was rusting in a Railyard when a young railroad museum took action to return the steam engine and run it. Not an unheard of action, this museum has rescued and operated a 1921 mainline steam engine so the skill was there, a machine shop was in the works, the project was approved, what would be the challenges?

There were mechanical ones: A cylinder that would not hold steam, springs that wouldn't give because they were welded in place, a frame 1/8" out of tram as a result of a collision, a tender badly warped because of fire. There were organizational issues: Collection of too many artifacts drove away volunteers, a canceled lease required removing it form the restoration shops as the museum faced hard decisions on which items it could keep. There were money issues, promised funds would not materialize, a storage agreement turned bad. The biggest issue: Where do you place a steam locomotive so it will be preserved for future generations?

This presentation will cite selected challenges and solutions in both the mechanical restoration of a locomotive and finding a place to keep it safe for the future.

History and Archaeology at "Hell's Four Acres": Minnesota's First Iron Shipping Port

Timothy A. Tumberg
Cultural Resource Program Manager
Minnesota Department of Natural Resources,
Division of Trails and Waterways
Fort Snelling History Center

Abstract

During the summer of 2007, the Minnesota Department of Natural Resources Division of Trails and Waterways Cultural Resources Program initiated archaeological investigations at the historic town-site of Agate Bay, located along the north shore of Lake Superior within the present day limits of the City of Two Harbors. Agate Bay developed in the mid-1880s in conjunction with and as a consequence of the opening of Minnesota's first (Vermilion) Iron Range. The larger port city of Duluth some 25 miles to the southwest has gained more renown, but Two Harbors remains active as an iron shipping port today and is the spot from which the first shipment of Minnesota iron was sent, in August 1884. Historic accounts of Agate Bay are rather sketchy and occasionally contradictory. According to one of the more popular accounts, during its few short years of existence, Agate Bay acquired a reputation as a rough-and-tumble frontier settlement. The location on which it stood became commonly known as "Hell's Four Acres," and included an especially notorious section called Whiskey Row. Other research suggests that Agate Bay was in fact simply a typical frontier-era settlement with no more than the usual number of saloons and other opportunities for vice, and its wild reputation was largely a myth perpetuated by officials of the Minnesota Iron Company in order to help leverage a buyout of the four prime acres of waterfront real estate. Though occupied for only a short time, Agate Bay has tremendous potential for an archaeological investigation because much of the platted town-site was capped by a wooden platform from shortly after its abandonment in the late 1880s until the 1920s, and then by a large concrete coal storage slab from the late 1920s until October 2006. Initial archaeological investigations conducted at the site during the summer of 2007 revealed that some intact subsurface artifact deposits remain extant, meaning that the wood and concrete structures have effectively sealed much of the former settlement as something of a time capsule. This paper will review the results of the historical and archaeological work conducted to date and propose avenues for further research at Agate Bay.

The Future of the Knight Foundry

Kimberly Wooten
Secretary, Board of Directors, Knight Foundry Corporation

The doors of the Knight Foundry opened for business in the Gold Rush town of Sutter Creek in the early 1870s, as Campbell, Hall & Company. Samuel Knight purchased the business outright in 1873. From its furnace would come cast-iron products for local and international markets, critical developments in water turbine power, and a legacy of industrial craftsmanship. Knight died in 1913, leaving his foundry to his employees; it operated as a commercial enterprise until 1991. Owing to the dedication of many individuals, the foundry continued to operate until its last pour in 1996. Today, the Knight Foundry is the only intact water-powered foundry and machine shop left in existence the United States.

When Knight purchased the foundry, he couldn't have imagined that 135 years later people in Sutter Creek, and indeed, across the nation, would be so intent on preserving his legacy. While past attempts to save the Knight Foundry have stalled with great disappointment, the future for the industrial site looks promising once again. With a price tag of 1.4 million dollars, raising the money for the purchase and clean-up of Knight Foundry has been challenging for the small community of Sutter Creek, but with the commitment of the City as the lead agency in grant acquisition, and the non-profit Knight Foundry Corporation as an active partner in that process, the prospects for purchasing the foundry are better than they have been for many years.

The intent of the Knight Foundry Corporation and the City of Sutter Creek remains constant: to preserve the foundry as an important link in the county's heritage tourism landscape, creating a dynamic living history experience that caters to both the community and its visitors. This paper will acquaint the audience with the history of the Knight Foundry, the plans for site preservation and public programming, and where efforts stand in the challenge to save the country's last water-powered foundry.

Ethnicity Underground

Andrew Johnston, PhD
Assistant Professor
Wentworth Institute of Technology
Department of Architecture

This paper explores the relationship between the physical spaces of mercury mining in California and the racial and ethnic organization of the quicksilver industry. It argues that how race and ethnicity were negotiated within the quicksilver industry shaped the underground landscapes of work at the mines. While the aboveground landscapes of work and camp were also shaped by ethnic and racial differentiation, it is striking how the underground landscape, one usually thought of as reflective primarily of geology and

technology, is also highly reflective of the social categories of race and ethnicity. How work was organized, and what group of people did particular jobs, was based in ethnic and racial relations and these relations influenced the physical form of the mines. Conversely the geology and geography influenced how work was organized and what racial and ethnic group did what job.

In addition to being the first mining in the American West, mercury mining was also very different than other types of mining. The most significant difference is that from 1845-1890 mercury mines in the American West employed racially and ethnically stratified wage-labor workforces, whereas other types of mining such as gold and silver mining did not. While gold was a poor man's metal, in theory at least accessible to any able-bodied person, quicksilver was a rich man's metal, requiring large capital outlays for development and an industrial organization. Gold and silver miners were mostly white, and if not working for themselves or in partnerships, were members of mining unions. Quicksilver miners were typically non-white, mostly Mexican or Chinese, and worked for low pay in abusive situations. Also significant is that the major mercury mines were long-term mines, with the half dozen major mines operating twenty to fifty years or more, whereas most of the gold and silver mines were boom and bust, operating from two to ten years at most.

At New Almaden, the largest of the California mercury mines, as at many other mines, labor was organized on a contract basis, again a situation unique to mercury mining. In the contract system work was organized into discreet chunks that were racialized according to a hierarchy of races. The level of control that a laboring group had over their working situation, the extent to which they were able to keep track of their own pay and to limit the pollution of their bodies, was largely based on their race. Rates of pay for different racial groups reflected the unequal power relations at the mine. The contract nature of the work helped determine the physical shape of the mine, as discrete tasks suited to the assumed skills and "natural" attributes of different racialized groups required particular physical spaces.

Using mine maps and sections, company records, and a very early collection of underground mine photographs, this paper will show how the underground landscapes of mercury mining were shaped by the ethnic and racial categories at work in the quicksilver industry.

Industrial Mercurialism: Agricola, the Danbury Shakes, and New Almaden

L.B. Tepper

The archeological record of the industrial production and use of mercury makes frequent reference to mercury intoxication among those engaged in the respective trades. Evidence is found in the appearance of the classic triad of inorganic mercurialism: 1) tremor; 2) "salivation" (copious saliva flow, gingivitis, loosened and lost teeth); and 3) erythism, a distinctive psychoemotional phenomenon characterized by irritability, shyness, timidity, and insomnia.

Although mercury miners have been "poisoned" for over 2000 years, reliable attribution specifically to mercury appears first in the writings of Paracelsus and Agricola in the 16th century. Their reports, however, are complicated by mysticism, mythical subterranean creatures, and jargon of the alchemist. They were familiar with the world's two major mercury mines active until recent times: Almaden (Spain) and Idrija (Slovenia since WWII), the former having produced one-third of all mercury ever mined. A more comprehensive and discerning examination of process-associated mercurialism, then seemingly intrinsic to mining, gilding, chemistry, mirror making, and the treatment of syphilis, appears in *De Morbis Artificum* by Bernardino Ramazzini (1700).

Mercury intoxication in miners is not associated with cinnabar (HgS), but rather with free-running native mercury in the ore body, sulfide roasting, and refinery retorting, mercury vapor thus volatilized being condensed and captured with uncertain efficiency. The utilization of mercury amalgams in the silvering of mirrors, in fire gilding (armor, vermeil, buttons), and in gold mining and refining stimulated expanded mercury production with concomitant mercurialism among miners. Production at the California mercury mines of New Almaden and New Idria was greatly energized by demands for the metal created by the Gold Rush of 1848-1852. Their total output was exceeded only by that of their namesakes in Europe, freeing the United States from dependence upon foreign sources. Alice Hamilton, investigating the California mines in the 1920s, reported that more than half the miners had experienced at least one attack of "salivation," furnace operators being most affected. Mercurialism was not prevalent in the gold fields in spite of amalgamation and retorting processes. Presumably the relative infrequency of mercurialism reflected the less confined working environment and more varied work content.

The mercuric nitrate processing of animal fur fibers ("carroting," "secrétage") to improve the integrity of felts for hat-making was evidently discovered by the Huguenots and exported to England following the revocation of the Edict of Nantes (1685). Mercury treatment causes fur fibers to become more limp and roughened, which enhances their capacity to mat in the felting process. Although carroting produced mercurialism, there is conjecture as to whether or not Lewis Carroll's Mad Hatter had mercury-related disease. Mercury tremor was common in the domestic hat industry, e.g., the "Danbury shakes". More recent industrial mercurialism, e.g., in thermometer manufacturing, is sporadic. Current interest in mercury intoxication is directed primarily to low-level environmental exposures.

Research on the Commercial and Industrial Architecture of George Mason

Wesley Thompson

Standing on the southwest corner of Huron and Michigan Ave. in downtown Ypsilanti stands a fairly non-descript Richardsonian Romanesque building that is used as the city hall. The city's offices are clustered in odd-shaped floors, with no real flow to them. The second floor mezzanine with a large safe gives away the building's former use, as a bank. The City Hall (Figure 1) was built in 1887 by the Ypsilanti Savings Bank Due to its having seen fire in the 1960s; the building has had significant modifications. Further research shows the building was designed by the Detroit architectural firm of Mason & Rice.

During the rise of Detroit as an industrial powerhouse, the city had numerous architectural firms, including Donaldson & Meier, Malcomson & Higginbotham and Mason & Rice just to name a few. Although all three were exceptional firms, Mason & Rice stands out because of the long and illustrious career of its founding partner George DeWitt Mason. Mason throughout his 70+ year career constantly raised the bar for architecture in and around the City of Detroit. His creative talent would create some of Detroit's most memorable homes, churches, train stations, hotels, factories and public housing. No real study has been done of his work; the best stand alone work is W. Hawkins's Ferry's *Buildings of Detroit: A History*. Even this work only mentions some of Mason's most notable work. A full detailed account of Mason's work is however impossible. A job list that was assembled after Mason's death is forty-six pages in length and numbers over 2,000 jobs, some large, some small.[1]

Figure 1Ypsilanti Savings Bank, 1887 (BHC)

This proposal for a paper presentation is an overview of current research that is being done on the industrial and commercial architecture of George D. Mason. Through his research the author has found an architect who was fully intoned to the styles of his day. For example Mason mastered

[1] The original copy of the job list is in the possession of Dr. Thomas Brunk, who kindly gave a copy to the author. The Papers of George D. Mason are located at the Detroit Public Library's Burton Historical Collection. This collection contains both his notebooks and his sketchbooks. Unfortunately, Mason quit writing in his notebooks after 1885, and his sketchbooks have many miscellaneous drawings, most of which have been crossed out for some reason. The sketchbooks do however show that Mason was a very accurate sketcher, and took copious notes on any buildings he observed.

the Richardsonian Romanesque Style not only in the bank mentioned previously but also in his Walkerville Train Station (1889) and the McMillan Block (1887) (this building is of particular interest for its ode to Henry Hobson Richardson on the buildings pillars). Mason also understood and uniquely used the Stick Style in the Michigan Central Railroad's Chelsea, Michigan Depot (1880). In his later career Mason would continue to follow and set the pace for Detroit architecture. Examples include the Cadillac Automobile Company factory (1905), which was built using the "Kahn Truss" bar system made famous by, Mason protégé, Albert Kahn (Kahn worked as a draftsman for Mason & Rice and later partnered with Mason), and Detroit's lavish Pontchartrain Hotel (1909) which also used this system of construction.

Mason rode the economic waves of the area, his career culminated during the Great Depression by doing a series of public works projects including the Herman Gardens public housing project. Mason's architecture is as unique as the history of Detroit and it is hoped that presenting theses and other buildings to the Society of Industrial Archeology it will hopefully allow a better understanding as to why Albert Kahn said of his mentor "Your achievements are so worn into the fabric of our city that each and every one of its citizens is even now your debtor."[2]

[2] Speech given by Albert Kahn at the Michigan Society of Architects, Masonic Temple Dedication Ceremony, no date. Professional Papers of Albert Kahn, Box 1, Transcripts of Speeches, Folder 1918-1929, Bentley Historical Library, University of Michigan.

3:00 – 4:30 Rm 227 – Craft and Production

Taking a New Approach to Crafts: Examining the Socio-Economic Role of the Blacksmith on the Fur Trade Frontier

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Abstract:

One of the most recent trends in industrial archaeology focuses on the examination of the social aspects of industry, whether based on themes of production, distribution, consumption, and capitalism (Casella 2005; Beaudry 2005; Symonds 2005). But when examining these Marxist centered constructs, how do we as archaeologists access the social dynamics involved in the often very non-social, material based study of industry? This research examines the work of the 18th century blacksmith within the frontier setting at Fort Michilimackinac, located in northern Michigan. As part of my dissertation research, I propose a methodology and theoretical base that facilitates the examination of the social phenomenon of the blacksmith within a dynamic cultural, political, and economic setting.

The primary objective of this research is to gain knowledge of the socio-economic role of the blacksmith within the frontier setting at the fur trade post Fort Michilimackinac. Most archaeological studies of blacksmithing focus only on the spatial layout of the shop, tools being used, and goods being repaired and manufactured (Light 1984; De Vore 1994; Faulkner 1990; Cox et al. 1990). However, my research will expand the knowledge of 18th century blacksmithing on the fur trade frontier within the context of political, economic, and social influences by answering questions such as: what types of jobs (civilian or military) are being completed by the blacksmith; which goods are being repaired most often and for whom within the community; are goods being locally manufactured by the blacksmith and consumed by local traders, Native Americans, or military personnel; and how does the fur trade community interact with the blacksmith and vice versa?

In order to gain information about the social and economic involvement of the blacksmith within the community, it is first necessary to understand the work of the blacksmith, including technological change and innovation. One goal of this research is to examine if technological changes were adopted in the blacksmith's techniques within this frontier setting. Change happened gradually, if at all on the American frontier and actual techniques of the blacksmith may have remained relatively unchanged in frontier areas like Fort Michilimackinac despite the shifts towards industrialization at larger population centers (Light 1987; Watson 2000). On the other hand, it may have been necessary to develop innovative techniques to adjust to the limited resources available on the frontier (Andrews 1977; Armour 1976; Bealer 1976; Hawley 1976; Light 1987; Watson 2000). Characterizing changing technology in association with the fur trade will illustrate how technology "affect[s] productivity and division of labor within the smith's immediate community and, by extension, the larger community" (Light 1987:664). For instance, differences in French and British nail production has been noted at the site of Fort Michilimackinac (Frurip et. al, 1983), but it is unclear whether differences may be seen in

other types of metal artifacts. Examination of metal artifacts across the site, historic documentation of trade goods and activities, and macroscopic analysis will be used to answer questions relating to the manufacture, repair, consumption, and distribution of various types of metal goods. Drawing from knowledge gained from previous archaeological excavations and historical research at Fort Michilimackinac, this research will provide a socio-economic based understanding of frontier blacksmithing and the ways in which the fur trade influenced local craftsmanship.

Beer: Pioneer German Families in California

R. Scott Baxter

From the outset of the Gold Rush one of the key components of most miner's needs was alcohol. Some preferred wine or distilled spirits, while others enjoyed the refreshing qualities of beer. To the good fortune of these thirsty miners were a series of unfortunate events on the other side of the world. A sequence of social and political upheavals in Germany coincided with the Gold Rush, resulting in a large influx of German immigrants into California. Many of these new immigrants were knowledgeable brewers who soon put their skills to work. The beer making process is one largely dependant on environmental factors and available ingredients. Faced with new environmental conditions and limited available ingredients, they soon developed recipes and methods to produce a drinkable beverage while dealing with unfamiliar conditions. The result was some distinctly New World beer.

Coincident with the development of the beer industry in California was the increased industrialization of the process. This industrialization led to increased task specialization, mechanization, and consolidation within the brewing industry.

Presented here are two examples of German families involved in the brewing industry in California during its formative years in the later half of the 19th century. One family in Placerville operated a brewery there from the 1850s until prohibition. The other operated a beer bottling plant in Santa Clara, cooperating with other German families in the brewing and distribution process. Archaeological and historical documentation of both locations has provided insight into the role of German immigrants in the beer industry, how their prior skills helped them in their chosen profession, and how they adapted to changes in technology within the industry.

Shadow Industry: Illicit Folk Production in an 18th Century Lime Kiln

Marco Meniketti
San Jose State University

Lime production has many purposes. Foremost among these is mortar. But other uses, such as a fertilizer for poor soils or as a coagulant in sugar production are perhaps less well known. This paper will describe the modern yet illicit small-scale manufacture of

lime in an 18th century kiln on the New River Plantation on the former British West Indian colony of Nevis.
The kiln formerly served the needs of the plantation, today an archaeological ruin and under jurisdiction of the Government. Yet the kiln, built in the late 18th century, continues to be used clandestinely by locals with a variety of needs. The author encountered one such operation accidentally during archaeological field work and was given an opportunity for ethnographic documentation of the mortar production on the grounds that the makers remain anonymous.
Sources of fuel, such as the coral reef nearby and fuel, ranging from dried logs to old furniture must be collected and brought to the site surreptitiously and the fires carried out at strategic times to avoid detection. However, production is an “open secret” and as long as procedures efforts are made to conceal the activity the Government is able to look the other way.

Henry Cowell: Lime Baron of Santa Cruz County: His Private and Public Life

Patricia Paramoure

Abstract

Henry Cowell, a Santa Cruz lime manufacturer, came to California just after the Gold Rush and first resided in San Francisco. In 1865, he purchased Albion P. Jordan's interests in the "Davis and Jordan Lime Company" in Santa Cruz and the name was changed to "Davis and Cowell Lime Company". He moved his family, his wife Harriett and four children, to Santa Cruz later that year. Another daughter was born in 1866.

Henry Cowell made millions through the exploitation of the natural limestone and redwood resources of the Santa Cruz area. And he bought land. By the time he died, in 1903, he was one of the richest men in the state. He owned over 12,000 acres in Santa Cruz County alone. At their most extensive, Cowell holdings spanned most of the west coast, from Texada Island in southwestern Canada to San Luis Obispo, California and included land in fourteen California counties, totaling 82,491 acres.

The Cowell family lived at their Santa Cruz ranch for at least fourteen years (and possibly as long as thirty-two years) and it was considered to be the home ranch. They lived in the farmhouse and the ranch was self-sufficient in that it supplied the family and the resident employees with food from its orchards, gardens, dairy and livestock operations. The ranch was also self-contained in respect to the lime business. The rock was quarried there and transported to the kilns. Lumber was cut on the ranch to fuel the kilns. An on-site cooperage made the barrels in which to ship the lime, and company drayage wagons brought the lime to the company warehouse and wharf on the coast. For a time they owned their own schooner which was used to ship the lime, mostly to San Francisco.

In the early 1960's, part of the Cowell Ranch was bought by the state of California for the building of University of California at Santa Cruz. Many of the ranch buildings still exist today, including the main house, barns, storage buildings, workers cabins, the cookhouse, and blacksmith shop. Also still in existence are many remnants of the lime operations. Especially evident are the cooperage and remnants of the kilns, near the main entrance to the university. Many of the ranch buildings were modernized and converted to office space. The main house served as the chancellor's residence in the early years of the university. Unfortunately, many of the other buildings have been left to the elements and the university has taken the attitude that the historic preservation of these buildings is not their responsibility. In 2007, the remnants of the ranch were designated a National Historic District and placed on the National Register of Historic Places.

Not much is known about Henry Cowell and his family. The Cowells were private people. They did not like attention. Few photographs and almost no direct quotes exist. Most of what we know about them comes from two sources: newspaper accounts and recollections by people who knew them, written mostly in the latter years of their lives. Both of these sources are prone to distortions and bias. This paper investigates the public and private lives of Henry Cowell and attempts to explore what type of person he really was.

Reinventing Reinforced Concrete: Post-war Bridges in Texas

Maryellen Ficker, Historic preservation specialist, Mead & Hunt, Inc

Following the end of World War II, funding provided through the Federal Aid Highway Act spurred a massive road building campaign in the United States. State highway departments with available matching funds and resources to build roads got the earliest start. With funding in place to obtain the federal match, Texas was ready to begin building roads immediately following the war. To facilitate the building of roads, bridge engineers were challenged to find bridge designs that were cheap and easy to construct. To achieve this goal, they reinvented reinforced concrete bridges with new and innovative designs that allowed for faster and more economical bridge construction. As a result of Texas Highway Department (THD) engineers' efforts, two new bridge types emerged: the FS slab and the pan-formed girder.

Although reinforced concrete slab bridges were extensively used on Texas roads prior to 1945, they were redesigned to support the post-war road-building boom. The THD created a new design, called the FS slab, based on research conducted at the University of Illinois. The new structures had raised structural curbs that were monolithically poured with the slab; the integrated curbs provided strength that allowed for thinner slab depth and more economical structures. Another post-war design was the pan-formed girder bridge, which was also a design created by the THD. This unique bridge type looked like a cross between a jack arch and a channel beam. Reusable steel forms were used to construct the pan-formed girders and allowed for rapid and extremely economical construction of these bridges.

Between end of World War II and the initiation of the interstate system in 1956, Texas built approximately one third of its present-day road system. Together, the FS slab and pan-formed girder bridges were the "work-horse" bridges used on these newly constructed farm-to-market roads, state highways, and US highways.

Based on research and oral histories, this presentation will trace the development of the FS slab and the pan-formed girder in Texas. The presentation will also explain how these bridge designs were different from their pre-war counterparts, how they were widely implemented, why they were successful, and what led to their eventual discontinued use. Most importantly, the presentation will illustrate how reinforced concrete bridges enabled THD and other state highway departments to build their roads in great numbers to meet post-war demand before the widespread use of prestressed concrete.

The Denied Nomination of the Silver Fox Airport Hangar: Why Industrial Landmarks are Losing the Historic Preservation Battle and How We Can Stop It

Rachael Greenlee

The Silver Fox Airport hangar in Delaware County, Indiana is one of the earliest (if not the earliest) extant hangars in Indiana and symbolizes a period of fledging aviation in the state from 1927 to 1936. Owned and operated by Fred Werts, the airport serviced Werts' airline, accommodated tourists flying to the Muncie area, and served as a rudimentary pilot school. After surviving two airplane crashes and the onset of the Great Depression, Wertz closed the airport in 1936. The airfield remained in use until 1950, when the hangar was converted to the Muncie Construction Company.

In May 2007, the Indiana Department of Transportation contracted Dr. Linda Weintraut of Weintraut and Associates to document and evaluate the Silver Fox Hangar for listing in the National Register of Historic Places. Although the exterior of the hangar has been modified from its original 1927 construction, the interior still conveys the feeling of an airplane hangar. Thus, Dr. Weintraut nominated the Silver Fox Airport hangar for eligibility to the National Register of Historic Places under Criterion A for its association with aviation history in Muncie and Indiana and Criterion C because it embodies the characteristics of a type, period, and method of construction of aviation architecture.

Yet, the Indiana State Historic Preservation Officer (SHPO) disagreed. Claiming that the hangar's historic setting and design had been severely compromised, the SHPO felt that the structure could no longer convey its significance. Although the SHPO concurred that the association of the Silver Fox Airport hangar with early aviation in Indiana had been firmly established, the agency cited that a different hangar (that had been moved from its original location, but had more structural integrity), served as a better landmark of early aviation in Indiana.

This is just an example of how industrial landmarks all over the country are being denied recognition and inclusion on state registers and the National Register of Historic Places. Such an oversight has many potential reasons. Most likely, the significance of a rusted, brick and steel airplane hangar is not as easy to recognize as a restored Victorian house. Another reason may be the lack of knowledge on the part of the Indiana SHPO to recognize industrial buildings, landscapes, and work areas as significant to the development of local and state communities. Perhaps if a member of the community or a local industrial preservation group had come forward in support of saving the Silver Fox Airport hangar, the Indiana SHPO would have reconsidered.

What is a solution to this problem? How can you keep this from happening in your area? Become more involved in your local preservation groups, and help save

industrial landmarks by becoming a consulting party. As part of the Section 106 process laid out in the National Historic Preservation Act of 1966, all regional or local preservation groups are invited to consult on all federally funded projects that may affect cultural resources, such as industrial structures. Don't know how to become a consulting party? This presentation will explain the steps and provide all the necessary information. Discussion of how to educate state historic preservation officers and their staff will also be encouraged.

Public Archaeology at the Cataract Mill Complex, Minneapolis, MN

Amanda Grohovd

This paper will discuss the history of the Cataract Mill Complex and the public archaeology program conducted at the site in 2006 and 2007. The Cataract Mill was the first privately owned flour mill in Minneapolis' West Side Milling District. Minneapolis was the international leader in flour milling during the first part of the 20th Century, and precipitated the development of companies such as Pillsbury and General Mills.

Minneapolis' milling district was also one of, if not the, largest direct-drive water powered system in the world at its height of operation. In the 1930s however, the flour milling industry began to move eastward to locations such as Buffalo, New York, and by the 1970s few flour mills operated in Minneapolis. Despite the fall of the Minneapolis milling industry, significant archaeological resources remain along Minneapolis' banks of the Mississippi River. These resources include both above- and below-ground architectural and artifactual remains of the mills (including entire rooms buried underground), an expansive system of tunnels and turbine shafts that extends for miles under the city, and the structural remains of the canals and railroad.

The Minneapolis Parks and Recreation Board now owns the Cataract Mill site and has incorporated it into "Mill Ruins Park." In 2006 and 2007, the Minneapolis Parks and Recreation Board in conjunction with *10,000 Lakes Archaeology, LLC* conducted a public archaeology program at the Cataract Mill site. This program received funding from the St. Anthony Falls Heritage Board, the History Channel and the Mississippi River Fund, and focused on bringing inner-city kids to the site to learn about their city's history, archaeology, math, and science. On Saturdays the site was also open to the public to tour, excavate and help process artifacts. Over the past two years the site has received hundreds of visitors, and in 2007 the project received an award for best interpretive project.

FELDSPAR MINES IN SAN DIEGO
AND
ITS USE IN MANUFACTURING PLUMBING FIXTURES IN RICHMOND, CALIFORNIA

Carl Calvert

Abstract

Discussion:

The manufacturing process of porcelain fixtures on the west coast began in the San Francisco Bay area with the formation of the Pacific Porcelain Ware Company in Richmond about 1909. Materials needed were clay, feldspar and steel. Porcelain is made of clay and feldspar. Steel was used to make the cast iron part of sinks and tubs. The Bay area had good deposits of clay at Point Richmond, but the need for steel and feldspar was wanting. Consequently, these items needed to be transported to Richmond by ship and rail from Eastern points where deposits were more plentiful. Richmond was an ideal manufacturing location because of its access to rail and shipping terminals.

Feldspar is used principally in the manufacture of porcelain, pottery and glass. However, it also has an extensive use for the manufacture of sparkplugs, signs, appliances, polish, abrasive soaps, tile, insulators, and as a straining material.

The process of fusing feldspar to metal was invented by David Buick in 1895 in Detroit while in the plumbing business with Alexander Manufacturing Company. David Buick later became famous for the Buick car.

The Standard Manufacturing Company began in 1875 by James Arrott and Frances Torrance in Pittsburg, PA manufacturing kitchen hollow ware. They made cast iron kettles, pots, and pans and enameled them. By 1879 they were producing two cast-iron bath tubs per day. In 1927 they moved to New York and continue in business today known as Standard American.

In 1925, Standard Manufacturing Company purchased the four large factories of Pacific Porcelain Ware Company in Richmond and San Pablo, CA and renamed it the Pacific Sanitary Company. Their purchase included the cast iron foundry in Richmond, the vitreous china plant in Richmond, the vitreous china plant in San Pablo, and the main office and retail building at 67 New Montgomery Street in San Francisco. About the same time the company purchased a feldspar mineral deposit in Campo, CA east of San Diego and began the construction of a grinding plant (Mill) to process the mined feldspar for shipment to the Richmond factory.

The mining operations in Campo began as a surface open pit hard-rock mine, and the company later turned to below ground tunneling. A Funicular Railway was installed with sorting operations to process the ore. It was trucked 6 miles to the still standing grinding plant; a nine story building where it was further crushed, ground, screened, and washed until it met a 200 mesh quality. Some of the used grindstones imported from Norway still remain at the site.

During the 1930's, the mining site in Campo was thought to be the biggest deposit of feldspar in the United States. The company claimed workman were only allowed to work in the dusty areas for 20 minutes wearing respirators and then were reassigned to work in other areas because of the dust health hazard. In later years employees' health suffered to the point the State of California began imposing requirements on the company to contain the dust. Most employees in the mine and mill died of Silicosis from exposure to the dust. Rather than upgrade the manufacturing process, the company choose to shut down operations in 1943 and sell the facility. The mill and mine further operated until 1959 under various private individuals before it was permanently closed. Today, the mill site has been transformed into a Transportation Museum, the re-use of an historic site.

Once the feldspar was processed, it was bagged into 100-lb burlap bags and in later years paper bags, and sent by rail to Richmond for use. As demand increased in the 1930's boxcars were used to transport the feldspar in bulk. The railcars were draped and stapled with wax paper after which feldspar was pumped into the railcar.

Feldspar is a general name for anhydrous aluminum silicate minerals which contain various amounts of Potassium, Sodium, and Calcium. ($KAISI_3O_3$). It is the earth's most abundant mineral. Still today about 50% of feldspar is used in glass production, 35% in ceramics, 4% enamel, and 11% in soap & abrasives. Feldspar increases the chemical stability of the finished products. It is usually ground 20 to 30 mesh for glass use, and 200 mesh for ceramic use.

Feldspar is used in ceramics because it fuses at lower temperatures than the other ingredients. It acts as a flux by wetting the solid particles and surface tension pulls them together.

In Richmond, the feldspar was mixed with clay to make porcelain fixtures. Sinks and bathtubs are first manufactured out of steel which provided the bonding surface for porcelain. Once the steel tubs were made and cooled, a porcelain paste was made up in floor tubs with a shovel and hoe. When mixed, it was shoveled into a bath tub and smoothed by hand. If finger prints remained, it was not important as when the tub was placed into the kiln the heat melted the wet porcelain leaving a perfectly smooth surface. In later years Standard Sanitary Manufacturing developed a method of making vitreous china sinks like toilets. They were pure china. Today we still place porcelain over steel to make bath tubs and sinks. The author knows of only two plants left in the US today that apply porcelain over steel in making bathroom fixtures. The remaining are manufactured overseas.

Conclusion:

These were the only porcelain bathroom fixture companies that operated on the west coast.

Feldspar is no longer mined in California, and is principally mined in Mitchell County, North Carolina at this time. The Standard Manufacturing plant in California was a strategic location for distribution of its products to the Western States, Hawaii, and Asia.

I have dozens of photos of the buildings in Richmond, San Pablo, and Campo, the mines, displays of the bags, pictures, products, and materials used.