Historic Structure Report - Final Report

Williamsport Power Generating Station



Prepared by:

MTFA Architecture, PLLC

with

Robinson & Associates, Inc.
McMullan Consulting Engineers
2RW Consultants, Inc.
Jensen Hughes, Inc.
Tidewater, Inc.

US Department of the Interior • National Park Service • National Capital Area
Resource Stewardship and Science • Washington, DC • 2023

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US Department of the Interior
National Park Service
Resource Stewardship and Science
Washington, DC

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Cover Photo: Power House, view from southwest looking northeast, 2021

Title Page: Power House, detail view from southwest looking northeast, 2021

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Administrative Data

Name and Location data:	Williamsport Power Generating Station 205 West Potomac Street Williamsport, MD 21795
Preferred Structure Name:	Williamsport Power Generating Station
Other Historic Names Used:	Trolley Barn Williamsport Generating Station Hagerstown Railway Company Powerhouse Victor Cushwa & Sons Williamsport Powerhouse Williamsport Preservation Training Center Workshop Chesapeake & Ohio Canal National Historical Park Storage Building Williamsport Generating Station Williamsport Power House
Park:	Chesapeake and Ohio Canal National Historical Park
Structure State:	Maryland
NPS Region:	Region 1 - National Capital Area
Administrative Unit:	Chesapeake and Ohio Canal National Historical Park
NPS Property Number:	227787
Cultural Resource Inventory System ID No.:	012915
Square Feet:	5,670 square feet

National Register of Historic Places Status:	Entered- Documented
Date:	1971: Contributing feature of Chesapeake and Ohio Canal National Historical Park (National Register) 2001: Contributing feature of Williamsport Historic District (National Register)
National Monument:	1961
Significance:	Contributing feature of the Chesapeake and Ohio Canal National Monument

List of Abbreviations

ABAAS	Architectural Barriers Act Accessibility Standard
AMP	Asset Management Process
CHOH	Chesapeake and Ohio Canal National Historical Park
C&O	Chesapeake and Ohio Canal
D###	Door number
DOI	Department of the Interior
FMSS	Facility Management Software System
FY	Fiscal Year
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HALS	Historic American Landscape Survey
HPTC	Historic Preservation Training Center
HSR	Historic Structure Report
IBC	International Buildng Code
IEBC	International Existing Building Code
LOC	Library of Congress
MD	Maryland
NCA	National Capital Area
NCPE	National Council on Preservation Education
NFPA	National Fire Protection Association
NHL	National Historic Landmark
NPS	National Park Service
NRHP	National Register of Historic Places
R###	Room number
SHPO	State Historic Preservation Office
USACE	United States Army Corps of Engineers
USGS	United State Geological Survey
W###	Window number

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6 Figure 2. Detail from Charles Varlé's 1808 cadastral map of Frederick and Washington counties with the town of Williamsport circled in red. Varlé's map identifies the ferry crossing at Williamsport, the crooked path of Conococheague Creek, and the road network (on the Maryland side only) that connected Williamsport with nearby towns and villages. [Edward C. Papenfuse and Joseph M. Coale III, *Atlas of Historical Maps of Maryland, 1608-1908* (Baltimore: Johns Hopkins University Press, 1982), Figure 89.]

8 Figure 3. Map of Williamsport as published in an 1877 atlas of Washington County, Maryland. The route of the Western Maryland Railroad can be seen along the south bank of Conococheague Creek and along the east bank of the canal. Note the rail sidings connecting the main line with points along the canal basin. [*Illustrated Atlas of Washington County, Maryland* (Philadelphia, PA: Lake, Griffing and Stevenson, 1877).]

13 Figure 4. Photograph of the Williamsport Power Generating Station under construction circa July 1896. This image shows the south façade of the building after the walls and roof had been constructed but before the windows were installed. [Image Number 1131.1-99.35-5, Box labeled Drawer E, Box 1, Chesapeake & Ohio Canal National Historical Park Archive, Williamsport, Maryland]

15 Figure 5. This photograph of the powerhouse (looking east) is dated circa 1901 and is perhaps the best image found to date of its original design and construction. The boiler house was located in the west wing (foreground of image), and the engine house was in the west wing (background). Note the chimney stack and the monitor on the roof of the boiler house. A series of steps along the south façade (right side of image) provided access from the west yard to the south door of the engine room. [Ethel Lehman Deibert Collection, Western Maryland Room, Washington County Free Library]

15 Figure 6. Although the exact engine model used in the Williamsport Power Generating Station is unknown, this image from a Harrisburg Foundry & Machine Works catalog published in 1900 shows the front view of a Harrisburg Standard Simple Engine. [*A System of Engines and products of the Harrisburg Foundry and Machine Works* (Harrisburg, PA: Harrisburg Foundry and Machine Works, 1900), no page.]

15 Figure 7. A General Electric 16KW multipolar dynamo as featured in *Hawkins Electrical Guide* (1917). [Nehemiah Hawkins, *Hawkins Electrical Guide, Number One* (New York: Theo. Audel & Co., 1917), 157.]

17 Figure 8. Electric trolley on Potomac Street in Williamsport, circa 1906-1923. The power lines that supplied electricity to the motorized trolley cars are faint, but visible, in the image. [Reproduction Number LC-USZ62-35324, Prints and Photographs Division, Library of Congress]

21 Figure 9. (Left) Oscar T. Crosby, author of *The Electric Railway in Theory and Practice*, included model power station plans in his manual. In this plan for a small power plant, the structure is divided into two parts with a fire wall separating the boiler room from the engine and generators. [Oscar T. Crosby, *The Electric Railway in Theory and Practice* (New York, NY: W.J. Johnston Co., 1896), 175.]

21 Figure 10. (Right) This model plan for a mid-sized power plant accommodates four boilers, two engines, and four generators. [Oscar T. Crosby, *The Electric Railway in Theory and Practice* (New York, NY: W.J. Johnston Co., 1896), 177.]

22 Figure 11. Interior of the engine room of the Nassau Electric Railway powerhouse in Brooklyn, New York. Note the tall windows, trussed roof, and operable overhead crane. ["The Nassau Electric Railroad Company," *Street Railway Journal* 11, no. 9 (September 1895), 567.]

24 Figure 12. The Buffalo Street Railroad Company Powerhouse, 1892. ["The Street Railway System of Buffalo," *Street Railway Journal* 11, no. 3 (March 1895), 139.]

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27 Figure 14. Portrait photograph of Victor Cushwa. [Thomas J. C. Williams, *A History of Washington County, Maryland*, vol. 2 (Chambersburg, PA: J. M. Runk & L. R. Titsworth, 1906).]

28 Figure 15. Lithograph of the Embrey & Cushwa warehouse published in 1877. Note the rail siding of the Western Maryland Railroad that passed through the west end of the building. This track extended north along the east side of the canal basin and then along the west side of Lot 223, where the Williamsport Power Generating Station would be constructed less than ten years later. [*Illustrated Atlas of Washington County, Maryland* (Philadelphia, PA: Lake, Griffing and Stevenson, 1877).]

30 Figure 16. Development Concept Plan for the Williamsport Area of the C&O Canal NHP. The Williamsport Power Generating Station is identified as the "Trolley Power Station" on the plan. At the time, the plan for the building was to restore the building as a visitor contact facility. [National Capital Team/ Denver Service Center, National Park Service, "Development Concept Plan for the Williamsport Area, Chesapeake & Ohio Canal National Historical Park," May 1983.]

31 Figure 17. Map of the Williamsport district of the C&O Canal showing the locations of key resources. [Robinson & Associates (NPMap basemap)]

33 Figure 18. Williamsport Power Generating Station (looking east), 1978. In this image, the powerhouse appears to be being used as storage. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

34 Figure 19. The Williamsport Power Generating Station, circa 1983, when it was being used as a workshop by the Williamsport Preservation Training Center. [LCS Image Binder,

Chesapeake & Ohio Canal National Historical Park Archive, Williamsport, Maryland]

46 Figure 20. This photograph of the Williamsport Power Generating Station (looking east) is dated circa 1901 and is perhaps the best image found to date of its original design and construction. The boilers were located in the west wing of the building (center of photo), and the engine and generator were located in the east wing (visible at the right side of the photo). Note the stairs along the south façade (no longer extant), which were required due to the topography of the site. [Ethel Lehman Deibert Collection, Western Maryland Room, Washington County Free Library]

49 Figure 21. Plan showing the location and dimensions of the boiler foundation in the west wing (marked "lower level" on plan) and the location of a stepped brick foundation in the east wing (marked "upper level"). These underpinnings were separate from the building foundation. [Steven J. Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," prepared for the National Park Service, January 1978, Figure 7.]

49 Figure 22. Photo of the boiler foundation located in the west wing of the powerhouse and uncovered during archaeological investigations in 1978. [Steven J. Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," prepared for the National Park Service, January 1978, Plate 4.]

50 Figure 23. Photo of a stepped brick foundation in the east wing of the powerhouse and uncovered during archaeological investigations in 1978. [Steven J. Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," prepared for the National Park Service, January 1978, Plate 6.]

51 Figure 24. Photograph of the C&O Canal basin, circa 1900-1924. The Williamsport Power Generating Station is located in the left half of the image, partially obscured by a two-story warehouse. Note that chimney stack originally over the west wing had been removed by this date. [Image Number 1172.3-99.72-5, Box labeled Drawer E, Box 1, Chesapeake & Ohio Canal National Historical Park Archive, Williamsport, Maryland]

53 Figure 25. Detail from the 1929 Sanborn map of Williamsport. Both wings of the Williamsport Power Generating Station (on right, in pink to denote its brick construction) are labeled with the letter "A," which typically denotes a garage. The building in the middle of the image is the Cushwa Warehouse, and the building at the lower left is a gas station. [1929 Sanborn map, Western Maryland Room, Washington County Free Library, Hagerstown, Maryland]

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55 Figure 28. Partial north elevation, 1978. The right side of the image shows evidence of the small ell that originally extended from the north façade of the east wing. When the ell was removed, which likely occurred during the Victor Cushwa & Sons ownership period (1911-1974), the opening between the ell and the east wing was filled with brick, but the steel lintel was left in place. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

55 Figure 29. West elevation, 1978. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

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57 Figure 31. First-floor plan, Preliminary Preservation Drawings, Sheet 2, 1978. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

57 Figure 32. South and east elevations, Preliminary Preservation Drawings, Sheet 3, 1978. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

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Foreword

In 1896, industrialist and entrepreneur Victor Cushwa sold a piece of land adjacent to the Chesapeake and Ohio Canal to the Hagerstown Railway Company for the construction of a generating station to power a new trolley line connecting Williamsport to Hagerstown and beyond. Although the canal continued to operate profitably for another few decades, the trolley line marked a moment of change. Williamsport had become prosperous as the landmark center of the canal's 184.5 mile length, but the rail line and its hub and spoke system promised to connect Williamsport to cities beyond the Potomac River valley. The Williamsport Power Generating Station powered the inter-city trolley for only a few years and the building was eventually folded into Cushwa's assets adjacent to the canal. Located just steps away from the Cushwa Warehouse, which was so shaped by the needs of the canal, the juxtaposition of these two buildings testifies to the transportation history that transformed this region in the 19th and early 20th centuries.

In 1978, shortly after the National Park Service acquired the Power Generating Station, the organization undertook an historic structure report. In the last half-century, however, the building and the expectations for this type of report have evolved. This study documents the recent life of the building and provides the full and thorough evaluation and analysis associated with a modern historic structure report. In addition, this project includes the full documentation of the building to Historic American Building Survey standards and that information has been submitted for inclusion in the collection at the Library of Congress.

Many individuals contributed to the successful completion of this work, but we would particularly like to thank the following employees of the National Park Service; Katherine Boyle, Justin Ebersole, Christiana Hanson and Blyth McManus of the Chesapeake and Ohio Canal National Historical Park, and Elizabeth Milnarik of the National Capital Regional Office. Britton Baine and Haley Schriber of MTFA, and Daria Gasparini of Robinson and Associates played the most significant roles in shaping this document.

It is hoped this study will prove valuable to park management in their ongoing efforts to rehabilitate the Williamsport Power Generating Station and to everyone in understanding and interpreting its history in Williamsport, and the broader history of 19th century rail architecture in rural America. We are grateful for the contributions and cooperation of all those who helped make this document possible.

Executive Summary

This historic structure report (HSR) was developed from investigations, both archival and on-site, undertaken in 2021 and 2022 in support of the National Park Service's desire to update its treatment approach and its current use of the historic Power Generating Station building in Williamsport, Maryland. The generating station is a well-preserved example of late-nineteenth century industrial architecture, and its proximity to and association with the nearby Cushwa Warehouse also makes it important as a surviving structure related to the Chesapeake and Ohio Canal in Williamsport, along whose western boundary the canal passes.

This building has been the subject of an earlier HSR which was jointly written by John Milner Associates and Keast & Hood in 1978; it describes the building as it existed at that time, and makes recommendations for its stabilization and ongoing maintenance.

This report builds on the earlier report with expanded research into the building's historic background and context, including the context of the former Hagerstown Railroad Company and a history of nineteenth century power-house design. This report also revisits the preservation and interpretation recommendations made in the previous report. Finally, three options for interior alterations to the generating station were recently developed by the authors of this report to improve the functionality of the building which the Chesapeake and Ohio Canal National Historical Park currently uses as public exhibit space, staff work space, and storage. The National Park Service has chosen one of these three options, with revisions, for further development, and this report presents the specifics of this preferred option.

Project Participants

Chesapeake and Ohio Canal National Historical Park
Tina Capetta – Superintendent
John Adams – Safety Officer
Katherine Boyle – Historian
Patrick Coyle – Supervisory Facility Operations Specialist
Jeri DeYoung – Former Chief of Resource Management
Justin Ebersole – Cultural Resource Specialist
Richard Fallon – Facilities Operations Specialist
Christiana Hanson – Chief of Interpretation, Education and Volunteers
Brian Hixon – Exhibits Specialist
Blyth McManus – Museum Curator
Joshua Nolen – Park Ranger
(Paul) Doug Palmer – Maintenance Mechanic Work Leader
Joseph Reed – Civil Engineer
Stephanie Spencer – Facility Management Systems Specialist
Edward Wenschhof – Chief of Visitor and Resource Protection
James Yelton – Chief of Maintenance

National Capital Region
Julie McGilvray – Program Manager, Preservation Services
Courtney Magill – Architectural Conservator
Elizabeth Milnarik – Project Manager, Historical Architect

MTFA Architecture
James P. Clark, FAIA – Principal-in-Charge
Britton Baine, RA – Senior Preservation Architect
Haley Schriber – Construction Chronology Graphics
Michelle Ferguson – Layout and Production
Hasti Azar – Quality-Control Reviewer

Robinson & Associates, Inc.
Daria Gasparini – Architectural Historian
Tim Kerr – Architectural Historian

McMullan Consulting Engineers
Doug Bond, PE – Principal Structural Engineer
Becca Biskaduros, PE – Project Structural Engineer
Deion Peele, EIT – Structural Engineer

2RW Consultants
Lucas Hoffmann, PE - Senior MEP Engineer

Jensen Hughes
Erik Anderson, PE – Senior Fire Protection Engineer
Emily Thomas – Fire Protection Engineer

Tidewater, Inc.
Jason Gauthier – Asbestos Inspector
Joel Kissoondath – Lead Risk Assessor



Part 1: Developmental History

Historical Background and Content
Chronology of Development and Use
Physical Description
Character Defining Features
Conditions Assessment

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Historical Background and Context

PREHISTORY

The archaeological record indicates that from the Late Archaic Period through the Middle Woodland Period (5000 BCE-500 CE) the area of present-day Williamsport was likely used as a transitory stopping place by indigenous groups who practiced a hunting-gathering existence. Evidence of Iroquoian-speaking Montgomery Complex peoples within the flood plain west of Williamsport signifies that there may once have been small campsites or more substantial villages in the area before 1300 CE. During the Late Woodland Period, there is also evidence of Monongahela and Susquehannock occupations west of Williamsport in the larger Great Appalachian Valley region. These cultures practiced agriculture and conducted trade with other tribes and with European explorers.[1]

FOUNDING AND DEVELOPMENT OF WILLIAMSPORT

The earliest Europeans to explore the land that today comprises Washington County were most likely fur traders. Next to inhabit the area were farmers, predominantly of German and Scotch-Irish descent, who traveled from Pennsylvania to the lower Cumberland Valley throughout the eighteenth century in search of inexpensive and fertile land. In 1739, Charles Friend obtained a grant from the colonial proprietor, Charles Calvert II, Fifth Lord of Baltimore, or 260 acres called "Sweed's Delight" on the north bank of Conococheague Creek.[2] Friend and other newcomers cleared land, planted crops, mainly grains, raised livestock, and established grist and flour mills. A ferry crossing on the Potomac River near the mouth of Conococheague Creek was established in 1749, greatly facilitating regional travel and trade. As the population of western Maryland increased, new towns and political divisions were formed. Hagerstown (originally Elizabethtown) was chartered in 1763, and Washington County was formed in 1776 through the division of Frederick County.

Before the onset of the French and Indian War in 1754, which delayed new exploration in the region until the 1760s, Joseph Williams established a tavern at the mouth of Conococheague Creek. The tavern was located on

1 National Park Service, Cultural Landscapes Inventory (NPS CLI), "Williamsport, Chesapeake and Ohio Canal National Historical Park," 2018, 41-42.

2 Land and Community Associates, "Cultural Landscape Report, Chesapeake & Ohio Canal, National Historic Park," prepared for the National Park Service, 1994, 2-2.

a 223-acre tract of land leased from Lord Baltimore, who managed a vast landholding in western Maryland known as Conococheague Manor. By 1786, Joseph William's son, the American Revolutionary War general, Otho Holland Williams (1749-1794), had consolidated roughly 688 acres of land around the Conococheague Creek that included Springfield Farm, his boyhood home.[3] Williams set aside part of that land to establish a new town, initially called "Williams Port," and in November 1786, the Maryland General Assembly passed its first act of incorporation. The preamble to the act reveals Williams' intent to establish the town as a tobacco port. It reads, in part:

> WHEREAS it is represented to this general assembly by Otho Holland Williams, that he is possessed of part of a tract of land called Ross's Purchase, and of a tract of land adjoining thereto called Leeds, contiguous to the mouth of Conococheague creek, and that, from the advantages of navigation from the head branches of Patowmack river to the mouth of Conococheague, and the great prospect of the navigation of the said river being extended to tide water, on the application of many of the inhabitants of Washington county, he hath been encouraged and induced to lay out part of the said tracts into a town, and hath contracted with the commissioners of the said county to build a warehouse on the said land, and to furnish scales and weights for the inspection of tobacco…

On May 16, 1787, the town commissioners filed a plat with Washington County that laid off 82 acres into "lots, streets, and alleys." This plat was later amended, enlarged, and recorded in a map of Williamsport dated 1876 (Figure 1).[4] It shows a town laid out with a grid plan modified to accommodate a steep hillside or escarpment that ran roughly parallel to the Potomac River east of the floodplain. Starting on the north, Williamsport's east-west streets were Potomac (now also known as Route 11), Salisbury, Church, and Frederick. The north-south streets were Water, Vermont, Conococheague, and Artisan (now Artizan). Commerce Street, a diagonal

[3] This included a 528¾-acre tract known as Ross's Purchase and 160 acres known as Leeds. See Edward Smith, "Historic Resource Study, Williamsport, Maryland, Historical Data," prepared for the National Park Service, 1979, 6; and Harlan D. Unrau, "Historic Structure Report, The Cushwa Warehouse on the Chesapeake & Ohio Canal, Williamsport, Maryland, Historical Data," prepared for the National Park Service, 1977 (2012 edition), 1.

[4] Washington County Circuit Court, Deed Book 75, pages 719 and 719a.

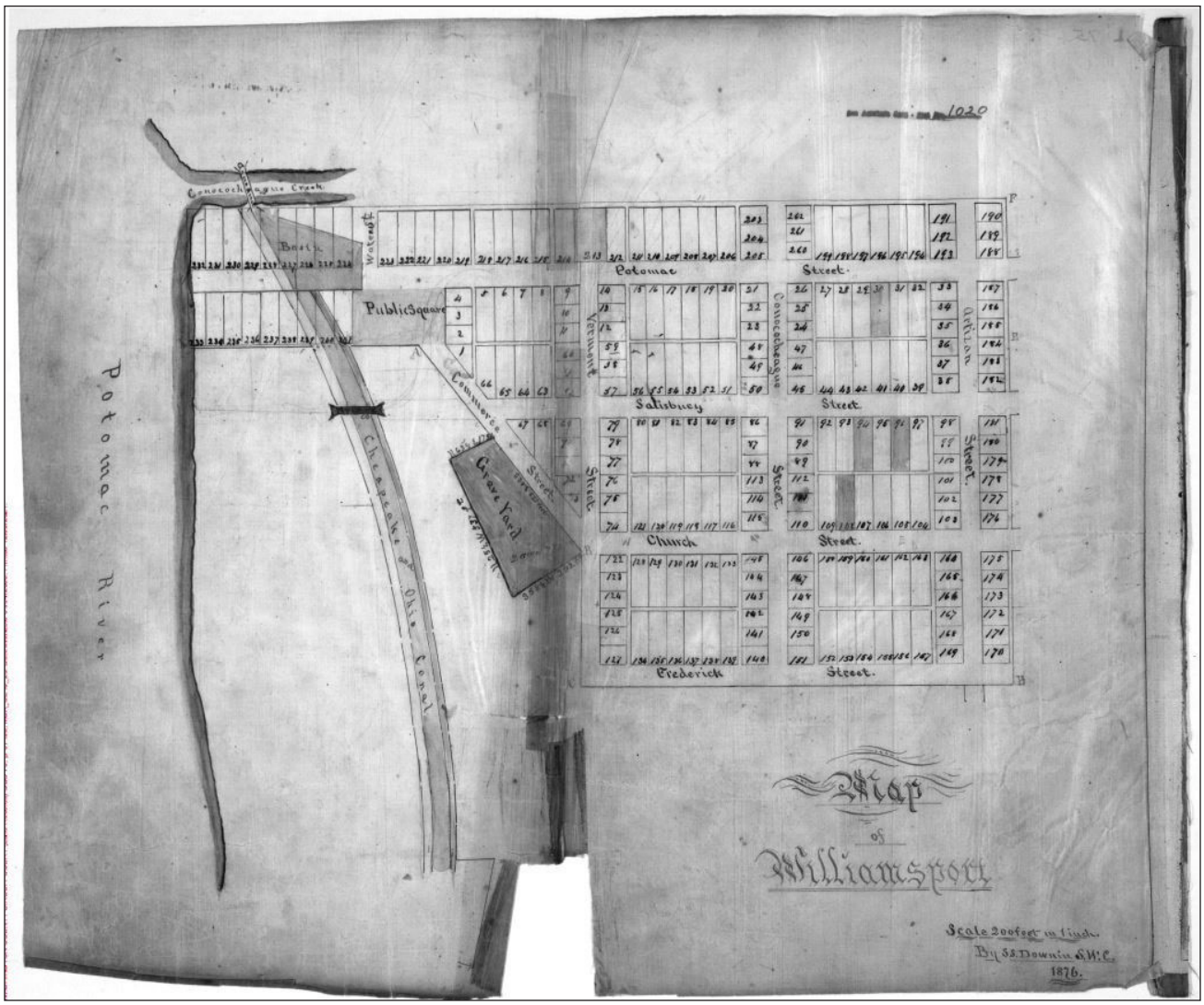


Figure 1. Map of Williamsport prepared in 1876. [Washington County Circuit Court, Deed Book 75, page 719a]

route that entered Williamsport from the south, skirted the eastern base of the escarpment. With the exception of Water, these street names remain in use today. As platted, the public square was located at the northwest edge of the grid, close to the junction of the river and creek and close to the ferry landing, which was at the west end of Potomac Street.

Unlike the Chesapeake region, tobacco culture never flourished in central and western Maryland, and Otho Williams' vision of the town as a tobacco port was never realized. Instead, Williamsport's prosperity derived from the seasonal shipment of flour and grains. Flour produced by grist mills located along Conococheague Creek was boated to Williamsport, where it was then



Figure 2. Detail from Charles Varlé's 1808 cadastral map of Frederick and Washington counties with the town of Williamsport circled in red. Varlé's map identifies the ferry crossing at Williamsport, the crooked path of Conococheague Creek, and the road network (on the Maryland side only) that connected Williamsport with nearby towns and villages. [Edward C. Papenfuse and Joseph M. Coale III, *Atlas of Historical Maps of Maryland, 1608-1908* (Baltimore: Johns Hopkins University Press, 1982), Figure 89.]

sold locally or shipped on the river to Georgetown and points between. River improvements and skirting canals carried out by the Patowmack (Potomac) Company between 1785 and 1802, greatly improved navigation along the Potomac between Cumberland (Maryland) and Georgetown (DC) and fostered the growth of Williamsport and other port towns. A well-established road network that connected Williamsport to Hagerstown, Frederick, Sharpsburg, and Martinsburg also facilitated the town's late eighteenth- and early-nineteenth-century development as a regional trading center (Figure 2).[5]

By 1820, the population of Williamsport numbered 827 residents, including 73 free Blacks and 119 enslaved people. Before slavery was abolished in Maryland in 1864, Washington County had a significant slave population and several slave markets (in Sharpsburg, Beaver Creek, and two in Hagerstown). Although documentation reviewed to date has not identified slave markets in Williamsport, its strategic location

[5] CLI, "Williamsport, Chesapeake and Ohio Canal National Historical Park," 2018, 44.

at a Potomac River ferry crossing and along key overland routes would have made it a likely place for the presence of both freedom seekers and slave catchers. Indeed, Williamsport was located along an escape route known as the Virginia Path, which started in Williamsport and paralleled Conococheague Creek north all the way to Harrisburg, Pennsylvania.[6]

ARRIVAL OF THE CHESAPEAKE AND OHIO CANAL AND THE WESTERN MARYLAND RAILROAD

The opening of the Chesapeake and Ohio (C&O) Canal was a seminal event in the history of Williamsport that spurred economic growth and transformed the community into a major regional shipping point. The canal's construction (1828-1850) was part of a larger, nationwide effort to revolutionize transportation in the early republic.

Construction of the C&O Canal began in 1828, and the canal opened between Georgetown and Williamsport in the spring of 1835. Williamsport was located near mile 100, between Locks 44 and 45. To facilitate the loading and unloading of products there, a basin was constructed on the berm side of the canal (the towpath was typically located on the river side of the canal). The basin allowed boat operators to move goods onto a wharf or into nearby warehouses without stopping the flow of traffic along the waterway, greatly increasing the capacity of tonnage shipped through the town and helping to establish Williamsport as a major stopping point along the canal.[7] North of the canal basin, an aqueduct carried canal boats across Conococheague Creek. The arrival of the C&O prompted town officials in Williamsport to embark on several public improvement projects, such as new and improved roads and the organization of a fire company.[8]

Before 1850, canal trade was predominantly agricultural, with lumber, lime, and stone shipped in lesser quantities. In the second half of the nineteenth century, coal became the chief commodity transported on the

6 Washington County Free Library, "Slavery in Washington County, Maryland, Mid-19th Century (1845-57)," accessed December 4, 2021, https://www.washcolibrary.org/assets/documents/NewsIndex_Slavery1845-1854.pdf.

7 NPS CLI, "Williamsport, Chesapeake and Ohio Canal National Historical Park," 2018, 41-42.

8 Smith, "Historic Resource Study, Williamsport, Maryland, Historical Data," 1979, 49, 51-52.



Figure 3. Map of Williamsport as published in an 1877 atlas of Washington County, Maryland. The route of the Western Maryland Railroad can be seen along the south bank of Conococheague Creek and along the east bank of the canal. Note the rail sidings connecting the main line with points along the canal basin. [*Illustrated Atlas of Washington County, Maryland* (Philadelphia, PA: Lake, Griffing and Stevenson, 1877).]

canal. In addition to supporting shipping and trade companies, the C&O encouraged the development of other industries in Williamsport. For example, water diverted through bypass flumes was used to power mills, and boat builders and repairmen benefitted from dry docks located along the berm side of the canal. Tourist activities also took place at the canal in Williamsport, where pleasure boats offered excursions to small groups.[9]

The C&O Canal entered a period of declining prosperity beginning in the 1850s due to mismanagement, a severe flood in April 1852, and

[9] NPS CLI, "Williamsport, Chesapeake and Ohio Canal National Historical Park," 2018, 50-52.

deferred repairs. During the Civil War, U.S. Army and Confederate troops were present in and near Williamsport, interrupting trade and further endangering the financial position of the canal company.

In 1861, in the early months of the Civil War, Confederate troops seized the ferry at Williamsport, and a skirmish ensued with United States troops assembled on the Maryland side of the river. Recognizing the strategic importance of Williamsport, the U.S. Army established a permanent post on the hillside east of the canal later that summer. Over the course of several days in December 1861, General Stonewall Jackson attempted to put the canal out of operation by destabilizing Dam 5, roughly 7 miles above Williamsport, but his efforts ultimately failed. During lulls in fighting, the canal was kept in operation. Following the Battle of Antietam in September 1862, U.S. Army troops burned the canal bridge and destroyed the pivot bridge at Lock 44, just south of Williamsport, in an effort to prevent Confederate troops from escaping by way of the town. The canal was repaired by October 1862, and navigation resumed that November. During the Confederate retreat from Gettysburg, part of General Lee's army crossed the river at Williamsport, leaving a severely damaged canal in their wake. There was additional military activity in Williamsport as a result of Confederate raids into Western Maryland from late spring 1864 into the fall. By late October 1864, however, the canal at Williamsport resumed normal operations. After repairs necessitated by the war, the tonnage of commodities (primarily coal) shipped on the canal increased year after year, allowing the company to pay off its debts from the previous decade. [10]

By the 1870s, Williamsport had become a thriving community of over 1,200 residents, with six churches, two schools, a bank, several groceries, hotels, taverns, and a large cemetery (Figure 3). Industries included a tannery, brickyard, coal and lumber yards, saw and grist mills, and a brewery.[11] An African American church and school were located on Artisan Street. Periodically, Williamsport experienced major floods that

[10] NPS CLI, "Williamsport, Chesapeake and Ohio Canal National Historical Park," 2018, 54-56; and Edward D. Smith, "Historic Structure Report, Williamsport Power House, Historical Data," prepared for the National Park Service, 1978, 74-89.

[11] *Illustrated Atlas of Washington County, Maryland* (Philadelphia, PA: Lake, Griffing and Stevenson, 1877), available at the Western Maryland Regional Library, Hagerstown, Maryland, or at http://www.whilbr.org/WashingtonCounty1877/index.aspx.

had disastrous consequences for its residents and businesses. The flood in 1889, for example, caused the C&O Canal to close for over a year.[12]

In 1873, a line of the Western Maryland Railroad was constructed from Hagerstown to the canal at Williamsport, officially opening on December 17 of that year. The Western Maryland Railroad was chartered (under a different name) in 1852 with the purpose of creating a rail connection between Baltimore and the farming communities of central and western Maryland, eventually reaching Hagerstown in 1872. A depot, engine house, and turn table were built in Williamsport near the south bank of Conococheague Creek, west of Conococheague Street (Figure 3). From there, the route of the railroad followed the south bank of the creek before turning south along the canal and terminating at a local coal yard. Rail sidings provided direct access to the canal basin.

Despite the arrival of the railroad, the C&O Canal remained an important asset to Williamsport. In fact, the period between 1870 and 1875 has been described as the "Golden Age" of the canal, when yearly canal tonnage nearly reached 1 million tons.[13] After this period, competition with railroads caused coal shipments and canal revenues to decline. Floods in 1886 and 1889 caused extensive damage, leaving the canal company, which was already in a financially precarious situation, hopelessly insolvent with no prospect for resuming operations. In 1890, a bankruptcy court gave control over the canal company to trustees for the bondholders and allowed the trustees to operate it under court oversight.[14] The trustees made the repairs necessary to bring the canal back into operation following the 1889 flood and entered into agreements with several Cumberland coal mining companies, including the Consolidation Coal Company, that pledged to ship certain tonnages of coal via the canal per year.

During this period of the C&O's management, only minimal resources were invested in maintaining or improving the canal and its associated resources. One casualty of deferred maintenance was the Conococheague Aqueduct,

12 National Register of Historic Places Registration Form, "Williamsport Historic District (WA-I-845)," 2001, Section 8, page 14.
13 NPS CLI, "Williamsport, Chesapeake and Ohio Canal National Historical Park," 2018, 56-57.
14 Author email correspondence with CHOH Archaeologist, Justin Ebersole, citing research on the 1889-1890 C&O Canal bankruptcy by historian Karen Gray.

which had been completed in 1835.[15] Early on the morning of April 20, 1920, the east parapet of the structure collapsed while a canal boat was crossing it. The structure, originally built of stone, was repaired with concrete, heavy timber, and wood planks, and operations were restored within a few weeks following the collapse. By this date, however, modern transportation systems had made the canal obsolete, and its future looked bleak. In 1924, two floods within a two-month period struck the C&O, placing a huge financial strain on the company, one from which it did not recover. Navigation operations ceased that year, ending canal commerce in the Potomac Valley.

THE HAGERSTOWN RAILROAD COMPANY

The first electric railway (or trolley) system in the United States began operations in Richmond, Virginia, in February 1888. The technology proved safe and reliable and was quickly adopted by cities and towns across the country. Electric power was cleaner and more efficient that the animals used for horse-drawn streetcars and an attractive alternative to steam-powered locomotives, which were noisy, produced smoke and embers, and emitted noxious fumes. The first electric streetcar in Washington, DC – the Eckington and Soldiers' Home Railway – was chartered in June 1888 and began operations that October.[16] Interurban and suburban electric railway lines soon followed, with the latter encouraging the growth of residential developments that attracted a wide range of socioeconomic groups. Electric railways were first developed in western Maryland for passenger service and to transport produce from farms to markets.

The Hagerstown Railway Company was chartered and given a municipal franchise from the city of Hagerstown on March 12, 1896, for the purpose of operating an electric-powered passenger railway in that city with lines to Williamsport and Funkstown. The incorporators included four men from Hagerstown (J. Irvin Bitner, A. J. Eyerly, John H. Blake, and McKinley B. Embrey) and three "foreign" directors from Harrisburg, Pennsylvania (J. A. Herman, William Jennings, and Christian W. Lynch), who were also

[15] Written Historical and Descriptive Data, Chesapeake & Ohio Canal, Conococheague Creek Aqueduct, Historic American Engineering Record, HAER No. MD-123, 24.

[16] LeRoy O. King, Jr., *100 Years of Capital Traction: The Story of Streetcars in the Nation's Capital* (Dallas, TX: Taylor Publishing Company, 1972), 17.

the principal investors in the project.[17] The company's agreement with the city stipulated that it had two months to start work on the railway and a total of eight months to complete it. Thus, after posting a $5,000 guarantee with a local bank, the company quickly initiated the survey work, started planting poles, and entered into negotiations with representatives of the Williamsport Turnpike Company concerning the right of way over the pike. The company also hired Dr. Samuel Ritter Ickes and J. E. Knepp of the Harrisburg Construction Company as construction superintendents.[18] The previous year, Ickes and Knepp had been involved in the defunct Hagerstown & Potomac Electric Railway, and the roadbed constructed for that railway was ultimately acquired by the Hagerstown Railway Company to use as part of its system.[19] The town of Williamsport passed an ordinance permitting the company to use its streets for an electric railway on April 9 with a similar timeline for construction as the one established by Hagerstown.[20] The tracks of the electric-powered Hagerstown Railway entered Williamsport along Potomac Street and were entirely independent of those of the Western Maryland Railroad, which had completed a line to Williamsport in 1873.

Initially, the Hagerstown Railway Company planned to procure electricity from a power plant in Hagerstown owned by the Schuyler Electric Company, which had been purchased by local businessman Powell Evans in 1895. When a deal with Evans could not be reached, the company set about building a power plant of their own in Williamsport. This power plant would produce electricity solely for the use of the Hagerstown Railway Company. The town of Williamsport

17 McKinley B. Embrey (1867-1912) was the grandson of Williamsport commission merchant Charles Embrey, who leased, then ultimately purchased, in 1864, the warehouse later known as the Cushwa Warehouse. After helping to incorporate the Hagerstown Railway Company in 1896, McKinley B. Embrey relocated to Brooklyn, New York, where he fell on hard times. In early 1911, while working as a bookkeeper, he was found guilty of stealing from his employer and sentenced to serve time in Sing Sing Prison. He died in 1912. See 1910 United States Federal Census [database on-line] (Lehi, UT: Ancestry.com Operations Inc, 2006); and Arthur D. Welton, ed., *Proceedings of the Thirty-Seventh Annual Convention of the American Bankers Association* (New York, NY: The Association, 1911), 167.

18 "Passed and Approved," *Hagerstown Morning Herald*, March 13, 1896; "To Survey on Monday," Hagerstown Morning Herald, March 21, 1896; and "The Street Railway," *Hagerstown Morning Herald*, March 25, 1896.

19 Dr. S. Ritter Ickes received his medical degree from Western Reserve University in Cleveland, Ohio, and practiced medicine for several years there before embarking on a new career as a promoter and operator of electric railways. In addition to Hagerstown, he was involved with trolley projects in Pennsylvania and in Canada. See "Street and Electric Railways," Engineering News and American Railway Journal 34, no. 23 (December 1895), 183; and Robert Flickinger, *The Flickinger Family History* (Des Moines, IA: Success Composition and Printing Co., 1927), 171.

20 "To Enter Williamsport," *Hagerstown Morning Herald*, April 10, 1896.



Figure 4. Photograph of the Williamsport Power Generating Station under construction circa July 1896. This image shows the south façade of the building after the walls and roof had been constructed but before the windows were installed. [Image Number 1131.1-99.35-5, Box labeled Drawer E, Box 1, Chesapeake & Ohio Canal National Historical Park Archive, Williamsport, Maryland]

built a power plant to furnish municipal electric light around 1899. This plant was located along the 700 block of North Conococheague Street.[21]

Williamsport was selected for the site of the Hagerstown Railway Company power plant in order to "secure the advantages of an unlimited amount of water power and coal," which at the time was forty cents a ton cheaper there than in Hagerstown.[22] Several locations in Williamsport were considered, but the final choice was a site that spanned two parcels owned by Victor Cushwa, one of the area's leading businessmen and coal distributors, who had purchased it from his former business partner, Theodore Embry, in 1880. The railway paid Cushwa a minimal sum for the lots ($5 dollars), essentially acquiring it through donation. Although the Western Maryland Railroad was entirely independent of the trolley, its tracks crossed the southeast corner of the powerhouse parcel as the line turned south in front of the Cushwa Warehouse to run parallel with the canal (Figure 3). As such, the deed of sale stipulated that the transfer was subject to any rights the Western Maryland Railroad Company may have to the ground occupied by the tracks and switches located on the land.[23] By locating its power station in Williamsport, the trolley company was ensured a reliable supply of fuel, due to its proximity to nearby canal related coal distribution operations, at a relatively low cost, as shipping fees were nonexistent. Although there is no record that Cushwa supplied the trolley company with coal, it would have been a way for him to quickly recoup the revenue lost when he donated land to the company for the construction of the powerhouse.

By May 7, 1896, the Hagerstown Railway Company had broken ground for the construction of the powerhouse.[24] Due to Williamsport's history with floods, the foundation was located on the most elevated portion of the site, which required leveling part of a hillside. It is unknown what role Ickes and Knepp, in their capacity as the trolley company's construction supervisors, may have had in the design of the powerhouse or whether the firm they were associated with, the Harrisburg Construction Company, was the builder. Previous studies of

21 Smith, "Historic Resource Study, Williamsport, Maryland, Historical Data," 1979, 103 and footnote 426; and National Register of Historic Places Registration Form, "Williamsport Historic District (WA-I-845)," 2001, Section 8, page 13.

22 "Trolley Chat," *Hagerstown Morning Herald*, April 20, 1896.

23 It is interesting to note that the deed for the land is dated June 3, 1896, nearly a month after construction began on the site. See Washington County Circuit Court, Land Records, 1896-1897, Deed Book 105, pages 52-53.

24 "Powerhouse Work," *Hagerstown Morning Herald*, May 8, 1896.



Figure 5. This photograph of the powerhouse (looking east) is dated circa 1901 and is perhaps the best image found to date of its original design and construction. The boiler house was located in the west wing (foreground of image), and the engine house was in the west wing (background). Note the chimney stack and the monitor on the roof of the boiler house. A series of steps along the south façade (right side of image) provided access from the west yard to the south door of the engine room. [Ethel Lehman Deibert Collection, Western Maryland Room, Washington County Free Library]

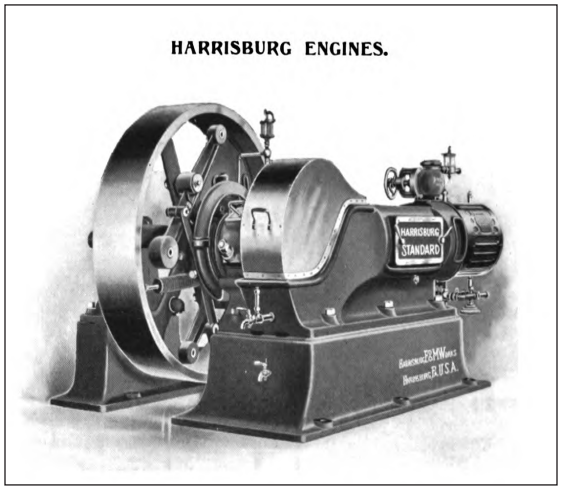


Figure 6. Although the exact engine model used in the Williamsport Power Generating Station is unknown, this image from a Harrisburg Foundry & Machine Works catalog published in 1900 shows the front view of a Harrisburg Standard Simple Engine. [*A System of Engines and products of the Harrisburg Foundry and Machine Works* (Harrisburg, PA: Harrisburg Foundry and Machine Works, 1900), no page.]

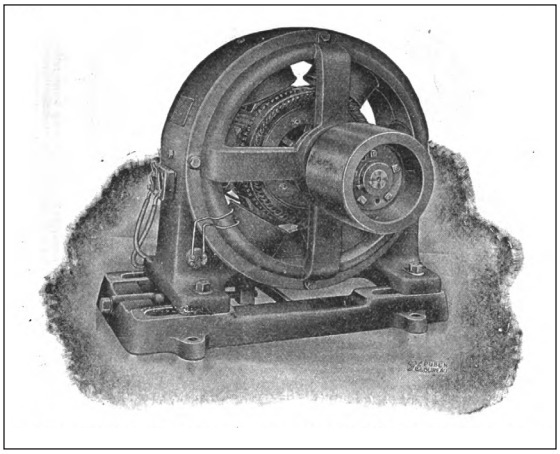


Figure 7. A General Electric 16KW multipolar dynamo as featured in *Hawkins Electrical Guide* (1917). [Nehemiah Hawkins, *Hawkins Electrical Guide, Number One* (New York: Theo. Audel & Co., 1917), 157.]

the powerhouse state that it was probably constructed using brick supplied by Victor Cushwa's newly established brickworks and that one of Cushwa's sons, David K. Cushwa, obtained the contract for excavating the site (Figure 4).[25]

On May 25, the Hagerstown Morning Herald reported that "the Williamsport powerhouse should be completed within two or three weeks. It is to be a 45 x 90 foot brick building."[26] While the Morning Herald's construction timeline proved to be a bit exaggerated, the work proceeded as quickly as weather permitted. By June 6, the boilers were installed, and the powerhouse (its actual dimensions were roughly 45 by 81 feet) was completed by August 3 (Figure 5).[27] The machinery included boilers and engines manufactured by Harrisburg Foundry & Machine Works (Figure 6) and a General Electric dynamo (Figure 7).[28] The term dynamo referred to electrical generators capable of delivering power for industry. Although the exact number of boilers, engines, and generators used at the Williamsport Power Generating Station is unknown, one can draw a comparison with the powerhouse in Middletown (no longer extant) that supplied electricity for the Frederick & Middletown Railway. This electric railway was established in 1896 and later called the Frederick Railway. Its powerhouse was fitted with "a battery of five boilers, furnishing steam to two compound engines of 1,000 HP capacity" and "two direct current and two alternating current generators, with the necessary exciters, transformers, switch-boards, etc."[29]

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25 Smith, "Historic Structure Report, Williamsport Power House, Historical Data," 1978, 4-5. Smith cites the *Hagerstown Daily Mail*, April 21 and May 7, 1896.

26 "Trolley Topics," *Hagerstown Morning Herald*, May 25, 1896.

27 "Trolley Topics," Hagerstown *Morning Herald*, June 6, 1896; and Smith, "Historic Structure Report, Williamsport Power House, Historical Data," 1978, 7. For the end date of construction Smith cites the *Hagerstown Daily Mail*, August 3, 1896.

28 There are two sources of information regarding what equipment was used at the Williamsport Power Generating Station. The first, an 1897 issue of *American Street Railway Investments*, states that the Hagerstown Railway Company used Harrisburg Foundry & Machine Works engines and General Electric dynamos. See *American Street Railway Investments, A supplement to the Street Railway Journal* (New York, NY: The Street Railway Publishing Company, 1897), 105. The 1978 archaeological report, citing the August 31, 1898, issue of *American Street Railway Directory*, states that the equipment included a 200-kilowatt General Electric generator, a 300-horsepower, high-speed, automatic engine made by Harrisburg Foundry & Machine Works, and a 300-horsepower, water-tube boiler also made by Harrisburg Foundry & Machine Works. Although this reads as if the powerhouse was equipped with only one boiler, engine, and generator, the report goes on to clarify that the powerhouse likely had two boilers based on the configuration of the boiler foundation. See Steven J. Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," prepared for the National Park Service, January 1978, 36-37.

29 This quotation comes from company documents that are part of the American Waterworks and Electric Company/Potomac Edison Company archive at the Pennsylvania Trolley Museum in Washington, Pennsylvania. See author



Figure 8. Electric trolley on Potomac Street in Williamsport, circa 1906-1923. The power lines that supplied electricity to the motorized trolley cars are faint, but visible, in the image. [Reproduction Number LC-USZ62-35324, Prints and Photographs Division, Library of Congress]

When it started operation in the late summer of 1896, the Hagerstown Railway Company included an urban loop in Hagerstown and a branch line to Williamsport which ran along Potomac Street (Figure 8) to Conococheague Street or just beyond, roughly two blocks from the powerhouse.[30] Initially, the speed of the cars was limited to 8 miles per hour, meaning that the 6-mile trip between Hagerstown and Williamsport could take up to 45 minutes. Later, greater speeds of up to 25 miles per hour were allowed, substantially shortening the trip.[31] The railway had 13 miles of track and twelve cars, of which nine were motor cars and three were trail cars. While motor cars were self-propelled, trail cars had to be coupled with a powered car and towed. Both types could carry passengers. While the bulk of the railway's business was passenger service, it also operated a small number of frieght cars. The railway's fleet included six cars purchased second-hand from the Martinsburg

correspondence with Reuben Moss, President/Curator of the Hagerstown & Frederick Railway Historical Society, Inc., November 23, 2021. According to Moss, the American Waterworks and Electric Company/Potomac Edison Company archive has no records related to the Williamsport Power Generating Station.

30 Service was inaugurated on the line between Williamsport and Hagerstown on August 8, 1896, and the Hagerstown loop that September. See Frank Tosh, "The Hagerstown & Frederick Railway Company," *The Headway Recorder* 23, no. 1 (1963), 1-4.

31 J. Alan Campbell, "History and Construction of the Street Railway System of Hagerstown, MD," 1934, unpublished manuscript available at the Western Maryland Room, Washington County Free Library, Hagerstown, Maryland.

Street Railway Company of Martinsburg, West Virginia, and six new cars built by the New Castle Car Company of New Castle, Pennsylvania. The following spring, a branch from Hagerstown to Funkstown was completed. That summer, the Baltimore Sun reported: "The building and operation of an electric railway in Hagerstown, with branches to Williamsport and Funkstown, was long considered a risky venture financially, and when the Hagerstown Railway Company last spring was organizing many persons predicted that the road would not pay for some years. The road has now been in operation nearly a year… The net profits per month were $900, or $10,800 a year."[32]

The Williamsport Power Generating Station only operated as the primary power station for the Hagerstown Railway for a little over two years. Due to growth in power demand, the company needed a larger facility, and, beginning in early 1897, it contracted with the Philadelphia architect and builder Charles McCaul to furnish plans for a new powerhouse to be located in Hagerstown.[33] Construction began in 1898 and was delayed three times that year – twice by storms that destroyed the walls and a third time due to a construction accident during which "the last of the iron roof trusses was being placed in position when it swayed and fell, displacing the other girders, all going down in a mass, crushing out the newly erected walls, and leaving the structure a heap of ruins for the third time."[34] The new powerhouse in Hagerstown was located at the corner of Summit Avenue and Lee Street. This plant was superseded by a new power generation station built in Security, Maryland, in 1913.[35] The Lee Street plant was eventually converted into a car barn in 1917 and was expanded in the 1930s to accommodate buses.[36] The same year saw the railway company expanding into the business of municipal lighting. It purchased the Hagerstown power plant owned by Powell Evans and submitted a proposal to provide arc lights to the city.[37] Although the town considered purchasing the trolley company's Williamsport plant once it was decommissioned in 1898, it instead built a municipal power station along

32 "Electric Railways," *Baltimore Sun*, August 5, 1897.
33 "The Real Estate World," *Philadelphia North American*, January 25, 1897.
34 "Personal and Miscellanea," *Electricity* 15, no. 18 (November 9, 1898), 283.
35 This building still stands and is occupied by Allegheny Door and Hardware. See author correspondence with Reuben Moss, President/Curator of the Hagerstown & Frederick Railway Historical Society, Inc., December 1, 2021.
36 Paul S. Reed & Associates, Inc., Maryland Inventory of Historic Properties Form, "Hagerstown and Frederick Railway Car Barn," 2003.
37 "Hagerstown Lights," *Baltimore Sun*, June 22, 1898, June 30, 1898, and July 2, 1898.

North Conococheague Street the following year.[38] Local trolley historians conjecture that the Williamsport Power Generating Station may have been maintained for a short time as a backup power system after the Lee Street plant was built.[39] When the Williamsport plant was eventually decommissioned, its equipment may have been relocated to new plants being built elsewhere.

An important milestone in the history of the Hagerstown Railway occurred in 1913, when the trolley company merged with the Frederick Railway (established in 1896 and originally called the Frederick & Middletown Railway) to form the Hagerstown & Frederick Railway Company. Using this single-track, interurban line, passengers could travel continuously between the two cities in two hours, with stops in Braddock Heights, Middletown, Myersville, Mt. Lena, Beaver Creek, and Funkstown along the way. While it was primarily a passenger line, freight cars also shared the tracks.

By the early twentieth century, in Williamsport and across the country, the number of residential and commercial energy consumers was growing. Signaling this demand, in the decade following its consolidation, the Hagerstown & Frederick Railway Company transitioned from a transit company to a company that earned most of its revenue by selling electricity.[40] In 1922, the Potomac Public Service Company, later renamed the Potomac Edison Company, acquired the Hagerstown & Frederick Railway Company and its powerplants. This corporate takeover reflected national trends, as expanding electric light and power companies turned to the acquisition of transit companies as an immediate source of supply. Consequently, many of today's public utility companies had their beginnings operating streetcar systems.

Potomac Edison gradually began to replace the Hagerstown & Frederick Railway trolley service with bus service. The introduction of bus systems, combined with rising automobile ownership and

38 Smith, "Historic Structure Report, Williamsport Power House, Historical Data," 1978, 103 and footnote 426; and "Washington County," *Baltimore Sun*, July 27, 1899.

39 Edward Smith notes, "A longtime resident of Williamsport who grew up near the original power house has stated that it was not abandoned until around 1901." See Smith, "Historic Structure Report, Williamsport Power House, Historical Data," 1978, 10; and Author correspondence with Reuben Moss, President/Curator of the Hagerstown & Frederick Railway Historical Society, Inc., November 23, 2021, and December 1, 2021.

40 Hagerstown & Frederick Railway Historical Society Inc., "History of the H&F, Company Growth and Consolidation," accessed November 18, 2021, https://hfrhs.org/history/; and Reuben Moss, video titled "Tracing the Hagerstown and Frederick," 2015 edition, accessed November 18, 2021, https://rmossphotography.com/trolley/.

improved roads, brought about the obsolescence of many of the area's interurban trolley lines by the late 1940s. The Hagerstown & Frederick Railway line to Williamsport operated its last trolley on August 4, 1947, and discontinued its passenger service altogether in 1954.[41]

NINETEENTH-CENTURY POWERHOUSE DESIGN

While the opportunity of donated land in Williamsport must have had an influence on the Hagerstown Railway Company's decision to build the powerhouse there, other factors almost certainly came into play. Trade journals, technical manuals, and other literature of the period provided the owners and managers of trolley and lighting companies with ample guidance on all aspects of the electrical industry, including the construction and operation of power stations. In 1896, the electrical engineer and public utilities executive, Oscar T. Crosby, published the second edition of his book, *The Electric Railway in Theory and Practice*.[42] In it, Crosby devoted an entire chapter to power stations. The factor that should go farthest in determining the location of the power station, he wrote, is the availability of fuel. He reasoned that since most companies were dependent on the railroads for the transportation of coal, the power station would be ideally located near railroad tracks and "so placed that coal cars can be run up to its very door and the fuel shoveled directly into the coal bins."[43] Proximity to water of suitable quality for use in the station's boilers was the next most important factor. Similar instruction was given in C. Francis Harding's book, *Electric Railway Engineering*, published in 1911. Harding wrote that the power station should be located on a railroad siding, in the vicinity of a navigable river, or at a point where coal may be deposited directly from the coal barges.[44]

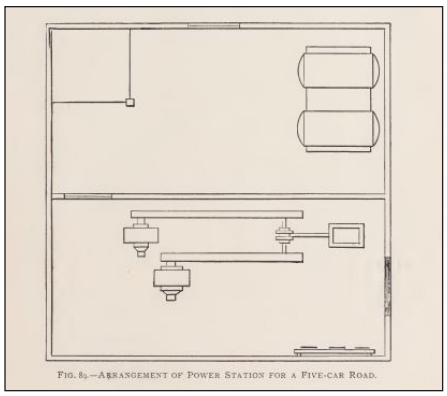
By this date, Williamsport had become an important coal interchange along the C&O Canal. Coal was transported on canal boats from Cumberland to Williamsport where it was sold locally or transferred to

41 Frank Tosh, "The Hagerstown & Frederick Railway Company," *The Headway Recorder* 23, no. 1 (1963), 6-7.

42 Crosby became the first president of the Potomac Electric Power Company of Washington, D.C., in 1896. The first edition of his book was published in 1892. See Library of Congress, Manuscript Division, "Oscar Terry Crosby Papers: A Finding Aid to the Collection in the Library of Congress," accessed November 22, 2021, http://rs5.loc.gov/service/mss/eadxmlmss/eadpdfmss/2005/ms005003.pdf.

43 Oscar T. Crosby, *The Electric Railway in Theory and Practice* (New York, NY: W.J. Johnston Co., 1896), 161.

44 C. Francis Harding, *Electric Railway Engineering* (New York: McGraw-Hill Book Company, 1911), 145-146.



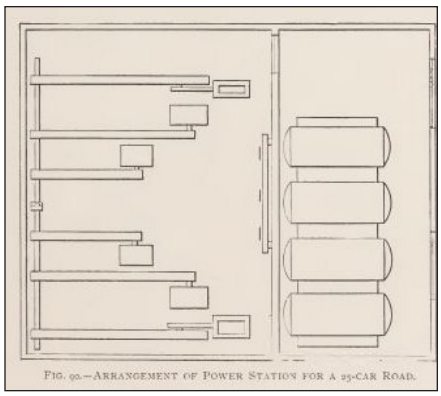


Figure 9. **(Left)** Oscar T. Crosby, author of *The Electric Railway in Theory and Practice*, included model power station plans in his manual. In this plan for a small power plant, the structure is divided into two parts with a fire wall separating the boiler room from the engine and generators. [Oscar T. Crosby, *The Electric Railway in Theory and Practice* (New York, NY: W.J. Johnston Co., 1896), 175.]

Figure 10. **(Right)** This model plan for a mid-sized power plant accommodates four boilers, two engines, and four generators. [Oscar T. Crosby, *The Electric Railway in Theory and Practice* (New York, NY: W.J. Johnston Co., 1896), 177.]

the Western Maryland Railroad and shipped to points north and east.[45] At the time, Victor Cushwa was one of the area's leading coal merchants. In 1880, he had become a distributor for the Consolidation Coal Company, which was headquartered in Cumberland, but he also purchased from other firms, such as Piedmont Coal & Iron Company, Cumberland Bituminous Coal Company, and George's Creek Cumberland Coal.[46]

By the late nineteenth century, the most widely used prime mover for generating electrical power for traction purposes was the steam engine.[47] Lewis Latimer's pioneering book on electric lighting, *Incandescent Electric Lighting, A Practical Description of the Edison System*, included a section on the design of power stations that described in detail the central power station of the Edison Electric Illuminating Company in Brooklyn, New York.[48] This was a three-story building measuring 75 by 100 feet. The first floor was divided into two sections with the engines (each belted to two generators) located in the front half and the boilers in the rear. Over the engine room on the second floor were the dynamos. Overhead travelling cranes facilitated the handling of the machinery. At the rear of the second floor were coal storage bins, water tanks, and a water heater. Offices, supply rooms, and workshops were located on the top floor, and in the basement were ashpits,

45 Unrau, "Historic Structure Report, The Cushwa Warehouse on the Chesapeake & Ohio Canal, Williamsport, Maryland, Historical Data," 1977 (2012 edition), 17.

46 Miscellaneous business records, Box: Cushwa, Victor (Co.), Western Maryland Room, Washington County Free Library, Hagerstown, Maryland.

47 Crosby, *The Electric Railway in Theory and Practice*, 29.

48 Lewis H. Latimer was one of the first major African American inventors. He worked as an assistant to Alexander Graham Bell and later became a member of Thomas Edison's research team. See Luvenia George, Smithsonian National Museum of American History, "Innovative Lives: Lewis Latimer (1848-1928): Renaissance Man," accessed November 29, 2021, https://invention.si.edu/innovative-lives-lewis-latimer-1848-1928-renaissance-man.

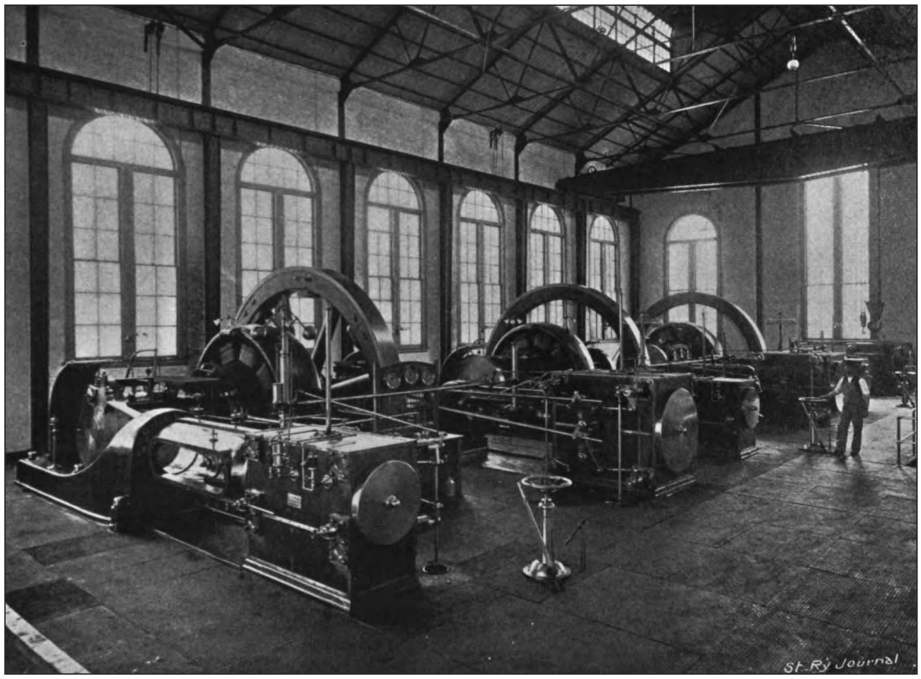


Figure 11. Interior of the engine room of the Nassau Electric Railway powerhouse in Brooklyn, New York. Note the tall windows, trussed roof, and operable overhead crane. ["The Nassau Electric Railroad Company," *Street Railway Journal* 11, no. 9 (September 1895), 567.]

smoke flues, pump rooms, and coal storage vaults. While Latimer's book described a large municipal plant, later manuals provided guidance on the layout of small power stations, such as that constructed in Williamsport.

In *The Electric Railway in Theory and Practice* (1896), for example, the author provided model floor plans for powerhouses serving a five-car trolley line (Figure 9) and a twenty-five-car line (Figure 10). As a frame of reference, initially the Williamsport Power Generating Station powered nine cars. In both plans, all of the machinery was placed on one floor under a single roof. The interior was subdivided into two spaces – one devoted to the boilers and coal bin and the other to the engine and generators. The engine was placed on the side of the room closest to the boilers and was belted to the generators "with slightly different lengths of belt, so as to render both machines more accessible."[49] The switchboard was placed along one wall in the room with the engine and generators so that the engineer could readily monitor all of the machinery from a single point. Another advantage of placing all of the equipment on the ground floor was that it reduced

[49] Crosby, *The Electric Railway in Theory and Practice*, 165. As documented in the Williamsport Power Generating Station archaeological study, the by 1890s direct-connect engines and generators had largely replaced older belt-driven units. See Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," 1978, 45.

vibrations. A similar arrangement was recommended for mid-sized power plants. A typical power station would also include plenty of headroom for traveling cranes, and, as space allowed, a workshop and repair shop.

In terms of the construction of the powerhouse, the author of The Electric Railway in Theory and Practice recommended a substantial brick structure on a solid bed foundation of rubble and cement. He stressed the importance of lightning protection and recommended impedance coils with lightning arrestors over a regular grounding system. While the book did not discuss the size and location of windows, fenestration was addressed in C. Francis Harding's manual published in 1911 and titled Electric Railway Engineering. Harding wrote that power plants should be "generously lighted." As such, it was typical for a powerhouse to have large windows fenestrating both the walls and the roof (via skylights, gables, and monitors). In this way, the building interior had an abundant source of natural light, enabling operators to conduct careful equipment inspections and to keep it well maintained. (Figure 11).[50] Harding's manual also discussed the various types of condensers used in electric power plants. Condensers, whether jet condensers, barometric condensers, or surface condensers, were used to convert steam into water which could be circulated back to the boilers.[51]

In her history of industrial architecture in the United States, historian Betsy Bradley writes that the primary design consideration for power plants was mitigating the risk of boiler explosions. For this reason, power plants were typically stand-alone structures constructed of noncombustible materials such as brick, stone, or reinforced concrete. They were only two-part structures with a fire wall separating the boiler house from the engine room. This compartmentalization also prevented coal dust from interfering with the workings of the engines and generators. Trussed, single-span roofs eliminated the need for partition walls or interior columns, which allowed the engineer clear lines of sight. Large service doors facilitated the delivery of coal and the transport of equipment.[52] The chimney or stack for the boiler house might be square, octagonal, or cylindrical and constructed of concrete or brick. The height of the chimney, which might range from 75 to 175 feet, depended on

50 Betsy H. Bradley, *The Works: The Industrial Architecture of the United States* (New York: Oxford University Press, 1999), 49.
51 Harding, *Electric Railway Engineering*, 159.
52 Bradley, *The Works*, 49-52.

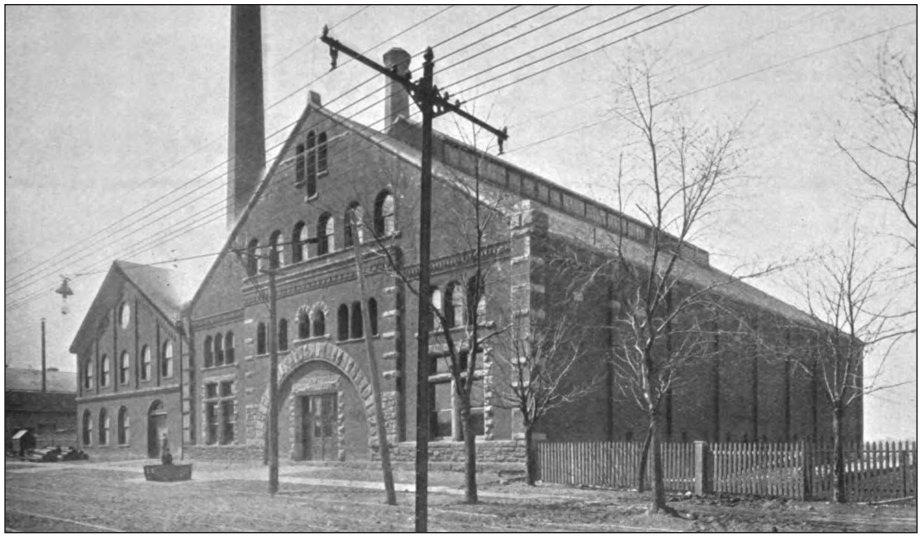


Figure 12. The Buffalo Street Railroad Company Powerhouse, 1892. ["The Street Railway System of Buffalo," *Street Railway Journal* 11, no. 3 (March 1895), 139.]

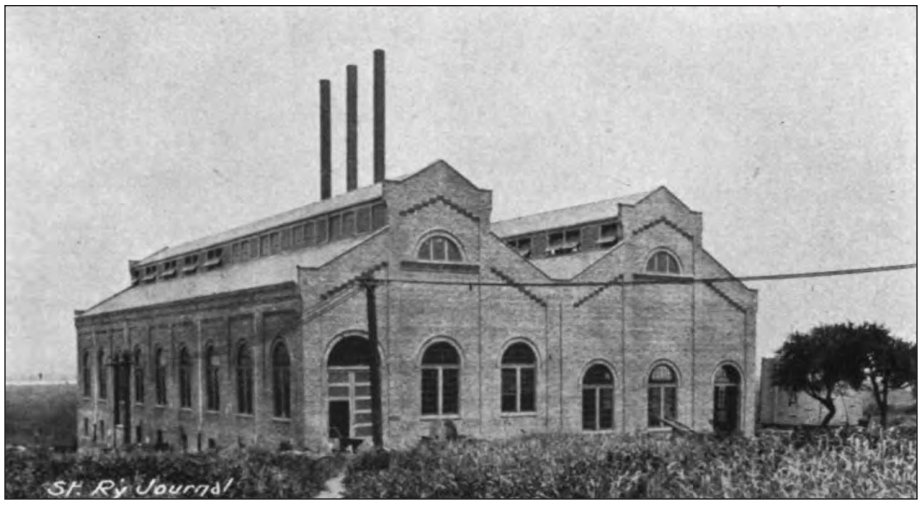


Figure 13. This power station in Secaucus, New Jersey, was completed in 1895. Note the almost identical design of both parts of the structure, which features round-arch door openings, round-arch and semicircular windows, brick pilasters, and a simple decorative treatment at the gable end walls, also in brick. ["The New Jersey Electric Railway Company," *Street Railway Journal* 11, no. 8 (August 1895), 499.]

the intensity of draft needed to facilitate combustion. In Bradley's analysis, the functional design of powerhouses changed little over the years.

Stylistically, the design of powerhouses and other industrial buildings of the late nineteenth and early twentieth centuries was influenced by the *Rundbogenstil* movement (also known as the Round-Arch Style) developed in Germany in the nineteenth century. The term *Rundbogenstil* was introduced by architectural historian Henry-Russell Hitchcock to denote a distinctly German approach to generically Italianate-style architecture, with Early Christian, Byzantine, Romanesque, and Italian Gothic variants. The style emphasized simple geometric massing, smooth wall surfaces, and a single architectural

motif – the round arch. Its practitioners had a strong preference for brick. Due to its directness and simplicity, in contrast to Beaux-Arts or Classical Revival architecture, the *Rundbogenstil* lent itself to a range of commercial and industrial building types.[53] The style was brought to the United States by German immigrant architects, such as Adolf Cluss and Paul Schulze. The round-arched openings of Schulze's Boylston Hall, built in 1857-58 at Harvard, was a source of influence for the Romanesque Revival architecture of practitioners such as Henry Hobson Richardson. Schulze formed a partnership with Cluss in 1878, and the two employed the round-arch style in their design for the Smithsonian's Arts and Industries Building, completed in 1881.

The influence of the *Rundbogenstil* on the design of nineteenth-century power stations can be seen in examples of the building type located across the United States. The powerhouse for the Buffalo Street Railroad Company, which operated electric trolleys beginning in 1889, dates to circa 1890 (Figure 12). It was a two-story, gable-front structure constructed of brick. The front façade of the boiler house featured stacked rows of tall, round-arch windows separated on the upper level by brick pilasters and a wide, arched door opening. A circular window in the gable end wall provided additional natural light. The attached engine house had a more elaborate design featuring rough-hewn stone arches, lintels, and banding. While round-arch windows predominated in the building, the ground-floor window and door openings were trabeated. A long monitor extended along the roof ridge of the engine room.

The New Jersey Electric Railway Company, chartered in 1894, built a large power station with Rundbogenstil elements in Secaucus, New Jersey (Figure 13). Both parts of the structure featured round-arch door openings, round-arch and semicircular windows, and brick pilasters. Decorative treatment, also in brick, was largely limited to the gable end walls.

ACQUISITION OF THE WILLIAMSPORT POWER GENERATING STATION BY VICTOR CUSHWA

On October 25, 1911, Victor M. Cushwa and David K. Cushwa of Victor Cushwa & Sons purchased the Williamsport Power Generating Station from two of

[53] Kathleen Curran, "The German *Rundbogenstil* and Reflections on the American Round-Arch Style," *Journal of the Society of Architectural Historians* 47, no. 4 (December 1998), 351; and William H. Pierson, Jr., "Richard Upjohn and the American *Rundbogenstil*," *Winterthur Portfolio* 21, no. 4 (Winter 1986), 229-230.

the directors of the Hagerstown Railway Company for $500, buying back the land the Cushwa company had sold to the railway fifteen years prior.[54] As noted earlier, the building may have served as a backup generation station by the railway company until around 1901, after which is likely stood empty, its machinery sold off or relocated to other generating plants in the region.

The former powerhouse was owned by the Cushwa family for over 60 years until 1974. While little is known about how the building functioned during this period, prior studies indicate that it was primarily utilized for the storage of supplies and materials.

BIOGRAPHY OF VICTOR CUSHWA

As previously mentioned, Victor Cushwa (1833-1912) was one of the leading businessmen in Washington County, Maryland, in the late nineteenth and early twentieth centuries (Figure 14). He was born outside of Clear Spring, Washington County, Maryland, and as a boy and young man apprenticed to his uncle, a tanner and currier. In 1860, Cushwa acquired a tannery of his own in Williamsport, which he sold in 1870 to become the general manager of the Washington County Leather Manufacturing Company in Hagerstown, founded a few years earlier. Cushwa married Mary Ann Kreigh in 1858, and together they had eight children. The Washington County Leather Manufacturing Company was destroyed by fire in 1872, compelling Cushwa to move on from the business. That year he entered into an informal partnership with Charles Embrey & Son. After 1875, the firm operated under the name Embrey & Cushwa (Figure 15) until Cushwa bought his partner's interests in 1880. The same year, Cushwa became a distributor for the Consolidation Coal Company.[55]

Cushwa's business, which primarily distributed coal, proved very successful, and, in 1886, he expanded by purchasing a property in Hagerstown, where he constructed warehouses and other buildings. Cushwa entered into a partnership with his son, Victor Monroe Cushwa, and son-in-law, M. Emmitt Cullen, in 1888, and the company name became Victor Cushwa & Sons, a wholesale business specializing in lime, cement, coal, and plaster. In addition

[54] Washington County Circuit Court, Deed Book 137, page 641.

[55] Lynn Roby Meekins, et al., Men of Mark in Maryland, vol. 4 (Baltimore, MD: B. F. Johnson, Inc., 1912), 215-218; and Thomas J. C. Williams, *A History of Washington County, Maryland: From the Earliest Settlements to the Present Time*, vol. 2 (Chambersburg, PA: J. M. Runk & L. R. Titsworth, 1906), 1008-1011.

to his warehouses in Williamsport and Hagerstown, the company owned facilities at Powell's Bend, two miles south of Williamsport, for the convenience of shipping over the Cumberland Valley and Pennsylvania Railroads.[56]

Cushwa established a brick company, called the Conococheague Brick and Earthenware Company, in 1896. The brick works were located about a quarter mile north of Williamsport along the route of the Potomac Valley railroad. The company manufactured plain, ornamental, and pressed brick, making daily shipments to Baltimore, Philadelphia, and Washington, DC.[57] Cushwa opened his brickworks the same year that the Hagerstown Railway Company inaugurated its trolley line between Hagerstown and Williamsport, an achievement made possible, in part, by the land Cushwa donated to the company for the construction of its powerhouse. The availability of interurban trolley service likely expanded the labor pool for Cushwa's brick kilns as well as a nearby tannery owned by W. D. Byron and Sons. These two businesses supplied jobs to many residents of Williamsport, contributing to the town's prosperity during this period.[58]

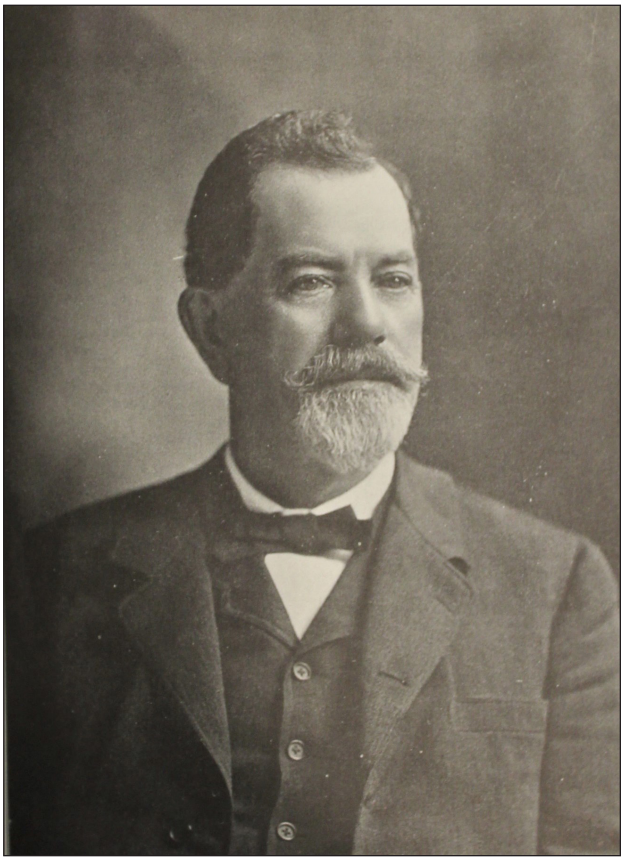


Figure 14. Portrait photograph of Victor Cushwa. [Thomas J. C. Williams, *A History of Washington County, Maryland*, vol. 2 (Chambersburg, PA: J. M. Runk & L. R. Titsworth, 1906).]

Mary Ann Cushwa died in 1899, and five years later, Victor Cushwa married Catherine E. Moore of Hagerstown. Victor Cushwa retired in 1909 at age 76, conveying the business – one of the oldest coal shipping firms in Maryland – to his sons (in 1901, David K. and C. Frank Cushwa had joined their father and older brother in the firm) and son-in-law. In addition to his business activities, Cushwa was a receiver of the C&O Canal, served as a director of the Potomac Valley Railroad Company and the Washington County Mutual Fire Insurance Company of Hagerstown, and served a term as county commissioner. In the last years of his life, he was instrumental

56 Lynn Roby Meekins, et al., *Men of Mark in Maryland*, vol. 4 (Baltimore, MD: B. F. Johnson, Inc., 1912), 215-218.
57 "Miscellaneous," *Clay Record* 9, no. 12 (December 29, 1896), 22.
58 Smith, "Historic Resource Study, Williamsport, Maryland, Historical Data," 1979, 104.

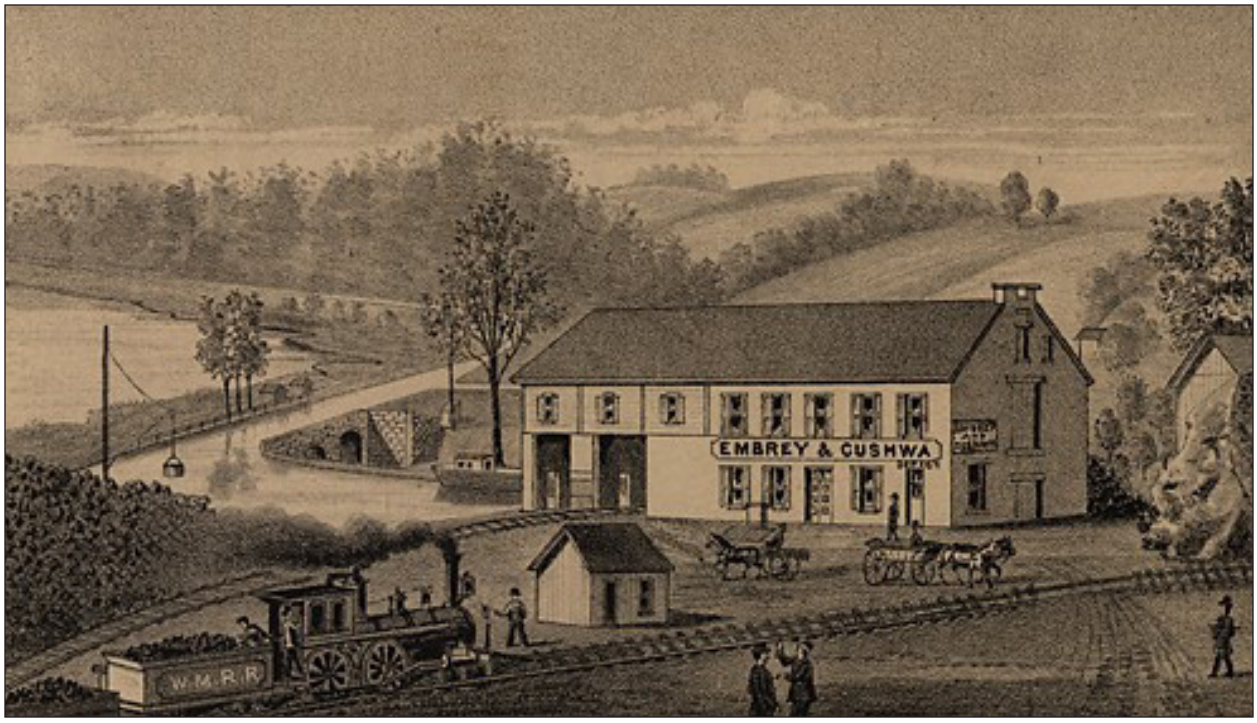


Figure 15. Lithograph of the Embrey & Cushwa warehouse published in 1877. Note the rail siding of the Western Maryland Railroad that passed through the west end of the building. This track extended north along the east side of the canal basin and then along the west side of Lot 223, where the Williamsport Power Generating Station would be constructed less than ten years later. [*Illustrated Atlas of Washington County, Maryland* (Philadelphia, PA: Lake, Griffing and Stevenson, 1877).]

in seeing to completion the construction of Williamsport's Washington-Berkeley Bridge (now known as the Route 11 Bridge), which opened in 1909.[59]

ACQUISITION OF THE CANAL BY THE NATIONAL PARK SERVICE AND THE CREATION OF THE C&O CANAL NATIONAL HISTORICAL PARK

When the federal government acquired the C&O Canal from court appointed receivers in 1938, NPS was given control over its development and management. Initially, the park service directed its restoration efforts on the lower 23 miles of the canal (Georgetown to Seneca, Maryland), which was rewatered and reopened under the name "Chesapeake and Ohio Canal Recreational Waterway" in 1940. Since the canal was purchased using public works funds as an unemployment relief measure, much of the restoration and improvement work was carried out by the Civilian Conservation Corps (CCC). Following the restoration of this portion of the canal, its recreational use surged.[60]

[59] Meekins, *Men of Mark in Maryland*, 215-218; and Williams, *A History of Washington County*, 1008-1011.

[60] Barry Mackintosh, *C&O Canal: The Making of a Park* (Washington, D.C.: National Park Service, Department of the Interior, 1991), 31, 38, 179.

In the period after World War II, when the federal government was dedicating vast resources to the construction of an interstate highway system, NPS partnered with the Bureau of Public Roads to study the feasibility of constructing a parkway along the course of the canal above Seneca to Cumberland. The idea of using the route of the canal as a scenic drive was first introduced in the 1901 McMillan Commission (Senate Park Commission) Plan. While the McMillan Plan primarily focused on the monumental core of Washington, DC, the document also recommended park additions and enhancements outside the city center. One recommendation was federal acquisition of the land along both sides of the Potomac River to Great Falls and conversion of the land into a national park connected with the city by a continuous river drive.[61]

The National Park Service-Bureau of Public Roads report, completed in 1950, concluded that a parkway would be both practical and advisable. Although the parkway plan was endorsed by NPS, the National Capital Planning Commission, and state planning and roads commissions, it also generated considerable resistance, most notably from Supreme Court Justice William O. Douglas who, in 1954, organized a weeklong hike along the canal for a group of reporters in an effort to demonstrate the need to protect and preserve its natural resources and to mobilize opposition to the plan. Ultimately, by 1956, the park service dropped the parkway scheme. Five years later, President Eisenhower designated the portion of the canal from Seneca to Cumberland a National Monument, which made that portion of the canal a unit of the national park system. By this time, the industrial character of the canal landscape at Williamsport had diminished. The canal basin was silted up, it's masonry walls showed signs of deterioration, and the canal basin was overgrown with vegetation.[62]

In January 1971, pursuant to Public Law 91-664, the C&O Canal was designated a National Historical Park. While the park area initially encompassed the entire length of the canal, roughly 5,250 acres, the act gave NPS authority to acquire additional lands to enlarge the canal's narrow right-of-way. Land acquisitions

61 Ibid, 5.

62 NPS CLI, "Williamsport, Chesapeake and Ohio Canal National Historical Park," 2018, 71-73; National Park Service, Division of Interpretive Planning, Harpers Ferry Center, "A Plan for the Interpretation of Williamsport, Chesapeake & Ohio Canal National Historical Park, Maryland," 1996; and Mackintosh, *C&O Canal: The Making of a Park*, 49-80.

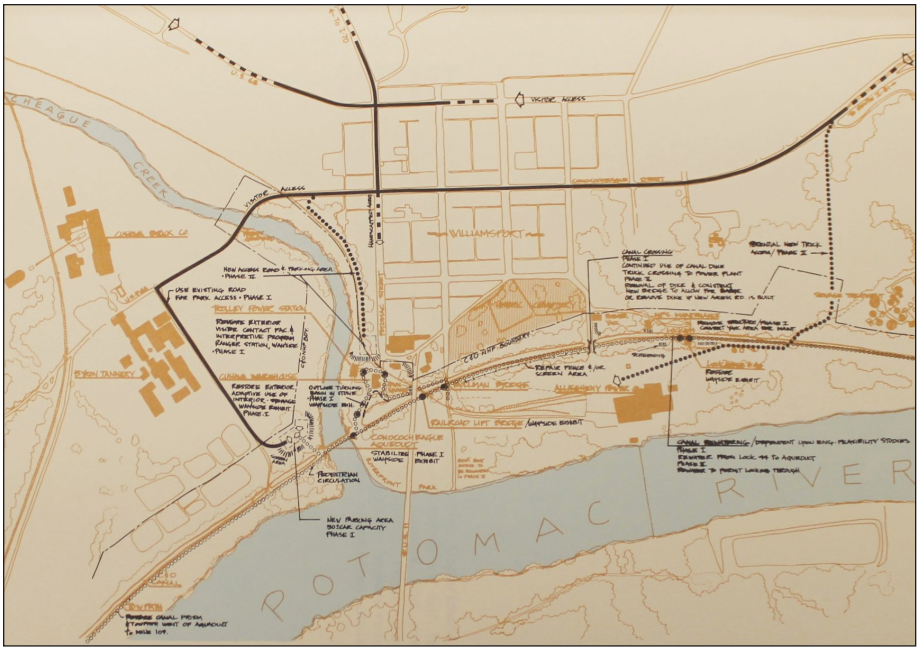


Figure 16. Development Concept Plan for the Williamsport Area of the C&O Canal NHP. The Williamsport Power Generating Station is identified as the "Trolley Power Station" on the plan. At the time, the plan for the building was to restore the building as a visitor contact facility. [National Capital Team/Denver Service Center, National Park Service, "Development Concept Plan for the Williamsport Area, Chesapeake & Ohio Canal National Historical Park," May 1983.]

proceeded vigorously through the mid-1970s, and with the land came many buildings.[63] Since the Williamsport Power Generating Station was built on private land, it was not originally included within the boundary of the park. It was eventually acquired by NPS in 1974 as part of these land acquisition efforts.

The National Historical Park designation in 1971 launched a new management era for the historic resource. With a mandate to "provide for the enjoyment of the park's resources in such a manner as to leave them unimpaired for the enjoyment of future generations," NPS set about preparing a general plan for the park, which was completed in 1976.[64] The "Chesapeake & Ohio Canal National Historical Park General Plan" established a zoning system to assign land use within the park and classified the Williamsport area as a "National Interpretive Center Zone." These were areas containing major historic restoration opportunities where park visitors could experience a functioning canal in a historic setting. The interpretive centers were meant to support the largest density of visitor use and follow the concept of an outdoor living history museum.[65]

63 Mackintosh, *C&O Canal: The Making of a Park*, 101-103, 168.
64 National Park Service, National Capital Team/Denver Service Center, "Development Concept Plan for the Williamsport Area, Chesapeake & Ohio Canal National Historical Park," May 1983, iv.
65 Ibid, v.

The first areas along the canal to receive development planning attention following the 1976 general plan were Great Falls and then Williamsport. Recognizing that the Williamsport area contained many historically significant remnants of the canal era "that could be restored to form a handsome outdoor museum," NPS carried out a range of documentation projects (surveys and mapping, archaeological studies, HSRs, and a historic resource study) between 1977 and 1979 to inform the preparation of a development concept plan for the area (Figure 16). Work on the development plan started in late 1980 and was completed in August 1982 (revised May 1983). The preferred alternative identified a two-phased approach for creating a national interpretive center in the Williamsport area according to the land use guidelines developed in the 1976 general plan. In this alternative, the first phase of work included: the stabilization of the Conococheague Aqueduct; the restoration of the

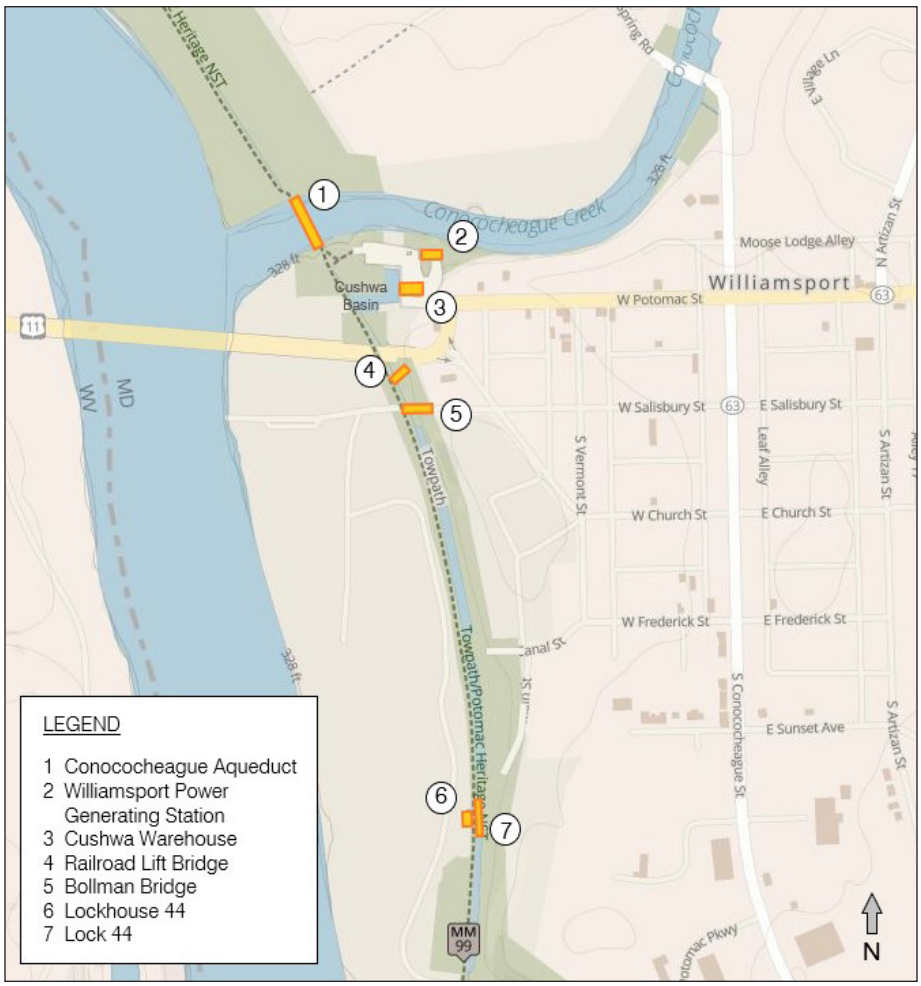


Figure 17. Map of the Williamsport district of the C&O Canal showing the locations of key resources. [Robinson & Associates (NPMap basemap)]

Williamsport Power Generating Station for use as a combined visitor contact station and management facility; and the restoration of the exterior of the Cushwa Warehouse with storage use on the interior. Proposed projects also included landscaping, delineating the historic dimensions of the canal basin in stone, restoring the canal prism and towpath, restoring Lock 44 and the lockhouse, and rewatering the canal from Lock 44 to the aqueduct (Figure 17). The second phase proposed rewatering the canal east of Lock 44 and restoring and watering the canal basin. To provide access to the Williamsport interpretive center while limiting vehicular traffic within the interpretive zone, the management plan proposed limiting Potomac Street access and placing a parking area east of the powerhouse. The powerhouse was selected as the preferred location of the visitor center over the Cushwa Warehouse because it was less flood-prone, more structurally sound, and the interior could be adapted for the proposed new use while preserving its original structure.[66]

Following the 1983 development plan, the Williamsport Power Generating Station was not renovated for a visitor services and administrative facility. Instead, it was utilized as a workshop and storage facility for the Williamsport Preservation Training Center (WPTC).

WILLIAMSPORT PRESERVATION TRAINING CENTER

In late June 1972, flooding from Hurricane Agnes caused immense destruction along the canal, prompting the Secretary of the Interior to allocate $400,000 for its repair and restoration and, perhaps more importantly, motivating him to list the park as a bicentennial area, making it eligible for additional funding. In the fall of 1973, a special unit of the Denver Service Center, National Capital Parks team was organized to oversee the repair and restoration work. One branch of the group, called the C&O Canal Restoration Team, was headquartered in Williamsport.[67] Not long after, around the time of the Bicentennial, Dan Bressler, an associate manager of the Denver Service Center, began to take steps to establish a training program to create a workforce with the specialized skills needed to care for the historic structures under NPS jurisdiction. Williamsport was selected as the home

66 Mackintosh, *C&O Canal: The Making of a Park*, 126, 130; and National Park Service, National Capital Team/Denver Service Center, "Development Concept Plan for the Williamsport Area, Chesapeake & Ohio Canal National Historical Park," May 1983.

67 James S. Askins, "Historic Preservation Training for NPS Personnel," *CRM* 4, no. 1 (March 1981), 6.



Figure 18. Williamsport Power Generating Station (looking east), 1978. In this image, the powerhouse appears to be being used as storage. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

for the training program due, in part, to its association with the C&O Canal Restoration Team, whose existing projects offered ideal opportunities for the new training program. The WPTC was formally established on November 5, 1977, when the first intake trainee entered the program.[68] It was led by James (Jim) S. Askins, a preservation craftsman and NPS employee.

Over time, the WPTC developed a three-year apprenticeship program focused on the preservation trades and later expanded its mission to provide a comprehensive program of preservation education and work-centered training. Oversight of the WPTC transferred from the Denver Service Center to the Harpers Ferry Center in 1987. The program relocated its administrative headquarters to Frederick, Maryland, in 1995, and shortly after changed its name to the Historic Preservation Training Center.[69]

68 H. Thomas McGrath, "1977-1997: A Retrospective of the Work of the Historic Preservation Training Center," *CRM* 20 no. 12 (1997), A-1; and Askins, "Historic Preservation Training for NPS Personnel," 6.

69 Mackintosh, *C&O Canal: The Making of a Park*, 159-167; Lisa Sasser, "A Half-Century of Promoting Traditional Building Skills for Preservation," *National Trust for Historic Preservation Forum Journal* 19, no 4 (Summer 2005), no page; and "Williamsport Preservation Training Center Relocates," *CRM* 19, no. 1 (1996), 42.



Figure 19. The Williamsport Power Generating Station, circa 1983, when it was being used as a workshop by the Williamsport Preservation Training Center. [LCS Image Binder, Chesapeake & Ohio Canal National Historical Park Archive, Williamsport, Maryland]

C&O CANAL NATIONAL HISTORICAL PARK IMPROVEMENTS AT WILLIAMSPORT

NPS did not make any immediate improvements to the Williamsport Power Generating Station after its acquisition in 1974. Rather, funds were allocated for documentation projects, including an HSR and an archaeological study, both completed in 1978. Although the C&O Canal Restoration Team had been headquartered in Williamsport since 1973, it is unclear how, if at all, the group utilized the Williamsport Power Generating Station. In 1978, when the HSR was completed, the building lacked utilities (heat and electricity), and photographs from the report seem to indicate that the building was not occupied (Figure 18). With the arrival of the WPTC, however, NPS made the powerhouse and the nearby Cushwa Warehouse available to house its operations.[70]

The WPTC achieved early success, which led to additional growth. By the mid-1980s, its leadership submitted a proposal to convert the Williamsport Power Generating Station into a shop and storage area and to renovate the Cushwa Warehouse for offices, classrooms, and other similar facilities for trainees (Figure 19). The 1985 proposal anticipated a three-phase project with a total cost of $636,900 for both projects. In response, C&O Canal Superintendent Richard Stanton issued a memo to the director of the National Capital Region addressing his concerns with the WPTC plan.

[70] Askins, "Historic Preservation Training for NPS Personnel," 6.

He opposed the proposal on the grounds that it was incompatible with the C&O Canal National Historical Park general plan, which designated the Williamsport section of the canal as a national interpretive center zone.[71]

NPS did not rehabilitate the Williamsport Power Generating Station until 1987. That year, NPS hired a contractor to a) construct a floor system in the west wing that divided the original boiler house into a dual level space and b) install sprinkler and electrical systems.[72] The WPTC continued to use the powerhouse as a workshop and the Cushwa Warehouse for administration and training purposes through the early 1990s.

During this period, NPS carried out a series of restoration projects in Williamsport. This included structural repairs and restoration of the west façade of the Cushwa Warehouse, rewatering the canal, reconstructing and rewatering the canal basin, and reconstructing the bypass flume. In May 1995, NPS opened a visitor center on the ground floor of the Cushwa Warehouse. While the visitor center gave the park a more formal and year-round presence in Williamsport, it was meant to be temporary as planning for a permanent visitor center complex in the Williamsport Power Generating Station continued.[73] Prior to the temporary visitor center, interpretation at the Williamsport site consisted mainly of a few wayside exhibits, occasional personal services programs, and elements of the annual Canal Days event.[74]

The opening of the Williamsport visitor center in the Cushwa Warehouse required the WPTC to vacate a portion of the building, placing constraints on its operations.[75] In November 1995, the center officially relocated its administrative offices to a new site – the Gambrill House at Monocacy National Battlefield in Frederick. The center's workshop remained in the Williamsport Power Generating Station, however, until a facility in Frederick

71 Memo, March 3, 1983, Folder MP 099.72 Cushwa Visitor Center, Box 3, Chesapeake & Ohio Canal National Historical Park Archive, Williamsport, Maryland (hereafter shortened to CHOH Archive); and Memo, November 7, 1985, Folder MP 099.72 Cushwa Visitor Center, Box 3, CHOH Archive.

72 Notice of Award, Contract No. CX-2000-7-9001, September 17, 1987, Box 3.3, CHOH Archive.

73 Task Directive, Folder 99.72, Box 2.2, CHOH Archive.

74 National Park Service, Division of Interpretive Planning, Harpers Ferry Center, "A plan for the interpretation of Williamsport, Chesapeake & Ohio Canal National Historical Park, Maryland," 1996.

75 Memo, March 20, 1995, Folder MP 099.72, Cushwa Visitor Center, Box 3, CHOH Archive; and Memo, April 11, 1995, Folder 99.72, Box 2.2, CHOH Archive.

(Jenkins Warehouse) was made available in 1998.[76] After the WPTC vacated the powerhouse, NPS used the building for meetings and events related to educational and volunteer programs and for temporary exhibits.[77]

In recent years, NPS has carried out several important projects in the Williamsport area, including the restoration of Lock 44, the lockhouse, and the Bollman Bridge. The most high-profile project, perhaps, was the restoration of the Conococheague Aqueduct in 2019. This two-year project created the first watered, operational aqueduct along the canal since 1924. Also in 2019, the National Park Service broke ground on a new C&O Canal National Historical Park Headquarters southeast of the Cushwa Warehouse on the former site of the Miller Lumber Company. The new headquarters opened in 2021.

[76] Tom Vitanza, HPTC Senior Historic Architect, "WPTC-HPTC Timeline," December 2017, CHOH Archive.

[77] "National Canal Museum Exhibit Installation at Trolley Barn, April-October 2008, Scope of Work," no date, CHOH Archive; and Tom Vitanza, HPTC Senior Historic Architect, "WPTC-HPTC Timeline," December 2017, CHOH Archive.

Chronology of Development and Use

TIMELINE

1776 Washington County is formed through the division of Frederick County.

1785 George Washington and others charter the Patowmack Company to improve navigation along the Potomac River.

1786 The Maryland General Assembly passes the first act of incorporation for the town of Williamsport, then known as "Williams Port," after its founder, the American Revolutionary War general, Otho Holland Williams. Williamsport is located in Washington County at the confluence of the Potomac River and Conococheague Creek.

1787 The board of commissioners of "Williams Port" lays off 82 acres into lots, streets, and alleys and files a plat with the county.

1810 A flood causes considerable damage to Williamsport. A bridge across Conococheague Creek and a warehouse (location undetermined) owned by Jacob T. Towson are washed away.

1823 The first Chesapeake and Ohio Canal (C&O) Convention meets in November in Washington, DC.

"Williams Port" is reincorporated as "Williamsport."

1828 Construction begins on the C&O Canal.

1833 The C&O Canal Company acquires its original land holdings in Williamsport and immediately adjacent to the town.

Construction of the Conococheague Creek Aqueduct begins.

1835 The C&O Canal opens between Georgetown and Williamsport, bringing increased trade and new jobs and business opportunities. Initially, canal trade is predominantly agricultural, with lumber, lime, and stone shipped in lesser quantities.

Structures associated with the canal in Williamsport include or would come to include the canal prism, Lock 44, a pivot bridge at Lock 44, a lockhouse, a turning and loading basin (known as the Williamsport Basin and later the Cushwa Basin), and the Conococheague Creek Aqueduct.

ca. 1835 A two-story, brick warehouse, later known as the Cushwa Warehouse, is built near the east edge of the canal basin.

1850 The C&O Canal is completed to Cumberland, resulting in an increase in commercial activity along the entire canal. After 1850, coal becomes the chief commodity being shipped on the C&O.

1852 A devastating flood in April causes extensive damage to the C&O Canal from Dam 6, upstream of Williamsport, to Georgetown and suspends navigation for a three-month period.

1861-65 During the Civil War, U.S. Army and Confederate troops are present in and near Williamsport, interrupting trade and endangering the financial position of the canal company.

1873 Victor Cushwa (1833-1912) becomes involved in the coal trade in Williamsport.

A line of the Western Maryland Railroad is extended from Hagerstown to the canal at Williamsport, officially opening on December 17. The tracks follow a route that passes by the east end of the Cushwa Warehouse before following the canal prism south to Lock 44.

1877 A devastating flood hits Williamsport in November, wrecking the canal, seriously damaging Dams 4 and 5, and washing away the Cumberland Valley Railroad Bridge across the Potomac River.

1879 A road bridge, known as the Bollman Bridge, is built over the canal at the west end of Salisbury Street.

1880 Victor Cushwa acquires full control of the business he operated with Theodore Embrey, and the company name is changed to Victor Cushwa. The same year, Cushwa becomes a distributor for the Consolidation Coal Company, which was headquartered in Cumberland (MD).

1886 Three floods occurring within a period of six weeks cause damage to the C&O Canal at Williamsport.

1888 Victor Cushwa forms a new partnership with his son (Victor Monroe Cushwa) and son-in-law (Martin Emmett Cullen), and the firm is renamed Victor Cushwa & Sons.

1889 The Great Flood of 1889 causes catastrophic damage to the canal, the railroad, and local businesses of Williamsport.

1896 On March 12, the Hagerstown Railway Company is chartered and given a municipal franchise to operate an interurban electric trolley. The agreement with the city gives the company two months to start work and a total of eight months to complete it.

The Hagerstown Railway Company builds a powerhouse in Williamsport to generate electricity and power an urban trolley loop in Hagerstown and a branch line between Hagerstown and Williamsport. It is constructed on land donated by Victor Cushwa and is completed by August 3.

The Hagerstown Railway Company operates the first trolley between Hagerstown and Williamsport on August 8.

The Frederick & Middletown Railway (later renamed the Frederick Railroad) is chartered. Trolley service between Frederick and Braddock Heights is inaugurated on August 22 and extended to Middletown by October.

Victor Cushwa establishes the Conococheague Brick and Earthenware Company in Williamsport. The brickworks supplies jobs to many town residents.

1897 The Hagerstown Railway Company completes a branch line between Hagerstown and Funkstown.

1898 The Hagerstown Railway Company replaces the Williamsport Power Generating Station with a new facility at Lee and Summit streets in Hagerstown.

ca. 1899 The town of Williamsport builds a power plant to furnish municipal electricity. The plant is located along the 700 block of North Conococheague Street.

1902 The Hagerstown Railway Company completes a branch line to Boonsboro.

1905 The Hagerstown Railway Company completes a branch line to Shady Grove, Pennsylvania, where riders could transfer to the Chambersburg, Greencastle & Waynesboro Railway.

1909 The Washington-Berkeley Bridge (Route 11 Bridge), a vehicular bridge across the Potomac River in Williamsport, is completed.

1911 On October 25, Victor Cushwa purchases the Williamsport Power Generating Station from the directors of the Hagerstown Railway Company.

1913 The Hagerstown Railway Company and the Frederick Railroad consolidate to form the Hagerstown & Frederick Railway Company.

1920 The berm side of the Conococheague Aqueduct collapses, disrupting canal traffic for a few weeks until repairs are completed.

1922 The Hagerstown & Frederick Railway Company is renamed the Potomac Public Service Company (later Potomac Edison).

Construction begins on the Potomac Edison coal-fired power plant on a site between the canal and river, northwest of Lock 44.

1923 A lift bridge is constructed to carry a rail spur over the canal to the Potomac Edison power plant.

1924 A flood in March does not result in serious damage to any of the canal structures at Williamsport, but causes the C&O Canal to close permanently.

1936 On March 17, a flood devastates the Potomac Valley and much of Williamsport. The former Williamsport Power Generating Station and other buildings near the canal basin are flooded. A lime storage shed owned by Victor Cushwa is washed away entirely.

1938 The C&O Canal is acquired by the federal government in September. NPS is given control over the canal's management.

1940 The lower 23 miles of the C&O Canal (Georgetown to Seneca, MD) reopen under the name "Chesapeake and Ohio Canal Recreational Waterway."

1947 The Williamsport line of the Hagerstown & Frederick Railway ceases trolley service.

1954 On February 20, the Hagerstown & Frederick Railway Company discontinues passenger trolley service across all of its lines.

1961 The C&O Canal becomes a National Monument on January 18.

1971 The C&O Canal is designated a National Historical Park on January 8.

1972 Flooding due to Hurricane Agnes strikes the canal. A special unit of the Denver Service Center, National Capital Parks team is organized to oversee the repair and restoration

work. One branch of the group, called the C&O Canal Restoration Team, is headquartered in Williamsport.

1974 NPS purchases the former Williamsport Power Generating Station from David K. Cushwa III.

1976 As part of the Chesapeake & Ohio Canal National Historical Park General Plan, the Williamsport area is designated a National Interpretive Center Zone.

1977 NPS undertakes archaeological excavations at the powerhouse site.

The Williamsport Preservation Training Center is established. NPS makes the Williamsport Power Generating Station and the Cushwa Warehouse available to house its operations.

1978 NPS contracts with John Milner Associates to prepare an HSR for the Williamsport Power Generating Station. Historian Edward D. Smith prepares the historical data section of the report.

1979 The Chesapeake & Ohio Canal National Historical Park Historic District is listed in the National Register.

1982 NPS prepares a Development Concept Plan for the Williamsport area of the C&O Canal National Historical Park. It is revised in May 1983.

1987 Wolfe Brothers, Inc., of Myersville, MD, is awarded a contract to rehabilitate the Williamsport Power Generating Station. By this time, the building is being used as a workshop by the Williamsport Preservation Training Center.

1993 NPS reconstructs several canal features in Williamsport, including the canal basin and its retaining walls, the lock, and a bypass flume.

1995 An interim visitor center at Williamsport is opened in May. It is located in the center room on the ground

floor of the Cushwa Warehouse and consists of an information desk, exhibits, and a video alcove.

The Williamsport Preservation Training Center leaves the Cushwa Warehouse, relocating its administrative headquarters to Frederick (MD) and shortly after changes its name to the Historic Preservation Training Center. The center continues to use the Williamsport Power Generating Station until a new warehouse facility in Frederick is made available.

1996 In January, the canal is severely damaged by a major winter flood, causing erosion of the towpath and extensive damage to locks, lockhouses, and other canal structures.

NPS prepares an updated interpretive plan for the Williamsport area of the C&O Canal National Historical Park.

1998 The Historic Preservation Training Center (formerly Williamsport Preservation Training Center) relocates its workshop from the Williamsport Power Generating Stations to a facility in Frederick.

2001 The Williamsport Historic District (WA-I-845), which encompasses the Williamsport Power Generating Station, is listed in the National Register of Historic Places.

2002 The Chesapeake & Ohio Canal National Historical Park headquarters relocates from the Ferry Hill Plantation visitor center near Sharpsburg (MD), to Hagerstown (MD).

2018 NPS and the Maryland Economic Development Corporation enter into a Cooperative Management Agreement that identifies a site along Potomac Street for a future C&O Canal National Historical Park headquarters.

2019 The Conococheague Aqueduct is rewatered after a two-year restoration project.

2021 The new C&O Canal National Historical Park headquarters opens in Williamsport.

ORIGINAL CONSTRUCTION AND THE HAGERSTOWN RAILWAY COMPANY PERIOD (1896-1911)

The construction of the Williamsport Power Generating Station started on May 7, 1896, and work was finished by August 3 of that year.[1] The site selected for the structure was approximately 110 feet northeast of the Cushwa Warehouse and spanned portions of two lots bound by Potomac Street on the south and Conococheague Creek on the north.[2]

As originally built, the powerhouse was a one-story, double-height, load-bearing masonry (brick) structure with a limestone foundation that was anchored to the underlying bedrock by a concrete bond (Figure 20).[3] Typical of the building type, the powerhouse was partitioned into two sections by a brick fire wall. The west wing, which housed the boilers, was square in plan (roughly 45 by 45 feet) with a gable roof. Along the ridge of the roof was a hipped-roof monitor with louvered vents, and a tall brick chimney extended from the south slope. The east wing of the building functioned as the engine house. It had a rectangular plan (roughly 45 by 35 feet) and a gable-on-hip (or Dutch gable) roof with hipped dormers. Due to the sloped topography of the site, the floor of the west wing of the powerhouse was 7 feet lower than the floor of the east wing. The roof over the west wing of the building was supported by four clear-span Howe trusses that were pocketed into and rested on brick pilasters along the north and south walls. The roof of the east wing was supported by three queen post trusses that rested on brick pilasters along the east and west walls. Iron tension rods formed the vertical elements of each truss, and the diagonal and horizontal chords were wood. The trusses supported a system of rafters and exposed wood sheathing. Both wings of the roof were clad with slate shingles.[4]

1 "Powerhouse Work," *Hagerstown Morning Herald*, May 8, 1896; and Smith, "Historic Structure Report, Williamsport Power House, Historical Data," 1978, 7. For the end date of construction, Smith cites the *Hagerstown Daily Mail*, August 3, 1896.

2 In evaluating maps of the area, the building appears to have been constructed on the northern sections of lots 222 and 223 as platted in the 1876 map of Williamsport recorded with the Washington County Circuit Court in Deed Book 75, page 719a. The historical data prepared for the 1978 HSR, however, states that the powerhouse was built on lots 221 and 222. See Smith, "Historic Structure Report, Williamsport Power House, Historical Data," 1978, 2.

3 Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," 1978, 11.

4 Ibid, 13.



Figure 20. This photograph of the Williamsport Power Generating Station (looking east) is dated circa 1901 and is perhaps the best image found to date of its original design and construction. The boilers were located in the west wing of the building (center of photo), and the engine and generator were located in the east wing (visible at the right side of the photo). Note the stairs along the south façade (no longer extant), which were required due to the topography of the site. [Ethel Lehman Deibert Collection, Western Maryland Room, Washington County Free Library]

Stylistically, the powerhouse featured a spare interpretation of the *Rundbogenstil* (Round-Arch Style). The brick walls were laid in common bond with every eighth course consisting of headers. The walls were articulated with brick belt courses that consisted of projecting headers. With the exceptions of the door opening on the west façade, which had a segmental arch, and a semicircular opening on the west gable end wall, the windows and doors of the powerhouse had round-arch heads. The use of a semicircular window in the gable may have been an aesthetic choice, given the low pitch of the roof. Bands of header courses were used to articulate the arched openings.[5] Incorporating decorative brick in this way was typical of industrial architecture in the *Rundbogenstil* and an economical and rational way to relieve the building's otherwise plain brickwork and flat wall surfaces.[6] The building also featured corbeled cornices, which were a noncombustible alterative to

[5] The 1978 historic structure report describes these as "rolok" courses, rather than header courses. The *Dictionary of Building Preservation* notes that a "rolok" is a nineteenth-century term for a rowlock brick (or bull header), which is a brick oriented with the smallest face exposed on the face of the wall and the smallest dimension horizonal. See Ward Bucher, ed., *Dictionary of Building Preservation* (New York: J. Wiley & Sons, Inc., 1996).

[6] Bradley, *The Works*, 234.

wood cornices and less expensive than sheet metal.[7] The corbeled cornices ran along all four sides of the east wing of the building and along the north and south façades of the west wing, with cornice returns on the west façade. Stone was used sparingly for windowsills, at the thresholds of doors, and for the voussoirs at the spring line of the segmental arch at the west entrance. The sills had chamfered upper edges. Windows were arched-head, double sash casements with butt hinges. The window sash and frames were white pine.[8]

In planning the powerhouse, the builders located the boiler house in the west wing, closest to a rail siding that ran in a north-south direction past the site on that side. Coal could be rolled up in gondolas using the siding, unloaded, and moved a short distance to the large service door on the west side of the powerhouse, where it would be stored inside in bins. Historic records do not indicate whether this service door (or the service door on the south façade of the east wing) had two leaves that were hinged on opposite jambs or whether they were sliding doors on tracks. The service door on the west façade had a tall threshold, and the floor of the west wing may have been higher than the existing exterior grade at the location of that door. The boiler house also had two man doors on the south façade and one man door on the north that shared masonry openings with round-arch, double sash, casement windows placed directly above. In addition to these combined window and door openings, the boiler house was well lit by three casement windows on the south façade, two double casements and a gable window on the west, and a double casement window on the north.

Typical of powerhouse design, the engine room was separated from the boiler house by a masonry partition wall. The south façade of the east wing was divided into three bays with a large service door occupying the center bay. This door was flanked by double sash, casement windows with round-arch heads. The east façade of the east wing featured four symmetrically arranged, double casement windows with round-arch heads, and the north façade had one double casement window with a round-arch head in the eastern bay.

7 Ibid, 237.

8 John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978, Section II: Description of Existing Conditions and Appendix D.

A small ell originally extended from the north façade of the engine house. The opening between the engine house and the ell (now bricked in) was spanned by a steel lintel, and a ghost mark on the north façade suggests that the wing had a gable or hipped roof. According to archaeological investigations, the inside dimensions of the ell measured roughly 8½ by 16½ feet, and the space enclosed a pit with the same dimensions that extended to a depth of roughly 11 feet below present grade to a concrete floor. Previous documentation of the powerhouse speculates that this ell may have housed a barometric condenser and condenser pit. This type of condenser required a vertical pipe measuring at least 34 feet.[9] Given this requirement, the column of the condenser would have extended through the roofline of the ell, which was roughly 25 feet high from the floor of the pit to the ridge of the roof. Historic photographs of the building do not capture the north façade, and it is unknown wether the ell was fenestrated.

Powerhouse interiors from this period were highly functional, with little or no decorative treatment, and noncombustible materials – brick, stone, or reinforced concrete – were favored. Interior brick walls might be painted white to reflect natural light coming in through windows. While textual and photographic records provide scant information on the appearance of the interior of the Williamsport Power Generating Station, architectural investigations offer some clues and suggest that the interior treatment was typical of the building type. The interior of both the boiler room (west wing) and engine house (east wing) likely had exposed brick walls and exposed roof trusses, rafters, and roof sheathing. The partition wall separating the two wings, also exposed brick, had two openings at the upper (eastern) floor level, both with segmental arched heads and dressed stone sills.[10] The northern of the two openings was roughly 12 feet from the interior face of the north wall; the southern opening was about 5 feet from the interior face of the south wall. These openings were used for the passage of steam headers and other piping, and it is unknown if they were fitted with interior doors.[11] The interior sills of the window openings consisted of flush brick soldier courses. Both

9 Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," 1978, 39-41.
10 John Milner Associates, "Historic Structure Report, Generation Station," 1978, Section II: Description of Existing Conditions.
11 Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," 1978, 24.

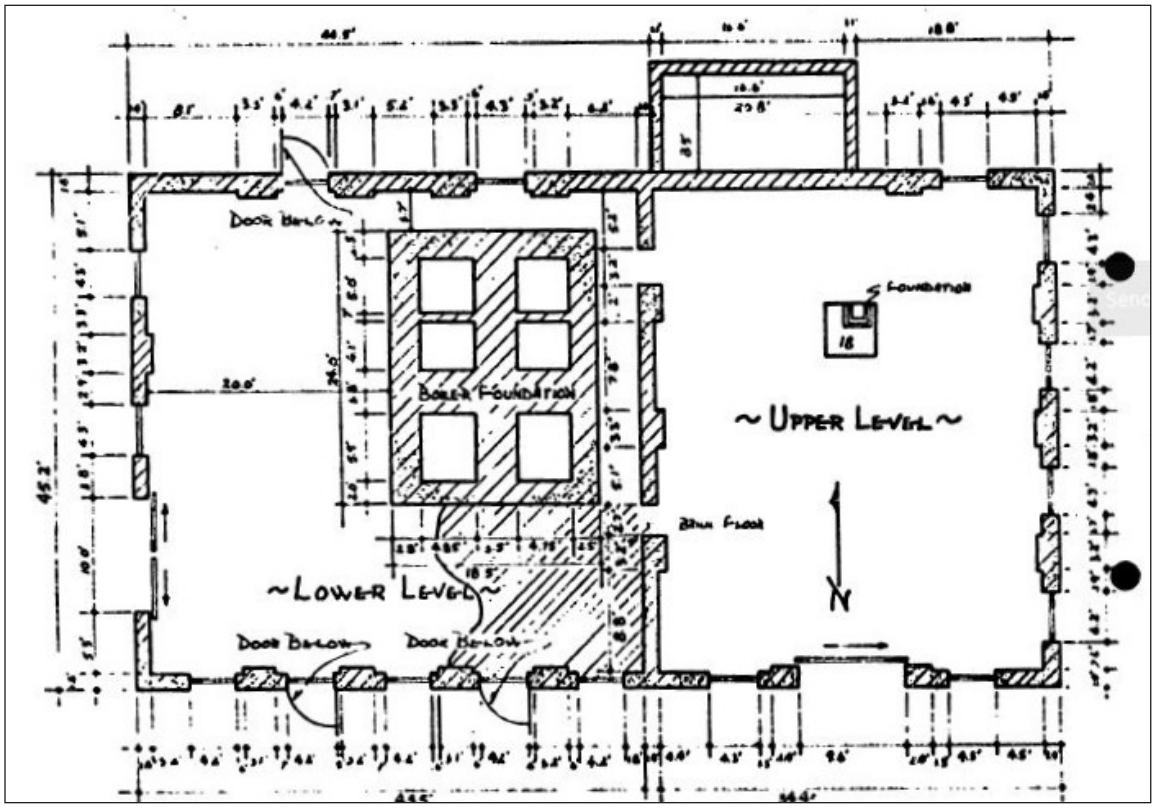


Figure 21. Plan showing the location and dimensions of the boiler foundation in the west wing (marked "lower level" on plan) and the location of a stepped brick foundation in the east wing (marked "upper level"). These underpinnings were separate from the building foundation. [Steven J. Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," prepared for the National Park Service, January 1978, Figure 7.]



Figure 22. Photo of the boiler foundation located in the west wing of the powerhouse and uncovered during archaeological investigations in 1978. [Steven J. Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," prepared for the National Park Service, January 1978, Plate 4.]



Figure 23. Photo of a stepped brick foundation in the east wing of the powerhouse and uncovered during archaeological investigations in 1978. [Steven J. Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," prepared for the National Park Service, January 1978, Plate 6.]

the boilers and engine equipment required foundations that were separate from the building itself. The boiler foundations were located toward the northeast corner of the west wing. They were constructed of rough stones and concrete and measured roughly 18 feet 5 inches in the east-west direction and 24 feet north-south (Figures 21 and 22).[12] Archaeological investigations indicate that the section of the floor south of the boilers was paved with brick. Machinery located in the engine house included an engine manufactured by Harrisburg Foundry & Machine Works and a General Electric dynamo.[13] The underpinnings for the engine and/or the generator consisted of stepped brick foundations that were set on a concrete floor poured directly on leveled bedrock (Figure 23).[14] The location of these underpinnings indicates that the engine room machinery was placed in the northern half of the room. The floor of the engine room consisted of leveled and compacted earth. It is unknown whether the engine room was equipped with an overhead traveling crane for handling heavy equipment, as no evidence of rails or a bridge, which would have supported the crane trolley, exist today. Given the construction date of the powerhouse, the building was likely equipped with artificial lighting

12 Ibid, 21 and Figure 7.

13 *American Street Railway Investments, A supplement to the Street Railway Journal* (New York, NY: The Street Railway Publishing Company, 1897), 105.

14 Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," 1978, 32.

to supplement the daylight that entered the building. However, no evidence of original interior lighting – either general or task-directed – exists today.

In 1898, the Hagerstown Railway Company built a new powerhouse in Hagerstown to replace the Williamsport facility. Historians speculate that the Williamsport Power Generating Station was used as a backup generation station by the trolley company for a few years after the new facility became operational.[15]

A historic photograph dated circa 1900-1924 of the C&O Canal basin captures the appearance and condition of the powerhouse near the end of this period (Figure 24). While the west façade is partially obscured by a two-story frame warehouse that stood along the north side of the basin, by this date the chimney over the boiler house had been dismantled. The roof monitor and dormers, however, remained as they were originally constructed. This photograph

[15] Author correspondence with Reuben Moss, President/Curator of the Hagerstown & Frederick Railway Historical Society, Inc., November 23, 2021; and Smith, "Historic Structure Report, Williamsport Power House, Historical Data," 1978, 10.



Figure 24. Photograph of the C&O Canal basin, circa 1900-1924. The Williamsport Power Generating Station is located in the left half of the image, partially obscured by a two-story warehouse. Note that chimney stack originally over the west wing had been removed by this date. [Image Number 1172.3-99.72-5, Box labeled Drawer E, Box 1, Chesapeake & Ohio Canal National Historical Park Archive, Williamsport, Maryland]

also clearly illustrates how railroad gondolas could be brought up close to the west door of the powerhouse via a rail siding that passed through the Cushwa Warehouse. Also of note is the topography of the terrain surrounding the building. While the land to the west is level, the east end of the building is built into the slope of a hill or escarpment. Access to the door in the south façade of the engine house could only be gained by climbing a series of steps (material undetermined) built up against the side of the building (Figure 20). Given this condition, the original purpose of the large door on the south façade of the east wing remains in question, as the surrounding topography would have made the door difficult to utilize for a function other than pedestrian passage.

CUSHWA COMPANY STORAGE WAREHOUSE (1911-1974)

On October 25, 1911, Victor M. Cushwa and David K. Cushwa of Victor Cushwa & Sons purchased the decommissioned power station from two of the directors of the Hagerstown Railway Company for $500.[16] The former powerhouse was owned by the Victor Cushwa & Sons firm for over 60 years until 1974. While little is known about how the building functioned during this period, prior studies indicate that it was primarily utilized for the storage of supplies and materials. One use of the east wing, for example, was the storage of bulk sand. Previous documentation of the powerhouse notes that the west wing was used as a garage for the Cushwa company's coal trucks after roughly 1945.[17] The 1929 Sanborn map for Williamsport, however, labels the building with the letter "A," which typically signifies a garage (Figure 25). This may suggest that its use as a truck garage may have started earlier than 1945.

The Cushwas made several significant changes to the building and its site during this period. Based on a photograph of the powerhouse following the great flood of 1936 shows that the louvered monitor over the boiler house had been removed by that date and indicates that the section of the roof over the west wing had been entirely replaced (Figure 26). At some point between 1936 and 1978, the gabled dormers on the roof of the engine house were also removed. It is unknown whether this roof was simply patched when the dormers came out or it was also replaced.

16 Washington County Circuit Court, Deed Book 137, page 641.
17 Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," 1978, 54.

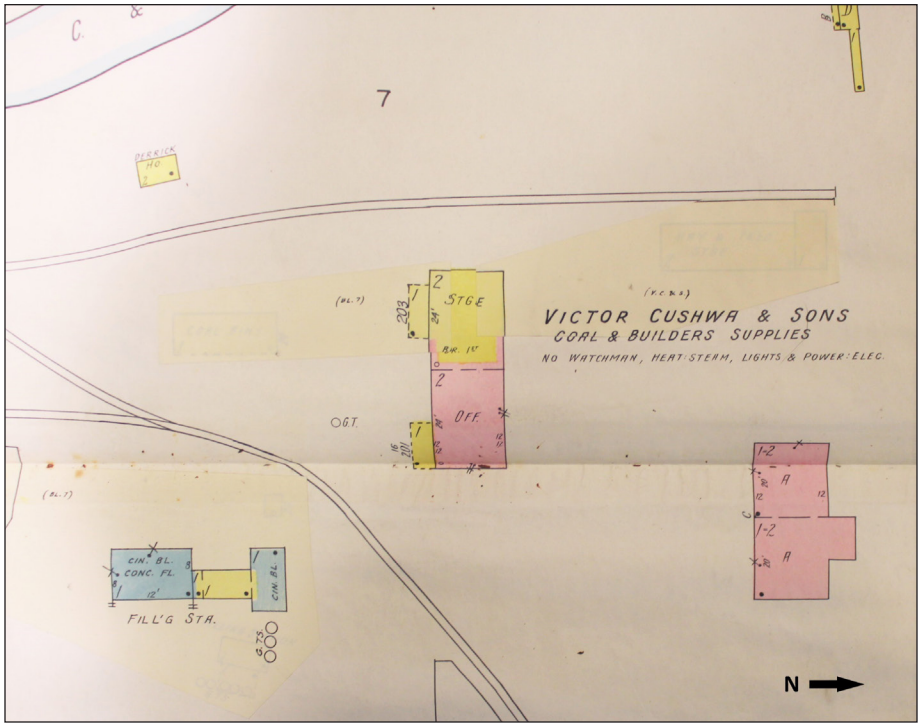


Figure 25. Detail from the 1929 Sanborn map of Williamsport. Both wings of the Williamsport Power Generating Station (on right, in pink to denote its brick construction) are labeled with the letter "A," which typically denotes a garage. The building in the middle of the image is the Cushwa Warehouse, and the building at the lower left is a gas station. [1929 Sanborn map, Western Maryland Room, Washington County Free Library, Hagerstown, Maryland]



Figure 26. View of Williamsport, (looking north), following the 1936 flood. By this date, the chimney stack and monitor over the west wing of the Williamsport Power Generating Station had been removed. Behind the powerhouse in the middle ground of the image is the Byron Tannery. Cushwa's brick plant was northeast of the tannery. [Eugene Gordon Collection, Western Maryland Room, Washington County Free Library]



Figure 27. The Williamsport Power Generating Station in 1978, a few years after its acquisition by the National Park Service. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

At some point also between 1936 and 1978, the terrain around the building was modified and regraded, perhaps to enable large vehicles and equipment to enter the building, which was used for a time as a truck garage. Along the east and south walls of the east wing, for example, a portion of the adjacent hillside was excavated and regraded to create a broad earthen ramp that sloped away from the south façade. This project may have coincided with changes to the service door itself. At some point, the service door on the south façade of the east wing was enlarged in width below the spring line of the arch. The brick jambs were rebuilt, with the transition between the enlarged opening and the original masonry arch accomplished through brick corbeling (Figure 27).[18] The ground along the west façade of the west wing was also regraded at some point during this period to create an earthen ramp that sloped up to the top of the threshold of the west service door, allowing vehicles to drive in and out.

Another major alteration to the building during this period was the demolition of the small ell that extended from the north façade of the east wing of the building. When the ell was removed, the pit associated with the space was filled and brick and stone foundation walls were left intact. The opening between the ell and the east wing of the building was filled with brick with the steel lintel left in place (Figure 28).

[18] John Milner Associates, "Historic Structure Report, Generation Station," 1978, Section II: Description of Existing Conditions.



Figure 28. Partial north elevation, 1978. The right side of the image shows evidence of the small ell that originally extended from the north façade of the east wing. When the ell was removed, which likely occurred during the Victor Cushwa & Sons ownership period (1911-1974), the opening between the ell and the east wing was filled with brick, but the steel lintel was left in place. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]



Figure 29. West elevation, 1978. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

Several other exterior modifications to the powerhouse were likely made during this period, although the exact dates of the changes are unknown. First, several stone windowsills were removed or removed and replaced with concrete sills. Second, protective coverings were installed in all window and door openings with the exception of the semicircular window in the west gable end wall, the large service door and transom on the west façade, and the large service door on the south façade of the east wing (Figure 29). The protective coverings may have been installed to secure materials and equipment being stored in the



Figure 30. Interior of the west wing, 1978. This view is looking east at the partition wall that separates the two sections of the building. Likely during the Victor Cushwa & Sons ownership period (1911-1974), the openings in the partition wall that were originally built for the passage of steam headers and other piping were crudely enlarged. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

building. While the window openings were covered, many still retained their original frames and some held original sash up until the late 1970s. Third, the original doors of the service openings were replaced with track-mounted wood doors. Lastly, the slate roof was replaced with light-weight aluminum sheeting.

On the interior, the openings in the partition wall between the two sections of the building (originally built for the passage of steam headers and other piping) were enlarged, destroying much of the arched heads (Figure 30). This may have been done to facilitate movement from one level to the other when the building was being utilized for storage.[19] It is unknown whether a staircase was constructed at one or more of the interior openings to provide access between the two levels or whether this was accomplished with ladders or other means. Lastly, several of the roof rafters and truss chords were replaced and/or repaired.[20]

[19] Phillips, "Archaeological Excavation of the Power Station, Williamsport, Maryland," 1978, 24.

[20] These conditions are described in the existing condition section of a historic structure report prepared for the National Park Service in 1978. Although the alterations may have occurred between 1974, when the building was acquired by the federal government, and 1978, when the historic structure report was prepared, they are not identified in that report as changes made by the National Park Service so likely predate its acquisition of the building.

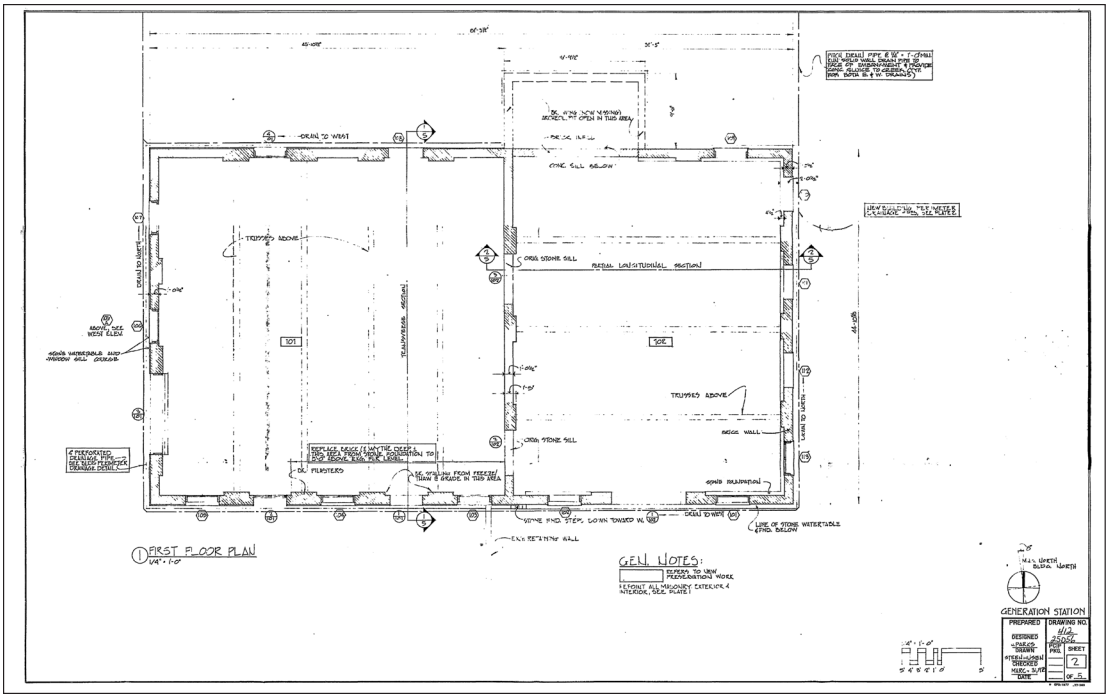


Figure 31. First-floor plan, Preliminary Preservation Drawings, Sheet 2, 1978. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

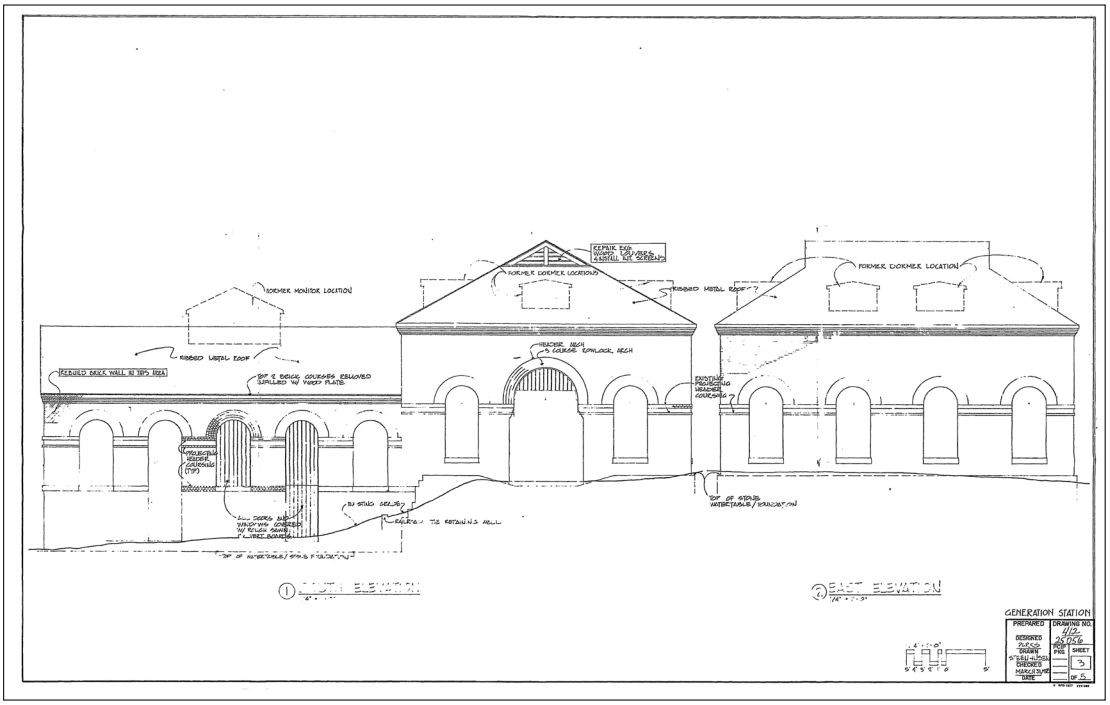


Figure 32. South and east elevations, Preliminary Preservation Drawings, Sheet 3, 1978. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

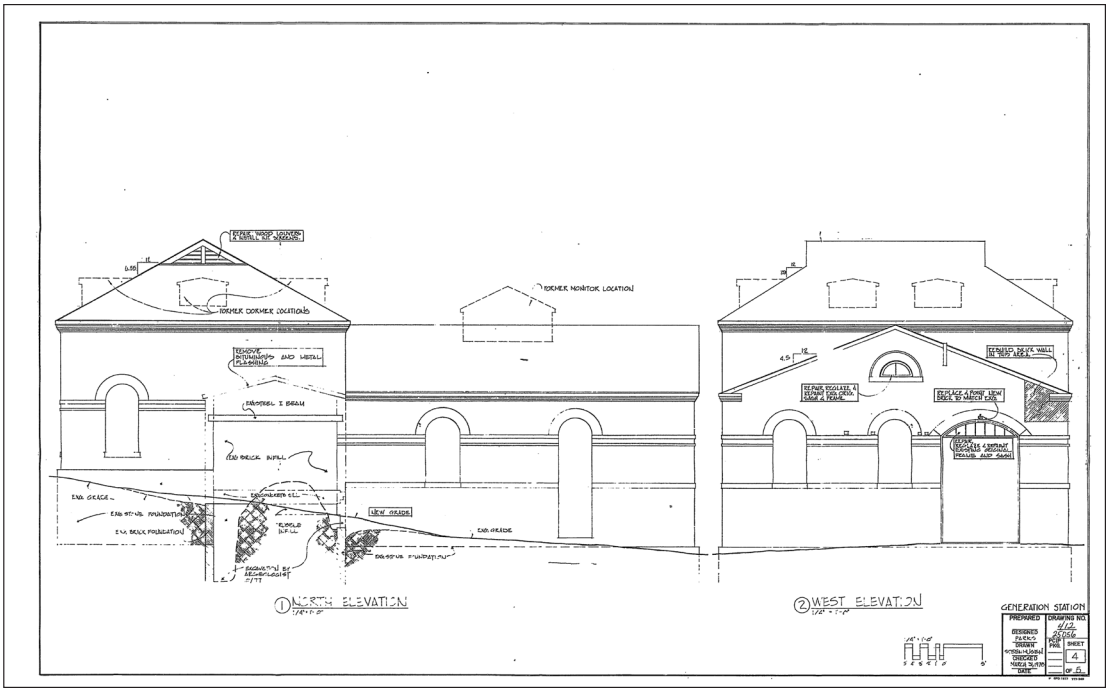


Figure 33. North and west elevations, Preliminary Preservation Drawings, Sheet 4, 1978. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

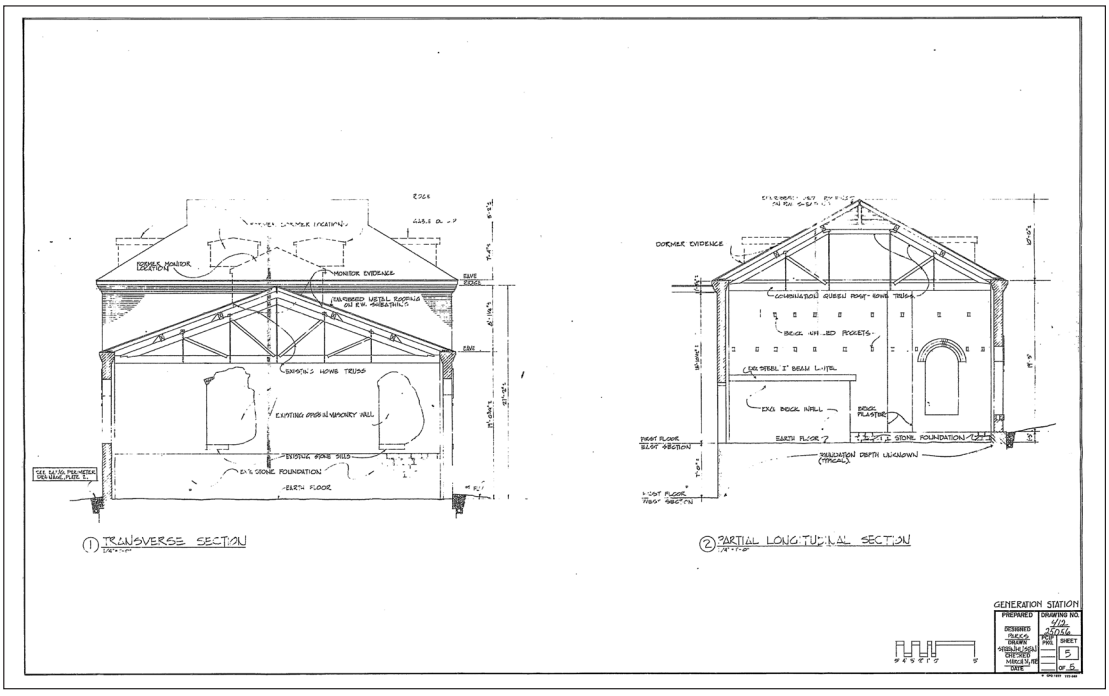


Figure 34. Sections, Preliminary Preservation Drawings, Sheet 5, 1978. [John Milner Associates, "Historic Structure Report, Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland," prepared for the National Park Service, August 1978.]

NATIONAL PARK SERVICE ACQUISITION AND ADAPTIVE REUSE (1974-CURRENT)

The National Park Service purchased the Williamsport Power Generating Station from Victor Cushwa & Sons in 1974 as part of a larger land acquisition initiative focused on enlarging the narrow right-of-way of the canal after the creation of the C&O Canal National Historical Park.

The appearance and condition of the former powerhouse at the beginning of this period are well documented in two key studies prepared for NPS in 1978 – an archaeological study and an HSR. As part of the HSR, preliminary preservation drawings, dated March 1978, were prepared for the Williamsport Power Generating Station (Figures 31 through 34). These drawings document many of the changes that had been made to the building up until that point, most during the previous period of development and described above.

In terms of the building's condition, the historic structure report notes that many areas of the brick bearing walls were deteriorated, most notably along the lower portions of the north and south walls of the west wing. There, the masonry pointing had eroded to a considerable depth. In addition, cracking and separation of brick had occurred near the eave line



Figure 35. (Bottom Left) First floor (Room 001) of the west wing, (looking south), 2021. The steel structural members, concrete floor, and concrete footings were installed in 1987. [Robinson & Associates]

at the southwest corner of the building.[21] At the time, the building was without water, sewer, electricity, security, or fire protection systems.

Starting perhaps as early as November 1977, when the Williamsport Preservation Training Center (WPTC) accepted its first trainee, or a year or so after, when the historic structure report and archaeological investigations had been completed, NPS made the former Williamsport Power Generating Station available to the training center. Records indicate that it was used as a workshop and for storage.

The principal project carried out to date by NPS at the Williamsport Power Generating Station occurred in 1987. That year, the agency engaged Wolfe Brothers, Inc., a general contractor based in Myersville, Maryland, to execute a rehabilitation project that divided the west wing into two levels through the construction of a second-floor system. The project also included the installation of sprinkler and electrical systems. To divide the west wing into two levels (today Rooms 001 and 102), the floor of the west wing was excavated roughly 2½ feet to create additional clearance and the space was retrofitted with a modern floor structure consisting of steel beams and joists and steel columns that rested on reinforced concrete footings (Figure 35). The second-floor ceiling was constructed of gypsum board affixed to the bottom chord of the roof trusses. A closed interior stair was constructed in the southeast corner of space to link the two levels, and interior steps were added at the west door on the south façade to bridge the distance between the exterior grade and the new first-floor level.[22] The openings in the partition wall between the east and west wings of the building were rebuilt to provide access between the spaces. The rehabilitation was carried out to accommodate a workshop for the WPTC, which had its administrative headquarters in the Cushwa Warehouse.[23]

Several years later, in 1992, the building was altered again when an office (Room 104), restroom (Room 103), and storage area were constructed in the southwest corner of the east wing. The project entailed excavation

21 John Milner Associates, "Historic Structure Report, Generation Station," 1978, Section II: Description of Existing Conditions.
22 Notice of Award, Contract No. CX-2000-7-9001, September 17, 1987, Box 3.3, CHOH Archive.
23 "National Canal Museum Exhibit Installation at Trolley Barn, April-October 2008, Scope of Work," no date, CHOH Archive.



Figure 36. View of the Williamsport Powerhouse looking northeast, 2021. [Robinson & Associates]

for a 4-inch-thick concrete slab and the construction of new interior partition walls and ceilings. The office, in the far southwest corner, measured roughly 9½ by 11 feet, and the bathroom, located immediately to the north, measured 10½ by 8 feet. The open storage area was located above the office and restroom spaces.[24] These spaces still remain.

NPS has carried out periodic repairs and maintenance in addition to the two major projects described above. For example, in 1993, the roof was repaired and repainted (gray), and sections of the west side of the building were repointed with lime-based mortar.[25]

In 1998, the WPTC relocated its workshop from the former powerhouse to the Jenkins Warehouse facility in Frederick. After this, NPS used the Williamsport Power Generating Station for meetings and events related to educational and volunteer programs and for temporary exhibits.[26]

24 Memo, Superintendent, C&O Canal National Historical Park to Chief, Cultural Resources Services, March 2, 1992, Folder 99.70: Williamsport Trolley Barn, Box 3.2, CHOH Archive.

25 Job Order Request, February 26, 1993, Folder 99.70: Williamsport Trolley Barn, Box 3.2, CHOH Archive.

26 Tom Vitanza, HPTC Senior Historic Architect, "WPTC-HPTC Timeline," December 2017, CHOH Archive; "National Canal Museum Exhibit Installation at Trolley Barn, April-October 2008, Scope of Work," no date, CHOH Archive.

Recent alterations have included the installation of a fire alarm system in 2003. In 2008, a temporary exhibit sponsored by the National Canal Museum was installed on the second floor (Room 102) of the west wing. To accommodate the exhibit, several changes were made to the building interior. Wood decking was installed in the east wing to provide an accessible path from the south exterior door of the east wing to the exhibit space. The walkway was installed over the gravel floor of the former engine room and remains in place today. A temporary air conditioning system was installed in the lower level of the west wing, which required the introduction of several vents in the exhibit room floor and an attic vent fan. ADA upgrades included the installation of an accessible toilet and sink in the east wing restroom, and the installation of a railing at the ramp located at the northern interior opening between the east and west wings.[27] These upgrades remained in place after the exhibit was taken down.

In 2018, emergency exit stairs were constructed along the north façade of the west wing, which remain in place today.[28] The emergency exit utilized an existing window opening that was boarded up on the exterior and encased with drywall on the interior. The boards and drywall were removed, and a fire rated door was installed in the opening (Door 102). The exit stairs consisted of a steel landing at the level of the window opening and steel steps that lead down to the west, parallel to the building façade, and terminated at a stepped concrete pad.

Today, the Williamsport Power Generating Station is used primarily for educational and volunteer purposes (Figure 36). In the west wing, the finished upper level (Room 102) provides classroom space and holds an assortment of educational and interpretive displays, and the lower level (Room 001) is used for general storage, including bicycles and kayaks for internal park use. The east wing (Room 101) is used as interpretive space. Following the relocation of CHOH headquarters to Williamsport, Room 102 served as a temporary archives space.

27 "National Canal Museum Exhibit Installation at Trolley Barn, April-October 2008, Scope of Work," no date, CHOH Archive.

28 "Supporting Documents and Photographs for PEPC Project 70491: Trolley Barn [Power Generating Station] Life Safety Improvements," July 2019, CHOH Archive.

Period of Significance

Although constructed in 1896 to house electrical generating equipment for a trolley line, the Williamsport Power Generating Station was used in this capacity for only two years before being supplanted by a larger facility in Hagerstown. For a few years at most, the Williamsport building may have continued serving as a backup power facility. But by 1911 even this use was unneeded, and the building was sold just fifteen years after its construction to Victor Cushwa who used it as a storage building and garage for his coal and building-material business. It remained in this use for the next 63 years until its purchase by the National Park Service in 1974.

The Generating Station has significance under at least two National Historic Landmark criteria:[1]

- Criterion 1: The Generating Station is associated with and represents the broad patterns of United States history, including the history of transportation and trade and population patterns on and near the C&O Canal.
- Criterion 4: The Generating Station embodies the distinguishing characteristics of late-nineteenth and early-twentieth century power houses, and the Rundbogenstil architectural style which was brought from Germany to America by immigrant architects such as the influential Adolf Cluss.

Criterion 1 is embodied in the factors which led the Generating Station to be built, decommissioned, and re-purposed. Though the building had two major uses during its operating life, both uses were closely tied to the history of transportation and trade along the C&O Canal. Criterion 4 is embodied in the building's construction and appearance. Even the changes made to the building during the Cushwa ownership were likely due to maintenance and financial concerns – for instance, rotten dormers being removed rather than repaired; the slate roof being replaced with less expensive corrugated metal – rather than because the changes were required by the new use. The overall siting, form, and massing of the building as it exists today is still the result of its original use as a generating station.

Because the existing exterior appearance of the building is fundamentally the same as its original appearance in 1896, and because the Cushwa ownership was the building's longest and most significant use (had Victor

[1] 36 CFR 65.4: National Historic Landmark Criteria

Cushwa not found the building useful enough to buy, it seems likely that it would have been demolished in 1911, or abandoned and left to decay), it seems appropriate to define the Power Generating Station's period of significance as the entire period from its construction in 1896 to the end of the Cushwa ownership in 1974. Therefore, the period of significance does not include NPS interventions such as the second floor and ceiling in the west wing, contemporary wall finishes, the lowered floor in the basement, and modern mechanical, electrical, and plumbing systems.

The most consequential loss of historic material on the interior is the original coal boilers and electrical generators, all of which were removed when the building was decommissioned in 1911 or earlier. The period of significance would allow the theoretical restoration of this, or similar, equipment if such a restoration ever became a possibility.

Physical Description

The Williamsport Power House is located at 205 West Potomac Street in Williamsport, Maryland, within the Chesapeake and Ohio Canal National Historical Park. It sits roughly 100 feet north of the Cushwa Warehouse and roughly 70 feet northeast of the northeast corner of the Cushwa Turning Basin. The Power House is one of a number of historic structures related to the canal and to Williamsport's industrial history which have been preserved in the immediate vicinity.



Figure 37. South (front) façad.e [MTFA Architecture]

ARCHITECTURAL DESCRIPTION — EXTERIOR

Built into a hill that rises steeply from west to east, the Power House consists of two single-story high-bay wings which are vertically offset from one another by the equivalent of about a story (Figure 37). The building is entirely constructed of brick atop a rough-cut limestone foundation and was designed in a German variant of the Italianate style, called Rundbogenstil. In plan, the building forms a rectangle approximately 45 feet by 81 feet, longer along its east-west axis. A rectangular ell, approximately 10 feet by 17 feet, once projected from the north wall of the east wing. This ell was removed sometime prior to 1974, but a built-up cast-iron or steel lintel beam remains in the wall over a now-infilled opening where the ell connected to the main building. Remnants of flashing on the north wall above this lintel beam trace the line of the ell's former gable or hipped roof (Figure 38).





The western wing, which was the original boiler house, has a gable roof with an east-west ridgeline which intersects the western wall of the taller eastern wing, which was the original engine house (Figure 39). The eastern wing has a hipped roof surmounted by a gable-roofed monitor with a north-south ridgeline and louvered ventilators in the two small gables. The exterior walls of the building are red brick laid in common bond with seven courses between each header course. Projecting brickwork forms water tables at the window sill levels (west wing only) and at the level of the springing points of the arched window heads. Both wings have a cornice of corbeled brick which continues around the entire perimeter of the east wing roofline and the north and south rooflines of the west wing. Short returns of the cornice wrap around to the west façade of the west wing (Figure 40).

Figure 38. North (rear) façade. [MTFA Architecture]

Figure 39. View looking northeast. [MTFA Architecture]

The current roof material is corrugated galvanized steel panels. There are no gutters or downspouts, though concavities in the water tables and abandoned brackets show where downspouts have existed in the past (Figure 41). Some remnants of wooden raking trim cling to the upper edges of the western gable. A tall boiler chimney that originally protruded from the roof of the west wing is no longer extant. Historic photos also show a raised ventilation monitor in the center of the west roof, with louvered side walls and a hipped roof. Historic photos and visible patching on the underside of the roof sheathing also show that the east wing roof had six dormer windows – two each facing east and west, and one each facing north and south. Each dormer had a side-by-side pair of horizontally-center-pivoting single-lite glazed sashes.

Tall arched windows and doors, characteristic of Rundbogenstil, are the building's most prominent visual characteristic. The main entrance is a large service door for freight or vehicles at the south wall of the east wing. Like all the doors and windows at the building, it has an arched head formed of three concentric arched rowlock brick courses with a fourth outer arched course of projecting headers. The doorway was widened at one point; to support the arch, corbeled brackets were formed at the tops of the widened door jambs. The door slides on an overhead track and is constructed of rough vertical planking with wooden cross-bracing on the interior face. A pair of arched windows with center-opening casement sashes flank the door, creating a symmetrical arrangement of openings at the south façade of the east wing. The south façade of the west wing has a symmetrical, regularly-spaced series of five arched windows with a sill line several feet above grade. Counting from the west, the windows at bays two and five have sill lines that extend to the ground to incorporate a doorway beneath the window. Of these two extended windows, the easterly window (at bay five) is completely boarded with vertical wooden planks. The westerly window (at bay two) has a center-opening casement window in its upper section and an outswinging door of vertical planking below. The sill of this casement window is about a foot higher than the window sills at bays one, three, and five in order to allow sufficient head height for the door below it. The remaining three windows at this façade have center-opening casement sashes.





Figure 40. West façade showing coal delivery door. [MTFA Architecture]

Figure 41. Façade detail showing location of removed rain leader. [MTFA Architecture]



Figure 42. East façade
[MTFA Architecture]

The west façade has two arched windows, one near the north corner and one in the center of the façade, both boarded over with vertical planking. A second large freight doorway, not quite centered between the center window and the south corner, interrupts the symmetry of the façade. This door was originally used to accept deliveries of coal from railroad gondolas which could pull up on tracks right outside. It has a double set of sliding doors of vertical planking with cross-bracing exposed on the exterior faces. This is the only opening in the building to have a segmental arch at the head rather than a semicircular arch. Also unique to this opening, the arch springs from a pair of stone voussoirs. The head of the sliding door is flat, and the space under the arch is filled with a five-lite transom window (with one missing muntin). An arched seven-lite window currently stored in the Cushwa Warehouse may be the original sash for this opening. Centered above the center window, within the gable, is a semicircular lunette window with an arch formed of two rows of rowlock bricks and a row of projecting headers. The sash, which is likely not original, has a single lite.

The north and rear façade of the building faces a sharp drop-off to Conococheague Creek below. At the east wing, the north façade has a single arched window which was centered between the east corner and the ell. This window is now boarded over with vertical planking. At the west wing, two arched windows are spaced symmetrically at the approximate third points of the façade. The easterly window has been

retrofitted into a fire-escape door which leads to an exterior structural-aluminum staircase. The westerly window has a low, ground-level sill similar to the two windows previously described on the south façade. This entire window opening is boarded over with vertical planking.

The east façade has a symmetrical, evenly-spaced row of four arched windows, all of which are boarded over with vertical planking.

All of the building's windows have stone sills. Where they survive, the casement sashes each have four stacked lites except for the window over the door in the south façade of the west wing which has three stacked lites in each sash. Most of the windows which are boarded over on the exterior are also covered on the interior with plywood or wall finishes. Some sashes appear to remain at some of these windows, though in deteriorated condition.

ARCHITECTURAL DESCRIPTION — INTERIOR

LOWER LEVEL

Room 001

The west wing of the Power House was originally a single high-bay space open from the earthen floor to the roof structure. Originally, it housed the coal-fired boiler that powered the generation equipment that provided electricity to the Williamsport-to-Hagerstown trolley line. This equipment was likely removed shortly after the building had been decommissioned as a generating station. In 1987, a steel-frame floor structure was inserted to convert the west wing into a more useful two-story space. At this time, the original floor was excavated about two and a half feet to provide head room in the lower level, and a new concrete floor slab was poured. Excavations carried out in 1978 discovered the original boiler foundations in the northeast section of this space. It is unclear if any of the foundations remain under the new, lower floor. The current lower-level room serves as a utilitarian storage and maintenance space with no floor, wall, or ceiling finishes. The walls are the exposed brick faces of the exterior building walls at the north, south, and west. The eastern wall, of rough-cut stone, is the foundation of the west wall of the east wing. The ceiling is open to the steel structure of the second floor. The floor is the exposed concrete slab mentioned above. Raised concrete curbs are visible around the south, north, and east perimeters of the room which support some of the structure

for the new intermediate floor above. Along the west side of the room, the inner face of the stone foundation wall is visible along the bottom of the wall.

The bottom half of the large, west-facing sliding service door opens into this space. The door leaves are faced on the interior with plywood. The doors have steel handles, and are locked with pins which penetrate through the doors and into the exterior frame, and hasp-and-eye hardware. At the north wall, a single outswing door of vertical planks with cross-bracing on the interior face leads to the exterior. Because of the lowered floor, the door is four steps up from the current floor level. A concrete and steel staircase near the east wall leads to the upper level.

Historic photographs show how the grade just outside the west door has changed over time. A photograph from ca. 1901 (Figure 20) shows that the exterior grade lay roughly a foot below the level of the threshold at the time. By 1978 (see Figure 29), the ground just outside the door had been re-graded to form an earthen ramp leading up to the threshold. As of 2022, the original threshold has been removed and the door sill has been lowered to align with the now-lowered interior floor (see Figure 40). The earthen ramp has also been removed, and the ground outside the door has been leveled. A comparison of Figure 20 from 1901 and Figure 29 from 1978 suggest that the threshold may also have been changed and lowered somewhat during that timespan.

UPPER LEVEL

Room 102

This room is the upper half of the original west wing high-bay space. Its primary use is as an exhibit and meeting room, though it now serves temporarily as an archival storage room and workroom. The room has three arched casement windows in the south wall which extend down to about two feet above the floor and are protected with white-painted metal railings. In addition, one window on the south wall, two windows on the west wall, and one on the north wall have been covered with planking on the exterior and are covered by gypsum wallboard on the interior. The top half of the west-facing sliding service door opens into this space. This opening is also protected by a railing. The transom under the segmental arch serves as another window into the room. One course of the brick rowlock arch of the window head is exposed at the interior of each functioning window and at one of the covered

windows. The walls of the room are white-painted drywall, likely from the 1987 renovation. Also likely as part of this renovation, a ceiling was installed to hide the roof structure, provide insulation, and provide a supporting framework for ceiling lights. The floor is gray-painted plywood. A hollow steel fire-exit door in a former window opening in the north wall leads directly to an external structural aluminum staircase to grade. A double door of clear-coated vertical planking with cross-bracing in the east wall and a segmentally-arched transom leads to Room 101. A single door of clear-coated vertical planking in the east wall leads to Room 104. Both of these doors are installed in what were formerly large openings that had been broken through the brick firewall between the east and west wings prior to the NPS acquisition of the building. A white-painted hollow-metal door leads to the staircase to Room 001. Beside it, a white-painted hollow-core wood door leads to a storage closet (Room 105). All of the lenses of the lay-in florescent overhead ceiling fixtures have been removed, leaving the bare light tubes exposed. Shelves, cabinets, and other furniture in the room prevented a full examination of the finishes, but those finishes that were visible appeared functional.

Room 101

This single-story high-bay room occupies the entire space within the east wing and is open from the gravel-covered earthen floor to the roof structure. It originally contained the electrical generators that provided power to the trolley system. During the years of the Cushwa ownership of the building, the generation equipment had reportedly already been removed.

Currently, the space retains its raw industrial character. Bare brick walls enclose it on all four sides and the roof structure overhead is exposed, with the underside of the wooden roof sheathing visible between the structural members. Sheathing planks of a darker color and different size mark former openings in the roof where dormers for light and ventilation were once located. At the tops of the walls, courses of corbeled brick similar to the exterior cornice are present, suggesting that this corbeling is as much to provide a generous bearing surface for the roof structure as it is to provide ornament. The central bay of the south wall, containing the large arched service door, is approximately twice as thick as the walls at the other bays and projects slightly into the space as a result. Similarly thickened piers exist between each window bay around the room and support the main trusses in the roof. Lines of infilled brick pockets

are visible in some of the walls; no evidence indicating their purpose has been found. A concrete ramp with a black-painted steel railing at one side provides an accessible path to Room 102 which has a slightly lower floor than Room 101. A non-original wood-plank door on a sliding track is now present at the large exterior service door in the south wall. The south-facing window to the east of the service door contains glazed casement sashes but is covered with plywood in the interior. The remaining windows – one on the north wall and four on the east wall – are covered with white-painted plywood paneling on the interiors except for one window which is roughly covered with unpainted planking through which can be seen the original casement sashes, now devoid of glass. Interior window sills are single rows of soldier-course bricks. At the arched window heads, three concentric half-circles of rowlock bricks are visible. The cast-iron or steel lintel beam set into the north wall over the former opening that led to the now-removed north ell is visible at the interior. Bolts running along its length indicate that it is probably a built-up beam consisting of two channels placed back-to-back and bolted together to form an I-beam.

Rooms 103 and 104

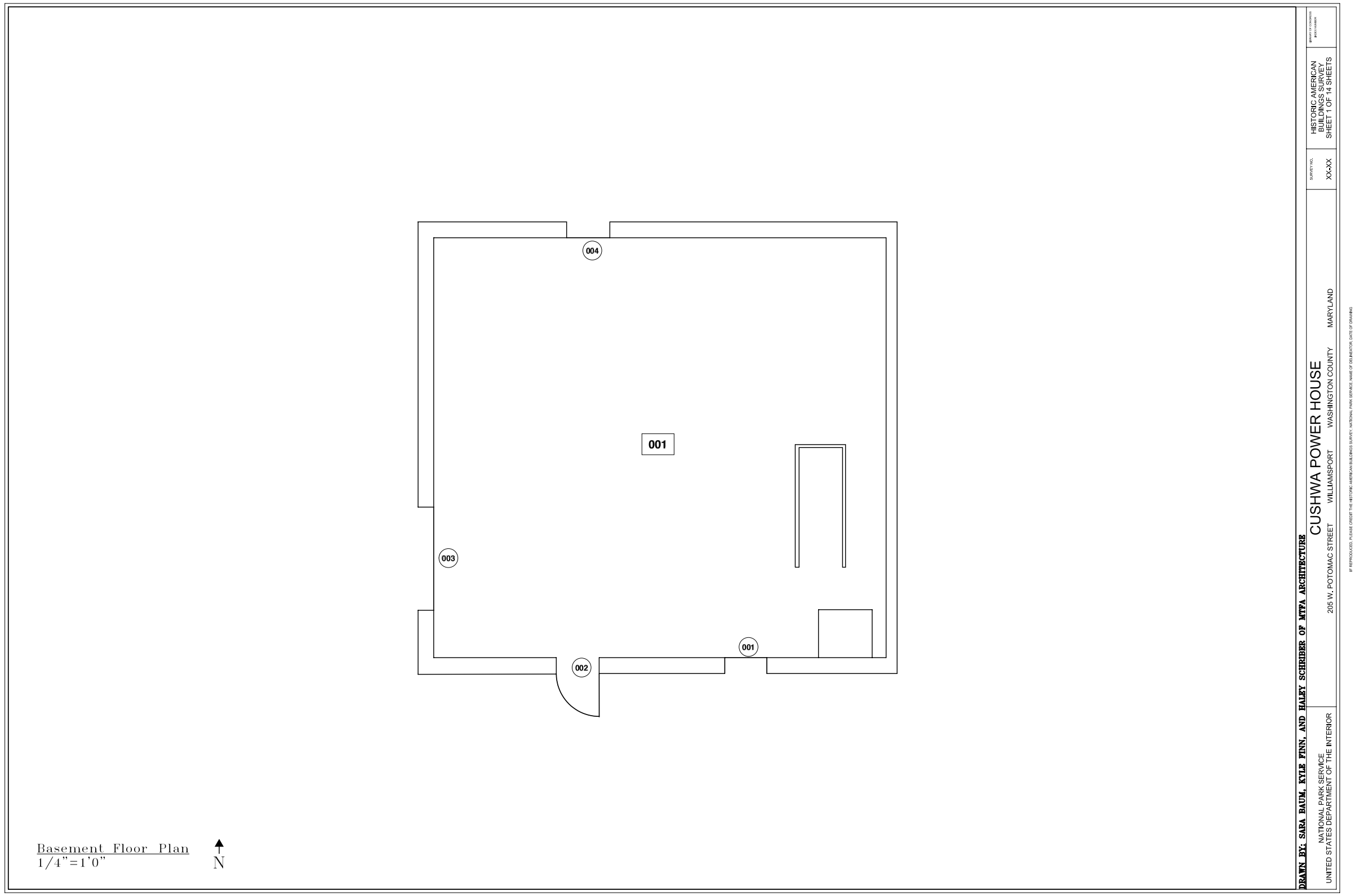
Two enclosed rooms with approximately 8' ceilings have been built within the southwest corner of Room 101. Room 104 forms an entrance vestibule to the secondary entrance to Room 102 and is also currently used for storage. It contains what was originally the second south-facing window illuminating Room 101. Room 103, north of 104, is a toilet room and janitor's space containing a water closet, lavatory, and janitor's utility sink. The exposed brick walls of Room 101 form the west walls of both rooms and the south wall of Room 104. The remaining walls of both rooms are white-painted wallboard, as are the ceilings. The outer faces of the walls (facing Room 101) are painted plywood, likely on wood or light-gauge steel studs. Both rooms have plain, clear-coated wood trim around the doors, vinyl tile floors, and clear-coated wood plank doors. Room 103 has painted wood baseboards, while Room 104 has clear-coated wood baseboards. Room 103 has two wooden bar-shaped items attached to the west wall, which is one of the brick walls of Room 101. These appear to be historic remnants from the Power House, but their original use could not be determined. The space above these rooms is used as a storage loft but is not accessible by any fixed staircase or ladder and is not an occupiable space.

ATTIC

The installation of the ceiling in Room 102 created an unoccupiable attic space above the room containing the roof structure of the west wing. At the east end of the attic is the brick wall of the taller east wing. At the west end of the attic is the inner face of the west gable. The attic is unfloored, with bare wooden joists and insulation and the exposed tops of the light fixtures in Room 102. The lunette window in the west gable provides natural illumination. The attic is reached by way of a set of folding overhead stairs in the stairwell that leads from Room 102 to Room 001.

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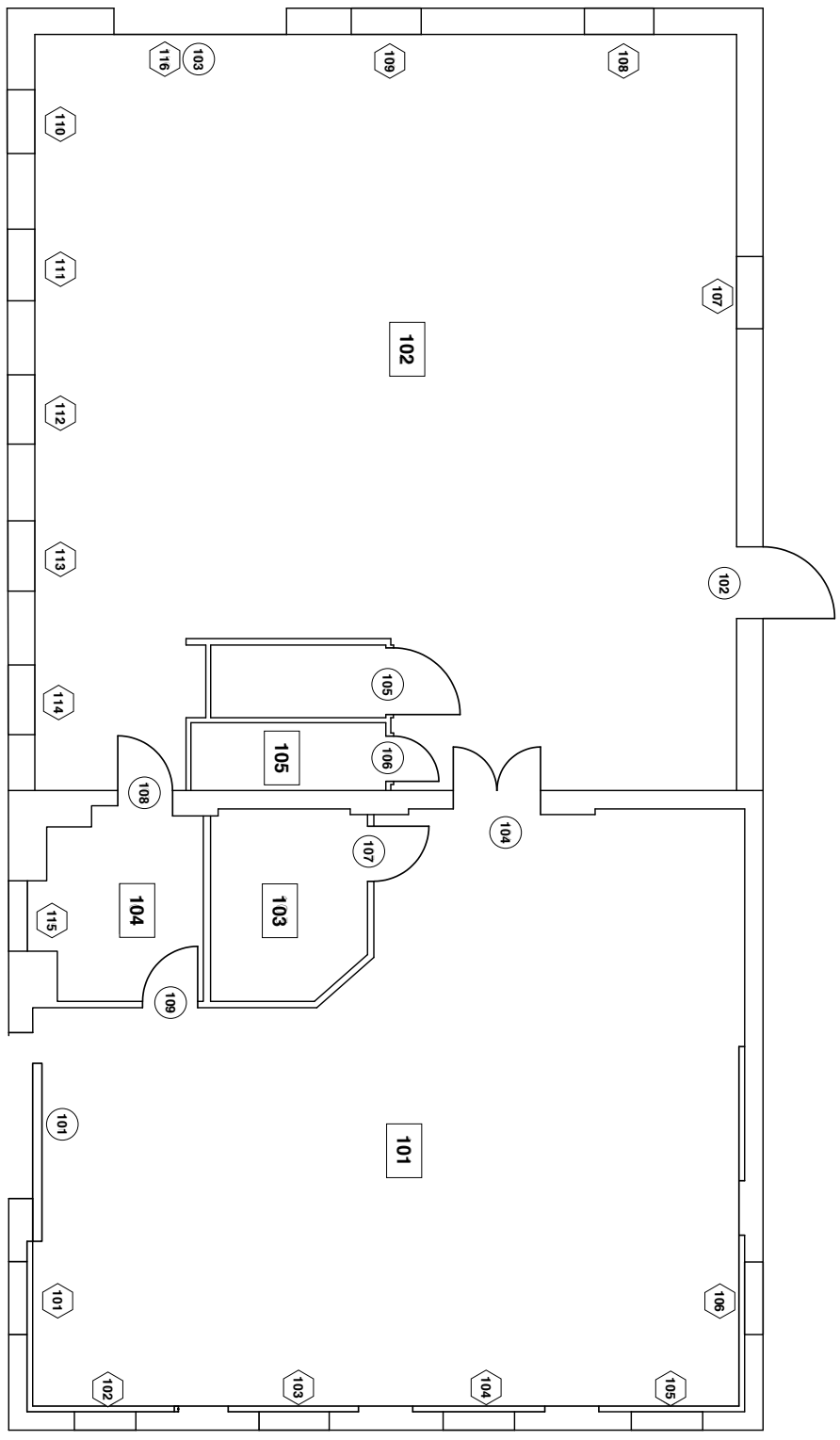
EXISTING CONDITIONS DRAWINGS



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First Floor Plan
1/4"=1'0"

N



DRAWN BY: SARA BAUM, KYLE FINN, AND HALEY SCHRIBER OF MTFA ARCHITECTURE

NATIONAL PARK SERVICE UNITED STATES DEPARTMENT OF THE INTERIOR	CUSHWA POWER HOUSE 205 W. POTOMAC STREET WILLIAMSPORT WASHINGTON COUNTY MARYLAND	SURVEY NO. XX-XX	HISTORIC AMERICAN BUILDINGS SURVEY SHEET 1 OF 14 SHEETS

IF REPRODUCED, PLEASE CREDIT THE HISTORIC AMERICAN BUILDINGS SURVEY, NATIONAL PARK SERVICE, NAME OF DELINEATOR, DATE OF DRAWING

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STRUCTURAL DESCRIPTION

McMullan and Associates conducted a visual survey on November 18, 2021 for the Williamsport Power Generating Station at the Chesapeake and Ohio Canal National Historical Park in Williamsport, MD. The scope of the survey included non-destructive, visual inspection of the historic structure including exterior walls, floor framing, columns, roof framing, and exterior and interior stairs.

An outline of the survey methodology is presented below:

1. Preparation
   The existing drawings and reports provided by the National Park Service (NPS) were reviewed. The existing documents provided were the following.
   a. Power Generating Station Drawings dated March 31st, 1978
   b. FEA Scoping Assessment dated January 21st, 2021
   c. Proposed Use Power Generating Station Plans not dated

National Park Services' historian and building engineer assisted with additional information as requested.

2. General Structure Condition Survey
   The survey consisted of a visual walkthrough by McMullan of accessible areas around the Power Generating Station to identify deficiencies and possible safety concerns. Close-up observations utilizing a zoom camera were performed and ladders were used to access higher structural elements.

PHYSICAL CONDITIONS NARRATIVE

Power Generating Station

The one-story masonry Power Generating Station building was constructed in 1896 to house the power generating equipment for an electric trolley line to Hagerstown, MD. The power station has a rectangular footprint in plan and a total area of 3,645 square feet (45 feet × 81 feet), laid out on an east-west axis northeast of the Cushwa Warehouse. The exterior walls are constructed of brick masonry supported by stone foundation walls. The building is separated into an east wing and a west wing by a brick wall on what is now the upper floor. The east wall of the lower floor of the west wing serves as a foundation wall of the east wing which does not have a lower level. The west wing of the building housed coal boilers which powered an electricity-generating plant in the east wing. Today, the east wing functions as an exhibit space. A single-occupant toilet room and a small vestibule are built against the west wall. The upper floor of the west wing currently accommodates archival storage and work space. The lower floor serves as storage space.

The construction of the east wing is a single-story, double-height brick masonry structure with brick masonry arched windows and doors with a stone foundation. The galvanized metal Dutch gable roof is supported by wood planks and framed with wood rafters spanning to purlins and roof trusses. Areas of infilled planking, where dormers used to be, could be observed in the roof by discoloration in the planking.

The western wing of the building is a brick masonry structure two stories high built into the slope of a hill. The lower level has a concrete slab on grade with brick exterior walls sitting on stone foundations. Concrete curbs are present along the exterior supporting the upper floor steel framing. The upper floor is constructed of steel bar joists spanning to steel wide flange girders at the center of the room and on the north and south wall. The wide flange girders span to steel wide flange columns bearing on the concrete slab in the middle of the room and the concrete curbs at the north and south walls. The flooring of the upper floor is constructed of plywood with vinyl coating. The steel columns are anchored to the existing brick wall with two anchors at approximately 36 inches on-center to brace the brick wall. The galvanized sheet-metal gable roof is supported by wood planking and framed with wood rafters spanning to purlins and roof trusses



Figure 43. Bridge at Williamsport, MD During 1936 Flood. [National Park Service Archives]

A large wooden door in the west wall opens into Room 001 on the lower level of the west wing. The concrete slab on grade below this door has water stains indicating water ponding. NPS staff stated that water often enters the building below this door. This water intrusion at the door is caused by grading issues which should be further investigated and addressed. The power station is in a flood plain due to the building's proximity to the Potomac River and Conococheague Creek. On the south side of the Cushwa Warehouse are markers indicating high water levels from previous floods which reached well into the upper story of both structures. There are two ways for a building to resist flood loads: allowing water into the building and keeping water out of the building. If water is allowed into the building it needs to easily exit the building and cause minimal damage to the materials in the structure. If water is kept out of the building, the structure needs to be designed as watertight to resist the flood forces. The Power Generation Station is not currently designed to resist water intrusion, and its character- defining features would make it difficult to retrofit the structure to do so. The building should be designed to allow water to flow in and out of the structure quickly, with minimal damage to interior finishes.

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PLUMBING, MECHANICAL, AND ELECTRICAL DESCRIPTION

PLUMBING

The building plumbing systems support a single-use restroom on the first floor. The building has an incoming water feed from the Cushwa Warehouse to support the plumbing fixtures and domestic water distribution. All the plumbing fixtures drain via a gravity sanitary line to an exterior sewage ejector sump pump system that serves the Cushwa Warehouse and the Williamsport Power Generating Station buildings.

MECHANICAL/HVAC

The building has a combination of HVAC systems to provide heating and cooling to various areas of the building. Electric unit heaters have been installed in Room 102. Baseboard electric resistance heaters have been installed in the restroom and adjacent support closet on the first-floor level. An electric unit heater has been provided for freeze protection of the fire sprinkler room. Air-conditioning for Room 102 is provided by a multi-zone ductless split-system with multiple indoor wall mounted air conditioning units and a single exterior condensing unit. Operable windows are also available to provide natural ventilation in this room. The first-floor bathroom is provided with a ceiling exhaust fan. Rooms 101 and 001 have no mechanical ventilation or climate control. Room 101 has some passive natural ventilation in the form of a ventilation monitor in the roof which can draw air up from the main entrance door when it is open. There is the potential for additional natural ventilation from several windows in the room, though they are all boarded up and non-operable at the time of this writing.

ELECTRICAL

The building electric service provides power to receptacle, lighting and equipment loads in the building. Lighting in the building is a mix of incandescent, fluorescent, and LED lighting. Emergency lighting is provided by wall packs with integral battery back-up and illumination heads.

A separate electric service is routed from the exterior site electrical distribution to the Basin Pump Distribution Panel located within Room 102. This panel serves a pump system controller for the nearby canal turning basin.

SUMMARY OF CONDITIONS

Plumbing

No upgrades to the existing water or sanitary services are anticipated for any proposed renovations. The existing building fixture count as well as ADA accessibility may need to be adjusted for the proposed renovations. Existing plumbing fixtures and accessories shall be removed and replaced with new low water consumption fixtures and dual flush manual operators. A new accessible drinking fountain shall be provided for the public areas. All existing sanitary, vent, and domestic water piping shall be replaced and provided with piping insulation. A new electric water heater with storage tank shall be provided.

All applicable code requirements outlined in International Building Code (IBC) 2021, International Plumbing Code (IPC) 2021 and International Energy Conservation Code (IECC) 2018 shall be complied with.

Mechanical

Mechanical system modifications are recommended for any proposed renovation to the building. The mechanical system should also provide the required ventilation air and humidity control for the conditioned areas of the building and be coordinated to maintain the historic nature of the building and exhibit areas.

All applicable code requirements outlined in International Building Code (IBC) 2021, International Mechanical Code (IMC) 2018, and International Energy Conservation Code (IECC) 2018 shall be complied with.

Electrical

The existing electrical distribution system and panels rated for a total capacity of 225A at 120/208V, three phase should be sufficient to support the new mechanical, lighting, and power distribution loads for the building. The existing load center located on the second floor should be replaced and an additional distribution panel for the first floor should be provided to increase the number of available power circuits.

All lighting in the building would be replaced with new LED lighting in accordance with the IECC requirements and IEC recommended light levels. LED lighting fixtures would comprise of lensed strip lights in

storage/support/back of house areas. New lighting fixtures for public and exhibit spaces will be coordinated to be compatible with the historic nature of the building. Lighting controls for the support spaces will include occupancy/vacancy sensors. New exit signs and egress emergency lighting will be provided as required by code. All emergency lighting fixtures shall be provided with integral or remote battery back-up power.

All surface mounted receptacles and data outlets on existing to remain walls would be demolished. New receptacles and data/AV outlets will be installed throughout the building as required to meet the programming requirements of the areas and in accordance with the NEC for receptacle locations and spacing.

New telecom/data cabling and outlets shall be provided as needed for any proposed renovation.

A new intrusion detection system should be provided for any building renovation. The system will include door/window sensors, glass break sensors, and motion detection. The system shall be provided with remote monitoring.

All applicable code requirements outlined in International Building Code (IBC) 2021, National Electrical Code (NEC) 2017, and International Energy Conservation Code (IECC) 2018 shall be complied with.

Maintenance

The proposed MEP systems would require limited routine maintenance which would include routine changing of mechanical air filters, seasonal servicing of the hot water boiler system, lubrication of the AHU fan motors, and general inspection and monitoring for repairs and replacement.

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FIRE PROTECTION DESCRIPTION

APPLICABLE CODES

The National Park Service Architectural Standards adopt by reference the 2018 editions of the International Codes, including the 2018 International Building Code (IBC) and International Existing Building Code (IEBC), and NFPA 101, Life Safety Code (when IBC is silent). Applicable codes include, but are not limited to:

- 2018 International Building Code (IBC), as adopted by National Park Service Architectural Standards
- 2018 International Existing Building Code (IEBC), as adopted by National Park Service Architectural Standards
- 2018 International Fire Code, as adopted by National Park Service Architectural Standards
- 2018 Life Safety Code, NFPA 101
- 2016 National Fire Alarm Code, NFPA 72
- 2017 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, NFPA 25
- 2016 Standard for the Installation of Sprinkler Systems, NFPA 13
- RM-58 (2015): National Park Service Reference Manual 58, Structural Fire

IEBC, IBC and NFPA 101 criteria are applicable to building renovations. The IEBC could be applied to limit the impact of applying new code requirements to an existing building. The applicability of the IEBC and the assessment of the level of alteration will be determined as the project progresses.

FIRE SPRINKLER

The Power Generating Station is partially sprinklered with an existing dry-pipe sprinkler system. Currently, the lower floor and WPTC Shop Area #2 on the second floor are sprinklered. WPTO Shop Area #1 is not currently sprinklered.

The sprinkler system is fed from a 4-inch ductile iron water main located in a heated and insulated closet in the lower level, see Figure 44. The dry pipe riser consists of a 4-inch Viking Model E2 dry pipe valve. Air for the dry system is supplied via a Viking air compressor located in room 104 in the wall cavity.

A Fire Department Connection (FDC) is provided on the exterior of the building outside of the lower level exterior entrance along with a water motor

gong. Control valves and water flow switches are electronically monitored with tamper and pressure switches. Electronic monitoring of water flow and valve supervision is performed via a DSC Fire Control/ Communicator Panel that is located next to the exterior entrance door on the lower level.

A backflow preventer is required for any connection to the domestic/ potable water supply. The sprinkler system is served by the domestic water system, but no backflow preventer was provided for the sprinkler system.



Figure 44. Heated room that contains sprinkler riser. [McMullan Consulting Engineers]

FIRE ALARM

There is no existing fire alarm system installed. Instead, there are single station smoke alarms placed throughout the building. A DSC Fire Control/ Communicator Panel is used to monitor the flow and tamper switches for the sprinkler system.

LIFE SAFETY

Use and Occupancy

The Power Generating Station is a mixed-use occupancy with Group B, A-3, and S occupancies. The lower floor is Group S (miscellaneous storage). The second floor is Group B and Group A-3 (temporary archive space and exhibit space). The attic is accessible only by a pull down ladder in the stair and is considered unoccupied.

Fire Rated Separations

No fire or smoke separations were observed in the building.

Construction Type

The Power Generating Station is constructed of wood structural framing, wood floor, and wood floor and roof joists. The construction type of the Power Generating Station most closely resembles Type VB per IBC §602.5.

Means of Egress

Means of egress is provided from the lower level and the upper level independently. The lower level (Storage occupancy) is served by a single means of egress consisting of an exterior exit door leading directly outside.

The upper level is served by two means of egress. One exit door on the north side of the building leads to a metal exterior stair. The other exit is the sliding door in the south façade. Note that this sliding door is only considered a means of egress if it is kept unlocked at all times when the building is occupied.

Portable Fire Extinguishers

Portable fire extinguishers were observed stored on the floor within the building.

Height and Area Requirements

The IBC contains limitations on maximum allowable height and area of a building depending on the construction type used and sprinkler protection provided. Although the Power Generating Station is an existing building, height and area limitations were evaluated for informational purposes.

The base tabular allowable area per floor for non-sprinklered Group A-3 occupancies with Type VB construction in the IBC is 5,500 sqft and the base allowable height is 1 story and 40 ft [IBC, Table 506.2, 504.4, 504.3]. Currently, the building is not in compliance with these requirements as it is two stories. When sprinklers are added the requirements per the IBC are an allowable area of 18,000 sqft and the base allowable height is 2 stories and 60 ft [IBC, Table 506.2, 504.4, 504.3]. The building would be in compliance with these requirements if it was fully sprinklered.

	TOTAL ALLOWABLE SPRINKLERED	TOTAL ALLOWABLE NON-SPRINKLERED	LEVEL 5 (HIGHEST OCCUPIED STORY)
FLOOR AREA (SQ. FT)	18,000 SF	5,500 SF	~3,700 SF
HEIGHT (FT)	60 FT	40 FT	<60 FT
HEIGHT (STORIES)	2	1	2

Occupant Load

The calculated occupant loads are required to be determined in accordance with Section 7.3.1.2 of the NFPA 101. Based on the use of the spaces, the following occupant load factors apply:

FLOOR	AREA (SQFT)	ROOM NUMBER	USE	OCCUPANCY TYPE	OCCUPANT LOAD FACTOR (SQFT / PERSON)	NUMBER OF OCCUPANTS (PERSONS)
Lower Level	1,980	001	Storage	Storage	500	4
TOTAL:						**4**
Main Level	1,935	102	Archive	Business	150	13
Main Level	1,540	101, 103, 104	Exhibit Space	Assembly	15	103
TOTAL:						**115**
Loft Level		300		Not Accessible	N/A	N/A
Total:						0
BUILDING TOTAL:						**119**

Egress Capacity

An exit capacity factor of 0.2 in. per person for level components NFPA 101 Table 7.3.3.1.

EGRESS COMPONENT	WIDTH (IN)	REQUIRED CAPACITY (PERSONS)	PROVIDED CAPACITY (PERSONS)
Lower Floor Exit Door	46.5	4	155
WPTC Shop Area Door	35.5	33	119
Sliding Barn Door	96	32	480

The exit capacity from the building is sufficient.

Number of Exits

Two means of egress are required per NFPA 101 §4.5.3.1. Two means of egress are provided from the main level and one means of egress is provided from the lower level.

Arrangement of Means of Egress

The most restrictive dead-end, common path, and travel distance limitations for the project areas are contained in the following table. Required values reflect fully sprinklered buildings.

ARRANGEMENT	MAXIMUM ALLOWABLE	ACTUAL
Dead-End Corridors (NFPA 101, 13.2.1.3)	20ft	N/A
Common Path of Travel (NFPA 101, 13.2.5.1.2)	75ft for <50 occupants 20ft for >50 occupants	51ft 0ft
Travel Distance (NFPA 101, 39.2.4.3)	250ft	60ft

The provided arrangement of means of egress meets or exceeds the requirements of the NFPA 101.

Portable Fire Extinguishers

Portable fire extinguishers are required to be installed where they are readily accessible per NFPA 10 §6.3.1 requirements There are several issues with the portable fire extinguishers in the Warehouse, these will be discussed further in the Portable Fire Extinguishers – Recommendations section. See Figure 45.

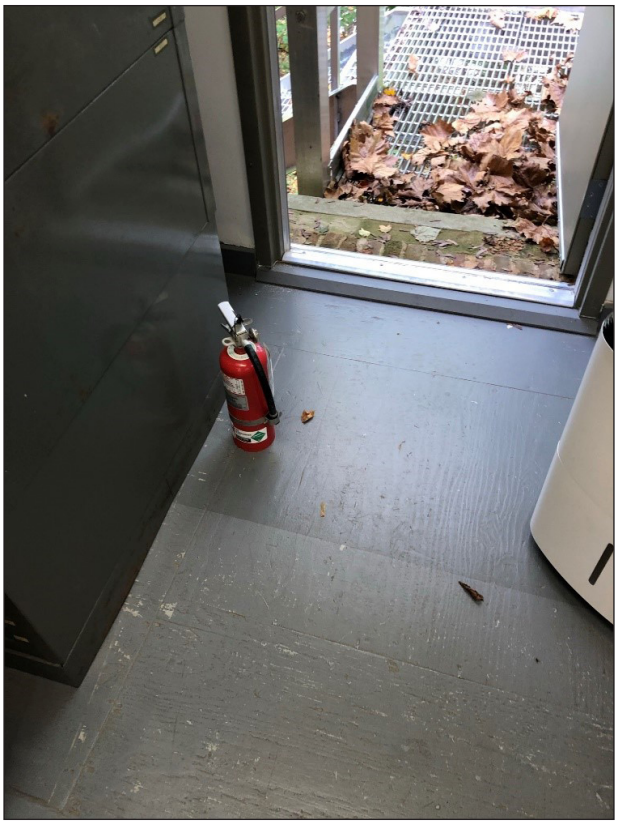


Figure 45. Improperly stored fire extinguisher. [Jensen Hughes]

Character-Defining Features and Materials

This section contains a list of the historically-significant features and materials within the Williamsport Power Generating Station.

FOOTPRINT AND PLAN

The rectangular building footprint and the overall logic of the plan are both formed by the two main wings which contained the two main pieces of equipment for which the building was constructed – the boiler and the power-generating engine. Except for the disappearance of the small ell to the north of the east wing, the footprint of the building has remained the same since the building was built. The plan has been changed to a greater extent, primarily by the addition of the intermediate floor and second-floor ceiling in the west wing which has divided this previously-open space into a basement, main level, and attic. In the east wing, the restroom and the small vestibule have also altered the layout, though to a far less obvious extent. All of the existing changes to the plan are reversible, and the building could be returned to a condition close to its pre-renovation appearance if such a decision were ever made.

SHAPE AND MASS

One of the most prominent visual aspects of the building is its two-part appearance consisting of the narrower, taller east wing on the uphill portion of the site and the longer, lower west wing on the downhill portion, but all tied together with uniform materials, fenestration, and corbeled brick detailing across both wings.

MATERIALS (EXTERIOR)

The primary materials of the exterior are red brick with stone windowsills and wood casement window sashes. The existing wooden doors are not original although the original doors were likely wood. The original roofing material was slate; the existing corrugated galvanized steel roof panels are therefore not contributing materials.

ROOF

The relatively steep roofs are prominent on this small building and lend much to the building's visual character and sense of scale even though dormers at the east wing roof, a louvered monitor at the west wing roof, and the building's original tall brick chimney stack no longer exist.

OPENINGS

Character-defining openings include all of the existing door and window openings which date to the original construction and relate to the original functions of the spaces within. The windows create a strong rhythm around the building, especially on the west, south, and east façades. The exterior freight service doors, though larger than the windows, relate to them in terms of their arched heads and placement in the façades. The alteration (widening) of Door 101 speaks to the continued industrial use of the building, and the skillful way the brick was corbeled to support the unaltered arch of the door head reflects – whether deliberately or only by chance – the use of corbeling in the cornice of the building. Some original sashes may exist within window openings that have been covered with wood paneling on the interior and exterior. The transom sash at the large coal delivery door in the west façade appears to be a non-historic replacement with a row of only five lites. Historic photographs show that the original transom had a row of seven lites. As of late 2021, a seven-lite arched window which may be the original sash for this transom was observed stored in the northernmost grain bin in the second-floor storage area of the nearby Cushwa Warehouse.

SECONDARY FEATURES (EXTERIOR)

Exposed portions of the roughly-cut limestone foundation and the cast-iron lintel beam set into the north wall of the east wing are additional character-defining features.

INTERIOR

The following interior elements are contributing character-defining features of the Generating Station and are part of its historic integrity:

LOWER LEVEL:

Exposed brick and limestone interior walls in Room 001

UPPER LEVEL:

Wooden heavy-timber trusses and iron tension rods in the roof structures of both wings

Exposed brick interior walls, window heads, and window sills in Room 101, 103, and 104

Wooden elements attached to wall in Room 103

ATTIC:

Wooden and metal building structural elements throughout the attic

Exposed brick interior walls

SETTING

The Generating Station was sited to take advantage of its location's proximity to railroad lines which could deliver coal for the Power House boiler directly to the door. It is also possible that the barometric condenser which occupied the now-removed ell benefitted from access to the water of the Conococheague Creek immediately to the north. The building's location near the Cushwa Warehouse ultimately led to its long association with the Cushwa company which continued for far longer than its short life as a power house for the trolley line to Hagerstown. Changes in the surrounding grade, the removal or burying of the railroad tracks, and the creation of gravel parking lots to the south and west have significantly altered the setting around the Generating Station.

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Conditions Assessment

QUALITATIVE CONDITION RATINGS

This section describes the existing conditions of the Generating Station as of December 2021. It identifies areas and types of deterioration exhibited by the building's architectural, structural, electrical, and mechanical features as categorized in the ASTM Uniformat II building element master list. A condition rating and deficiency rating is provided for each element. Additionally, a written description of the observed conditions of the building materials and elements is provided. The section also provides recommendations for material and feature repairs.

METHODOLOGY

Survey work for preparation of the conditions assessment was completed in the autumn of 2021. The field assessment was limited to visual inspection from the ground and the interior. Finishes were not removed to investigate hidden portions of the structure, nor were confined spaces entered. Assessment of the roofs was limited to conditions visible from the ground and within the attic.

CONDITIONS ASSESSMENT STANDARD DEFINITIONS

The condition assessment definitions used for this HSR are based upon those outlines in NPS Park Facility Management Division's (PFMD) Asset Management Process (AMP), the Facilities Management Software System (FMSS), and the Facility Condition Assessment (FCAS) and adapted for use by the CHOH NPS. For the purposes of this report, these definitions were strictly interpreted as a way to qualitatively assess the current condition of the Williamsport Power Generating Station.

GOOD

- Routine maintenance should be sufficient to maintain the current condition; and/ or
- A cyclic maintenance or repair/rehabilitation project is not specifically required to maintain the current condition or correct deficiencies

FAIR

- The feature generally provides an adequate level of service to operations, but
- The feature requires more than routine maintenance, and
- Cyclic maintenance or repair/rehabilitation work may be required in the future

POOR

- Feature requires immediate attention
- Routine maintenance is needed at higher level of effort to meet significant safety and legal requirements
- Cyclic maintenance should be scheduled for the current year
- A special repair/rehabilitation project should be requested consistent with park requirements, priorities, and long- term management objectives

MAINTENANCE DEFICIENCY PRIORITY RATINGS (10- YEAR RATING PERIOD)

NONE- Long-Term Priority

- This rating indicates standard preventative maintenance priorities and preservation methods have been followed
- Routine maintenance should continue to be followed on a regular basis to maintain a state of good repair

MINOR- Short Term/Long- Term Priority

- This rating indicates standard preventative maintenance priorities and preservation methods have not been followed
- There is reduced life expectancy of affected adjacent or related materials and/or systems within 5 to 10 years and beyond;
- There is condition with long-term impact within 5 to 10 years and beyond

SERIOUS- Immediate/Short- Term Priority

- This rating defines a deteriorated condition that if not corrected within 1 to 5 years will result in the failure of the feature
- A threat to the health and/or safety of the user may occur within 1 to 5 years if the ongoing deterioration is not corrected
- There is ongoing deterioration of adjacent or related materials and/or features as a result of the feature's deficiency

CRITICAL- Immediate Priority

- This rating defines an advanced state of deterioration which has resulted in the failure of a feature or will result in the failure of a feature if not corrected within 1 year
- There is accelerated deterioration of adjacent or related materials or systems as a result of the feature's deficiencies if not corrected within 1 year
- There is immediate threat to the health and safety of the user
- There is failure to meet a legislated requirement

NOT RATED

- The feature was not rated as it was not extant at the time of the report or is planned to be removed and not replaced.

SUMMARY OF CONDITIONS

Based on FMSS terminology, as previously defined, the Williamsport Power Generating Station has been rated as follows:

Exterior Building Features

Overall Condition Rating: Fair

Overall Deficiency Rating: Minor

Interior Building Features

Overall Condition Rating: Good

Overall Deficiency Rating: None

ASTM UNIFORMAT II CLASSIFICATION FOR GENERATING STATION

MAJOR GROUP ELEMENT	GROUP ELEMENT	INDIVIDUAL ELEMENTS	MATERIAL	QUALITATIVE CONDITION RATING	MAINTENANCE DEFICIENCY PRIORITY
A Substructure	A10 Foundations	A1010 Standard Foundations	Stone	Fair	Serious
			Concrete	Good	Minor
		A1030 Slab on Grade	Concrete	Good	Minor
B Shell	B10 Superstructure	B1010 Floor Construction	Metal	Good	Minor
		B1020 Roof Construction	Wood	Good / Fair	Minor / Serious
	B20 Exterior Closure	B2010 Exterior Walls	Brick	Fair	Minor / Serious
		B2020 Exterior Windows	Wood	Good / Poor	Minor / Critical
		B2030 Exterior Doors	Wood	Fair	Minor
	B30 Roofing	B3010 Roof Coverings	Galvanized steel	Fair	Serious
C Interiors	C20 Staircases	C2010 Stair Construction	Metal	Good	None
			Wood folding	Poor	Critical
D Services	D20 Plumbing	D2010 Plumbing Fixtures	Water Closets	Fair	Minor
			Lavatory	Fair	Minor
			Laundry Sink	Fair	Minor
		D2020 Domestic Water Distribution	Pipes & Fittings	Fair	Minor
			Electric Water Heater	Poor	Not Rated
			Insulation	Poor	Serious
		D2030 Sanitary Waste	Waste, Vent, Pipe & Fittings	Fair	Minor
			Floor Drains	Fair	Minor
		D2040 Rain Water Drainage	None installed	Poor	Serious
	D30 HVAC	D3020 Heat Generating Systems	Electric Unit Heaters	Good	Minor
			Electric Baseboard	Fair	Minor
		D3040 Distribution Systems	Exhaust Fans	Fair	Minor
		D3050 Terminal & Package Units	Ductless Split-System	Good	Minor
	D40 Fire Protection	D4010: Fire Protection Sprinkler Systems	Sprinkler System	Poor	Serious
		D4040: Special Electrical Systems	Fire Alarm System	Poor	Not Rated
	D50 Electrical	D5010 Electrical Service & Distribution	MDP, Branch Circuit Panels	Good	Minor
			Circuit Breakers	Good	Minor
			Conduit and Wiring to Panels	Good	Minor
		D5020 Lighting & Branch Wiring	Electrical Wiring	Good/Poor	Minor/Serious
			Lighting Fixtures	Good/Poor	Minor/Serious
		D5040 Special Electrical Systems	Emergency Lighting System	Fair	Minor

ARCHITECTURAL CONDITIONS

EXTERIOR BRICK MASONRY

Major Group Element
B Shell

Group Elements
B20 Exterior Enclosure

Individual Elements
B2010 Exterior Walls

Material
Brick

Qualitative Condition Rating
Fair

Maintenance Deficiency Priority
Serious

The power house has characteristically rough-surfaced, irregular brick. It has likely weathered somewhat over the century and a quarter since the building was built, but it is basically sound. The mortar of the brick masonry exterior walls, however, is heavily eroded. Past repointing campaigns are evident in scattered areas. In some areas, the repointing technique was adequate, but in other areas the work seems to have involved only applying a thin layer of mortar over older, deteriorated mortar. This is little more than a temporary cosmetic repair at best, and this newer mortar is crumbling from the building as the mortar underneath continues to deteriorate. The newer mortar also completely fills the joints. The rough bricks at the Power House have irregular, rounded arrises which do not provide a sharp border against which to tool a mortar joint. Any repointing should hold the surface of the mortar a fraction of an inch back from the brick faces in order to keep the mortar joints from looking excessively wide and sloppy. This recommendation is also in line with the recommendation made in the 1978 HSR.

The walls are three wythes thick generally, thickening to four wythes at interior perimeter piers and at the main south and west doors. Brick spalls, loose bricks, and some missing bricks were observed at some scattered locations. This is a concern in particular at the overhanging corbeled cornices where any bricks of doubtful integrity should be repaired or replaced in kind as a safety measure.



Figure 46. Worn bedding mortar and deteriorating surface-applied repointing mortar. Note overfilled joints causing overly wide and uneven appearance, along with poor tooling. [MTFA Architecture]



Figure 47. Spalled bricks at corbeled cornice. [MTFA Architecture]



Figure 48. Displaced and missing bricks at corbeled cornice. [MTFA Architecture]

WOOD WINDOWS

Wood casement inswing windows have been restored or possibly replaced at most of the south (front) façade. Restored or replaced windows have replicated-antique wrought-iron hardware that is not original to the building. Where windows are boarded up, casement sashes can be seen between the boards in some cases, though the condition of the sashes is difficult to determine. At one boarded window, it is possible to clearly see that the sash is still in place. However, all the glass is missing, some deterioration is visible at the window frame, and the visible hardware is rusted. Any boarded-up windows which are returned to use in the future will likely need full sash restoration if not replacement in kind. The restored windows are also in need of glazing replacement and repainting, including frames and sashes.

Major Group Element
B Shell

Group Elements
B20 Exterior Enclosure

Individual Elements
B2020 Exterior Windows

Material
Wood

Qualitative Condition Rating
Good / Poor

Maintenance Deficiency Priority
Minor / Critical



Figure 49. South (front) façade showing mix of previously-restored windows and boarded-up window. [MTFA Architecture]



Figure 50. Boarded-up window, interior view, showing deteriorated casement sashes visible in a gap in the boards. [MTFA Architecture]



Figure 51. Previously-restored window showing deterioration of paint and glazing putty. [MTFA Architecture]

Major Group Element
B Shell

Group Elements
B20 Exterior Enclosure

Individual Elements
B2030 Exterior Doors

Material
Wood

Qualitative Condition Rating
Fair

Maintenance Deficiency Priority
Minor

EXTERIOR WOOD DOORS

The building has three exterior wood doors. One is a single sliding service door for vehicles and equipment, one is a double sliding service door for freight deliveries, and one is a single outswing pedestrian door. The doors are not original, though they resemble the doors known or likely to have been in place historically. They are in serviceable condition, though with some structural and material deterioration.



Figure 52. South elevation service door, seen from interior. [MTFA Architecture]



Figure 53. West elevation, showing freight door. [MTFA Architecture]

GALVANIZED STEEL CORRUGATED ROOF PANELS

The existing galvanized steel corrugated roof panels replace the building's original slate roof. Most of the zinc coating has worn away from the exposed exterior side of the panels which now have an almost uniform coating of surface rust. Some holes exist in the panels, and the sheathing is starting to deteriorate at these areas. All of the perimeter trim which closed the gap between the exterior walls and the roof system is missing, potentially allowing water, insects, snakes, and other fauna to enter the building. Sheet metal flashing at the junction between the west roof and the rising wall of the east wing is crumpled and not securely fastened.

Wood planks span between the wood rafters supporting the standing seam metal roof. It is assumed these wood members are nailed to the roof rafters. There was uniform corrosion observed along the sheet metal. The metal is bent above the window at the southwest corner of the building.

Major Group Element
B Shell

Group Elements
B30 Roofing

Individual Elements
B3010 Roof Coverings

Material
Galvanized steel

Qualitative Condition Rating
Fair

Maintenance Deficiency Priority
Serious



Figure 54. Roof detail showing surface rust at galvanized roof panels. [MTFA Architecture]



Figure 55. West gable showing missing raking trim, with one remnant remaining. [MTFA Architecture]



Figure 56. Corrosion of metal roof. [McMullan Consulting Engineers]



Figure 57. Bent roof at southwest corner. [McMullan Consulting Engineers]

FOLDING WOOD ATTIC ACCESS STAIRS

The attic over the west wing is reached by a set of folding wooden stairs which disappear into a trap door in the ceiling of the stairwell between the upper and lower level. Because there is a descending staircase directly below the trap door, the folding stairs are out of arm's reach once the trap door is opened and cannot be safely unfolded. There is also not enough room within the stairwell for the stairs to unfold, which has caused damage to the wall in the stairwell from repeated scraping of the folding stairs. Once unfolded, the stairs are hazardous to climb because they are positioned directly over the descending staircase; someone who fell off the attic stairs would risk falling all the way to the lower level. A similar folding stair could be installed nearly anywhere in the ceiling of the main upper level room where the stairs would be easier and safer to operate.

Major Group Element
C Interiors

Group Elements
C20 Stairs

Individual Elements
C 2010 Stair Construction

Material
Wood folding

Qualitative Condition Rating
Poor

Maintenance Deficiency Priority
Critical



Figure 58. View down from attic showing descending stairs at bottom of folding stairs. [MTFA Architecture]



Figure 59. Trap door in closed position. Damage to wall is visible from repeated scraping of folding stairs. [MTFA Architecture]

Major Group Element
B Shell

Group Elements
B20 Exterior Closure

Individual Elements
B2010 Exterior Walls

Material
Brick

Qualitative Condition Rating
Fair

Maintenance Deficiency Priority
Serious

STRUCTURAL CONDITIONS

EXTERIOR AND INTERIOR BRICK WALLS

The exterior walls of the Power Generating Station are constructed of load-bearing multi wythe brick walls. There are several locations where broken bricks were observed on the interior and exterior walls.

At the west exterior façade of the western half of the building, framing for the original door has been removed, revealing blocking (partially missing) inside a vertical reveal in the brick masonry (Figure 62).

On the north exterior façade of the eastern half of the building, brick infill is present where a large opening previously connected to a now-demolished ell which extended north of the main building. A built-up iron or steel I-beam lintel consisting of two channels bolted back-to-back is still present over the former opening. Below the filled-in opening is concrete fill on top of a stone foundation wall which extends down to grade.

There are broken bricks and missing mortar at the interior of the north wall of the western half. The brick wall above the arched window near the southwest corner of the western half is displaced inward an inch or more. There were small gaps observed between the top of brick wall and roof at west exterior façade of the western half where light shone through.



Figure 60. Deteriorated bricks at the east interior wall of eastern half. [McMullan Consulting Engineers]

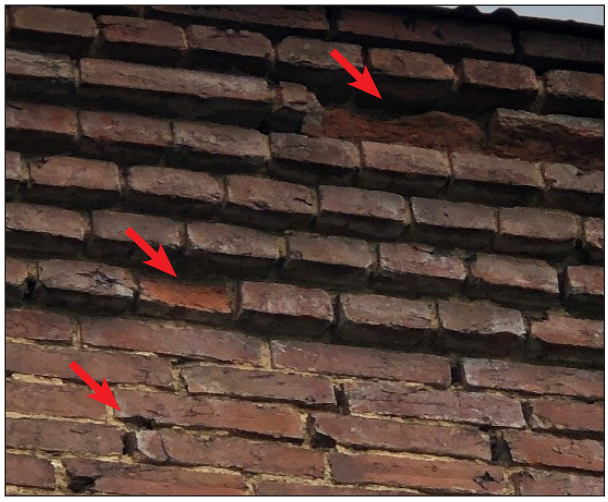


Figure 61. Broken brick and missing mortar at south exterior wall of eastern half. [McMullan Consulting Engineers]



Figure 62. Broken and loose brick at blocking reveal by exterior door on the west wall of the western half. [McMullan Consulting Engineers]

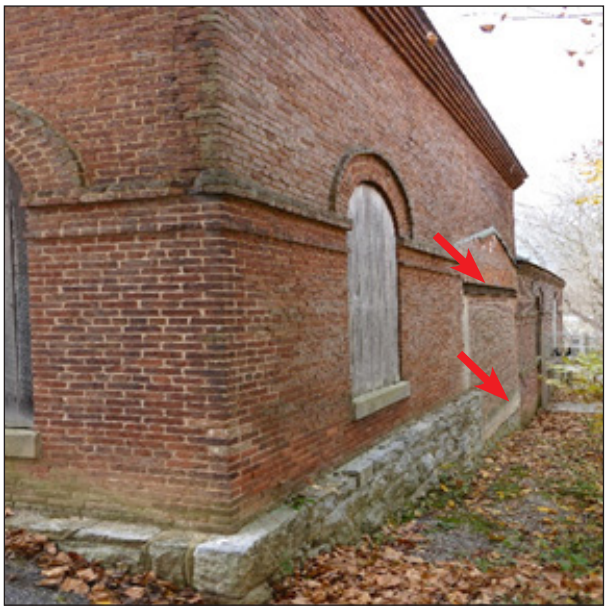


Figure 63. Existing brick infill at exterior north façade of the eastern half. Iron or steel built-up lintel is still present at top of brick infill, with concrete below brick. [McMullan Consulting Engineers]



Figure 64. Broken brick and missing mortar at the interior of wall on the north façade of western half. [McMullan Consulting Engineers]



Figure 65. Brick wall is displaced in about an inch or more above the arched window near the southwest corner of the western half. There are also un-mortared gaps. [McMullan Consulting Engineers]



Figure 66. Gaps between top of brick wall and roof at west exterior façade of the western half. [McMullan Consulting Engineers]

BRICK WINDOW AND DOOR ARCHES

The existing window openings use three rowlock courses of brick with a fourth course of projecting header brick to create a semicircular arch. The south exterior door (Figure 67) uses a larger version of this arch with corbeled brick under the springing points, while the west door (Figure 68) utilizes a similar but shallower arch with stone skewback units.

Major Group Element
B Shell

Group Elements
B20 Exterior Closure

Individual Elements
B2010 Exterior Walls

Material
Brick

Qualitative Condition Rating
Fair

Maintenance Deficiency Priority
Minor



Figure 67. Double-height door located on south façade. [McMullan Consulting Engineers]

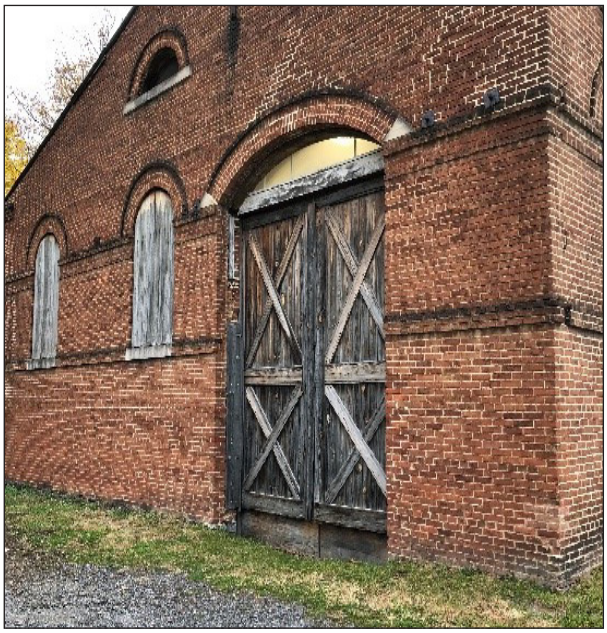


Figure 68. Double-height door located on west façade. [McMullan Consulting Engineers]



Figure 69. Four arched windows on eastern façade. [McMullan Consulting Engineers]



Figure 70. Two arched windows on west façade. [McMullan Consulting Engineers]



Figure 71. North façade arched window lowered to grade. [McMullan Consulting Engineers]

STONE FOUNDATION WALLS

Stone foundation walls support the exterior brick walls around the perimeter of the building and the interior brick wall between the east and western half of the building. The height and thickness of the foundation walls are unknown but they are assumed to be supported on bedrock. There were no signs of foundation settlement or shift of the exterior foundation walls.

The interior foundation wall separating the east and western half could be observed from the lower level of the western half. The wall does not extend to the underside of the upper level as there were three courses of brick on top of the stone wall below the underside of the upper floor. The thickness of the stone wall is unknown. A crack was observed near the northeast corner of the wall with variable thickness.

Missing stone and mortar were observed at the foundation wall west of the south exterior Door 101 leading to Room 101.

Major Group Element
A Substructure

Group Elements
A10 Foundations

Individual Elements
A1010 Standard Foundations

Material
Stone

Qualitative Condition Rating
Fair

Maintenance Deficiency Priority
Serious



Figure 72. Foundation wall exposed on the west and north face. [McMullan Consulting Engineers]



Figure 73. Missing stone and mortar at foundation wall near south exterior Door 101. [McMullan Consulting Engineers]



Figure 74. Crack observed in stone wall located in the western half. [McMullan Consulting Engineers]

EXTERIOR AND INTERIOR STAIRS

Inside the building, a staircase constructed of steel channel stringers and steel treads with concrete topping connects Room 001 on the lower level with Room 102 on the upper level (Figure 75).

On the north side of the building there is an aluminum exterior emergency exit stair (Figure 76) with an aluminum landing. The bottom of the stairs is supported on a concrete foundation.

Major Group Element
C Interiors

Group Elements
C20 Staircases

Individual Elements
C2010 Stair Construction

Material
Metal

Qualitative Condition Rating
Good

Maintenance Deficiency Priority
None



Figure 75. Staircase in western half upper to lower floor (Stair 1). [McMullan Consulting Engineers]



Figure 76. Aluminum stairs to upper floor of western half (Stair 2). [McMullan Consulting Engineers]

Major Group Element
B Shell

Group Elements
B10 Superstructure

Individual Elements
B1020 Roof Construction

Material
Wood

Qualitative Condition Rating
Fair

Maintenance Deficiency Priority
Serious

ROOF PLANKING

The roof deck at the eastern and western half of the building is constructed of ¾ inch wood planks spanning across to roof rafters.

The floor deck at the western half is constructed of two layers of plywood spanning 24 inches on-center between steel bar joists.

The wood planks in the northeast corner of the roof in the eastern half are discolored, water stained, and appear black which is likely the result of water infiltration.

There is a 1"×1" inch hole observed in a wood plank at the northeast corner of the roof in the eastern half.

There was a 3"×3" inch hole observed in wood floor in the western half.



Figure 77. Discoloration and water staining of wood planks at the eastern half roof. [McMullan Consulting Engineers]



Figure 78. Hole in wood plank at northeast corner of roof in the eastern half. [McMullan Consulting Engineers]

ROOF FRAMING

The roof framing for the eastern, engine room section of the building is 2.5"×5.625" rafters spaced at 16 inches on-center, supporting wood planks with corrugated steel roof. The rafters spanning east to west are assumed to be nailed into the ridge beam at the center of the eastern half. The rafters running north to south were not accessed for measurement but are assumed to be nailed to the top chord of the adjacent truss.

The trusses in the eastern half are constructed of a wood bottom chord that measure 8"×11.75". The diagonal members of the top chord are four laminations of 1.625"×7.5" wood members. The horizontal wood member of the top chord is not accessible for measurement. According to the existing record drawings dated March 3rd 1978, the diagonal truss members are 3.5"×7.5". There are ¼" and ½" diameter vertical steel rods bolted to plates at the top and bottom chords of the truss. The trusses span east to west and are supported on a steel bearing plate that is embedded into the brick walls. There is a metal timber splice added to the bottom chord of the truss.

The wood rafters in the western half of the building are slightly smaller than those in the east, measuring 2.5"×5.75" spaced at 16 inches on-center spanning north to south. The rafters span to 5.25"×9.25" purlins, two per span, running east to west across the top chords of the trusses. Notches were observed in the purlins where they span continuously over the truss. The wood rafters support wood planks with a corrugated steel roof.

The trusses in the western half of the building span north to south bearing on the exterior brick walls with a steel plate embedded into the wall. The members of the trusses could not be measured during the site survey. According to the existing 1978 drawings, the bottom chord is 8.875"×12", the top chord is 8.625"×9.62", and the diagonal members are 3.25"×8.25". There are ¼" and ½" diameter vertical steel rods bolted to plates at the top and bottom chords of the truss.

Major Group Element
B Shell

Group Elements
B10 Superstructure

Individual Elements
B1020 Roof Construction

Material
Wood

Qualitative Condition Rating
Good

Maintenance Deficiency Priority
Minor

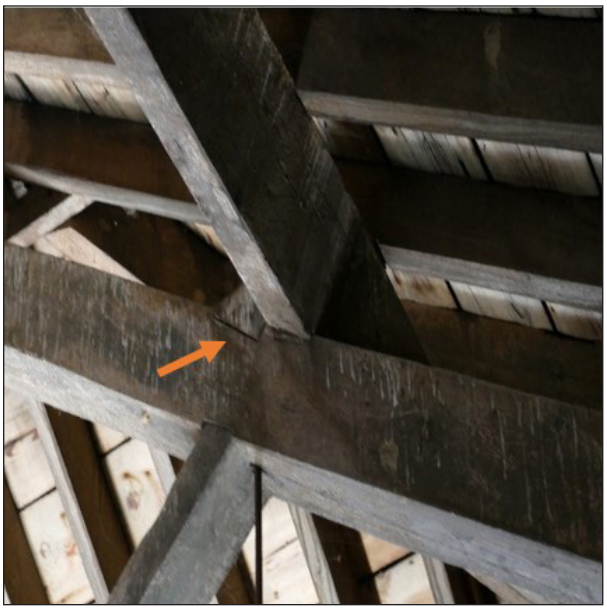


Figure 79. Small notch in rafters at bearing of purlins. [McMullan Consulting Engineers]



Figure 80. Wood blocking used to brace purlin missing at western wall of the eastern half. [McMullan Consulting Engineers]



Figure 81. Scarf joint in bottom chord of truss in the eastern half. [McMullan Consulting Engineers]



Figure 82. Small notch in purlin across truss. [McMullan Consulting Engineers]



Figure 83. Splitting of wood purlin at the western half. [McMullan Consulting Engineers]



Figure 84. Wood purlin not securely embedded into brick wall. [McMullan Consulting Engineers]

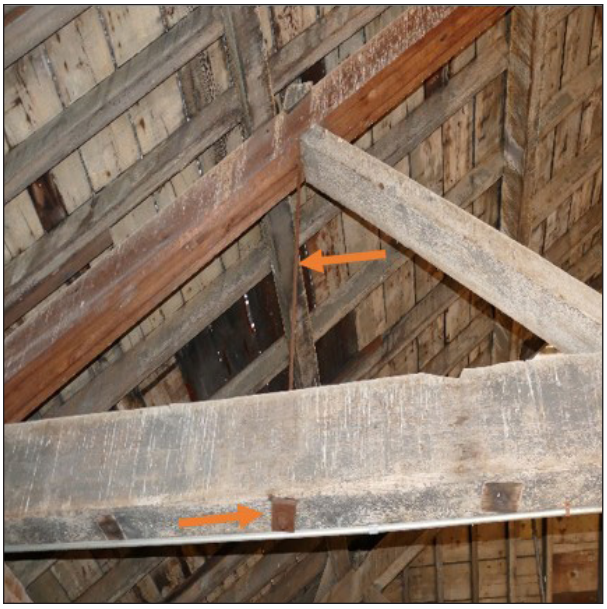


Figure 85. Rusting of vertical steel rods, plates, and bolts at wood trusses. [McMullan Consulting Engineers]



Figure 86. Minor rusting of steel bearing plates. [McMullan Consulting Engineers]

Major Group Element
B Shell

Group Elements
B10 Superstructure

Individual Elements
B1010 Floor Construction

Material
Metal

Qualitative Condition Rating
Good

Maintenance Deficiency Priority
Minor

STEEL FRAMING MEMBERS

In the western half of the building, structural steel wide flange beams support the steel bar joists and plywood floor framing. There are two connections used to frame the beams into the columns. The first is where the beams are connected to the web of the columns using a double angle shear connection. At the other bearing condition, the bottom flange of the beam is bolted through a steel plate and the top flange of the column, allowing the wide flange beam to be continuous over the column.

The beams along the north and south walls measured to be 8" deep with 6½" wide and 3/8" thick flange (W8x21). The columns along the north and south wall are 8" deep with 4" wide and ¼" thick flanges (W8x13). The beam in the center of the room measured to be 12½" deep with 6$^{7}/_{16}$" wide and ½" thick flanges (W12x22). There are two different column sizes used in the middle frame: the easternmost column measures 8.17" deep with 3.875" wide and ¼" thick flanges (W8x13) and the two western columns measure 8.17" deep with a 5.44" wide and ¼" thick flange (W8x18). There was a 12" deep channel observed along the west wall framed to the end of two steel beams.

A 3½" x 3½" ledger angle is used for deck bearing. There were two channels spaced 36" apart, welded to the flanges of the columns, and bolted to the existing brick wall using ½" diameter steel bolts along the height of the column. This connection was typical at all the columns along the north and south walls and was assumed to be used for wall bracing.



Figure 87. Steel beam framed into steel column with shear connection. [McMullan Consulting Engineers]



Figure 88. Steel beam bolted to steel plate and top of steel column. [McMullan Consulting Engineers]



Figure 89. Steel beam continuous over vertical wood studs. [McMullan Consulting Engineers]



Figure 90. Steel channel welded to column and bolted to wall for bracing. [McMullan Consulting Engineers]



Figure 91. Steel channel framed into the end of steel beams. [McMullan Consulting Engineers]



Figure 92. Ledger angle provides bearing for the plywood decking. [McMullan Consulting Engineers]

Major Group Element
B Shell

Group Elements
B10 Superstructure

Individual Elements
B1010 Floor Construction

Material
Metal

Qualitative Condition Rating
Good

Maintenance Deficiency Priority
Minor

STEEL BAR JOIST

Steel bar joists support the plywood floor decking and bear on the steel beams. The joists are spaced at 24 inches on-center and are 12" in depth. The top and bottom chords are constructed of steel double angles that have 1½" long legs and are ⅛" thick. The diagonal members are constructed of ¾" round steel bars. No deficiencies of the bar joists were observed.



Figure 93. Steel bar joist. [McMullan Consulting Engineers]

CONCRETE CURB

Concrete curbs were observed along the north and south walls of the western half of the building at the lower floor and measure 21" in depth and 17" in width. They are cast on the slab-on-grade and provide support for the steel columns above the existing stone foundation. No cracks or spalls were observed during the visual survey.

Major Group Element
A Substructure

Group Elements
A10 Foundations

Individual Elements
A1010 Standard Foundations

Material
Concrete

Qualitative Condition Rating
Good

Maintenance Deficiency Priority
Minor



Figure 94. Lower-level western half concrete curb supporting steel. [McMullan Consulting Engineers]

Major Group Element
A Substructure

Group Elements
A10 Foundations

Individual Elements
A1030 Slab on Grade

Material
Concrete

Qualitative Condition Rating
Good

Maintenance Deficiency Priority
Minor

CONCRETE SLAB ON GRADE

The lower floor of the western half of the building is constructed of concrete slab on grade. No cracks or spalls were observed.



Figure 95. Concrete slab on grade. [McMullan Consulting Engineers]

PLUMBING, MECHANICAL, AND ELECTRICAL CONDITIONS

MAJOR GROUP ELEMENT	GROUP ELEMENT	INDIVIDUAL ELEMENTS	MATERIAL	QUALITATIVE CONDITION RATING	MAINTENANCE DEFICIENCY PRIORITY
D Services	D20 Plumbing	D2010 Plumbing Fixtures	Water Closets	Fair	Minor
			Lavatory	Fair	Minor
			Laundry Sink	Fair	Minor
		D2020 Domestic Water Distribution	Pipes & Fittings	Fair	Minor
			Electric Water Heater	Poor	Not Rated
			Insulation	Poor	Serious
		D2030 Sanitary Waste	Waste, Vent, Pipe & Fittings	Fair	Minor
			Floor Drains	Fair	Minor
		D2040 Rain Water Drainage	None Installed	Poor	Serious
	D30 HVAC	D3020 Heat Generating Systems	Electric Unit Heaters	Good	Minor
			Electric Baseboard	Fair	Minor
		D3040 Distribution Systems	Exhaust Fans	Fair	Minor
		D3050 Terminal Package Units	Ductless Split-System	Good	Minor
	D50 Electrical	D5010 Electrical Service & Distribution	MDP, Branch Circuit Panels	Good	Minor
			Circuit Breakers	Good	Minor
			Conduit and Wiring to Panels	Good	Minor
		D5020 Lighting & Branch Wiring	Electrical Wiring	Good/Poor	Minor/Serious
			Lighting Fixtures	Good/Poor	Minor/Serious
		D5040 Special Electrical Systems	Emergency Lighting System	Fair	Minor

The existing building MEP systems are in fair condition for the building. The plumbing infrastructure for the building is also adequate. The building mechanical systems provide heating and cooling to Room 102. The other support areas of the building including the fire protection closet are provided with electric unit heaters or electric baseboard heaters. The existing mechanical systems appears to provide adequate heat for the building's current use. The electrical service is adequate, and the existing distribution equipment is in good condition.

MAJOR GROUP ELEMENT	GROUP ELEMENT	INDIVIDUAL ELEMENTS	MATERIAL	QUALITATIVE CONDITION RATING	MAINTENANCE DEFICIENCY PRIORITY
D Services	D20 Plumbing	D2010 Plumbing Fixtures	Water Closets	Fair	Minor
			Lavatory	Fair	Minor
			Laundry Sink	Fair	Minor
		D2020 Domestic Water Distribution	Pipes & Fittings	Fair	Minor
			Electric Water Heater	Poor	Not Rated
			Insulation	Poor	Serious
		D2030 Sanitary Waste	Waste, Vent, Pipe & Fittings	Fair	Minor
			Floor Drains	Fair	Minor
		D2040 Rain Water Drainage	None Installed	Poor	Serious

PLUMBING CONDITIONS

A 3/4" water service line enters the building on the lower level of the building within the fire service entrance enclosure. The water service has a handwheel-operated isolation valve and pressure reducing valve. There did not appear to be a separate water utility meter located outside the building and it is suspected that the water is fed and metered from the adjacent Cushwa Warehouse. The copper domestic cold-water piping is in fair condition, but the distribution piping has not been provided with exterior insulation which is now a code requirement for domestic hot-water distribution.

The building does not have any domestic hot water generation systems or distribution to the restroom fixtures.

The plumbing fixtures in the restroom include a floor-mounted manual flush-tank water closet, a wall-mounted lavatory with an ADA center-set faucet and ADA drain piping guards (Figure 96). A floor-mounted laundry sink is also located within the restroom. These fixtures appear to be in fair condition with some minor deterioration due to the building's seasonal use and operation. The plumbing fixtures do not meet current water conservation codes and standards.

Wastewater and gases from these fixtures are conveyed through cast-iron and PVC sanitary/vent pipes. The sanitary waste pipes from the fixtures combine to a single 3" sanitary gravity line that routes south out of the building to the exterior sanitary sewage ejector pumps located between Cushwa Warehouse and the Generating Station. This 3" gravity line exits out of the building on

the south to an exterior sanitary sewer lateral clean-out. The sanitary piping and distribution are in fair condition. There is a sewage ejector control panel located within the building support/storage areas (Figure 97).

The building does not have any exterior gutters and downspouts to convey storm water from the roof area. Storm water sheets off the existing roof structure onto the building and site.



Figure 96. First floor restroom. [2RW Consultants, Inc.]



Figure 97. Sewage pump controller. [2RW Consultants, Inc.]

Major Group Element	Group Element	Individual Elements	Material	Qualitative Condition Rating	Maintenance Deficiency Priority
D Services	D30 HVAC	D3020 Heat Generating Systems	Electric Unit Heaters	Good	Minor
			Electric Baseboard	Fair	Minor
		D3040 Distribution Systems	Exhaust Fans	Fair	Minor
		D3050 Terminal Package Units	Ductless Split-System	Good	Minor

MECHANICAL/HVAC CONDITIONS

The building has a combination of HVAC systems to provide heating and cooling to various areas of the building. Electric unit heaters have been installed within Room 102 (Figure 98). Baseboard electric resistance heaters have been installed in the restroom and adjacent support closet on the first-floor level (Figure 99). Air-conditioning for the document storage area is provided by a multi-zone ductless split-system with multiple indoor wall mounted air conditioning units and a single exterior condensing unit (Figures 100 and 101). The equipment and units were operational during the site investigation and appear to be in good working condition. The first-floor public exhibition areas did not appear to have any provisions for air-conditioning.

Natural ventilation in the building is provided through operable windows in Room 102. There is no central mechanical ventilation serving any of the building spaces.

The exhibition space on the east side of the building and the attic areas have not been provided with any mechanical HVAC systems for heating, cooling, or ventilation air. The existing building envelope in these areas would not allow any systems to condition these spaces (Figure 102) effectively or efficiently.



Figure 98. Electric unit heater. [2RW Consultants, Inc.]



Figure 99. Electric baseboard heater. [2RW Consultants, Inc.]



Figure 100. Ductless split-system, wall mounted AC unit. [2RW Consultants, Inc.]



Figure 101. Ductless split-system, exterior condensing unit. [2RW Consultants, Inc.]



Figure 102. Unconditioned exhibit area. [2RW Consultants, Inc.]

MAJOR GROUP ELEMENT	GROUP ELEMENT	INDIVIDUAL ELEMENTS	MATERIAL	QUALITATIVE CONDITION RATING	MAINTENANCE DEFICIENCY PRIORITY
D Services	D50 Electrical	D5010 Electrical Service & Distribution	MDP, Branch Circuit Panels	Good	Minor
			Circuit Breakers	Good	Minor
			Conduit and Wiring to Panels	Good	Minor
		D5020 Lighting & Branch Wiring	Electrical Wiring	Good/Poor	Minor/Serious
			Lighting Fixtures	Good/Poor	Minor/Serious
		D5090 Other Electrical Systems	Emergency Lighting System	Fair	Minor

ELECTRICAL CONDITIONS

The building's 120/208-volt three phase electric service (Figure 103) is routed from the exterior site electrical distribution from a 120/208-volt three phase 225 ampere (A) enclosed circuit breaker via below grade conduit to the building Main Distribution Panel. The panel is provided with 225 ampere (A) MCB. This panel serves all main electrical loads in the building as well as feeding a 120/208-volt single phase load center on the exterior of the building for connection to trailers (Figure 104). The main distribution panel equipment is in good condition and no immediate concerns were noted. The branch circuits utilize a combination of NM-B (Romex) wiring and MC cable wiring throughout the building with several instances of surface mounted metallic conduit raceway being used for circuits and distribution added over the years (Figure 105). While the NM-B (Romex) wiring is acceptable by code for Type III, IV or V Building construction types, it is generally not standard practice to be installed in a commercial building.

A separate 277/477-volt three phase electric service is routed from the exterior site electrical distribution from a 277/477-volt three phase 225 ampere (A) enclosed circuit breaker via below grade conduit to the Basin Pump Distribution Panel located within the document storage area. The panel is provided with 225 ampere (A) MCB. This panel serves the system controller for the large, rebuilt Cushwa turning basin. The distribution equipment and controllers are in good working condition and appear to have been installed during a recent project (Figure 106).

Lighting in the building is a mix of various style fluorescent lighting fixtures of lay-in and surface mounted wraparound lens type (Figures 107 and

108). The fixtures appear to have been installed and replaced at various dates. Almost all the lighting fixtures are in working condition with a few needing a bulb replacement. Lighting controls consist of wall mounted switches in each room. Emergency lighting is provided by wall packs with integral battery back-up and illumination heads (Figure 109) and egress doors have been provided with illuminated exit signs (Figure 110).

The building does not appear to be provided with a security or intrusion control system. There is a small telecommunication backboard located on the first floor that appears to provide communication and phone to the building (Figure 111).



Figure 103. Electrical service, transformer, and enclosed main circuit breaker. [2RW Consultants, Inc.]



Figure 104. Exterior load center for trailer connections. [2RW Consultants, Inc.]



Figure 105. Surface mount electrical conduit/raceways. [2RW Consultants, Inc.]



Figure 106. Electrical distribution and controller for basin pumps. [2RW Consultants, Inc.]



Figure 107. Lay-in 2x4 fluorescent fixtures. [2RW Consultants, Inc.]



Figure 108. Typical lower-level fluorescent lighting fixture. [2RW Consultants, Inc.]



Figure 109. Emergency lighting wall pack. [2RW Consultants, Inc.]



Figure 110. Illuminated building exit sign light. [2RW Consultants, Inc.]



Figure 111. First floor telecom backboard D-Marc.
[2RW Consultants, Inc.]

FIRE PROTECTION CONDITIONS

The following table provides a summary of the existing conditions observed on site.

Major Group Element	Group Element	Individual Element	Material	Qualitative Condition Rating	Maintenance Deficiency Priority
D Services	D40 Fire Protection	D4010 Fire Protection Sprinkler Systems	Sprinkler System	Poor	Serious
D Services	D40 Fire Protection	D4040 Special Electrical Systems	Fire Alarm System	Poor	Not Rated

FIRE SPRINKLER

The Power Generating Station is partially sprinklered with a dry-pipe sprinkler system. The sprinkler system is served by the domestic water system, but no backflow preventer was provided for the sprinkler system. A backflow preventer is required for any connection to the domestic/potable water supply.

FIRE ALARM

There is no existing fire alarm system installed, and the applicable codes would not require the installation of a fire alarm system.

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HAZARDOUS MATERIALS CONDITIONS

Tidewater, Inc. (Tidewater) performed a Hazardous Materials Survey for asbestos-containing Materials (ACM) and lead-based paint (LBP) at the Williamsport Power Generating Station located at 205 West Potomac Street in Williamsport, Maryland.

The survey was conducted to document the presence of hazardous materials to facilitate the abatement, if required, of asbestos-containing materials (ACMs) and the use of lead-safe work practices during any future planned projects. The survey was completed in general compliance with the Asbestos Hazard Emergency Response Act (AHERA), the National Emission Standard for Hazardous Air Pollutants (NESHAP), the Occupational Safety and Health Administration (OSHA), and the Environmental Protection Agency (EPA) guidelines and regulations.

BACKGROUND

Tidewater's approved Scope of Work included providing hazardous materials consulting services as it relates to the Scope of Work dated July 16, 2021, to responses to project team questions issued by Elizabeth Milnarik of NPS via emails dated August 20, 25, and 26, 2021, and to the Consultant Agreement dated September 27, 2021 Revised.

Representatives from MTFA and the NPS were available onsite during the survey to facilitate access to the buildings.

The following building areas were inaccessible at the time of this survey:

- The metal roof.
- The interior portions of all areas where destruction would be required for access (i.e., mastics, walls, behind wood paneling on walls, under floors, etc.)

EXISTING DOCUMENTATION

Tidewater was not provided with any prior hazardous materials inspection reports.

ASBESTOS-CONTAINING MATERIALS SAMPLING ACTIVITIES

Tidewater's representative, Mr. Jason Gauthier, an EPA-certified and MDE-accredited Asbestos Inspector, conducted the asbestos survey on November 4, 2021. Tidewater collected fourteen (14) representative bulk samples (22 layers) of suspect building materials from the generating station during the survey.

The materials sampled from the generating station during the survey included: 12"x12" vinyl floor tile (VFT) and associated mastic, gypsum wallboard and associated joint compound, building caulks, and exterior window glazing.

Upon completion of sampling activities, Tidewater delivered the collected samples to EMSL Analytical, Inc., of Beltsville, Maryland, an independent laboratory accredited by the National Institute of Standards and Technology (NIST) and a successful participant in the National Voluntary Laboratory Accreditation Program (NVLAP). Rigorous chain-of-custody guidelines were followed throughout to ensure proper handling and delivery of the samples.

The samples were analyzed via Polarized Light Microscopy (PLM) techniques using the current EPA method EPA/600/R-93/116.

The following records have been provided separately to the National Park Service:

- Analytical laboratory report and chain of custody
- Site diagrams
- Selected photographs
- Copies of Tidewater's applicable certifications and licenses.

ASBESTOS-CONTAINING MATERIALS RESULTS/CONCLUSIONS

Current federal and state of Maryland regulations define an asbestos-containing material as containing more than 1% asbestos. Based upon a review of existing data and the laboratory analyses, no asbestos-containing materials were identified in the Generating Station. Tidewater did not observe any suspect thermal system insulation (TSI) or sprayed-on fireproofing in accessible portions of the building during the survey. Fiberglass batting insulation was observed in select wall cavities in the building.

Although no asbestos-containing materials were identified during this survey, additional suspect materials which were previously inaccessible may be discovered during future projects. Any other suspect materials uncovered during future demolition or renovation activities which have not been previously sampled for asbestos content should be considered asbestos-containing until sampling and analysis determines otherwise.

LEAD-BASED PAINT TESTING

Tidewater's representative, Mr. Joel Kissoondath, a MDE-accredited Lead Risk Assessor, completed the lead-based paint survey on November 4, 2021. Testing for lead content in paints and finishes was performed using a Niton X-Ray Fluorescence (XRF) Spectrum Analyzer. This instrument detects levels of lead in a component by reading and analyzing the fluorescence emanating from a surface when exposed to small amounts of radiation. XRF readings are reported in milligrams per square centimeter (mg/cm2), a mass-per-area reading. Lead-based paint (LBP) is defined as paint containing more than 1.0 mg/cm2 lead by federal EPA and HUD regulations, and as paint containing more than 0.7 mg/cm2 lead by state of Maryland regulations. The stricter state of Maryland standard was used during this survey.

A total of 223 XRF readings, including nine (9) calibration readings, were recorded during the survey (including readings taken at the adjacent Cushwa Warehouse which are discussed in a separate report). Based on the XRF data collected during this survey, no LBP was identified on accessible building components in/on the generating station.

The following records have been provided separately to the National Park Service:

- XRF data summary
- Selected photographs
- Copies of Tidewater's applicable certifications and licenses

Although no LBP was identified during this survey, additional suspect coatings or components which were previously inaccessible may be discovered during future projects. Any other suspect coatings or components uncovered during future

demolition or renovation activities which have not been previously tested for lead content should be considered lead containing until testing determines otherwise.

OTHER REGULATED MATERIALS

During the survey, Tidewater did not observe significant quantities of suspect microbial growth or evidence of pest infiltration that would likely result in a significant impact to the proposed project.

Additionally, Tidewater observed the following suspected universal waste, or other potentially regulated materials (ORM) that may require specialized disposal practices during the survey:

- Fluorescent light fixtures with mercury-containing lamps and suspected PCB-containing ballasts
- Emergency/exit light fixtures with suspected mercury-containing bulbs and lead-acid batteries
- Lead-acid batteries associated with fire control panels, etc
- Smoke detectors with suspected radioactive sources
- Fire extinguishers

Universal and other potentially regulated wastes should be separated from other waste streams and disposed of in accordance with all applicable federal, state, and local regulations.

De minimis quantities of miscellaneous maintenance/janitorial/office supplies, aerosol spray cans, incandescent light bulbs, empty containers of various sizes, etc. were observed during the inspection but were not quantified. These materials are not anticipated to require specialized disposal practices.

LIMITATIONS

This report only describes the conditions present at the time of sampling and testing, and the results presented here are limited, based upon the information available at the time of the survey.



Part 2: Ultimate Treatment and Use

Preferred Option for Ultimate Use
Requirements for Treatment
Legislation and Standards

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Preferred Option for Ultimate Use

The Williamsport Power Generating Station was built in 1896 to generate electricity for an urban trolley loop in Hagerstown, Maryland, and a branch line between Hagerstown and nearby Williamsport. The Generating Station operated for only two years before being replaced by a new facility in Hagerstown in 1898. In 1911, Victor Cushwa purchased the building and began to use it for storage related to his coal and building materials dealership which operated out of the nearby Cushwa Warehouse. No equipment relating to the building's original use as a generating station remains in the building.

The building was acquired by the National Park Service (NPS) in 1974 and subsequently used for public exhibit and meeting space, along with light storage in the basement. Currently, the western half of the upper (main) level is fully finished and the eastern half remains a raw space. Two small rooms – a toilet room and a storage room – have been constructed within the larger space of the eastern half. The basement, which extends only under the western half of the building, has a concrete floor and lighting, but is otherwise unfinished storage space.

The building sits just beyond the end of Potomac Street just west of the downtown core of the city of Williamsport, Maryland, and is easily accessible from the surrounding streets. The National Park Service's C&O Canal National Historic Park Headquarters building, completed in late 2021, sits directly across Commerce Street from the site. A restored portion of the C&O Canal is nearby, and other restored or preserved resources related to the canal and to Williamsport's industrial history exist in the immediate vicinity.

The NPS desires to generally retain the current uses within the building, with some modifications; in particular, the NPS would like to move the visitor center and bookstore now housed in the nearby Cushwa Warehouse, also owned by NPS, into the Power Generating Station. Three options, designated A through C, were previously proposed for modifying the interior layouts of both floors, and the NPS has chosen one preferred layout (Option A) with some revisions (see Appendix A for descriptions and layouts of all three options, including the original version of Option A). This preferred layout has been conceptually developed and is presented in this report section. This layout attempts to limit the alteration of historic fabric to the minimum amount possible while improving the functionality of both levels of the

building and supporting continued useful occupancy of the building by the NPS. The option takes a rehabilitation approach to treatment, as defined by the Secretary of the Interior's Standards for the Treatment of Historic Properties. The feasibility of the preferred option has been analyzed as well as possible from field surveys of the visible portions of the building and from data and previous reports supplied by NPS. However, it should be understood that this option is conceptual and is presented only as a basis for further exploration and refinement. A class-C cost estimate is provided for the option.

DESCRIPTION OF OPTION A (WITH REVISIONS):

Room 101 becomes a new visitor center and gift shop with additional space for exhibits. Rooms 103 and 104 are removed, returning the large space of Room 101 to its full size and layout. North of Room 101, a pair of new restrooms and a janitor's closet are built on top of the approximate footprint of the former ell extension. The brick infill wall is penetrated for new doors but is otherwise left in place. To avoid adding any additional openings in the exterior walls, the large sliding door in the south wall (Door 101) will be replaced with a swinging double door detailed to resemble the original freight door at this opening.

Within Room 102, the existing staircase is reconfigured and moved directly against the east wall to open up additional floor space while keeping both doors to Room 101 open and usable. The existing closet is eliminated. The entrance to the staircase is moved to the southwest corner of the stairwell enclosure, away from the double doors to Room 101. This reduces congestion along the path of travel near these doors. The rest of Room 102 remains open as a large, flexible space for classes and events.

Room 001 becomes the bicycle rental space currently housed in the Cushwa Warehouse, and also provides storage for NPS bicycles for staff use. A wire-mesh enclosure with a locking gate houses the NPS bicycles separately, and a second mesh enclosure provides secure storage for bookstore inventory. A fire-rated enclosure is built along the east wall at the bottom of the reoriented staircase. The existing plywood sprinkler enclosure is removed and replaced with a more permanent sprinkler closet. The existing sliding doors in the west wall are replaced with inswing doors (the upper portion of the doors, at the level of Room 102, are replaced with permanent wood-panel infill). The

single doorway in the south wall is retained as the room's emergency exit, but is replaced with a door of better quality and greater historic appropriateness.

Because the lower level of the building is limited to storage in this option, the addition of an elevator for handicapped access (originally part of Option A) was eliminated. The exterior doors in the west wall provide direct at-grade access to the lower level in the event that handicapped access is needed.

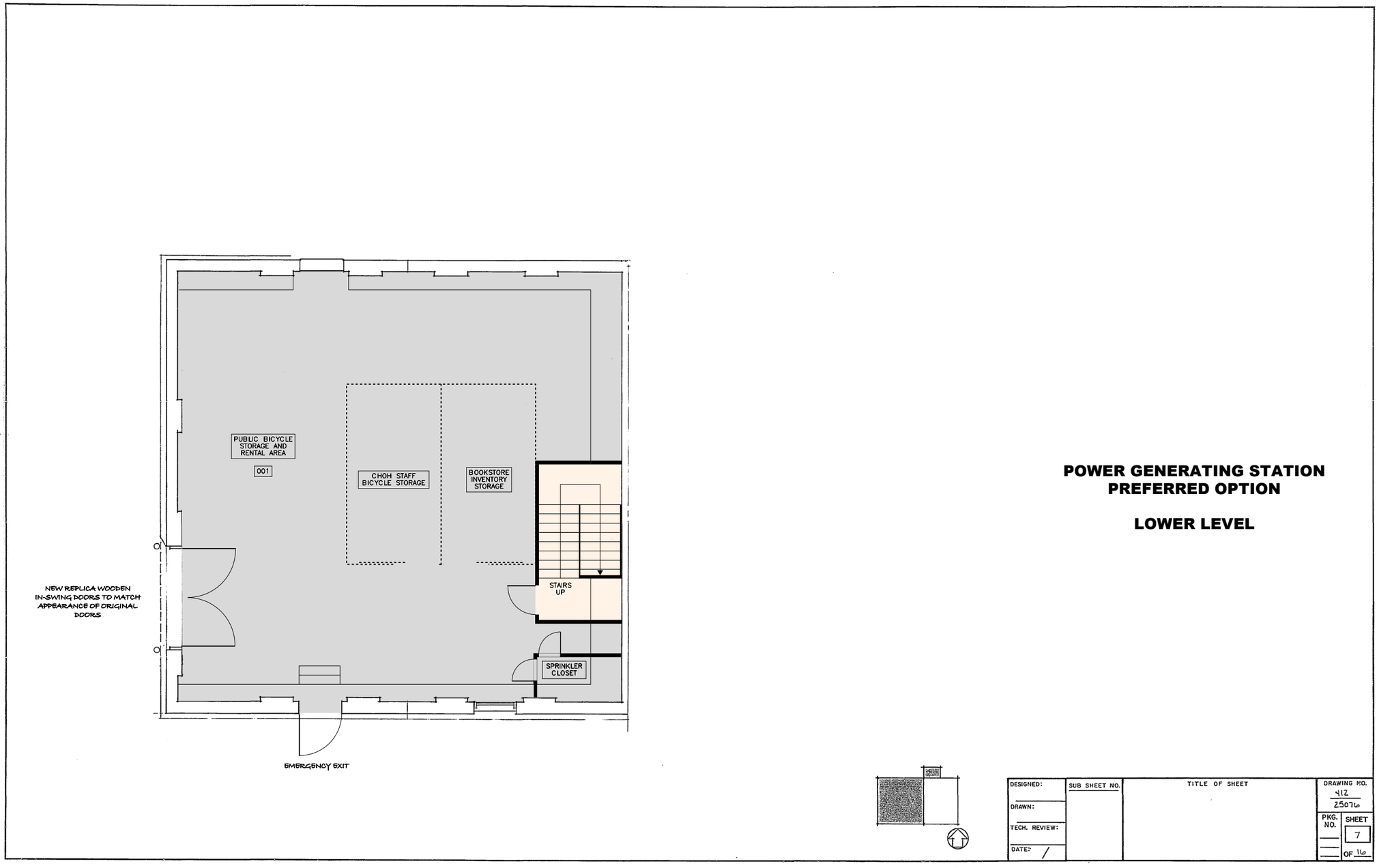
More specific, room-by-room descriptions of this option follow below, and concept sketches follow the text. See the requirements for treatment in the next section for additional information on recommended repairs, maintenance, and alterations.

ARCHITECTURAL TREATMENTS

- Public Bicycle Storage and Rental Area (Room 001):
  - Remove metal staircase and surrounding wood framing.
  - Remove plywood enclosure around sprinkler pump.
  - Remove ceiling structure at location of new staircase opening.
  - Install new U-type metal-pan staircase to upper level. Install gypsum board stud wall enclosure around stairs and lower landing.
  - Install new insulated gypsum board stud wall enclosure around existing sprinkler equipment with two (2) full-height access doors.
  - Install new metal mesh security cages with sliding access doors.
- Exhibit Space / Visitor Center (Room 101):
  - Remove portions of brick infill at north wall for doors to new restrooms and janitor's closet.
  - Remove existing wooden walkway and gravel, and install new concrete floor at entire room with electric radiant floor heating system.
  - Install panic hardware at both leaves of existing Door 104 so that it can serve as the primary exit from Room 101.
  - Repoint exposed brick walls.
- Classroom / Multi-Purpose Space (Room 102):
  - Remove existing stair enclosure and install new enclosure around new stairs from Room 001 and upper landing.
  - Remove approximately 2' X 4' section of ceiling for new attic hatch opening. Remove existing hatch door assembly. Install new attic access hatch with pull-down door and folding ladder in new location. Fill in old hatch opening to match adjacent ceiling surface.
  - Reverse the swing of Door 108 and add panic hardware so that it can serve as an exit door from Room 102.
  - Remove existing plywood floor construction and install new flooring system on existing framing and joists.
- Existing restroom, side vestibule, and closet (existing Rooms 103, 104, and 105):
  - Completely remove all rooms, including partition walls, floors, ceilings (Rooms 103 and 104 only), doors, plumbing fixtures (water closet, lavatory, janitor's sink) and all associated piping.

- New restrooms and janitor's closet (new Rooms 103, 104, and 105):
  - Construct two single-occupant restrooms and a janitor's closet within a single structure against the exterior north wall of the building, adjacent to the northwest corner of Room 101. Install doors to Room 101. See Structural section below for more information.
- Finish treatments:
  - General: Prepare and paint exposed surfaces of all existing-to-remain and new gypsum wall and ceiling assemblies.
  - Room 102: Install new LVT floor finish at entire floor. Patch ceiling at locations of wall removal and attic hatch infill.
  - Rooms 103, 104, and 105: Install new painted gypsum board wall and ceiling assemblies. Install new ceramic tile at floor and halfway up all walls.
  - No asbestos-containing materials or lead-based paint have been identified at this building.
- An exterior restoration campaign to address deteriorated elements and bring the building back up to a state of good repair.

ARCHITECTURAL PREFERRED OPTION DRAWINGS

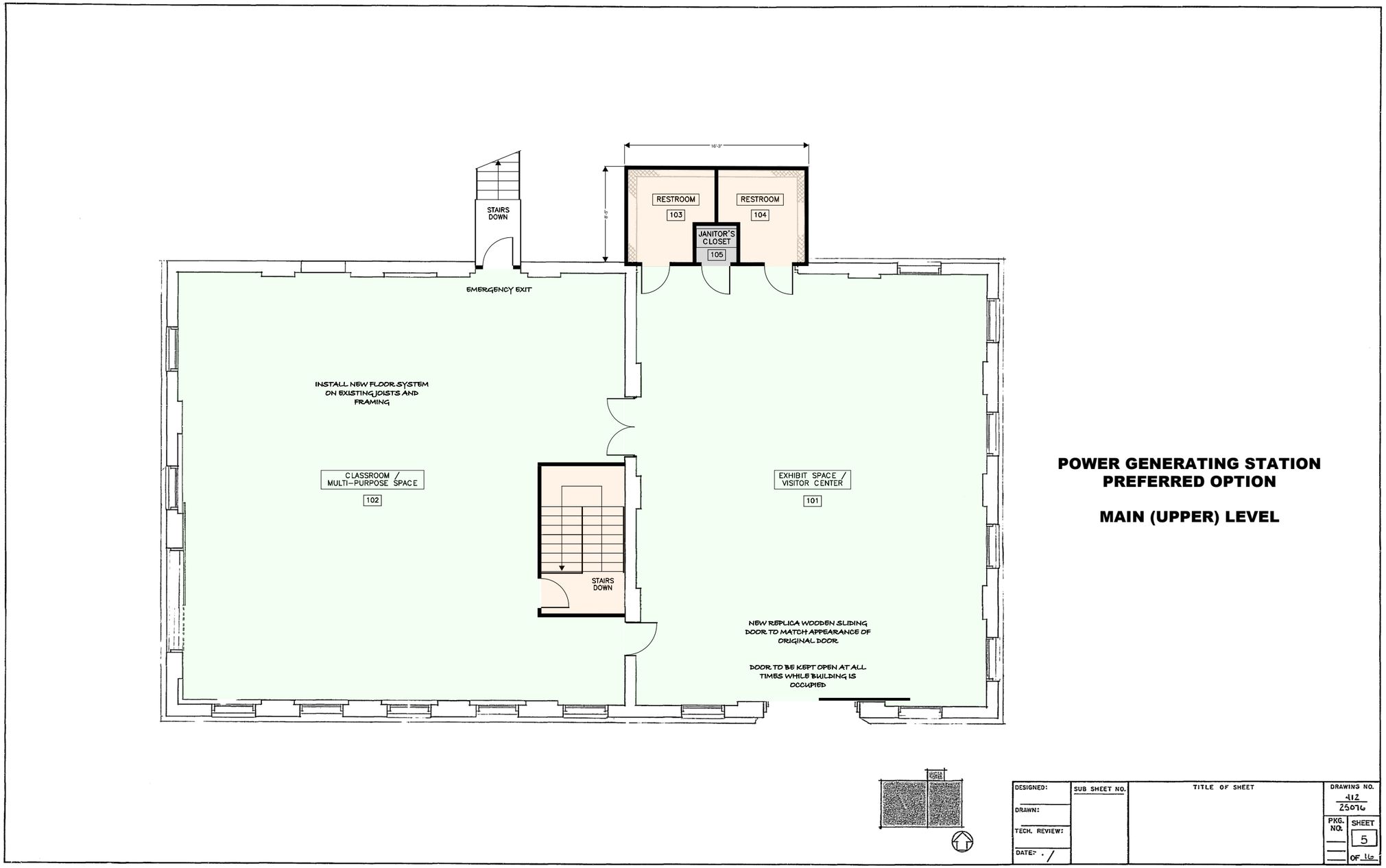


POWER GENERATING STATION
PREFERRED OPTION

LOWER LEVEL

DESIGNED:	SUB SHEET NO.	TITLE OF SHEET	DRAWING NO. 412 25076
DRAWN:			PKG. NO. / SHEET 7
TECH. REVIEW:			OF 16
DATE: /			

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16'-3"
10'-10"
STAIRS DOWN
RESTROOM
103
RESTROOM
104
JANITOR'S CLOSET
105
EMERGENCY EXIT
INSTALL NEW FLOOR SYSTEM ON EXISTING JOISTS AND FRAMING
CLASSROOM / MULTI-PURPOSE SPACE
102
STAIRS DOWN
EXHIBIT SPACE / VISITOR CENTER
101
NEW REPLICA WOODEN SLIDING DOOR TO MATCH APPEARANCE OF ORIGINAL DOOR
DOOR TO BE KEPT OPEN AT ALL TIMES WHILE BUILDING IS OCCUPIED
POWER GENERATING STATION
PREFERRED OPTION
MAIN (UPPER) LEVEL
DESIGNED:
DRAWN:
TECH. REVIEW:
DATE:
SUB SHEET NO.
TITLE OF SHEET
DRAWING NO.
412
25076
PKG. NO.
SHEET
5
OF 16

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STRUCTURAL TREATMENTS

The building is currently occupied by exhibit spaces, classroom space and office-type spaces for the National Park Service. The building code requires a minimum live load of 100 pounds per square feet (psf) for public spaces, 50 psf + 15 psf of partitions for office spaces, and 40 psf for classroom spaces. Currently the ultimate treatment and use recommendation does not change this live load requirement, but the following work is recommended to improve the building's performance. See the architectural section for additional information and sketches on the preferred alternative for treatment and use.

EXTERIOR WALLS

- Remove and replace broken bricks with new matching brick, and repoint cracked and missing mortar. See architectural recommendations for additional information.
- Remove and replace broken foundation stones to match existing, and repoint mortar.

ROOF

- Remove and replace deteriorated sheathing planks.
- Install new blocking at purlins where missing.
- Where the wood purlin bears on the brick wall within the attic space over Room 102, fill gaps and cracks with mortar.
- Scrape and clean rusted tie rods, steel plates, and steel bolts, and apply corrosion resistive coating. Scrape and clean steel bearing plates and apply corrosion resistive coating.
- Remove the existing sheet-metal roof and install a new slate roof. Rebuild existing monitors and dormers to match historic configurations. Additional investigation and analysis of the roof framing should be completed for the heavier roofing and dormers.

EXTERIOR SITE

- Install new raised steel dunnage supported on concrete footings for mechanical equipment relocated to higher ground, above the level of the flood plain, depending on the type of HVAC system installed.

ROOM 001

- Seal the existing crack in the stone wall with mortar and monitor for further movement and cracking.

ROOM 102

- Stair Replacement and Redesign: Temporarily shore the existing floor framing and remove the existing stair. Remove existing steel joists and flooring at the location of the new stair, cut the existing steel wide-flange girder at this location, and remove one existing wide-flange steel column for new stair installation. Provide new steel wide-flange post and concrete foundation to support the cut existing girder end. Provide new steel framing and deck to support the upper floor and frame the new stair. The new stair is assumed to be a steel stair connected to the new steel framing.

- Remove plywood floor and install new flooring. If the new flooring increases the overall loading by more than 5%, additional investigation is recommended to determine the capacity of the existing floor bar joists and potential strengthening.

ROOMS 103, 104, AND 105

- The new toilet rooms and janitor's closet will be isolated from the existing structure. The exact configuration of the toilet room walls and foundations cannot be determined until a geotechnical report is completed, but it is assumed the new rooms will be constructed with eight-inch concrete masonry unit (CMU) block walls faced with brick and supported on a pile cap (Figure 94) with micropiles. The pile cap with micropile foundation is assumed due to the steep slope and sloped bedrock per (Figure 95). Other alternate foundation types may include a lean concrete foundation doweled to the bedrock or a concrete mat foundation doweled to the bedrock. The exact foundation type can be determined when the bedrock elevation is determined in a geotechnical report or test pit. The existing power station foundations are assumed to sit on bedrock therefore no underpinning of the existing foundations is required. The 1978 HSR for the Cushwa Warehouse locates bedrock in this area around one to five feet below grade, but this could drop off with grade on the north side of the site. The proposed new toilet room extension is situated on the north side of the site, and bedrock is assumed to be within five feet of grade. The roof of the toilet room structure will be steel framed with structural wood deck and slate shingles.



Figure 112. East Grade. [MTFA Architecture]

• The existing grade on the north side of the building has a steep slope between the existing stairs and the east side. Water runoff from the parking has washed out the soil around the foundations of the building and down the adjacent hill (Figure 112). Regrading of this area is recommended to stabilize the slope

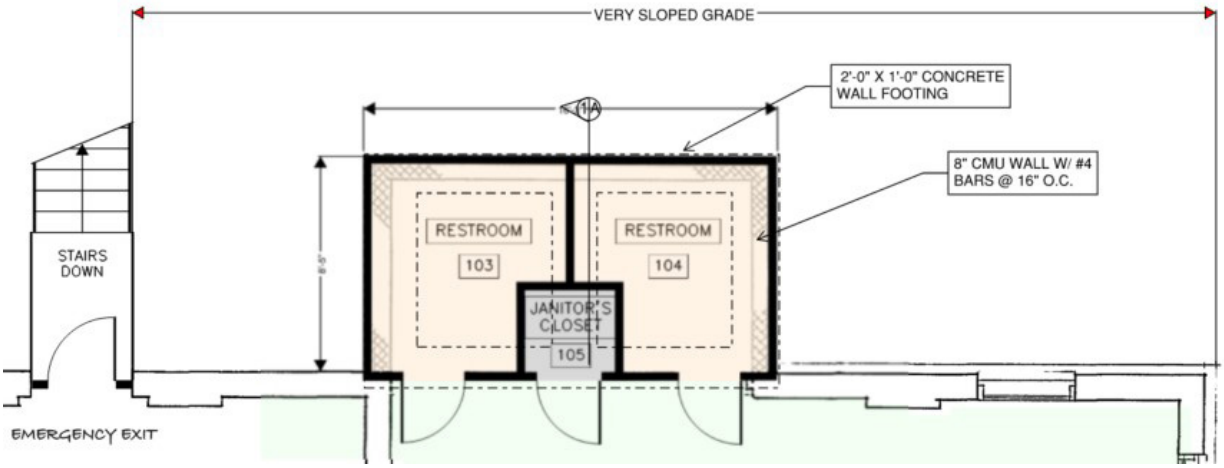


Figure 113. Proposed toilet room framing plan. [MTFA Architecture]

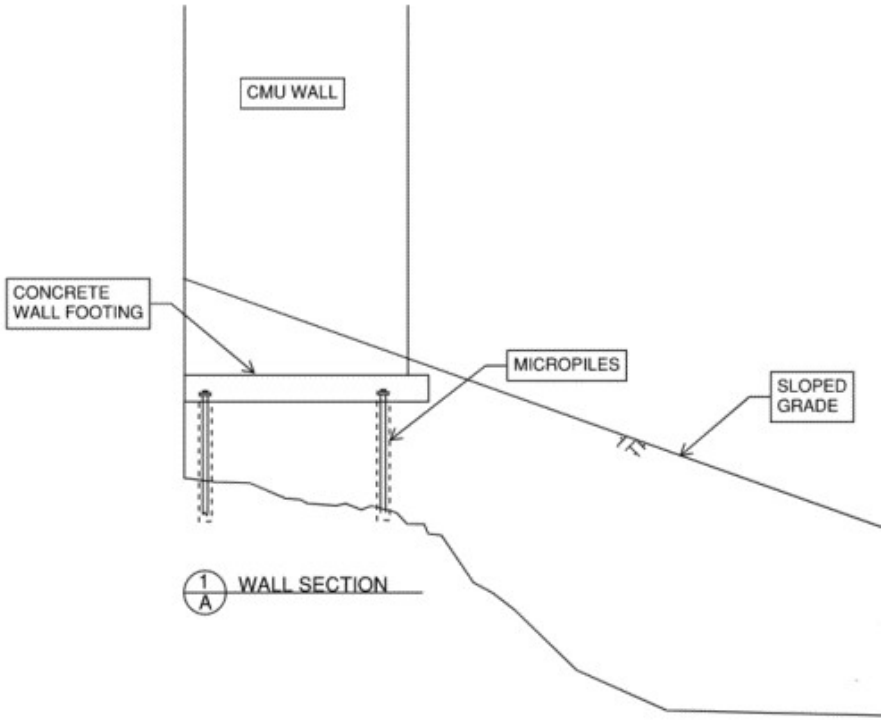


Figure 114. Proposed toilet room section. [MTFA Architecture]

PLUMBING, MECHANICAL, AND ELECTRICAL TREATMENTS AND ALTERNATIVES

MECHANICAL

A new split-system, air-cooled heat pump system should be provided to condition Room 102. The system should utilize direct expansion (DX) heat pump refrigerant coils located within a new air handling unit (AHU) within the attic area. Refrigerant piping would connect the AHU to an exterior high efficiency, air-cooled heat pump condensing unit located on the north side of the building out of the flood level. The system should be provided with variable speed compressors within the heat pump condensing unit to address part load capacity control and provide appropriate dehumidification control for Room 102. An auxiliary electric heat section will provide emergency heat capacity if the heat pump condensing unit is not able to meet demand due to low outdoor ambient air temperature conditions. The AHU should be configured to operate as a constant volume unit with a single thermal zone for Room 102 temperature and humidity control. The unit will also be provided with demand control ventilation to adjust the volume of outside air based on space occupancy. Based on initial space calculation a unit rated at 5-tons and delivering 1900 Cubic Feet per Minute (CFM) of supply air. New air distribution ductwork and diffusers/grilles/registers should be provided for the Room 102 Classroom. All main ductwork associated with this system should run within the attic roof truss areas. All refrigerant piping will be insulated appropriately in accordance with code requirements. The layout of the mechanical distribution systems will be coordinated with the architectural and structural design to preserve the historic and structural integrity of the building.

Mechanical ventilation should be provided via the new AHU system distribution. New bathroom exhaust fans should duct directly to the building exterior.

Room 101 should be provided with new electric radiant floor systems and natural ventilation from the operable door, restored operable windows, and reconstructed dormer windows. High volume, low velocity ceiling fans within Room 101 will work in conjunction with motorized dampers at the existing monitor ventilation opening and motorized sashes at the new dormers. The park is considering exhibits that involve waterflow, and these may be designed to provide further conditioning to the space.

Projects should comply with all applicable code requirements outlined in International Building Code (IBC) 2021, International Existing Building Code (IEBC) 2021, International Mechanical Code (IMC) 2018, and International Energy Conservation Code (IECC) 2018. The NPS has its own AHJ.

An alternate treatment for the mechanical systems to achieve NPS's goals would be to provide a new water-cooled, geothermal heat pump system to condition Room 102. The system would also use direct expansion (DX) heat pump refrigerant coils located within a new air handling unit (AHU) within the attic area. A new exterior geothermal well borefield would supply geothermal water to the water-cooled, DX AHU condenser section. The AHU should be provided with variable speed compressors to address part load capacity control and provide appropriate dehumidification control for Room 102. The AHU should be configured to operate as a constant volume unit with a single thermal zone for Room 102 temperature and humidity control. The unit will also be provided with demand control ventilation to adjust the volume of outside air based on space occupancy. Based on initial space calculation a unit rated at 3.5-tons and delivering 1400 Cubic Feet per Minute (CFM) of supply air. New air distribution ductwork and diffusers/grilles/registers should be provided for the Room 102 Classroom. All main ductwork associated with this system should run within the attic roof truss areas. All refrigerant piping should be insulated appropriately in accordance with code requirements. The layout of the mechanical distribution systems should be coordinated to preserve the structural integrity and historic character of the building.

The site geothermal borefield would consist of two vertical closed loop wells at 300 to 400 feet depth and spaced 20' apart. The final depth and quantity would be determined after a test well is provided to determine conductivity. The geothermal condenser piping should be HDPE to be buried a minimum of 3 feet below grade. Locating the geothermal borefield below the existing parking and pathway area to the building is recommended to limit disturbance to the site. A single geothermal water circulator pump, rated at eight gallons per minute should be provided in an operating/standby configuration. Geotechnical information would need to be reviewed for geothermal configuration. Depending on the distance to bedrock even a horizontal geothermal system may not be recommended.

A heat pump hot water generator connected to the geothermal water distribution would provide the hot water distribution to the radiant floor system in Room 101. The hot water generator could be installed in the lower-level storage area.

The alternative mechanical system recommended provides the required thermal conditioning for the space while increasing the energy efficiency and sustainability of the system. The initial installation costs for the geothermal heat pump system are significantly higher than the air-cooled heat pump system and the maintenance requirements increase with the introduction of the hydronic pump and system components. However, the alternative mechanical system does not require the use of fossil fuels.

ELECTRICAL

The existing electrical distribution system and panels rated for a total capacity of 225A at 120/208V, three phase should be sufficient to support the new mechanical, lighting, and power distribution loads for the building. The existing distribution panels should remain and be utilized to connect any new equipment or power receptacles required.

All lighting in the building is recommended to be replaced with new LED lighting in accordance with the IECC requirements and IEC recommended light levels. New lighting fixtures in public areas will be sympathetic to the historic character of the building, while those in storage and support areas are to be LED lensed strip fixture lights. Lighting controls for the support spaces will include occupancy/vacancy sensors. New exit signs and egress emergency lighting will be provided as required by code. All emergency lighting fixtures should be provided with integral or remote battery back-up power.

All surface mounted receptacles and data outlets on existing to remain walls should be removed. New receptacles and data/AV outlets should be installed throughout the building as required to meet the programming requirements of the areas and in accordance with the NEC for receptacle locations and spacing.

New telecom/data cabling and outlets should be provided as needed for any proposed renovation.

A new intrusion detection system should be provided for any building renovation. The system will include door/window sensors, glass break sensors, and motion detection. The system should be provided with remote monitoring.

Projects should comply with all applicable code requirements outlined in International Building Code (IBC) 2021, International Existing Building Code (IEBC) 2021, National Electrical Code (NEC) 2017, and International Energy Conservation Code (IECC) 2018. The NPS has its own AHJ.

PLUMBING

No upgrades to the existing water or sanitary service sizes or capacities are anticipated for any proposed renovations. Based on an assumed occupancy of 46 men and 46 women on the main level, two single-use restrooms with toilet and lavatory will be required, along with a mop basin. All existing plumbing fixtures and accessories should be removed and replaced with new low water consumption fixtures and dual-flush manual operators. All existing sanitary, vent, and domestic water piping should be replaced and provided with piping insulation. A new electric water heater with storage tank should be provided. The existing site sanitary sewage ejector pumps need to be replaced with pumps with commercial grinders to address problems from items introduced to the site sanitary from the adjacent public restrooms.

Projects should comply with all applicable code requirements outlined in International Building Code (IBC) 2021, International Existing Building Code (IEBC) 2021, International Plumbing Code (IPC) 2021 and International Energy Conservation Code (IECC) 2018. The NPS has its own AHJ.

MAINTENANCE

The proposed MEP systems would require limited routine maintenance, including regular air filter changes, the seasonal servicing of the HVAC system and general inspection and monitoring for repairs and replacement.

FIRE PROTECTION TREATMENTS

APPLICABLE CODES

The National Park Service Architectural Standards adopt by reference the 2018 editions of the International Codes, including the 2018 International Building Code (IBC) and International Existing Building Code (IEBC), and NFPA 101, Life Safety Code (when IBC is silent). Applicable codes include, but are not limited to:

- 2018 International Building Code (IBC), as adopted by National Park Service Architectural Standards
- 2018 International Existing Building Code (IEBC), as adopted by National Park Service Architectural Standards
- 2018 International Fire Code, as adopted by National Park Service Architectural Standards
- 2018 Life Safety Code, NFPA 101
- 2016 National Fire Alarm Code, NFPA 72
- 2017 Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, NFPA 25
- 2016 Standard for the Installation of Sprinkler Systems, NFPA 13
- RM-58 (2015): National Park Service Reference Manual 58, Structural Fire

IEBC, IBC and NPFA 101 criteria are applicable to building renovations. As a contributor to a NRN district, the Power Generating Station is historic, so Chapter 12 of the IEBC applies as well. Where meeting IBC could impact the historic character of a building, IEBC may provide alternative means for the building to meet code provisions. Under the IEBC, the preferred alternative would be classified as a Level 3 Alteration. Based on conditions observed on site, the following sprinkler-related items are recommended:

1. Per IBC Table 504.4 a sprinkler system is required in the Power Generating Station because it is a two-story mixed-use building with both A-3 and B occupancies with two stories. Per IBC height and area limitations in Table 504.4 the building is required to be fully sprinklered for this building to be two stories in height. In addition, Section 1203.2 of the IEBC allows historic structures that do not conform to IEBC construction requirements to remain as is, so long as the building is fully sprinkler protected and has the correct number of exits. On site it was observed that the building is only

partially sprinklered. The sprinkler system should be extended throughout the entire building to be compliant with code requirements.

2. The Power Generating Station is classified as a light hazard space. Any changes to the sprinkler system as the result of renovation work should follow the design criteria given in NFPA 13 §11.2.3.1.1 design criteria 0.10 gpm over 1,500-ft2 design area with 250 gpm outside hose allowance and a minimum 5.6 k-factor.

3. Per NFPA §6.2.9.1 a spare sprinkler cabinet with at least six sprinklers should be provided. Currently no spare sprinklers are provided.

4. A backflow preventer for the sprinkler system should be installed.

FIRE ALARM

Although not required by code, to ensure adequate protection of occupants, a fire alarm system in the building in compliance with NFPA 72 requirements is recommended.

LIFE SAFETY

Use and Occupancy

The Power Generating Station is a mixed-use occupancy with Group B, A-3, and S occupancies. The lower floor is Group S (miscellaneous storage). The second floor is Group B and Group A-3 (temporary archive space and exhibit space). The attic is accessible only by a pull down ladder in the stair and is considered unoccupied.

Fire Rated Separations

No fire or smoke separations were observed in the building.

Construction Type

The Power Generating Station is constructed of wood structural framing, wood floor, and wood floor and roof joists. The construction type of the Power Generating Station most closely resembles Type VB per IBC §602.5.

Height and Area Requirements

The IBC contains limitations on maximum allowable height and area of a building depending on the construction type used and sprinkler protection provided. Although the Power Generating Station is an existing building, height and area limitations were evaluated for informational purposes.

The base tabular allowable area per floor for non-sprinklered Group A-3 occupancies with Type VB construction in the IBC is 5,500 sqft and the base allowable height is 1 story and 40 ft [IBC, Table 506.2, 504.4, 504.3]. Currently, the building is not in compliance with these requirements as it is two stories. When sprinklers are added, IBC allows for an area of 18,000 sqft, with a base allowable height of 2 stories and 60 feet [IBC Table 506.2, 504.4, 504.3.

	Total Allowable Sprinklered	Total Allowable Non-Sprinklered	Level 5 (Highest Occupied Story)
Floor Area(sq. ft)	18,000 SF	5,500 SF	~3,700 SF
Height (ft)	60 FT	40 FT	<60 FT
Height (stories)	2	1	2

Means of Egress

The means of egress from the floor are required to comply the requirements of NFPA 101 applicable to existing business occupancies and existing assembly occupancies depending on what requirements are more restrictive.

Means of egress is provided from the lower level and the upper level independently. The lower level (Storage occupancy) is served by a single means of egress consisting of an exterior exit door leading directly outside. Per NFPA 101 §42.2.4.1 only one exit is required from this level.

The upper level is served by two means of egress. One exit door on the north side of the building leads to a metal exterior stair. The other exit is a sliding door that will be held open at all times while the building is occupied.

There is one stair in the building going from the lower level to the main floor. Based on the requirements in NFPA 101 Table §7.3.3.1 using 0.3 in. per person stair capacity in the building is given in the table below Note that the stair is not needed for egress, but the egress capacity is shown for informational purposes:

Egress Component	Width (in)	Required Capacity (persons)	Provided Capacity (persons)
Stair	50	4	167

The means of egress in this building are sufficient.

Occupant Load

The calculated occupant loads are required to be determined in accordance with Section 7.3.1.2 of the NFPA 101. The occupant loads shown reflect the current occupancies as noted during site surveys. Based on the use of the spaces, the following occupant load factors apply:

Current Occupant Load:

FLOOR	AREA (SQFT)	ROOM NUMBER	USE	OCCUPANCY TYPE	OCCUPANT LOAD FACTOR (SQFT / PERSON)	NUMBER OF OCCUPANTS (PERSONS)
Lower Level	1,780	001	Storage	Storage	500	4
TOTAL:						**4**
Main Level	1,780	102	Archive	Business	150	12
Main Level	1,540	101, 103, 104	Exhibit Space	Assembly	15	103
TOTAL:						**115**
Loft Level		300		Not Accessible	N/A	N/A
Total:						0
BUILDING TOTAL:						**119**

Note: The archive space is a temporary use.

Preferred Option Occupant Load:

FLOOR	AREA (SQFT)	ROOM NUMBER	USE	OCCUPANCY TYPE	OCCUPANT LOAD FACTOR (SQFT / PERSON)	NUMBER OF OCCUPANTS (PERSONS)
Lower Level	1,780	Public Bicycle Storage	Storage	Storage	500	4
TOTAL:						**4**
Main Level	1,780	Classroom / Multi-Purpose	Assembly	Assembly	15	119
Main Level	1,377	Exhibit Space	Exhibit Space	Assembly	15	92
Main Level	63	Restroom	Business	Business	150	1
Main Level	63	Restroom	Business	Business	150	1
Main Level	15	Janitor's Closet	Storage	Storage	500	1
TOTAL:						**214**
Loft Level		300		Not Accessible	N/A	N/A
Total:						0
BUILDING TOTAL:						**218**

Egress Capacity

An exit capacity factor of 0.2 in. per person for level components NFPA 101 Table 7.3.3.1.

Egress Component	Width (in)	Required Capacity (persons)	Provided Capacity (persons)
Lower Floor Exit Door	46.5	4	155
WPTC Shop Area Door	35.5	33	119
Sliding Door	96	32	480

The exit capacity from the building is sufficient.

Number of Exits

Two means of egress are required per NFPA 101 §4.5.3.1. Two means of egress are provided from the main level and one means of egress is provided from the lower level. On the upper level, the new exterior door into Room 101 will be kept unlocked at all times when the building is occupied allowing or it to be used for egress. The lower level sliding door cannot be used for egress however, per NFPA 101 §42.2.4.1 only one exit is required from the lower level.

Arrangement of Means of Egress

The most restrictive dead-end, common path, and travel distance limitations for the project areas are contained in the following table. Required values reflect fully sprinklered buildings. The travel distance was measured from the farthest point on each floor to the nearest exit.

Arrangement	Maximum Allowable	Current	Preferred Option
Dead-End Corridors (NFPA 101, 13.2.1.3)	20ft	N/A	N/A
Common Path of Travel (NFPA 101, 13.2.5.1.2)	75ft for <50 occupants	51ft	N/A
	20ft for >50 occupants	0 ft	N/A
Travel Distance (NFPA 101, 39.2.4.3)	250ft	60ft	60ft

The provided arrangement of means of egress meets or exceeds the requirements of the NFPA 101.

On site it was observed that there are deficiencies that should be addressed in any rehabilitation project.

1. Per NFPA 101 §4.5.3.1. two exits are required from the building. Exits are required to be operable with a single motion. To comply with this requirement, an operational policy will be put in place to secure the existing barn door in an open position. This would allow this door to function as an exit.
2. Per NFPA 101 §7.1.5. headroom of at least 6'8" is required to be maintained along a means of egress from a building. The headroom along the stairs from the lower level to the main level is not sufficient, at only 6 feet. However, the stair is not considered part of the means of egress.

The WPTC Shop Area Door, Door 102, and the door that leads from the classroom / multipurpose space into the exhibit space, Door 104, will be equipped with panic hardware.

Portable Fire Extinguishers

Per NFPA 10 §6.3.1.4 portable fire extinguishers are required to be installed in one of the following ways; securely on a bracket, in a bracket with releasing straps supplied by the extinguisher manufacturer, in a bracket with releasing straps approved for that purpose, or in an approved cabinet or wall recesses where they are readily accessible. On site it was observed that fire extinguishers were placed on the floor (Figure 115).

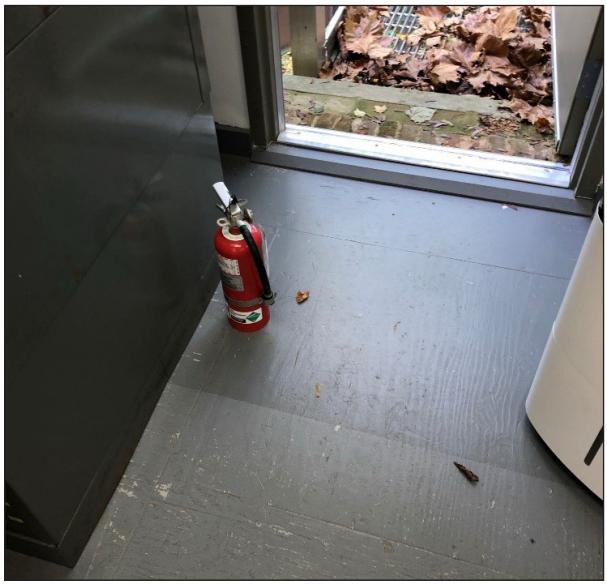


Figure 115. Improperly stored fire extinguisher. [Jensen Hughes]

Provide wall brackets to hang fire extinguishers to that they are readily accessible for use. See Figure 115.

Requirements for Treatment

EXTERIOR WALLS

Remove and replace damaged or missing bricks with new bricks of like appearance. Rake out and repoint all exterior mortar joints across the entire building, including brick building wall and stone foundation wall joints. Scrape, clean, prime, and paint the exposed surfaces of the cast-iron lintel beam at the north façade.

New exterior walls for the restroom wing in the Preferred Option are envisioned for the purposes of this report to be 8" concrete masonry units (CMU) with brick veneer. A section of the brick wall infill under the cast-iron lintel beam should be removed for door openings to the restrooms and janitor's closet. The cast-iron beam itself is a character-defining feature of the historic generating station and should be retained in place and protected from damage during all work. It should not be penetrated, welded to, or used in any way as a structural member beyond the structural purpose it is already serving. Ideally, it will also remain fully visible on the interior.

The weathering of the brick corners (arrises) means that attempting to recreate the original flush mortar joint profile will result in joints that are feathered and inappropriately wide, and joints like this can be seen in many places on the building from past re-pointing campaigns. The best joint profile for weathered brick is a flat profile, slightly struck back from the original line of the brick face, and struck with a slight angle to shed water. A typical pointing detail from the 1978 HSR for the Generating Station is reproduced here (Figure 116). More information about appropriate mixtures and techniques for repointing the building can be found in the 1978 HSR, which is included in this report as an appendix.

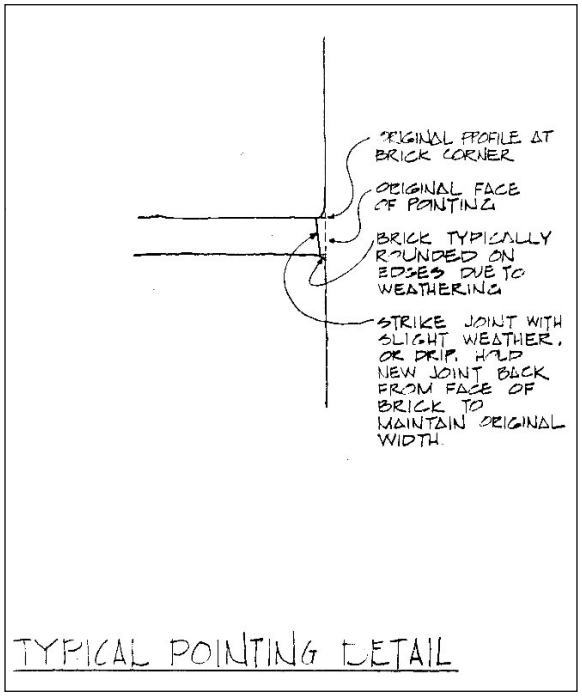


Figure 116. Typical Pointing Detail. [John Milner Associates and Keast & Hood Company. "Historic Structure Report: Generation Station, Chesapeake and Ohio Canal National Historical Park, Williamsport, Maryland." 1978. Plate 1.]

Also as noted in the 1978 HSR, the joints should be repointed with a soft mortar to ensure that the soft bricks are not further damaged by being pressed against hard mortar during expansion and contraction cycles resulting from environmental temperature and moisture variations. The proper pointing mortar should be chiefly lime and sand with a minimal amount of portland cement. Historic mortars did not use any cement at all, but historic lime had natural impurities that gave it desirable hydraulic properties which improved its workability. The lime that is widely available now is so pure that it does not result in a workable mortar on its own. To improve the workability of the mortar, some portland cement can be added to the mortar to a maximum of 20% of the lime (1 part cement to 4 parts lime). To reduce staining and efflorescence, this cement should be nonstaining white portland cement or sulfate-resisting portland cement. The mortar should be color-matched as closely as possible to original existing mortar by carefully choosing the color and proportion of the sand, augmented if necessary by a stable pigment. It is unlikely that any original mortar still exists on the outer walls after more than 100 years of weathering, but mortar from the interior faces of the walls would be likely to be original and suitable for color matching.

The 1978 HSR states that mortar was collected for testing at the time of the report, but it is not clear if the testing was ever performed. Analyzing the original mortar would add valuable historic data about the building, but caution should be used before replicating an original mix for present-day use. Even original mortar mixes were sometimes too hard for the brick, or had other problems such as poor frost resistance, or were simply made with whatever components happened to be available or affordable, even if they were not of high quality. In addition, weathering weakens brick, and by the time a building is many decades old, even a mortar that was originally compatible may be too hard for the now-fragile historic brick. As part of any analysis of original mortar, its long-term durability and its compatibility with the existing brick should be confirmed before considering the mix for replication.

WINDOWS AND DOORS

Restore all windows to full operation and good repair. This will involve removing the wooden planking, plywood, and wall finishes from the inside and outside faces of the 12 windows that are now boarded and inaccessible. At the six existing exposed windows, replace the glazing putty, and prepare and paint

the frames, sashes, and trim. The treatment of the 12 inaccessible windows will depend on their condition once they are exposed. The preferred approach, if conditions allow, is to restore the existing window frames and sashes in the same manner as the six exposed windows. If any window sashes are missing, or are so deteriorated that there is no practical way to repair them, then those specific individual windows should be replaced with new wood windows, custom-made to exactly match the appearance of the existing historic windows.

The windows in Room 101 should receive interior shutters or other window treatments which are capable of independently controlling light and air and which should be able to work in conjunction with the passive cooling methods intended for use in this space.

The sliding doors at the south and west façades (Doors 003 and 101) are unpainted and are deteriorating due to use and exposure. They are also not historically accurate. Replace both sets of doors with new doors, accurately detailed and fabricated to match typical heavy-duty wooden industrial doors of the period. Both sets of new doors should be in-swing double doors that replicate the appearance of the original sliding double doors. The upper part of the west door which fills the opening at the upper level should be a solid panel that resembles the upper part of the door. Prepare and paint both sets of doors; historic photographs suggest that the original versions of these doors were painted a light color. Investigate the condition of the original transom which appears to be stored on the second floor of the Cushwa Warehouse nearby. If feasible, restore the original transom with new putty, paint, and glass if necessary. Remove the existing non-historic transom and replace it with the restored original transom. If the historic original transom cannot be salvaged, fabricate and install a new transom that matches the historic profile and lite pattern of the original. Adjust the vertical location of the door head based on the size of the historic transom.

ROOF

Remove the existing corrugated metal roof, which is not original or historically accurate, and replace it with slate shingles to match its original appearance. Damaged sheathing boards should also be replaced during the roof work.

Wood raking trim should be installed and painted at the west gable, and a full system of gutters and rain leaders should be installed. Leaders should be located at the existing concavities in the brick water tables where the original leaders were placed.

Recreate the original six glazed operable dormer windows at the east wing roof and the original raised ventilation monitor at the west wing roof

INTERIOR FLOORS

Remove the wood walkway and gravel base layer in Room 101 and install a new concrete floor with an integral radiant heat system at the full extent of the space. Remove and replace the plywood floor structure in Room 102 with a new, permanent floor structure. Include raceways or other provisions for floor-mounted electrical receptacles.

INTERIOR PARTITIONS

Remove the partitions and ceiling structures that enclose toilet room (Room 103), storage room (Room 104), closet (Room 105) and the staircase in Room 102. Also remove the plywood enclosure around the sprinkler equipment in Room 001.

New partitions will be required to enclose the following new spaces:

- Room 001: Stairwell: Fire-rated stud wall assembly.
- Room 001: Sprinkler closet: Insulated stud wall assembly.
- Room 001: Storage cages: Metal mesh security cage assembly.
- Rooms 103, 104, and 105: Restrooms and Janitor's Closet: Acoustically-rated stud wall assembly between all three rooms.
- Room 102: Stairwell: Fire-rated stud wall assembly.

CEILING, WALL, AND FLOOR FINISHES

Note: All finishes shown here are strictly preliminary and have been chosen as a reasonable basis for the pricing of the Preferred Option. Further discussion and study of proposed finishes is recommended during the Preferred Option design phase.

- Room 001: No work needed except in conjunction with new partitions.
- Room 101: Install an architectural-grade concrete floor at the full extent of the space. Repoint the exposed brick walls where existing mortar is deteriorated.
- Room 102: Install new LVT (luxury vinyl tile) finish on new floor deck. Paint walls, ceiling, doors, and trim.
- Rooms 103, 104, and 105: Install ceramic tile at the floors and halfway up the walls. The remainder of the walls and the ceilings to be white-painted wallboard.

STAIRS

Remove the existing staircase and replace it with a U-type staircase, moved east to a new floor opening. Make structural alterations to the floor structure as required.

Legislation and Standards

This project is subject to numerous laws and regulations which guide and control the use and treatment of historic buildings. These requirements serve to protect cultural resources while addressing issues of human safety, fire protection, energy conservation, abatement of hazardous materials, and accessibility. In addition, numerous standards outlining best practices have been developed to guide design professionals and building owners in the use, maintenance, and re-use of historic structures. The following laws and standards have the most significant impact on the treatment and use for the Williamsport Power Generating Station.

THE ARCHITECTURAL BARRIERS ACT

This law serves as the accessibility standard for this property. The standards in this act provide guidance on federal accessibility requirements for existing buildings and alterations within existing buildings.

INTERNATIONAL BUILDING CODE (IBC)

INTERNATIONAL EXISTING BUILDING CODE (IEBC)

These codes are the applicable building codes for this project. As the Generating Station is an existing building, the IEBC serves as the primary code with application of the IBC where referenced and as necessary.

THE INTERNATIONAL MECHANICAL CODE (IMC)

THE INTERNATIONAL PLUMBING CODE (IPC)

NATIONAL ELECTRICAL CODE (NEC)

INTERNATIONAL FIRE CODE

LIFE SAFETY CODE, NFPA 101

NATIONAL FIRE ALARM CODE, NFPA 72

STANDARD FOR THE INSPECTION, TESTING, AND MAINTENANCE OF WATER-BASED FIRE PROTECTION SYSTEMS, NFPA 25

STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS, NFPA 13

NATIONAL HISTORIC PRESERVATION ACT OF 1966

This law and subsequent regulations mandate that federal agencies protect historic cultural resources. A major component to its administration is the Section 106 process, which requires federal agencies to review and determine the impact of any alterations to the resources. If an alteration is

deemed to cause an adverse effect, the process will require the agency to provide some form of mitigation for the impact to the historic resource.

NPS PRESERVATION BRIEFS

NPS publishes and maintains a series of briefs describing best preservation practices regarding material and planning issues. They can be found online at www.nps.gov.

NPS PRESERVATION TECH NOTES

NPS publishes and maintains a series of case studies in historic preservation which provide practical information on traditional practices and innovative techniques for successfully maintaining and preserving cultural resources. They can be found online at www.nps.gov.

THE SECRETARY OF INTERIOR'S STANDARDS FOR TREATMENT OF HISTORIC PROPERTIES (SI STANDARDS)

These guidelines outline criteria for alterations to historic fabric. These standards establish hierarchies of treatment which seek the lowest level of intervention necessary to achieve a project's goals. Preservation of historic materials is a priority of the guidelines and all modern alterations should be reversible and minimize damage to the historic fabric.

Of the four treatment standards defined by the SI Standards, Rehabilitation is the standard that most closely complies with the intended treatment of the Cushwa Warehouse. Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations, and additions while preserving those portions or features which convey its historical, cultural, or architectural values.[1] The Rehabilitation Standards acknowledge the need to alter or add to a historic building to meet continuing or new uses while retaining the building's historic character.

[1] Anne E. Grimmer, *The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring & Reconstructing Historic Buildings*. U.S. Department of the Interior, National Park Service, Technical Preservation Services, Washington, DC, 2017, 2. This document is available as a PDF at www.nps.gov.

STANDARDS FOR REHABILITATION:[2]

1. A property will be used as it was historically or be given a new use that requires minimal change to its distinctive materials, features, spaces and spatial relationships.

2. The historic character of a property will be retained and preserved. The removal of distinctive materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.

3. Each property will be recognized as a physical record of its time, place and use. Changes that create a false sense of historical development, such as adding conjectural features or elements from other historic properties, will not be undertaken.

4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.

5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize a property will be preserved.

6. Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture and, where possible, materials. Replacement of missing features will be substantiated by documentary and physical evidence.

7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.

8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

9. New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.

10. New additions and adjacent or related new construction will be undertaken in such a manner that, if removed in the future, the essential form and integrity of the historic property and its environment would be unimpaired.

[2] Grimmer, 76.

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ARCHIVES

Western Maryland Room, Washington County Free Library, Hagerstown, Maryland.

Chesapeake & Ohio Canal National Historical Park Archives, Williamsport, Maryland.

Appendices

Appendix 1: 75% Architectural Options Drawings

Appendix 2: Historic Structure Report, Generation Station, 1978: John Milner Associates and Keast & Hood

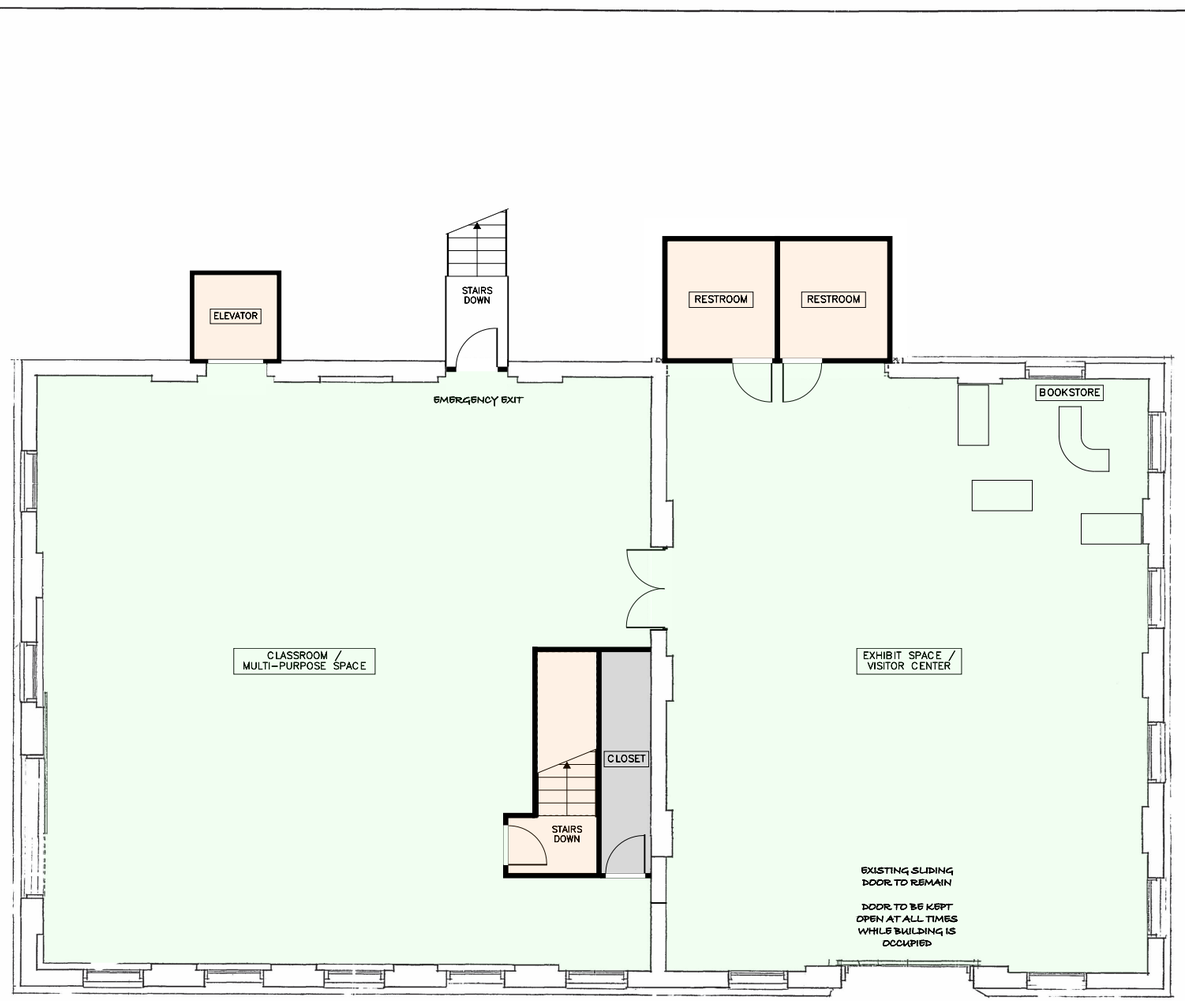
Appendix 1:

75% Architectural Options Drawings

75% ARCHITECTURAL OPTIONS DRAWINGS

The architectural options drawings shown in this appendix are preliminary concepts that were prepared for the 75% submission of this Historic Structures Report. They have been superseded by the Preferred Option described in Part 2 of this report. They are reproduced here for reference.

ARCHITECTURAL OPTIONS DRAWINGS



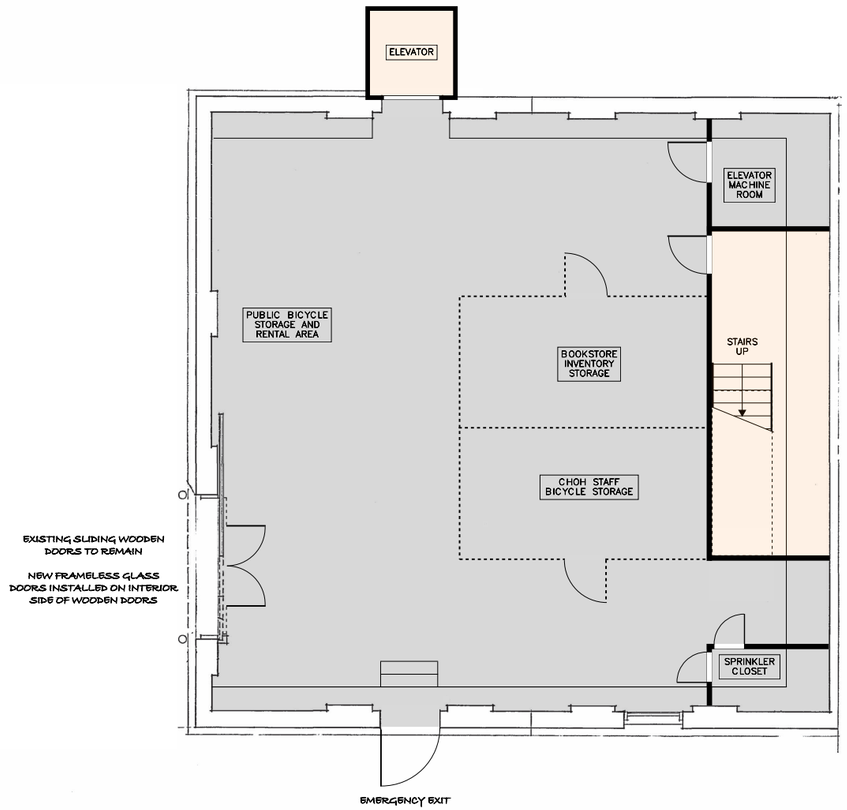
POWER GENERATING STATION

OPTION A
MAIN FLOOR

RECONSTRUCTION OF EL, ELEVATOR ACCESS TO LOWER LEVEL, ALTERATION TO STAIRCASE

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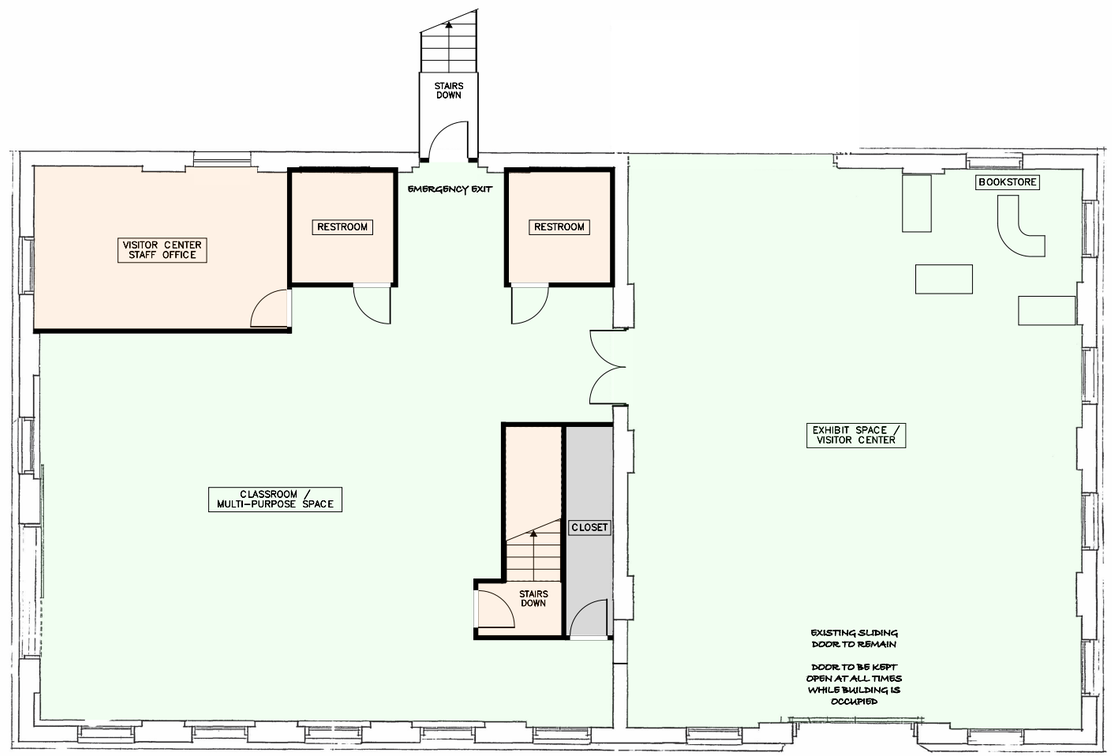
POWER GENERATING STATION

OPTION A
LOWER FLOOR

RECONSTRUCTION OF EL, ELEVATOR ACCESS TO LOWER LEVEL, ALTERATION TO STAIRCASE

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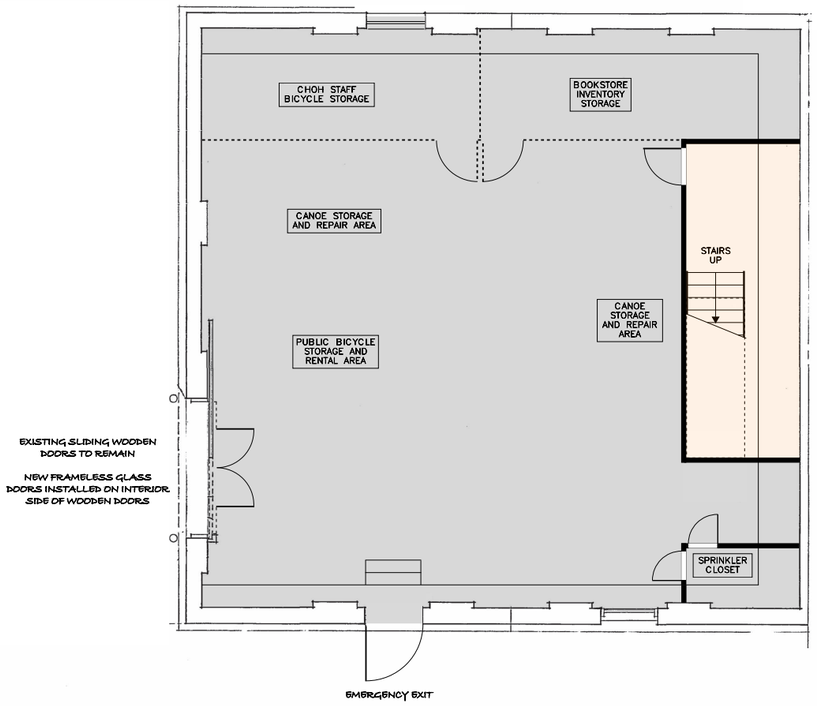
POWER GENERATING STATION

OPTION B
MAIN FLOOR

NO CHANGE TO EXISTING FOOTPRINT, STAIR-ONLY ACCESS TO LOWER LEVEL, ALTERATION TO STAIRCASE

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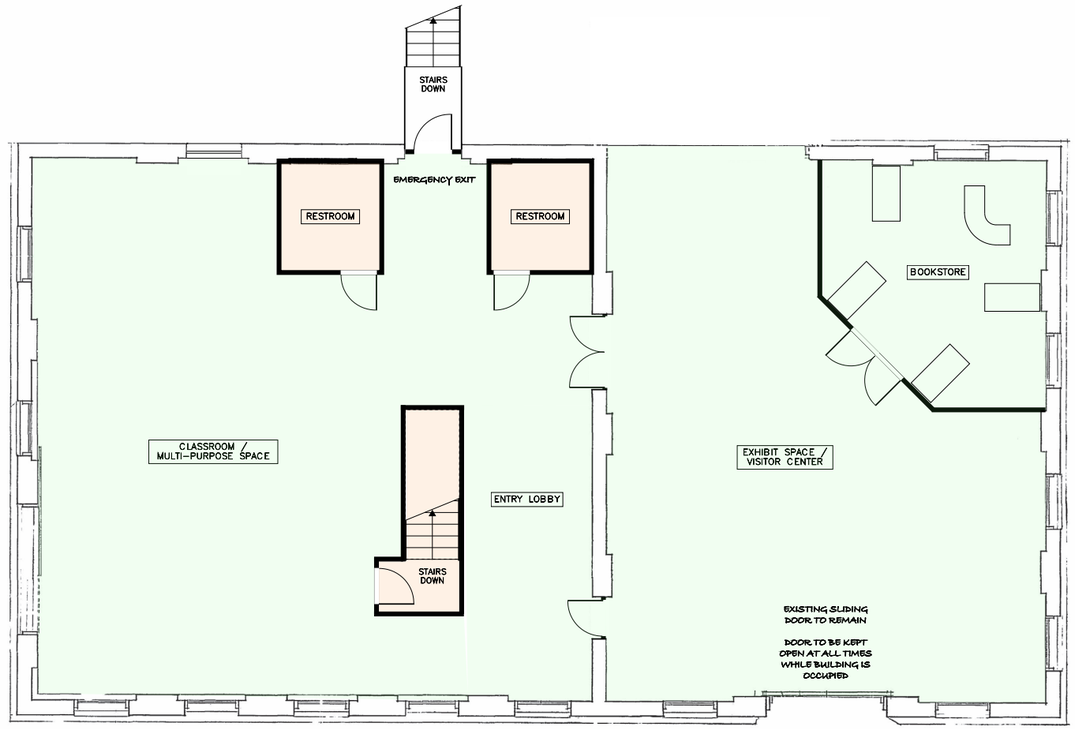
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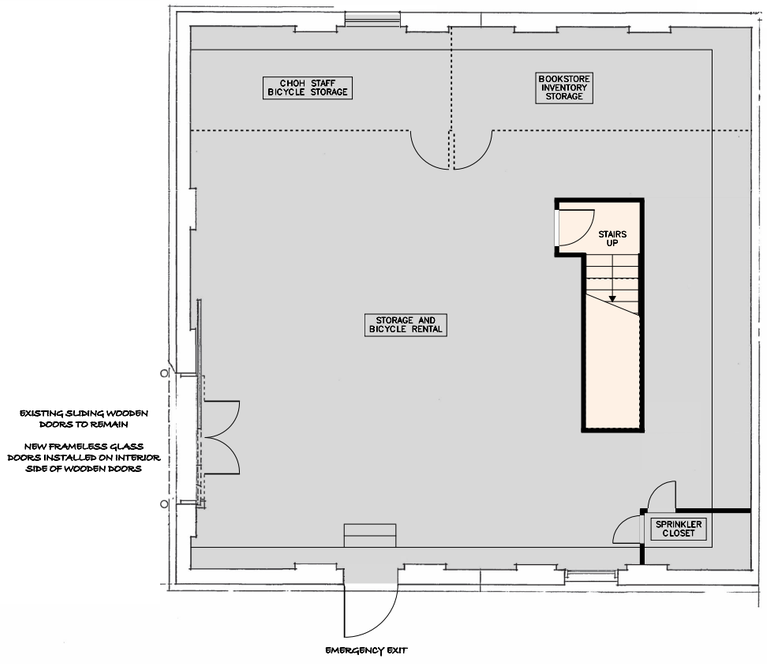
POWER GENERATING STATION

OPTION C
MAIN FLOOR

NO CHANGE TO EXISTING FOOTPRINT, STAIR-ONLY ACCESS TO LOWER LEVEL, ALTERNATE STAIRCASE LAYOUT, CLIMATE-CONTROLLED BOOKSTORE

DESIGNED:	SUB SHEET NO.	TITLE OF SHEET	DRAWING NO. 412 / 25076
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POWER GENERATING STATION

OPTION C
LOWER FLOOR

NO CHANGE TO EXISTING FOOTPRINT, STAIR-ONLY ACCESS TO LOWER LEVEL, ALTERNATE STAIRCASE LAYOUT

DESIGNED:	SUB SHEET NO.	TITLE OF SHEET	DRAWING NO. 412 2507b
DRAWN:			PKG. NO. — — —
TECH. REVIEW:			SHEET 7 OF 16
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Appendix 2:

Historic Structure Report, Generation Station, 1978: John Milner Associates and Keast & Hood

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D-47

HISTORIC STRUCTURE REPORT

GENERATION STATION

Chesapeake and Ohio Canal National Historical Park
Williamsport, Maryland



NATIONAL PARK SERVICE
U.S. DEPARTMENT OF THE INTERIOR

DENVER SERVICE CENTER
C & O CANAL RESTORATION TEAM

JOHN MILNER ASSOCIATES
WEST CHESTER, PENNSYLVANIA
and
KEAST and HOOD COMPANY
PHILADELPHIA, PENNSYLVANIA

GENERATION STATION

Chesapeake and Ohio Canal
National Historical Park
Williamsport, Maryland

Work Directive No. 8-0019-78-05

HISTORIC STRUCTURE REPORT
PHASE III SUBMISSION
(REVIEW COPY)

prepared for

National Park Service
Denver Service Center
C&O Canal Restoration Team

by

John Milner Associates
West Chester, Pennsylvania

August, 1978

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INTRODUCTION AND SUMMARY OF WORK

I. INTRODUCTION AND SUMMARY OF WORK

The following historic structure report for the Generation Station is the result of recording, examinations, and analyses conducted by John Milner Associates, Architects and Planners, in conjunction with Keast and Hood, structural engineering consultants, and Edward H. Richardson Associates, civil engineering consultants. This work was undertaken during the period of November, 1977 through March, 1978. Descriptions of existing conditions, and subsequent analyses and recommendations reflect the state of the building during the initial recording and examination period, ending January, 1978.

The scope of work for this project was primarily architectural in nature. Such documentary materials as existed were supplied to John Milner Associates by the National Park Service. No original documentary research was included in the scope of this work directive. The historical data report on the Generation Station, previously prepared by Edward D. Smith of the National Park Service, is not included as an integral part of this report. In addition, archeological mitigation was recently undertaken relevant to the Generation Station. The results of this work, carried out by National Park Service personnel, are presently in draft form, and will be produced in final form as a separate report.

The historical data report, archeological report, and available documentation supplied by the National Park Service were reviewed by John Milner Associates for purposes of comparative analysis with architectural evidence. The conclusions drawn regarding original appearance of the building, and subsequent

alterations and additions, take into consideration the evidence, documentation, and evaluations contained in these sources. In developing the architectural chronology, every attempt has been made to base the evaluation strictly upon physical evidence and factually based material from the historical and archeological reports. In consequence, there remain several questions concerning original construction and early evolution which can be answered only by conjecture, the future discovery of additional historical documentation, or possibly through more extensive physical investigations.

The architectural investigations on the Generation Station were limited to surface inspections, examinations of structural components, and observations of stylistic elements and other exposed features. No destructive testing was undertaken.

An appropriate target restoration period will be established subsequent to National Park Service evaluation of this historic structure report. As an interim program for maintaining existing building fabric, this report includes comprehensive preservation recommendations. At present, all extant features and materials must be considered historic fabric, pending resolution of a restoration program. Consequently, the preservation recommendations approach to the structure encompasses maximum maintenance and preservation of all existing elements over a period of five years. Many of the recommendations relate to relatively modern twentieth century material; others are directed toward cyclical maintenance or temporary protection. It must be stressed that these recommendations do not take into account cost effectiveness, but were developed solely on the basis of maximizing preservation of extant features in their present condition. Evaluation of the preservation recommendations should include comparative analysis with the restoration recommendations in determing the most desirable, and practical, course of action.

Restoration and adaptive reuse recommendations are included in this report as supportive material in long range planning for the Generation Station. They are intended as guidelines, developed through our investigations and evaluations of the existing building, suggesting various items for consideration when finalizing a long range restoration plan.

In addition to the architectural descriptions and evaluations contained in this report, principal areas of work under the directive included the following:

SUMMARY OF WORK

A. Work on the Generation Station began with a review of documentary materials supplied by the National Park Service. This material consisted primarily of the historical data section (in draft form) of an historic structure report, prepared by Edward D. Smith and several historical photographs. Following the on-site architectural survey and preparation of record drawings, draft copies of reports pertaining to recent archeological excavations at the Generation Station were also received and reviewed.

B. Subsequent to the review of the historical data, on-site work began with the physical documentation of the existing structure. This documentation provides much of the raw data for the following draft historic structure report and consisted of:

    1. A photographic record of the existing structure, both interior and exterior: views include overalls

placing the building in context with its environs, elevations, details, archeological evidence and interior spatial relationships. Photographs were taken in black and white, in 4" x 5" format.

2. On-site measurements of existing conditions: the Station was comprehensively measured for the preparation of record drawings. Included were plan, section, elevation and detail measurements along with significant profiles and a record of physical evidence. Present structural and cosmetic conditions were also recorded.

3. Physical Description: Extensive on-site notes were taken regarding the present appearance of the building, allowing for a thorough narrative recording of the building in this report.

4. Samples: To aid in determining original appearance, subsequent alterations/additions, and ultimate restoration, samples of building fabric were taken for laboratory analysis. Samples included:

   a) paint chips
   b) wood samples
   c) mortar
   d) brick.

   Paint, wood and brick samples have since been analyzed. The results of laboratory analyses on wood and paint are included in the Appendices.

5. Elevation References: Elevation points were determined at various locations on the structure, related to benchmarks and applied to record drawings.

6. Architectural Investigations: Architectural examinations were conducted, to the extent practicable through observation and comparative analysis. No destructive testing was undertaken; no removals, sub-surface examinations, or demolition were included in the investigations. A thorough recording and comparison of architectural elements and treatments were, however, carried out, and all apparent physical evidence noted.

7. Record Drawings: Measured drawings were prepared for the Generation Station to serve as a record of existing conditions. The drawings include plans, elevations, sections and details in a format suitable for conversion to design and construction documents. See Appendix A. for a complete list of record drawings.

8. Existing structural systems and components were evaluated, and recommendations for their stabilization and preservation developed.

9. Areas and features requiring immediate stabilization were identified, techniques for stabilization developed, and corresponding preliminary cost estimates prepared.

10. A preservation program was developed, along with corresponding preliminary preservation drawings and details.

11. An outline specification was prepared relevant to all preservation work, supplementing the preservation recommendations.

12. Historical photos and illustrations of the Station were collected for inclusion in this report.

DESCRIPTION OF EXISTING CONDITIONS

II. DESCRIPTION OF EXISTING CONDITIONS

A. Environs

The Generation Station, also commonly referred to as the Power Station or Power House, was originally constructed in 1896 to house the generating equipment for the Hagerstown trolley system, the first electric trolley line in Washington County. The building is situated approximately 110 feet to the northeast of the Cushwa Warehouse, with the south elevation, or facade, oriented to Potomac Street and the former public square of Williamsport. The transverse axis of the structure is north-south (approximately N 8° W). The longitudinal axis roughly parallels the adjacent Conococheaque Creek, with the building situated atop the southern bank of this tributary.

The Generation Station visually consists of two parts. The western (lower) portion is a square one-story brick section with gable roof. This section is situated on relatively level ground having roughly the same elevation as the area surrounding the Warehouse. The eastern (or "upper") portion of the building is rectangular in plan, one-story, constructed of brick with gable-on-hip roof. The floor level of this section is seven feet above that of the western, gable-roofed portion of the building. A steep wooded hillside rises immediately to the east of Generation Station, and the grade to the south of the facade falls off gradually in the direction of the Warehouse. A retaining wall and berm running south from the Generation Station define the break in grade between the eastern and western portions of the structure.

To the south-southwest of the Generation Station is situated the Cushwa Warehouse, a rectangular, two-story brick and frame structure with gable roof. Approximately 95 feet to the southwest of the Generation Station is the northeast corner of the turning basin for boats on the C & O Canal. Although portions of the basin walls exist in situ, the basin itself has been filled in to the level of surrounding grade.

At the northwest corner of the basin, in line with the canal ditch and northwest of the Generation Station is the Conococheaque Aqueduct, a massive limestone structure consisting of three equal arch spans, extending approximately 210 feet between abutments. At present, the National Park Service maintians offices in a mobile home located to the west of the Generation Station. The creek bank to the north, hillside to the east, and flat lands to the west of the Station are partially wooded, while the area between the Warehouse and Generation Station is open and presently used for staff parking. Early views of the site indicate railroad spurs near the Warehouse: portions of railroad ties are evident north of the western end of the building, which may be remnants of the nineteenth century spur. In addition, sections of track still remain to the southeast of the Warehouse.

The land immediately surrounding the lower portion of the Generation Station, Warehouse and the area between the Station and canal is relatively flat. 1870-1880 photos of the area indicate that the ground east and south of the Warehouse at one time rose sharply to bluffs overlooking the nearby turning basin and aqueduct to the west and Conocheaque Creek to the

north. The western portion of this hillside was cut back at some later date, expanding the area of open lowlands.

The Generation Station was strategically located to take advantage of the water supply of Conococheaque Creek, coal supplies from the warehouse and canal, and access from Potomac Street, the primary route through Williamsport.

B. Generation Station - Exterior

The Generation Station is a one-story industrial structure, rectangular in plan (approximately 45' x 81'), constructed of brick masonry bearing walls and rubble limestone foundations.

The structure is visually divided into two parts: the eastern, or upper portion is rectangular in plan (35' x 45') consisting of one-story surmounted by a gable-on-hip roof. The lower, or western portion is square in plan (45' x 46'), one-story in height, with gable roof. The ridge of this gable runs east-west, abutting the eave line of the eastern section of the building. The floor level of the eastern portion of the building is seven feet above that of the western portion: this change in floor levels is reflected in the two distinct grade elevations of the facade.

The facade, or south elevation of the building is oriented to Potomac Street. The eastern gable-on-hip portion is symmetrically divided into three bays: a large central service door flanked by a single window opening on either side. The western, gable-roofed section of the facade is five bays. The openings are symmetrically arranged and regularly spaced, consisting of three windows, separated by two door openings. All window and door openings on the facade have semi-circular arched heads, composed of three rolok courses of brick and an outer arch course of projecting header brick. A double belt course of projecting brick visually ties together all openings at the spring line of the arched heads. Similarly, a single belt course of brick runs between these openings

four courses beneath the spring line belting. This decorative arched window treatment and belt coursing is consistent throughout all four elevations, with the single exception of the service door of the west elevation, which contains a segmentally arched head.

Both the window and door openings have projecting, dressed stone sills with a chamfered upper edge. Several sills have been removed and/or replaced with concrete sills, notably on the east elevation. While the eastern section of the building has no belt coursing at this point, the western (lower) section has a triple belt course of brick in line and flush with the face of the window sill. This treatment applies to all exterior elevations of the gable-roofed section.

All window and pedestrian door openings presently contain contemporary, protective board coverings, with the exception of the semicircular window and door transom on the west elevation, whose sash and frames remain exposed. The original doors of the service openings have been replaced with contemporary, track-mounted doors. As illustrated in the record drawing plan, many of the original frames and several sash are extant behind these protective boards. The sash are arched-head double casements throughout, applied with butt hinges. The frames are composed of solid plank with applied exterior backband moldings.

The door openings on the north and south elevations of the western section are formed by extending window openings to the floor level. While the frames, sash, and doors are largely missing, adequate evidence exists to confirm that the doors

were surmounted by casement windows similar in appearance and comparable location to the other window openings in this section of the building.

The masonry opening of the facade service door has been enlarged in width below the spring line of the arched head. The brick jambs have been rebuilt below this point, with the transition between the enlarged opening and original masonry arch accomplished through corbelling. Beginning at the spring line, nine brick courses corbel downward away from the original opening at either jamb, serving to expand the lower portion of the entrance.

The east elevation of the building consists of four window openings, regularly spaced and symmetrically located. The west elevation consists of a one small semi-circular window located in line with the ridge, within the pediment of the galbe, two first floor windows and a large service entrance. The semi-circular window opening is formed by an arch composed of two rolok courses and an outer, projecting header course, resting upon a projecting, chamfered stone sill. One first floor window is located directly beneath the ridge; the second window being located near the north elevation. The service opening is located to the south of these windows, and is surmounted by a segmentally arched head composed of the same brick coursing as other first floor openings. The spring line is equivalent to the top of the uppermost belt course, above which, impost-type stone blocks form the transition between the brick arch and the belt coursing. A seven light transom exists within the service opening.

The north elevation presently contains three openings: One window opening near the eastern ends of both the gabled and gable-on-hip sections, and a window-over-door opening located near the west end of the gabled section. The window and door openings in the western section are placed in approximate symmetry to the overall length of the gabled portion of the Generation Station. The north elevation of the eastern section also contains an area of infill brick where an original, or early, one-story, gable-roofed ell was attached. The ell abutted the north elevation near the western end of the gable-on-hip section, and traces of flashing define the pitch of the gable. Archeological investigation in this area uncovered the brick and stone foundation walls of the ell, as shown on the record drawings. A steel lintel is exposed on both the interior and exterior of the building in this area of brick infill.

The stone foundations of the building are exposed in very few areas due to the subsequent raising of grade around the Generation Station. Stone is still visible along portions of the north and south walls of the gable-on-hip section. The limestone foundations are laid in rubble fashion, crudely dressed in some areas. They project several inches from the exterior face of the brick masonry above.

The cornice of the building is composed of corbelled brick courses which run continuously around all four sides of the gable-on-hip section, and along the north and south side of the gabled (western) section, with returns at the west elevation. The gable ends of the gable-on-hip roof of the eastern

section are enclosed with fixed wood louvers. Although no chimneys or dormers presently exist, circa 1896-1910 photos of the building indicate a large, central, hip-roofed monitor and chimney stack on the gabled (western) section, a single dormer on the north and south hip-roof slopes of the eastern section, and a pair of dormers on the east and west roof slopes of the eastern section.

While the present roof, window coverings, and foundations appear to be in sound condition, many areas of the brick bearing walls are deteriorated. Brick is in notably poor condition along the lower portions of the north and south walls of the western section. Pointing has been washed out to a considerable depth from brick at the northwest corner, and cracking and separation of brick has occurred near the eave line at the southwest corner of the building. The western portion of the facade has been repointed as have some smaller areas on the north elevation of this section of the building.

C. Generation Station - Interior

The interior of the Generation Station is composed of two large rooms corresponding to the eastern and western (or gable and gable-on-hip) sections of the building. The floor level of the eastern room is seven feet above that of the western room. Both rooms contain earth floors, exposed brick walls, and exposed roof trussing, rafters and roof sheathing. Neither room contains any trim or wall finishes.

The transverse wall dividing these two rooms is formed by the west (exterior) brick wall of the gable-on-hip section. The lower portion of this wall is exposed, roughly dressed limestone, which keys into the limestone foundations of the north and south walls of the gable-on-hip section. Two door openings exist in this wall at the upper (eastern) floor level, with segmentally arched brick heads composed of double rolok courses and dressed stone sills. The arched heads are largely destroyed and the southern jambs have been broken out to enlarge the openings.

All interior masonry walls of the building, with the exception of the west face of the transverse dividing wall, contain exposed brick pilasters between window and door openings. The pilasters of the east and west walls of the gable-on-hip section, and those of the north and south walls of the gabled section correspond to the locations of roof trusses, providing bearing for the end points of these features. The gabled portion of the building contains four regularly spaced Howe trusses, spanning the area between the north and south exterior walls. The eastern section contains three queen-post Howe trusses, regularly spaced and running in an east-west direction. The gable surmounting the hip portion of this roof is framed upon the short

upper chords of these trusses, with the gable running in a north-south direction. Both truss types contain iron tie rod vertical members and heavy wood diagonal and horizontal chords. Heavy wood purlins surmount the trusses, in turn supporting a system of common rafters and exposed wood sheathing.

Early photographs and recent archeological excavations indicate that the roof was originally slate, with a central hipped roof monitor and chimney stack on the gabled section, and jerkin head dormers on the hip section. These roof features are non-extant although evidence of their locations is apparent in the patching of roof sheathing and rafters on the interior.

Several roof rafters and truss chords have been replaced and/or repaired with scabs and helpers. The end points of the trusses pocket into the brick masonry walls, bearing upon the pilasters. The common rafters rest upon the top of the corbelled eaves.

The arched brick heads of the window and door openings are exposed on the interior, and consist of three semi-circular rolok courses, flush with the interior of the walls. The exposed interior sills consist of a flush soldier course of brick. The brick coursing of the interior is common bond with header rows approximately every eight courses.

A series of infilled pockets exist within the brickwork on the interior. In the eastern section, a line of infilled pockets occurs on all four interior elevations, approximately three feet above the I-beam in the north wall. A second line of pockets occurs on all elevations at a level approximately five feet above the lower line of pokects.

Several machinery foundations have been exposed beneath the floor levels through recent archeological excavations. No machinery exists at present.

D. Structural Systems

1. General

a. The Generation Station is composed of two building sections of basically similar construction yet possessing discrepancies indicative of **two separate building periods.** Each section is constructed with clear span timber trussed roofs which are supported by pilastered masonry brick walls. The construction details for the materials used in both sections are similar to each other, however, the roof trusses are analytically different. Although there is a seven foot floor differential between the two building sections, the contact planes between the brick walls of each section appear intact, thus indicating satisfactory foundation support conditions for those areas. Observation of other building areas did not indicate the existance of any obvious foundation problems. The parts of the building in need of repair are the **brick walls and pilasters that have been seriously weakened by "freeze-thaw" action and poor drainage conditions** over the many years in which the building has been unheated.

b. The present roof covering is of light weight aluminum sheets. The original roof cover material was slate shingles; the structural review of the roof trusses has considered the reapplication of slate in the future.

2. Foundations and Exterior Bearing Walls

a. While the building is slightly elevated above the nearby Cushwa Warehouse, it has been subjected to several

major floodings of the Potomac River and the Conococheaque Creek. While the floods do not appear to have caused any direct damage to the foundations or upper walls, as a consequence of foundation settlement or undermining, their influence toward the eventual weakening of the brick walls and pilasters must be considered significant. The absence of obvious wall settlement cracking indicates the presence of **stable foundation support materials**. However, the long term "freeze-thaw" damage to the pilaster walls is related to the walls having been frequently saturated by roof run-off, occasional major floods, and poor drainage conditions at grade.

b. Both the brick units and the lime-clay mortar joints are porous, having the characteristics of absorbing and retaining water over long periods of time thereby being susceptible to winter frost pressures. Evidence of brick and mortar deterioration are evident on the visible wall surfaces of both building sections at low and high wall areas. While wall weakening is somewhat generalized throughout the building, there is a section of wall that has been **severely weakened by the long term "freeze-thaw" action** that will require careful reconstruction. That particular condition can be seen on the **inner face of the south wall in the gabled section where it abuts the eastern section of the building**. Three feet of earth backfill presently abut the outer face of this wall. Constant saturation of the soil and wall by roof run-off and surface drainage continues to be a major contributory factor in weakening this wall, as well as other walls similarly exposed.

c. A condition of concern relative to the structural integrity of the wall system is that **several of the pilastered wall areas are either out-of-plumb** (i.e. the tops of the pilasters have moved outward from the plane of the wall) **or slightly bowed at mid-height**. The cause of top out-of-plumbness seen in the east and west walls of the east rooms cannot logically be contributed to a spreading or thrusting of the roof trusses since the internal truss member forces are contained and not imparted to the supports. The displacements might possilby be associated with past major floods or perhaps as a response to the operation and support of heavy mechanical equipment from earlier occupancies. The out-of-plumbness ranges between one and two inches. The **outward bowing** is evident in the pilastered walls of the west rooms and can be associated with what appears to be an **overall weakened masonry condition aggravated by truss bearing eccentricities**. Reference to the truss end bearing condition in Section 1/Sheet 5 of 5 indicates an eccentricity of at least twelve inches between the last truss panel point and a reasonable bearing centroid over the pilastered wall section. Rectifying the consequences of these bearing eccentricities may involve the future insertion of steel angles or bearing plates in a manner which distributes loads to a bearing centroid.

Another factor contributing to the inherent weakness of the wall is the manner in which the wythes were laid. A cross section of the wall make-up was noted at an opening through the south wall between the east and west rooms. The wall was laid in common bond with headers approximately every eighth course; a condition

which creates a void between inner and outer wythes of brick, except at header courses. The absence of mortared joints between wythes was presumably conceived as a method of facilitating inner-wall drainage. However, when considered in conjunction with the presently soft mortar, this condition is a significant factor in weakening the walls.

3. Trussed Roof Construction

a. The trussed roofs over the two building sections were examined from an overview approach and structually reviewed for their ability to support a 20 psf live load and a heavier slate roof that could possibly be installed as part of an exterior restoration. Although the trusses of each section are of different configurations and determinantcy, each type has the ability to safely sustain the aforenoted loads including the possible reconstruction of former dormers and monitor. One truss of each building section has been substantially rebuilt in the past, most likely in response to end bearing decay or equipment overload.

b. A detailed examination of individual truss joints and the masonry embedded ends of truss members was not included in the structural survey and analysis. However, these elements are usually susceptible to decay from roof leaks and moisture migrating through the walls. When the walls are scaffolded for the proposed repointing (which is structurally necessary), the integrity of the truss joints and bearing ends can be properly determined.

ARCHITECTURAL INVESTIGATIONS AND CONCLUSIONS

III. ARCHITECTURAL INVESTIGATIONS AND CONCLUSIONS

Architectural investigations were conducted on the Generation Station in an effort to determine original appearance, subsequent alterations and additions, and chronology of construction dates. The results of these physical examinations of building fabric will provide additional documentation on the structure and assist in determining an appropriate target restoration period.

The investigations conducted as a part of this historic structure report were limited to the observation and examination of exposed building fabric and features. No destructive testing or sub-surface probing was undertaken. Physical examinations were supplemented by historical and archeological data provided by the National Park Service, as well as with several late nineteenth and early twentieth century photographs. This material was relied upon in many cases for substantiation of the architectural findings.

The Generation Station was basically constructed as a shell for the containment of power operated equipment. Since this shell is largely intact, the additional examinations were directed toward several specific points:

1. Construction sequence and alterations
2. Roof features and framing
3. Fenestration
4. Machinery related building features

A. Construction Sequence and Alterations

Documentary records establish the construction date of the Generation Station at 1896. Dimension references and early photographs suggest that the entire structure was built in a single construction phase. However, several physical discrepancies exist between the two sections of the building which suggest separate construction periods.

The foundations of the gable-on-hip section are uniformly constructed and keyed together, including the west (presently interior) wall of this section. The foundations step down approximately seven feet to the lower level, with the north and south brick walls of the western section abutting the stone foundations of the eastern section.

The belt courses of the western section are inconsistent with the belting of the eastern section, particularly at the window sill level. Brick patching occurs in the eastern section where the corbelled eave of the west gable abuts the eastern block of the building, suggesting that the brickwork of the upper section was modified to accommodate the corbelling at a later date. The west face of the transverse partition wall is constructed in a similar manner to other exterior walls.

Several features, however, are in conflict with the theory of two construction phases. The upper areas of brick in the west gable section are keyed into the brick of the east section, appearing to be of simultaneous construction. Aside from the discrepancies in belt coursing, the fenestration and detailing of both sections is similar. In addition, the

evidence of door frames in the openings on the transverse partition wall indicate that the frames were nearly flush with the west face of the wall. These frames would have been recessed or nearly flush with the east face had this originally been an exterior wall. Although there are minor differences between the trusses of the two sections, they are both basically Howe-type trusses, with those of the eastern section modified to accommodate a gable-on-hip roof.

In considering both the physical evidence and documentation it must be concluded that the western section was begun prior to completion of the eastern portion of the building. It does appear probable, however, that construction of the western gable portion was not initiated until after the foundations of the eastern section were installed.

The only major alteration to the building configuration as a whole is the removal of the northern ell above grade. Although the original opening between the upper section and the ell is infilled with brick, it appears that the ell was an original feature, which tied into the north wall of the main structure.

B. Roof Features and Framing

The present roof configuration and major framing elements are original to the building. Some rafters and truss chord members have been replaced, although the majority appear to be original. Roof sheathing was inaccessible although the roof would definitely have been sheathed originally. Early photos and artifactual material from archeological excava-

tions confirm that the original roof material was slate. Patches in the roof sheathing and rafter splices confirm the respective locations and sizes of the hipped monitor and jerkin head dormers evident in early photographs.

C. Fenestration

All original openings are extant within the masonry walls and sufficient original sash, frames and transoms exist to accurately reproduce missing elements. All original doors, however, are missing, and early photos available to date do not illustrate these elements. While door hinging and operation is fairly evident, the exact appearance of the doors is unknown. The early photographs do indicate the general size and configuration of sash within the monitor and dormers, although details cannot be identified.

D. Machinery-Related Building Features

These features consist primarily of sub-surface interior machinery foundations exposed through mitigation, regular pocketing on the interior faces of the masonry walls, and the former ell at the north wall of the building. While each of these features relates to the machinery layout and use of the structure, considerable conjecture is involved in defining the former appearance of the elements and the related machinery.

RECOMMENDATIONS

IV. RECOMMENDATIONS

A. Immediate Stabilization Recommendations

Immediate stabilization work involves those elements of the building which are presently in a deteriorated state and pose a threat to the continued structural stability and/or preservation of historic fabric.

Most major areas of work described under the following section, "Preservation and Maintenance Recommendations" relate to the stability of the structure and warrant immediate attention. Consequently, reference should be made to section IV. B. for areas requiring immediate stabilization.

Cost estimates for all major items of preservation/ stabilization work are included in Appendix F of this report.

B. Preservation and Maintenance Recommendations

1. Roofing

Inspect entire metal roof for areas of rust, leaks, deformation, separation, and splitting. Identify all areas requiring remedial work.

A periodic inspection should be made of the entire roof (approximately every 6 months) and spot inspections made for leakage during and immediately after intense storms. Patch repairs to the roof should be made immediately upon identifying prob-

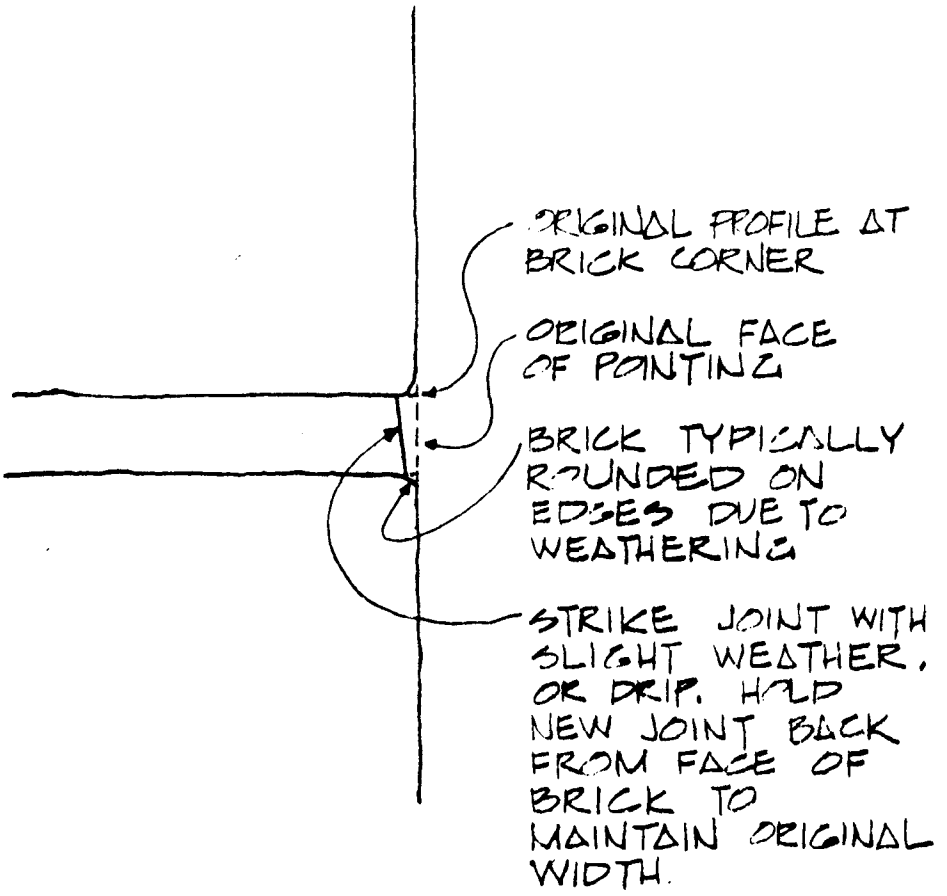
lem areas. Particular areas to note during inspections include:

- Ridges
- Flashings
- Drips, returns, and seams at eaves and bargeboards
- Seams -- check for lifting and separation

Spot repairs for small areas within the metal roof should be made by removing severely rusted material, forming a clean edge of base metal. Prime the area around the patch with red iron oxide linseed oil primer. Insert 6 mil polyethelene sheet into area to be patched, tuck beneath edges of existing metal and tack in place (polyethelene will serve to protect existing wood sheathing from application of roof cement). Cover hole, overlapping edges of remaining metal by 4"±, with asphalt impregnated fabric and apply 2-3 coats of asphalt based roofing cement. Take care to thoroughly coat edges of fabric, for continuous bond to metal roof.

2. Masonry

The entire Generation Station should be repointed, both on the exterior and interior by removing pointing and mortar to a minimum depth of 1 ½" or to sound material, whichever is greater. All brick areas should be repointed as per the accompanying detail, Plate 1, using a flexible lime and sand mortar and pointing. The use of



TYPICAL POINTING DETAIL

PLATE 1

portland cement should be greatly restrained due to the extremely soft nature of the brick.

The original mortar/pointing used in the Generation Station is of a light brown or tan color. (Pointing of the stonework varies slightly in tint and hardness from that of the brickwork.) This coloration is not solely due to the color or grade of sand in the mortar mix. Rather, it is a combination of clay, brick dust and extraneous matter such as soil. Such coloration is difficult, if not impossible, to achieve through a sand-lime-cement mix. Three options do exist for obtaining the proper coloration:

1. Reproduce the original mortar mix based upon laboratory findings: this method will produce a soft, inferior mortar which will not withstand weathering over a long period of time.

2. The use of colored premix: the proportion of portland cement in premixes can be cut with the use of additional lime and sand. However, the colorfastness of some pigments is questionable.

3. The use of admixes for color: basically similar to premixes in terms of advantages/disadvantages.

For purposes of the outline specification (see Appendix) a sand-lime-cement mortar is called for. If the original mortar is reproduced, additional natural components will be added as per laboratory analysis. It is recommended, however, that a colored premix (e. g., Flamingo or Medusa) be considered for insured durability. Pigment components should first be checked for stability. A color should be selected which is somewhat darker than the final shade desired. The addition of lime and brown bar sand will lighten the hue and reduce the cement proportions to the extent that a more flexible mortar can be achieved.

There is no original pointing remaining on the exterior of the building in the strict sense of the term. "Pointing" on the Generation Station refers to flush cut mortar which, to varying degrees, has undergone surface weathering. Moisture problems exist in numerous locations throughout the exterior brick walls. Full alleviation of this problem will involve total repointing of all brick. The removal, or cutting of existing deteriorated mortar must be done by hand raking the joints. The use of power tools should be prohibited.

The accompanying preliminary preservation drawings illustrate major areas of brick which

require resetting or replacement. In addition it may be stated that replacement brick will be required in any instance where:

- Brick is missing,

- The face of exterior brick is damaged to the extent that the soft inner body of the brick is exposed to moisture and weathering,

- Major cracks have occurred to the extent that wall separation, bowing or settling is taking place, or

- Brick has been previously replaced with more contemporary brick of incongruous size, shape, color, or hardness (since a restoration target period has not been established, such replacement should only take place where later brick is a causative factor in deterioration of adjacent masonry areas).

Repair of major cracks in the brick masonry, as noted in above, will involve removal of adjacent bricks to the extent necessary for keying the wall together throughout the linear extent of the break. In such cases the existing, original brick should be carefully removed, cleaned and reused, if possible, in knitting the wall back together.

It is extremely important that new and replacement brick match the original as nearly as possible. This match should provide for a consistency of

color, texture and size. It should be noted that it is quite difficult to provide an exact duplication of color for a true salmon brick, since an extremely low kiln temperature is required, resulting in abnormally soft brick -- a condition which many modern day kilns are incapable of achieving. However, a reasonably comparable range of brick can be produced. Acceptance of a higher percentage of waste material will allow for a comparable match if time and care are taken in matching individual brick to existing adjacent areas.

As significant as the selection and reproduction of appropriate materials is the proper installation and repair of masonry. This work should be accomplished by skilled masons, experienced in restoration. Particular attention must be given to matching coursing, bond, tooling, and the general character and appearance of the brick and stonework.

The recommendations for brick masonry apply equally to the repair and replacement of stone. While it is not anticipated that any major areas of the limestone foundations will require rebuilding or replacement, a thorough inspection of visible stone and obvious problem areas should be made, and the above guidelines used to govern remedial work. In addition, particular care must be taken to match new and existing stonework in terms of dressing, size and placement of stones, and of course, the type of stone being used.

The use of sealers or coatings on masonry should be strictly prohibited. While water repellant

coatings may prove effective for the stabilization of deteriorated brick in the short run, they tend to have limited absorption, creating new vapor and moisture barriers within the brick. This barrier eventually results in a new fracture zone and subsequent spalling. In this sense, sealers are a detrimental factor. Breathable coatings, while allowing transfer of moisture, may trap salts within the masonry potentially resulting in spalling. Although sealers work in a variety of ways, to date there is insufficient data to insure that no deteriorating action will result within the masonry.

Existing grade and drainage problems are severely affecting areas of brick masonry, and are potential threats to the structural stability of the building. This area of work is discussed in the following subsection.

3. Grading and Drainage

Portions of the present grade surrounding the Generation Station are above the top of the stone foundations. This condition, compounded by areas of level grade, is causing serious deterioration of the brick thus contributing to a continuous loss of original fabric. At present this problem has developed to proportions which pose a structural threat to the building.

The principal goal of the preservation recommendations is to establish means for insuring maximum retention of the existing fabric through time.

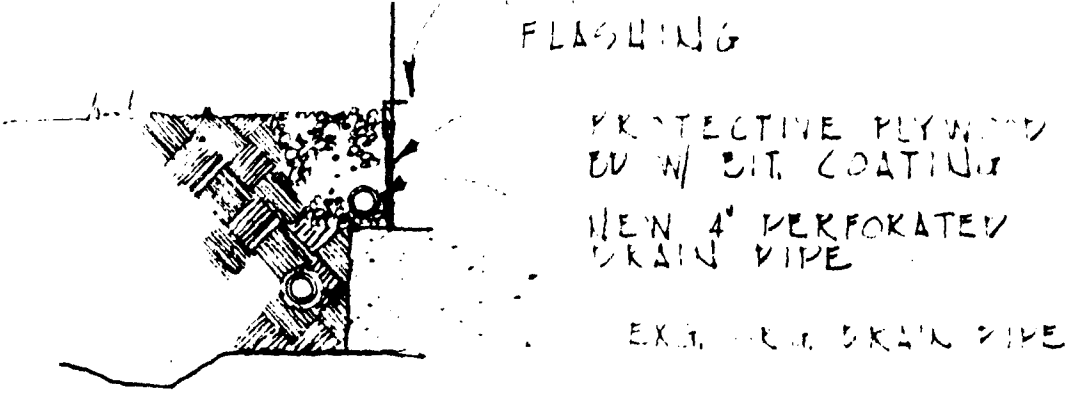
Consequently, the present problems of grade and drainage must be alleviated. A partial solution is re-establishment of an earlier and thus slightly lower grade, appropriately pitched away from the building and swaled if necessary. However, this solution must be held in abeyance until such time as 1) a restoration target date for the area is established and an appropriate historic grade for the entire basin area approved and, 2) a comprehensive regrading and drainage plan for the basin area is developed within defined historic, economic, and physical limitations.

An interim preservation solution must, therefore, include retention of present ground levels and formations. Consequently, the most appropriate means for immediate alleviation of major water problems below grade is the incorporation of a subsurface drainage system. The system is graphically illustrated in the accompanying sketch (Plate 2) and includes the following work items:

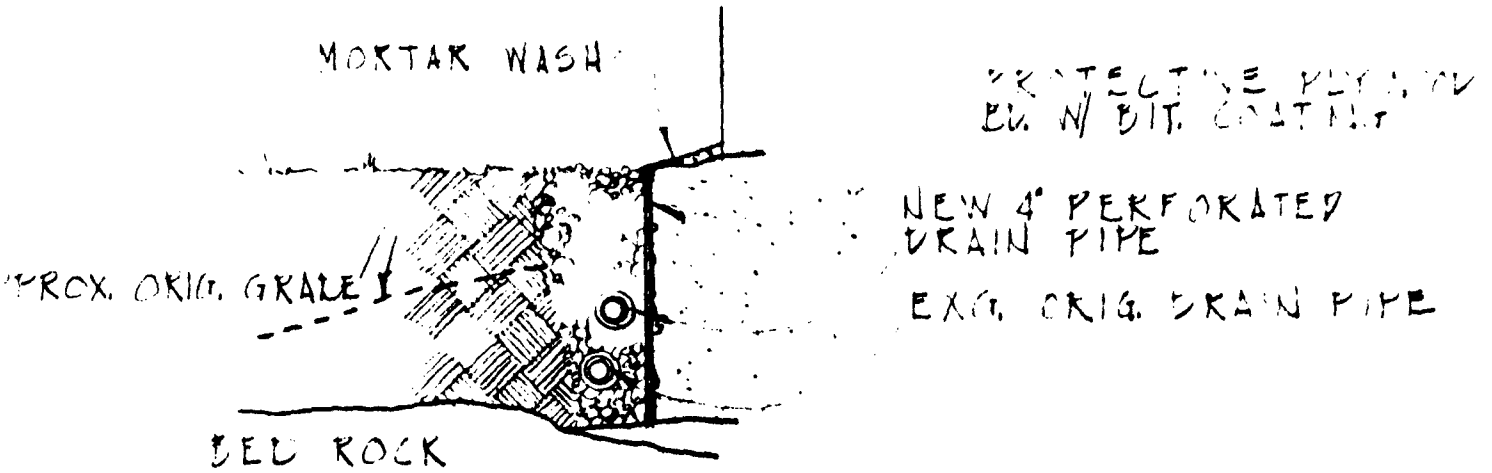
- Excavation of continuous trenches along the east, south and west walls of the Generation Station: installation of perforated drain pipes, gravel backfill, and protective boards and flashing at the face of the structure.

  Note: Such excavations should be done under the supervision of an historic archeologist.

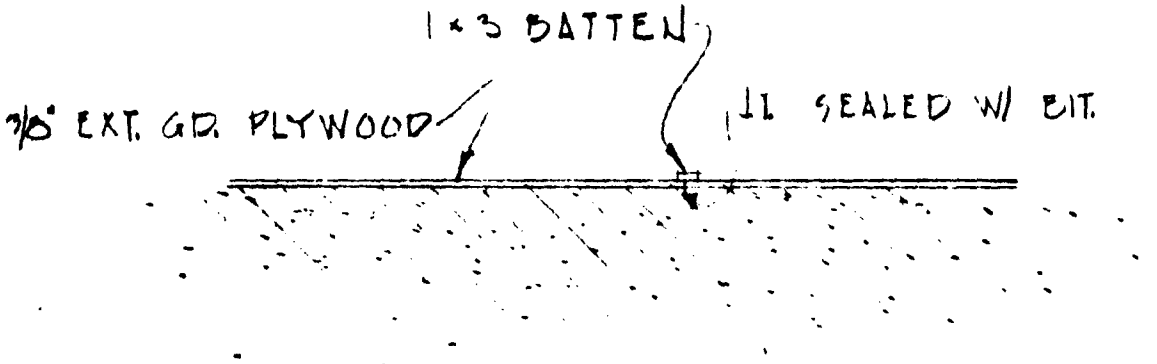
- Drain lines which carry the water to acceptable low points; e.g., the south bank of the Conococheaque Creek. Stone or concrete spillways should be provided at the creek bank to prevent erosion



ELDG. PERIMETER DRAINAGE DETAIL
(AT SOUTH & WEST ELEVATIONS)

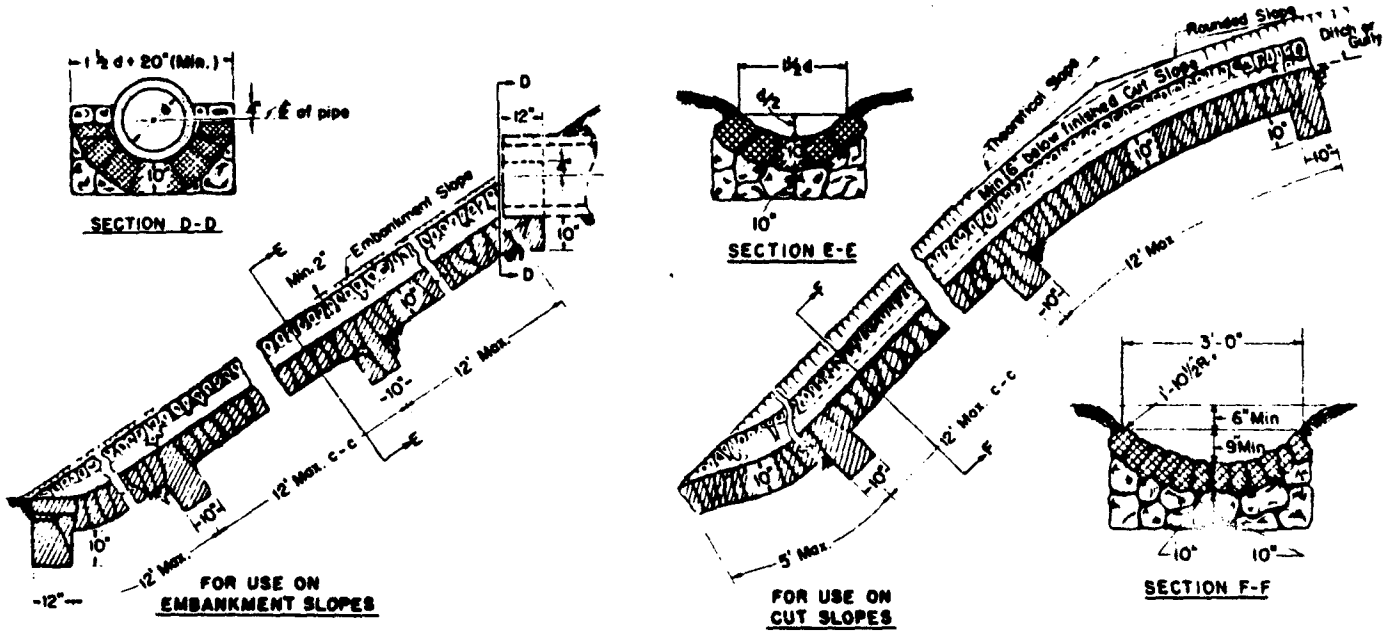


ELDG. PERIMETER DRAINAGE DETAIL
(AT NORTH & EAST ELEVATIONS)

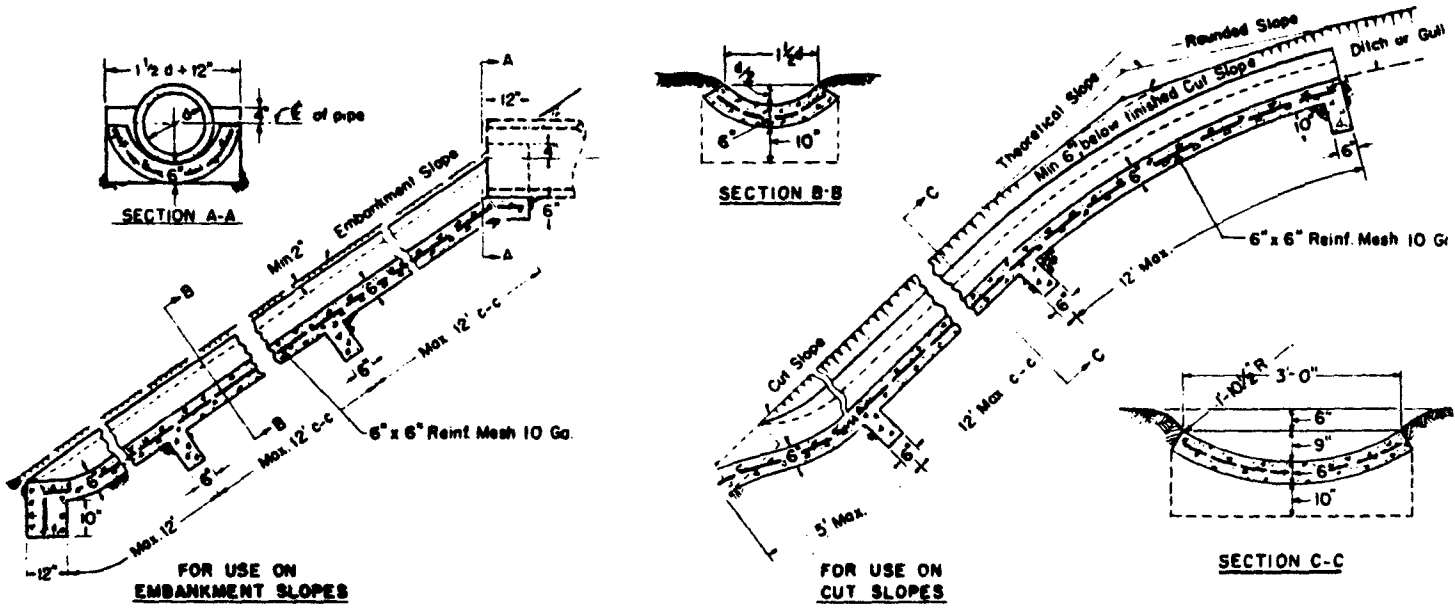


PLYWOOD JT. DETAIL @ FOUNDATION

PLATE 2



MORTARED STONE SPILLWAYS



CEMENT CONCRETE SPILLWAYS

PLATE 3

from water runoff (See plate 3).

- The areas surrounding the Generation Station should be sodded to prevent erosion, particularly on the north and east elevations.

It is interesting to note that a ceramic perimeter drain pipe was installed at the time the Generation Station was constructed, and is still extant, at least in some areas. The pipe does not appear to be functioning at present for the collection and removal of water. Prior to installing a new drainage system, it would be desirable to determine the possibility of reusing (by snaking out any blockage) the present drainage system. Also, it would be desirable to lay new drains in a manner which does not disturb the original pipes.

4. Fenestration and Exterior Trim

Fenestration and trim elements encompass all wood features on the exterior of the Generation Station and include:

- Cornices and bargeboards
- Window sash and frames
- Door frames and transoms
- Louvers

The following procedures apply to all exterior wood elements:

Brush and scrape down all loose, scaling or peeling paint from exterior wood elements.

Repaint all exterior trim, louvers and other wood elements with oil base primer and finish coats. Use brush application.

Window Repairs:

Extant sash in openings 3/101 and 106A should be reglazed as necessary, replacing missing lights with appropriately sized antique glass. All old putty should be removed prior to replacement of lights and the muntins cleaned and primed. Reglaze with glazing compound.

Existing temporary closures applied to the frames should be maintained. All extant sash and frames should be scraped and repainted.

5. Structural System

Masonry: See Section 2 - Masonry, for repair and preservation of brick and stone bearing walls.

Timber Framing (Trussed Roof Construction)

General examination of the trusses during this project phase disclosed no obvious deterioration or failures. However, a closer inspection of the trusses, purlins, and rafters should be made to ascertain deficiencies that could contribute to failure. The areas requiring closer inspection are those that have been exposed to excessive wetness such as wall embedded ends, the contact planes between truss member ends, and the tightness of truss tension members. Disclosure

of deterioration, distress, or loose tension members should be recorded so that those conditions might be evaluated for proper repair procedures. The inspection of embedded ends could be performed following the scaffold erection required for the inner wall face repointing. The scaffolding will also permit accurate measurement of the wall alignments.

While the truss structural analysis indicates that the roof construction is capable of supporting a slate roof, it appears advisible to consider the installation of a structural steel wall bracing system if the additional weight is to be added to the roof, in order to compensate for truss-end bearing eccentricities over the pilasters. Confirmation of such a requirement could be more accurately determined following an assessment of the wall alignments from scaffolding.

6. Infestation

The building should be thoroughly inspected for any and all forms of infestation by a qualified exterminator and treated as necessary.

Annual inspection of the building should be made for possible infestation.

C. Restoration Recommendations

The scope of a long range restoration program for the Generation Station should be compatible with documented evidence of original appearance; i.e., elements of restoration or reconstruction which rely heavily upon conjecture should be strictly avoided. In addition, the restoration work should conform to the establishment of a target restoration date. The significance of the structure lies in its conception and use as a power house for the first trolley line in Washington County, Maryland. Very few building alterations have taken place since the initial construction and the structure appears much as it did in 1896.

The major original exterior features which are no longer extant include the slate roofing, monitor, dormers, and several doors and window sash. The original appearance of many of these features is clearly illustrated in c. 1896-1910 photographs, allowing for reasonably accurate restoration. The photographs which illustrate roof features such as monitor and dormers are supplemented by physical evidence which pinpoints the size and location of each element. Several window frames and sash are extant, which provide models for restoration of the fenestration.

It is recommended that the exterior of the Generation Station be restored to its original appearance, with the possible exception of reconstructing the ell on the north elevation. While the plan size and configuration, materials, height, and roof form are evident, the fenestration, if any, is unknown. The ell should be rebuilt only if substantial documentation and evidence can be uncovered to define its appearance in some detail.

Since no machinery exists within the building, it is not recommended that machinery restoration or reconstruction take place. Substantial conjecture would be necessary in designing appro-

priate equipment. The extant machinery foundations, however, might be exposed for public display.

In regard to interior building fabric, restoration should include the door openings in the transverse partition wall, exterior fenestration, and replacement of deteriorated, missing, or contemporary roof framing members. In addition, restoration would of course involve remedial, stabilization and preservation work described under "Preservation and Maintenance Recommendations."

It is further suggested that the building lends itself to an adaptive public use. The large open spaces, possessing dramatic qualities, should be maintained and made accessible to the public. Direct access to Potomac Street supports the building's potential use as a visitor orientation center. Interior use and furnishings must, however, be of a nature accepting periodic flooding of the lower floor level.

D. Adaptive Reuse Considerations

Both preservation and restoration of the Generation Station are greatly affected by the use to which the building is put. The interior is spacially dramatic and consequently desirable as a public space. However, park needs for additional space may override this preference. In judging the appropriateness of proposed adaptive uses, they must be weighed in terms of their compatibility with the historic structure. In particular, appropriate uses will:

1. Require minimum interior alterations to fabric and divisions of space,

2. Be suitable to both building and tenants in terms of square footage requirements, utility and amenity needs, and

3. Not interfere with adequate access to and circulation within various portions of the building by the public.

Prior to proceeding with restoration work and the final determination of future use, potential adaptive uses should be evaluated for the following:

1. Total floor area required.

2. Approximate number of personnel to be accommodated.

3. Type and area of storage facilities required.

4. Office or other partitioned space required (including number and optimal sizes of offices and their interrelationships).

5. Furnishings requirements, with estimated psf floor loading.

6. Existing fabric removals required.

7. Restroom and other plumbing requirements.

8. Support facilities required; e.g. concession space, lunch-room or locker rooms.

9. HVAC requirements.

10. Code requirements as related to specific use.

11. Electrical and telephone service requirements.

12. Modifications to finishes required (e.g. floor coverings).

13. Portions of building to be designated for yearround use (insulation/heating).

14. Accommodation of visitor access and circulation.

15. Compatibility with periodic flooding situation.

In addition to building requirements, the development of surrounding National Park Service lands will have a bearing on the use and restoration of the Generation Station. It would be beneficial to resolve many of the following points relating to the overall Williamsport site prior to adapting portions of the Generation Station for new uses. Such uses should be evaluated in terms of their compatibility with plans for the site as a whole.

1. Develop comprehensive land use and acquisition plan with priorities and phasing.

2. Establish future requirements for maintenance barns and/or maintenance vehicle parking.

3. Plan locations for visitor and staff parking.

4. Project future spatial requirements for offices (including field offices, relocation of Seneca offices, etc.), and other park related facilities.

5. Develop optimal pedestrian and vehicular circulation plans including:

   a. Major points of access/egress.

   b. Separation of pedestrian and vehicular traffic.

   c. Areas to be open to visitors.

   d. Options for pedestrian/vehicular crossing of restored canal.

6. Develop restoration-reconstruction programs for Canal, including:

   a. Rewatering.

   b. Use of canal boats.

   c. Reconstruction of turning basin and/or wharves.

   d. Restoration of railroad spurs.

7. Evaluate other available building spaces and sites for park personnel and visitor use.

E. Utility, Security and Fire Protection Systems

The introduction and/or modification of utility, security and fire protection systems will depend largely upon the future use of the Generation Station. To the greatest degree possible, new systems should be designed to have minimum impact upon the historic structure, i.e., concealed, with minimal demolition of historic fabric. Such work need not take place as part of a preservation program, but should be considered if, and when, the Generation Station is restored and/or put to an adaptive use involving regular occupancy.

No utilities presently exist within the structure, and none are proposed within a preservation-oriented program of maintenance. The lack of heat within the structure presents no major threat to preservation so long as the building is made structurally sound and watertight.

Wood framing consists primarily of roof truss systems. The balance of the structure is masonry, devoid of interior trim. Consequently, a fire protection system is not necessary at present, unless substantial quantities of combustible materials are to be stored on a regular basis in this facility.

Present security is adequate.

APPENDICES

APPENDIX A: LIST OF RECORD DRAWINGS (NOT INCLUDED)

The following drawings were measured and delineated during the period of November, 1977 to January, 1978, by the staff of John Milner Associates, Architects and Planners, West Chester, Pennsylvania.

GENERATION STATION
Williamsport, Maryland
Record Drawings

Sheet No.	Description
1	Location and Vicinity Plans, Sheet Index
2	First Floor Plan @ 1/4" = 1'-0"
3	South and East Elevations @ 1/4" = 1'-0"
4	North and West Elevations @ 1/4" = 1'-0"
5	Transverse and Partial Longitudinal Sections @ 1/4" = 1'-0"
6	Miscellaneous Details Including: window and door details.

APPENDIX B: PRELIMINARY PRESERVATION DRAWINGS

GENERATION STATION
Williamsport, Maryland

Sheet No.	Description
1	Location and Vicinity Plans, Sheet Index
2	First Floor Plan @ 1/4" - 1'-0"
3	South and East Elevations @ 1/4" = 1'-0"
4	North and West Elevations @ 1/4" = 1'-0"
5	Transverse and Partial Longitudinal Sections @ 1/4" = 1'-0"

In addition to the above drawings, the following sketches regarding preservation techniques and details are included within the body of this report.

Plate No.	Description
1	Brick Pointing Detail
2	Drainage Detail
3	Stone Spillway Details

APPENDIX C
OUTLINE SPECIFICATIONS

CHESAPEAKE AND OHIO CANAL
NATIONAL HISTORICAL PARK

BASIC AGREEMENT NO. CX-2000-8-0019

WORK DIRECTIVE NO. 8-0019-78-05

Preservation of the

GENERATION STATION

OUTLINE SPECIFICATIONS

prepared by

John Milner Associates
West Chester, Pennsylvania

April 25, 1978

TABLE OF CONTENTS

Outline Technical Specifications

Section	Description
01564	Pest Control
02221	Excavation, Trenching, and Backfilling
02502	Foundation Drainage
02547	Mortared Stone Spillways
02822	Sodding
03306	Concrete
04520	Masonry Restoration
06100	Rough Carpentry
06200	Finish Carpentry
06300	Wood Treatment
07160	Bituminous Dampproofing
07601	Flashing and Sheet Metal
07951	Sealants and Caulking
08800	Glazing
09901	Painting and Other Finishing

1. Work includes thorough inspection of entire structure and treatment, as required, for all forms of infestation. All work by qualified exterminator.

2. Submit certification of treatment.

3. Repeat annually.

1. Work includes:

   A. Excavation, trenching and backfilling for foundation drainage system.

   B. Excavation for stone or concrete spillways at termination of solid wall drainage pipes.

2. Porous fill shall be coarse, washed gravel or crushed stone, 1 to 2 inch size.

4. Excavate for foundation drains along east, west and south walls. Backfill with porour fill after installation of perforated drain pipes and protection boards.

5. Trench for solid wall drain pipes. Backfill, finishing and removed topsoil.

1. Work includes:

   A. Perforated drainage pipe at east, west and south walls of the Generation Station.

   B. Solid wall drainage pipe to outfall at spillways.

   C. Standard fittings at couplings and angles.

2. Pipe: Bituminized fiber pipe, ASTM D2311.

1. Work includes mortared stone spillways at outfall of solid wall drainage popes. (Alternate to cement concrete spillways.)

2. Stone: Sound, free from structural defects and foreign substances, not less than 3 inches thick, of a length not less than 3 times the thickness and of a width of at least 10 inches.

3. Mortar Materials:

   A. Portland Cement: ASTM C150.

   B. Fine Aggregate: ASTM C144.

   C. Water: Potable

4. Mortar Mix: Mortar shall be composed of one part cement and two parts fine aggregate and mixed with sufficient water to form a plastic composition.

1. Work includes sodding of the perimeter of the Generation Station from the outer edge of drainage trenches or building face as applicable, to a distance of not less than 10 feet from the building line.

2. Sod: Local sod, free of weeds and undesirable native grasses.

1. Work includes concrete spillways at outfall of drainage pipes. (Alternate.)

2. Concrete: ready-mix, 3,300 psi at 28 days.

3. Welded wire fabric: ASTM A185.

1. Work Includes:

   A. Careful removal of bituminous and metal flashing from north wall.

   B. Careful inspection of all brick masonry.

   C. Resetting of sound brick which has become loose or misaligned, or which is affected by the repair of adjacent areas.

   D. Replacement of brick:

      1) Which is missing.

      2) The face of which is damaged to the extent that the soft inner body is exposed to the weather.

      3) Which contains major cracks associated with wall separation, bowing or settling.

      4) Which is non-original, incongruous in size, shape, color, texture or hardness and which is also a causative factor in the deterioration of adjacent areas.

   E. Careful inspection of foundation stone exposed by trenching.

   F. Replacement of foundation stone which is missing or seriously cracked, based on guidelines similar to those for brick, above.

   G. Addition of mortar wash to projecting stone foundation.

   H. Complete repointing of exterior brick masonry.

   I. Complete repointing of interior brick masonry.

   J. Patch pointing of foundation stone, as required.

2. New brick shall match range of existing original brick as closely as possible in terms of size, shape, color, texture and hardness. Submit samples.

3. New stone shall match existing original limestone in type, size, shape, dressing and placement. Submit samples.

4. Mortar shall be a flexible lime/sand mortar, tan in color, with minimal portland cement content. In no case shall the ratio or portland cement to lime be greater than 1 to 3. Adjust proportions of mix to achieve color and texture as directed by Architect. Submit samples.

   A. Hydrated lime: ASTM C207, Type S.

   B. Portland cement: Nonstaining white cement, ASTM C150, Type 1.

   C. Sand: Brown bar sand.

   D. Water: Potable.

5. Remove all pointing and mortar on both exterior and interior of Generation Station to a minimum depth of 1-1/2" to sound material, whichever is greater. Remove mortar from all areas patched with portland cement or other hard, brittle mortar. Remove using hand methods only; the use of power tools is strictly prohibited.

6. Repoint to indicated profile.

1. Work Includes:

   A. Structural scabs, shims and helper beams, as required.

   B. Plywood protective boards, with battens, in building perimeter drainage trenches.

   C. Careful removal and reinstallation of temporary window and door coverings, as required for painting of extant original frames and sash.

2. Structural members shall be Select Structural Grade Douglas Fir (WCLB or WWPA) or Southern Pine (SPIB), 19 percent maximum moisture content.

3. Plywood shall be exterior grade.

1. Work Includes:

   A. Repair/replacement of miscellaneous split, broken, deteriorated or missing exterior trim.

   B. Resetting of indicated window and door frames as needed.

   C. Resetting of loose, extant trim as needed.

   D. Addition of insect screening to back of existing louvers.

2. Match extant original sizes and profiles.

3. Match original species (white pine). Moisture content shall approximate that of the wood being patched or repaired.

4. Plywood shall be exterior grade.

5. Insect screening shall be stainless steel or bronze mesh.

6. Resorcinol glue shall be equal to "Elmer's Waterproof Glue", Bordon, Inc.

7. Cut out and remove defective areas. Cut edges to a clean miter. Install new dutchmen and splices using glue and finishing nails. Set nail head and putty.

1. Work Includes:

   A. Treatment of all exposed interior and exterior wood.

   B. Treatment of all new structural wood elements, including scabs, shims and helper beams.

2. Preservative: "Woodlife Clear".

3. Protect glass and other adjacent surfaces during application.

4. Treat exterior wood with brush or spray application.

5. Treat new structural wood with brush, spray or (wherever possible) minimum three minute dip application.

1. Work includes in-place dampproofing of plywood protective boards in building perimeter drainage trenches.

2. Manufacturer's standard asphalt and water emulsion, semi-fibrated, semi-mastic type.

3. Protect adjacent masonry surfaces.

4. Brush on at the rate of one gallon per 20 sq. ft. (Spray application prohibited.)

1. Work Includes:

   A. Inspection of all roofing and flashing:

      1) Identification of metal(s).

      2) Location of problem areas.

   B. Remedial waterproofing measures:

      1) Patch repairs.

   C. Miscellaneous flashings, including:

      1) Temporary flashing of plywood protective boards in portions of building perimeter drainage trenches.

2. Sheet metal for repair work shall be the same as the metal being repaired, or shall be close to it on the electrolytic scale.

3. Sheet metal for miscellaneous flashings shall be cold rolled copper sheet complying with ASTM B 370, 16 ounces per square foot, lead coated (0.06 pounds per square foot). Flashings indicated as "temporary" may be sheet aluminum.

4. Plastic roof cement shall be asbestos-fibered, asphalt based, Fed. Spec. SS-C-153B, Type 1, Class A and B.

5. Asphalt impregnated joint tape.

1. Work includes caulking of:

   A. Perimeter of window and door frames in masonry walls.

   B. Flashing reglet in brick masonry directly above plywood protective boards.

2. Caulking compound: Oil-based, synthetic resin caulking compound, Fed. Spec. TT-C-598.

1. Work Includes:

   A. Replacement of missing and broken lights in transom of Opening 3/101 and Window 106A.

   B. Replacement of all deteriorated putty and glazing compound.

2. Glass: Genuine antique window glass in appropriate sizes.

3. Oil-based face glazing compound: Fed. Spec. TT-G-410.

1.

A. Surface preparation and painting or other finishing of:

1) Extant doors, sash, frames, trim and temporary window coverings.

2. Painting and finishing system:

1st Coat -- Primer undercoat (Fed. Spec. TT-P-25).
2nd Coat -- Exterior oil paint (Fed. Spec. TT-P-105, off-white.)
3rd Coat -- (Repeat 2nd Coat, if required).

APPENDIX D: IDENTIFICATION OF WOOD SAMPLES - GENERATION STATION

Sample No.	Description	Identification of Species
1	Window - exterior backband	white pine
2	Window - muntin	white pine

Laboratory analysis of wood samples was conducted by the Center for Wood Anatomy Research, U. S. Forest Products Laboratory, Madison, Wisconsin.

Note: Paint colors are keyed to Munsell Color System

	ROOM NO.	BASE COAT	1st COLOR	2nd COLOR	3rd COLOR	4th COLOR	5th COLOR	6th COLOR	7th COLOR	8th COLOR	9th COLOR
EVIDENCE	Exterior trim		10YR 7/6	off white	(Note:	traces of red exist between these two coats)					
COMMENTS	(brush application required)										
	Approximately commercial match to Munsell 10YR 7/6= MAB - "Golden Buff"*										
	No. 3-12D semi-gloss oil base										

	ROOM NO.	BASE COAT	1st COLOR	2nd COLOR	3rd COLOR	4th COLOR	5th COLOR	6th COLOR	7th COLOR	8th COLOR	9th COLOR
EVIDENCE											
COMMENTS	*The tan-ochre first coat varies in shade between samples.										
	Light to yellow range commercial match= Pittsburgh Paints - "Gold Dust"										
	Dark to tan range commercial match = Martin Senour - "Ludwell Tenement Gold" - W1078										
	Light to tan range commercial match = Finneran and Haley - "Todd House Yellow"										
	Best average color approximation in commercial match= MAB - "Golden Buff" - 3-12D										

APPENDIX F: PRELIMINARY STABILIZATION COST ESTIMATES

The following cost estimates relate to the major work items described in Section IV. B., "Preservation and Maintenance Recommendations", and are preliminary in nature.

1. Masonry repairs and repointing (both exterior and interior)	$41,000.00
2. Perimeter Drainage System	$ 4,800.00
3. Stone spillways (2)	$ 6,000.00
4. Painting	$ 1,200.00
5. Caulking and reglazing	$ 800.00
Total	$53,800.00

APPENDIX G: PHOTOGRAPHS

HISTORICAL VIEWS

Plate No.

A-1 C. 1896 view of Generation Station from South (during construction).

A-2 C. 1900 view of Generation Station and Cushwa Warehouse from South.

A-3 C. 1900-1928 view of Generation Station and Cushwa Warehouse from west bank of turning basin.

CONTEMPORARY VIEWS (November, 1977)

A-4 Generation Station and Warehouse from Southeast.

A-5 Generation Station and Warehouse from West.

A-6 Generation Station from Southwest.

A-7 Generation Station - South elevation (facade).

A-8 Generation Station - West elevation.

A-9 Generation Station - East elevation.

A-10 Generation Station - partial North elevation (Eastern section).

A-11 Generation Station - partial North elevation (Western section).

APPENDIX G: (cont'd.)

A-12 Generation Station - North elevation from Northwest.

A-13 Generation Station - Truss System in Eastern section.

A-14 Generation Station - Truss System in Western section.

A-15 Generation Station - Archeological Pit @ East elevation.

APPENDIX H:
PRELIMINARY PRESERVATION DRAWINGS



PLATE A-1

PLATE A-2

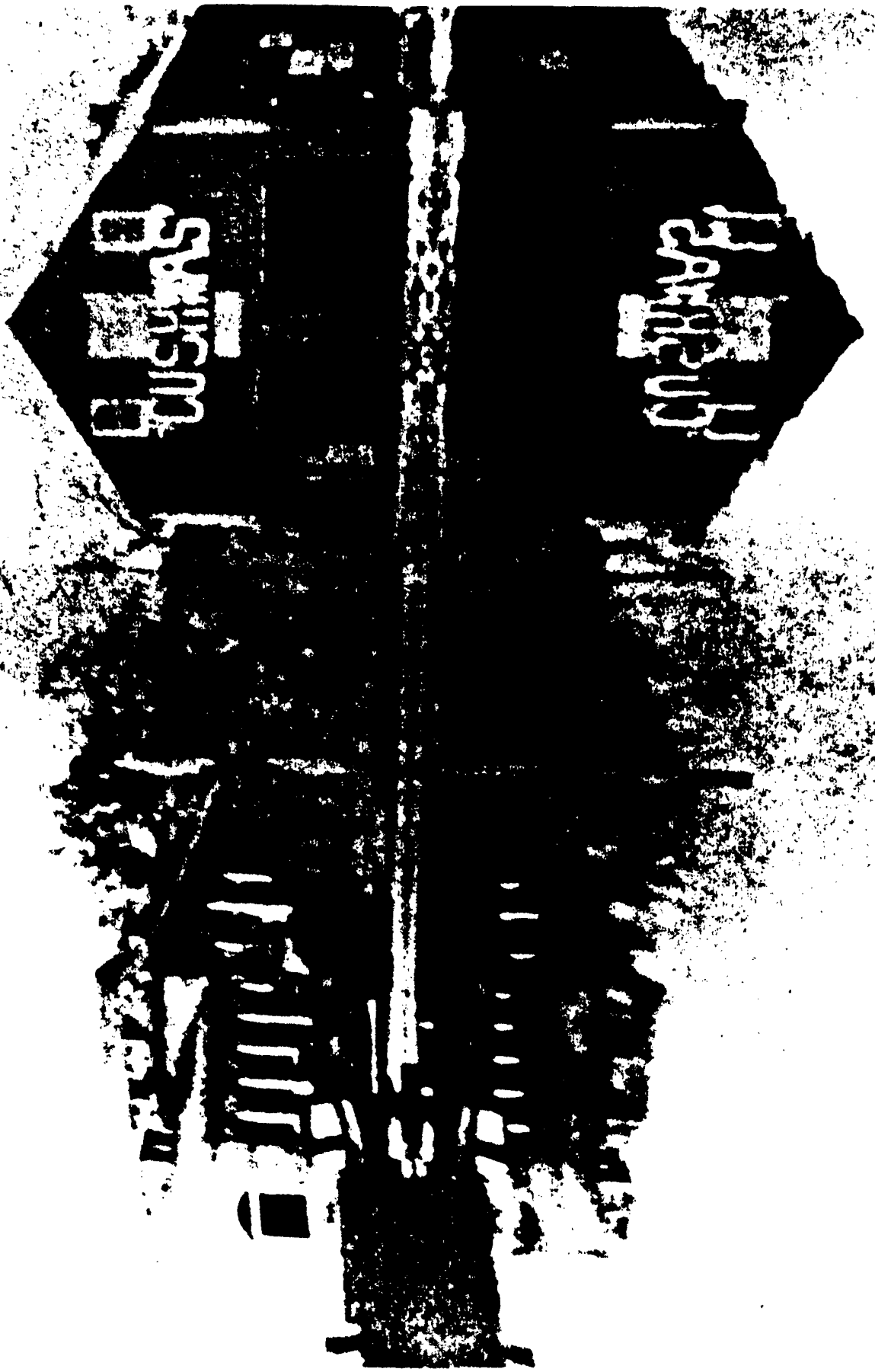


PLATE A-3

PLATE A-4

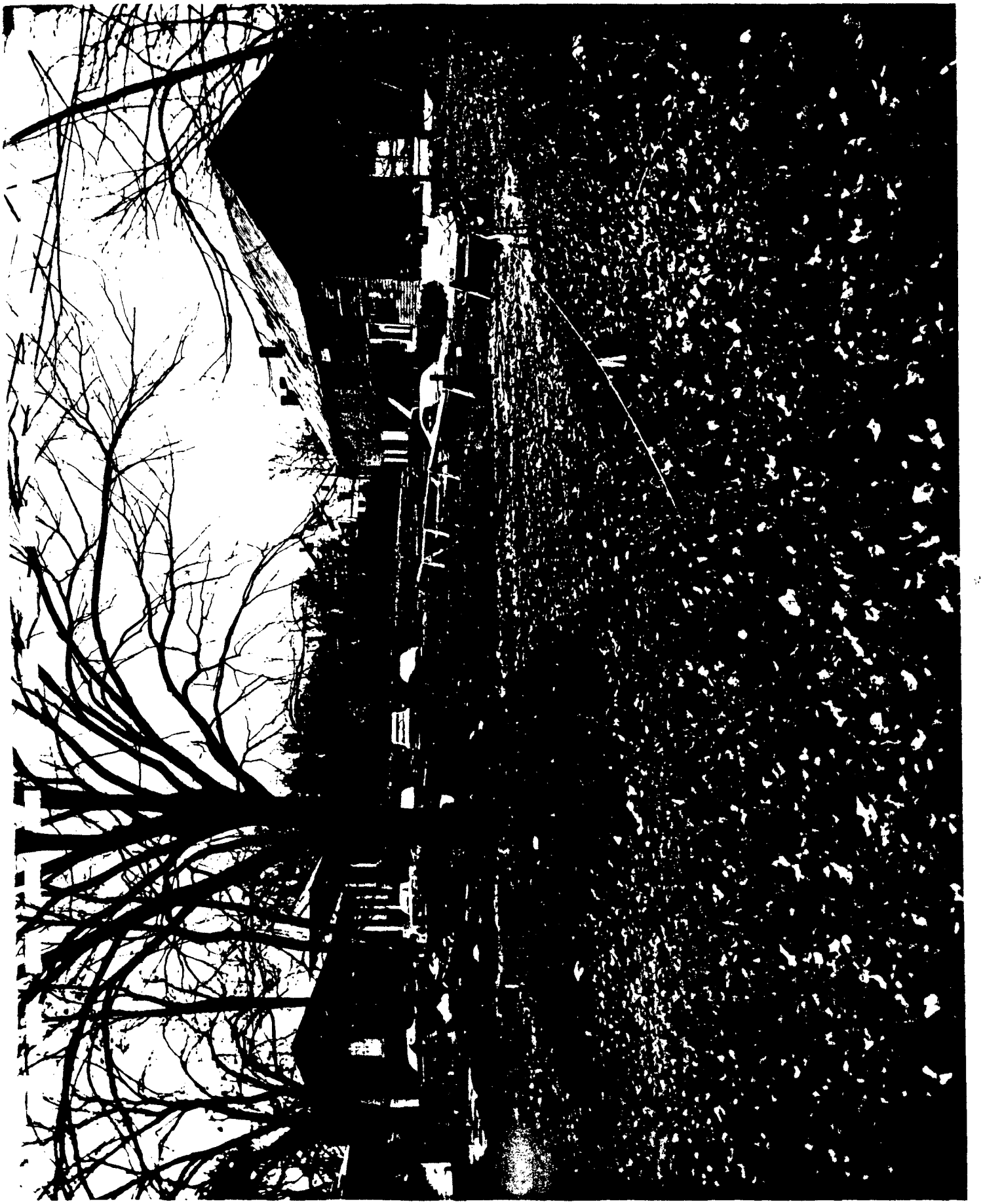


PLATE A-5

PLATE A-6

PLATE A-7

PLATE A-8



PLATE A-9



PLATE A-10

PLATE A-11

PLATE A-12

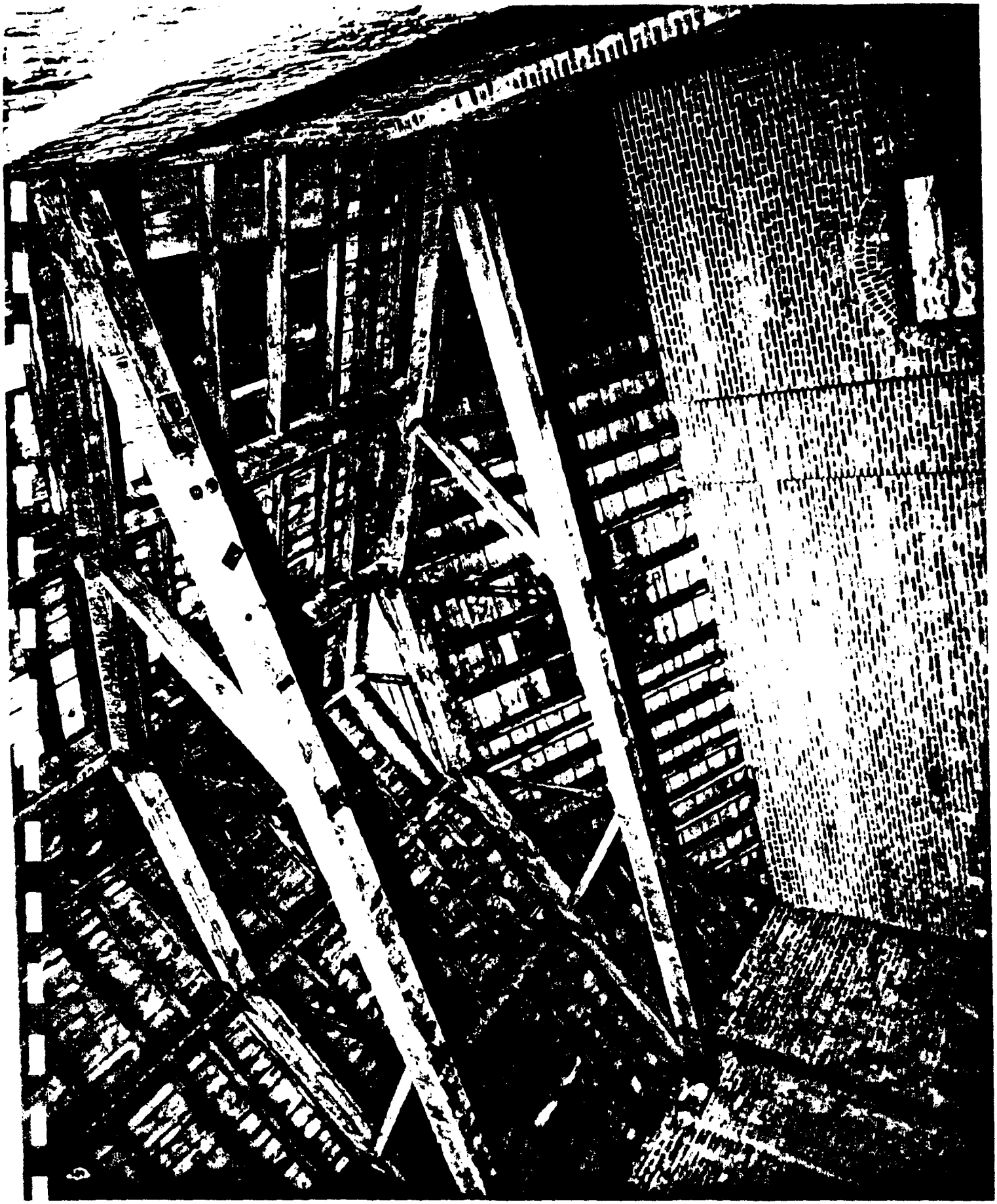


PLATE A-13



PLATE A-14

PLATE A-15