Historic Industrial Buildings: An evolution from Industry to Adaptive Reuse

New buildings began to appear in American towns and cities in the early nineteenth century. These buildings were not designed to be lived in, and were not dedicated to agriculture or the craft of an artisan. They were dedicated to industrial production and its related needs as the industrial revolution took root on the American continent.

Mechanization of production on a large scale required large, sturdy buildings, with windows to harness daylight that were able to accommodate heavy equipment. Textile production, tool making, paper processing, clothing and many other buildings were designed to make the products that were driving the expansion and growth of the United States. The late nineteenth century saw the introduction of electricity to power and light industrial production. The buildings began to change as well, night production was now possible as the buildings were lit.

Insurance company influence and owners' experience dictated most of the features that distinguished most industrial buildings constructed between 1880 and 1930. This design became known as “slow-burn construction” from the features intended to limit the structures' vulnerability to fire damage. Broad, gently-sloping roofs covered expansive floors of unfinished boards in a space without interior walls. Heavy wooden posts rose vertically, regularly spaced, to hold the weight of upper floors, their equipment and the roof. Exterior walls were constructed of brick and would be 12 to 24 inches thick as needed for the interior load. The windows however, dominated the building's appearance – large windows to admit daylight and ventilation – as closely spaced and tall as engineering would allow. Until the twentieth century, windows were wooden double or triple-hung, the sashes divided by wooden mullions into the individual panes. In the twentieth century, metal divided light windows became dominant. Stairs, hoists and lifts were often located in towers outside the walls of the factory itself. If they were located within the footprint of the larger building, they were separated by masonry walls as thick as the exterior.

1. Typical slow burn construction interior in 1909.

Fire doors were introduced as a means of further ensuring safety. Thick wood doors, clad in metal were hung on wheels on an inclined track. A counterweight was attached to the door by a rope and fusable link to allow easier opening and closing of the large heavy door. The counterweight also

served as a safety feature: in the event of fire, the rope would burn away if exposed to flame and the fuseable metal link would weaken and break if exposed to high heat. Either outcome released the door to slide closed along its track and slowed the spread of smoke and flame.

2. Slow burn wood construction.

Various strategies were employed to maximize the natural lighting in industrial buildings. The interior brick walls were nearly universally painted white from about four feet above the floor to the top at the ceiling. The lower four feet of wall was painted a darker color, usually green, to better hide scuffs and other wear that was a byproduct of industrial use. While industrial structures employed expansive fenestration in their walls – others used variants in cases where even more light was needed and in cases where equipment might need to be attached to a solid exterior wall. Clerestories and monitor roofs allowed for this.

During the early to mid twentieth century, concrete began to be used in place of wood in the construction of industrial buildings. Poured reinforced concrete floors and concrete mushroom columns added strength and additional fire safety.

3. Concrete construction with mushroom columns.

Another technological advance changed the character of some existing industrial buildings during the 1950's and 1960's – the advent of air conditioning. In some cases, building operators added air conditioning, making opening windows no longer necessary. In many cases, window sashes were simply fixed in position. However, a significant number had their windows filled in by a number of means. In some cases, windows were removed and the openings filled with brick or concrete block; in others – they were left in place, but covered with inserts of wood, fiberglass or corrugated metal. Adequate lighting within the factory was provided by the installation of additional electric lighting.

The final stage in the evolution of historic industrial buildings is the challenge presented by the decline of heavy industry and manufacturing in the U.S. economy. As industry has declined, many of the historic buildings in use were shuttered. Some found new industrial uses, but most did not.

During the 1950's and 1960's small-scale reuse of former industrial buildings began in large cities, where affordable building space was in high demand. New York City provides the classic example as manufacturing and warehousing began to move from Manhattan to the outer boroughs and suburbs. The newly vacant buildings along the waterfront and downtown south of 30th Street gained popularity amongst artists, musicians and other creative types because of the affordability, large size and adaptability of the spaces. An artist could simply sweep up and move in – with room for a studio and living space. Musicians enjoyed the fact that they could play at all hours and not worry abut disturbing neighbors in more traditional neighborhoods.

The creative types attracted more creatives, apartments became more sophisticated and the formerly industrial neighborhoods like Tribeca, Soho and Chelsea became some of the hottest in New York, fueled by their supply of historic industrial buildings.

While the changes in New York City were happening organically, in 1964 San Francisco, a large vacant chocolate factory was deliberately turned into a shopping and entertainment venue, Ghirardelli Square. Now considered the first large industrial adaptive reuse project in the United States, its success inspired other similar projects all over the country.

Industrial adaptive reuse has grown beyond large cities and now includes many examples in smaller communities with their own industrial heritage. Creation of the historic rehabilitation tax credit in 1986 spurred many industrial adaptive reuse projects and had an especially strong impact in those smaller communities, where disused industrial building were often the largest buildings in the community and had a correspondingly large negative impact from the loss of manufacturing and subsequent lack of activity and deterioration in the derelict structures.

Sustainable Growth Through Adaptive Reuse

It is self-evident that the “greenest” building is one that is already built. An existing historic industrial building is the manifestation of thousands upon thousands of hours of invested labor. The materials – old growth wood beams, floors; locally fired brick; stone and poured concrete are at best very costly in today's marketplace if they're available at all. They are located at strategic locations within their communities: near transportation, power, infrastructure and worker housing. When approached intelligently, historic industrial buildings can be a tremendous asset to a community.

The final product of an adaptive reuse project, whether new housing, office, commercial or cultural space is far more substantial and interesting than a new construction project of similar budget. Minimal investment is typically required for new roads, water, sewer and power and a potential negative element in a community is transformed into a positive. Indeed, adaptive reuse projects,

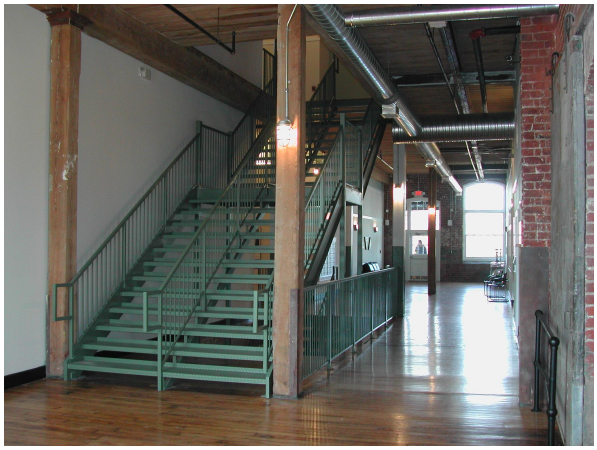
historically integrated into their environments often act as a catalyst for positive change in the surrounding area. New private investment is sparked, public funds not required for new infrastructure can be diverted to other uses and the resulting transformed building embodies a character that attracts business and creative change.

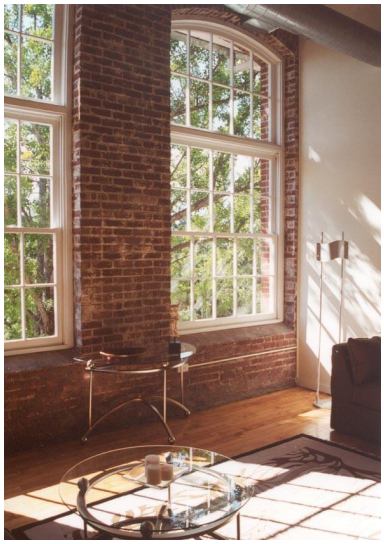
Examples of Industrial Adaptive Reuse

Residential Use

Creation of housing in the form of apartments and condominiums in former industrial buildings has been very successful. Design elements that made factories function are now sought after by many buyers and renters for their homes – large windows, brick and stone masonry and wood floors comprise an aesthetic with many admirers. Industrial chic is so popular that it has inspired a a destructive form of imitation, where builders remove more refined finish materials from the interior of other historic building types just to expose hidden brick, wood and metal structure. The relatively narrow footprint of many historic industrial buildings is also an advantage in creating residences as building codes require windows for living spaces, and the narrow shape reduces wasted space on interiors that would not be suitable for living. Other favorable design elements include high ceilings, which in some cases allow for the construction of loft levels in the original space. This advantage allows for more revenue generating space with the original building footprint.

Examples of Successful Residential Adaptive Reuse





Rhode Island Mill Apartments
Location: Eden NC
Former Use: Textile Mill
Built: 1903

Adaptive Reuse: 2002
New Use: Apartments

Shoe Factory Apartments
Location: Beaver Dam WI
Former Use: Factory and Warehouse
Built: 1922

Adaptive Reuse: 2004
New Use: Apartments

Commercial Uses
The large open spaces and sturdy construction of historic industrial buildings allow for a wide range of uses and adaptability for commercial rental use including office, retail entertainment and dining. The design elements that make residential use popular with consumers are just as compelling here.

Powerhouse Square
Location: Raleigh NC
Former Use: Power plant and Trolley Barn
Built: 1910

Adaptive Reuse: 1999
New Use: Office Space and Restaurants

American Tobacco Factory
Location: Durham NC
Former Use: Factory
Built: 1878 – 1940

Adaptive Reuse: 2004
New Use: Office, Retail, Restaurants.

Environmental Challenges Associated with Adaptive Reuse of Industrial Buildings
Historic buildings typically contain some types of environmental contamination, usually from common building materials once thought to be safe such as lead paint and asbestos. Historic industrial buildings also carry the environmental legacy of the manufacturing processes that took place inside them. Careful analysis of environmental concerns must be made early in the planning for the redevelopment of any historic industrial building.

Lead Paint
The heavy metal lead was a near universal additive to paints used on walls, furniture and equipment until it was banned in the United States in 1977. Prized for its ability to improve the appearance, durability and dry time for paint, lead is the most common environmental hazard in historic industrial buildings. The deterioration of old paint in industrial buildings is a special concern, especially as the U.S. Consumer Products Safety Commission stated that the primary motivation for the ban was "the risk of lead poisoning in children who may ingest paint chips or peelings." Remediation of lead paint hazards is typically accomplished by a combination of two or three techniques conducted to the specifications designed by and under the supervision of an environmental engineer. These techniques are chemical removal, where a chemical is applied to the paint to soften it, and it is scraped away; blast removal, where high pressure water or air is mixed with a blast media like sand to remove the paint layer; and encapsulation, where a protective coating is applied to the paint to cover and isolate it from human contact.

Asbestos
Asbestos is a mineral that was used in household and industrial products for fire safety until the late twentieth century. The mineral fibers of asbestos are now recognized to be a serious heath risk to those who inhale them. Asbestos is commonly found in insulation, vinyl and linoleum tile, adhesives, window glazing, acoustic tile and ceiling applications. Asbestos containing material must be removed and disposed of in a controlled environment by specially licensed workers under the supervision of an environmental engineer.

Fuel
Fuel hazards can be found in and around fuel storage tanks and their former locations. Fuel oil was used to fire boilers and furnaces. Gasoline may have been used to fuel machines and equipment.

Storage tanks both above and below ground may have leaked and contaminated soil and ground water. Above ground tanks present a fairly straightforward remediation task, but determining the extent of underground contamination is more involved, requiring the creation of monitoring wells in the area of possible contamination, followed by the removal of affected soil.

Other Concerns
Other types of contamination are possible depending on the nature of industrial processes that the building has been used for in its life. Proper assessment of possible contamination is made by an environmental engineer from thorough examination of the site, coupled with detailed analysis of the historic record concerning use of the site.

Financial and Market Challenges
While a historic industrial building may functionally be quite adaptable to a new use as residential or commercial space, market forces play a critical part. Like any other development opportunity, the forces of supply and demand come into play. Many of the former industrial buildings are large, typically exceeding 100,000 square feet. For example, a building of this type and size may easily be reconfigured into 75 to 80 residential units. Can the market support this many units? Should the units target a specific segment of the residential market – seniors, student housing, income-restricted housing, live/work units, for example? In every instance the proposed use must be substantiated.

The second critical area of analysis relates to the financial economics. Every project must be able to be sustained economically. Because projects require a battery of financing types and sources, the project's financial plan must pass very careful scrutiny by lenders and investors.

A critical element in the financing of older industrial buildings is access to a wide range of federal, state and local tax incentives. The gateway to many of these tax incentives is listing the property on the National Register of Historic Places. While the National Register program is honorary in nature and places no restrictions whatsoever on the property, it is a required first step to access many tax incentives and grant programs. Federal tax law allows a 20 percent credit against the qualified cost of rehabilitating a historic building. More than 30 states have similar programs offering credits and incentives at the state level. These tax credits provide a critical source of equity for the project.
In addition to the rehabilitation tax credit programs, a variety of other tax programs have been used in the rehabilitation and adaptive reuse of historic industrial buildings. These include the low income housing tax credit, the New Markets Tax Credits, and a variety of other programs. At the state and local level, incentive programs to reduce and/or eliminate sales and use tax, real property taxes and mortgage recording taxes can be accessed to help make the project work economically.