

GRAY'S FERRY CHEMICAL WORKS.  
MARRISON BROTHERS & CO.  
WHITE LEAD, COLORS, PAINTS & CHEMICALS.



# PENNOVATION WORKS

Historical Research + Interpretive Strategy

February 2017



*Front Cover*

(Top) Courtesy of the Kislak Center for Special Collections, University of Pennsylvania; (Bottom) Courtesy of PlanPhilly

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IMAGE FROM GOOGLE MAPS (2016 IMAGERY)



Aerial photograph of the Pennovation Works campus (outlined in red) and the Grays Ferry Crescent Trail Park (outlined in white).





Rendering of the Pennovation Center under construction.

## Project Background

The Pennovation Works campus is the University of Pennsylvania's newest center for research and innovation, located between the Schuylkill River and the Grays Ferry neighborhood of Philadelphia. The campus is currently under development, led by Penn Facilities and Real Estate Services (FRES), and it already hosts researchers and entrepreneurs in a collaborative campus environment. The site's signature building—the Pennovation Center—officially opened in October 2016. FRES engaged PennPraxis, the consulting and research arm of the University of Pennsylvania School of Design, to research the history of the site and opportunities for interpretation, exploring themes of innovation and invention in order to tie the impact of Penn's current innovation enterprise to the site's longstanding role in Philadelphia, the region, and the nation as a hub of industry.

PennPraxis' research focused on two key areas of inquiry and analysis: 1) the history and physical evolution of the site, and its associations with innovations in industry; and 2) contemporary case studies and best practices, based on comparable sites at other institutions and universities. PennPraxis also convened five stakeholder meetings and one faculty presentation of the research findings. Over twenty faculty, staff, and administrators participated in these stakeholder meetings between August and October 2016.

The findings from the research and presentations informed the development of an interpretive framework for the Pennovation Works campus, which is presented in Part 2 of this document.

HARRISON BROS & CO., "THE CHEMISTRY OF PAINT", 1902, UNIVERSITY OF PENNSYLVANIA SPECIAL COLLECTIONS







(Opposite) Acid storage tanks at Harrison Brothers & Co., 1902; (left) Aerial view of the DuPont facilities at Grays Ferry, 1930s.

## Part 1: Site History

Pennovation Works is The University of Pennsylvania's South Philadelphia campus, located on the east bank of the Schuylkill River in the Grays Ferry neighborhood of Philadelphia. Aimed at fostering an environment for research and entrepreneurship, the 23-acre property provides flexible workspace for university affiliates, tech startups, and established businesses. The University acquired the site in 2010. In the decades before this, many of the site's historic structures were demolished. Existing industrial buildings have been lightly refurbished to provide flexible work spaces, and a color laboratory building originally constructed in 1932 has been rehabilitated and altered as the flagship Pennovation Center, with shared desk spaces, laboratories and common areas. Out of 40 buildings on the property, the University identified 13 that were

constructed more than 50 years ago, and three that have reuse potential: the John Marshall Laboratory (built 1950), the Pennovation Center building (built 1932) and a main office building (built 1937). The University plans to refurbish these structures while introducing new infrastructure on site. The campus plan also integrates developments occurring on the Schuylkill riverfront, including the anticipated extensions of the Schuylkill River Trail. The University of Pennsylvania intends for the Pennovation Works site to serve as a place where established businesses, researchers, and startups can co-mingle and develop new products, ideas, and talent.

Innovation is not a new concept for this property, and a history of the site and its surroundings reveals themes of innovation from the 1700s to the present



day. The Pennovation Works property has been a prime location for industry for over 150 years. The nearby river crossing has been a major entrance to the city, witnessing Swedish farmers traveling to and from to market, travelers visiting from the south, and the swift passage of rail cars and automobiles into Philadelphia. Throughout its history, this corner of the city has been a site of ingenuity, research and production. Innovation takes on a different form in each phase of history, responding to the economies, technological advances, and opportunities of the day. The following summary describes the history of the site in terms of the major themes that characterized its development.

Philadelphia. Swedish settlers colonized the Upper Delaware Valley in 1638 with the establishment of New Sweden in Wilmington and smaller settlements up the Delaware River. The colony transferred hands during the following decades, from the Swedish to the Dutch in 1655 and to the English in 1664, but Swedish farmers remained on the land. William Penn established the City of Philadelphia in 1682 between the Delaware and Schuylkill Rivers, with Cedar Street, today's South Street, forming the southern boundary.

Swedish colonists began to occupy South Philadelphia from the mid-17th century. Peter Mattsson (also known as Peter Dalbo) was an early settler in the area, and the first to acquire the tract of land that today encompasses the study site and Pennovation Works.<sup>1</sup> In 1676 Mattson acquired 300 acres stretching from the Schuylkill River to the southeast, bounded by present day Wharton Street to the south, Washington Avenue on the north and 25th street to the east.<sup>2</sup> When he died in 1699 the land was left to his four children, and the property continued to be passed down through generations.<sup>3</sup> These descendants include the Dupuy family, who built the "Clover Hill" house that formed the eastern boundary of the Pennovation Works site. The house was still standing in a 1910 account, "crowded with large chemical factories" and near several other brick country houses "distinguished in their day for their grandeur."<sup>4</sup> An 1808 map by John Hills shows "Dupuy's Rock" on the Schuylkill River near the focus area, another remnant of the family legacy.<sup>5</sup> Dupuy descendants included Rebecca, wife

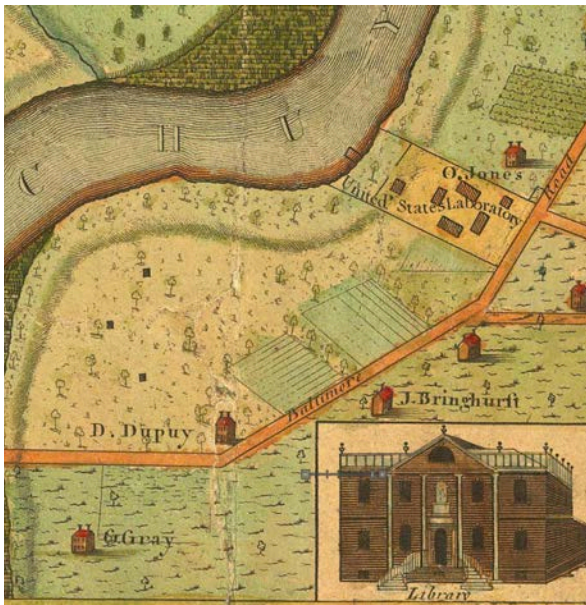
**"New Plan of the City and Its Environs," 1802, by Charles P. Varle.**

### FARMS AND COUNTRY HOUSES

For nearly two centuries, the land that became South Philadelphia was comprised of farms, country houses, and wilds. Swedish and Finnish settlers tended the land from the late 1600s. The site of Pennovation Works was part of Passyunk township, located southwest of Philadelphia. Present-day Grays Ferry Avenue was an early route into the city for Swedish farmers, leading from a ferry crossing at the Schuylkill River. Until the Consolidation Act of 1854, Passyunk and the study site remained outside of Philadelphia city limits.

When European explorers first arrived in the Upper Delaware Valley, Passyunk and the Wequiaquenske bands of Lenape Indians occupied present-day South

IMAGE FROM DAVIDRUMSEY.COM



of Colonel Jacob Weiss, founder of the Lehigh Coal and Navigation Company and the first man to bring Lehigh Coal to Philadelphia, an important component in the growth of Philadelphia.<sup>6</sup>

Through the 1700s, the east bank of the Schuylkill remained meadows and woodland while Philadelphia's development remained gathered on the Delaware Riverfront.<sup>7</sup> Written accounts describe the Schuylkill Riverbanks as an escape from the city, and a good place for fishing.<sup>8</sup> The study site was part of Passyunk, a township mostly comprised of farms, with no village center.<sup>9</sup> William Bartram noted the large and fat cattle produced on the "rich grazing pastures."<sup>10</sup>

The land surrounding the study site attracted some notable residents. Thomas Jefferson lived on the riverfront just south of Grays Ferry during the summer of 1793, while serving as Secretary of State in the capital city.<sup>11</sup> Philadelphia experienced its worst outbreak of yellow fever that year, and Jefferson most likely chose this outpost to avoid exposure to the disease.<sup>12</sup> The small house overlooking the river was known as Joseph Harmer's Retreat, situated between what are today Reed and Dickinson Streets.<sup>13</sup> Other early country houses in the area included the Bringhurst family "plantation" built in 1771.<sup>14</sup> Wachsmuth House was also nearby, built by a family of French merchants who migrated to Philadelphia in 1783.<sup>15</sup> Prominent property owner and ferry operator George Gray owned the study site from 1749.

## GEORGE GRAY AND THE ENTRANCE TO THE CITY

The Grays Ferry neighborhood is named for early resident and noted entrepreneur George Gray. Gray and his descendants operated the ferry crossing on the Schuylkill, and developed the land on both sides of the river as an inn, ferry house, and extensive public garden. Known as the Lower Ferry, the river crossing was a prominent and profitable transportation service.

The elder George Gray acquired the land on both sides of the River in 1742.<sup>16</sup> Upon his death in 1749, he left 199 acres of land and the ferry service to his young son, George. George Gray leveled and widened the road to the river, he built an inn on the west riverbank and a large brick house on the east side. A map drawn in 1862 by Samuel Smedley identifies an artificial bank on the bend of the river at the study site, probably another result of Gray's improvements to his property. In 1778, Gray replaced the ferry with a floating bridge that could be pushed aside to accommodate barges and ships navigating the river. The British Army had first installed the floating bridge during their occupation of the crossing during the American War of Independence. In 1800, George Gray's sons George and Robert took ownership of the land.

Gray's Ferry was the southernmost of three major ferries operated in Philadelphia across the Schuylkill. Known as the Lower Ferry, it was first established in 1683 by Benjamin Chambers. A prominent river crossing into Philadelphia, the ferry led to the construction of Grays Ferry Avenue in 1696.<sup>17</sup> The

**View of Gray's Gardens (background)  
from the east bank of the Schuylkill  
River (foreground).**



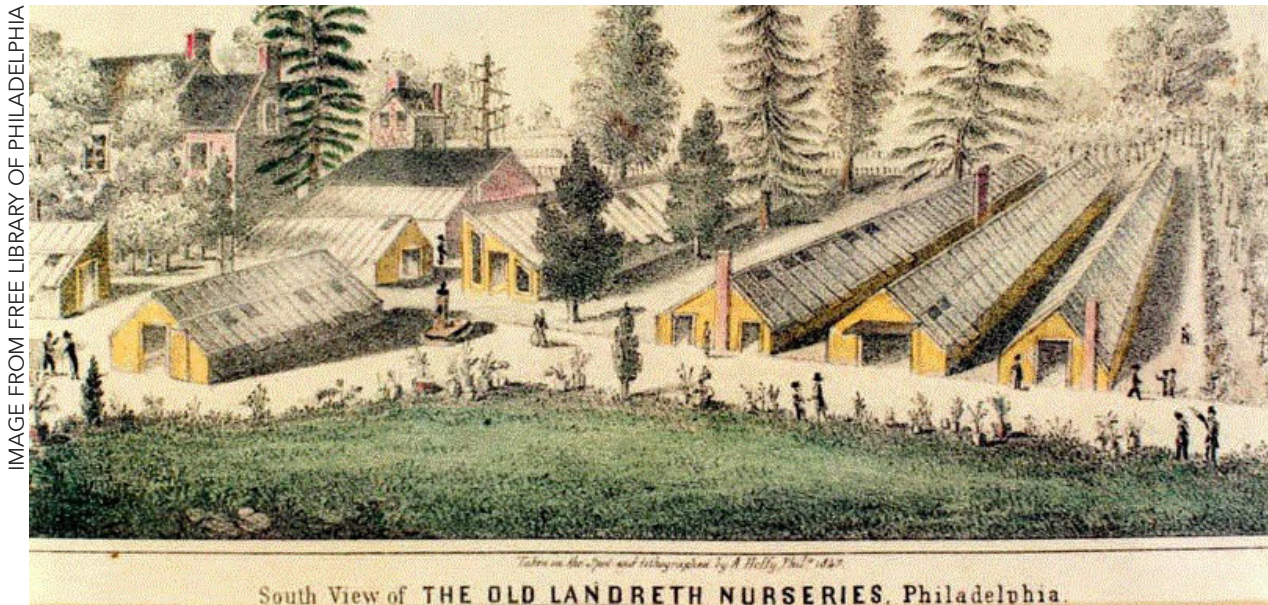
P. CLARK. [SCHUYLKILL RIVER AT GRAY'S FERRY], CA. 1835. LIBRARY COMPANY OF PHILADELPHIA.



Lower Ferry was an important entrance to the city and a means of transportation for farmers headed to market and travelers passing through. Anyone approaching Philadelphia from Chester, Baltimore, and other cities in the south would have entered Philadelphia here.

George Washington crossed the Schuylkill at Gray's Ferry on April 20, 1789 on the way to his Presidential inauguration in New York.<sup>18</sup> The bridge was decorated for the event with triumphal arches and eleven flags, each named for a state that had adopted the Constitution.<sup>19</sup> As George Washington passed through the arches and over the bridge, a laurel wreath was lowered upon his head.<sup>20</sup> Thousands watched the procession continue up the Avenue and through the city.

**South view of the old Landreth nurseries, 1784.**



## GARDENS

The study site is close to the celebrated landscapes of Bartram's Garden and The Woodlands. Established in 1728, Bartram's Garden is the oldest surviving botanic garden in the United States. Located on the west side of the river, the property today still serves as a garden and arboretum. William Hamilton built the Woodlands also as a horticultural showcase. From 1785, he developed the grounds to reflect his interests in botany and plant collection. Lying between these prominent estates was Gray's Gardens, an impressive picturesque landscape with greenhouses and walking paths. The Gray family established the garden in 1780 with the guidance of Samuel Vaughan, designer of Philadelphia's State House garden. Visitors called it an enchanted grounds, "a veritable fairy scene, with bowers, grottoes, waterfalls, bridges, islands, and a most attractive inn, with tables set upon the greensward."<sup>21</sup> Covering many acres, the land was modeled on the public gardens of London. It served as an attraction, drawing patrons to dine at the tavern and walk the grounds. Wooden arched Chinese bridges and romantic grottoes ornamented a winding system of paths, where unexpected vistas were arranged artfully for visitors to encounter. A greenhouse showcased pineapples, oranges, lemons and tropical flowers.<sup>22</sup> Across the river, the study site was also owned by the Gray family and kept as open pasture.

On the east side of the river, not far from the gardens of John Bartram, William Hamilton, and the Gray family,



stood David Landreth and Sons, the first commercial seed house in America. The company was established in Philadelphia in 1784, at Federal Street and Grays Ferry Avenue.<sup>23</sup> Landreth's was at the forefront of plant breeding. Early customers included John Adams, Thomas Jefferson and George Washington. Before seed businesses such as Landreth's arose, household gardeners would save their own seeds, slowly improving their crop by choosing the best plants. Commercial distributors made a variety of seeds more widely available and they developed and created hybrid and improved versions of various plants. Landreth's introduced many vegetables to the American garden. The company developed the original Beefsteak Tomato (1869), which became an essential ingredient for the nearby Campbell Soup Company.<sup>24</sup> Landreth's also promoted and distributed seeds brought back from America's West in the 1804-1806 Lewis and Clark's Expedition. These plants included Osage Orange, now a popular type of hedgerow.<sup>25</sup> Other successful plants created by Landreth's include Bloomsdale Spinach (1826), Green Glaze Collards (1820) and Landreth Stringless Bush Bean.<sup>26</sup> The company moved their operations to Bucks County, Pennsylvania in 1847.

## TRANSPORTATION

With Philadelphia's entry into the railroad age, the southern entrance to the city transformed into a

rail corridor. Many railroads were constructed into Philadelphia at this time, including the Reading Railroad built in 1833, Lehigh Valley in 1846, and Delaware, Lackawanna and Western Railroad in 1849. Philadelphia became more firmly connected to the wider country. The city's economy transformed from an international port to a hub of industry connected to a wider region and to the American West. In 1837, the Philadelphia Wilmington and Baltimore (PW&B) Railroad built a bridge at Grays Ferry and established the first direct route between Philadelphia and Baltimore. The floating bridge owned by George Gray's descendants, and a few acres of land around it, was sold to the PW&B Railroad Company in 1837. That same year, Moses Gray Palmer, William Palmer and William Gray Palmer sold the study site to William Young, a wealthy Philadelphian.<sup>27</sup>

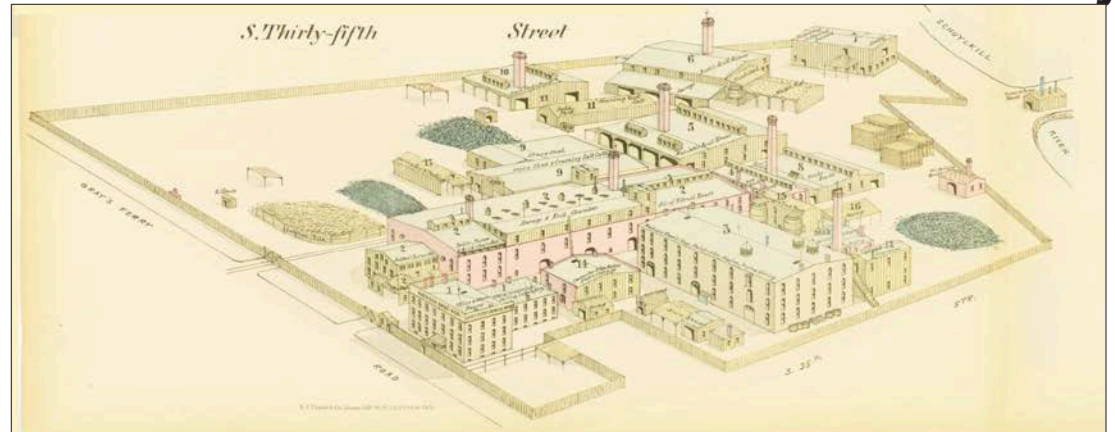
PW&B built a permanent bridge over the river in 1838. The covered trellis bridge spanned 800 feet and had both a railroad track and a road lane to allow for a large amount of traffic and goods to pass to and from this southern point of the city. Named Newkirk Viaduct after the PW&B president Matthew Newkirk, the bridge established the first direct rail line between Philadelphia and Baltimore. The momentous construction was commemorated with a large obelisk monument beside the bridge.<sup>28</sup> Soon after, the City of Philadelphia paid the PW&B Company a lease, which allowed for free public passage across the bridge. With this new connection out of the city, the study

**View of the Newkirk Viaduct, 1876.**

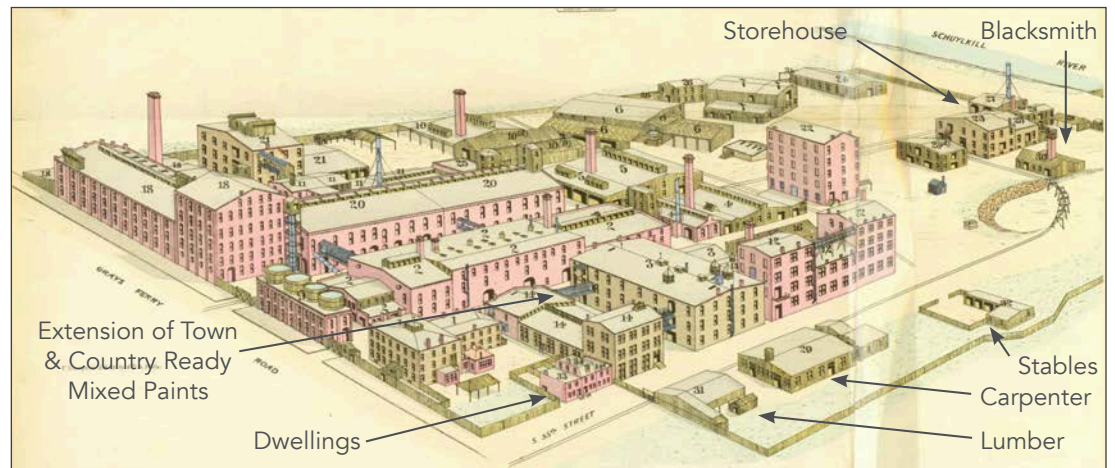


# Evolution of the Harrison Brothers & Co. Manufactory

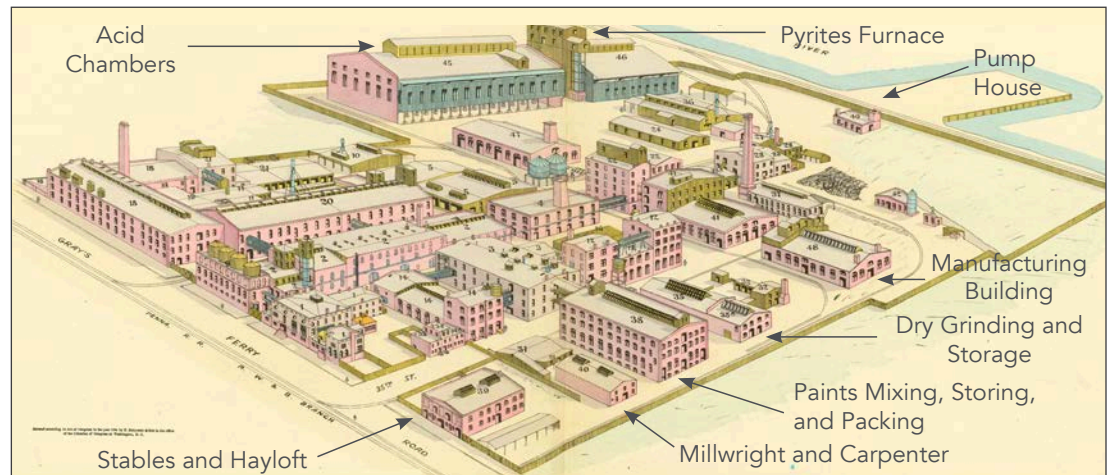
1878



1885



1894



ERNEST HEXAMER, HEXAMER GENERAL SURVEYS. IMAGES FROM FREE LIBRARY OF PHILADELPHIA, VIA PHILAGEOHISTORY.ORG



site became well served by both rail and ship traffic. Industry developed not long after.

## JOHN HARRISON AND THE HARRISON BROTHERS

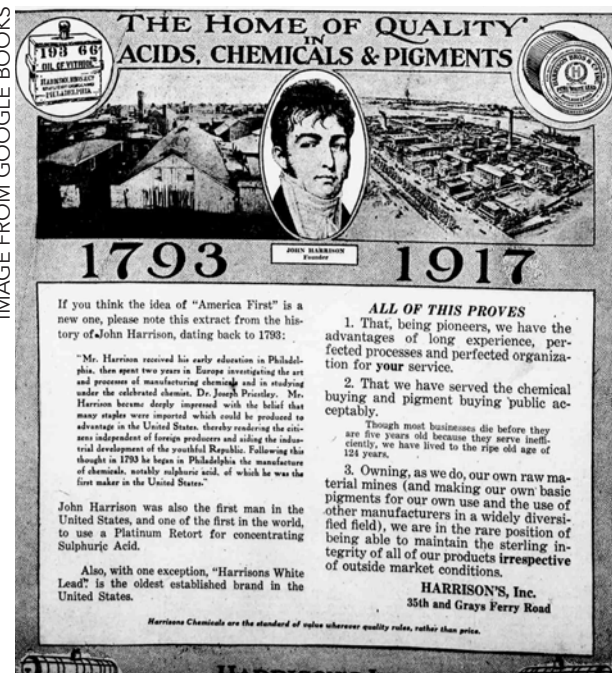
From 1865 to 1917, Harrison Brothers & Company operated an industrial chemicals and paint manufacturing company on the study site. John Harrison (1773-1833) first established his industrial chemicals business in 1793, eventually building a large factory in Kensington, north of Philadelphia. After Harrison's death, the business was left to his three sons Thomas Harrison (1805-1899), Michael Leib Harrison (1807-1881), and George Leib Harrison (1811-1885).<sup>29</sup> The brothers, along with cousin Thomas Skelton Harrison and brother John Harrison, first acquired part of the Grays Ferry site in April 1865 with the purchase of just over ten acres of land from Henry Coleman.<sup>30</sup> The parcel was located west of 35th Street, between Grays Ferry Road and the River.<sup>31</sup> Henry Coleman had acquired the land earlier that year as part of larger tract, which included an existing stone hotel building. The brothers bought more land from Henry Coleman in August of 1865 and promptly developed the property.

John Harrison was the first manufacturer of sulfuric acid (oil of vitriol) in the United States. Harrison was born to a Quaker family in Philadelphia in 1773 and he apprenticed to a druggist as a boy. As a young man, Harrison traveled to England to study chemistry under

Dr. Joseph Priestly, who is credited with discovering oxygen. Following his return to Philadelphia, Harrison established himself as a druggist and chemist. In 1793 he set up his first lead chamber to produce sulfuric acid, and he devoted the next decade to improving this process with larger lead chambers and improved methods. Harrison's success is due in large part to his use of a platinum still to concentrate the acid. This still revolutionized his business by eliminating much of the dangers of producing the acid and the cost of replacing delicate glass vessels. He first started using the still in 1814. The industrial chemical trade was a quickly growing industry, and Harrison's timing couldn't have been better. In 1810, the Secretary of the Treasury recorded that "about 200,000 pounds of oil of vitriol and acids are annually manufactured in a single establishment in Philadelphia."<sup>32</sup> Charles Lennig constructed the largest lead chambers in America in Bridesburg in 1829. After the Civil War, fertilizer and petroleum consumed more acid than ever before, and from 1872 to 1882, sulfuric acid manufacturing increased by almost 1,000 percent.<sup>33</sup> In Philadelphia, many factories and mills used sulfuric acid for treating water, pickling iron and steel and as a component in consumer products. The Philadelphia area was eventually home to 18 sulfuric acid plants.<sup>34</sup>

Harrison trained his sons, Michael Leib Harrison and Thomas Harrison, as chemists and included them in the business as Harrison & Sons. Upon his death in 1833, the company became Harrison & Brothers and in 1859, grandsons John Harrison, George Leib and

IMAGE FROM GOOGLE BOOKS



(Top) Advertisement for Harrison Brothers (with a view of the Grays Ferry manufactory), 1917. (Below) Entrance to the Harrison Brothers & Co. headquarters, 1900. The shadow of the company's telegraph wire is visible at the right of the photograph.



HARRISON BROS & CO., "THE CHEMISTRY OF PAINT," 1902, UNIV. OF PENN. SPECIAL COLL.



Thomas Skelton Harrison joined and the company to become Harrison Brothers & Company. By the Civil War the business already had branches in Maryland and New York, and it was growing. In 1865 the brothers purchased ten acres on the river in Grays Ferry. The Grays Ferry site had a wharf to dock large ships unloading freight, and the railroad lines passing along Grays Ferry Avenue. In 1867, they obtained the rights to place a private telegraph wire between the main Philadelphia factory and the New York branch office, functioning as one of the first private telegraph wires in the country "long before the idea was thought of to rent wires for private business."<sup>35</sup> As the Kensington Factory closed in 1871, more construction took place on the Grays Ferry site. By the 1870s, the property contained various buildings serving the different

chemical products: sulfuric acid, nitric acid, muriatic acid, white and red lead and paints.

#### PRODUCTS OF HARRISON BROTHERS & CO.

In addition to producing nitric acid, muriatic acid, red and white lead, the Harrisons used these chemicals to manufacture their own finished products like varnish and paint. Because of the high costs of transporting acid and other chemicals, manufacturers of acids also often made more finished products on site.<sup>36</sup> Harrison became a prominent producer of white lead after 1812, then red and litharge, crystal alum after 1840, and eventually pigments in oil and then mixed paints. Paint imports in America grew rapidly in the late 18th century until 1804, when Samuel Wetherill established the first white lead plant in the country on Broad and Chestnut Streets in Philadelphia, allowing for the production of paints in America. The paint production business shifted from the creation of dyes to pastes, and finally to ready-mixed paints.

Harrison Brothers & Company was a pioneer of the ready-mixed paint business. Ready-mixed paint production only became possible with the availability of tin cans in the 1850s. With the main ingredients of acid and lead readily available on site, and these improvements in packaging, John Harrison became a leader in the paint business. Ready-mixed paints shaped the built environment of the Victorian Age, allowing for the polychromatic paint schemes still visible in many towns and cities today. Paint

**View from Grays Ferry Avenue to the Harrison Brothers & Co. site, 1870.**



# CHEMICALS PRODUCED AND THEIR COMMON USES

Harrison Brothers & Co. was a leader in the production of various chemicals in Philadelphia, products that later contributed to their prominence in the ready-mixed paint business. Among their products were:

**White lead:** Although white lead occurs naturally as a mineral, it has been prepared as an artificial pigment since the 4th Century BC in Greece. During the 19th century, the industrial process to create the pigment was improved, which allowed Harrison Brothers (and others) to produce the pigment more quickly. White lead pigment was historically used in oil painting and as a waterproofing paint for Royal Navy vessels. It was often used to tint lead paint (and some cosmetics) because of its density, opacity, fast-drying time, and smooth texture when combined with dryable oils.

**Red lead:** When combined with iron oxide, red lead made inexpensive and durable paints that were suitable for priming and finishing--particularly for ironwork.

**Litharge and Orange mineral (Lead oxide):** Litharge was used to create red-orange pigment and helped to speed the paint-drying process.

**Iron liquor (Solution of ferrous acetate):** When used with other mordants of iron and copper, iron liquor produced dark shades of pigments and dyes.

**Ammonia:** When combined with casein (a complex protein found in milk), ammonia serves as a binding medium for paint.

"The Development and Transition of Dye Products," American Wool and Cotton Reporters (December 29, 1910): 1969; Sophie Godraind, Robyn Pender, and Bill Martin, eds., Practical Building Conservation: Metals, English Heritage (Farnham, UK: Ashgate Publishing, 2012); Gerald W.R. Ward, ed., The Grove Encyclopedia of Materials and Techniques in Art (Oxford, UK: Oxford University Press, 2008).



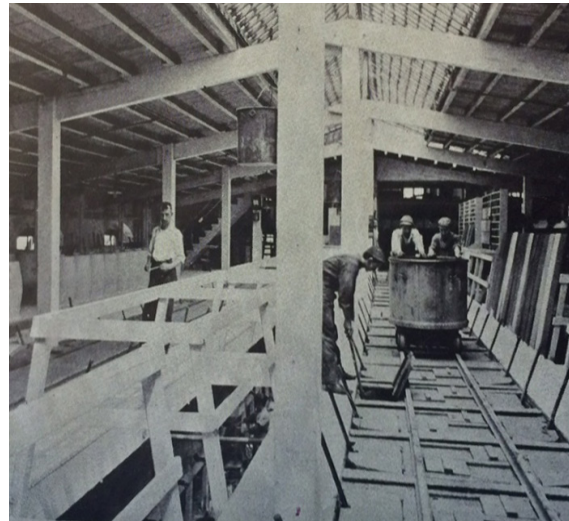
Harrison Brothers & Co., color-grinding department, 1902.

HARRISON BROS & CO., "THE CHEMISTRY OF PAINT,"  
1902, UNIV. OF PENNSYLVANIA SPECIAL COLLECTIONS





(Top left) Ready-mixed paint department at Harrison Brothers & Co., 1902; (top right) Harrison Brothers paint color card, 1871; (bottom left) Harrison Brothers trade card (undated); (bottom right) Harrison Brothers office building, 1902, reclad according to a design by architect Wilson Eyre, Jr.

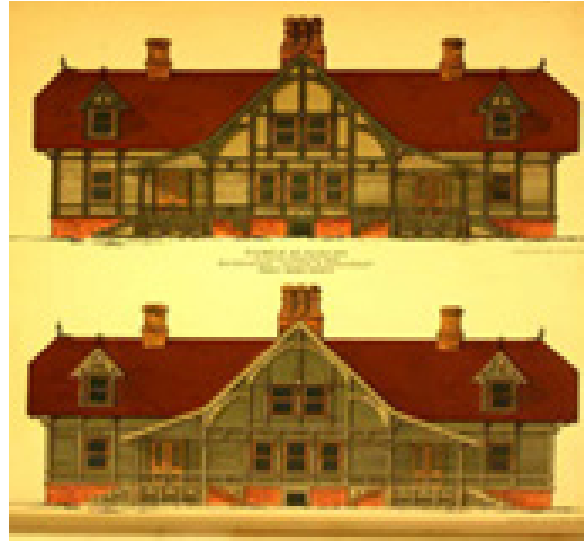


IMAGES FROM (TOP LEFT AND BOTTOM RIGHT) HARRISON BROS. & CO., "THE CHEMISTRY OF PAINT," 1902, UNIVERSITY OF PENNSYLVANIA SPECIAL COLLECTIONS; (TOP RIGHT) DUNNEEDWARDS.COM; (BOTTOM LEFT) DIGITALCOMMONWEALTH.ORG





IMAGES FROM (TOP LEFT) HARRISON BROS & CO., "THE CHEMISTRY OF PAINT," 1902; UNIV. OF PENN. SPECIAL COLLECTIONS; (TOP RIGHT AND LOWER LEFT) HARRISON BROS & CO., "TOWN AND COUNTRY HOUSE PAINTING..." , 1883; (LOWER RIGHT) COURTESY OF THE HAGLEY MUSEUM & LIBRARY



(Top left) View of Harrison Brothers & Co. facility on Grays Ferry Avenue, 1902; (top right and bottom left) Polychromatic paint scheme recommendations, published in Harrison Brothers promotional materials, 1883; (bottom right) Harrison Brothers' advertising ephemera (undated).

**Statue of John Harrison on the University of Pennsylvania campus, outside the John Harrison Laboratory of Chemistry, 2016.**



became a form of expression. Harrison Brothers produced a variety of colors and advertised them with vivid publications and advertisements. Some advertisements were books that featured pictures of houses painted in varying palettes of Harrison's Town and Country paint line. The company would sometimes hire architects to draw the houses for these publications. A year after little-known architects Hazelhurst and Huckel were hired to produce one such portfolio in 1885, they received commissions to design 14 houses, two banks, one courthouse, one hotel, an office building, parish house and Sunday school.<sup>37</sup> These advertisements served as a showcase for both architect and paint company. Harrison Brothers became one of the largest color manufacturers in the United States, with distribution through the country and 20 traveling salesmen.<sup>38</sup>

#### DEVELOPMENT OF THE SITE

As the business grew, the site at Grays Ferry developed. New factories were built or demolished as the need arose. By 1878, the site contained 14 buildings with three of them built of stone and three stories high.<sup>39</sup> In 1882, the property included ten distinct factories, manufacturing crude materials delivered to the site into finished products.<sup>40</sup> Eight leaden chambers, each 320 feet long, were used to manufacture sulfuric acid.<sup>41</sup> The site served the business well. Rail tracks traveled through the property and connected to the PW&B railroad. Docks on a deep section of the river that could allow for large ships to travel up the three miles from

the mouth of the Schuylkill and load cargo or discharge raw materials. Harrison Brothers owned mines in western and southern United States containing sulfur, aluminum ore, lead, zinc, and marium sulphate ores.<sup>42</sup> The host of volatile materials on site made the property especially vulnerable to fires. Underground tanks stored benzine and turpentine, and potassium chlorate was kept in the front yard. Early drawings of the property show an open air enclosure containing sulfur. In 1886, a fire burned down the five-story alum building and exploded a tower.<sup>43</sup> In 1916, another large fire occurred when two sulfuric acid tanks exploded.<sup>44</sup> At the time of the first fire, 29 buildings were recorded on the property.<sup>45</sup>

In 1882, the company purchased a tract of land from The University of Pennsylvania. The property was situated on the east side of 35th street, allowing for the factory to expand eastward. Isaiah V. Williamson had donated the land to the University in 1874. Williamson was a successful Philadelphia businessman who bestowed a series of properties to the University in the 1870s.<sup>46</sup> He had purchased the tract from the Dupuy family in 1847, descendants of the Swedish colonists who had farmed the land two centuries earlier.

By 1891, the facility covered 30 acres and was producing large amounts of chemicals, including 5,000 tons of white lead annually.<sup>47</sup> Philadelphia architect Wilson Eyre, Jr. designed the main office building on Grays Ferry Avenue between 1888 and 1890. Eyre is known as an architect of many shingle style country houses in

the city. He also designed University of Pennsylvania buildings such as the rotunda of the Museum of Archaeology and Anthropology. The Italianate building fronting Grays Ferry Avenue was largely an adaptation of the original, with the same footprint but introducing a new exterior shell. Fronting Grays Ferry Avenue, the building was faced in brick and stucco, with four bays of oculi on the upper story.

From 1878 to 1894, the workforce at Harrison Brothers more than doubled to employ 400 people, including 40 children.<sup>48</sup> By the turn of the century, the property was a small city unto itself, with 70 factories, two miles of railway tracks, almost a mile of water front with docks, “a central power plant, electric light and power station, water works with five miles of high pressure mains, a private firefighting department, machine shop, carpenter shop, cooperage, supply store, private restaurant.”<sup>49</sup> The factory hosted a summer school course for university students and an athletic field and a tennis court provided recreation grounds for the factory workers. The paint production facility boasted of its clients, with buildings throughout the country painted with Harrison Paint, including educational buildings at Yale and Harvard, the public library in Boston, and the Congressional Library in Washington, DC.<sup>50</sup> Thomas and M. Lieb Harrison retired in 1877, and the firm was incorporated as Harrison Brothers & Company, Inc., on March 2, 1898.

The John Harrison Laboratory of Chemistry was founded at the University of Pennsylvania in 1894. The

laboratory was donated by Charles Custis Harrison, grandson of John and University of Pennsylvania provost from 1894 to 1910. A statue of John Harrison still stands on the University campus today.

### INDUSTRY ON THE SCHUYLKILL

The establishment and growth of the study site coincides with the industrial development of Philadelphia as a whole. From the mid-19th century, the city became a leader in America: one of the world leaders in sugar refining, a textile productions hub, and with enclaves specializing in leather production, liquors and malt, tobacco, cooking and heating stoves, carriage building, automotive industry, steam rail, and shipbuilding.<sup>51</sup> With canals stretching inland from the 1820s and railroads built beginning in the 1830s, Philadelphia shifted its focus away from foreign sea trade and became connected to a wider regional economy to its west.<sup>52</sup> From 1830 to 1860, the city boomed, its population expanding from 161,000 people to more than 560,000.<sup>53</sup> Philadelphia developed into a dense grid of housing, with manufacturing lining both riverfronts.<sup>54</sup> Pockets on the Delaware and Schuylkill river served as specialized industrial ecosystems: the north shore of the Delaware River contained districts for leather and wool and for machinery and textile manufacturing; the south shore of the Delaware housed garments and sweatshops; the Schuylkill Riverfront on Market Street was a center for furniture, woodworking and packing houses, and the northwest shore was the setting of the new

**Industries along the Lower Schuylkill, 1895.**





## 34TH STREET/UNIVERSITY AVENUE BRIDGE

IMAGE FROM THE HISTORIC AMERICAN BUILDING SURVEY



**View of the 34th Street Bridge, looking southeast, 1998.**

Spanning the Schuylkill River northeast of the Pennovation Works campus, the 34th Street Bridge was designed in 1927 by consulting architect Paul Philippe Cret and engineered by City of Philadelphia engineers John Vogelsson and Steven Noyes. It was constructed between 1927 and 1933 (before, during, and after the 1929 Stock Market Crash), a late landmark to the City Beautiful Movement in Philadelphia. The bridge is one of few moveable bridges in Philadelphia (and the northernmost operable drawbridge today), with a double-leaf simple-trunnion bascule bridge design that allows shipping traffic to pass on the Schuylkill River. From its earliest design, the bridge was seen as a gateway to the University of Pennsylvania; as such, it has alternately been named the 34th Street Bridge, the University Bridge, and the University Avenue Bridge. Paul Philippe Cret, a nationally-renowned architect in the early 20th century, taught a design studio in the University of Pennsylvania's Department of Architecture from 1903 to 1937. His design for the bridge employs the stripped-down classicism that was characteristic of his portfolio. A chevron motif repeats throughout the structure in carved friezes and moldings, bronze doors and railings, and other features. The original railings also included chevrons, but they were replaced with an aluminum railing when the bridge was renovated in 1984.

Although the bridge was under construction for six years and eventually completed in 1933, no funding or planning was approved during that time to connect the bridge to the surrounding streets. As a result, it carried no car traffic for its first four years, but was kept in the closed position at all times. Thus, the bridge required two operators on duty around the clock to open the bridge for passing boats.

Helen Ross, "University Avenue Bridge," Written Historian and Descriptive Data, Historic American Engineering Record, National Park Service, U.S. Department of the Interior, 1998 (revised and expanded by Justin M. Spivey, 2001). From Prints and Photographs Division, Library of Congress (HAER No. PA-503).

railroad yards and a metalworking district.<sup>55</sup> When Harrison Brothers & Company purchased the study site in 1865, the area already hosted several industrial chemical manufacturers.

In the late 19th century, the study site was part of an industrial ecosystem. Grays Ferry Avenue contained chemical factories, a slaughterhouse, tar roofer, and a tin factory.<sup>56</sup> These factories were interconnected through similar chemical processes and products, and likely through a similarly skilled labor force. Henry Bower was the first manufacturer in the area, establishing a small chemical plant on the riverfront near Grays Ferry Avenue in 1858.<sup>57</sup> Bower was the first to produce pure inodorous glycerine. His plant manufactured ammonium sulfate from waste produced by the Philadelphia Gas Works at Market Street. Bower also produced potassium ferrocyanide, a chemical process that uses animal matter of hooves and horns, which would have most likely been sourced from the nearby Grays Ferry Abbatoir.<sup>58</sup> Potassium ferrocyanide was used in the production of "Prussian blue" pigments, a product that would undoubtedly have piqued the interest of nearby paint factory Harrison Brothers.<sup>59</sup> The pocket around Grays Ferry Avenue featured other businesses that also have been interwoven with the production of sulfuric acid, nitric acid, iron sulfate, white lead, and alum manufactured at Harrison Brothers. Grays Ferry Printing Ink Works, built from 1872 on 33rd Street, probably benefited from the nearby abundance of sulfuric acid, a principal ingredient in printing inks, or nitric acid, an

ingredient for coloring leather on books and etching brass plates. Ehret Jr Tar Works was established from 1860 just south of Grays Ferry Bridge, with major improvements to the factory in 1888.<sup>60</sup> In 1887, Henry Bower's business expanded to become the Ammonia Company of Philadelphia, producing tin and chlorine. In 1883, Bower partnered with Thomas Harrison of Harrison Brothers and salt manufacturer Henry Pemberton to establish the nearby Kalion Chemical Company to manufacture bichromate of potash, a product used in the tanning and textile industries.

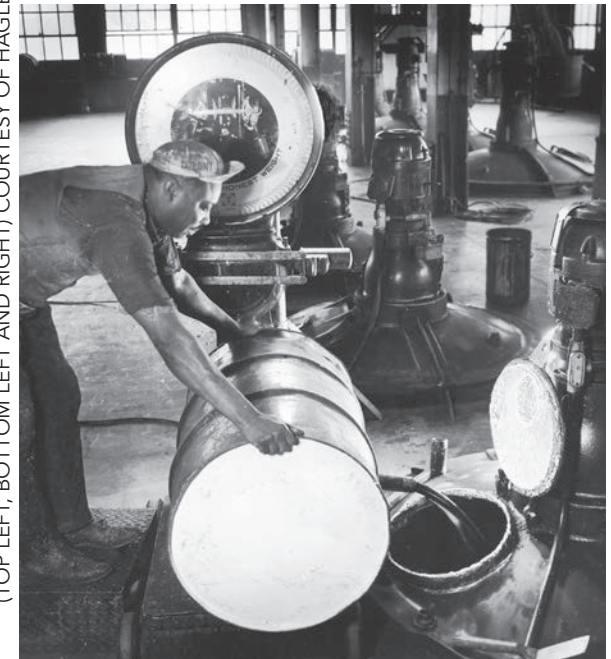
From the mid-19th century to early 20th century, the east bank of the Schuylkill featured several distinct business districts. A cluster of stone merchants was positioned on the riverfront just south of the Market Street Bridge, with businesses such as Sartori and Son Marble Merchants, Sam Prince Marble and Soap Stone, Freedley and Sons Marble Yard, and Italian Marble.<sup>61</sup> South of these wharfs, near Spruce Street, business shifted towards ice and coal houses, with companies such as Cold Spring Ice and Coal Yard, Knickerbocker Ice and Coal Yard, and Penn Ice and Coal Company in 1875, and Black Diamond Coal, Standard Ice Manufacturing Company and Donaghy & Sons by 1910.<sup>62</sup> South of these yards, the Schuylkill riverfront housed wood and coal yards.<sup>63</sup> The US Naval Asylum and US Arsenal occupied a stretch of the riverfront below the coal yards, and the industrial chemical companies were positioned at the bend in the river further south.<sup>64</sup>

Duco paint card, ca. 1925.





(Top left) Straining operation at DuPont, ca. 1935; (top right) Duco paint advertisement, 1925; (bottom left) View of Marshall Laboratories, 1950s; (bottom right) Loading and shading operation, ca. 1935



(TOP LEFT, BOTTOM LEFT AND RIGHT) COURTESY OF HAGLEY MUSEUM & LIBRARY; (TOP RIGHT) IMAGE FROM PERIODPAPER.COM





AERO SERVICE CORPORATION. [ALLIED CHEMICAL & DYE CORPORATION PLANT], 1940. MODERN REPRODUCTION FROM ORIGINAL NEGATIVE. GIFT OF VIRGIL KAUFFMAN. ALLIED CHEMICAL & DYE CORPORATION PLANT], 1940, LIBRARY COMPANY OF PHILADELPHIA.

**Aerial view of the DuPont facility on Grays Ferry Avenue (center, between Grays Ferry bridge (left) and 34th Street Bridge (right), 1940.**

**View of the Pennovation Center, looking west, 2016.**



### A DUPONT LABORATORY

In 1917, the E.I. du Pont de Nemours & Company (DuPont) acquired Harrison Brothers & Company, Inc. and all of its property, including pyrite mines in Virginia and the central Grays Ferry site.<sup>65</sup> This transfer was part of a series of DuPont acquisitions during the first decades of the 20th century. After almost solely focusing on explosives for centuries, the company transformed to become a diversified chemical firm focusing on “products of peace.”<sup>66</sup> From 1902, DuPont moved to acquire well-established companies that used the nitrocellulose compounds shared with explosives.<sup>67</sup> In this way, the company entered into a series of new businesses, including paints and lacquers, textile coatings, photographic film, and plastics.<sup>68</sup> In 1903, a headquarters for development was established in Wilmington, Delaware and ten manufacturing departments were created to lead the ten new fields. The Philadelphia site was part of the new Fabrics and Finishes Department, tasked to research and manufacture protective and decorative finishes and coatings.

As a division of DuPont, the Grays Ferry site operated as a paint and finishes manufacturer and a research lab. Successful products developed on site include Duco lacquer, a quick drying glossy paint that was durable. Duco revolutionized auto production, allowing for cars to roll off of the assembly line much more quickly.<sup>69</sup> Cars could also be painted in vibrant colors. The lacquer was discovered when chemists who were working on improving movie film left the

thick nitrocellulose compound out over the weekend and returned to find a liquid that was remarkably better at holding pigment.<sup>70</sup> The company’s Dulux Enamel was another successful coating produced at Grays Ferry. Dulux Enamel took longer to dry but it was cheaper and more durable, making it an ideal coating for industrial vehicles, as well as other products such as refrigerators, washing machines and transcontinental passenger trains.<sup>71</sup> From 1925, these products were part of DuPont’s line of automotive finishes.<sup>72</sup> The Grays Ferry factory remained the company’s principal center of paint research. In 1927, the Grays Ferry site had 1164 employees and was the 40th largest industrial firm in Philadelphia.<sup>73</sup>

The John Marshall Laboratory (Building 227) opened in 1950, marking a shift towards more research on site and a decline in the manufacturing arm. The building cost \$2 million and was built to consolidate laboratory facilities on site.<sup>74</sup> The lab was named after chemist John Marshall, who died in 1949. At the time of his death Marshall was serving as director of DuPont’s Fabrics and Finishes division in Wilmington. From 1927 to 1933, he had been director of the paint research laboratory in Philadelphia, where he oversaw the refinement of Dulux Enamel. In the second half of the 20th century, the Marshall Lab was incredibly productive, churning out many patents, processes, and products. Products developed here include Teflon non-stick cookware, which was discovered at the DuPont Jackson labs but refined in the test kitchens in Philadelphia. Over the following decades, research





IMAGE FROM PENNOVATION CENTER,  
UNIVERSITY OF PENNSYLVANIA

**Pennovation Center, 2016.**

at the Marshall Laboratory shifted from consumer products to industrial coatings.

Marshall Laboratory employed celebrated chemists, including a series of DuPont departmental fellows. Ying K. Lee was the first departmental fellow, and winner of the DuPont Lavoisier medal in 2000. Lee was the inventor of Lucite dispersion lacquer for automotive finishes, and served as the scientific ambassador to China. From 1987 to 2008, the company hosted the DuPont-Marshall Laboratory Lecture Series at the University of Pennsylvania Department of Chemistry. Past speakers in the annual lecture series (now renamed the Axalta series) include Nobel Prize winners Steven Chu and Roald Hoffman.

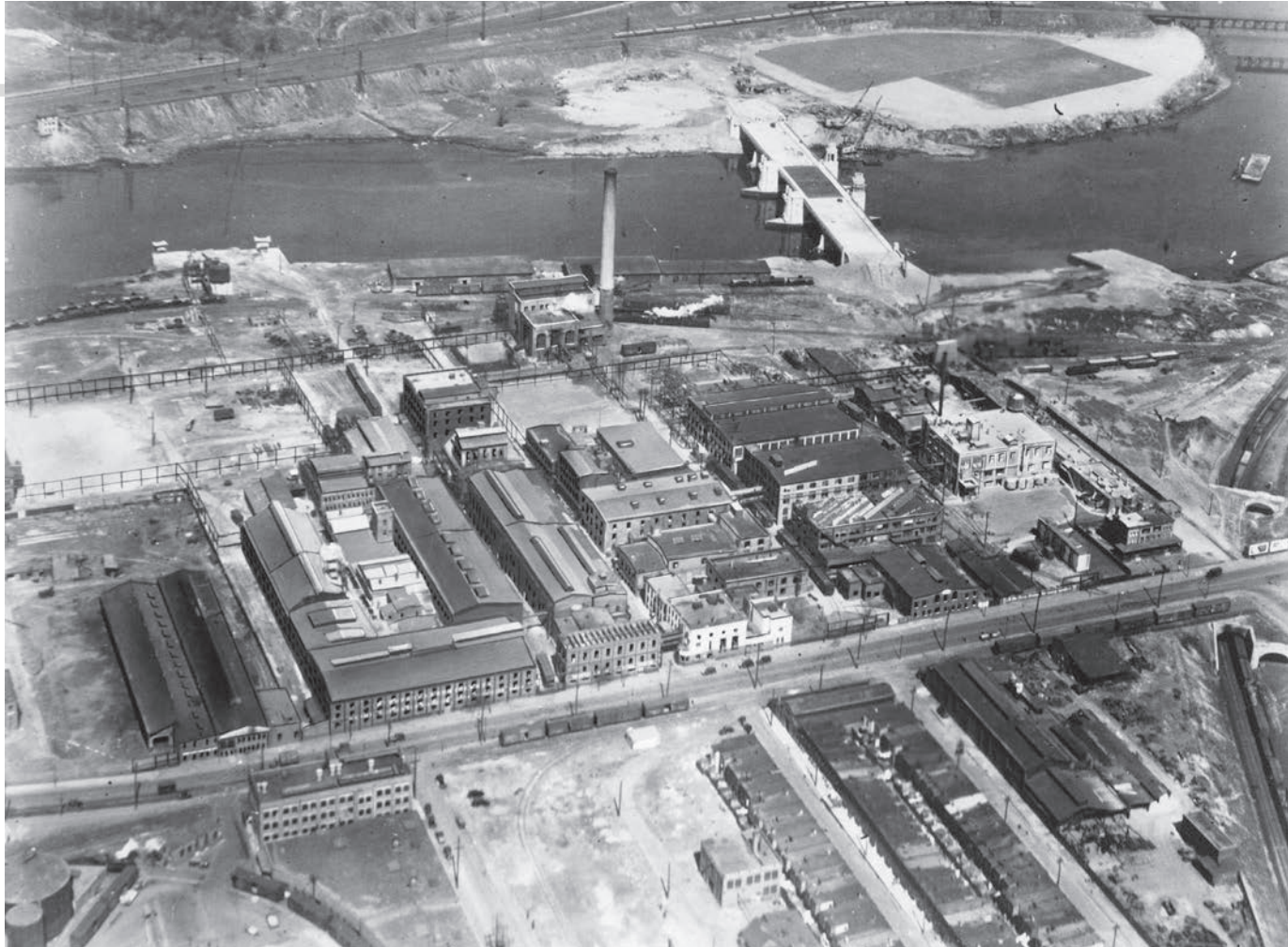
## CONCLUSION

With the deindustrialization of Philadelphia, manufacturing on the study site also declined. Consumer paint production on site ceased in 1979,

and in 1982 the Finishes and Fabricated Products Department's Manufacturing Division closed. In 1983 almost all of the 19th century buildings on the site were demolished, and staff was reduced to 400 people.<sup>75</sup> For the next 25 years, the site was used for research.

In 2004, 6.8 acres of riverfront property was transferred to the City of Philadelphia as the Grays Ferry Crescent Park. Not long after, in 2009, DuPont closed the remaining laboratories and transferred the staff to the main Experimental Station in Wilmington. The University of Pennsylvania purchased the property in 2010. Today, the property serves as the University's research campus, with light industrial and shared working spaces for researchers and entrepreneurs. Of the forty buildings on the property, 12 are over 50 years old. Of those 12, three have been identified as having adaptive reuse potential: the Marshall Laboratory building, an office building, and a manufacturing building. The manufacturing building, formerly a Color Shop originally constructed in 1932, was redeveloped in 2016 as the Pennovation Center.

(LEFT) IMAGE FROM HAGLEY MUSEUM & LIBRARY; (RIGHT) IMAGE FROM  
GOOGLE MAPS, 2016 DATA



**Comparative view of the Pennovation Works site in the 1930s (left) and 2016 (right).**

#### **AREAS FOR FURTHER RESEARCH**

Over the course of our research, stakeholder meetings, and presentations, some additional themes and research questions emerged, but could not be fully addressed within the timeframe of this project. They present opportunities for supplemental investigation and interpretation in a future phase of this work.

- John Harrison's research relationship with Joseph Priestley (discoverer of oxygen), with whom he studied chemistry in England
- History of paint marketing, particularly with respect to the promotion of health and hygiene through modern paint products. (This also relates to the history of lead-based paint and public health.)
- History of color and chemistry research
- Post-World War I history of synthetic paint production (as Americans acquired German production secrets



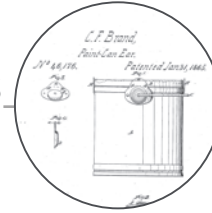


in the aftermath of the war)

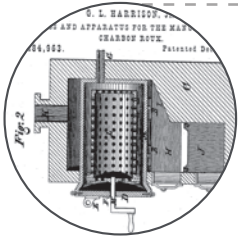
- The redevelopment and reuse of formerly industrial sites in post-industrial cities
- Rise of research institutions (including the University of Pennsylvania) as drivers of urban redevelopment in the mid- and late-twentieth century

## A Selection of Patents Secured on Behalf of Harrison Brothers and DuPont (Phila.)

**1865** IMPROVEMENT IN EARS FOR PAINT-CANS  
Charles F. Brand



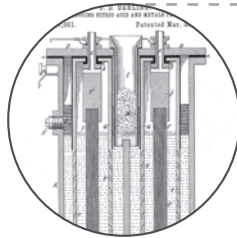
**1876** IMPROVEMENT  
IN PROCESSES  
AND APPARATUS  
FOR THE  
MANUFACTURE OF  
CHARBON-ROUX  
George L. Harrison, Jr.



**1876** IMPROVEMENT IN METAL CANS  
George L. Harrison, Jr.

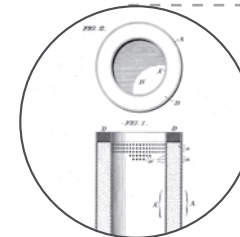
**1885** MANUFACTURE OF CRYSTAL ALUM  
Henry C. Freist

**1894** METHOD OF AND APPARATUS FOR MANUFACTURING  
SULFURIC ACID AND BY-PRODUCTS  
James D. Darling



**1895** PROCESS  
Henry C. Freist

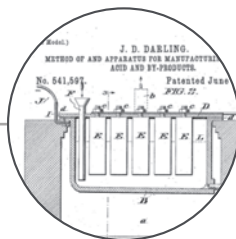
POROUS DIAPHRAGM FOR  
ELECTROLYTIC APPARATUS  
James D. Darling





SS OF UTILIZING NITER-CAKE OR OTHER ACID SULFATES

C. Freist



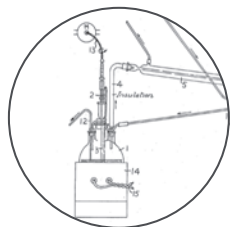
FOR 1897

TUS  
ling

**1899** IMPROVEMENTS IN ZINC ELECTRODES  
James D. Darling



PROCESS OF MUFFLING LITHOPONE **1924**  
AND APPARATUS  
Herman G. Schanche



RESINOUS COMPOSITION AND METHOD OF PREPARING SAME **1940**  
Donald Edwards Edgar and Paul Robinson

**1934** SYNTHETIC RESIN  
John W. Iliff/Paul Robinson

A reimagined and repurposed industrial building at the Wake Forest Innovation Quarter.



IMAGE COURTESY OF WAKE FOREST  
BAPTIST MEDICAL CENTER

## Part 2: Case Studies

Research also included the investigation of case studies and best practices from repurposed industrial sites around the country. Case study sites were selected for their shared characteristics with the history and/or current use of the Pennovation Works campus as a research and development hub. A selection of case studies is presented on the following pages, organized by the degree to which these sites interpret their history to their current users and public audiences, from in-depth interpretation to moderate interpretation, to minimal interpretation, and finally, sites with no interpretive elements or programming. Interpretive elements include some combination of the following:

- On-site passive interpretation (galleries, exhibits, or other installations that do not require staffing)

- In situ interpretive signage
- On-site active interpretation (tours and other programming that require staffing and/or volunteers)
- Artistic interpretation
- Integrity/Architectural interventions (renovations or rehabilitation of the site's historic fabric)
- Design features/references to history (in branding, wayfinding elements, environmental graphics, etc.)
- Online interpretation

The selected case study sites span the country from Brooklyn to San Francisco. Additional case studies from other universities and institutions are presented in the Appendix.





IMAGES FROM (TOP LEFT) AMERICAN TOBACCO CAMPUS.COM; (TOP RIGHT) INNOVATIONQUARTER.COM; (BOTTOM LEFT) UCSF MEDICAL CENTER ART COLLECTION; (BOTTOM RIGHT) BROOKLYNNAVYARD.ORG



Interpretive methods at comparable sites include: (top left) the integration of iconic architectural features (e.g. Lucky Strike silo) into the site design of the American Tobacco Campus in Durham, NC; (top right) special programs on the plaza at the center of the Wake Forest Innovation Quarter; (bottom left) public art program throughout the campus of the University of California-San Francisco Medical Center at Mission Bay (this piece by Jim Isermann); (bottom right) Bike tours at the Brooklyn Navy Yard

## Brooklyn Navy Yard (Brooklyn, New York)



IMAGE FROM ARCHDAILY

IMAGE FROM BROOKLYNNAVYARD.ORG



<b>Developer</b>	Brooklyn Navy Yard Development Corporation
<b>Closed</b>	1966 (federal government); 1979 (private shipbuilding)
<b>Redeveloped</b>	Late 1990s/Early 2000s
<b>Acreage</b>	300 acres
<b>Website</b>	<a href="http://brooklynnavyyard.org">brooklynnavyyard.org</a> <a href="http://bldg92.org/about">bldg92.org/about</a>
<b>Designations</b>	Brooklyn Navy Yard, National Register; Quarters A, National Historic Landmark; Dry Dock #1, Navy Yard Hospital Building (R95), Commandant's House/ Quarters A, and Surgeon's Residence (R1), NYC Landmarks; Admiral's Row, eligible for inclusion on National Register

**HISTORY** The Brooklyn Navy Yard, located in New York City along the East River in Wallabout Basin, was one of the most active and innovative military shipbuilding facilities in the United States. During the Revolutionary War, the site was the anchorage of the notorious British prison ships, on which an estimated 11,000 American patriots and other prisoners died under horrific conditions. Commissioned by the U.S. Navy in 1801, the Yard was in continuous operation until 1966, playing a crucial role in American naval, industrial, and cultural history, re-inventing itself time and again in response to the military, economic, technological, and social forces affecting the nation as a whole. The Brooklyn Navy Yard was once one of the nation's most storied naval shipbuilding facilities that for over 150 years built and launched America's most famous fighting ships, including the USS Maine, USS Arizona, and USS Missouri. The Yard also served as an important point of passage, home, and workplace for countless veterans as they served our country. Through its public programming, the Yard continues to honor and preserve this rich history.

**ABOUT** The Brooklyn Navy Yard (the Yard) is now home to over 330 businesses employing more than 7,000 people and generating over \$2B per year in economic impact for the City. Building on the Yard's history as the economic heart of Brooklyn, the 300-acre, waterfront asset offers a critical pathway to the middle class for many New Yorkers. The Brooklyn Navy Yard Development Corporation (BNYDC) is the not-for-profit corporation that serves as the real estate developer and property manager of the Yard on behalf of its owner, the City of New York. Industrial users are BNYDC's highest priority.

**TENANTS/USES** include 25 WA Associates, LLC (movie studio); Abby Lichtman Design LLC (textile design



studio); Accurate Knitting Corp. (sweater manufacturing); Active Fire Sprinkler NYC, LLC; etc. New Lab, a multidisciplinary design and technology center, builds on the history of innovation at the site.

**OPEN TO PUBLIC** Building 92 (former Marine Commandant's residence)

**ON-SITE PASSIVE INTERPRETATION** Gallery 92 [in BLDG 92] (Making It in NYC, Reflections on Rosie [the Riveter]); tours; special exhibits (Weaving to Heal, Here + There, Porthole to Freedom, These Hands Built, Wesley Fagan: A Life in Pictures); mural, with new proposals on annual basis; linked with smartphone/GPS tracking app); Today's Yard gallery (video gallery in 1st floor east gallery; showcases 15 businesses in the Yard)

**IN SITU INTERPRETIVE SIGNAGE** Unknown

**ON-SITE ACTIVE INTERPRETATION** The Classic; bike tours; bus tours; factory tours; WWII tour; seasonal photography tours; inside industry tours; sustainable architecture and industry tour; urban ecology tours; school group tours; tools and talent workshops

**ARTISTIC INTERPRETATION** Visiting Artist program

**PROGRAMMING/EVENTS** Lecture/public program series

**MASTER PLAN/DESIGN GUIDELINES?** Brooklyn Waterfront Greenway: "The aesthetic character of the Working Industrial Waterfront segments of the Greenway should be functional and utilitarian, with an industrial style. Elements taken directly from surrounding sites, such as nautical elements, machine parts, and/or train architecture, can reference the historic industrial character. Historic design may be warranted when the Greenway passes areas with historic structures."

**INTEGRITY/ARCHITECTURAL INTERVENTIONS** BLDG 92 (former Marine Commandant's residence) adaptively reused with a four-story modern extension (the entire site is LEED-Platinum). Design by Beyer Blinder Belle. Adaptive reuse of historic structures AND public access and education are highlighted as two of the priorities of the Navy Yard's sustainability plan. Additional architectural services by workshop apd.

**DESIGN FEATURES/REFERENCES TO HISTORY** Signage slogan: "We used to launch ships. Now we launch businesses." Blue (like water) used throughout site, e.g. fence piers, graphics, etc. Bench design incorporates wood, steel, and rivets. Additional photos of design features and historical references here. Environmental graphic design partially done by Russell Design: "A bold signage and wayfinding program designed for the scale of semi-trailers that spans throughout a 300 acre decommissioned Naval Yard turned industrial park in the heart of Brooklyn, with buildings and architectural styles ranging from the Revolutionary War to modern state of the art LEED contemporary structures."

**ONLINE INTERPRETATION** Timeline (narrative only; no images); school curricula; BNY Collections

**EVENT RENTALS AVAILABLE?** Yes

**Environmental graphics throughout the industrial park employ a color palette and logo that reference the history of the site as a navy yard.**



IMAGE FROM BROOKLYNNAVY YARD.ORG

## Richardson Olmsted Complex (Buffalo, New York)



IMAGES FROM RICHARDSON-OLMSTED.COM



**HISTORY** The Richardson Olmsted complex was constructed beginning in 1872 and opened in 1880 as the Buffalo State Asylum for the Insane. The building was designed by nationally-renowned architect Henry Hobson Richardson (creator of the Richardsonian Romanesque architectural style), with the surrounding landscape designed by Frederick Law Olmsted (landscape architect of Central Park). The facility adhered to the state-of-the-art psychiatric principles promoted by Dr. Thomas Story Kirkbride, superintendent of the Pennsylvania Hospital for the Insane in Philadelphia and a founder of the Association of Medical Superintendents of American Institutions for the Insane (AMSII), a predecessor of the American Psychiatric Association. Over the years, mental health treatment changed, as did the buildings and grounds. In 1927, the site was reduced by half to develop Buffalo State College. Patients were moved to a new facility in the 1970s, and the Richardson Olmsted Complex began to deteriorate. It eventually was abandoned. In 1973, the Complex was placed on the National Register of Historic Places, and, in 1986, it was named a National Historic Landmark. In 2006, then-Governor George Pataki identified a state appropriation and appointed the Richardson Center Corporation Board of Directors to save the complex.

**ABOUT** Today, the Richardson Olmsted Complex is being brought back to life by the Richardson Center Corporation. The first phase of renewal consists of development of the site as a hotel and conference center intertwined with an architecture center in a third of the building space, which is on track to be completed in 2016.

**TENANTS/USES** include Hotel Henry, Urban Resort Conference Center; Buffalo Architecture Center; potential additional tenants: SUNY-Buffalo State and other compatible not-for-profit and arts/cultural uses

**Developer** Richardson Center Corporation

**Closed** 1927 (site reduced by half);  
Closed beginning in the 1970s

**Redeveloped** 2006+ (ongoing)

**Acreage** 93 acres

**Website** richardson-olmsted.com  
hotelhenry.com  
buffaloarchitecturecenter.  
wordpress.com

**Designations** National Historic Landmark



**OPEN TO PUBLIC** South Lawn and grounds

**ON-SITE PASSIVE INTERPRETATION** Audio tours of South Lawn (available via smartphone)

**IN SITU INTERPRETIVE SIGNAGE** None currently (under construction)

**ON-SITE ACTIVE INTERPRETATION** Public tours (April-September) include landscape tours, in-depth tours, construction tours, photography, and welcome tours. Private and student tours are also offered.

**ARTISTIC INTERPRETATION** Call for local artists – soliciting prints from local artists for Hotel Henry (under construction). No known initiatives at this time for the broader complex or landscape.

**PROGRAMMING/EVENTS** None currently (under construction)

**MASTER PLAN/DESIGN GUIDELINES?** Reports include Master Plan (2009); Historic Structures Report (2008); Cultural Landscape Report (2008); Environmental Impact Statement (2011); South Lawn Site Plan; South Lawn Site Design Planning; Buffalo Architecture Center Institutional, Operational, and Pre-Development Planning Report (2011)

**INTEGRITY/ARCHITECTURAL INTERVENTIONS** Restoration of the Towers Building and its two flanking structures as a hotel/conference center and architecture museum. Rehabilitation/re-greening of the South Lawn (designed by Frederick Law Olmsted and Calvert Vaux).

**DESIGN FEATURES/REFERENCES TO HISTORY** Towers building incorporated into branding

**ONLINE INTERPRETATION** Narrative history and historic images; The Richardson Olmsted Complex (video)

**ASSOCIATED RESEARCH/ARCHIVES AVAILABLE** When construction is complete, complex will host the Buffalo Architectural Center.

**EVENT RENTALS AVAILABLE?** Yes, once the Hotel Henry Urban Resort and Buffalo Architectural Center open in late 2017.

IMAGE FROM RICHARDSON-OLMSTED.COM



The project's logo, employed both on-site (below) and online, features a stylized silhouette of the building's prominent towers.

## Wake Forest Innovation Quarter (Winston-Salem, NC)



IMAGES FROM INNOVATIONQUARTER.COM



<b>Historic name</b>	R.J. Reynolds Tobacco Company/Piedmont Triad Research Park
<b>Developer</b>	Wake Forest Baptist Medical Center/Wake Forest University/Wexford Science and Technology
<b>Closed</b>	1986+
<b>Redeveloped</b>	1994+ (ongoing)
<b>Acreage</b>	200 acres
<b>Website</b>	innovationquarter.com
<b>Designations</b>	National Register Historic District (Downtown Winston-Salem Tobacco District); Forsyth County Local Historic Landmarks (selected buildings)

**HISTORY** The 1913 introduction of Camel cigarettes launched Forsyth County as the wealthiest county in North Carolina, and is what drove Reynolds into being one of the largest manufacturing facilities in Winston-Salem. The complex was part of the company's initial expansion phase. Together with its storage and production structures, it is arguably the most complete production facility remaining from the hundreds of buildings that encompassed the eastern section of downtown.

**ABOUT** Home to more than 60 companies, 4 leading academic institutions, more than 3,100 workers and over 6,000 students, the Innovation Quarter is a place for research, business and education in biomedical science, information technology, clinical services and advanced materials. The Innovation Quarter currently comprises nearly 3 million square feet of inspirational office, laboratory and educational space on its 145 developable acres. In addition, there are more than 775 apartments, lofts and condominiums within or close by the Innovation Quarter.

**TENANTS/USES** include Center for Design Innovation; Forsyth Technical Community College; Wake Forest University School of Medicine; Winston-Salem State University; 97 Display; The Amnion Foundation; Wexford Science & Technology, etc.

**OPEN TO PUBLIC** Most special and interpretive events are open to the public. The campus grounds are generally open to the public; a recent master plan established the principle of reconnecting the Innovation Quarter to its surrounding neighborhoods.

**ON-SITE PASSIVE INTERPRETATION** "Making Sense of the Factory," presented by New Winston Museum,



Reynolda House, Triad Cultural Arts, and Wake Forest Innovation Quarter, comprises four events throughout 2016—all free and open to the public. The first event was a lecture and a sensory exhibit (based on oral histories) at Biotech Place in May 2016. Other events in the series will explore themes such as the history of tobacco marketing and advertising, labor relations, and civil rights in the tobacco era.

**IN SITU INTERPRETIVE SIGNAGE** It does not appear so

**ON-SITE ACTIVE INTERPRETATION** Active interpretation seems to focus more on special, occasional events than regular tours, etc. Special interpretive events open to the public/Quarter tenants include:

- “Making Sense of the Factory” program series includes lectures (see On-Site Passive Interpretation, above);
- “Remembering the Neighborhood: Life in the Former Tobacco District” (November 2015), which included a panel discussion with former residents and workers, an interactive mapping project of the area, and story collection exercises;
- “Innovation and Cinema,” an annual film series that explores the relationship between innovation and the world. Representatives from various business, departments, and institutions associated with the Innovation Quarter are creatively paired with a film that reflects their current work.

**ARTISTIC INTERPRETATION** On Site/In Sight pop up dance performance (May 2016), part of a three-day dance festival that included site-specific works throughout downtown Winston-Salem.

Programming/events: Occasional/special events include yoga, Juneteenth Festival, Innovation & Cinema, concerts, Halloween parties, etc. Regular networking events include Network Night, Lunch & Learn, and speaker events with various tenants.

**MASTER PLAN/DESIGN GUIDELINES?** District does have a Master Plan, but it does not seem to be available online. Properties utilizing federal rehabilitation tax credits must adhere to federal design standards for historic properties.

**INTEGRITY/ARCHITECTURAL INTERVENTIONS** Site features a blend of adaptive reuse (e.g. Wake Forest Biotech Place) and new construction. Wake Forest Biotech Place and other buildings being adaptively reused utilizing federal rehabilitation tax credits comply with the Secretary of the Interior’s Standards for Rehabilitation.

**DESIGN FEATURES/REFERENCES TO HISTORY** Historic R.J. Reynolds smokestacks incorporated into site design as significant features; Bailey Park pavilion, etc. use designs and materials compatible to the historic architecture of the complex. Branding/logo for innovation quarter references scientific/medical innovations and history of site.

**ONLINE INTERPRETATION** Online timeline focuses on Innovation Quarter history only; no R.J. Reynolds history

**ASSOCIATED RESEARCH/ARCHIVES AVAILABLE** No

**EVENT RENTALS AVAILABLE?** Yes

**Passive interpretation on-site has included various pop-up galleries and exhibits for campus tenants and the public.**



## Bell Works/Bell Labs (Holmdel, New Jersey)



IMAGE FROM ARCHITECT MAGAZINE (MAY 23, 2016)

IMAGE FROM INSTAGRAM USER @SARAHMEYOHAS



**HISTORY** The Bell Labs Holmdel Complex functioned for 44 years as a research and development facility, initially for the Bell System. The centerpiece of the campus is an Eero Saarinen structure and served as the home to over 6,000 engineers and researchers. The modernist building, dubbed “The Biggest Mirror Ever” at the time of construction by Architectural Forum, due to its mirror box exterior, was the site of at least one Nobel Prize discovery, the laser cooling work of Steven Chu. Additional innovations created under the Bell Telephone Laboratories include the work of Karl Guthe Jansky, who invented radio astronomy at the site. The building is located in a 472-acre site, which includes a 134-acre landscape designed by Sasaki, Walker and Associates.

**ABOUT** Mixed-use plan includes: converting the building to a mixed-use facility with restaurants, retail shops, a hotel/conference center, health club, and daycare center; office space for multiple tenants in the range of 1,500 to 300,000 square feet; incorporating a 20,000 square foot public library for the Town of Holmdel; and adding a residential element that will include 40 single-family homes and 185 age-restricted townhomes around the perimeter of the landscape.

**TENANTS/USES** include iCIMS; Booskerdoo Coffee; WorkWave; Spirent; Symbolic IO; MetTel; etherFax; Springboard Public Relations; McCann Systems; NVIDIA, etc.

**OPEN TO PUBLIC** Lobby/atrium; building tours available on request

**ON-SITE PASSIVE INTERPRETATION** None currently (restoration in progress)

**IN SITU INTERPRETIVE SIGNAGE** Not currently (renovation in progress)

**Developer** Somerset Development  
**Closed** 2007  
**Redeveloped** 2013+ (ongoing)  
**Acreage** 472 acres (2 million ft<sup>2</sup> building)  
**Website** <http://bell.works/>  
**Designations** National Register nomination pending (July 2016)



**ON-SITE ACTIVE INTERPRETATION** Tours available on request; Building S.T.E.A.M. (Science, Technology, Education, Arts, and Math) Maker Festival 2016 (May 2016) (convened by outside organizers) “brought together the maker community, schools and industry to illustrate innovation, creativity and invention as we strive to provide a hands-on immersive environment of learning and exploration.”

**ARTISTIC INTERPRETATION** 10,000 Roses art performance piece (August 2016); atrium floor replaced with Josef Albers art installation

**PROGRAMMING/EVENTS** Building S.T.E.A.M. Maker Festival 2016 (May 2016); occasional speaker/event series hosted by various building tenants;

**MASTER PLAN/DESIGN GUIDELINES?** Designs for the main building and its immediate landscape adhere to the Secretary of the Interior’s Standards for Rehabilitation (the project includes funding from Federal Historic Rehabilitation Tax Credits).

**INTEGRITY/ARCHITECTURAL INTERVENTIONS** Slate atrium floor replaced with Josef Albers art installation (Albers frequently collaborated with architects, although there is no evidence he was involved in Saarinen’s design for Bell Labs); Toll Brothers constructing 40 single-family homes and 185 townhomes on portion of site not considered significant to the historic landscape design

**DESIGN FEATURES/REFERENCES TO HISTORY** Restoration per Secretary of the Interior’s Standards for rehabilitation; Bell Works intends to create a “small Bell Labs” within the facility: 2,000-3,000 square foot laboratory space for students; Bell Works logo refers to scientific history at the site:

**ONLINE INTERPRETATION** Gallery of innovations developed on-site

**ASSOCIATED RESEARCH/ARCHIVES AVAILABLE** No

**EVENT RENTALS AVAILABLE?** Yes

**As the site’s redevelopment is underway, it has hosted events such as an artistic installations (preceding page, right) and a Maker festival (below).**



IMAGE FROM BELL WORKS

moderate interpretation

## American Tobacco Campus (Durham, North Carolina)



**HISTORY** The American Tobacco Company Manufacturing Plant represents the history of the tobacco industry in Durham through its evolution from W. T. Blackwell & Company, to The American Tobacco Company trust (which absorbed the Blackwell firm in 1899), through the reorganized American Tobacco Company (formed when the trust was dissolved in 1911). These massive brick warehouses and factories, with their slow-burn mill construction and decoration evocative of medieval architecture, reflect the power and success of the trust. After 1911, the reorganized American Tobacco Company remained as the industry's powerhouse through the 1950s, its continued growth required the construction of a new power plant and three starkly modern factories at the southeast end of the complex. Altogether, the American Tobacco Company Manufacturing Plant is an important landmark to Durham's manufacture of tobacco products, and a major monument of North Carolina's primary industry of the twentieth century. *(Excerpted from the National Register nomination)*

**ABOUT** Today, the campus hosts a mix of office, residential retail, and dining tenants. It regularly hosts outdoor events, taking advantage of the campus' historic waterworks, water tower, etc. as backdrops for concerts, 5K runs, etc. The complex features a mix of adaptive reuse and new construction. Durham Bulls Athletic Park, home to the minor-league baseball team, and the Durham Performing Arts Center are located adjacent to the historic tobacco campus.

**TENANTS/USES** include Action NC; American Tobacco Barber Shop; American Underground; Art Institute; Bank of North Carolina; Duke Real Estate; Duke Alumni Association; Durham Bulls Corporate Office; Lend Lease; Little

**Developer** Capitol Broadcasting Company

**Closed** 1980s

**Redeveloped** Early 2000s

**Acreage** 14.6 acres

**Website** [americantobaccocampus.com](http://americantobaccocampus.com)

**Designations** National Register Historic District  
(American Tobacco Historic District)



Diversified Architectural Consulting; North Carolina Public Radio/WUNC; Shoeboxed; Teach for America; The Nature Conservancy; West Monroe Partners

**OPEN TO PUBLIC** General site; The Powerplant (art gallery and the Full Frame Theater inside); restaurants and retail

**ON-SITE PASSIVE INTERPRETATION** No known features

**IN SITU INTERPRETIVE SIGNAGE** Unknown

**ON-SITE ACTIVE INTERPRETATION** No regular interpretive programming organized on-site; Preservation Durham organizes walking tours of Tobacco Heritage, including the American Tobacco Campus

**ARTISTIC INTERPRETATION** The Power Plant on site hosts art gallery space, but the exhibits do not appear to be site-specific. Rather, the gallery is a joint initiative of the Center for Documentary Studies and the MFA in Experimental and Documentary Arts at Duke University.

**PROGRAMMING/EVENTS** Regular outdoor events, including concerts (American Tobacco Amphitheater, films (Full Frame Theater), blood drive, etc.

**MASTER PLAN/DESIGN GUIDELINES?** Secretary of the Interior's Standards for Rehabilitation (project utilized federal rehabilitation tax credits)

**INTEGRITY/ARCHITECTURAL INTERVENTIONS** Warehouse architecture restored and adaptively reused. A new 440,000-gallon water feature (known as Bull River) incorporated into site design, reminiscent of the historic industrial production.

**DESIGN FEATURES/REFERENCES TO HISTORY** Water tower and smokestack (and their associated logos) restored as prominent, centerpiece features. Both structures are also incorporated into branding materials. A new 440,000-gallon water feature (known as Bull River) incorporated into site design, reminiscent of the historic industrial production. American Tobacco Train Car incorporated into site design, in reference to the tobacco industry's historic relationship with the railroad shipping industry. Signage throughout the campus evokes the industrial character of the site's history, and branding of the complex uses the historic smokestack and water tower in its graphics.

**ONLINE INTERPRETATION** Narrative history

Wayfinding elements and environmental graphics, including tenant signage, evoke the industrial character and history of the campus.



IMAGE FROM AMERICAN TOBACCO CAMPUS.COM

## The Navy Yard (Philadelphia, Pennsylvania)



IMAGES FROM NAVY YARD.ORG



<b>Historic name</b>	Philadelphia Naval Shipyard and Philadelphia Naval Business Ctr.
<b>Developer</b>	Philadelphia Industrial Development Corporation (PIDC)
<b>Closed</b>	1991 (Base Realignment decision) 1996 (Philadelphia Naval Shipyard closes)
<b>Redeveloped</b>	2000+ (ongoing)
<b>Acreage</b>	1,200 acres
<b>Website</b>	navyyard.org
<b>Designations</b>	National Register Historic District (Philadelphia Naval Shipyard Historic District); Commandant's Quarters, Marine Barracks individually designated on the National Register

**HISTORY** On March 27, 1794, President George Washington signed the Naval Act, which called for the purchase of six frigates to defend the country. Built in a shipyard below Carpenter Street in Philadelphia's Southwark neighborhood, the first of the commissioned ships launched from a private shipyard on May 10, 1797. Shortly thereafter, this became an official part of the United States Navy, after it purchased its first piece of real estate along the Delaware River, establishing the Southwark Yard between Federal and Reed Streets in 1801. The Southwark Yard remained active for much of the 19th century, serving the country well as a production center during the War of 1812 up through the Civil War. Investments in floating dry docks (the first in the world) extended its useful life, but eventually it became clear that Philadelphia would need an entirely new shipyard. The City of Philadelphia eventually transferred 923-acre League Island to the U.S. Government in 1868 for \$1. Funding came slowly in the wake of the Civil War, but the first buildings began to rise in the 1870s. After eight years of running two shipyards, Southwark closed in 1876. The Philadelphia Naval Shipyard (PNSY) continued to operate as a naval base until 1996, employing more than 40,000 people during its peak production period in World War II. During that time, 53 warships were constructed, and an additional 1,218 were repaired. In 1991, the Base Realignment and Closure Commission (BRAC) made the decision to cease operations. The Philadelphia Naval Shipyard closed on September 26, 1996.

**ABOUT** The campus hosts a mix of new and adaptively-reused buildings for office, research and development, light and heavy industrial and manufacturing, distribution, and recreational use. Redevelopment is ongoing.

**TENANTS/USES** include A. P. Construction, Inc.; American Systems Corporation; AMSEC; Ben Franklin Technology



Partners of Southeastern PA; CBRE; Delaware Valley Industrial Resource Center; Drexel University; Epsilon Systems Solutions, Inc.; GSK; Jefferson University Hospitals; Tasty Baking Company; Urban Outfitters; etc.

**OPEN TO PUBLIC** Courtyard by Marriott hotel; restaurants; Chapel of the Four Chaplains (occasional)

**ON-SITE PASSIVE INTERPRETATION** Self-guided tour (on website)

**IN SITU INTERPRETIVE SIGNAGE** None currently

**ON-SITE ACTIVE INTERPRETATION** No regular interpretation (see programming/events)

**PROGRAMMING/EVENTS** Lunch truck lineup; free summer outdoor yoga (with Nava Yoga Center); occasional Earth Day bike tours (celebrating sustainability initiatives on the campus); PHS Fall Garden Festival; Philly Foodworks CSA pickup; finish line for Broad Street Run, Philly 10K, and Susan G. Komen Race for the Cure; Navy Yard 5K; etc.

**MASTER PLAN/DESIGN GUIDELINES?** Master Plan (2004, updated 2013)

**INTEGRITY/ARCHITECTURAL INTERVENTIONS** Blend of new construction (e.g. Courtyard by Marriott building) and adaptive reuse of historic structures, e.g. five buildings repurposed for Urban Outfitters' corporate campus.

**DESIGN FEATURES/REFERENCES TO HISTORY** The 2013 Master Plan update calls for the introduction of a new canal in the Canal District, which would be the anchoring open space element, reminiscent of the existing dry dock and building configurations in the Historic Core and Shipyard districts. It also calls for an expansion of the Navy's energy research complex in the Education and Research Campus, and the development of a new research and academic campus complementing the continued growth of the site's R&D activities. Philadelphia Navy Yard logo (and associated signage) refers to history/naval landscape of the site.

**ONLINE INTERPRETATION:** Extended timeline (narrative only; no images); Interactive Interpretation

**OTHER NOTES:** The Workshop School (a project-based school started as the Sustainability Workshop at the Navy Yard)

**EVENT RENTALS AVAILABLE?** No warehouse space; only available through individual tenants: Chapel of Four Chaplains, Courtyard by Marriott South Philadelphia, Lo Spiedo, Mercer Café

**The campus' signage, branding, and environmental graphics reference the naval history and geography of the site.**



minimal interpretation

## Mission Bay (San Francisco, California)



IMAGE FROM THE CENTER FOR LAND USE INTERPRETATION



IMAGE FROM THE YARD AT MISSION ROCK

**HISTORY** Beginning in the mid-1800s, in attempts to make this area suitable for building, Mission Bay was used as a convenient place to deposit refuse from building projects and debris from the 1906 earthquake. As the marsh quickly stabilized with the weight of the infill, the area quickly became an industrial district. By 1850, the area was used for shipbuilding and repair, butchery and meat production, and oyster and clam fishing. With the addition of the railroad, Mission Bay became the home to shipyards, canneries, a sugar refinery and various warehouses. In 1998 the area was announced by the Board of Supervisors as a redevelopment project. Much of the land was long a railyard of the Southern Pacific Railroad Company, and transferred to Catellus Development Corporation when it was spun off as part of the aborted merger of Southern Pacific and the Santa Fe Railway. Catellus subsequently sold or sub-contracted several parcels to other developers. It has rapidly evolved into a wealthy neighborhood of luxury condominiums, hospitals, and biotechnology research and development.

**ABOUT** The Mission Bay Project, a public/private partnership with the San Francisco Redevelopment Agency, involves the transformation of a 303 acre former rail yard into a vibrant, high-density, transit-oriented community. This brownfield infill site adjacent to the San Francisco Giants baseball stadium (AT&T Park) is under construction with: 6,400 units of housing (including 4,500 market-rate and 1,900+ affordable homes); 3.4 million square feet of commercial office and biotech lab space; 3.15 million square feet for the University of California-San Francisco Research Campus; 550 bed UCSF Medical Center on 14.5 acres; 285,000 square feet of retail; a hotel; a new school, police and fire station and library; and 49+ acres of public parks and open space, providing vastly improved access

<b>Historic name</b>	Mission Bay neighborhood
<b>Developer</b>	Mission Bay Development Group/ San Francisco Redevelopment Agency
<b>Closed</b>	n/a
<b>Redeveloped</b>	1998+ (ongoing)
<b>Acreage</b>	303 acres
<b>Website</b>	mbaydevelopment.com
<b>Designations</b>	None

to the waterfront.

\$700 million of investment in new public infrastructure and parks is being leveraged to generate \$9+ billion in new investment from private developers, users, and institutions. This community will be home to an estimated 11,000 new residents, promoting smart growth by placing housing and jobs directly adjacent to transit.

**TENANTS/USES** include approx. 6,000 condos, California Institute for Regenerative Medicine, Gap Inc. (Old Navy Headquarters), University of California-San Francisco (research campus), Salesforce.com, Third Street Light Rail Project, Caltrain, AT&T Fiber to the premises greenfield project, San Francisco Public Library, Bayer's U.S. Innovation Center, Nektar Therapeutics

**OPEN TO PUBLIC** San Francisco Public Library, San Francisco Public Safety Building, San Francisco Bay Trail, Blue Greenway waterfront trail; Mission Bay parks; China Basin Park

**ON-SITE PASSIVE INTERPRETATION** No known passive interpretation.

**IN SITU INTERPRETIVE SIGNAGE** No known interpretive signage

**ON-SITE ACTIVE INTERPRETATION** San Francisco Public Library (Mission Bay branch) runs walking tours of the neighborhood; San Francisco City Guides runs a walking tour as well.

**ARTISTIC INTERPRETATION** UCSF Medical Center has a public art collection, both inside and outside of its facilities. Among the more prominent of the exterior works are Richard Serra's "Ballast" and Lawrence Weiner's "Brought to Light Subsequently Allowed to Dissipate."

**PROGRAMMING/EVENTS** Mission Bay Parks events

**MASTER PLAN/DESIGN GUIDELINES?** Mission Bay North signage master plan; Mission Bay Redevelopment Plan-North; Mission Bay Redevelopment Plan-South

**INTEGRITY/ARCHITECTURAL INTERVENTIONS** Dominated by new construction, but design plans call for historic Pier 48 to be renovated as the expanded home for Anchor Brewing (San Francisco's oldest and largest manufacturing business)

**DESIGN FEATURES/REFERENCES TO HISTORY** Shipping container building and planter design at The Yard at Mission Rock

**ONLINE INTERPRETATION** San Francisco Public Library – Mission Bay Branch Archives

**EVENT RENTALS AVAILABLE?** Mission Bay Commons (Mission Bay Parks)

**The UC-San Francisco Medical Center hosts a public art collection both inside and outside (below) its facilities in Mission Bay.**



IMAGE FROM UCSF MEDICAL CENTER ART COLLECTION



## West Campus, Yale University



IMAGES FROM WESTCAMPUS.YALE.EDU



**HISTORY** The Bayer Pharmaceutical campus was dedicated in 1988. It closed and was sold to Yale University in 2007.

**ABOUT** WestCampus is organized into research institutes and core facilities—all designed to promote collaboration and interdisciplinary dialogue. The research institutes focus on a particular area of study. Each institute includes faculty and researchers from a wide range of academic departments and professional schools—or, in some cases, from Yale's libraries and museums. West Campus' core facilities support the work of these institutes, offering researchers access to state-of-the-art technology, specialized laboratory equipment, and research services. The core facilities are also resources for the entire campus, and several offer services to outside institutions. *(Excerpted from the official website)*

**TENANTS/USES** include Yale Energy Sciences Institute, Yale Systems Biology Institute, Yale Chemical Biology Institute, Yale Cancer Biology Institute, Yale Nanobiology Institute, Yale Institute for the Preservation of Cultural Heritage, Yale Center for Molecular Discovery, West Campus Materials Characterization Core, Yale Center for Genome Analysis, Yale Landscape Lab, West Campus Imaging Core, West Campus Analytical Core, Yale Center for Research Computing

**OPEN TO PUBLIC** West Campus grounds

**ON-SITE PASSIVE INTERPRETATION** It doesn't appear so.

**IN SITU INTERPRETIVE SIGNAGE** Unknown

**Historic name** Bayer Pharmaceutical Campus  
**Developer** Yale University  
**Closed** 2007  
**Redeveloped** 2007+ (ongoing)  
**Acreage** 136 acres  
**Website** westcampus.yale.edu  
**Designations** None

**ON-SITE ACTIVE INTERPRETATION** Campus tours

**PROGRAMMING/EVENTS** Department-related symposia, etc. Calendar here.

**MASTER PLAN/DESIGN GUIDELINES?** Yes. 2000 plan, with 2009 supplement. Vision areas are: health, culture, energy, and environment

**INTEGRITY/ARCHITECTURAL INTERVENTIONS** It doesn't appear that any new construction has taken place on the property since Yale acquired it, and it is unclear whether any new construction is planned at this point. Solar-voltaic array of over 4,000 solar panels on 350,000+ square feet of roof space.

**DESIGN FEATURES/REFERENCES TO HISTORY** None

**ONLINE INTERPRETATION** Photo gallery tour; brochure

**OTHER NOTES** Includes Oyster Creek Nature Preserve

**EVENT RENTALS AVAILABLE?** n/a

**Design interventions on the West Campus are very limited, and have focused on green initiatives spearheaded by environmental groups and departments on campus.**



IMAGE FROM WESTCAMPUS.YALE.EDU

## Interpretive Websites

*In addition to any physical interventions and interpretive programming on the Pennovation Works campus, the history of the complex offers strong opportunities to interpret the site digitally, in the form of an online timeline, exhibit, and/or model. This selection of websites and digital models offers design inspiration and case studies for a future Pennovation Works interpretive website.*

### DIGITAL HADRIAN'S VILLA PROJECT [vwhl.soic.indiana.edu/villa/](http://vwhl.soic.indiana.edu/villa/)

The Digital Hadrian's Villa Project is a 3D digital model of Hadrian's Villa in the early First Century AD. The website is organized by a map of the villa complex, with narrative history and historic images catalogued for each individual building. The project also includes interviews from academics, panoramas, and an art database.



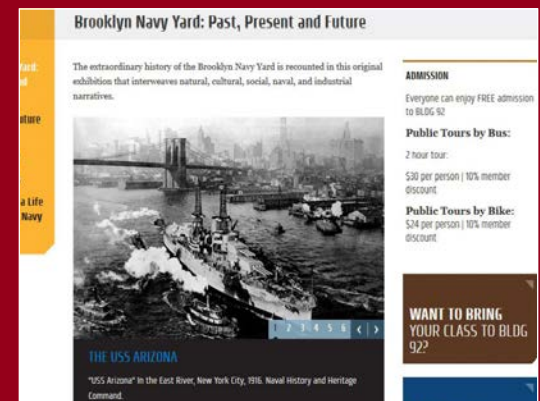
### ANNE FRANK TIMELINE [annefrank.org/en/Subsites/Timeline/](http://annefrank.org/en/Subsites/Timeline/)

The timeline is dense with information and graphics, including historic images, maps, and ephemera. The site is organized by theme, date, and subject (relating Anne Frank's specific history to larger historic events and developments).



### BROOKLYN NAVY YARD (BLDG 92) [bldg92.org/exhibitions/](http://bldg92.org/exhibitions/)

The digital content related to the history of the Brooklyn Navy Yard is dispersed across websites for the Brooklyn Navy Yard Development Corporation, BLDG 92 (the building on-site dedicated to exhibits), and the Resource Center. Collectively, they offer a narrative timeline, historic images, and a blog about the site's history and programs.







#### **ROME REBORN 2.0 | [romereborn.frischerconsulting.com/about-current.php](http://romereborn.frischerconsulting.com/about-current.php)**

This project recreates the urban development of ancient Rome over the span of nearly 1,500 years. Viewers explore the city via video demonstrations of the digital model.

### **OTHER WEBSITES WITH STRONG INTERPRETIVE FEATURES**

#### **ILLUMINATING RENO'S DIVORCE INDUSTRY [renodivorcehistory.org](http://renodivorcehistory.org)**

The website is organized by theme or sortable by content type (historic photographs, documents, audio, video, and books). It is graphically appealing and presents a combination of historic images/ephemera and a narrative timeline.

#### **BILTMORE HISTORY [biltmore.com/visit/biltmore-house-gardens/estate-history](http://biltmore.com/visit/biltmore-house-gardens/estate-history)**

The site's timeline emphasizes historic imagery, which depicts the estate's changes over time. The color palette and typography are more traditional, but the information is well-researched and brings the history and significance of the Biltmore up to the present day.

#### **URBAN SIMULATION: WORLD'S COLUMBIAN EXPOSITION OF 1893 [ust.ucla.edu/ustweb/Projects/columbian\\_expo.htm](http://ust.ucla.edu/ustweb/Projects/columbian_expo.htm)**

Researchers at UCLA have developed a 3D digital model of the World's Columbian Exposition in Chicago, enabling fly-throughs of the landscape and close-up views of the fair's buildings.

#### **MADE IN NORTHERN IRELAND [bbc.co.uk/timelines/zqpb9qt#z2sr82p](http://bbc.co.uk/timelines/zqpb9qt#z2sr82p)**

The timeline (of inventions developed in Northern Ireland) is organized chronologically, with a striking yet simple timeline design. Individual posts are brief, but include links to additional information and articles elsewhere on the BBC website. Data includes images, videos, and narrative history.

Pennovation Center and plaza, 2016.



IMAGE FROM HWKN ARCHITECTS

## Part 3: Interpretive Framework

Based on preceding research, this interpretive framework offers recommendations in four areas of intervention or programming: Communications and Education; Physical/Site Interpretations and Passive Interpretation; Programming/Active Interpretation; and Partnerships. Passive interpretation refers to initiatives or installations that may require staff or volunteer time for setup, but are otherwise static. Active interpretation refers to programs or events that require staff or volunteer time on an ongoing basis and/or for the duration of the event.

### ASSUMPTIONS

This interpretive framework was developed with the following assumptions in mind:

- The Pennovation campus is designed for ongoing development. Most, if not all, near-term installations in the public realm, or in buildings that may undergo redevelopment, should be temporary, movable, or flexible in their use of space within the campus.
- Programming and partnerships should take advantage of existing campus initiatives and organizations wherever possible, to avoid creating a Pennovation infrastructure that is redundant to existing programs on the main Penn campus.
- Any interpretations of the site's history should be relevant to current and potential Pennovation researchers and tenants. The narratives presented in these materials or programs should therefore connect the history of the site to its current use and future development.

- Interpretive initiatives on the site will be implemented on an ongoing basis. Recommendations are therefore presented based on their suitability for the short-medium or long term.
- The theme of “innovation” should be interpreted across all fields of study across the University of Pennsylvania’s undergraduate and graduate schools, research centers, etc. —not limited solely to science and engineering, etc. Likewise, the interpretation of Pennovation’s history should therefore highlight all research backgrounds when applicable to reach audiences across varied areas of study.
- Access to the Pennovation campus is currently limited to the Penn community. In the future, programs and initiatives may be opened to neighbors and other members of the broader community, but interpretive recommendations should consider access and audience to be an evolving framework.

## STRATEGIES AND RECOMMENDATIONS

### 1. COMMUNICATIONS AND EDUCATION

#### *Short and Medium Term Strategies*

- 1.1 Incorporate the history of innovation at the site into printed materials and marketing collateral for Pennovation visitors and tenants. The site’s continuous role as a hub of research and development offers a novel opportunity to connect its history to its future as Pennovation Works. By making this narrative an explicit thread in Pennovation’s marketing collateral, the University of Pennsylvania (and FRES in particular) can link the impact of Penn’s current innovation enterprise to the site’s longstanding role in Philadelphia, the region, and the nation as a hub of ground-breaking research. This legacy would make potential tenants feel as if they were part of a continuum and add to the value of joining the site.
- 1.2 Create a robust website and/or mobile app to present and interpret the site’s history to current audiences. The rich history of the Pennovation campus, and the wealth of visual materials and ephemera associated with that history, offer a strong opportunity for interpretation as an informative, visually-compelling website.
  - 1.2.1 Build an interactive model of the Pennovation Works site over time to feature on interpretive website and/or app. The website could feature an interactive model of Pennovation Works, showing its development over time, which could be developed by PennDesign or Penn Engineering students, drawing upon their digital modeling skills and demonstrating advancements in these techniques. The model could illustrate development from the factory village of Harrison Brothers to the research and development laboratories of DuPont, to the opening of the Pennovation Center.

**The Digital Hadrian’s Villa Project offers a model for an interpretive website that tracing the development of a site’s history and architecture over time.**  
*(See page 48 for more on this website.)*



IMAGE FROM VWHL.SOIC.INDIANA.EDU/VILLA





- 1.3 Host a bioblitz event for local students (high school through PhD) to observe a portion of the site's ecosystem and biodiversity. The event could be modeled after the bioblitz event at Penn's biopond.

#### *Long Term Strategies*

- 1.4 Develop educational programs for local high school students that convey history of innovation and inspire new careers in related fields among local youth. The Pennovation campus' historic associations with reputable companies of the past and present offers opportunities to interpret the site's significance to local students. The program could be modeled after the existing educational program Unpacking the Past at the Penn Museum, and could invite members of the site's current tenants to educate local students about science, technology, business and health care, and encourage local students to enter these fields.

## 2. PHYSICAL/SITE INTERVENTIONS AND PASSIVE INTERPRETATION

#### *Short and Medium Term Strategies*

- 2.1 Collaborate with arts partners to incorporate public art installations in the plaza and meadow, with potential counterpoints on the main Penn campus to draw the Penn community to see the larger artwork at Pennovation Works. Develop temporary, moveable installations for development pads. Rather than be limited by future development interests, the Pennovation Works campus should take full advantage of its flexible site by installing a range of public art installations. For environmental remediation and site design reasons, the plaza and meadow will not be further developed and could therefore serve as sites for long-term public art. Nearly all other development pads could host temporary art installations that could move or evolve as the site's development progresses. FRES should engage with the visual arts community at Penn to begin implementation of this strategy. (see also Strategy 4.1)
- 2.2 Incorporate historic images and information into construction signage as development progresses. Construction signage often presents a rendering of the future building or landscape, highlighting what is to come, but rarely illustrates what previously occupied a site. For development pads and construction projects at Pennovation Works, signage could use historic images and photographs to highlight the legacy of development on the site, making a meaningful connection between the Penn community and the previous activities of research and development at Pennovation Works.
- 2.3 Incorporate historic maps and images into wayfinding signage and environmental graphics. The historic imagery of the Harrison Brothers and DuPont facilities on-site are striking in their contrast to the current

**BLOSSOM**Interactive is a six-foot tall, interactive sculpture that was designed and constructed by PennDesign students as one of the 2016 PennPraxis Social Impact Projects. It offers a model for a temporary, moveable art installation that engages with pedestrians.

IMAGE FROM PENNDISIGN







Each year, the Serpentine Gallery in London commissions a temporary summer pavilion by a leading architect who has not yet completed a building in England. The pictured pavilion was designed by Jean Nouvel in 2010.

Interpretive markers and established viewing points (both interior and exterior) would reinforce the views and visual connections between Pennovation and its university and urban context.



- 2.8 Offer a portion of flex-use exterior space as workspace for art and architecture students. Many disciplines in the Penn's School of Design, as well as the undergraduate programs in architecture and fine arts, require space to design, experiment, and innovate in architecture and the fine arts. Meyerson Hall, the home of PennDesign, (and the area of campus immediately surrounding the building) is limited in this capacity. PennDesign already has a single studio at the Pennovation campus, however more space could be used. The Pennovation campus could offer overflow space for this kind of experimentation, activating its flex-use exterior space for temporary student workspace, and this type of use could relocate and adapt as development plans progress.
- 2.9 Introduce interpretive markers and visuals on windows and observation points (interior and exterior) to link Pennovation Works with sites of significance to Penn and the historic industries on the Schuylkill River. The Pennovation Center, and the Pennovation Works campus overall, present stunning views of Philadelphia, the University of Pennsylvania, and the Schuylkill River. By incorporating subtle graphics on the interior of windows, or signage on the site, the connection between Pennovation and its historic and current connections—by association, geography, industry, etc.—can be made more clear through subtle yet explicit representations.
- 2.10 Continue the historic building numbering system for new development, and interpret its logic for the public. The DuPont-era numbering system for campus buildings is a quirk of its historic development that is based on the chronological sequence of construction (rather than geographic layout or circulation order). Continuing this numbering system, with a clear explanation/interpretation of the system to avoid confusion, would highlight one of the idiosyncrasies that only emerge from a site with a long and storied past.

#### *Long Term Strategies*

- 2.11 Create an innovation pathway to University City using wayfinding signage and environmental graphics. The Pennovation Works site, situated along the Schuylkill River to the south of Center City, has historically been the gateway to the city, both geographically and industrially. Today, the Pennovation campus functions as the “keystone” of the Schuylkill River in its relationship between centers of industry to the north and the south, and the “intellectual” entrance to the research institutions in University City. FRES should coordinate with University City District, the City of Philadelphia, the Schuylkill River Development Corporation (SRDC), and others, to inform any interpretive elements associated with the extension of the Schuylkill River Trail to the site. This could include interpretive elements (e.g. lookout points, signage,



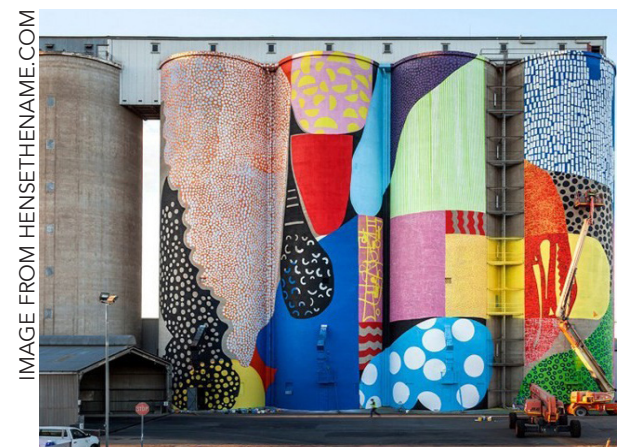
audio/cell phone tour, etc.), wayfinding signage, and environmental graphics that would emphasize the physical, historical, and thematic connections between Pennovation, University City, and Center City Philadelphia. These coordinate with signage already present along the trail.

2.12 Install a mural on an exterior wall to incorporate references to the site's history. Site interpretation could include murals or exterior wall installations that draw upon the visual elements (both photographs and ephemera) to convey meaningful elements of the site's history to members of the Pennovation community. This could include references to innovations in paint technology, ready-mixed paint, and the progressions in palettes that occurred on-site. The actual content and design of any future mural should be developed with the full participation of the artist, and artists should be engaged to discuss an overarching approach to this strategy at an early stage (See Strategy 4.1).

2.13 Incorporate the vivid color palettes of historic advertisements into interior building treatments. The Harrison Brothers and DuPont-era advertisements include visually compelling images and vivid color palettes to promote the companies' products. These ephemera—such as the color grid used in Harrison Brothers' ready-mixed paint business—could provide design and color inspiration for the treatment of interior spaces in the Pennovation Center or (depending on future development plans) the Marshall Laboratories building.

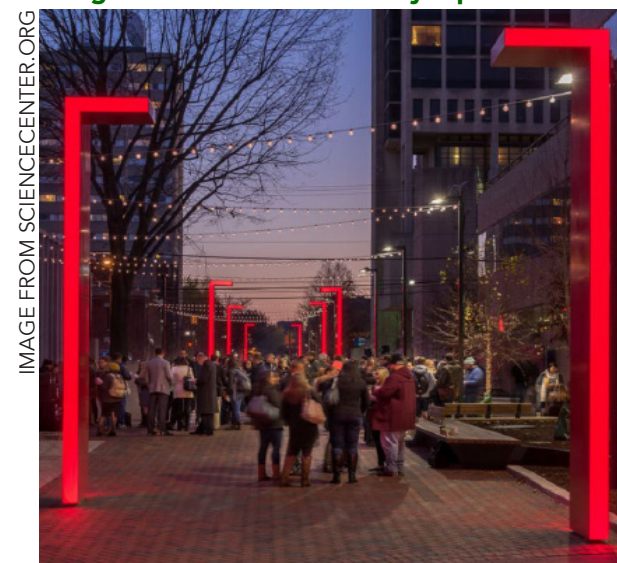
2.14 Add Pennovation Works signage to rooftops that can be viewed from above. Many commercial and institutional buildings now feature signage that can be viewed from airplanes, such as the Target bullseye on large format stores. A similar type of signage could be developed for Pennovation that could be viewed from above, especially given the site's close proximity to Philadelphia International Airport (PHL) and numerous helipads. This could serve both as an interim and permanent installation on rooftops as the site develops.

2.15 Include recreational amenities on site. Dating back to 1902, the Harrison Brothers campus featured recreational amenities, including a baseball diamond and a tennis court, to provide an added benefit to employees and opportunities for socializing and exercise. This is also a trend among start-up firms and technology companies that seek to foster camaraderie between employees beyond work. Although some areas at Pennovation Works may not be suitable given industrial contamination, opportunity areas could be identified and fitness and recreational programs provided as a permanent or interim use on-site.



**Muralist Alex "HENSE" Brewer paints every exterior surface of his subject buildings, creating joyful polychromatic schemes. Image depicts his work Silos, in Australia.**

**Innovation Plaza on 37th Street is an actively programmed pocket park with placemaking elements and events that foster community among Science Center and uCity Square tenants.**





**Leandro Erlich's "Dalston House" offers a model for an experimental, interactive landscape intervention that engages users.**

**TED Talks (or a similar type of event series) would offer researchers an opportunity to present their work to new audiences, and could also include lectures on the history of the site and its research innovations.**



- 2.16 Curate experimental landscape art and architecture, in partnership with an adventurous landscape architect and large-scale public artist. The flexibility of the Pennovation Works campus, and the phased approach to its redevelopment, offer opportunities to create a more ambitious, unorthodox landscape within the site, in partnership with a particularly bold landscape artist or architect.

### 3. PROGRAMMING/ACTIVE INTERPRETATION

#### *Short and Medium Term Strategies*

- 3.1 Develop tour talking points or a script that includes stories about the history and development of the site. Corresponding with information portrayed on a new website (see Strategy 1.1), and discussed through an audio tour (see Strategy 3.7), a brochure or guide for a walking tour could be developed to lead interested individuals through the site. Such a program could also include information currently shared by FRES representatives when giving site tours, including information about history, future plans, and ongoing development. In the near term this tour would be limited to the Penn community and invited guests, but could be opened to a wider community audience as deemed appropriate.
- 3.2 Host a lecture/event series offering current and future tenants the opportunity to discuss their research and exchange ideas. Current Pennovation Works tenants expressed interest in learning more about what other researchers on the site are doing and learning. As the Pennovation community expands, the campus could foster a deeper culture of collaboration by hosting regular mixer events in the form of "lightning" talks (e.g. TED talks) and/or a First Friday happy hour (similar to Nerd Nites, organized elsewhere in the city) to offer occupants an opportunity to interact with and learn from other Pennovation tenants. Subjects could include topics related to current research, or about the site's history, or about current trends or developments related to a current or past area of study (e.g. evolution of paint products and research). Theme nights could also be planned, highlighting one of the areas of research focus on the campus.
- 3.3 Invite Penn's arts and culture organizations to Pennovation campus for performances to foster campus culture at Pennovation Works. The Pennovation campus is a new and quickly-developing ecosystem that is both detached from and connected to the main campus. As Pennovation Works' population expands in the coming months and years, the campus would benefit from an informal programming series that connects Pennovation's occupants with arts and culture organizations on the main campus. As an example, an a capella group could perform at lunchtime; a dance troupe could provide entertainment

during a mixer event; the marching band could perform during the week before home football games, etc. These events could also link up with the 40th Street summer series to capitalize on the popularity of that existing programming.

- 3.4 Draw Penn community to site by hosting scavenger hunt. While drawing future tenants to Pennovation Works is a primary goal, informing the Penn community of staff, faculty and students about the site is also important to making the campus feel like a part of the whole. Pennovation Works could be the site of a scavenger hunt like CitySolve or XPLORE that encourages participants to solve clues while they travel to and traverse the site, thereby encouraging Penn affiliates to both visit and learn about the site and environs. With the addition of prizes or a competition, the hunt would be an attractive way to generate energy around campus discovery.
- 3.5 Create a film screening series that celebrates the theme of innovation. Host an occasional film screening series on the plaza outside the Pennovation Center, inviting building occupants to select a film that explores the theme of innovation, or is relevant to their work, and host a post-screening discussion and socializing. This type of programming would bolster the spirit of interaction, collaboration, and partnership on the campus.
- 3.6 Host a hack-a-thon or maker festival for university and high school students. The Pennovation site has a history of experimentation, and a hack-a-thon or maker festival could pay tribute to that legacy by convening an event for area students to test and investigate their ideas. Such an event could be held annually or bi-annually, and potentially include a prize to maintain interest and enthusiasm.
- 3.7 Partner with the Fairmount Parks Conservancy or the Philadelphia Horticultural Society to host a pop-up beer garden at Pennovation Works. Based on FPC's and PHS' recent successes, such programming would activate the plaza in a low-intensity, high-traffic way for several days, weeks, or months.

#### *Long Term Strategies*

- 3.7 Post new audio tour stops within the Discover Penn program. The Discover Penn cell phone tour is an established program to interpret the history of Penn resources to the public. Several new tour checkpoints could be developed with information about Harrison Brothers, DuPont, and the other historical themes about the site's development. Narrators could include professors (e.g. those with an expertise in the history of science), former DuPont employees, and local historians.

**A Pennovation Works scavenger hunt would introduce Penn students, faculty, and staff to the Pennovation campus in an engaging and interactive way.**



IMAGE FROM SF.FUNCHEAP.COM





**Pennovation Works could partner with the Schuylkill River Development Corporation to offer kayak tours on the Schuylkill, interpreting the campus from a new perspective.**

IMAGE FROM VISITPHILLY.COM



- 3.8 Renew lecture series at Penn featuring former DuPont employees and current innovators to discuss their work. Former DuPont employees, such as those engaged over the course of the Research and Consolidation phase of this project, offer fascinating insight into the experience of working at the company's Grays Ferry facilities. Historically, the DuPont company maintained a lecture series (the Marshall lecture series) in conjunction with the University of Pennsylvania, bringing renowned researchers (including Nobel Prize winners) to present to students and DuPont employees about their work. A new version of this lecture series could be revived at the Pennovation campus by extending an invitation to former DuPont employees to discuss (via brief talks, a panel discussion, or other format) their research and experience working on the site in the twentieth century.
- 3.9 Explore the creation of a water taxi tour route on the Schuylkill River (e.g. from 30th Street Station to the Navy Yard), interpreting the history and development of the site from the water and offering a new perspective on the activity of Pennovation Works.

#### 4. RESEARCH AND PARTNERSHIPS

- 4.1 Engage with individual artists and arts organizations early. Stakeholder input from the internal stakeholders meetings made it clear that artists should be involved in the interpretive planning process from the beginning, rather than engaged when the site, subject matter, and form of any installation has already been determined. The Penn community includes an abundance of artists and arts organizations; we recommend seeking their input for any interpretive next steps.

- 4.1.1. Explore partnerships with new media artists at Penn to create digital art, computer animation, or interactive art that is inspired by the history of the site. Students and faculty from PennDesign's Time-Based and Interactive Media Certificate program could introduce new ways to interpret the history of the Pennovation Works campus (on- or off-site) using moving images, digital technology, and interactivity.

- 4.2 Collaborate with the Schuylkill River Development Corporation (SRDC) to offer kayak (and other waterfront) tours of Grays Ferry Crescent and Pennovation Works. SRDC currently hosts kayak tours on the Schuylkill River as part of their community programming during the warmer months. FRES could potentially partner with the SRDC to extend the geography of the tours and incorporate narratives about Pennovation's

history and current use into their tours. These river-based programs could be offered specifically to Pennovation researchers, and to the public as part of existing programming.

- 4.3 Interpret the theme of innovation broadly across all disciplines at Penn. Innovative research takes place every day at each of Penn's four undergraduate schools, twelve graduate schools, three teaching hospitals, and over a hundred research centers. While it is very relevant to highlight the theme of innovation as it relates to the sciences, any interpretation of innovation at the Pennovation campus should take full advantage of the breadth of Penn's ecosystem of knowledge. As interpretive programs are developed, FRES should call upon Communications liaisons throughout the University to collect a wide-range of innovation stories.
- 4.4 Develop an Innovator-in-Residence program. An Innovator-in-Residence program at Pennovation Works similar to the fellowships offered through Penn's Program in the Environmental Humanities, offering grant funding and temporary workspace to a researcher (or small group of researchers) in exchange for recurring presentations of their work (e.g. office hours, show-and-tell, lectures, etc.). This program would foster a culture of collaboration, encourage fresh ideas, and an exchange of ideas by incubating the breakthroughs of a promising research talent.
- 4.5 Gather former DuPont employees to collect oral histories of past research at the site. This interpretive project presents an unusual opportunity to draw on the experiences of former researchers at the site. Drawing on the connections to Robert Butera and others, the interpretive plan for Pennovation Works would benefit from the collection of oral histories from these DuPont employees, who could offer their memories and experiences of research conducted on-site.
- 4.6 Partner with Coded for Kids, TechGirlz, Code for Philly, and other STEM organizations to engage local students in the past and present research conducted on the Pennovation Works site.
- 4.7 Market the Pennovation Works campus to FringeArts, DesignPhiladelphia, the Philadelphia Film Office, and other arts organizations to serve as a location for art and/or film screenings (as the Rotunda does).
- 4.8 Connect with the Center for Architecture to cross-promote design-related events at Pennovation Works.

Pennovation Center plaza, 2016.



IMAGE FROM LAND COLLECTIVE

IMAGE FROM CURBED PHILLY



Pennovation Center pitch bleacher, 2016.



## Conclusion



As the Pennovation Works site develops over time, telling the story of its past stages of development will remain an important element in encouraging both appreciation and sustained investment. The interpretation framework puts forward strategies that include communication and education, physical and site interventions, programming, and partnerships aimed at highlighting the themes that contribute to the site's significance.

The purpose of the interpretation framework is to provide a collection of options that Penn's Facilities and Real Estate Services (FRES) may implement as the site develops. Since the site will develop over many years, the intention is that several options may be implementable in the interim—before site construction is complete. This includes forms of programming, partnerships, temporary installations, and interior building treatments. Other interventions—those identified as long-term strategies—may take place further in the future.

The strategies contained in the document are recommendations, not requirements. Therefore they may be implemented as needed given ample support from tenants, stakeholders, and with available funds. In the near future, interpretation strategies may be conceived with a larger audience—with audiences

from the greater neighborhood and Philadelphia community invited to participate.

Through the implementation of the strategies contained in this framework, those that visit Pennovation Works will become aware of the eras that characterized the site in its earlier days, from farms and country estates, to its pivotal role as a transportation juncture, to the origin of Harrison Brothers, DuPont, and the industry that helped lift Philadelphia to its national industrial primacy. As the newest addition to Penn's campus, Pennovation Works will carry on the legacy of the university and its surrounding city for intellectual advancement, community building, and longstanding innovation.



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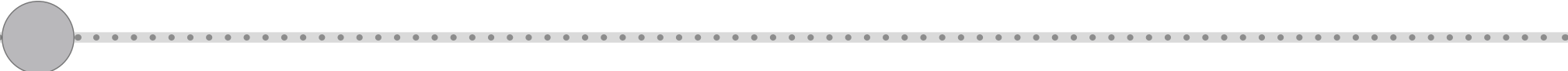
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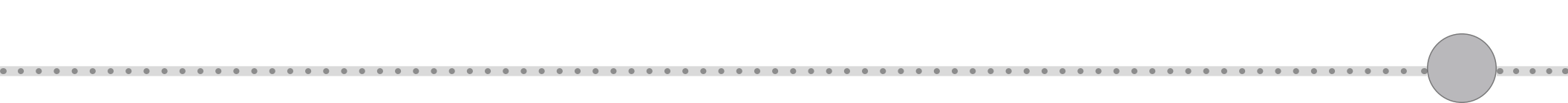
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## Appendix B: Case Studies, Other Institutions

### HARVARD UNIVERSITY

**INNOVATION HUB:** Harvard Innovation Lab (i-lab). “The Harvard Innovation Lab is a unique collaboration and education space designed to foster entrepreneurship and innovation across Harvard. A leading example of the power of One Harvard, the i-lab also serves as the gateway to Harvard University’s expanding Allston campus and its vision to become a truly cross-disciplinary research and innovation focused learning and development community.”

**RESEARCH CAMPUS:** Harvard University, Allston Campus in development. “The Allston Campus is home to Harvard Business School, graduate student residences, and athletic facilities. At least 2,000 students are enrolled at the Business School, and many more of the 21,225-strong student body use the facilities at the Allston Campus. Harvard University filed its most recent institutional master plan for the Allston Campus in 2013. The document includes plans for continued revitalization of Barry’s Corner, a campus and community vision, a new network of green spaces, plans to improve the public realm and streetscapes, a strategy to promote environmental sustainability, pedestrian access improvements, improved transportation networks, and community benefits.

**ADAPTIVE USE IN INNOVATION HUB/RESEARCH CAMPUS?** Yes. The i-lab is housed in Batten Hall, which was originally constructed in 1964 as the headquarters of WGBH public television headquarters. The Allston Campus master plan includes new construction of 1.4 million square feet and 500,000 square feet of renovated space (including Harvard Stadium, a National Historic Landmark). The master plan identifies all buildings and resources in the area that are 45 years old or more (or will reach that benchmark during construction). The Urban Design Principles outlined in the master plan include principles related to Heritage.

**The Harvard Innovation Lab (i-lab) was established in 2011. It is housed in Batten Hall, which was constructed in 1964 as the headquarters of WGBH public television headquarters.**

### YALE UNIVERSITY

**INNOVATION HUB:** Yale Center for Engineering Innovation and Design. “The Center for Engineering Innovation and Design (CEID) [serves] as a hub for collaborative design and interdisciplinary activity at Yale University. Its goal is to enable the design, development, and actualization of ideas, from the whiteboard to the real world. Students, staff, and faculty from across Yale have access to CEID resources, participate in courses and events, and collaborate with CEID staff on a wide range of projects. The CEID acts as both an educational resource as well as a focal point for design and engineering on campus. Our 8,700-square foot design lab combines an open studio, lecture hall, wet lab, and meeting rooms.”

**RESEARCH CAMPUS:** Yale University - West Campus. See expanded case study.

**ADAPTIVE USE IN INNOVATION HUB/RESEARCH CAMPUS?** No. The CEID occupies a newly-constructed building. The Yale University-West Campus occupies a pharmaceutical campus constructed in the 1980s.

IMAGE FROM I-LAB.HARVARD.EDU





## Other Institutions

Several universities have created innovation hubs or centers in recent years. To understand how the Pennovation Works project compares with similar facilities, Research included the innovation hubs or centers at other Ivy League institutions and a selection of other universities with close parallels. As this analysis demonstrates, the University of Pennsylvania is unique in its creation of an innovation center that includes the adaptive reuse of older, extant buildings and the inclusion of on-site interpretive elements that link the history of the site to its current use.

### UNIVERSITY OF PENNSYLVANIA

HARVARD UNIVERSITY

YALE UNIVERSITY

CORNELL UNIVERSITY

COLUMBIA UNIVERSITY

BROWN UNIVERSITY

PRINCETON UNIVERSITY

DARTMOUTH COLLEGE

DUKE UNIVERSITY

UNIVERSITY OF CHICAGO

STANFORD UNIVERSITY

UNIVERSITY OF CALIF. - BERKELEY

INNOVATION HUB/CENTER  
RESEARCH CAMPUS  
ADAPTIVE REUSE - INNOV. HUB  
ON-SITE INTERPRETIVE ELEMENTS

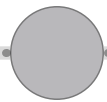
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The Bridge @ Cornell Tech

Stanford Industrial Park





**Renderings of the Bridge at Cornell Tech, which is in development on Roosevelt Island in New York City.**

IMAGE FROM INHABITAT.COM



### CORNELL UNIVERSITY

**INNOVATION HUB/RESEARCH CAMPUS:** The Bridge at Cornell Tech, in development. The Bridge, in development on Roosevelt Island in New York City, will be an innovation hub and campus for startups, entrepreneurs, investors, and established companies. "The Bridge will be...an ecosystem custom designed to accelerate the commercialization of new products and technologies."

**ADAPTIVE REUSE IN INNOVATION HUB/RESEARCH CAMPUS?** No. The project occupies the former site of the Coler-Goldwater Specialty Hospital on Roosevelt Island, but Cornell's campus on the island consists entirely of new construction. It does not appear to include the adaptive reuse of any older or historic structures.

### COLUMBIA UNIVERSITY

**INNOVATION HUB:** DST Innovation Lab, Columbia Startup Lab, and Brown Institute for Media Innovation. *DST Innovation Lab (Dynamical Systems Theory, Peace and Conflict):* "The goals of the Innovation Lab are to create opportunities, structures, and support mechanisms to bring together experienced scholars, practitioners, and scholar-practitioners working with complexity science, conflict, and peace to share leading-edge ideas, methods, and practices, and to inspire and support collaborative work in this area for moving the work forward." *The Columbia Startup Lab* is a co-working facility located at WeWork Soho West that provides subsidized space for 71 Columbia alumni entrepreneurs to house and nurture their fledgling ventures. The Lab is a partnership between Columbia College and the Schools of Business, Engineering, Law, and International and Public Affairs. *The Brown Institute for Media Innovation* is a collaboration between Columbia University and Stanford University, designed to encourage and support new endeavors in media innovation. At Stanford, the primary focus is on media technology, and the Institute is anchored in the School of Engineer. At Columbia, the primary focus is on content, and the Institute is anchored in the Graduate School of Journalism.

**RESEARCH CAMPUS:** No

**ADAPTIVE USE IN INNOVATION HUB/RESEARCH CAMPUS?** No . The DST Innovation Lab, Columbia Startup Lab, and the Brown Institute for Media Innovation are housed in new construction.

### BROWN UNIVERSITY

**INNOVATION HUB:** The Jonathan M. Nelson Center for Entrepreneurship, announced January 2016 and in development. The Center "will operate in collaboration with existing departments, schools, and centers at Brown to provide students with a strong academic grounding in entrepreneurship, blended with applied experiences and mentorship opportunities." The Center will be housed in a new building that will accommodate classrooms, workspace, and areas for faculty and students to collaborate on developing new ventures. Entrepreneurs-in-

residence and student-led activities will also be housed in the Center.

RESEARCH CAMPUS: No

ADAPTIVE USE IN INNOVATION HUB/RESEARCH CAMPUS? No. The Nelson Center for Entrepreneurship will be housed in a new purpose-built facility.

## PRINCETON UNIVERSITY

INNOVATION HUBS: Andlinger Center for Energy and the Environment, Keller Center for innovation in Engineering Education, Lewis-Sigler Institute for Integrative Genomics, Mid-InfraRed Technologies for Health and the Environment, the Princeton Institute for the Science and Technology of Materials (PRISM), the Princeton Neuroscience Institute, and the High-Performance Computing Research Center. With the exception of the Princeton Neuroscience Institute, all of these centers are housed in a single building constructed in the last 25 years. The Princeton Neuroscience Institute is housed in a small complex built in 2006.

RESEARCH CAMPUS: The James Forrestal Campus is a 1,600-acre complex located three miles from the main Princeton campus. It occupies the former campus of the Rockefeller Institute for Medical Research, which sold the property to Princeton in 1951. It is the home of the Program in Atmospheric and Oceanic Sciences and three research facilities, the Princeton Plasma Physics Laboratory, the Geophysical Fluid Dynamics Laboratory, and the Mechanical and Aerospace Engineer department's Gas Dynamics and Fluid Mechanics Laboratory.

ADAPTIVE USE IN INNOVATION HUB/RESEARCH CAMPUS? Yes. The Forrestal Campus uses a complex of 16 buildings constructed by the Rockefeller Institute for Medical Research in the early 20th century. In 1976, Princeton expanded the campus to 1,600 acres. The campus does not appear to include interpretive signage.

## DARTMOUTH COLLEGE

INNOVATION HUB: Dartmouth Entrepreneurial Network (DEN). "The Dartmouth Entrepreneurial Network (DEN) fosters and promotes entrepreneurship among students, faculty, clinicians, researchers, staff, alumni, and community members from all schools at Dartmouth, the Dartmouth-Hitchcock Medical Center (DHMC), and the Dartmouth Regional Technology Center (DRTC). The DEN includes over 45,000 people and 14 chapter cities, courses, workshops, speaker series, startup competitions, and networking activities. The DEN is a core component of the newly established Dartmouth Office of Entrepreneurship and Technology Transfer.

RESEARCH CAMPUS: No

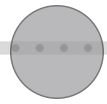
ADAPTIVE USE IN INNOVATION HUB/RESEARCH CAMPUS? No. The Dartmouth Entrepreneurial Network is housed in a new purpose-built facility.

**The James Forrestal Campus is located three miles from the main Princeton University campus. It occupies a complex that was originally constructed by the Rockefeller Institute for Medical Research in the early 20th century.**

IMAGE FROM PRINCETONCAMPUSPLANBLOG.COM







**Duke University's Innovation and Entrepreneurship Initiative occupies a portion of the Bullpen building, constructed in 1916 by the Imperial Tobacco Company of Great Britain and Ireland.**

IMAGE FROM SITES.DUKE.EDU



## DUKE UNIVERSITY

**INNOVATION HUB:** Innovation Co-Lab/Innovation Studio, Center for Entrepreneurship and Innovation, and the Duke Innovation and Entrepreneurship Initiative. The *Innovation Co-Lab/Innovation Studio* is a creativity incubator, “focused on exploring how new and emerging technologies can fundamentally reshape the research, academic, and service missions of the university.” The *Center for Entrepreneurship and Innovation* is part of the Fuqua School of Business. “The center will contribute both to the advancement of knowledge and the practice of entrepreneurship.” The *Duke Innovation and Entrepreneurship Initiative* is housed in the Bullpen and is the hub for all innovation and entrepreneurship activity at Duke University.

**RESEARCH CAMPUS:** North Carolina Research Campus. This research campus is a public-private research center on a 350-acre campus in Kannapolis, North Carolina. “The campus was formed through a partnership of private corporations, universities, and healthcare organizations, with the activities of the campus focused on human health, food, nutrition, and agriculture. Participating universities include: Duke University/MURDOCK Study, UNC Chapel Hill Nutrition Research Institute, North Carolina State University Plants for Human Health Institute, UNC Charlotte Bioinformatics Research Services Division, North Carolina Central University, and others.

**ADAPTIVE USE IN INNOVATION HUB/RESEARCH CAMPUS?** Yes. The Duke Innovation and Entrepreneurship Initiative is housed in the Bullpen building, which was constructed in 1916 by the Imperial Tobacco Company of Great Britain and Ireland. The Initiative occupies a portion of this adaptively-reused building, but it does not appear that Duke University oversaw the rehabilitation of the building. The building is currently owned by Measurement, Inc. The Initiative space within the building does not seem to include interpretive elements or signage; the Initiative’s website does include a narrative site history.

## UNIVERSITY OF CHICAGO

**INNOVATION HUB:** The Chicago Innovation Exchange (which will be housed under the umbrella of the Polsky Center for Entrepreneurship and Innovation, announced May 2016). “The Chicago Innovation Exchange is the University of Chicago’s new center to help scholars and entrepreneurs translate their ideas and new technologies into start-up businesses and products....The CIE provides space for proof-of-concept work, business incubation, collaboration opportunities, and programming for new ventures created by UChicago faculty, students, and staff, as well as local community entrepreneurs.”

**RESEARCH CAMPUS:** No

**ADAPTIVE USE IN INNOVATION HUB/RESEARCH CAMPUS?** Yes. The Chicago Innovation Exchange is housed on the second floor of the Harper Theater complex, with additional space in the adjacent building and the new Harper Court office building. The Harper Theater was constructed in 1915 as a 1,200-seat vaudeville house.

## STANFORD UNIVERSITY

INNOVATION HUB: The Brown Institute for Media Innovation, the Center for Social Innovation, the Meta-Research Innovation Center at Stanford. The *Brown Institute for Media Innovation* is “a collaboration between Columbia University and Stanford University, designed to encourage and support new endeavors in media innovation.” The *Center for Social Innovation* was established to “strengthen the capacity of individuals and organizations to develop innovation solutions to complex problems.” The *Meta-Research Innovation Center* is “a research-to-action center focused on transforming research practices to improve the quality of scientific studies in biomedicine and beyond.”

RESEARCH CAMPUS: Yes. The Stanford Research Park was established in 1951 as the Stanford Industrial Park. It is a technology park that covers 700 acres and hosts 162 buildings, 23,000 employees, and 140 different companies. The campus hosts the main headquarters for Hewlett-Packard and Tesla Motors.

ADAPTIVE USE IN INNOVATION HUB/RESEARCH CAMPUS? Yes. The Stanford Research Park was originally constructed in 1951 as the Stanford Industrial Park.

## UNIVERSITY OF CALIFORNIA - BERKELEY

INNOVATION HUB: The CITRIS Foundry, the Pantas and Ting Sutardia Center for Entrepreneurship and Technology, the Institute for Business Innovation, and the Jacobs Institute for All Things Design. The *CITRIS Foundry* “helps top entrepreneurs from the University of California build applied tech companies that make a significant impact on the world.” The *Pantas and Ting Sutardia Center for Entrepreneurship and Technology* is the primary hub on the UC-Berkeley campus for “the study and practice of ‘technology-centric’ entrepreneurship and innovation.” The *Institute for Business Innovation* “disseminates pioneering research on innovation, trains students to be inventive and entrepreneurial leaders, and facilitates innovation in both start-up and corporate domains.” The *Jacobs Institute for All Things Design* is an “interdisciplinary hub for learning and making at the intersection of design and technology.”

RESEARCH CAMPUS: Yes. The Berkeley Global Campus at Richmond Bay (in development) “will be a focal point for an international coalition of leading academic institutions and private sector and community partners.”

ADAPTIVE USE IN INNOVATION HUB/RESEARCH CAMPUS? No. With the exception of the Pantas and Ting Sutardia Center for Entrepreneurship and Technology, Berkeley’s other innovation hubs are housed in purpose-built new facilities. The Pantas and Ting Sutardia Center for Entrepreneurship and Technology is located in a larger historic building that has been rehabilitated, but was not adaptively reused specifically or exclusively for the Center.

**The Stanford Research Park was established by Stanford University in 1951. It spans 700 acres and hosts 140 different companies.**

IMAGE FROM PAHISTORY.ORG





## Appendix C: Internal Stakeholder Meetings

Over the course of four presentations, the following individuals participated in the stakeholder meetings:

### **FACILITIES AND REAL ESTATE SERVICES (FRES)**

Anne Papageorge, Vice President for Facilities and Real Estate Services

David Hollenberg, University Architect

Edward Datz, Executive Director of Real Estate Operations

Paul Sehnert, Director of Real Estate Development

Jennifer Rizzi, Director of Communications

### **OFFICE OF THE EXECUTIVE VICE PRESIDENT**

Anthony Sorrentino, Executive Director

### **OFFICE OF THE VICE PROVOST FOR FACULTY AFFAIRS**

Anita LaFrance Allen, Vice Provost for Faculty (Penn Law & University Arts Council)

### **OFFICE OF THE VICE PROVOST FOR RESEARCH**

Michael Borda, Director of Research Initiatives

### **OFFICE OF GOVERNMENT AND COMMUNITY AFFAIRS**

Jeffrey Cooper, Vice President

### **PENN CENTER FOR INNOVATION**

John Swartley, Executive Director & Associate Vice Provost for Research

Laurie Actman, Chief Operating Officer

### **PENN VET WORKING DOG CENTER**

Cynthia Otto, Executive Director

Vicki Berkowitz, Associate Director





## **PENN UNIVERSITY ARCHIVES AND RECORDS CENTER**

Mark Frazier Lloyd, Director

## **PENN FACULTY AND STAFF**

Francesca Ammon, Assistant Professor of City and Regional Planning, PennDesign

David Barnes, Associate Professor, History and Sociology of Science, Penn School of Arts and Sciences

Michael Grant, Director of Communications, PennDesign

Randall Mason, Associate Professor and Chair, Historic Preservation, PennDesign

Frank Matero, Professor of Architecture, PennDesign

