**Ohio and Erie Canal**
**Cuyahoga Valley National Park**
**Ohio**

# Ohio and Erie Canal History and Historic Structure Assessment

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For:
Friends of the Crooked River
and
Cuyahoga Valley National Park

# FOREWORD

The preparation of a Historic Structure Report (HSR) for the Ohio and Erie Canal has been a goal for the National Park Service since the creation of the Cuyahoga Valley National Recreation Area in 1974 and Cuyahoga Valley National Park in 2000, listed as such in the Park's Foundation Document, Resource Management Plan, and other planning documents. NPS historians and others have compiled numerous studies and surveys pertaining to the canal and its component structures within the Park, most notably the *Historic Structure Report: History Section for the Ohio and Erie Canal* (Unrau and Scrattish 1984) and the *(Draft) Historic Structure Report: Administrative and Architectural Data Sections* (Cossell 1993). Cossell's report was never completed or approved and remains available only in draft form.

An opportunity to move forward with the HSR was presented by the Cuyahoga River Ecosystem Restoration Canal Diversion Dam Project which will remove the Brecksville Diversion Dam and Pinery Dam in the Cuyahoga River. A Memorandum of Agreement executed by the Ohio EPA, the National Park Service, Cuyahoga Valley National Park, and the Ohio State Historic Preservation Officer, includes the stipulation: "NPS and Ohio EPA will update a draft Historic Structures Report (HSR) for the Ohio and Erie Canal within the Park to HSR standards as a precursor to a full Cultural Landscape Report (CLR) to mitigate the adverse effects to the larger canal landscape by guiding the long-term management of the resource."

The purpose of this *Ohio and Erie Canal History and Historic Structure Assessment* is to consolidate and update information from previous studies in a single document that will guide future management of canal-related resources in the Park. It provides a comprehensive history and inventory of canal structures with some general treatment recommendations as mitigation for the removal of the river dams. It integrates the disparate and sometimes contradictory information contained in previous studies, updates the historical sections to reflect the results of recent scholarship and current NPS standards, updates the architectural section to reflect changes in conditions that have occurred during the 25 years since Cossell's survey, and expands her survey to include other types of canal structures for which NPS has management responsibilities.

Preparation of this document was funded by Ohio EPA and administered by Friends of the Crooked River. It is not intended to be a comprehensive treatment plan. Like Cossell's 1993 draft HSR, it presents a general approach for dealing with the abandoned canal structures and offers guidance to be used in developing individual long-term treatment plans. The ultimate treatment and associated detailed technical specifications for each structure type will follow the completion of a CLR for the canal corridor. The CLR will be the comprehensive treatment document for the canal and its many features and will identify an overall treatment strategy for the canal corridor based on SOI Standards and Park/visitor needs. The Park will seek project funding to produce treatment guidelines to guide the implementation of treatment and maintenance requirements for landscape characteristics and historic structures in the canal corridor. All projects will follow the process for regional 106 review and the standard four-step consultation process with the Ohio SHPO. The Park will coordinate the findings of this assessment with the Ohio SHPO, resulting in a conclusive determination of eligibility for all associated structures within the canal corridor and then use the results of this coordination to update the NPS cultural resource database.

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# MANAGEMENT SUMMARY

## Purpose and Scope

The preparation of a Historic Structure Report (HSR) for the Ohio and Erie Canal has been a goal for the National Park Service since the creation of the Cuyahoga Valley National Recreation Area in 1974 and Cuyahoga Valley National Park in 2000, listed as such in the Park's Foundation Document, Resource Management Plan, and other planning documents. The first steps toward achieving this goal occurred in 1984 when NPS historians Harlan Unrau and Nick Scrattish completed a document titled *Historic Structure Report: History Section for the Ohio and Erie Canal*, which essentially comprised Parts 1A and 1B of a comprehensive HSR. A product of extensive research among primary sources, it provided an in-depth account of the evolution and impact of the canal. In 1993 NPS historic architect Paulette Oswick Cossell prepared a *(Draft) Historic Structure Report: Administrative and Architectural Data Sections*, which presented descriptions and condition assessments for most concrete and stone masonry canal structures in the Park and offered general recommendations for treatment. It comprised Part 1C and Part II of a comprehensive HSR. Cossell's document however was never completed or approved and remains available only in draft form.

During the 45 years since the creation of the recreation area, NPS historians and others have compiled numerous studies and surveys pertaining to the Ohio and Erie Canal and its component structures within the boundaries of Cuyahoga Valley National Park. The completion of a comprehensive HSR however remained an elusive goal. An opportunity to move forward occurred with the Cuyahoga River Ecosystem Restoration Canal Diversion Dam Project which will remove the Brecksville Diversion Dam and Pinery Dam in the Cuyahoga River in order to restore stream flow and enhance the riparian ecosystem. A Memorandum of Agreement stipulated that the existing draft HSR be updated as one of several measures to mitigate the project's adverse effects on historic properties. The group Friends of the Crooked River contracted with Heberling Associates, Inc. to perform this work, which was funded by the Ohio Environmental Protection Agency. Scott D. Heberling, MA, project historian and historical archeologist, was responsible for background research, field survey, and report preparation.

The purpose of this *Ohio and Erie Canal History and Historic Structure Assessment* is to consolidate and update information from previous studies in a single document that will guide future management of canal-related resources in the Park. The document integrates the disparate and sometimes contradictory information contained in previous studies, updates the historical sections to reflect the results of recent scholarship on the Ohio and Erie Canal and current NPS standards, updates the architectural section to reflect changes in conditions that have occurred during the 25 years since Cossell's survey, and expands her survey to include other types of canal structures for which NPS has management responsibilities.

The report is divided into two main parts: Part I *Developmental History* and Part II *Treatment and Use*. Part I has three sections: 1A, *Historical Background and Context*, derived mainly from the 1984 work by Unrau and Scrattish but substantially edited and updated to include the results of recent scholarship; 1B, *Chronology of Development and Use*, again derived mainly from the work by Unrau and Scrattish; and 1C, *Physical Description and Condition Assessment*, essentially an updated and expanded version of the 1993 work by

Cossell. Part II presents the *Ultimate Treatment and Use* for the canal and its component structures based on the Park's internal planning documents; *Requirements for Treatment*, summarizing the NPS Standards for Preservation and Standards for Restoration; and *Recommendations for Treatment*.

This *Ohio and Erie Canal History and Historic Structure Assessment* is not intended to be a comprehensive treatment plan. Like Cossell's draft HSR, it presents a general approach for dealing with the abandoned canal structures and offers guidance to be used in developing individual long-term treatment plans. The ultimate treatment and associated detailed technical specifications for each structure type will follow the completion of a Cultural Landscape Report (CLR) for the canal corridor. The Park will seek project funding to produce treatment guidelines to guide the implementation of treatment and maintenance requirements for landscape characteristics and historic structures in the canal corridor.

**Historical Overview**

The Ohio and Erie Canal, a 308-mile inland waterway, was constructed to link Lake Erie at Cleveland with the Ohio River at Portsmouth. The canal provided the first viable means of transportation to develop the interior of the state of Ohio and the western frontier of the United States. The opening of the northern division of the canal in 1827 was the catalyst for development of the Cuyahoga Valley. The canal was a key link in the transportation network of northeastern Ohio and served as the major route of travel and communication through the Cuyahoga Valley for several decades.

The Cuyahoga Valley reached the apex of its importance as a transportation corridor between 1827 and 1840. Interregional competition from the proliferation of new canal routes during the 1840s and the construction of Ohio's railroad system in the 1850s ultimately led to the canal's demise. By 1860 it was clear that canals could not compete against the greater flexibility and speed of the railroads. The canal system experienced a long period of decline prior to the devastating flood event of March 1913 that ended Ohio's canal era once and for all. The Ohio and Erie Canal from Akron north to Brecksville was totally destroyed by the 1913 flood. The segment from Brecksville north to Cleveland was considered salvageable and, although abandoned as a transportation route, was retained as an industrial water supply.

Approximately 22 miles of the Ohio and Erie Canal passes through the Cuyahoga Valley National Park, following the course of the Cuyahoga River between Akron and Cleveland (Figure 1). The northern 6 miles of canal in the park, from Rockside Road to Route 82, remain in a watered condition, supplied with water by the Brecksville Dam (1951) and a short feeder located near Route 82. The southern 16 miles of canal within the park are no longer watered, but the prism and towpath are still easily discernible for most of the distance. Both the watered and unwatered sections of canal include the remains of numerous historic structures such as locks, aqueducts, culverts, and waste weirs, all linked by the canal prism and towpath. The watered section contains 12 extant canal structures in addition to the prism and towpath, and the unwatered section contains 35 extant structures plus the prism and towpath. The relatively narrow valley, with its steep walls, has discouraged commercial and residential development, and this segment of the canal, abandoned in 1913, lies practically undisturbed.

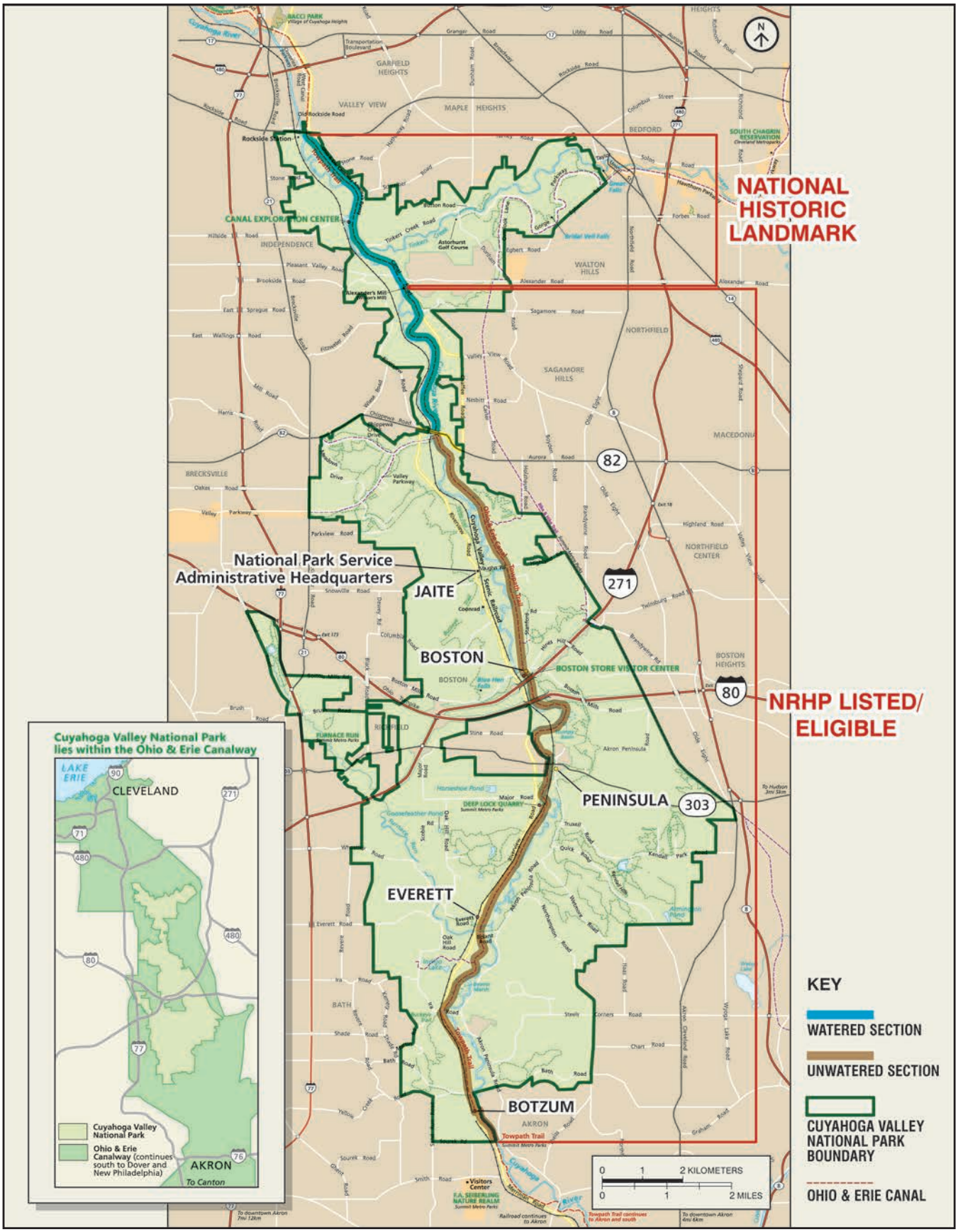


Figure 1. Map of Cuyahoga Valley National Park showing the Ohio and Erie Canal (*Source for base map:* National Park Service)

## Statement of Significance

The Ohio and Erie Canal was one of the most important of America's 19th century canals, operating as a navigation system from 1827 to 1913. It originally was conceived as an extension of New York State's Erie Canal, part of a system that connected New York City and the eastern seaboard with the western and southern states via Lake Erie and the Hudson, Ohio, and Mississippi Rivers. It employed much of the same technology that already had been tested successfully on New York's Erie Canal. For these reasons the Ohio and Erie was in large measure conceived, promoted, financed, designed, and constructed by New Yorkers. When completed it provided a source of raw materials and agricultural produce for east coast cities and a ready market for the manufactured goods they produced, creating an interrelated regional economy. The Ohio and Erie connected a formerly poor and remote frontier region to distant cities and markets, establishing the foundation for Ohio's industrial, commercial, and political development. Although navigation ended with the devastating flood of 1913, numerous remnants of the canal in the Cuyahoga Valley still survive and retain integrity. The entire canal section in Cuyahoga Valley National Park is listed in the National Register of Historic Places, and the northern portion was designated a National Historic Landmark (NHL) in 1966; the NHL boundaries were expanded in 1983.

## Methodology

Although the HSR drafts by Unrau and Scrattish (1984) and Cossell (1993) provide a solid foundation, the present document required extensive new work including file review, historical research, and field survey. The author examined Cuyahoga Valley National Park's Resource Management Division files, which contain internal correspondence, survey data, maps, and original construction plans relating to the canal, and also the collection of planning documents, technical reports, and real estate records housed at the Park's Hawkins Library. Several days were spent at the Ohio History Center in Columbus, examining the annual reports, engineers' reports, surveys, maps, engineering drawings, and other records of the Ohio Board of Canal Commissioners and Ohio Board of Public Works. The Louis Baus Canal Photograph Collection and the Canal Society of Ohio Collection at the University of Akron, Archival Services, and historic photographs available on the *Summit Memory* website proved to be very important. All primary sources of information are listed in the References section of this report.

We reviewed several important canal histories published during the 34 years since Unrau and Scrattish prepared their *History Section for the Ohio and Erie Canal.* These include *Ohio's Grand Canal: A Brief History of the Ohio and Erie Canal*, Terry K. Woods (2008) and *Canal Fever: The Ohio and Erie Canal from Waterway to Canalway*, Lynn Metzger and Peg Bobel, eds. (2009). There also have been two published collections of historic canal photographs: *Ohio and Erie Canal*, Boone Triplett (2014), and *A Photo Album of Ohio's Canal Era, 1825-1913*, Jack Gieck (1998).

Most of the field survey was completed during October-December 2017, with limited supplemental survey performed in March 2018 and July 2018. The survey proceeded from south to north through the Park. The author visually inspected, described, photographed, and mapped all extant canal structures with a level of documentation similar to that employed by Cossell in her 1993 draft HSR. Each structure was visually inspected during the field survey

and assigned a condition to define the treatment needs and techniques necessary to meet *The Secretary of the Interior's Standards for the Treatment of Historic Properties*. No physical tests of structures or materials were made. Only extant navigational and water control structures of earth, wood, stone, and concrete are included in the field survey and report. Buildings, even if associated with the canal, are not included. This report also does not include archeological sites associated with the canal, such as boatyards, dry docks, and former water control structures.

**Recommendations for Treatment**

*The Secretary of the Interior's Standards for the Treatment of Historic Properties* (SOI Standards) describe four broad treatment approaches that may be applied to historic properties: Preservation, Rehabilitation, Restoration, and Reconstruction.

> ***Preservation*** is defined as the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction.
>
> ***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.
>
> ***Restoration*** is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period.
>
> ***Reconstruction*** is defined as the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.

Treatment of the Ohio and Erie Canal in Cuyahoga Valley National Park will be guided by the historic preservation objectives defined in Park planning documents and by the SOI Standards. The planning documents establish the historic preservation objective (Ultimate Treatment and Use) for structures along the unwatered section of canal as *Preservation*. For structures along the watered section of canal the historic preservation objective is a combination of *Preservation* and *Restoration*.

Although no longer water-charged, the unwatered section of the canal is still discernible as a formerly navigable waterway. Taken as a group, the abandoned and deteriorated structures retain enough form and material to convey their original use and function. Although historical documentation and existing materials, features, finishes, and evidence of construction techniques/craftsmanship are sufficient to permit accurate restoration, such treatment would not be in accordance with established criteria for restoration projects outlined in NPS policies and guidelines. Restoration of these structures is not essential for public understanding and

appreciation of the Park's historical and cultural associations. The existing condition of the structures along the unwatered portion of the canal allow for satisfactory protection, maintenance, use, and interpretation, and they also convey a desirable sense of evolution reflecting the abandonment of the canal and the subsequent decline of structural components. Adequate interpretation of these structures can be imparted through preservation alone.

The recommended level of treatment for locks in the watered section is restoration. Lock No. 38 already has been restored to its 1907 appearance and interpretation focuses on the latter part of the canal's period of significance following the 1905-1906 reconstruction of the northern division. Restoration of Locks Nos. 37 and 39 to their 1907 appearance and function would allow for the integrity of the locks to be preserved while returning the structures to operational condition. Restoration to this period will permit the preservation or stabilization of concrete wall surfaces, an alteration of historical value which conveys a desirable sense of evolution, and minimize removal of existing fabric. Sufficient historic documentation and existing materials, features, finishes, and evidence of construction techniques/craftsmanship exists to accurately reconstruct missing or severely deteriorated elements. The results will not only increase the life of the structures and their value as a cultural resource but also provide a beneficial contribution to the historic scene thereby enhancing the historic integrity of the National Historic Landmark. Except for the Pinery Dam which is scheduled to be removed in summer 2019,[1] the recommended level of treatment for all other structures in the watered section (waste structures, feeder, mudcatcher, prism, and basins) is preservation. There have been no major alterations to any of them since their construction. Preservation will permit the retention of historic features and minimize the removal of existing fabric.

For all structures where preservation is the preferred approach, recommended treatment is divided into two categories: *immediate preservation* and *long-term preservation*. Work recommended as immediate preservation is aimed at reducing the rate of deterioration by limiting deleterious factors such as the growth of invasive vegetation, water infiltration, natural weathering, and visitor use. This can be achieved through a program of routine maintenance and limited intervention. The discussion on long-term preservation presents concepts to guide a program which will manage, passively or actively, the inherent decline of the structures. It must be recognized that natural deterioration can only be slowed, not stopped completely. It is recommended that a specific treatment plan for each individual structure be developed by park planners in accordance with the general methodology and preservation concepts outlined here. This should occur following the completion of a proposed Cultural Landscape Report (CLR) for the canal corridor.

1. The original Pinery Dam was constructed in 1827 to supply water to the canal section north of the Pinery Narrows. It was rebuilt or repaired many times during the canal's period of significance. In 1951 it was replaced by the Brecksville Diversion Dam, which continued to supply water to the canal for industrial purposes, but the Pinery Dam still remains in place, submerged in the pool behind the newer concrete dam. Both dams will be removed in connection with the Cuyahoga River Ecosystem Restoration, Canal Diversion Dam Project, designed to restore stream flow and enhance the riparian ecosystem.

# ADMINISTRATIVE DATA

## Locational Data

*Name:* Ohio and Erie Canal

*Location:* Cuyahoga Valley National Park, Cuyahoga County and Summit County, Ohio
(Grid points refer to center line of canal at north and south boundaries of Park).

| | | |
|---|---|---|
| *UTM Coordinates:* | S | 17.451916.4582635 |
| | N | 17.447516.4582635 |
| *Latitude/Longitude:* | S | 41.159126 / -81.573090 |
| *Coordinates:* | N | 41.393535 / -81.627812 |

*Identification Numbers:*

IDLCS equates to Resource ID and HS# equates to Structure ID in the CRIS (Cultural Resource Inventory System) which replaced the LCS and CLI in 2019. Feature ID numbers are derived from the 2009 Cultural Landscape Inventory.

| | | |
|---|---|---|
| Lock No. 24: | IDLCS: | 011149 |
| | LCS Structure No.: | HS-102 |
| | Feature ID No. | 104526 |
| Lock No. 25: | IDLCS: | 011150 |
| | LCS Structure No.: | HS-103 |
| | Feature ID No. | 104527 |
| Lock No. 26: | IDLCS: | 011151 |
| | LCS Structure No.: | HS-104 |
| | Feature ID No. | 104528 |
| Lock No. 27: | IDLCS: | 011153 |
| | LCS Structure No.: | HS-106 |
| | Feature ID No. | 104529 |
| Lock No. 28: | IDLCS: | 011154 |
| | LCS Structure No.: | HS-107 |
| | Feature ID No. | 104530 |
| Lock No. 29: | IDLCS: | 011157 |
| | LCS Structure No.: | HS-110 |
| | Feature ID No. | 104531 |

| | | |
|---|---|---|
| Lock No. 30: | IDLCS: | 011158 |
| | LCS Structure No.: | HS-111 |
| | Feature ID No. | 104532 |
| Lock No. 31: | IDLCS: | 011159 |
| | LCS Structure No.: | HS-112 |
| | Feature ID No. | 104533 |
| Lock No. 32: | IDLCS: | 011161 |
| | LCS Structure No.: | HS-114 |
| | Feature ID No. | 105017 |
| Lock No. 33: | IDLCS: | 011162 |
| | LCS Structure No.: | HS-115 |
| | Feature ID No. | 105018 |
| Lock No. 34: | IDLCS: | 011163 |
| | LCS Structure No.: | HS-116 |
| | Feature ID No. | 105019 |
| Lock No. 35: | IDLCS: | 011164 |
| | LCS Structure No.: | HS-117 |
| | Feature ID No. | 105020 |
| Lock No. 36: | IDLCS: | 011165 |
| | LCS Structure No.: | HS-118 |
| | Feature ID No. | 105021 |
| Lock No. 37: | IDLCS: | 011168 |
| | LCS Structure No.: | HS-121 |
| | Feature ID No. | 105022 |
| Lock No. 38: | IDLCS: | 011173 |
| | LCS Structure No.: | HS-126 |
| | Feature ID No. | 105023 |
| Lock No. 39: | IDLCS: | 011175 |
| | LCS Structure No.: | HS-128 |
| | Feature ID No. | 105024 |
| Tinkers Creek Aqueduct: | IDLCS: | 011170 |
| | LCS Structure No.: | HS-123 |
| | Feature ID No. | 105033 |

| | | |
|---|---|---|
| Furnace Run Aqueduct: | IDLCS: | 011152 |
| | LCS Structure No.: | HS-105 |
| | Feature ID No. | 104521 |
| Yellow Creek Culvert: | IDLCS: | 011148 |
| | LCS Structure No.: | HS-101 |
| | Feature ID No. | 105036 |
| Ira Road Culvert: | Feature ID No. | 104525 |
| Stanford Creek Culvert | Feature ID No. | 105028 |
| Brandywine Creek Culvert | Feature ID No. | 104517 |
| Bolanz Flood Gate: | Feature ID No. | 104155 |
| Goose Pond Weir: | Feature ID No. | 104523 |
| Hooker's Run Flood Gate: | Feature ID No. | 104524 |
| Station 638+20: Flood Gate and Weir | LCS Structure No.: | HS-130 |
| | Feature ID No. | 105032 |
| Station 460+44: Waste Weir | Feature ID No. | 105029 |
| Galley Run Mudcatcher: | LCS Structure No.: | HS-132 |
| | Feature ID No.: | 104522 |
| Peninsula Feeder Complex: | Feature ID No.: | 105026 |
| Brecksville Dam, Feeder, Head Gate: | LCS Structure No. | HS-133 (feeder) |
| | Feature ID No.: | 104518 |
| Stumpy Basin: | IDLCS: | 011160 |
| | LCS Structure No.: | HS-113 |
| | Feature ID No.: | 105043 |
| Canal Prism: | LCS Structure No.: | HS-100 |
| | Feature ID No.: | 105037 |
| Towpath Trail: | Feature ID No.: | 105041 |

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| Canal Segment #36: | LCS Structure No.: | HS-119 |
| Canal Segment #37A: | LCS Structure No.: | HS-122 |
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| Canal Segment #38: | LCS Structure No.: | HS-127 |

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**Cultural Resource Data:**

*National Register Status:*

In 1966 a 1.5-mile section of the watered portion of the canal and associated structures were listed as a National Historic Landmark (NHL) in the National Register of Historic Places (NRHP). The listing was amended and expanded in 1983 to encompass a 4.0-mile section between Rockside Road and a point 50 feet south of Lock No. 37 (Figure 1). The Landmark includes Locks Nos. 37, 38, and 39, Tinkers Creek Aqueduct, several culverts and waste structures, and two buildings dating from the canal era. Designation as a NHL recognizes a property as being nationally significant.

Three additional canal structures were listed in the NRHP in 1984. Lock No. 29 and the remains of the Peninsula Aqueduct were included in the Peninsula Village Historic District listing, and Lock No. 28 was designated as an individual listing.

In 1979 the Ohio and Erie Canal was listed in the NRHP as a thematic resource or historic district. This listing designated most of the canal and numerous structures within the Park. The listing included three segments of the canal encompassing a combined distance of 16 miles, including the previously designated NHL but excluding three areas where the canal was obliterated by modern construction. The following structures were identified as contributing to

the NRHP thematic resource listing: Locks Nos. 39 through 37, Locks Nos. 35 through 26, Tinkers Creek Aqueduct, Peninsula Feeder, Peninsula Aqueduct and Furnace Run Aqueduct. Locks Nos. 36, 25, and 24 were not included in the listing. The nomination retained the 70-foot wide corridor (40 feet on the towpath side and 30 feet on the berm side) as a historic property boundary as well as all extant physical features of the canal and structures and sites historically related to the canal.

The NRHP status of the Ohio and Erie Canal within the Park was again modified and its boundary expanded in 2004 through the completion of a Cultural Landscapes Inventory (CLI) by the Midwest Regional Office staff of the National Park Service. That study expanded the period of significance to 1825-1913 and evaluated the canal corridor as a single holistic landscape incorporating a wide range of associated landscape features including the previously excluded locks. The established historic property boundary was retained (70-foot wide corridor, 40 feet on the towpath side, and 30 feet on the berm side). Based on the content of the CLI, this more comprehensive designation and all the resources that it encompasses were determined by the National Park Service to be eligible for NRHP in 2004 in consultation with the State Historic Preservation Office, a finding reaffirmed by the park superintendent in approval of an updated CLI in 2009 (Figure 1).

All the individual structures and features described in this updated Historic Structure Report are contributing components of the NRHP-listed/eligible Ohio and Erie Canal historic property and/or were identified as contributing landscape elements of the Ohio and Erie Canal in the CLI. All were constructed during the property's period of significance.

*Period of Significance:* 1825-1913

*Areas of Significance:* Transportation, Engineering, Commerce, Exploration-Settlement, Industry

*Proposed Treatment:* Preservation, Restoration

# PART I – DEVELOPMENTAL HISTORY

## A. HISTORICAL BACKGROUND AND CONTEXT

This section is a condensed, edited, reorganized, and updated version of the *Historic Structure Report: History Section for the Ohio and Erie Canal* prepared by Harlan Unrau and Nick Scrattish in 1984 and Chapter 4 of the *Historic Resource Study for the Cuyahoga Valley National Recreation Area* prepared by Nick Scrattish in 1985.[2] Much of the text was drawn directly from those documents but was updated to reflect the results of recent scholarship about the Ohio and Erie Canal as well as current National Park Service standards for Historic Structure Reports. The reader is referred to the 1984 Historic Structure Report by Unrau and Scrattish for more detailed information.

### Introduction

The construction of the Ohio and Erie Canal between 1825 and1832 was part of the wave of enthusiasm for canal-building that swept the United States during the 1820s and early 1830s. It was the first and most successful of Ohio's 813 miles of canals and an impressive engineering achievement that linked the sparsely-settled frontier region with the rest of the nation, promoting settlement and economic development within its borders. The Ohio and Erie Canal stretched for 308.14 miles from Cleveland, where the Cuyahoga River empties into Lake Erie, south to Portsmouth, where the Scioto River discharges into the Ohio. The waterway had 146 lift locks providing a total rise and fall of 1,207.35 feet, as well as 5 guard locks, 14 aqueducts, 203 culverts, 8 dams for crossing streams, and 6 feeder dams. In addition to the Muskingum Navigation, a canalized river, there were several branch canals and feeders that connected with the main trunk of the canal at various points (Figure 2).[3]

Historian Sam Tamburro has noted that "the canal system that developed in the nineteenth century created a commercial network that revolutionized trade and travel in the United States. Nowhere are these connections more evident than the nexus between New York's Erie Canal and Ohio's Ohio & Erie Canal."[4] The Ohio and Erie Canal is best understood as an extension of the Erie Canal, connecting a poor and remote frontier region with New York City and the eastern seaboard via Lake Erie and the Hudson River. The Ohio canal project was enthusiastically supported by New York politicians like DeWitt Clinton; designed by New York engineers like James Geddes, David S. Bates, William H. Price, and Nathan S. Roberts; and financed by New York banking houses and wealthy businessmen such as John Jacob Astor who also had lent funds for the Erie Canal. When completed it provided a source of raw materials and agricultural produce for east coast cities and a ready market for the manufactured goods they produced. The canal system created an interrelated regional economy.

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2. Harlan Unrau and Nick Scrattish, *Historic Structure Report, Ohio and Erie Canal, Cuyahoga Valley National Recreation Area, Ohio* (Denver, CO: National Park Service, Midwest Service Center, 1984); Nick Scrattish, *Historic Resource Study, Cuyahoga Valley National Recreation Area, Ohio* (Denver, CO: National Park Service, Denver Service Center, 1985).
3. Jack Gieke, "Building the Canals: The Engineers," in *Canal Fever: The Ohio and Erie Canal, from Waterway to Canalway,* ed. Lynn Metzger and Peg Bobel, (Kent: Kent State University Press, 2009), 20; Ohio Board of Canal Commissioners, *11th Annual Report of the Canal Commissioners* (January 22, 1833), 6.
4. Sam Tamburro, "The History of the Ohio & Erie Canal," In *Canal Fever: The Ohio & Erie Canal from Waterway to Canalway*, ed. Lynn Metzger and Peg Bobel (Kent, OH: Kent State University Press, 2009), 3.

Figure 2. Ohio canal system

But it did even more: according to Tamburro, "in the first half of the nineteenth century, Ohio's population migration and settlement patterns, politics, social issues, architecture, and culture were all affected by the connectivity of the Ohio & Erie Canal."[5]

The Ohio and Erie carried more trade than any other Ohio canal, including vast quantities of wheat, corn, flour, and coal sent north to Cleveland as well as manufactured goods destined for the interior.[6] According to canal historian Terry Woods: "The canals of Ohio, once the mainstay of the state's transportation system, shunted Ohio products out of the state and the necessities for the good life in. In just a little more than twenty-five years, these artificial waterways—and the men and women who lived and worked on or near them—transformed the state of Ohio from an isolated frontier, where farmers were unable to ship their harvests to market, into a prosperous and influential agricultural and industrial power."[7]

**Beginnings**

Soon after Ohio was granted statehood in 1803 the need for an adequate transportation system became apparent to her political leaders. One of them, US Senator Thomas Worthington, later a governor and canal commissioner, actively supported internal improvements such as roads and canals.[8] An abortive early attempt to improve waterborne transportation in northeastern Ohio was the "Cuyahoga and Muskingum Navigation" scheme which had the goal of clearing the Cuyahoga and Tuscarawas river channels of logs and trees, and making the portage between them passable for the traffic of loaded wagons. To raise the needed funds the Legislature of the State of Ohio sanctioned a lottery scheduled for the first Monday in January 1808. The drawing never came off and fewer than a quarter of the lottery tickets were sold.[9] So ended the first attempt to improve the waterways of northeastern Ohio.

Despite the failure of the Cuyahoga and Muskingum Navigation scheme as well as the unenviable financial record of early eastern canals, there was continued enthusiasm in northeastern Ohio for internal improvements that might enhance the area's commercial potential. For a time the federal government under the leadership of Treasury Secretary Albert Gallatin embraced a program of federally sponsored canals and highways to connect the eastern and western states, but the War of 1812 disrupted and delayed these plans. By the end of the war the moment had passed and there was no longer any political appetite for federally funded internal improvements. Individual states were left to their own devices. New York took the lead, proposing an ambitious plan for constructing a canal between the Hudson River and Lake Erie, directly linking New York City with western markets. Clearly such a canal would have enormous benefits for Ohio since it would provide a new channel of commerce and communication with east coast cities, particularly New York.[10]

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5. Tamburro, "History of the Ohio & Erie Canal", 3-4.
6. Ronald E. Shaw, *Canals for a Nation: The Canal Era in the United States, 1790-1860* (Lexington, KY: University Press of Kentucky, 1990), 127.
7. Terry K. Woods, *Ohio's Grand Canal: A Brief History of the Ohio and Erie Canal* (Kent, Ohio: Kent State University Press, 2008), 2-3.
8. Frank W. Trevorrow, *Ohio's Canals* (Oberlin, Ohio: privately printed, 1973), 1.
9. Charles Whittlesey, *Early History of Cleveland, Ohio* (Cleveland: Fairbanks, Benedict, and Co., 1867), 420; Crisfield Johnson, *History of Cuyahoga County, Ohio* (Philadelphia: D.W. Ensign, and Co., 1879), 54; William H. Perrin, *History of Summit County, Ohio* (Chicago: Baskin and Battey, 1881), 322.
10. Woods, *Ohio's Grand Canal*, 2-3.

As early as 1811 New York had asked Ohio's cooperation in securing federal funding for its proposed Erie Canal project. The Ohio legislature resolved that New York's canal was a project of national concern, arguing that it would strengthen the bonds of union by encouraging agriculture, manufacturing, and internal commerce. The legislature suggested that the federal government should help defray the canal's cost. Although federal funding was not forthcoming, in 1815 New York invited Ohio to join her in building the Erie Canal. Governor Thomas Worthington (1814-1818) passed along a letter from DeWitt Clinton, then President of the New York Board of Canal Commissioners, stressing the benefits that the Erie Canal was likely to bring to Ohio and requesting its financial support in return. Facing its own difficult fiscal issues, the Ohio legislature declined to provide the requested funds but did approve other forms of cooperation. It also noted the need for a canal that would link the Ohio River and Lake Erie.[11] New York proceeded to build the Erie Canal on its own, completing the massive project in 1825. Ohio now had access to the Hudson River and the burgeoning port of New York City. Yet the commercial benefits accruable to Ohioans depended on a dramatic improvement of their own roads and waterways.[12]

The state's generally favorable topography and numerous water resources supported the feasibility of constructing canals in Ohio. Governor Worthington understood the economic benefits of a canal between the Ohio Valley and Lake Erie that would provide the inhabitants of the state's most densely settled region with access to the Erie Canal and New York City. His successor, Ethan Allen Brown (1818-1822), zealously carried forward the mission during his time in office. Historian John S. Still has argued that Brown ultimately was the individual most responsible for the construction of Ohio's canal system.[13] In his inaugural address Brown stated that "if we would raise the character of our state by increasing industry and our resources it seems necessary to improve the internal communications, and open a cheaper way to market for the surplus produce of a large portion of our fertile country"[14] There was some sentiment in the legislature to incorporate a private company that would build a canal between Lake Erie and the Ohio River, but other members, as well as Governor Brown, were adamant that Ohio canals should only be built by the State of Ohio. In December 1818 Senator Nathaniel Beasley offered a resolution to establish a joint committee to draft a bill authorizing the governor to employ engineers to survey four potential lake-to-river canal routes: Miami-Maumee, Scioto-Sandusky, Muskingum-Cuyahoga, and Grand-Big Beaver Rivers.[15]

Throughout the depression year of 1819 the canal issue permeated Ohio politics. Both houses of the legislature approved a resolution for the purpose of selecting the most favorable route and formed a committee to draft a bill providing the necessary funds. The bill never became law. This pattern characterized canal legislation in the Assembly. As a rule, one or the other of the houses was disposed to work with Governor Brown but only rarely did the two work in conjunction. Much of the friction stemmed from regional competition. Individual

11. *Ohio Senate Journal,* January 15 and 17, 1812; Rufus King, *First Fruits of the Ordinance of 1787* (Boston: Houghton, Mifflin, and Co., 1888), 347; C.C. Huntington and C.P. McClelland, *History of the Ohio Canals: Their Construction, Cost, Use, and Partial Abandonment* (Columbus: Ohio State Archaeological and Historical Society, 1905), 2-3.
12. Chester E. Finn, "The Ohio Canals: Public Enterprise on the Frontier," *Ohio State Archaeological and Historical Quarterly* 51 (January-March 1942), 3-4.
13. John S. Still, "Ethan Allen Brown and Ohio's Canal System," *Ohio Historical Quarterly* 66 (1957), 22.
14. Still, "Ethan Allen Brown," 23-24.
15. Finn, "The Ohio Canals," 7; Still, "Ethan Allen Brown," 24.

legislators lent their support to a particular proposal only when their constituents would benefit directly.[16]

Governor Brown sought to minimize the effects of regional jealousy by emphasizing internal improvements in general rather than focusing on canal construction. His main accomplishment was to draft a comprehensive report on the practicality of connecting Lake Erie with the Ohio River, submitted to the Legislature in January 1820. Legislators were informed that three routes were serious candidates. One of these would follow the Cuyahoga and Tuscarawas rivers, as well as the portage that connected them. Brown's report estimated that a canal could be constructed for $2.5 million, regardless of route. In Brown's opinion, Ohio was not in a position to undertake such a massive project without assistance. The most likely source of aid appeared to be the federal government. If Congress would sell to Ohio some four million acres of land recently acquired from the Indians at $1.00 per acre for ten years without interest, the state could resell the land at $3.00 per acre once the canal opened. This would generate a profit as well as funding canal construction.[17]

The real significance of Brown's report is that it maintained public interest in a canal at a time when the project began to appear unworkable. Ohio's first legislative act regarding "navigable communication between Lake Erie and the Ohio River" followed Brown's report by only four weeks. Likely stimulated by Brown's efforts, the legislature appropriated funds for a canal survey but made the survey contingent on a land grant from Congress. Despite the efforts of both of the state's US senators, Congress was not willing to give land to Ohio under this condition, so consequently, the surveys were not performed.[18]

During the 1821-1822 session of the legislature, Brown unsuccessfully continued to press for survey appropriations. Brown's 1821 message to the Legislature once again proposed a canal survey. This time the Assembly appointed a special committee to study the issue, chaired by Micajah T. Williams of Cincinnati, a longtime advocate of internal improvements. The committee's report strongly recommended construction of a Lake Erie-Ohio River canal to be built by the state. The report was vague enough to diffuse local jealousy, and for this reason as well as economic concerns, the legislature finally acted. It established a seven-member canal commission to direct surveys and authorized the commission to hire a competent civil engineer to perform surveys of five possible routes between Lake Erie and the Ohio River.[19] The biggest engineering challenges involved finding a viable route over the high ground that ran through the middle of the state and securing an adequate source of water at the summit to sustain canal operations.[20]

As a group the seven canal commissioners were representative of the state's regional, commercial, and political interests. They included: former Governor Brown, now a US senator; Alfred Kelley of Cleveland, a banker, lawyer, and real estate speculator; former governor and longtime canal proponent Thomas Worthington of Chillicothe; Benjamin Tappan of

16. Harry N. Scheiber, *Ohio Canal Era: A Case Study of Government and the Economy, 1820-1861* (Athens: Ohio University Press, 1987), 15; Still, "Ethan Allen Brown," 24-25.
17. Scheiber, *Ohio Canal Era*, 15; Still, "Ethan Allen Brown," 24-27, 43.
18. Still, "Ethan Allen Brown," 28; Scheiber, *Ohio Canal Era*, 16.
19. Still, "Ethan Allen Brown," 33-35; Scheiber, *Ohio Canal Era*, 16-17.
20. Shaw, *Canals for a Nation,* 127.

Steubenville, a lawyer and former federal judge; Jeremiah Morrow, a farmer and former Congressman from southwestern Ohio; Ebenezer Buckingham, a wealthy merchant and salt manufacturer from the Muskingum Valley; and Isaac Minor, a former member of the Madison County judiciary in west-central Ohio. Later events showed the commissioners to be adept at producing a politically acceptable canal plan and realistic about engineering problems. One of the commission's first decisions in 1822 was to dictate that the canal should pass through as many settled regions of the state as possible to command maximum support from the public.[21]

**Surveys**

In March 1822 James Geddes, one of the senior engineers on the Erie Canal, was engaged for the Ohio canal surveys with the cooperation of New York Governor DeWitt Clinton, an active supporter of the lake-to-river canal. Like his counterparts in Ohio, Governor Clinton saw the canal as a means of increasing trade between the Ohio River Valley and New York City via the Erie Canal for the mutual benefit of both.[22] Geddes began his surveys in mid-April and over the next eight months he examined some 900 miles of terrain. He surveyed all five proposed routes but only had time to conduct careful instrument surveys of two: one extending from the Scioto Valley northward across the Scioto-Sandusky portage and from there down to the lake, and the other, which he favored, stretching from the Scioto eastward to the upper Muskingum River and then northward to Lake Erie by either the Black or Cuyahoga rivers (Figure 3). The Scioto-Muskingum line, which the commission hoped would command wide support, later became the general route of the Ohio and Erie Canal which followed the Cuyahoga River to its termination in Cleveland.[23] Geddes examined and took levels on the summits between the Grand and Mahoning, the Cuyahoga and Tuscarawas, and the Black and Killbuck Rivers. The Cuyahoga summit, at 395 feet above Lake Erie, was the highest of the three. Even so, Geddes believed that it would be the easiest to supply with water because of the Portage Lakes.[24]

On January 3, 1823 the Board of Canal Commissioners submitted its first annual report, consisting of a summary of its findings and tentative conclusions, to the state legislature. In addition to reiterating the economic advantages of a lake-to-river canal, the commission observed that based on Geddes's surveys there was some possibility of success on all five of the routes originally suggested.[25] Based on this report the legislature provided funding for additional surveys and a thorough study of each route. It directed that two commissioners be named "acting commissioners" to serve in a supervisory capacity and spend full time in the field. In June 1823 Alfred Kelley and Micajah T. Williams, who had succeeded Morrow, were appointed acting commissioners; thus the two men who later were called upon to supervise the construction of the first Ohio canals initially assumed a managerial role in mid-1823 and began a decade in which they provided continuity to the administration of both the survey and construction phases of the work. By all accounts Kelley and Williams each possessed an

21. Scheiber, *Ohio Canal Era*, 17, 19, 40; John Kilbourne, *Public Documents Concerning the Ohio Canals, which are to Connect Lake Erie with the Ohio River* (Columbus: I.N. Whiting, 1832), 27.
22. Kilbourne, *Public Documents*, 31.
23. Giecke, "Building the Canals," 21; Scheiber, *Ohio Canal Era*, 20; Kilbourne, *Public Documents*, 40-48, 51.
24. Trevorrow, *Ohio's Canals*, 29.
25. Kilbourne, *Public Documents*, 31-32, 35-40.

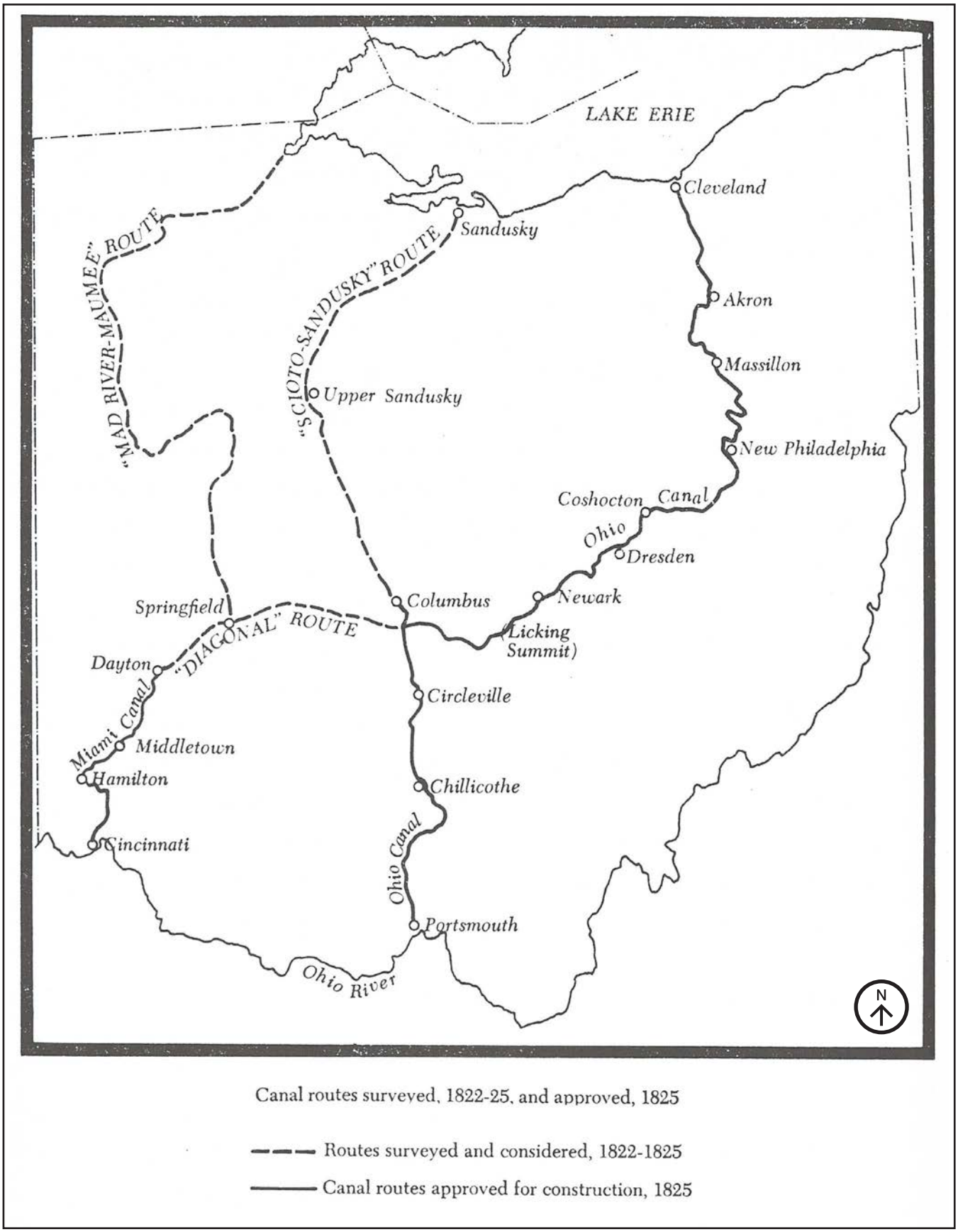


Figure 3. Canal routes surveyed, 1822-25, and approved, 1825 (*Source:* Scheiber, *Ohio Canal Era*, 18)

extraordinary combination of competence, dedication, and political savvy, and they deserve much of the credit for the success of the enterprise (Figures 4 and 5).[26]

The remainder of 1823 was spent in performing the additional surveys. In January 1824 the commissioners reported to the state legislature concerning their findings during the previous year. The board reluctantly declared that the Sandusky-Scioto route was "extremely doubtful" as a viable canal route because of inadequate water supply, but both the Cincinnati-Maumee-Lake Erie and the Scioto-Muskingum-Lake Erie routes appeared feasible. The latter route was the more promising of the two because of its topography and the fact that it was calculated to attract the most public support since it passed through more settled areas of the state than did the Cincinnati-Maumee route. The western part of the state could be served by a relatively inexpensive canal following a route northward from Cincinnati which had been surveyed by Williams. Although James Geddes had left Ohio and returned to New York after completing the preliminary surveys and would not be replaced until late in the summer of 1824, the commissioners recruited David S. Bates, another senior Erie Canal engineer, to review the surveys and endorse them in a letter attached to the report.[27]

Thus as early as January 1824 the canal's principal route between northeastern Ohio and the Scioto had gained widespread support. Topography was favorable, and the route was likely to attract the most public support. To win over the residents of western Ohio a second canal was planned. It would connect Cincinnati with Dayton via the Miami Valley with the promise to extend it to Toledo and Lake Erie at some later date.[28] Several branches and short feeder canals were built later, but the Ohio and Erie and Miami and Erie were the trunk lines of Ohio's canal system.

Throughout 1824 the canal commission worked to produce a final report in preparation for the construction of a lake-to-river canal following the Scioto-Muskingum-Lake Erie route. The engineers examined multiple routes within that general corridor. The crucial engineering question was whether the water supply would permit a canal to cross the divide on the Licking Summit between the Scioto and Muskingum watersheds, for such a route would bind together the interests of those two valleys. Commissioner Micajah Williams declared that the cut "must be done, whatever the cost may be." David S. Bates returned in the autumn to review the commissioners' work and found that the engineers had solved the problem of the Licking Summit. He approved their plan for an elaborate "deep cut" and large reservoir at the summit and fully endorsed the Ohio engineers' full lake-to-river canal line with three options for the final descent from the Muskingum headwaters to the Lake Erie shore.[29] Bates submitted a report to the canal commissioners with a detailed evaluation of the section through the Cuyahoga Valley:

26. Scheiber, *Ohio Canal Era*, 20-21, 357; Shaw, *Canals for a Nation,* 204; Still, "Ethan Allen Brown," 39; Jack Gieke, *A Photo Album of Ohio's Canal Era, 1825-1913* (Kent, OH: Kent State University Press, 1998), xvi.
27. Scheiber, *Ohio Canal Era*, 21; Harry N. Scheiber, "The Ohio Canal Movement, 1820-1825," *Ohio Historical Quarterly* 69(3), (1960), 243-245; Still, "Ethan Allen Brown," 39; Kilbourne, *Public Documents*, 54-64, 67-80, 83-96.
28. Scheiber, *Ohio Canal Era*, 22; Woods, *Ohio's Grand Canal*, 5.
29. Scheiber, *Ohio Canal Era*, 22-25; Still, "Ethan Allen Brown," 40; Kilbourne, *Public Documents*, 103-112, 115-128, 131-144, 147.

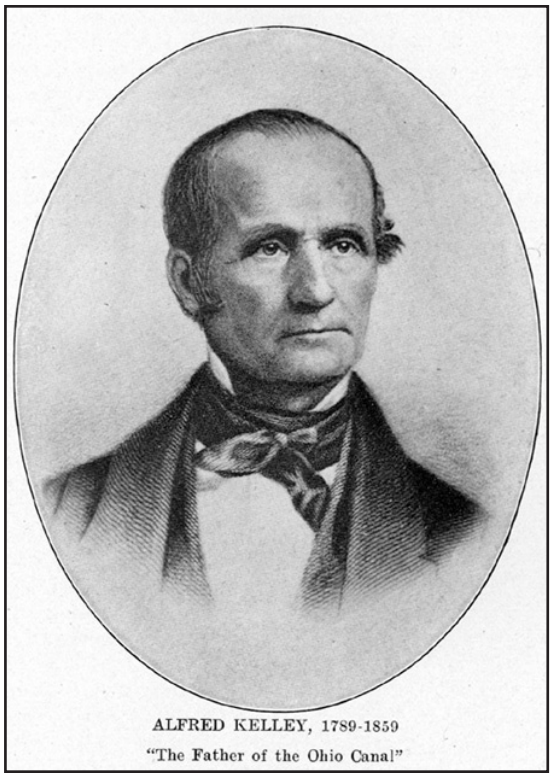


Figure 4. Portrait of Alfred Kelley (*Source:* Orth, *A History of Cleveland, Ohio*, 690)

Figure 5. Portrait of Micajah T. Williams (*Source:* Wikimedia Commons, collection of Cincinnati Museum Center)

After passing...near the Little Cuyahoga, the line enters the valley of the main Cuyahoga, and is conducted along the bottoms of that river, where the formation and qualities of the earth are favorable to canalling. Few difficulties occur and none of them are important, until the line reaches the Peninsula, so called. Here the river turns to the east, and after a circuit of near a mile, returns so nearly the same place, as to leave a narrow ridge, not more than twenty feet wide in the narrowest part connecting the land thus enclosed by the river, with the western bank. Immediately below this point are several wash banks, which taken together, form an aggregate length of near three fourths of a mile. To avoid these wash banks, it is proposed to cut through this isthmus where it is about sixty feet wide, and cross to the east side of the river, on an aqueduct formed by a wooden trunk supported by stone piers. The situation is peculiarly favorable for crossing: The canal line has sufficient elevation, and the bed of the river which is here 150 feet wide, and also the bank on the west side are rock. On the opposite side, a lock will be required, the mason work of which, with a little extension, will form the abutment on that side.

About one mile below this place of crossing, there is a sliding clay bank on the east side of the river of 30 rods in length. This may, however be avoided by turning the stream across a low narrow point of bottom on the opposite side and conducting the canal near this artificial channel across the same point. To accomplish this work, will not be very difficult or expensive, as the river at this place never rises more than eight or ten feet in height, and has a rock bottom on which works may be erected with perfect security. This cut will shorten the canal line 22 chains, in the distance of half a mile.

After passing this place the line is remarkably favorable for five or six miles; being located through extensive bottoms, out of the reach of floods, to the head of the Pinery Narrows. The extent of these narrows, in length, is about two miles: The river, in passing through this defile, and crossing from one side to the other, alternately makes wash banks on each side, leaving a narrow bottom on the other. The aggregate length of these wash banks, on the east side, is about three fourths of a mile; and about half that distance on the west. Through the narrows, the river runs over a smooth flat rock, very shallow, when the river is low, rising floods to the depth of 8 or 10 feet. A wall of timber or stone of ten feet in height will effectually protect the canal along the foot of these wash banks; and when this wall is constructed, the additional expence of the canal will not probably be greater, than that of constructing a canal for the same distance on the most favorable ground. It may probably be found necessary to take in a supply of water from the Cuyahoga at this place; which may be done by means of a low cheap dam; and the expence of recrossing the river will be small should a line on the west side, below this place, be found, on examination, the most favorable.

From the foot of the Pinery narrows, to the head of Stillwater in the river on the lake level, the line is conducted along the bottoms and is very favorable, with

> the exception of four or five short points of hill, the base of which are [*sic*] approached by the river. And these present no formidable difficulty. From the head of Stillwater, it is proposed to construct a towpath along the bank of the river to Cleaveland, six miles. This will require very little more than clearing the timber from the bank.[30]

On January 10, 1825 the Board of Canal Commissioners presented a final report with recommendations based on three years of survey work. The board estimated the cost of constructing the canal to be between $2,801,709.85 and $3,061,368.47, depending on the exact route selected.[31] The advocates for Ohio canals could point to New York's Erie Canal where toll revenues had exceeded interest costs on the state debt by more than $50,000 in 1824.[32]

In response to this report, the state legislature passed a law commonly referred to as the "1825 canal bill," incorporating virtually all of the commissioners' recommendations. It authorized the canal commissioners to construct two canals: the Ohio and Erie via the Scioto-Muskingum route, and the Miami and Erie from Cincinnati to Dayton. While the routes were specified, the commissioners were given a great deal of latitude in the details, particularly in relation to the line of the Ohio and Erie north of Coshocton.[33] The 1825 law continued the seven-member canal commission and also created a three-member canal fund commission authorized to borrow money on the credit of the state. Canal fund commissioners issued certificates of tax-free stock for these loans. It was anticipated that the income from canal tolls would be sufficient to meet interest payments.[34] In April 1825 the fund commissioners secured a $400,000 loan, followed by $1,000,000 in 1826 and $1,200,000 each of the next two years. Although the federal government would not provide direct financial aid, it did donate over 1.1 million acres of land to the state which was sold at $2.00 per acre with the proceeds used to finance the project. It was the revenue from these loans and land sales that paid for the construction of the Ohio and Erie Canal between Portage Summit and Lake Erie.[35]

Because of the large number of canal projects in the eastern states and the relatively small number of trained civil engineers to oversee their construction, the canal commissioners had found it difficult to replace engineer James Geddes after his departure early in the Ohio project. However the completion of the Erie Canal in 1825 enabled the Ohio board to attract two men with extensive New York experience: David S. Bates accepted the appointment as principal engineer, and William H. Price was named resident engineer for the northern portion of the Ohio and Erie. Price would serve in various engineering capacities on Ohio canals and railroads for decades. Also appointed as resident engineer for the southern division of the Ohio and Erie as well as the Miami and Erie was Samuel Forrer, who had been on the staff since 1822 and over the course of a fifty-year career would serve in every capacity from rodman to canal commissioner. During early 1825 the board employed Nathan S. Roberts, another prominent Erie Canal engineer, to assist with surveying the final route of the Ohio and Erie Canal between Coshocton and Lake Erie. Due to the shortage of trained engineers, many men

30. Kilbourne, *Public Documents*, 111-112.
31. Still, "Ethan Allen Brown," 40.
32. Scheiber, *Ohio Canal Era*, 25.
33. Scheiber, *Ohio Canal Era*, 27-28; Woods, *Ohio's Grand Canal*, 6.
34. Finn, "The Ohio Canals," 12; Huntington and McClelland, *History of the Ohio Canals*, 17-18.
35. Scheiber, *Ohio Canal Era*, 46; Tamburro, "The History of the Ohio & Erie Canal," 6.

who were hired into the lower echelons of the corps learned the skills of civil engineering and canal construction technology through on-the-job training and eventually rose to senior positions in the corps. One of them was Richard Howe, a Ohio native who served as resident engineer on the northern division from 1825 through the 1850s.[36]

After funds were assured and the nucleus of the engineering corps had been recruited the main issue still to be resolved was the route for the northern portion of the Ohio and Erie Canal between Coshocton and Lake Erie. In April 1825 the commissioners asked engineers Roberts, Price, and Forrer to survey and submit detailed cost estimates for the Kilbuck-Black and Tuscarawas-Cuyahoga routes north of Licking Summit. The engineers' report confirmed the commissioners' earlier recommendation in favor of the Tuscarawas and Cuyahoga route to Lake Erie because it would be more accessible, incur lower construction costs, and have a more adequate water supply. At the summit between the two rivers, water could be drawn from the Portage Lakes via a series of feeders.[37]

On May 5, 1825 the commissioners convened at Wooster to evaluate the engineers' findings. At this time they formally approved the Cuyahoga route. The Kilbuck-Black route may never have been seriously considered. Historian Harry Scheiber has suggested that the April surveys were probably a ruse whose object was to induce proprietors along the Cuyahoga Valley to donate land for the canal.[38] It is known that as early as February 1825, Benjamin Tappan had written Kelley that work on the route "from the Portage summit to Cleveland" should be started "as soon as you [Kelley] have got the people of Cleveland and the Cuyahoga valley to give all they will give."[39]

In establishing construction priorities for the Ohio and Erie Canal the commissioners and the engineering corps were presented with a difficult challenge. The canal would cover more than 300 miles and require the construction of 146 locks, 14 aqueducts, and 153 culverts. Since it was impossible to build the entire canal at once the commissioners decided to complete at least one sizeable segment before beginning the others. It would be politically advantageous to begin with the southern division down the Scioto Valley to the Ohio River because of the large population and highly active citizenry demanding immediate construction in that area. The southern division was expected to generate heavy traffic and toll revenues. However the commissioners chose to concentrate their resources initially on the northern division in the sparsely-settled Cuyahoga Valley and thus fulfill one of their main goals: the opening of a route from the interior of the state to Lake Erie and the lucrative New York market. Concurrently they would work on the 11-mile line of the Licking Summit since the excavations for the "deep cut" there would require substantial time for completion.[40]

36. Kilbourne, *Public Documents*, 179; Woods, *Ohio's Grand Canal*, 4; Giecke, "Building the Canals," 24-25; Scheiber, *Ohio Canal Era*, 62-64; Tamburro, "History of the Ohio and Erie Canal," 5.
37. Scheiber, *Ohio Canal Era*, 40; Giecke, "Building the Canal," 28; Kilbourne, *Public Documents*, 179-180, 196-203.
38. Kilbourne, *Public Documents*, 72-73; Scheiber, *Ohio Canal Era*, 40.
39. Harry N. Scheiber, "Alfred Kelley and the Ohio Business Elite, 1822-1859," *Ohio History* 87 (Autumn 1978), 373-374.
40. Scheiber, *Ohio Canal Era*, 42-44.

## Construction

On July 4, 1825 groundbreaking ceremonies were held at Licking Summit, three miles south of Newark. In attendance was a large group of state officials and visiting dignitaries, including New York Governor DeWitt Clinton and Ohio Governor Jeremiah Morrow. On July 21 a similar ceremony was held at Middletown to break ground for the Miami and Erie Canal.[41]

Immediately after determination of the final route of the Ohio and Erie Canal between Coshocton and Lake Erie, a careful location of the line from the Portage Summit to Cleveland was commenced under resident engineer William H. Price. He prepared plat maps, surveys, plans, and profiles of the line and the locks and wrote detailed specifications for each section, accompanied by cost and work estimates.[42] Unfortunately none of the original surveys, profiles, or plans prepared by Price have survived.

Though details are sketchy, land acquisition through the Cuyahoga Valley proceeded at a brisk pace. Many owners willingly sold the required strips of land to the commissioners since they recognized that the canal would enhance the value of their remaining property.[43] The February 1825 act gave the canal commissioners the right of eminent domain over all the lands they might need for the canal's construction. Disputes between the commission and landowners were referred to an impartial board of three to five men. Their decisions could only be appealed to the legislature. The commission paid owners a specified price and in return the state received land titles in fee simple.[44]

The state relied exclusively on private contractors for construction of the canal. The sector between Akron and Cleveland was divided into one-half mile sections and the commissioners solicited bids for each, the lowest bidder winning a specific contract. All work was performed according to the written agreement, and contractors were paid monthly for their progress.[45] Sometimes there were separate contracts for locks, aqueducts, culverts, and other structures but other times the structures were included in the section contracts.

The commissioners received bids for work in the Cuyahoga Valley on three separate dates in 1825. On June 10 proposals were received for the line north of Portage Summit to Lock No. 28. A month later, on July 9, about seven miles of additional line extending northward to Lock No. 35 were put under contract. On August 29 the remainder of the line between Lock No. 35 and its termination near the lake at Cleveland was contracted, with the exception of about one mile at the northern end, which required further survey and examination.

Contracts were let in short sections so that the capital requirements of construction would be within the means of small contractors, thus encouraging competitive bidding.[46]

41. Finn, "The Ohio Canals," 1-2.
42. Kilbourne, *Public Documents*, 181; Woods, *Ohio's Grand Canal*, 10.
43. Finn, "The Ohio Canals," 13.
44. Scheiber, *Ohio Canal Era*, 68; Finn, "The Ohio Canals," 13.
45. Scheiber, *Ohio Canal Era*, 46.
46. Scheiber, *Ohio Canal Era*, 70.

Sections 35-91 were located within the present boundaries of Cuyahoga Valley National Park. Professional contractors from New York's Erie Canal were early on the scene, but many of the best refrained from bidding. Instead these men hired on as foremen to local contractors who had hastily organized contracting companies. It was fortuitous that work on the Ohio canals was beginning just as the construction of the Erie Canal was winding down since it ensured an ample supply of skilled contractors and workmen, at least at the outset. As a rule, local contractors first hired local farmers to do the digging. For farmers, canal construction was not that much different from farming except that it paid cash, an important consideration in this cash-poor frontier region. The initial work force is estimated to have been between 1,500 and 2,000 men. Forest and earth were attacked with vigor along the canal's northerly route through the villages of Peninsula and Boston, and Northfield and Independence Townships. Locals did good work, but in the summer of 1826 rain, heat, and smallpox took a heavy toll and most of those who survived left for home.[47]

Problems compounded when less experienced contractors began to default. In their eagerness to win a contract these men had bid well below Commissioner Kelley's estimate for specific sections. Some were simply dishonest or incompetent.[48] Their failure to complete a section meant that a contract had to be re-let quickly to keep work in progress. During 1826 five contracts for work on the line within the present boundaries of Cuyahoga Valley National Park were abandoned and re-let.

By the late summer of 1826 professional contractors moved in to take up some of the slack. They generally knew more about constructing canals than Kelley himself. The professional contractor carefully considered rising wages and increased costs for materials. Tough and cynical, the professionals wrote off a percentage of their laborers to smallpox, cholera, and "canal sickness" (malaria), which were tremendous problems along the line. However even the professionals had trouble adjusting to the constant labor shortage which set in later in the 1826 construction season. The principal cause was the competition for labor on two major projects farther east: the Pennsylvania canals and the National Road from Wheeling through Ohio.[49] Another nagging problem was the inconsistent disbursement of state funds to pay for work completed. At the end of 1826 none of the Ohio canal lines had been completed, and the commissioners decided to concentrate resources on the northern part of the line; elsewhere they would "keep up appearances...but with limited expenditures."[50]

Physical progress on the Akron-Cleveland sector was remarkable considering the state of construction technology in early nineteenth century America. Notwithstanding the aid of animals and blasting powder, canal building was a time-consuming and labor-intensive operation. A contractor was only rarely able to anticipate the nature of subsoil and bedrock along his section and any delays in procuring hewn stone, timber, and labor could mean

47. Scheiber, *Ohio Canal Era*, 45, 70-71; Harlan Hatcher, *The Western Reserve: The Story of New Connecticut in Ohio* (Indianapolis, IN: Bobbs-Merrill Co., 1949), 103-104; George Knepper, "Mucking Through: Common Labor on the Ohio and Erie Canal," in *Canal Fever: The Ohio and Erie Canal, from Waterway to Canalway,* ed. Lynn Metzger and Peg Bobel, (Kent: Kent State University Press, 2009), 46.
48. Scheiber, *Ohio Canal Era*, 45, 71; Hatcher, *The Western Reserve*, 104.
49. Scheiber, *Ohio Canal Era*, 47-48; Finn, "The Ohio Canals," 15-16.
50. Woods, *Ohio's Grand Canal*, 16; Scheiber, *Ohio Canal Era*, 47.

disaster for those who played with too thin a margin. In addition, the construction season in northern Ohio was fairly short, limited to the late spring, summer, and early autumn months.[51]

Pressure for completion of the 38-mile sector was intense. The commissioners had given it top priority so that shipments of goods to New York could begin as early as possible from Ohio's interior. This would generate toll revenue and demonstrate the canal's viability so that eastern bankers might be more amenable to loaning enough money to complete the project. It also would bolster public support.[52] Initial progress reinforced the widespread belief that the sector's completion late in the summer of 1826 was assured. However the time required to fabricate intricate components as well as serious labor problems forced construction into the 1827 working season.

The *5th Annual Report of the Board of Canal Commissioners* was issued on January 17, 1827. Excerpts from this document provide a detailed picture of the canal's progress through the Cuyahoga Valley, a full six months before its opening.

> In proceeding from Lake Erie to the Portage summit level, a distance of 37 miles, an ascent of 395 feet is encountered, requiring to overcome it, 44 locks; several points presenting considerable obstructions to the making of a canal, also occur in this distance, contributing to increase the difficulty and expense of the work. The Cuyahoga is turned out of its course, *and a new channel for its waters formed,* in four different places, to make room for, and give security to the canal; and in several other places, part of its channel is necessarily occupied, requiring protection walls to secure the banks of the canal from the action of the current in the river. The main river and two of its branches are also crossed by aqueducts; two other branches are crossed by dams of considerable extent.
>
> Most of these heavy items of work have already been performed, besides the ordinary work required in the construction of a canal. The walls of 32 of the locks are laid, and the other work appertaining to them, is nearly or quite completed. Six of the remaining locks are in a state of great forwardness, and would have been finished, but for the approach of cold weather, which made it proper to suspend the further progress of the mason work until the coming spring. The foundations of three more are laid; and nearly all the materials necessary for the completion of all the locks which now remain unfinished, between the Portage summit and the Lake, prepared and delivered in places convenient for the vigorous prosecution, as early in the spring as the weather will admit....
>
> On this part of the line [Akron-Cleveland], nine culverts of stone, six of wood, three dams, and two aqueducts across branches of the Cuyahoga river, have been erected; and the aqueduct over the river at the Peninsula, is in a state of forwardness, which renders the work safe, and promises its early completion in

51. Scheiber, *Ohio Canal Era*, 53; Carter Goodrich ed., *Canals and American Economic Development* (New York: Columbia University Press, 1961), 174.
52. Kilbourne, *Public Documents*, 275; Still, "Ethan Allen Brown," 51.

> the spring. Seven road bridges and a number of towpath bridges have also been erected.
>
> Of the more ordinary work, appertaining to the construction of a canal, such as excavation and embankment, a large proportion is entirely finished and taken off from the hands of the contractors. Far the greater part of the remainder is as nearly finished as the season will admit, only requiring for its completion a little work in trimming the banks, after the frost shall have left the ground in the spring. The work on a few of the sections is more backward, but should the winter prove favorable to the prosecution of the work, little, except masonry, will remain to be done in the spring. It is impossible to ascertain the precise amount of work which remains unfinished on this part of the canal, without a very minute examination and estimate; nearly nine-tenths, however, of the whole amount of work necessary to the completion of this division of the Ohio canal is done, and it is believed, in a neat, substantial and permanent manner.
>
> It is confidently believed that so much of the canal as extends from the Portage summit to the basin, near its termination at Cleveland, will be finished and ready for navigation in June next; the work is now in a state of forwardness which warrants this expectation, and no ordinary event will prevent its being realized.
>
> The heavy rains which fell in the latter part of the month of June, produced a freshet in the Cuyahoga river and its branches, which occasioned some damage to contractors, whose work in the valley of that river, was in an unfinished and insecure state, and exposed to the violence of the flood. The amount of damage thus sustained, has not been precisely ascertained; it is believed, however, that the aggregate amount will not vary materially from two thousand dollars...[53]

Late in March 1827 Ethan Allen Brown, former governor and current canal fund commissioner, was informed that Governor Clinton and other New York dignitaries were interested in seeing a practical demonstration of the navigability of the Ohio and Erie as soon as possible. About May 15, however, Ohioans' enthusiasm for a grand opening in July was somewhat dampened when Kelley indicated that by July the canal would be navigable no farther south than Akron. Even so, Brown believed that a demonstration was better than none. Accordingly, he involved Kelley, who by June had transmitted details for a full-blown civic celebration of the canal's opening to Ohio Governor Trimble. The date was set for Independence Day: July 4, 1827.[54]

Early on the morning of July 3 Governor Trimble, Brown, and a number of other distinguished individuals boarded the canal boat *State of Ohio*. The boat left Portage Summit at 10 AM and despite delays caused by a collapsed bank it reached the village of Boston by late afternoon. Here it was joined by another vessel named for Trimble. Six miles south of Cleveland, the two boats were met by the *Pioneer*, an Erie Canal boat. The rest of the trip had a carnival-like atmosphere. One eyewitness said the scene "produced an impression on the mind

53. Kilbourne, *Public Documents*, 237-238.
54. Still, "Ethan Allen Brown," 51-52.

not soon to be obliterated." Only a few hours after the *State of Ohio*, *Allen Trimble,* and *Pioneer* reached Cleveland, the freight canal boat *Enterprise* came into town with a load of flour and whiskey from Akron. The northernmost sector of the Ohio and Erie Canal was open for business.[55]

An extraordinary rush was necessary to meet the July 4 deadline. As a result certain components along the sector "that were esteemed to be of less pressing importance" were simply not ready. For example the construction of feeders from the river, needed to insure an adequate and permanent supply of water, was postponed. Sluice gates, designed to pass water from one lock level to another, were also unfinished.[56]

As the *6th Annual Report of the Board of Canal Commissioners* makes clear, it took months to make the sector completely operable.

> The canal was filled and supplied with water, while the rainy season continued, by the small streams naturally flowing into the canal, or which were easily turned in, together with a temporary supply from the main river, readily introduced while the stream continued swollen with floods. The supply furnished by the small streams was found deficient, as had been anticipated, when they had shrunk to their usual low water mark. This deficiency was increased by the difficulty of passing the water onward through the culvert [sluice] gates of the lock with sufficient regularity to keep water of equal depth in the numerous short levels which occur on this part of the canal. The culvert gates were liable to be shut by accident or design, or to be choaked [*sic*] with floating substances, which would raise the water in the level above and throw it over the waste weirs; thus occasioning a loss of water even where the supply was most deficient.
>
> From these causes the navigation of the canal necessarily sustained considerable interruption.
>
> As soon as the banks of the canal had become sufficiently firm to admit of raising the water in the canal with safety, and the attention of the engineers could be diverted from the constant watchfulness necessary to prevent accidents on the first filling of a new canal, means were taken to introduce a more ample supply of water. A feeder from the main Cuyahoga was introduced at the place where the canal first enters the valley of that river in its descent northwardly from the summit. The work of forming and securing sluices or feeders round the locks so as to pass the water regularly from one level to another, was also commenced: a temporary feeder from the Cuyahoga was also introduced at the Pinery, about fifteen miles above Cleaveland, and a contract made for the construction of a permanent feeder near the same place, which is now in the progress of completion.

55. Still, "Ethan Allen Brown," 52-53; also see Woods, *Ohio's Grand Canal*, 16-17.
56. Kilbourne, *Public Documents*, 275-276.

> After these feeders were so far completed as to admit of the introduction of water, the canal was abundantly supplied from a point about one mile and a half below Akron to Cleaveland: and the navigation continued without interruption, except that occasioned by a few small breaches, until late in December [1827]...
>
> A few accidents of minor importance occurred on that part of the canal which has been filled with water, such as must ever be expected on the first trial of a new canal. In some instances the natural soil on which the canal rests, is not found to be sufficiently firm to resist the pressure of water, and has given way, while the artificial banks raised thereon have remained firm until undermined by water which passed underneath....It is also found by experiment, as was anticipated, that artificial banks, especially those raised to a considerable height and not well packed while making settle much, and consequently need raising on the introduction of water. Even banks of this description which have stood for more than a year, are found to shrink after being saturated with water.
>
> Means have been adopted to secure the banks of the canal from injury, in places where there are necessarily exposed to the operation of the strong current of the river. In some of these places where the water is deep strong piles have been driven and interwoven with brush, in order to ward off the violence of the current, until a more permanent protection could be made. Slope walls of stone resting on the slope of the bank, or walls of hewn timber firmly secured to the bank by means of ties, have been built where the current was so rapid as to render the cheaper method of protecting the banks insufficient. In most places the plan of throwing rough heavy stone on the outward slope of the bank, has been found a cheap, effectual, and it is believed, permanent method of preventing [*sic*] it from the abrasion of the current.[57]

Additional work on the canal between Akron and Cleveland continued through late 1827. In August 1828 the Ohio and Erie was opened south of Akron across Portage Summit to Massillon. Nearly two years later, in July 1830, the section across the Licking Summit was completed. In October 1831 the canal was opened as far south as Chillicothe, and the work was finally finished to Portsmouth on the Ohio River in October 1832.[58] The Ohio and Erie Canal was now complete and fully navigable.

## Components of the Ohio and Erie Canal

All told, the Ohio and Erie Canal extended 308.14 miles from Cleveland, where the Cuyahoga River empties into Lake Erie, to Portsmouth, where the Scioto River discharges into the Ohio. The canal stretched some 38 miles through the Cuyahoga Valley, from Cleveland to the north end of the Portage Summit at Akron, rising some 395 feet above the level of the lake via 44 locks. The length of the Portage Summit level was about nine miles, and from the south end of that level the canal descended some 238 feet via 29 locks along the Muskingum River Valley, 102 miles to the Dresden Side-Cut at Webbsport, near the mouth of Wakatomaka

57. Kilbourne, *Public Documents*, 276.
58. Scheiber, *Ohio Canal Era*, 50-52.

Creek, a small westerly branch of the Muskingum. From Webbsport, the canal extended 42 miles to Newark, ascending 160 feet via 19 locks up the Wakatomaka and Licking Valleys. Five miles south of Newark at Licking Summit (317 feet above the level of Lake Erie), which separated the tributaries of the Scioto from the streams running down to the Muskingum, the 2,500-acre Licking Reservoir (now known as Buckeye Lake) was located to supply water for a "deep cut." From the 14-mile Licking Summit level, the canal descended 202 feet via 30 locks some 30 miles through the Little Walnut Creek Valley to Lockbourne where the 11-mile Columbus Feeder entered the main trunk. The canal then descended 211 feet via 24 locks through the Scioto River Valley, 87 miles to Portsmouth, where it entered the Scioto, 200 yards above the confluence of the Scioto and the Ohio.[59]

Along the entire line of the Ohio and Erie Canal there were 146 lift locks providing a total rise and fall of 1,207.35 feet. In addition there were five guard locks, 14 aqueducts, 153 stone culverts, 50 wooden culverts, 8 dams for crossing streams, and 6 feeder dams. Five principal feeder lines connected with the main trunk of the canal: Tuscarawas Feeder (3.2 miles); Walhonding Feeder (1.3 miles); Muskingum Side-Cut (2.58 miles); Granville Feeder (6.14 miles); and Columbus Feeder (11.0 miles).[60]

The total cost of building the Ohio and Erie Canal has been estimated at $4.3 million, about one-third higher than projected but still less expensive than any other canal of similar size in the United States.[61] When completed the final cost of the section from Cleveland to the south end of Licking Summit, a distance of 194 miles, was $1,782,000 including costs for feeders, reservoirs, bridges, and other structures: an average cost per mile of $8,980. The aggregate cost for the 139-mile stretch from Cleveland to Kaldersburgh, opposite Coshocton on the Muskingum was $1,122,000, or $8,026 per mile of canal.[62]

By the time the entire Ohio and Erie was completed in 1832, the Akron-Cleveland sector was functioning smoothly (Figure 6). The sector's southern terminus was Lock No. 1 in Akron, 395 feet above Lake Erie. From Lock No. 1 north, a series of twenty-one locks stepped down to the Portage Path, descending from the summit (Figure 7). The canal then ran level for a short distance to Lock No. 23, near the confluence of the Cuyahoga and Little Cuyahoga Rivers. Four miles north the canal entered present Cuyahoga Valley National Park at the village of Botzum (originally called "The Basin" then "Niles)," founded on a tract purchased and surveyed in 1836. After crossing Yellow Creek and passing through the nearby Locks Nos. 24 and 25, the canal reached Lock No. 26 at the tiny village of Ira. During the canal era this lock was better known as "Pancake Lock." Continuing north through the valley the canal crossed Furnace Run on an aqueduct (constructed in 1860, replacing an earlier stone culvert) and passed through Lock No. 27 ("Johnny Cake Lock") at Everett. At Everett, formerly called Unionville, there were stables and feed for draft animals as well as a cheese factory and post office. Approximately 2.2 miles north was Lock No. 28 ("Deep Lock") which featured a lift of

59. George White Dial, "The Construction of the Ohio Canals," *Ohio Archaeological and Historical Society Publications* 13(4) (1904), 472-473; Ohio Board of Canal Commissioners, *11th Annual Report of the Canal Commissioners* (January 22, 1833), 7-8; Trevorrow, *Ohio's Canals*, 140-141; Gieke, *A Photo Album*, 53-54.
60. Ohio Board of Canal Commissioners, *11th Annual Report of the Canal Commissioners* (January 22, 1833), 6.
61. Scheiber, *Ohio Canal Era*, 53; Shaw, *Canals for a Nation,* 129; Tamburro, "History of the Ohio & Erie Canal," 6.
62. Kilbourne, *Public Documents*, 281.

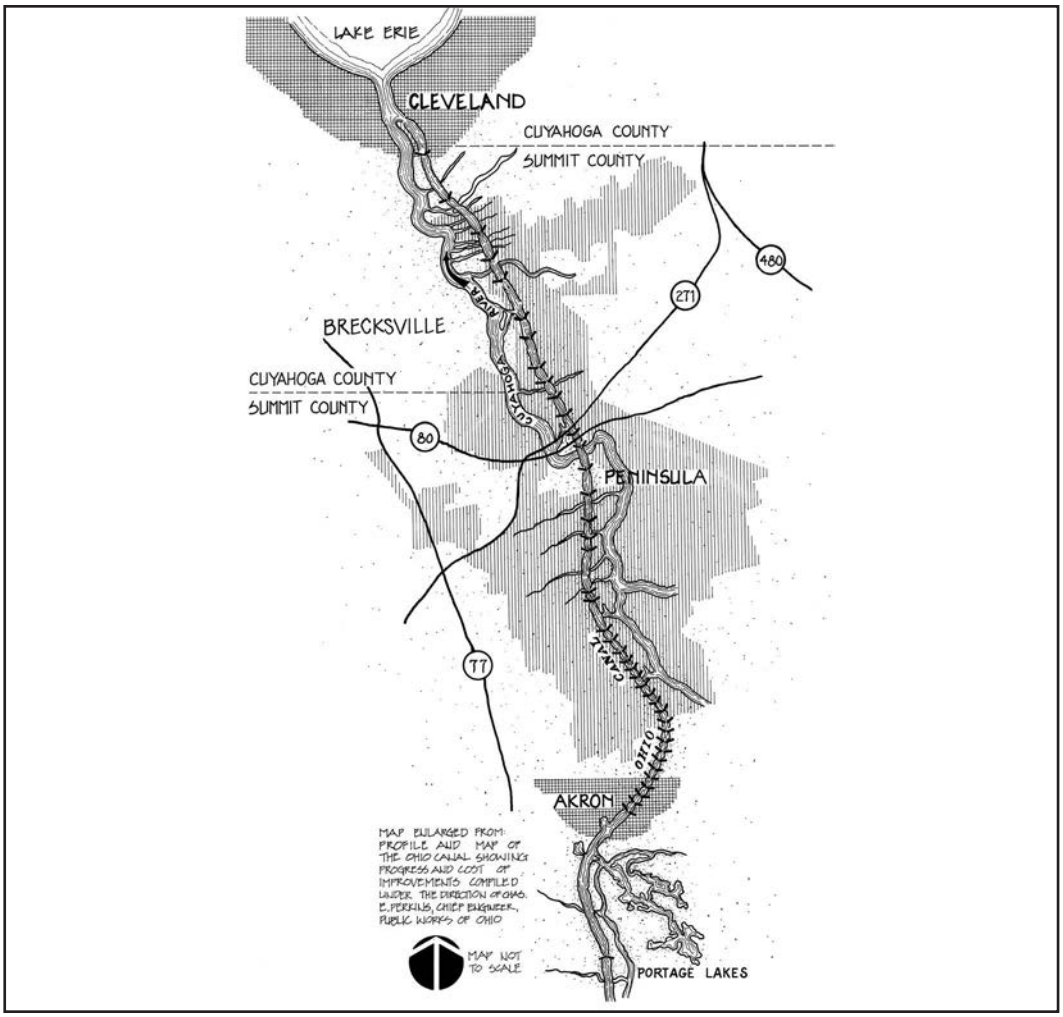


Figure 6. Ohio and Erie Canal between Cleveland and Akron (*Source:* Historic American Engineering Record, National Park Service, Ohio and Erie Canal Recording Project, *Ohio and Erie Canal, HAER No. OH-59),* William F, Conaway, Delineator, 1986)

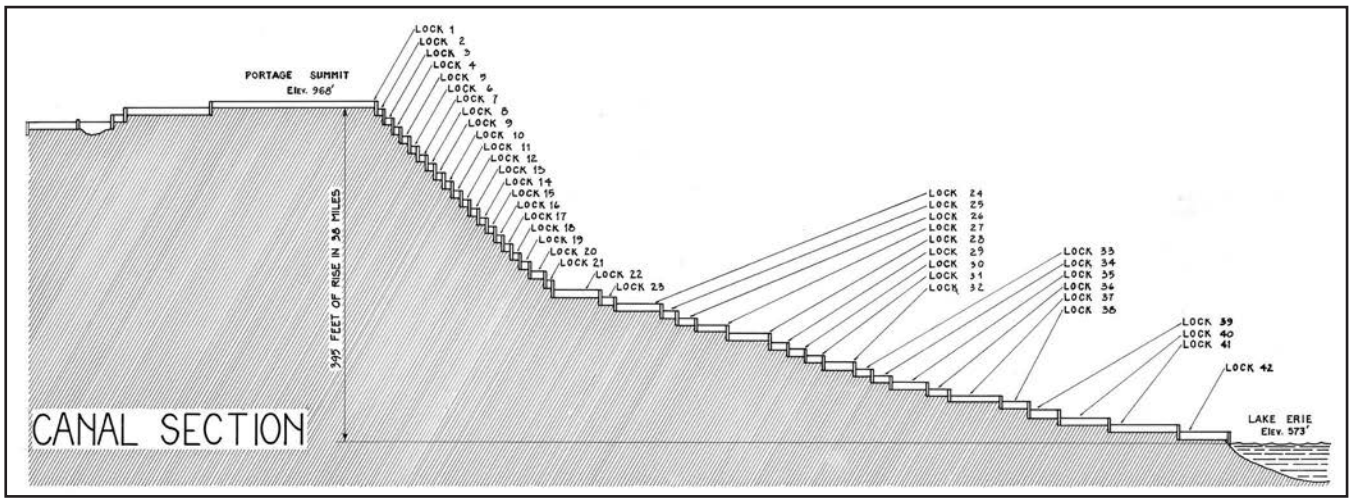


Figure 7. Ohio and Erie Canal profile, Cleveland to Akron (*Source:* Historic American Engineering Record, National Park Service, Ohio and Erie Canal Recording Project, *Ohio and Erie Canal, HAER No. OH-59,* William F, Conaway, Delineator, 1986)

17 feet, the greatest of any lock between Akron and Cleveland. Most locks had a lift of 8 to 10 feet.

At the village of Peninsula, where there was a turning basin and boat yard, the canal crossed to the east side of the Cuyahoga on a 100-foot long aqueduct and immediately entered Lock No. 29 which lowered boats 12 feet. Peninsula was a true canal town whose yards reputedly produced more boats than any other town served by the Ohio and Erie or the Miami and Erie.[63] It owed much of its success to the accident of location since it was a convenient half-way stop between Akron and Cleveland. During the height of the canal era the village had no fewer than five hotels, five banks, and 14 taverns to succor weary travelers (Figure 8).[64]

About .3-mile north of the village of Peninsula was Lock No. 30 and the feeder complex which supplied the canal with water from the river. The feeder was constructed in 1830 to address chronic problems with water supply. A low dam of brush and stone diverted water from the river into a 132-foot long feeder channel. A head gate, supported by walls of cut stone on rock, regulated the flow of water into the feeder.[65]

The canal proceeded north to Lock No. 31 ("Lonesome Lock") and then Lock No. 32 at Boston Village. At Boston there was a turning basin where the *State of Ohio* had met the *Allen Trimble* on the canal's opening day. Boston was a small but lively village that featured several stores and taverns, a boat yard, a distillery, a sawmill, and a gristmill (Figure 9). James Brown, a noted counterfeiter in the valley, ran a tavern there in the 1830s and 1840s.

North of Boston were Lock No. 33 ("Lower Boston Lock" or "Wallace Lock") and a culvert carrying Brandywine Creek under the canal. The canal continued north to Lock No. 34 ("Red Lock") and Lock No. 35 ("Kettlewell Lock" or "Whiskey Lock"), and then to Lock No. 36 ("17-Mile Lock") at the southern end of the Pinery Narrows. Here there was another basin and another feeder which supplied water to the final 17 miles of canal between this point and Cleveland. A short distance north of Lock No. 36, Galley Run emptied directly into the canal, with a masonry structure known as a "mudcatcher" to prevent accumulation of silt in the waterway. The canal then continued another two miles through a gorge known as the Pinery Narrows and entered Cuyahoga County.

In Cuyahoga County, Lock No. 37 ("14-Mile Lock") was, as its nickname implied, approximately 14 miles from the canal's northern terminus at Cleveland. From 1851 on, the canal furnished water power to a mill near the lock, known as Alexander's Mill and later, Wilson's Mill. About equidistant between Locks Nos. 37 and 38 a 95-ft long aqueduct carried the canal over Tinkers Creek. North of Lock No. 37 were Lock No. 38 ("12-Mile Lock") and Lock No. 39 ("11-Mile Lock"), the northernmost locks in Cuyahoga Valley National Park.

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63. Mosure-Fok and Syrakis Company Ltd., *Technical Report for the Cuyahoga River Valley Park Study.* Report prepared for Ohio Department of Natural Resources, Division of Planning, Recreation Planning. 1974-1975. (Youngstown, OH: Mosure-Fok and Syrakis Company, Ltd., 1975), 16.
64. James S. Jackson, "One Hundred and Fifty Years on the Ohio Canal," *Western Reserve Historical Society News* (July-August 1977), 40.
65. Ohio Board of Canal Commissioners, *9th Annual Report of the Canal Commissioners* (January 11, 1831); Ohio Board of Canal Commissioners, *11th Annual Report*, 9.

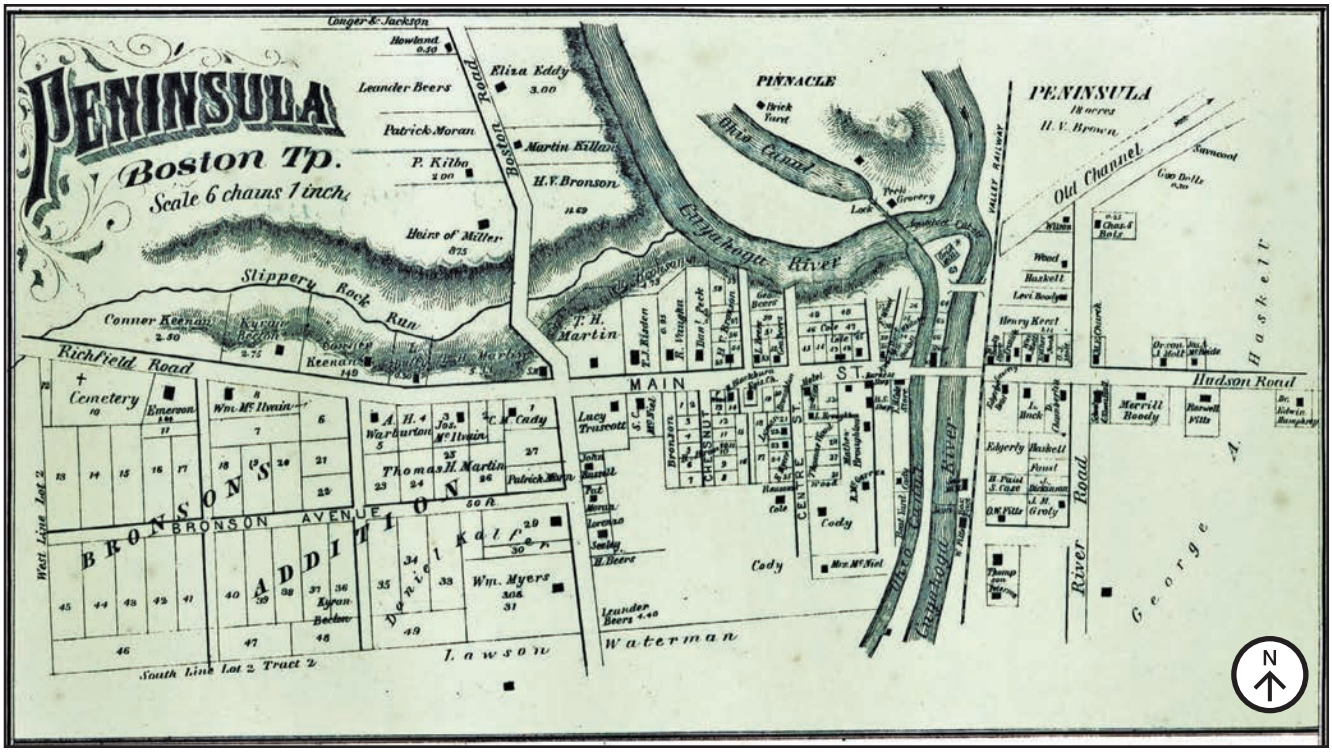


Figure 8. Map of Peninsula, Ohio in 1874 (*Source:* Tackabury, Mead, and Moffett, *Combination Atlas Map of Summit County, Ohio)*

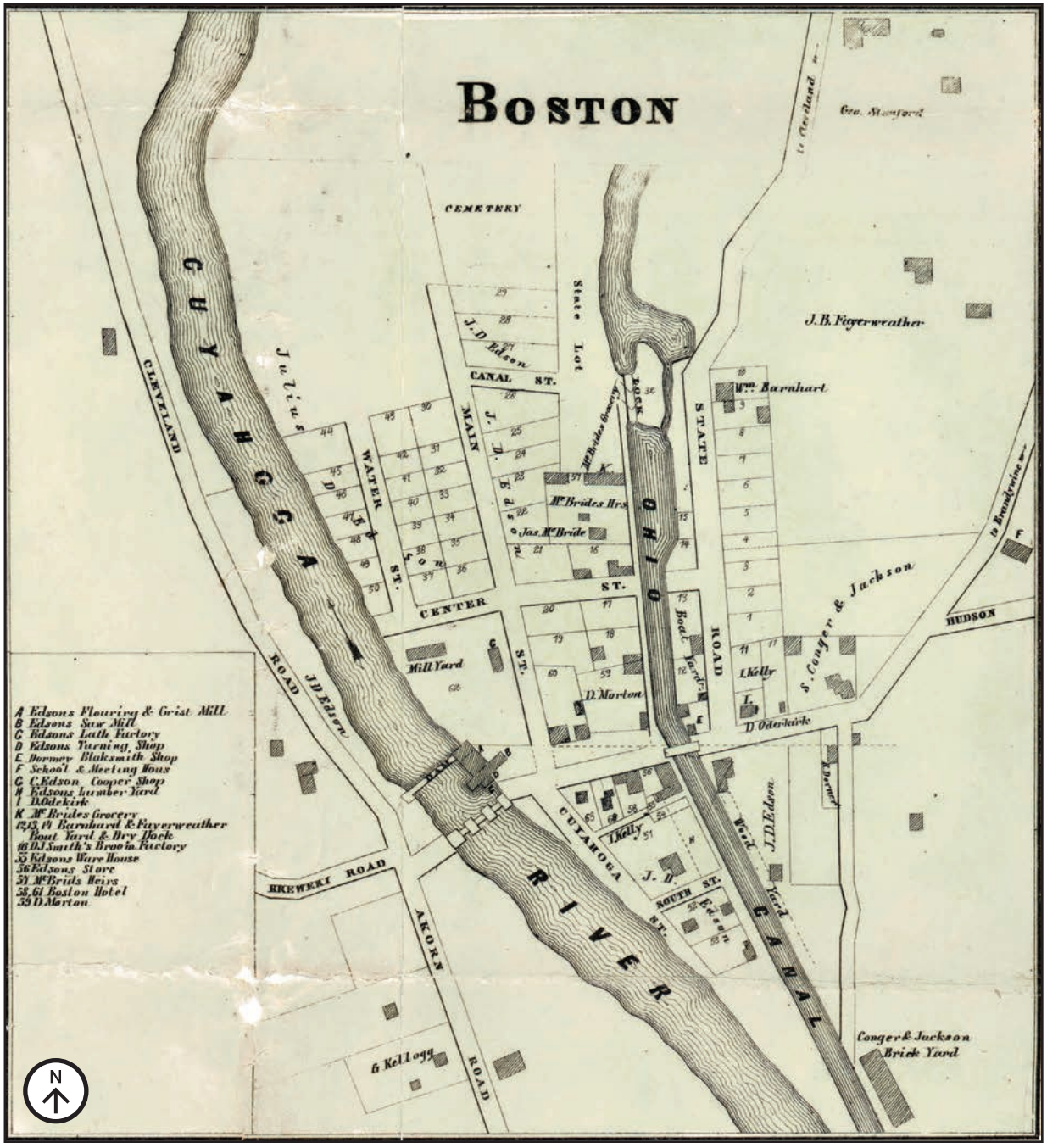


Figure 9. Map of Boston, Ohio in 1856 (*Source:* Paul, *Map of Summit County, Ohio*)

In later years there was a state boat repair slip nearby. Zimmerman's Tavern at Lock No. 39 was a local landmark renowned for cock fighting during the canal era.

From Lock No. 39 to Cleveland the terrain became flatter, and there were only three locks (Nos. 40-42). In the city itself, Locks Nos. 43 and 44 were completed no earlier than the summer of 1828. Between the last two locks there was a large basin which accommodated both lake vessels and canal boats. It was a busy hub of commerce. Between the terminus of the canal and the lake there were dry docks, warehouses, and other improvements that were designed to facilitate the transfer of goods between lake vessels and canal boats.[66]

At their policy meeting in May 1825 the canal commissioners adopted the specifications used on the Erie Canal for the construction of the Ohio canals.[67] The Ohio and Erie's prism was 26 feet wide at the bottom and 45 feet wide at the water line. The canal's towpath was usually 10 feet wide, and the opposite "berm" bank not less than six feet. General specifications stipulated that every five rods (330 feet) along the towpath there be a sluice to carry off excess water, but this was not done in practice. Lock chambers were 90 feet long and 15 feet wide "in the clear." The plans and specifications for other necessary structures such as culverts, aqueducts, waste structures, feeders, bridges, and protective walls were handled on a case-by-case basis and were generally handwritten in the section contracts by an acting commissioner or engineer.

Like all of the early canals, the Ohio and Erie was designed to accommodate a special kind of traffic: boats towed by horses or mules (Figure 10). The animals were driven on the towpath, which was always located on the side between river and canal so that landslides were least likely to damage it. The canal's earthen embankments could handle only a gentle wash, restricting boat movement to about four miles per hour. Boats were built to be less than half the width of the canal prism so that they could pass one another in transit. There were basins at occasional intervals along the line where boats could turn, take on or discharge cargo and passengers, or wait their turn to pass through a lock. Lock dimensions dictated the dimensions of the boats: Ohio canal boats were usually 60 to 75 feet long and 14 feet wide (Figure 11). Most of the early boats were designed to carry both passengers and freight and had a maximum cargo capacity of 30 to 40 tons, but by the 1840s this had increased to as much as 60 tons through a combination of regular dredging, an increase in the water level, and redesign of the boats. Combination cargo-passenger boats usually carried people on short runs which did not require overnight onboard accommodations. Packet boats offered express passenger service between terminals.[68]

Boat yards were established at many towns and villages along the canal route, including Peninsula and Boston. By October 1831 when the Ohio and Erie was completed to Columbus and Circleville, approximately 45 boats were operating, and the number quickly increased after the entire line was open to navigation the following year. By 1838 there were as many as 340 boats operating on the Ohio and Erie. Transportation lines were formed, each consisting of

66. Trevorrow, *Ohio's Canals*, 41-45.
67. Scheiber, *Ohio Canal Era*, 40; Woods, *Ohio's Grand Canal*, 8.
68. Scheiber, *Ohio Canal Era*, 40-41; Woods, *Ohio's Grand Canal*, 20; Ohio Board of Public Works, *Sixth Annual Report of the Board of Public Works, 1843,* 5.

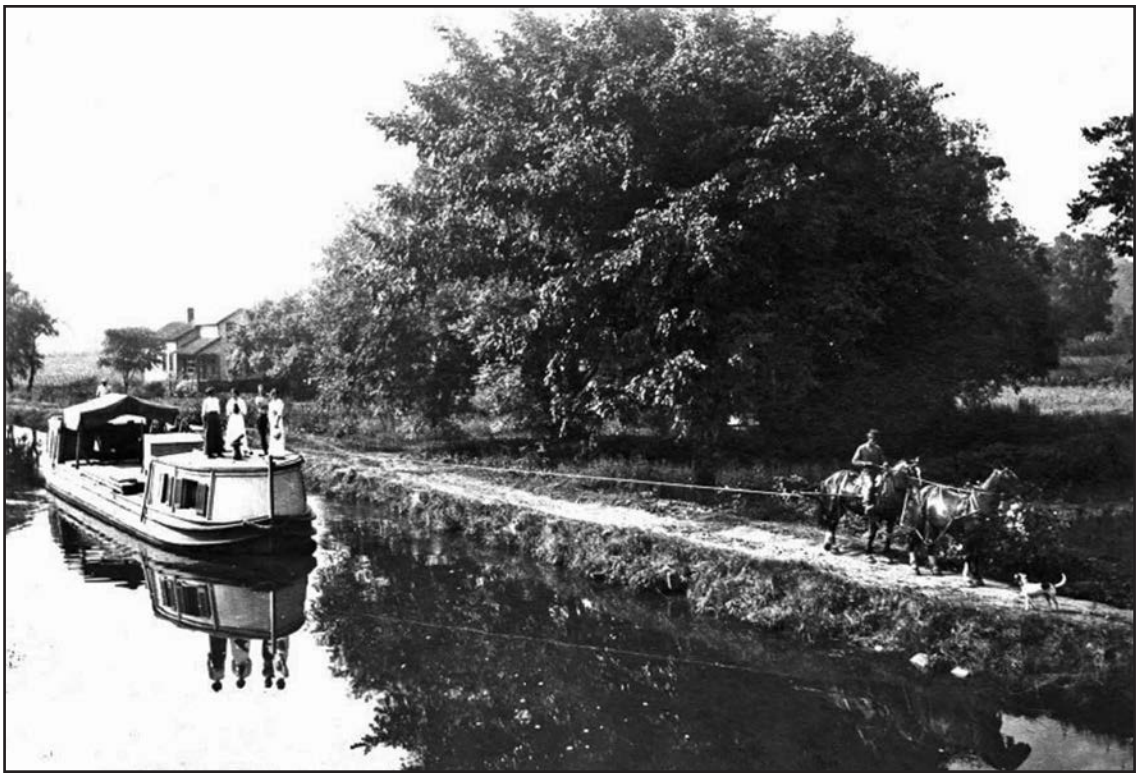

Figure 10. State boat south of Stone Road, 1912 (*Source:* Louis Baus Canal Photograph Collection, OEC_56, The University of Akron, University Libraries Archival Services)

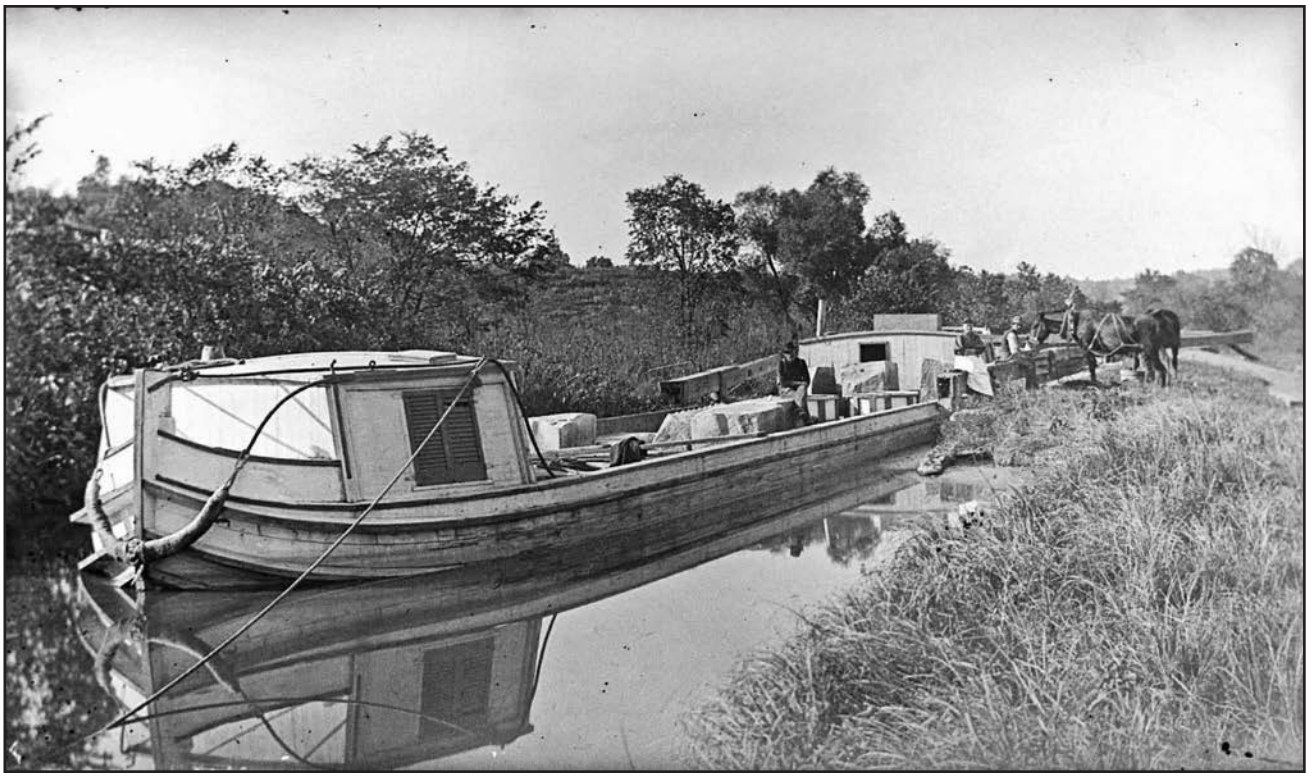

Figure 11. Lower lock at Botzum, 1890 (*Source*: Edwin Bell Howe Photograph Collection, Summit Memory)

a fleet of boats, warehousing facilities, and forwarding and receiving houses. There were five major freight and passenger lines in 1835, operating boats that carried both freight and passengers. Other boats were affiliated with an individual mill or other business. Toll offices were established at larger towns such as Cleveland and Akron, but boats on short local runs managed to avoid paying tolls all together.[69]

In January 1835 four of the larger transportation lines formed a consortium in an attempt to reduce shipping costs. Two more lines joined the Canal Line Consortium in 1836, increasing the total number of boats under its control to 66. Ultimately the consortium accounted for over half of all freight and passenger traffic on the Ohio and Erie Canal. The Ohio Canal Packet Boat Company was formed in March 1837 to provide the first true express passenger service on the Ohio and Erie. It ran a fleet of eight express packets between Cleveland and Portsmouth, a trip that normally took 80 hours.[70]

**Economic Impact of the Ohio and Erie Canal in the Cuyahoga Valley**

Before 1825 the valley and territory surrounding it constituted a nearly unbroken wilderness. Occasionally a crude dwelling or two on an irregular patch of denuded land poked through the forest. The valley's economy, like the rest of Ohio's interior, was grounded on barter. Farmers grew corn and raised swine to subsist. Meager surpluses were occasionally exchanged for staples to augment this mean state of affairs. Nevertheless, landowners and squatters alike lived from hand to mouth. Roads were few, and invariably became quagmires in inclement weather. The costs involved in transporting goods across the Allegheny Mountains to eastern urban markets were so prohibitive that the only major market available to most Ohioans was New Orleans, a difficult 1,400-mile trip downriver from Cincinnati.[71] The region's waterways had many obstructions and could only be navigated at certain times of the year, and then generally in only one direction.

Subsistence agriculture was the economic backbone of the Cuyahoga Valley during the frontier period. This inhibited the development of better communications, the growth of major commercial enterprises, and the accumulation of working capital. Settlers and squatters who ventured into the wilds of northeastern Ohio faced a difficult existence. Poverty exacerbated by the near absence of cash characterized life in the region.

During 1825 to 1827 construction of the Ohio and Erie Canal through the Cuyahoga Valley dramatically changed this scene. The transition from barter to cash was swift. Cash disbursements to canal contractors were passed on to canal laborers, and, in turn, to local merchants. Canal historian Terry Woods notes that "perhaps for the first time in Ohio's history, cash money was in circulation."[72] Pressing needs for stone and wood to build canal components spawned quarrying and lumber industries. Quarries near Peninsula supplied most of the Berea sandstone used in lock construction between Akron and Cleveland. White oak was greatly in demand to build gates, culverts, and aqueducts. This resulted in a proliferation of sawmills in

69. Woods, *Ohio's Grand Canal*, 20-21.
70. Woods, *Ohio's Grand Canal*, 22-23.
71. Woods, *Ohio's Grand Canal*, 2-3, 88.
72. Woods, *Ohio's Grand Canal*, 89.

the valley. As a byproduct of new industries, local labor acquired new skills. During the early years of the canal era, stone masons, sawyers, carpenters, shipwrights, blacksmiths, and animal care specialists abounded.

Even so, the economic stimuli derived from the canal's construction were transitory. The long-term impact of the canal in northeastern Ohio, as elsewhere, was a function of its actual operation.[73] Urban growth at the sector's terminal points resulted from the need to develop facilities for handling canal commerce. Akron and Cleveland quickly responded to this need and profited from it. Akron, founded in 1825, had 3,206 residents by 1850, and Cleveland's population rose from 606 in 1820 to 1,076 in 1830 and 6,071 in 1840.[74]

Within the Cuyahoga Valley the shift from the subsistence farming of corn and swine to the commercial production of wheat and cattle dates from 1827. After the canal opened settlers began to clear land to produce cash commodities. Until 1827 the price of wheat near Akron had been 20-30 cents a bushel. By 1833 it was 75 cents.[75] The trend to produce cash commodities was particularly pronounced in counties and townships that bordered the canal. Harry Scheiber has calculated that in the six counties on the Ohio and Erie's northern division, urban property values rose 360% between 1832 and 1840.[76] The appreciation of mostly rural property in the valley was not as striking, but significant economic differences began to appear between settlers and squatters, the latter having far fewer opportunities to accumulate cash.[77] Settlers invested in personal possessions, more elaborate homes, and in internal improvements of a local nature such as plank roads.

Archeological evidence from house sites in the valley supports the view that settlers living in townships bordering the canal became wealthier during this period.[78] Similarly, most of the imposing residences, commercial structures, and churches in the valley date from the late 1820s through the 1840s. Nearly all brick construction dates to this period and is reflected in the increased tax value of individual properties. Road development was actively sponsored during the 1830s. Settlers wanted better access to the canal for the shipment and importation of goods. The economic need for better transportation to the canal decreased the isolation imposed on settlers and squatters alike before the canal era.

The Cleveland-Akron sector of the canal went into active operation immediately after it was opened on July 4, 1827. By mid-December an amount of cargo equivalent in weight to more than 10,000 barrels had been transported northward, while the equivalent of more than 8,000 barrels had been moved southward. The principal products carried in the northward trade were wheat, flour, tobacco, whiskey, beef, butter, and cheese, while those in the southward trade were general merchandise, salt, and fish. Near the end of 1827 coal began to be shipped from Talmadge to Cleveland, and the coal trade became a major part of the northward

73. Scheiber, *Ohio Canal Era*, 90-91.
74. Woods, *Ohio's Grand Canal*, 89.
75. Scheiber, *Ohio Canal Era*, 192; Woods, *Ohio's Grand Canal*, 89.
76. Scheiber, *Ohio Canal Era*, 198.
77. David S. Brose, "Proposal to the National Park Service, Midwest Archaeological Center" (Cleveland: Cleveland Museum of Natural History, 1979), 105.
78. Brose, "Proposal to the National Park Service," 105.

commerce once the canal reached the Muskingum River and its branches where extensive coal fields were located near the waterway.

Trade on the Ohio and Erie continued to increase until 1840. During the 1827-1840 period much of the region served by the canal had no alternative routes of transport to the eastern seaboard and depended almost exclusively on the waterway for both imports and exports. The canal was the only water transport link between Lake Erie and the Ohio River during this period, and thus it held a virtual monopoly position for long-haul freight between the two major market areas of the West.[79] While the Ohio and Erie Canal held its monopoly position it was a spectacular success in contributing to population growth and economic development in the region it served. As the opportunities for exporting to cash markets became more attractive, settlers began to come into northeastern Ohio to take advantage of the large tracts of cheap and fertile lands available from the federal government. Population in the northern and central counties through which the canal ran gained by 70,000 in the 1820s and by 100,000 in the 1830s, far exceeding the rate of gain in older settled sections of the state.

Earlier expectations that the Ohio and Erie would make the northern and central portions of the state a vast granary and emergent wheat belt serving the growing population of New York and the Atlantic Coast were fulfilled as the growing trade made Cleveland the principal market for grain in the Great Lakes region by 1840. The northern and central sections of the Ohio and Erie also proved a boon to coal mining in areas through which it passed as Cleveland and later Akron developed into large markets and terminals of the coal traffic. By the mid-1840s Cleveland consumed about 80% of the coal shipped over the canal. It is estimated that nearly 25% of the coal mined in Ohio in 1850 was transported over the Ohio and Erie to the developing grain and steel industries at Cleveland and Akron.[80]

The Ohio and Erie Canal also played a major economic role as a channel for imported items from the eastern seaboard such as hardware, textiles, clothing, farm implements, machinery, processed foods, and finished goods, all classified as “merchandise.” Cleveland was the main entryway for such goods destined for northern and central Ohio, and as a result, merchandise shipments by canal from that city rose from some 5.2 million pounds in 1832 to nearly 20 million pounds in 1839. The second largest import item on the canal was New York salt, a basic dietary item and a necessity for meat-packing; the total imports of salt rose from just under 30,000 barrels in 1832 to nearly 110,000 barrels in 1839. Northern and central Ohio also relied on the canal as a conduit for the export and import of other products. Corn, pork, and whiskey were major staples of the northward trade to Cleveland for export, while gypsum and lumber were significant in the southward trade (Figure 12).

The Ohio and Erie thus played an impressive role in the growth and development of the Cuyahoga Valley and other parts of northern and central Ohio. By 1840 Ohio was recognized as the “Third State of the Union,” ranking only behind New York and Pennsylvania in measurable criteria of economic development. The canal trade, which reached its peak in 1851, benefitted those areas as follows:

79. Scheiber, *Ohio Canal Era*, 191.
80. Earl Heydinger, “Early Coal Traffic on the Ohio and Erie,” *Towpaths* 12 (1974), 34-36.

Figure 12. Lumber boat at Lock No. 26 (*Source*: Edwin Bell Howe Photograph Collection, Summit Memory)

> Together with the surge in population came the anticipated increase of land values, reflecting both agriculture's new profitability and the rising total acreage of land in cultivation. But perhaps the most striking features of development were the growth of cities and the prominence of commerce and industry in the central and northern canal regions…
>
> This rapid rate of urban growth was also reflected in the occupations by which the people earned their livelihood. In the regions where urbanization was taking hold, along the central and northern portions of the canal, the proportion of all nonprofessional workers engaged in manufacturing, trades, and commerce was 22 percent—as compared to less than 15 per cent in Ohio counties lacking canal facilities….
>
> This degree of diversification in the local economies of the northern and central regions was all the more remarkable considering the near-frontier status of most of these areas two decades earlier. Apparently the model of development postulated by the early canal advocates had been realized: rising farm income and population brought new business to the commercial towns, and also a larger "home market" for local goods produced in shops and factories which had the advantage of canal transport for raw materials. A diversified economic structure produced an interaction between agricultural growth and urban-based commerce and industry that pushed the canal counties ahead in the race for economic development.[81]

**The Long Decline of the Ohio and Erie Canal**

The heyday of the Ohio and Erie Canal was brief. The beginning of its long decline can be traced to 1840 when the opening of the Pennsylvania and Ohio (or Mahoning) Canal between Akron and Youngstown broke the regional monopoly of the Ohio and Erie. Three major commodities from the Mahoning Valley then began to pass through the Cuyahoga Valley on their way to Cleveland: namely, coal, wool, and dairy products. Although augmenting Cleveland's exports of these goods, the Mahoning was a threat to Cleveland's export of goods to Ohio's interior. Henceforth, consumers in northeastern Ohio were free to import commodities by way of the Ohio River, the P & O/Mahoning, or the Ohio and Erie. The P & O Canal strengthened traffic on the northern section of the Ohio and Erie but reduced traffic on the southern portion.[82]

Freight rates on the Ohio and Erie Canal declined during the 1840s because of interregional competition from Pennsylvania, Indiana, and Illinois canals. Yet even while these canals were under construction, the venerable river system that served New Orleans showed remarkable resiliency. The expansion of steamboat capacity and the hearty competition given steamboats by river flatboats kept rates down. During the 1840s rates on shipments from Cincinnati to New Orleans fell from 50 cents per 100 pounds to 20-28 cents. This situation gave the canal commissioners of Ohio even more incentive to cut tolls on the Ohio and Erie.

81. Scheiber, *Ohio Canal Era*, 191-200, 391-397.
82. Scheiber, *Ohio Canal Era*, 215-217; Woods, *Ohio's Grand Canal*, 25.

Naturally the proliferation of canals and the staying power of the southern river system forced boat operators on the Ohio and Erie to pare their rates during the 1840s.[83] Canal historian Terry Woods states that the "great reduction in the cost of river transportation between New Orleans and the eastern markets put an effective stop to through traffic in both directions between Lake Erie and the Ohio River...By the early 1840s, the traffic pattern on the canal had permanently changed. For all practical purposes, goods at or south of Newark were transported south on the canal to the river, and goods north of Newark were transported to the lake."[84]

Thus in the 1840s interregional competition from other waterways severely restricted profits on the Ohio and Erie Canal, but it was the development of the Ohio railroad system in the 1850s that was the primary cause of the Ohio and Erie's demise. Potential trouble for the canal loomed as early as 1837 when the Loan Law of March 24 allowed the investment of state funds in railroad companies.[85] The 1837 law is significant because it marked a change in official state policy toward internal improvements. For three years state construction of public works was abandoned in favor of state aid to private enterprise engaged in such work. The era of privately owned internal improvements in the State of Ohio had dawned.

To be sure, the Loan Law of 1837 was repealed on March 17, 1840. One cause was public outcry over a plundering of the state treasury to finance loans to fly-by-night companies. The deeper cause however was the general distrust of state participation in internal improvements. On March 13, 1843 the State Assembly forbade state aid of any kind to private companies constructing internal improvements. The logical conclusion was embodied in the State Constitution of 1851 which prohibited the state from extending credit to or becoming a stockholder in any private company.[86]

The absence of government support did not abate the proliferation of railroads in the state. By 1851 Ohio was no longer poor. Indeed, Ohio entrepreneurs were eager to invest their own capital in internal improvements. The decade of the 1850s was characterized by furious railroad construction throughout the country, but in no state was the rate of construction greater than in Ohio. In 1850 there had been only a little more than 300 miles of track in Ohio, but by 1860 this had increased to approximately 3,000 miles.[87]

Farmers, merchants, and travelers who could choose between railroads and canals usually picked the former. Rails offered the public greater speed. Shipments of goods to the Atlantic coast took several weeks by canal but only a few days by rail. Rail transport also was viable all year; the canals often were closed for four or five months during the winter, and even during other seasons, traffic could be halted by floods, low water, and other natural occurrences. Railroads were not immune from operational problems, but rerouting rail traffic was comparatively easy. Once telegraphic communication became widespread, railroads permitted their customers to reap the advantages of short-term price movements in interregional markets.[88]

83. Scheiber, *Ohio Canal Era*, 213-214.
84. Woods, *Ohio's Grand Canal*, 24-25.
85. Finn, "The Ohio Canals," 28.
86. Finn, "The Ohio Canals," 129.
87. Scheiber, *Ohio Canal Era*, 290.
88. Scheiber, *Ohio Canal Era*, 320-327.

In order to compete with the railroads more effectively, the Board of Public Works undertook an extensive program of repairs to the canals in 1850, including the rebuilding of 19 locks on the Ohio and Erie. The following year the board proposed a more comprehensive $2 million modernization program that would include widening and deepening the canals, but this went nowhere in the legislature, which was beginning to believe that the best policy might be to dispose of the canal system altogether. Nothing came of a proposal in the 1852-1853 session of the legislature to sell the canals, but after 1853 declining tonnage on the trunk lines eroded public confidence.[89] In 1855 increased expenditures for maintenance induced the Board of Public Works to negotiate five-year contracts with private firms for maintenance and repair of the canals. The plan was a failure. In 1857 the General Assembly declared the 1855 contracts fraudulent. Ensuing lawsuits dragged on, allowing the canals to fall into an even greater state of disrepair.[90]

During the 1850s Ohio's canal system suffered one misfortune after another. Droughts in 1851 and 1856 bottled up traffic on the Ohio and Erie for weeks.[91] In the mid-1850s the P & O Canal was essentially put out of business when it was sold to the Mahoning Railroad.[92] For seventeen years this canal had acted as the only feeder for the northernmost sector of the Ohio and Erie. Loss of the P & O was followed by severe floods in 1858 and 1860.[93]

Disgust with the canals' performance became widespread among Ohio politicians. Governor Salmon P. Chase advocated sale of the canals in his annual addresses of 1857, 1859, and 1860. The Assembly balked at selling but the Act of April 6, 1859 authorized leasing the state's entire public works system for an annual rent of not less than $54,000. Railroads were excluded from submitting bids. No other bids were received however, and the state continued to struggle with its down-at-the-heels canal system.[94] Continued public dissatisfaction, a Republican Legislature, and active lobbying by the railroads resulted in the Act of June 2, 1861 which provided that the public works of the state be leased to the highest bidder for a period of ten years. A syndicate of ten operators submitted the higher of two bids received. For $20,075 per annum, Ohio canals were handed over to the syndicate.[95]

Between 1861 and 1877 the private operation of the canals was "neither brilliantly good nor terribly bad."[96] The syndicate's record was sufficiently competent to win another 10-year lease. It performed routine dredging and maintenance on the Ohio and Erie and partially rebuilt a number of locks. The Civil War years brought a burst of activity along the line as boats were kept busy hauling grain and other freight. The boat yards at Akron, Peninsula, and Boston were at near capacity during the war, and the canal as a whole seems to have been a profitable enterprise once again. [97]This renewed activity however ended with the war, and afterward traffic kept declining, especially during the summer of 1875. The transportation companies that

89. Finn, "The Ohio Canals," 35; Woods, *Ohio's Grand Canal*, 28.
90. Scheiber, *Ohio Canal Era*, 302-303.
91. Scheiber, *Ohio Canal Era*, 327.
92. Ernest L. Bogart, *Internal Improvements and the State Debt in Ohio: An Essay in Economic History* (New York: Longman, Green, and Co., 1924), 126.
93. Scheiber, *Ohio Canal Era*, 327.
94. Finn, "The Ohio Canals," 35-36; Woods, *Ohio's Grand Canal*, 29.
95. Finn, "The Ohio Canals," 36.
96. Finn, "The Ohio Canals," 36.
97. Woods, *Ohio's Grand Canal*, 55.

had controlled most canal shipping were dissolved, leaving the business to individual boat captains who were often unreliable. On December 1, 1877 the syndicate surrendered its lease.[98]

After a short period of receivership, the Board of Public Works again took charge of the canals. Between 1878 and 1902 the system continued to deteriorate. Although local short-haul navigation remained viable in some areas, including the northern division, traffic continued to decline, and a number of canal sections were abandoned or acquired by railroads.[99] As early as 1875 the Ohio and Erie's northern terminus had been relocated three miles farther south. At that time Lock No. 42 was rebuilt to provide access to the river. The Valley Railway, then slated for construction through the valley, acquired the canal bed between Locks Nos. 42 and 44 as part of its right-of-way.[100]

About 1880 the exhaustion of coal mines near Akron caused gross tonnage of coal, the principal article hauled through the Cuyahoga Valley, to plummet. Debilitating floods struck again in 1882 and 1884. These left the canal full of debris and damaged feeder components, especially dams. By this date the Valley Railway was in operation through the valley and attracted business formerly received by the canal. The Board of Public Works reduced canal tolls in an unsuccessful effort to stem the loss of business to the railroads, resulting in a steep fall in revenues. The 1880s and early 1890s saw the abandonment of almost all of the Ohio branch and feeder canals. In 1894 only the two trunk lines and a few feeders survived, and these were mostly in deplorable condition. Destructive floods in 1898 and 1902 effectively ended commercial navigation on the Ohio and Erie Canal south of Dresden. The northern section remained open, but navigation was difficult, so "by the late 1890s, converted freighters, taking church and picnic groups on short jaunts to nearby picnic groves along the canal, were the most prevalent type of traffic."[101]

The roots of a movement to save Ohio canals can be traced to 1878 when Governor Young argued that the state could not afford to abandon them.[102] Following Governor Foraker's pro-canal message of January 2, 1888, a three-man canal survey commission was formed "to establish the boundaries and lines of canals, canal basins, reservoirs, etc., by an accurate survey—and to define and protect the ownership and titles of the state in and to all lands belonging to and connected with said canals."[103] Between 1888 and 1892 the commission, reduced to two men in 1892, worked to overcome myriad obstacles. The results of their exhaustive investigations were beneficial to the state. In 1902 the legislature declared that the Miami and Erie Canal, as well as the northern division of the Ohio and Erie Canal from Cleveland to Dresden, would be retained and maintained as a public canal.[104] The legislature also moved forward with an investigation of the condition of the Ohio and Erie southern division.

98. Bogart, *Internal Improvements and the State Debt,* 115; Woods, *Ohio's Grand Canal*, 57.
99. Bogart, *Internal Improvements and the State Debt*, 115-116.
100. J. and M. Jackson, *The Colorful Era*, 119.
101. Bogart, *Internal Improvements and the State Debt*, 130-131; Woods, *Ohio's Grand Canal*, 59-61.
102. Huntington and McClelland, *History of the Ohio Canals*, 51.
103. Bogart, *Internal Improvements and the State Debt*, 132.
104. Bogart, *Internal Improvements and the State Debt*, 138, 161.

In 1903 the detailed report of Chief Engineer Charles W. Perkins of the Board of Public Works helped to implement a comprehensive rehabilitation program for the state's remaining canals. The main purpose of this program was to adapt the canals to the demands of modern traffic as well as to preserve the state's lucrative long-term water power leases to private commercial interests. Sufficient statewide sympathy motivated the legislature to make financial allotments from the General Fund in 1904. It appropriated $75,000 for 1904, $125,000 for 1905, $250,000 for 1906, and $356,000 for 1907.[105] In order to make practicable the improvements from Cleveland to Dresden, which included a canal with a minimum of five feet of water, Perkins calculated that it would be necessary to secure $30,000 worth of water leases along the Ohio and Erie's northern division.[106] During 1905-1906 the canal from Akron to Cleveland was dredged, and major repairs were made to all locks in the valley, using concrete as the primary building material. Nearly all canal components between Lock Nos. 24 and 38 were rehabilitated in 1905 (Figure 13). The rest (one culvert, two sluices, and the Galley Run Mudcatcher) were addressed during 1906-1909.[107]

Despite material improvements to the canal in the Cuyahoga Valley and elsewhere along the Ohio and Erie's northern division, public opinion regarding the canal system had not really changed. In fact the suspension of navigation during the rehabilitation project had driven away the little shipping business that had remained. Cost overruns and defective work brought charges of fraud and mismanagement against Chief Engineer Perkins, who was not reappointed when his term expired in 1910. His successor, John I. Miller, confirmed in his 1911 report that the Ohio and Erie from Cleveland to Dresden had been rebuilt for most of the way, but no aqueduct existed at Roscoe and dredging had been discontinued at Tuscarawas due to lack of funds. In Miller's opinion these deficiencies put the whole system out of commission. Miller pleaded for the state to settle on a fixed policy in its attitude toward the canals, one that would not change with the arrival of each new legislature.[108]

Events just prior to the disastrous flood of March 1913 show that no reversal in attitude of either the state or the public was in the cards. Nearly all the Ohio and Erie Canal between Dresden and Portsmouth was officially abandoned in 1911. The following year the legislature abolished the Board of Public Works and named John I. Miller supervisor of Public Works. Miller vigorously prosecuted two related projects: continuation of the surveying and platting of canal lands and disposition of major lawsuits in which the Board was attempting to recover state property.[109] By 1912 the state had managed to compile a partial survey of canal lands undoubtedly in its possession, but it was far more difficult to ascertain what lands in the possession of other parties really belonged to the state.

The devastating flood of March 1913 only accelerated the demise of Ohio's unpopular canal system. Sixteen miles of the Ohio and Erie's northern division between Portage Summit and Brecksville were totally destroyed (Figure 14). The section from Brecksville to Cleveland was considered salvageable, but only because it held enough water to allow the state to

105. Bogart, *Internal Improvements and the State Debt*, 138-139; Woods, *Ohio's Grand Canal*, 70.
106. Huntington and McClelland, *History of the Ohio Canals*, 51.
107. James Dillow Robinson, "Canal Maintenance and Recollections," *Towpaths* 17 (1979), 9-10.
108. *Executive Documents: Annual Reports for 1912*, Part 1, 876; Woods, *Ohio's Grand Canal*, 63-65.
109. Ohio Board of Public Works, *74th Annual Report of the Board of Public Works, 1912,* 835; Woods, *Ohio's Grand Canal*, 66.

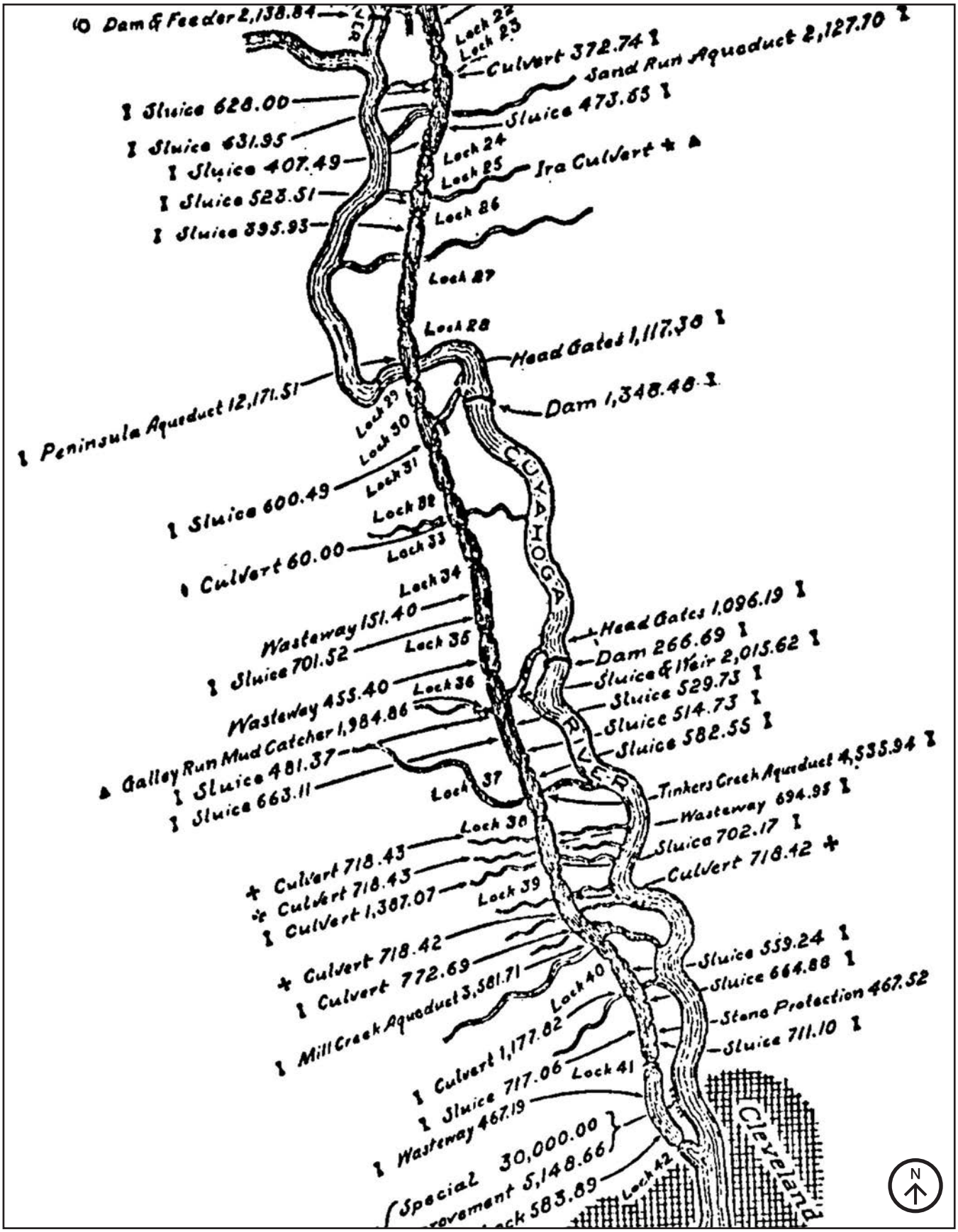


Figure 13. Canal structures rebuilt during the 1905-1909 rehabilitation program (*Source:* Ohio Board of Public Works, *71st Annual Report*, 1909)

Figure 14. View of flood damage in Peninsula, 1913 (*Source:* Summit County Historical Society collection, www.summitmemory.org)

continue its hydraulic leases with industries along the route, including the American Steel and Wire Company mill in Cleveland.[110]

Following the March flood, the Ohio 1913 Canal Commission was appointed to make recommendations for the disposition of the state's remaining canals. Its report stressed the feasibility of reconstructing part of the old system, with federal aid, as a barge canal across Ohio. However, there was no hint that any part of the Ohio and Erie was eligible for this modernization. This report was the death sentence for the Akron-to-Cleveland section:

> 2nd. The Commission finds that the rehabilitation of the canals of the State on the original basis or standard of construction is impracticable and highly inadvisable.
>
> 3rd. In event a barge canal is not feasible, and inasmuch as it would not be advisable to rehabilitate the canal into the original standard of construction and specifications, the Commission advises that the State retain its ownership in the rights of way in the sections of canal that are producing revenue in the way of water rentals.
>
> 4th. The Commission recommends that the waterways, both natural and artificial, be developed and improved for water power and industrial purposes wherever possible; that the canals be drained at such points where the revenues do not justify the cost of maintenance, and placed in such condition as to prevent their becoming nuisances to the communities through which they pass.[111]

After the flood the state officially kept the northern portion of the Ohio and Erie Canal open because of the lucrative water power leases, maintaining it as well as necessary to keep the water flowing. Also as long as there was any prospect of building a modern lake-to-river barge canal between Cleveland and Dresden, it made sense for the state to retain the Ohio and Erie right-of-way, but eventually the proposed route shifted east to the Mahoning Valley and Youngstown. Finally, in July 1929 the last section of the Ohio and Erie Canal was abandoned for navigational purposes, officially ending the canal era in the Cuyahoga and Tuscarawas valleys.[112]

Even after it ceased to be a transportation system the canal continued to be maintained as a source of hydraulic power and cooling water. The state continued its long-term water leases with private industries and municipalities. Some portions of the canal began to be used for recreational purposes, some were redeveloped, and others were allowed to revert to nature.[113] By the 1960s a number of local groups in towns along the Ohio and Erie Canal engaged in grassroots efforts to preserve remnants of the canal and adjacent historic resources

110. Ohio Board of Public Works, *75th Annual Report of the Board of Public Works, 1913,* 5.
111. Ohio Board of Public Works, *76th Annual Report of the Board of Public Works, 1914,* 11-12.
112. Woods, *Ohio's Grand Canal*, 72-74.
113. Woods, *Ohio's Grand Canal*, 74-75.

and open space throughout the corridor. Many of them came together in 1992 to form the Cuyahoga Valley Association, a broad-based preservation advocacy organization.[114]

Within the present limits of Cuyahoga Valley National Park, the canal section north of the Pinery Feeder at Brecksville was leased to the American Steel and Wire Company into the 1990s while the rest was allowed to deteriorate. The portions south of the village of Ira became highway right-of-way and part of the City of Akron's wastewater collection and treatment system. In 1974 the Cuyahoga Valley National Recreation Area was created, and in 2000, Cuyahoga Valley National Park. Areas formerly leased to American Steel and Wire ultimately were acquired by the federal government and by Summit and Cuyahoga counties which established a trail system on portions of the old towpath. On a larger scale, in 1996 the Ohio and Erie Canal Heritage Corridor (now known as the Ohio and Erie Canalway National Heritage Area) was created from the former canal lands between Cleveland and Zoar, and later extended south to New Philadelphia. Over several decades, state, county, and federal entities have redeveloped the old canal into an integrated regional recreational asset enjoyed by millions of visitors annually.[115]

114. Bob Downing and Russ Musarra, "Saving the 'Little Silver Ribbon,'" in *Canal Fever: The Ohio and Erie Canal, from Waterway to Canalway*, ed. Lynn Metzger and Peg Bobel (Kent: Kent State University Press, 2009), 253-276.
115. Woods, *Ohio's Grand Canal*, 76-77; Tamburro, "History of the Ohio and Erie Canal," 16-17; Peg Bobel and Lynn Metzger, "Journey to Canalway," in *Canal Fever: The Ohio and Erie Canal, from Waterway to Canalway*, ed. Lynn Metzger and Peg Bobel (Kent: Kent State University Press, 2009), 335-355.

## B. CHRONOLOGY OF DEVELOPMENT AND USE

This section incorporates text from the *Historic Structure Report: History Section* for the Ohio and Erie Canal prepared by Harlan Unrau and Nick Scrattish in 1984 and from the *(Draft) Historic Structure Report: Administrative and Architectural Data Sections* prepared by Paulette Oswick Cossell in 1993, portions of which were derived from the 1984 report by Unrau and Scrattish.[116] The text has been edited, reorganized, and expanded for clarity and to meet current National Park Service standards for Historic Structure Reports.

### History of Use and Physical Changes

Within Cuyahoga Valley National Park, the Ohio and Erie Canal as it exists today is an amalgam of structures and features constructed and repaired repeatedly over the course of 88 years, its period of significance (1825-1913); the canal was effectively abandoned for navigational purposes in 1913, acquired by the federal government in 1989, and minimally maintained since that time. Prior to 1989 virtually all the canal lands and associated structures within the Park were owned by the State of Ohio. The absence of fee ownership prevented federal intervention to protect, stabilize, or preserve the resource. Considerable obstacles, however, impeded the acquisition of the canal. Complicating the matter was a state regulation preventing the donation of the canal to the federal government (O.RC.123.681) and a stipulation in the recreation area enabling legislation prohibiting the acquisition of public lands except through donation (PL. 93-555). Legislation, introduced in the Ohio legislature, was enacted to allow for transfer of the canal within the recreation area to the United States (Amendment to the 1959 Canal Lands Authority Act). In December 1989 canal lands encompassing 129.71 acres were acquired in fee by donation from the State of Ohio and assigned tract number 105-075.

Although the canal underwent massive rehabilitation in 1905-1909, it would be incorrect to consider it an early 20th century system. The locations and dimensions of principal structures such as the canal prism and the 16 lift locks are essentially unchanged since the system's original construction in 1825-1827, although the prism was dredged and long stretches of the towpath rebuilt many times, and the locks were repaired repeatedly. Most of the existing culverts, flood gates, and waste weirs were constructed much later than the prism and locks, and many of the original structures have disappeared completely, their locations unknown. One of the two aqueducts survives as a ruin, while the other was completely reconstructed in 2007. None of the 19th-century road and foot bridges over the canal are extant, and many of the turning basins have been filled or silted in. The Peninsula feeder is a ruin, but the Pinery feeder complex still functions as originally designed, although its component structures were replaced or repaired many times over the years.

The northern six miles of canal in the park, from Rockside Road to Route 82, remains in a watered condition, supplied with water by the Pinery Feeder and Brecksville Dam (1951). Since 1913, when canal navigation ended, this section with its three lift locks, one aqueduct, and several culverts, flood gates, and waste weirs received enough maintenance to keep the water flowing to the American Steel and Wire Company plant in Cleveland under the terms of

116. Unrau and Scrattish, *Historic Structure Report;* Cossell, *Ohio and Erie Canal*.

its hydraulic lease with the State of Ohio. Structures have been repaired or replaced as necessary, first by the American Steel and Wire Company, then more recently by the federal government. For this reason the canal structures along the watered section are in much better condition than those along the 16-mile unwatered section in the southern portion of the Park. That section was completely abandoned after 1913 and allowed to revert to nature. Some structures were destroyed by river action or highway construction, and the others deteriorated to varying degrees. Only after the canal's acquisition by the federal government in 1989 and the creation of the multi-use trail on its towpath was there any effort to stabilize the surviving canal structures, done in a non-comprehensive manner as part of the Park's routine maintenance program.

The following section describes the history of construction and repair of each of the extant canal structures along the 22-mile section of the Ohio and Erie Canal in Cuyahoga Valley National Park. The discussion is organized by structure type: Locks; Aqueducts; Culverts; Waste Structures; Feeders and Dams; Other Water Control Structures; Bridges; Prism and Towpath; and Basins. In contrast to the 1993 *(Draft) Historic Structure Report for the Ohio and Erie Canal*, which documented only the masonry and concrete structures, this updated report considers all the various structures that were once integral components of the canal system and for which the Park has maintenance responsibilities.

**Locks**

There are 16 lift locks in the Park (Lock Nos. 24-39 inclusive), all dating to the original design and construction of the canal during the period 1825-1827. The locks, built at a cost of about $7,000 each, were constructed of sandstone walls with wooden foundations, floors and gates. Lock chambers measured 90 feet long and 15 feet wide and the lift varied from 5.5 feet (Lock No. 26) to 17 feet (Lock No. 28). During the canal era frequent repairs were required to maintain the locks; these efforts varied in degree over the years and had a direct impact on both the condition of the locks and the viability of the waterway. Deterioration of materials, damage from severe weather, and impact from heavy use all contributed to the necessity of frequent repairs. In addition, operational problems led to the incorporation of improvements.

Immediately after the canal opened for navigation in July 1827 it became apparent that the locks required modifications if the canal was to function as a viable waterway. The most significant issue was the difficulty of passing water through the locks with enough regularity to maintain uniform water depths in the numerous short levels on the Cleveland to Akron sector. The culvert gates were easily shut by either accident or design and frequently clogged with floating debris, thus raising the water in the level above the lock and causing it to overflow the prism. Such occurrences caused further losses of water in an area that already had an inadequate water supply. Channels, originally referred to as "regulating weirs" and later commonly referred to as spillways or waste weirs, were constructed around each lock during the summer and fall of 1827. These spillways provided a control mechanism which allowed a flow of water to bypass the locks and thus maintain the desired water levels in each section. A "tumble" of wood or stone was typically constructed at the upper end of the spillway to prevent erosion and sedimentation in the canal below. The average cost of the spillways was $250 for

those of cut stone masonry resting on foundations similar to those of the locks, and $150 for those of wood and constructed either on rock foundations or earthen slopes.[117]

In the early days of operation some of the locks sustained collision damage from boats entering the chamber. In 1828 extra "bumping beams" and piles were added to all locks on the northern division to protect them from boat damage. Frederick A. Sprague was awarded a contract to install a new bumping beam at each lock, "to be laid on a level with the upper mitre and to be connected with the lower bumping beam by means of a plank or timber of four inches in thickness and 20 inches in breadth boxed in to each of the bumping beams...and firmly spiked on, also to trim the gates and put in two snubbing posts to each lock where necessary."[118]

Another measure to protect locks from erosion and "the careless or unskillful navigation and management of boats" was the installation of wooden cribwork at the head and foot of many locks in 1828. This work was performed by Justus and Chester Hamilton.[119] With the addition of piles and regulating spillways, the canal commissioners elected to dispense with regular lock tenders along the entire line of the canal except at the Pinery, Peninsula, and Yellow Creek feeders, a shortsighted cost-saving measure that ultimately led to damage to the locks and inefficient navigation.[120]

The natural deterioration of material, especially the rapid decay of wood, soon became a serious problem. By 1834 wood elements of the locks, most notably the lock gates, had become severely deteriorated and required replacement. It was clear that wood elements not continuously submerged in water would require entire renewal or extensive repairs every six to nine years.[121]

During 1841-1842 a number of structures on the northern division were repaired, including rehabilitation of some locks and lock gates. Protective cribwork was installed at one or both ends of some of the locks.[122] However, after the late 1830s the decentralization of responsibilities along the canal resulted in what was to become a continual decline in the condition of the locks. As with all canal structures, the locks received minimal maintenance; repairs were deferred until they became critical, threatening suspension of navigation. This included even "ordinary repairs" such as renewal of wood elements and the regrouting of masonry. Maintenance efforts diminished even more in 1856 when ordinary repairs were contracted to private firms and then were virtually curtailed when the entire operation and maintenance of the canal was transferred to a private syndicate in 1861. During this time flooding took a devastating toll on the deteriorated locks and in some instances undermined foundations. The only notable improvements made by the syndicate were the installation of

117. Kilbourne, *Public Documents*, 24.
118. Agreement between Frederick A. Sprague and Canal Commissioners of State of Ohio, February 13, 1828, "Contracts," *Records of the Board of Public Works of Ohio,* Series 1231, Ohio History Center, Columbus.
119. Agreement between Justus and Chester Hamilton and Canal Commissioners of State of Ohio, May 1, 1828 "Contracts," *Records of the Board of Public Works of Ohio,* Series 1231, Ohio History Center, Columbus).
120. Ohio Board of Public Works, *22nd Annual Report of the Board of Public Works of Ohio* (December 1860), 8-9.
121. Ohio Board of Canal Commissioners, *14th Annual Report*, 6-7.
122. Ohio Board of Public Works, *4th Annual Report of the Board of Public Works of Ohio* (December 1840), 4-5; Ohio Board of Public Works, *5th Annual Report of the Board of Public Works of Ohio* (December 1841), 5.

new, modified gates with larger and more numerous wickets at all locks in the valley during 1858-1859 and the regrouting and repointing of many locks in 1872.[123]

It was not until 1877 that maintenance activities on the locks resumed. As early as 1864 it was reported that the masonry in many of the locks was deteriorating and the walls were inclining inward, but no action was taken to address the problem for over a decade. During an inspection of the entire system following the resumption of state control in 1877 engineers noted that some of the locks looked "somewhat rough," but they still "seemed substantial, and did not leak to any material extent." A few (Nos. 29, 33, 34, 36, and 38) would need special attention over and above routine repairs.[124] During spring repairs in 1876 and 1877 crews set back the top two courses of masonry in the chambers and wing walls of most of the locks in the Cuyahoga Valley. Such action was required because most locks were constructed with no "frost-batter," thus allowing frost action to cause the lock chambers to become more contracted each year.[125] In 1881 the two upper courses of Locks Nos. 32 and 33 were taken down and rebuilt. Lock No. 29 was in such poor condition that complete replacement with all new material was required in 1882, at a cost of nearly $13,500. At the completion of the reconstruction the Board of Public Works proclaimed that Lock No. 29 was now "universally acknowledged to be one of the finest structures on the Public Works."[126]

In 1884, following a devastating flood, most lock chambers again had become contracted in width and it was necessary to re-lay the top courses to maintain navigation. During 1886-1887, as part of a major effort to increase the efficiency of the northern division, the upper courses of the lock walls were again set back and new gates installed. For the first time, brick, cement, and concrete were used for repairs; prior to this only grout and wood had been used.[127]

Despite these repairs Chief Engineer Charles Perkins reported that further work was necessary on the locks. Many lock walls were so far out of plumb that boats were chafed in passing. Some chamber walls needed repairing where the stone was crumbling. Insufficient appropriations necessitated patching of structures rather than their substantial reconstruction. Continual efforts were made to repair the locks; chamber surfaces were adjusted and aligned, wing walls rebuilt, miter sills repaired, and new flooring installed at various locks. While these repairs resulted in an improvement of the physical condition of the locks, they continued to decline. According to Perkins, this slow, continuing deterioration was leading to irreparable ruin of the locks.[128]

In November 1904 the state legislature appropriated funds for a major rehabilitation of the northern division of the canal which occurred from 1905 to1909. Work was performed by both private contractors and state crews under the supervision of T.D. Paul, the Engineer in

123. Ohio Board of Public Works, *20th Annual Report of the Board of Public Works of Ohio* (December 1858), 13; Ohio Board of Public Works, *21st Annual Report of the Board of Public Works of Ohio* (December 1859), 14-16; Ohio Board of Public Works, *34th Annual Report of the Board of Public Works of Ohio* (December 1872), 12.
124. Ohio Board of Public Works, *39th Annual Report of the Board of Public Works of Ohio* (December 1877), 11.
125. Ohio Board of Public Works, *38th Annual Report of the Board of Public Works of Ohio* (December 1876), 18.
126. Ohio Board of Public Works, *44th Annual Report of the Board of Public Works of Ohio* (December 1882), 24, 29.
127. Ohio Board of Public Works, *46th Annual Report of the Board of Public Works of Ohio* (December 1884), 32-33; Ohio Board of Public Works, *48th Annual Report of the Board of Public Works of Ohio* (December 1886), 19-20.
128. Ohio Board of Public Works, *64th Annual Report of the Board of Public Works of Ohio* (December 1902), 38.

Charge. In general contract work was limited to the walls above the low-level water line, and the state worked on foundations and the lower parts of the lock walls. All the locks in the valley were "rebuilt" on an improved design with the exception of the recently replaced Lock No. 29 (Figure 15). Defective masonry was removed and replaced with concrete. A 15-horsepower traction engine with attached hoister, a pulsometer pump, and two small concrete force-pumps for grouting deteriorated lock walls were used; this equipment allowed crews to grout a considerable portion of the old walls which otherwise would have had to have been removed and rebuilt. New flooring and miters were placed, and new gates were installed in every lock. Tumbles generally were either faced with concrete or replaced with new concrete structures. Most tumbles featured a curved front to discharge water with less undermining tendency.[129]

On February 14, 1905 the Board of Public Works awarded contracts for repair work on the locks and other structures on the northern division: the section between Locks Nos. 22 and 28 was assigned to the firm of McGarry & McGowen; the section between Locks Nos. 28 and 36 to P.T. McCourt; and the section between Locks Nos. 36 and 42 to George W. Carmichael & Co. The firm of Murphy and Miles of Columbus received a contract to supply 5,000 barrels of cement for the lock reconstruction work and Russell & Co. of Massillon provided the 15-horsepower traction engine with attached hoister. The Atlantic Foundry Company of Akron supplied metal hardware for the locks and lock gates. By early November 1906 most of the repair work at the locks had been completed, including all the new gates.[130] Additional work completed in 1908-1909 consisted of backfilling and grading at Locks Nos. 24, 26, and 27, as well as extensive masonry and concrete repairs at Lock No. 28 which were required due to defective concrete used by contractor P.T. McCourt during the 1905-1906 rehabilitation.[131]

The canal was abandoned as a navigable waterway in 1913 following that year's devastating flood. Under the terms of its hydraulic lease with the State of Ohio, maintenance of the structures north of Brecksville Station (now the Station Road Trailhead) was the responsibility of the American Steel and Wire Company which utilized the canal as a source of cooling water. While documentation of work performed during this period (1913-1988) is scarce, it appears that the locks received virtually no maintenance. The tumbles, however, were maintained and improved since they were necessary to ensure the flow of water required for industrial purposes. Drawings dating to the 1950s suggest that a face of reinforced concrete was applied to the side walls, new slabs of reinforced concrete were installed, and in some cases, an extension to the discharge apron was constructed.

Since the identification of the canal as a significant historic resource and the establishment of Cuyahoga Valley National Recreation Area, and subsequently Cuyahoga Valley National Park, the 16 locks located in the Park now figure prominently among cultural resource management priorities. Those along the watered portion afford an excellent opportunity for interpretation of the historic canal era and its significance in the development of the Cuyahoga Valley. In 1986-1987 Locks Nos. 28, 29, 37, 38, and 39 were documented by the National Park Service, Historic Engineering Record (HAER No. OH-59). Locks along the

129. Ohio Board of Public Works, *67th Annual Report of the Board of Public Works of Ohio* (December 1905), 181-182; Ohio Board of Public Works, *69th Annual Report of the Board of Public Works of Ohio* (December 1907), 41-45.
130. Ohio Board of Public Works, *67th Annual Report*, 181-183.
131. Ohio Board of Public Works, *70th Annual Report of the Board of Public Works of Ohio* (December 1908), 59-62; Ohio Board of Public Works, *71st Annual Report of the Board of Public Works of Ohio* (December 1909), 76-77, 99-104.

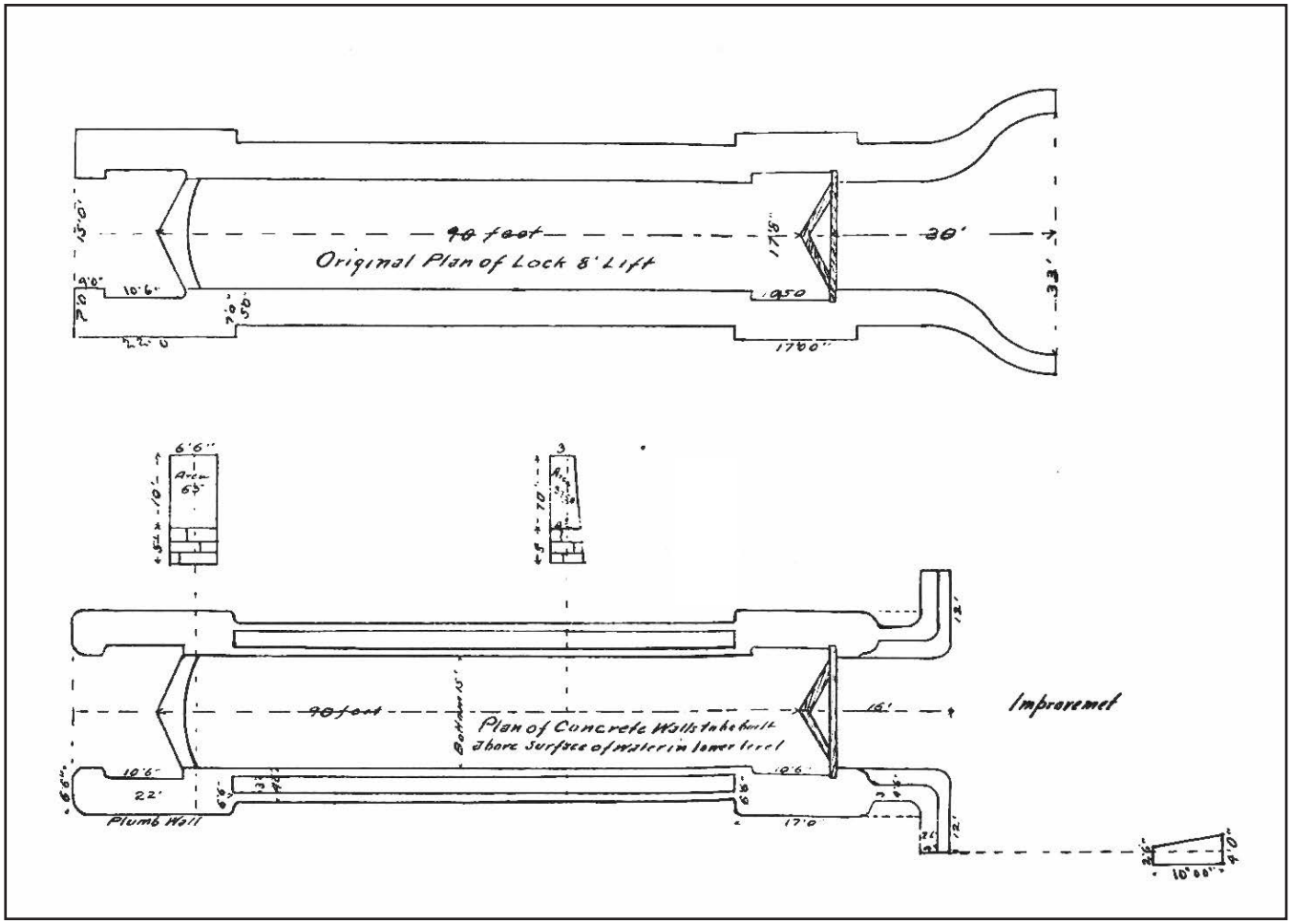


Figure 15. Plan for rebuilt locks on the Ohio and Erie Canal northern division, 1905 (*Source*: Contract for the Improvement of the Northern Division of the Ohio Canal between the Board of Public Works of Ohio and McGarry & McGown, February 14, 1905 and Contract for the Improvement of the Northern Division of the Ohio Canal between the Board of Public Works of Ohio and P.T. McCourt, February 14, 1905, "Contracts," Records of the Board of Public Works of Ohio, Series 1231, Ohio Historical Society, Columbus)

unwatered portion exhibit greater deterioration but remain important points of interest for users of the towpath trail.

In 1991-1992 Lock No. 38, located adjacent to the Park's Canal Discovery Center, underwent a comprehensive restoration to its 1907 appearance by personnel from the National Park Service's Williamsport Preservation Training Center. The team documented existing conditions; removed and either reused or replicated hardware and wooden elements; applied a new surface layer of concrete to the walls; restored the internal culvert; and installed new gates and balance beams. Although the lock was dewatered during construction, crews maintained 18 inches of water in the chamber at all times in order to keep the wood flooring and foundation timbers submerged and preserved.[132]

The construction and repair record for each of the 16 locks within the Park is summarized below (see Section C for photographs and drawings and Figures 50a-c for map locations of all locks and other features). All were built during the initial construction of the northern division (1825-1827) and were repaired periodically until the system was abandoned in 1913. The three locks in the watered section received occasional attention after 1913, including comprehensive restoration of Lock No. 38 by the National Park Service in 1991-1992. Information in this section is based on: "Ohio Canal Ledger," *A. Kelley's Register, 1825-1827*, Series 1239; "Contracts," Series 1231, *Records of the Board of Public Works*, Ohio History Center, Columbus; various *Annual Reports of the Canal Commissioners* and *Annual Reports of the Board of Public Works of Ohio*; and the resource files at Cuyahoga Valley National Park. Unless otherwise noted, specific references related to the construction and repair history of the locks can be found in the *Historic Structure Report: History Section* by Unrau and Scrattish.[133] For this *Ohio and Erie Canal History and Historic Structure Assessment* we examined nearly all of the annual reports archived at the Ohio History Center and found the summary by Unrau and Scrattish to be very comprehensive, with only a few documented repairs to locks and other structures that do not appear on their list.

Lock No. 24 or Niles/Botzum Lock

- 1825: Contract for constructing Lock No. 24 was awarded to Abraham L. Beaumont of Lyons, New York, and Henry F. Guy of Lockport, New York, on June 14. Construction was complete by spring 1827.

- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.

- 1859: Installation of new lock gates with larger (2.5-ft square instead of original 2.0-ft square) and more numerous (two per gate instead of four) wickets.

- 1887: Walls were repaired and set back.

132. Robert W. Bobel, "The 1991-1992 Restoration of Lock 38 of the Ohio & Erie Canal, in the Cuyahoga Valley National Recreation Area by the National Park Service," *Towpaths* 31, no. 4 (1993), 37-48.
133. Unrau and Scrattish, *Historic Structure Report,* 141-192, 224-227.

- 1893: Foot bridge was replaced.
- 1895: Lock valves, sheeting, and miter sills were repaired.
- 1898: Walls were repaired.
- 1905-1906: Lock was rebuilt with concrete, new gates were installed; upper four courses of stone were trimmed off and set back for 30 feet; hollow quoins were regrouted.
- 1908: Backfill with proper grading was placed behind lock walls.
- 1909: Backfill with proper grading was placed behind lock walls.
- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.
- 1930s: Improvement of Riverview Road resulted in the removal of the east side of Lock No. 24 as the canal was filled between Ira and Bath roads.[134]

Lock No. 25 or Mudcatcher Lock

- 1825: Contract for constructing Lock No. 25 was awarded to Reuben Brackett of Lockport, New York, on June 14. Construction was complete by spring 1827.
- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.
- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.
- 1887: Walls were repaired and set back.
- 1887: Gates and waste weir were repaired.
- 1895: Lock valves, sheeting, and miter sills were repaired.
- 1905-1906: Lock was rebuilt with concrete, new gates were installed; hollow quoins were regrouted.
- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

134. Fred A. Finney, *Calumet, Canal, and Cuyahoga: An Archaeological Overview and Assessment of Cuyahoga Valley National Park* (Omaha, NE: Upper Midwest Archaeology and the National Park Service Mid-West Regional Office, 2002), 292.

- 1930s: Improvement of Riverview Road resulted in the removal of the east side of Lock No. 25 as the canal was filled between Ira and Bath roads.[135]

Lock No. 26 or Pancake Lock (Figure 16)

- 1825: Contract for constructing Lock No. 26 was awarded to Robert Blackstock and Daniel Van Slyke of the State of New York on June 13.
- 1827: Contract for completing Lock No. 26 was awarded to John Mason Fuller.
- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.
- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.
- 1887: Walls were repaired and set back.
- 1895: Lock valves, sheeting, and miter sills were repaired.
- 1905-1906: Lock was rebuilt with concrete, new gates were installed; hollow quoins were regrouted.
- 1907: Tumble was repaired.
- 1908: Backfill with proper grading behind lock walls.
- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

Lock No. 27 or Johnny Cake Lock

- 1825: Contract for constructing Lock No. 27 was awarded to James Steward and Alexander McFarlan of Montgomery County, New York, on June 17.
- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.
- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.
- 1886: Walls were repaired and set back.
- 1892: Wing wall was rebuilt.

135. Finney, *Calumet, Canal, and Cuyahoga*, 292.

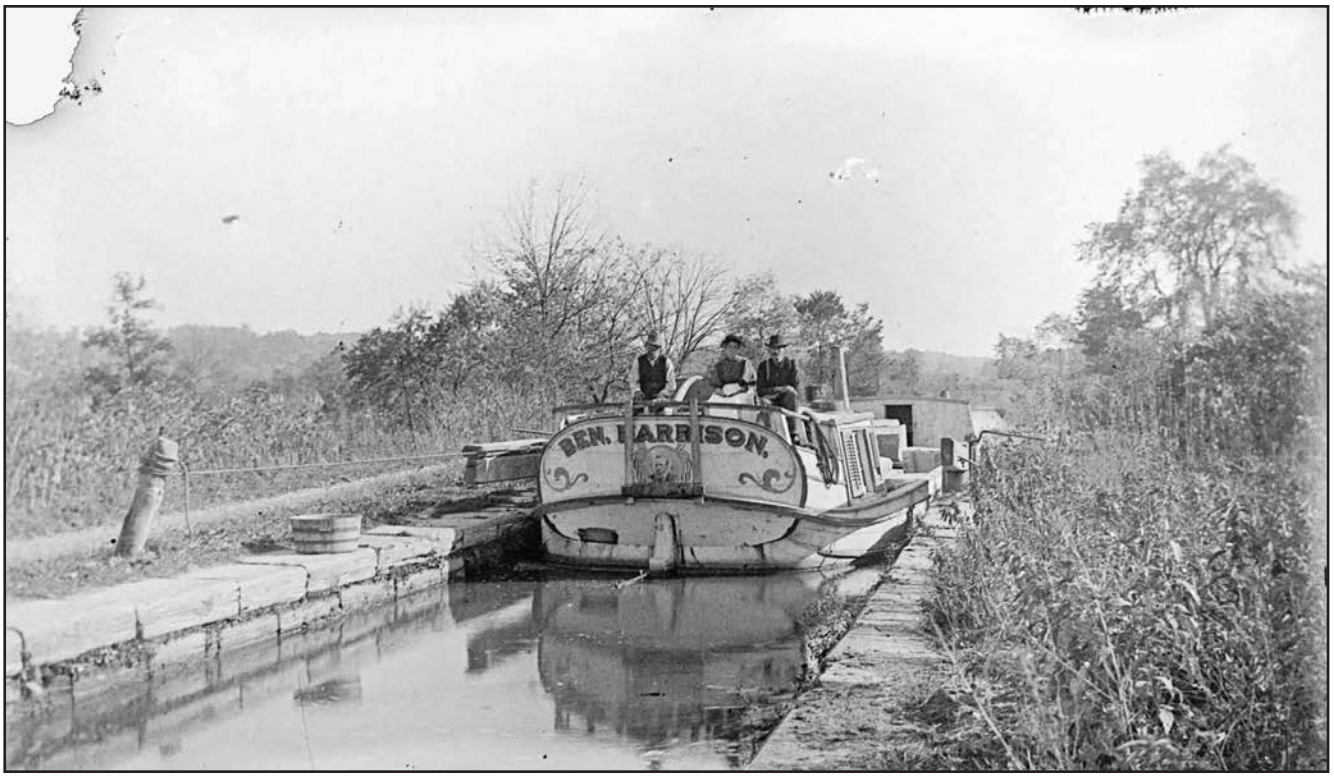


Figure 16. Canal boat at Lock No. 26 (*Source*: Edwin Bell Howe Photograph Collection, Portage Lakes Historical Society, www.summitmemory.org)

- 1895: Lock valves, sheeting, and miter sills were repaired.
- 1899: Stonework repairs and new sheeting.
- 1901: New wing wall and gate recess were installed on towpath side and concrete was poured under lock.
- 1902: New flooring was installed, and walls were realigned.
- 1903: New footbridge was built.
- 1906: Lock was rebuilt with concrete, upper two to three courses of stone were trimmed and set back; new gates were installed; portions of chamber were sheeted with two-inch plank; hollow quoins were regrouted.
- 1908: Backfill with proper grading behind lock walls.
- 1909: Backfill with proper grading behind lock walls; tumble reduced in height 6-10 inches.
- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

Lock No. 28 or Deep Lock

- 1825: Contract for constructing Lock No. 28 was awarded to Samuel Y. Potter and Stephen N. Sergeant of Medina County, Ohio, on July 12.
- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.
- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.
- 1886: Walls were dressed down and bottom repaired.
- 1887: Walls were repaired and set back.
- 1895: Stonework, lock valves, sheeting, and miter sills were repaired.
- 1898: Walls were repaired.
- 1899: Stonework repairs and new sheeting installed.
- 1902: New flooring was installed, and walls were realigned.

- 1905-1906: Lock was rebuilt with concrete, new gates installed; stone trimmed off and set back on both sides for 60 feet; hollow quoins were regrouted.

- 1909: Major repairs were required due to defective concrete used during 1905-1906 reconstruction: lower 14 feet of the lock (5 feet of original stone walls and 9 feet of concrete walls built in 1905-1906) was refaced with 12 inch layer of concrete, and upper 6 feet was completely rebuilt in concrete, at cost of $4,500; east wing wall was extended; old stone wall at lower end was torn down and rebuilt 20 feet high and 35 feet long; top course and coping of west wing wall were relaid and 18-foot long 4-ft high protection wall built of old stone; new concrete foundation was laid for upper wing walls; two new snubbing posts set in concrete were installed; gates were remitered and new wooden wicket stops installed in the gates; new foot bridge was built; wing walls and apron of the tumble were lengthened.[136]

- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

Lock No. 29 or Peninsula Lock (Figures 17 and 18)

The history of Lock No. 29 does not parallel that of the other locks within the Park, due at least in part to the proximity of Lock No. 29 to the Cuyahoga River. Prior to the construction of the Valley Railway, the river formed a peninsula to the east of the lock. Lock No. 29 was surrounded by the river on three sides. The situation was intensified, especially during conditions of high water, by the central pier of the Peninsula Aqueduct which greatly diminished the effective flow of the river just south of the lock.

In early 1882 the original lock was removed, and a masonry lock was constructed of new material. While available documentation merely indicates that the lock was in poor condition, it is likely that the river contributed to the deterioration. During a flood the following year, the flow of the river was restricted by the pier of the aqueduct, and the river rechanneled itself across the canal just north of the lock. The foundation of the lock was undermined and a process of steady decline began.

At the time of the 1905-1909 improvement of the northern division, the central portion of the foundation timbers had completely failed, causing the walls to lean inward. Unlike the other locks, however, Lock No. 29 was dismantled and reconstructed. The foundation timbers were found to be about five feet above a natural level sheet of shale rock and under the lock walls, beneath the timbers, were rough walls extending down to the shale. The gravel and earth fill between these lower walls was removed, and the area was filled with concrete up to the timbers. A channel which had run along the west of the lock was abandoned, and a culvert was integrated into the construction of the west wall.

136. Ohio Board of Public Works, *71st Annual Report*, 76-77, 100-101.

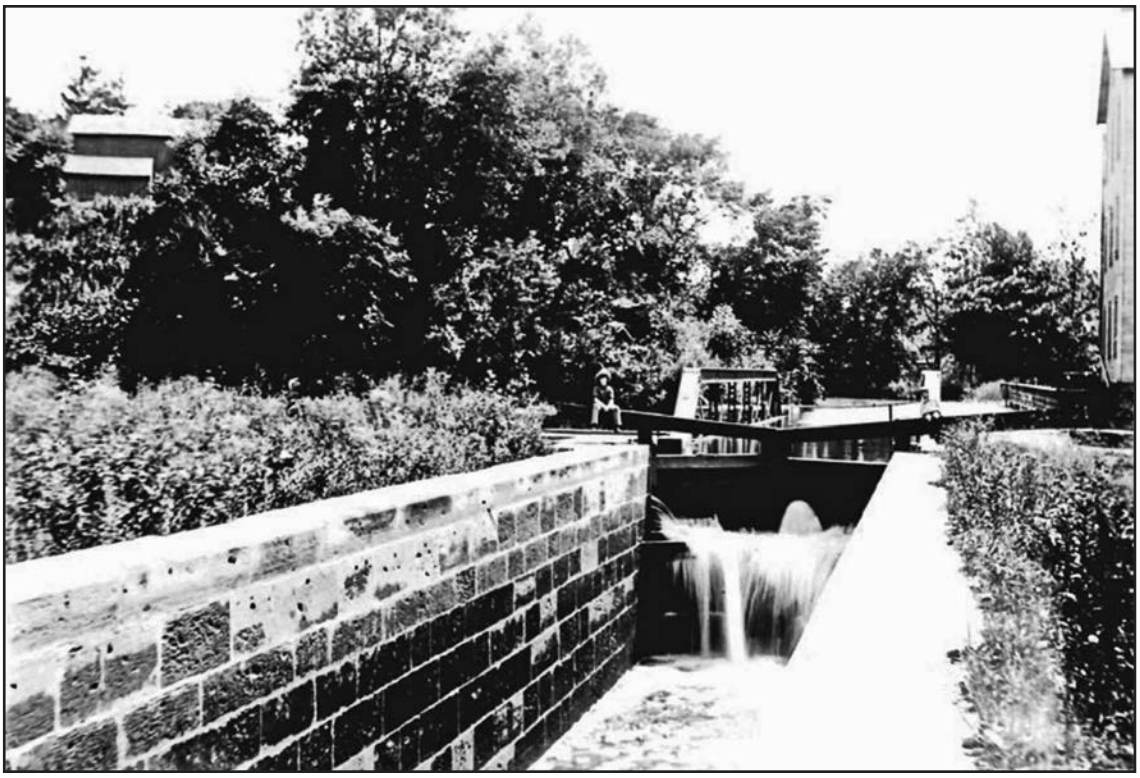

Figure 17. View of Lock No. 29 at Peninsula, looking toward the aqueduct, 1898 (*Source:* Louis Baus Canal Photograph Collection, OEC_117, The University of Akron, University Libraries Archival Services). This image appears to be reversed.

Figure 18. View of Lock No. 29 at Peninsula, 1898 (*Source:* Louis Baus Canal Photograph Collection, OEC_118, The University of Akron, University Libraries Archival Services)

- 1825: Contract for constructing Lock No. 29 was awarded to John Johnson and John Flinn of Rochester, New York, on July 13. Johnson and Flinn also built the Peninsula Aqueduct and Lock No. 30.

- 1827: Contract was relet to Alanson Sweet and Horace Wood on May 9, and relet again to William Stow Jr. on November 23.

- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.

- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.

- 1869: New change bridge was built; new wing wall and one pair of gates were replaced.

- 1874: New towpath bridge was built.

- 1882: Lock was completely rebuilt at cost of $13,385.07.

- 1883: Protective piles and stone were placed around the lock.

- 1885: Protective levee was built.

- 1894: New towpath bridge was built.

- 1902: New flooring was installed.

- 1906: Lock was dismantled and reconstructed; new gates were installed; two bucking beams were installed at upper end; lower miter sill was put in and grouted; portions of chamber were sheeted with two-inch plank; hollow quoins were regrouted.

- 1909: Masonry and concrete repairs.

- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

Lock No. 30 or Feeder Lock

- 1825: Contract for constructing Lock No. 30 was awarded to John Johnson and John Flinn of Rochester, New York, on July 13. Johnson and Flinn also built the Peninsula Aqueduct and Lock No. 29.

- 1827: Contract was relet to Alanson Sweet and Horace Wood on May 9, and relet again to William Stow Jr. on November 23.

- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.

- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.

- 1874: New towpath bridge was constructed.

- 1882: New cribs were built on both sides of lock.

- 1886: Lock walls were repaired and set back.

- 1887: Lock walls were repaired and set back.

- 1887: Gates and waste weir were repaired.

- 1895: Lock stonework was repaired.

- 1898: Walls of lock were repaired.

- 1902: Walls were realigned.

- 1905-1906: Lock was rebuilt with concrete, new gates were installed; new chafing plank was installed on all gates; upper two to three courses of stone were trimmed off and set back; two bucking beams were installed at upper end, new steel miter sill was installed at upper end; lower miter sill was put in and grouted; portions of chamber were sheeted with two-inch plank.

- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

Lock No. 31 or Lonesome Lock (Figure 19)

- 1825: Contract for constructing Lock No. 31 was awarded to Harvey Wellman of Cleveland, Ohio, on July 14.

- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.

- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.

- 1886: Walls were repaired and set back.

- 1887: 90 yards of sheet piling were installed in waste weir.

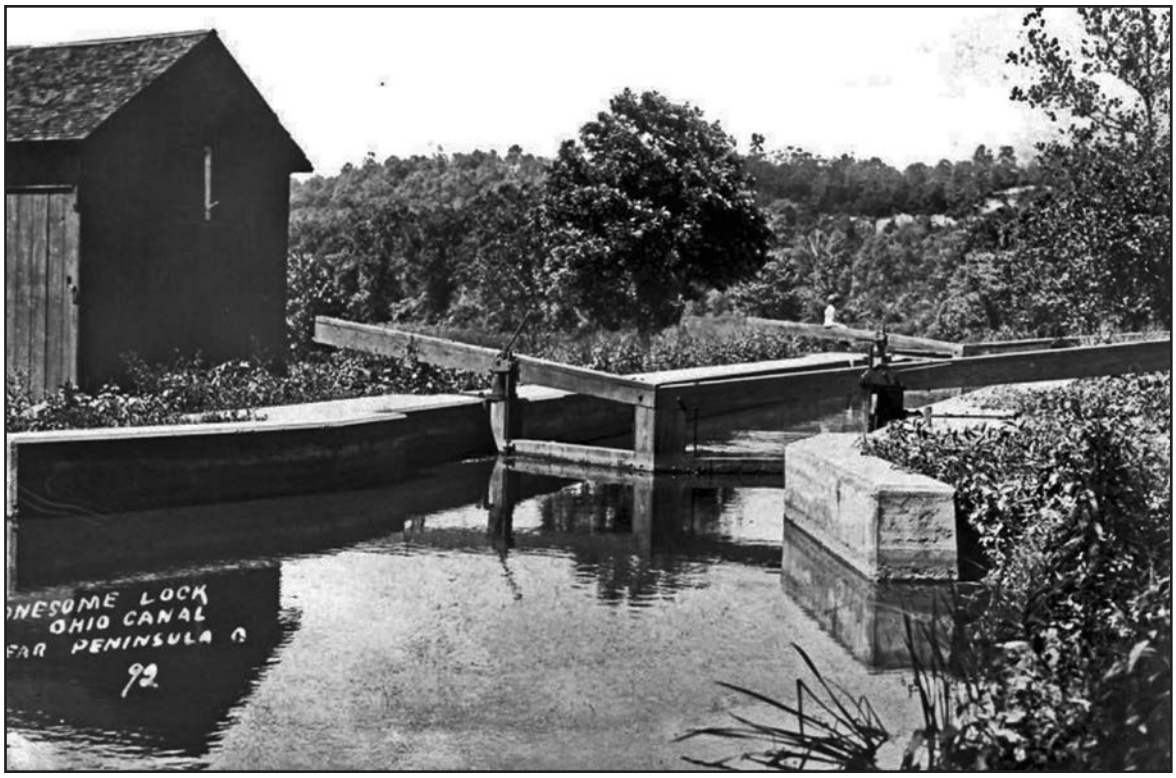


Figure 19. View of Lock No. 31/Lost Lock/Lonesome Lock, 1892 (*Source:* Louis Baus Canal Photograph Collection, OEC_114, The University of Akron, University Libraries Archival Services)

Figure 20. View of Lock No. 32 at Boston, 1908 (*Source:* Louis Baus Canal Photograph Collection, OEC_112, The University of Akron, University Libraries Archival Services)

- 1902: Walls were realigned.

- 1905-1906: Lock was rebuilt with concrete; upper three courses of stone were trimmed off and set back; new gates were installed; two bucking beams were installed at upper end, new steel miter sill was installed at upper end; portions of chamber were sheeted with two-inch plank.

- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

Lock No. 32 or Boston Lock (Figure 20)

- 1825: Contract for constructing Lock No. 32 was awarded to Patrick Mitton and James Whalen on July 12.

- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.

- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.

- 1881: Upper two courses of walls were taken down and rebuilt.

- 1886: Walls were repaired and set back.

- 1887: Walls were repaired and set back.

- 1892: Stone surfaces of chamber were adjusted and aligned.

- 1899: Stonework repairs and new sheeting.

- 1902: Walls were realigned.

- 1905-1906: Lock was rebuilt with concrete, new gates were installed; stone was trimmed off and set back on one side for 20 feet; two bucking beams were installed at upper end, new steel miter sill was installed at upper end; portions of chamber were sheeted with two-inch plank.

- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

- 1996: Repaired by National Park Service: vegetation removed; new concrete coping (caps) installed on both chamber walls; minor concrete repairs made to the walls.[137]

137. Memos dated September 24, 1996 and October 31, 1996, Lock 32, Cuyahoga Valley National Park, Resource Management Division files.

Lock No. 33 or Wallace /Lost Lock (Figure 21)

- 1825: Contract for constructing Lock No. 33 was awarded to Elias Cozad of Euclid, Ohio, on July 14.
- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.
- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.
- 1881: Upper two courses of walls were taken down and rebuilt.
- 1882: New cribs were built on both sides of lock.
- 1892: Stone surfaces of chamber were adjusted and aligned.
- 1905-1906: Lock was rebuilt with concrete, new gates were installed; stone was trimmed off and set back on both sides for 30 feet; new chafing plank was installed on lower gates; two bucking beams were installed at upper end, new steel miter sill was installed at upper end; portions of chamber were sheeted with two-inch plank.
- 1908: Tumble was lowered.
- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

Lock No. 34 or Red Lock

- 1825: Contract for constructing Lock No. 34 was awarded to Asa Randolph, William Brown, and Patrick Frederick Brannan of the State of New York on July 12.
- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.
- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.
- 1882: New cribs were built on both sides of lock.
- 1887: Walls were repaired and set back.
- 1892: Stone surfaces of chamber were adjusted and aligned.
- 1893: Stones were set back or chipped off.

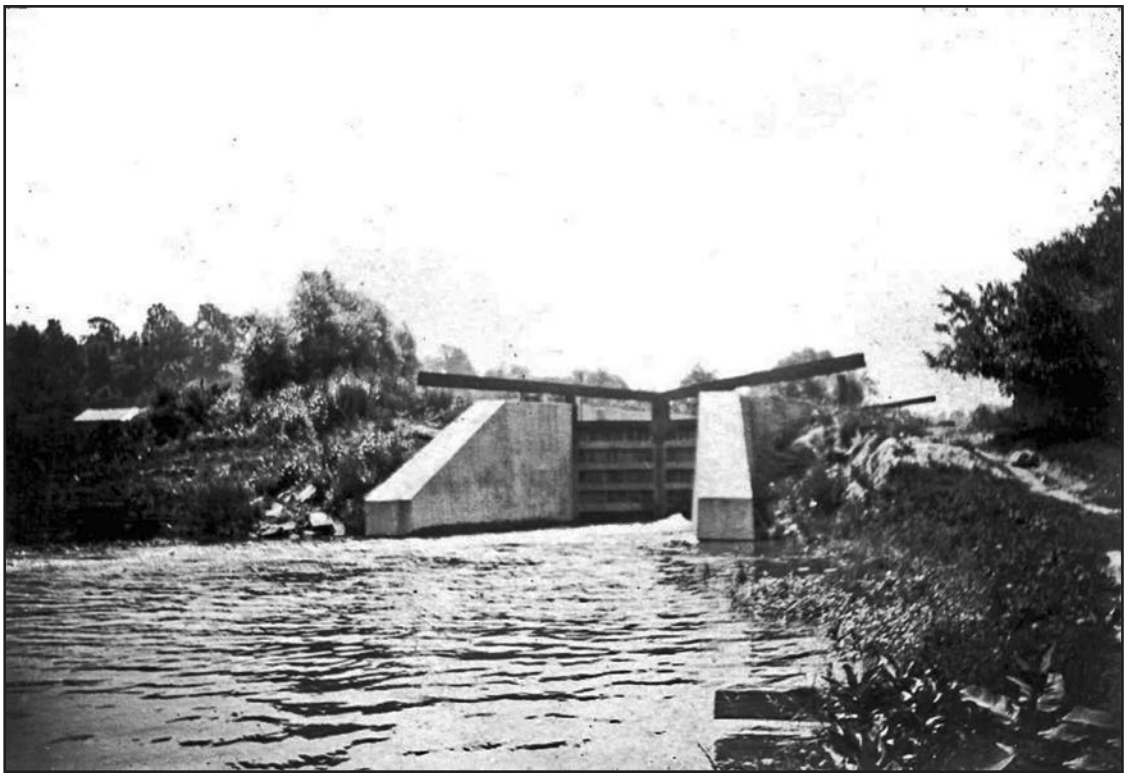

Figure 21. View of Lock No. 33/Wallace Lock, 1908 (*Source:* Louis Baus Canal Photograph Collection, OEC_110, The University of Akron, University Libraries Archival Services)

- 1895: Stone work was repaired.
- 1900: New footbridge was built.
- 1906: Lock was rebuilt with concrete, new gates installed; stone trimmed off and set back on both sides for 70 feet; two bucking beams installed, new steel miter sill installed at upper end; portions of chamber sheeted with two-inch plank.
- 1908: Tumble was lowered.
- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

Lock No. 35 or Kettlewell/Whiskey Lock

- 1825: Contract for constructing Lock No. 35 was awarded to Andrew Johnston of Boston, Ohio, and Samuel R. Richards of Lockport, New York, on September 8.
- 1828: Additional bumping beam and wood cribbing was installed to avoid damage from boat collisions.
- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.
- 1892: Stone surfaces of chamber were adjusted and aligned.
- 1900: New foot bridge was built.
- 1906: Lock was rebuilt with concrete, new gates were installed; stone was trimmed off and set back on both sides for 50 feet; new chafing plank was installed on all gates; two bucking beams were replaced and new lower miter sill was put in; lower end was sheeted with two-inch plank.
- 1909: Tumbles were rebuilt, and stone protection walls were placed along both sides of spillway channel.
- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

Lock No. 36 or Pinery Lock/17-Mile Lock

- 1825: Contract for constructing Lock No. 36 was awarded to Rufus Wright and Spencer Wright of Rockport, Ohio, on September 7.
- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.

- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.

- 1893: Upper wing walls were replaced/repaired, and 1,000 feet of two-inch plank was laid in the floor.

- 1893: Waste weir was rebuilt.

- 1898: New miter sills were installed in lock.

- 1901: New foot bridge was built.

- 1902: Walls were realigned.

- 1905-1906: Lock was rebuilt with concrete, new gates were installed; upper three courses of stone were trimmed off and set back for 40 feet.

- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal. Lock was abandoned.

- 1931: It is believed that the lock was filled in during construction of Brecksville-Northfield High Level Bridge (Route 82).

Lock No. 37 or 14-Mile Lock (Figure 22)

- 1825: Contract for constructing Lock No. 37 was awarded to Augustus Southworth of Holley, New York, on September 8.

- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.

- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.

- 1887: New pair of lower gates and new bucking beam were installed, coping stones were set back.
- 1893: Two upper courses of walls were set back four inches; stone under the upper mitre sill was taken up and relaid in cement.

- 1895: Stone work was repaired.

- 1896: Wing walls were rebuilt.

Figure 22. View of Alexander/Wilson Mill and Lock No. 37/14-Mile Lock (*Source:* Louis Baus Canal Photograph Collection, OEC_63, The University of Akron, University Libraries Archival Services)

- 1905-1906: Lock was rebuilt with concrete, new gates were installed; upper two courses of stone were trimmed off and set back for 30 feet; new chafing plank was installed on all gates.

- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal.

- 1913-1992: Undocumented periodic repairs may have been made by the holder of the hydraulic lease.

- 1994: Interim water control measures were performed by the National Park Service. The upper gates had deteriorated to such an extent that they no longer regulated the water flow so that water constantly flowed through the lock. The project removed salvageable historic fabric from upper gate area and placed it in storage; then installed wide flange sections and stop logs on top of the breast wall to direct water away from the lock into the spillway. This restored the water flow and raised the water level between Locks Nos. 36 and 37 to a more historically appropriate depth.[138]

- 2016: Site work was performed in connection with repairs to the adjacent flood gate, towpath, and bridge carrying the towpath over the spillway. Work included dredging the canal between the lock and flood gate as well as temporary removal of stop logs at the upper end of the lock to facilitate water flow.[139]

Lock No. 38 or 12-Mile Lock (Figure 23)

- 1825: Contract for constructing Lock No. 38 was awarded to Stephen Snyder, Samuel Rosseter, John C. Pease, and Paul Snyder of the State of New York, on September 10.

- 1826: Contract was relet to Harvey Wellman of Cleveland, Ohio, on October 10.

- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.

- 1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.

- 1887: Walls were repaired and set back.

- 1893: Stones were set back or chipped off.

- 1896: Wing walls were rebuilt.

138. Assessment of Actions Having an Effect on Cultural Resources, Lock 37 (HS-121)-Interim Water Control, December 8, 1994, Cuyahoga Valley National Park, Resource Management Division files.
139. Categorical Exclusion Form, PEPC Project No. 64265, Lock 37 Spillway/Floodgate Rehabilitation and Towpath Trail Approach Repairs, May 31, 2016, Cuyahoga Valley National Park, Resource Management Division files.

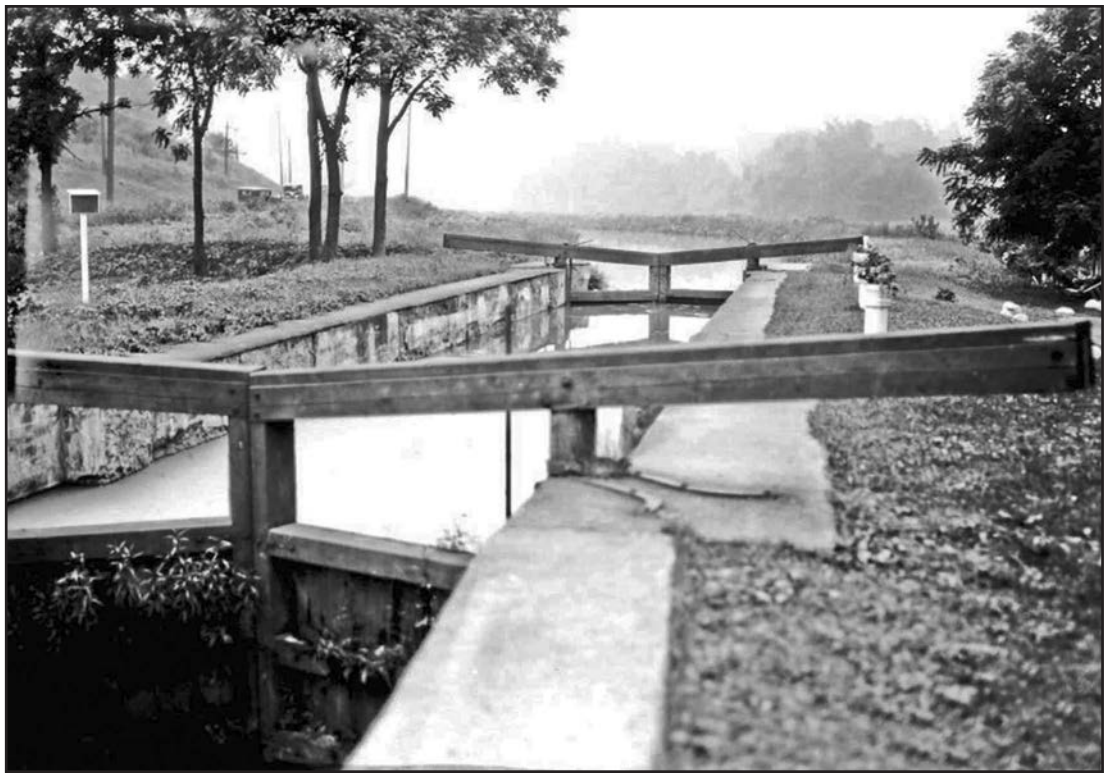

Figure 23. View of Lock No. 38/12-Mile Lock, 1930 (*Source:* Louis Baus Canal Photograph Collection, OEC_53, The University of Akron, University Libraries Archival Services)

- 1905-1906: Lock was rebuilt with concrete, new gates were installed; upper four courses of stone were trimmed off and set back for 50 feet; new chafing plank was installed on lower gates.

- 1906-1913: No record of any repairs made as part of rehabilitation of northern division.[140]

- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal.

- 1913-1992: Undocumented repairs were made by the holder of the hydraulic lease. There were changes to the gates, balance beams, and spillway but no record of any improvements to the chamber.[141]

- 1992: Complete restoration by the National Park Service, Williamsport Preservation Training Center.[142]

- 1993: Minor modifications were made to both the upper and lower gates to address leakage issues; adjustments included attaching steel sweeps to upstream side of each gate and neoprene strips acting as gaskets to the downstream side. Gates were adjusted via the goose necks to create a better seal. In a separate project, staff from the Williamsport Training Center installed a new foot bridge at the north end of the lock.[143]

Lock No. 39 or 11-Mile Lock (Figures 24 and 25)

- 1825: Contract for constructing Lock No. 39 was awarded to William A. Harper of Harpersfield, Ohio, on September 7.

- 1826: Contract was relet to Alexander McFarlan and William Van Slyke of the State of New York on May 16.

- 1827: Contract was relet to George S. Rathbun and John Milliman on March 1.

- 1828: Additional bumping beam and wood cribbing were installed to avoid damage from boat collisions.1859: Installation of new lock gates with larger (2.5 feet square instead of original 2.0 feet square) and more numerous (two per gate instead of four) wickets.

- 1886: Re-cemented throughout.

- 1892: Stone surfaces of chamber were adjusted and aligned.

140. Bobel, “The 1991-1992 Restoration of Lock 38,” 37.
141. Bobel, “The 1991-1992 Restoration of Lock 38,” 37.
142. Bobel, “The 1991-1992 Restoration of Lock 38.”
143. Memo from Douglas C. Hicks to Rob Bobel Regarding Lock Gate Modifications at Lock #38, June 8, 1993; Memo from Don H. Castleberry to W. Ray Luce Regarding Proposed Construction of Foot Bridge at Lock #38, Cuyahoga Valley National Park, Resource Management Division files.

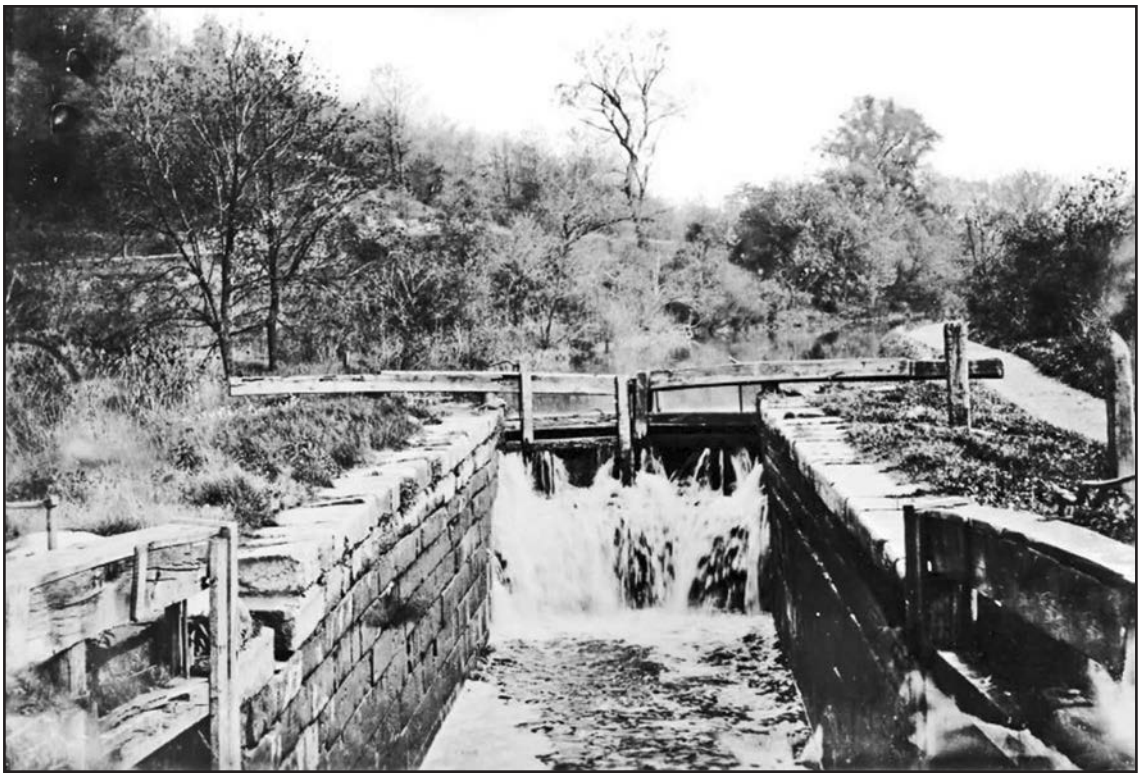

Figure 24. View of Lock No. 39/11-Mile Lock about 1900 (*Source:* Louis Baus Canal Photograph Collection, OEC_46, The University of Akron, University Libraries Archival Services)

Figure 25. View of Lock No. 39/11-Mile Lock, 1916 (*Source:* Louis Baus Canal Photograph Collection, OEC_50, The University of Akron, University Libraries Archival Services)

- 1902: New towpath bridge was built.
- 1905-1906: Lock was rebuilt with concrete, new gates were installed.
- 1909: Gates were remitered, and new wooden wicket stops were installed in the gates.
- 1913: Flood of 1913 ended navigation on the Ohio and Erie Canal.
- 1913-1992: Undocumented repairs may have been made by the holder of the hydraulic lease.
- 1972: American Steel and Wire Company replaced the lock gates and repaired spalled concrete.[144]

**Aqueducts**

Aqueducts were necessary to carry the canal across the larger streams of the Cuyahoga Valley. On the Ohio and Erie Canal the aqueducts were essentially wooden troughs or "trunks" supported by masonry piers and abutments, rather than solid but expensive masonry structures as were found on some other contemporary canals. This was done as a cost-saving measure but ultimately proved to be a false economy since the wooden superstructures rapidly deteriorated and suffered frequent flood damage, requiring constant maintenance and repeated rebuilding. The inherent nature of an aqueduct dictated that the trunk had to be constructed at the same elevation as the canal it carried, but because it was usually below frequent-flood elevations it was subject to static and dynamic hydraulic pressures, scour, buoyancy, and debris impact from the waterway it crossed.[145] In addition, wooden aqueducts were invariably leaky, and the loss of water could be a serious problem on the higher sections of the canal where reliable water supply was already problematic. Yet another problem was that the narrow width of the aqueducts could cause bottlenecks for navigation since only one boat could cross at a time.

As originally conceived, there were 14 aqueducts on the entire length of the Ohio and Erie Canal, and two of them were within the present limits of Cuyahoga Valley National Park: one spanning the Cuyahoga River at the village of Peninsula and the other over Tinkers Creek in the northern portion of the Park. In 1860 a third aqueduct was built at Furnace Run to replace a stone culvert which had proved inadequate for passing water under the canal. The wooden trunk of the Tinkers Creek Aqueduct was 95 feet long and supported by one pier and two abutments of uncut stone masonry. The abutments rested on a floor of hewn timbers which extended from the center of the pier across each waterway. Sheet piling was installed across the stream to protect the foundation from being undermined. The Peninsula Aqueduct was built in a more substantial manner. Its wooden trunk was about 100 feet long and was supported by one pier and two abutments of cut stone masonry laid in regular range work, resting on the clay

144. Letter from. L.K. Smith, United States Steel Corporation to A.C. Gienow, Director of Public Works State of Ohio (November 13, 1970), Cuyahoga Valley National Park, Resource Management Division files.
145. National Park Service and Bergmann Associates, *Environmental Assessment for Tinkers Creek Aqueduct Phase II* (Brecksville, OH: National Park Service, Cuyahoga Valley National Park, 2009), 20.

slate bed of the Cuyahoga River.[146] The Furnace Run Aqueduct was the smallest of the three, originally consisting of a 40-foot wrought-iron trunk supported by stone abutments resting on mud sills.

In December 1826 the Canal Commissioners reported that, between Portage Summit and Cleveland, "two aqueducts across branches of the Cuyahoga [presumably including the one at Tinkers Creek], have been erected; and the aqueduct over the river at the Peninsula, is in a state of forwardness, which renders the work safe, and promises its early completion in the spring."[147] The aqueducts were opened for navigation along with the rest of the system on July 4, 1827.

By 1836 the Canal Commissioners already recognized that the deteriorating and leaky wooden aqueducts were likely to be a continual problem requiring replacement or major repair every six to nine years. They hoped eventually to replace them with more durable stone structures, but this never occurred due to the substantial cost involved. Recognizing that the factors of cost and the availability of stone would require that some wooden aqueducts be rebuilt with timber, the Commissioners determined that such structures be reconstructed in a more durable manner based on models currently under construction on the Miami and Erie Canal. The plans for the aqueducts, which presumably would henceforth be used on the Ohio and Erie, provided that the principal timbers and side frames within the trunk be entirely below water to make them more secure against premature decay. The cross beams were suspended under the floor so that they could easily be removed and replaced without interference to the other parts of the trunk.[148]

The three aqueducts were repaired frequently over the course of the 19th century and were rebuilt multiple times. Not surprisingly, the major 1905-1909 improvement program for the northern division of the canal included replacement or rehabilitation of the aqueducts. The Peninsula Aqueduct was completely rebuilt with new abutments from the bedrock up and the center pier was removed to improve the hydrology of the Cuyahoga River. The abutments of the Tinkers Creek Aqueduct were repaired. Each aqueduct received a new superstructure consisting of steel trusses supporting a wooden trunk.[149] The Furnace Run Aqueduct, which had been replaced ten years earlier, does not appear to have required major work.

The Peninsula and Furnace Run aqueducts were destroyed by the great flood of 1913 and were not rebuilt. The masonry substructures deteriorated over the course of the 20th century. In the early 1990s during construction of the Ohio and Erie Canal towpath trail, the National Park Service installed a new prefabricated single-span pedestrian bridge to carry the trail over the Cuyahoga River at Peninsula, repairing and utilizing the old aqueduct abutments. At Furnace Run the towpath trail was constructed adjacent to the remains of the former aqueduct, crossing the stream on a new prefabricated single-span pedestrian bridge. In each case the aqueduct is interpreted as a ruin.[150]

146. Ohio Board of Canal Commissioners, *11th Annual Report*, 7-10.
147. Ohio Board of Canal Commissioners, *5th Annual Report of the Canal Commissioners* (December 19, 1826), 237.
148. Ohio Board of Canal Commissioners, *14th Annual Report*, 6-7.
149. Ohio Board of Public Works, *67th Annual Report*.
150. Cossell, *Ohio and Erie Cana*l, 102, 106.

The Tinkers Creek Aqueduct still survives and functions today, albeit in modified form. After the abandonment of the canal as a navigable waterway in 1913, maintenance of the aqueduct became the responsibility of the American Steel and Wire Company. Documentation of improvements/repairs performed during that period is limited. The trunk was repaired periodically, and the aqueduct was reconstructed in the 1940s, again in the 1960s, and in 1975.[151] Following the creation of the Cuyahoga Valley National Recreation Area in 1974 and Cuyahoga Valley National Park in 2000, the Tinkers Creek Aqueduct has ranked high among the Park's cultural resource management priorities. The aqueduct, located within the watered portion of the canal, is a critical element in maintaining the continuity of the waterway and the towpath. By 2002 the aqueduct had deteriorated to the point where it could no longer hold water. Earthen dams were placed at both ends of the structure, and three HDPE pipes were installed as an interim measure to maintain water flow across Tinkers Creek. In 2007 the truss superstructure, wooden trough, HDPE pipes, and towpath trail bridge were removed. Two new steel pipes were installed to maintain water flow. A new two-span towpath trail bridge was installed on the existing stone abutments and pier. In 2009 the aqueduct was reconstructed, utilizing a two-span reinforced concrete through-girder and floor slab system which served as a trough with the same dimensions as the previous structure. New concrete stub abutments were installed to support the new superstructure, but the existing 1845 masonry pier was dismantled and rebuilt, and the stone abutments were refurbished, conveying the illusion that they supported the trunk. The goal of the rehabilitation project was to create a "contemporary-but-compatible structure using the historic abutments and center pier," rather than attempting to duplicate the appearance of the historic structure.[152]

The following section summarizes the record of construction and repair for each of the three aqueducts within the Park. Information in this section is based on: "Ohio Canal Ledger," *A. Kelley's Register, 1825-1827*, Series 1239; "Contracts," Series 1231, *Records of the Board of Public Works*, Ohio History Center, Columbus; various *Annual Reports of the Canal Commissioners* and *Annual Reports of the Board of Public Works of Ohio*; and the files at Cuyahoga Valley National Park. Unless otherwise noted, specific references related to the construction and repair history of the aqueducts can be found in the *Historic Structure Report: History Section* by Unrau and Scrattish.[153]

Furnace Run Aqueduct (Figure 26)

- During the original construction of the canal, a stone arch culvert was installed to carry Furnace Run under the canal. Frequently obstructed by deposits of gravel and sandy soil, the culvert was inadequate to pass the required volume of water. The stream frequently rose over the embankment of the canal, submerging acres of cultivated land. In July 1858 a 20-ft section of the culvert collapsed. Temporary repairs provided for continued navigation until 1860 when the culvert was removed and an aqueduct installed.

151. *Akron Beacon Journal* (November 6, 1975).
152. National Park Service and Bergmann Associates, *Environmental Assessment for Tinkers Creek Aqueduct*, 20; Anthony Borelli, "Reconstruction of the Ohio & Erie Canal Aqueduct over Tinkers Creek," *Aspire* (2013), 32-35.
153. Unrau and Scrattish, *Historic Structure Report,* 141-192, 224-227.

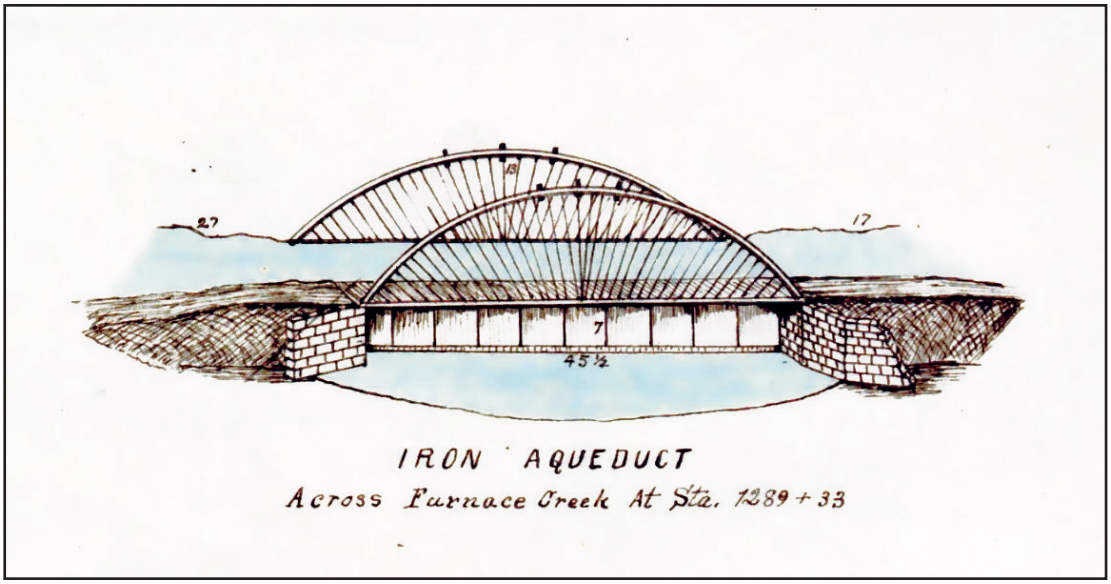


Figure 26. Illustration of Furnace Run Aqueduct, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

- 1860: Mosley and Co. of Cincinnati, Ohio, was awarded a contract to construct a patent wrought iron aqueduct of 40-ft span. Stone abutments were constructed by state crews. The project cost $2,523.61 and was completed in April 1860. The Commissioners called it "the most perfect and best adapted to the purpose of anything yet resorted to...The aqueduct rests upon abutments and towers of heavy stone masonry and is as durable as stone and iron can make it."[154]

- 1866: Despite the optimism of the Commissioners, the new Furnace Run Aqueduct often was damaged by floods. The abutments had been constructed on mud sills and were extremely susceptible to the hydraulics of Furnace Run. In 1866 the north abutment was destroyed by a flood and a new abutment was constructed on a pile foundation.[155]

- 1877: The Furnace Run Aqueduct was rebuilt.

- 1882: The trunk of the Furnace Run Aqueduct was repaired. The Board of Public Works reported that the substantial character of the iron structure after twenty years of use demonstrated that if the state intended to maintain its works with true economy it must provide for iron aqueducts.[156]

- 1883: A devastating flood in February carried off the aqueduct and destroyed one abutment. A substantial new abutment was constructed on a pile foundation, and a row of piles was driven into the stream bed near the aqueduct to offer better protection from floods.

- 1892: The aqueduct was repaired and repainted.

- 1893: A new towpath bridge was constructed.

- 1895: The aqueduct was rebuilt.

- 1899: The aqueduct was again displaced by a flood, but the abutments were not damaged. The superstructure was put back in position and repaired.

- 1902: The aqueduct was repaired.

- 1906: Minor repairs were made.

- 1912: The Furnace Run Aqueduct was badly damaged when the north abutment was undermined; a new north abutment was constructed, the south abutment repaired, new retaining walls constructed, and the truss replaced.

154. Ohio Board of Public Works, *21st Annual Report*, 16-17; Ohio Board of Public Works, *22nd Annual Report*, 7-8.
155. Ohio Board of Public Works, *28th Annual Report of the Board of Public Works of Ohio* (December 1866), 4-5, 15.
156. Ohio Board of Public Works, *44thth Annual Report*, 24, 29.

- 1913: The new aqueduct was destroyed by the great flood of 1913 and was not rebuilt.

- Early 1990s: The National Park Service installed a single-span prefabricated pedestrian bridge to carry the towpath trail over Furnace Run, adjacent to the ruins of the aqueduct.

Peninsula Aqueduct (Figures 27 and 28)

- 1825: The contract for constructing the Peninsula Aqueduct was awarded to John Johnson and John Flinn of Rochester, New York, on July 13. Johnson and Flinn also built Locks Nos. 29 and 30. The original aqueduct consisted of a wooden trunk with timber framing, supported by masonry abutments and a central pier.

- 1827: Contract was relet to Alanson Sweet and Horace Wood on May 9, and relet again to William Stow Jr. on November 23.

- 1842: Pier was rebuilt and other repairs made.

- 1844: The seriously-deteriorated aqueduct was rebuilt, presumably on a plan similar to that discussed by the Canal Commissioners in 1836.[157]

- 1857: Flooding during the winter of 1856-1857 damaged the aqueduct. Engineers reported that the north abutment wall had begun to crumble because of the defective quality of the stone and the poor workmanship of the original construction.[158]

- 1864: The east wing wall of the south abutment was repaired. Inspections revealed that the trunk of the aqueduct needed replanking and the masonry was "getting out of order—the west wing of the north abutment pretty seriously so." In addition "the water way for the river under this aqueduct is not, and never was, of sufficient capacity, and it is necessary to be careful to keep it free from all lodgments of drift, &c. to prevent the canal bank to the northward being cut through by the river at times of high water."[159]

- 1872: The Peninsula Aqueduct was rebuilt.

- 1890: The towpath bridge was rebuilt (100 feet long and 8 feet wide).

- 1892: The pier of aqueduct was repaired.

- 1893: New iron band and protection was placed around the central pier in the river.

- 1895: The aqueduct was repaired.

- 1896: A new trunk and bottom were placed in one span of the aqueduct.

157. Ohio Board of Public Works, *7th Annual Report of the Board of Public Works of Ohio* (December 1844), 3-5.
158. Ohio Board of Public Works, *19th Annual Report of the Board of Public Works of Ohio* (December 1857), 10-11.
159. Ohio Board of Public Works, *25th Annual Report of the Board of Public Works of Ohio* (December 1863), 11-12; Ohio Board of Public Works, *26th Annual Report of the Board of Public Works of Ohio* (December 1864), 13-14.

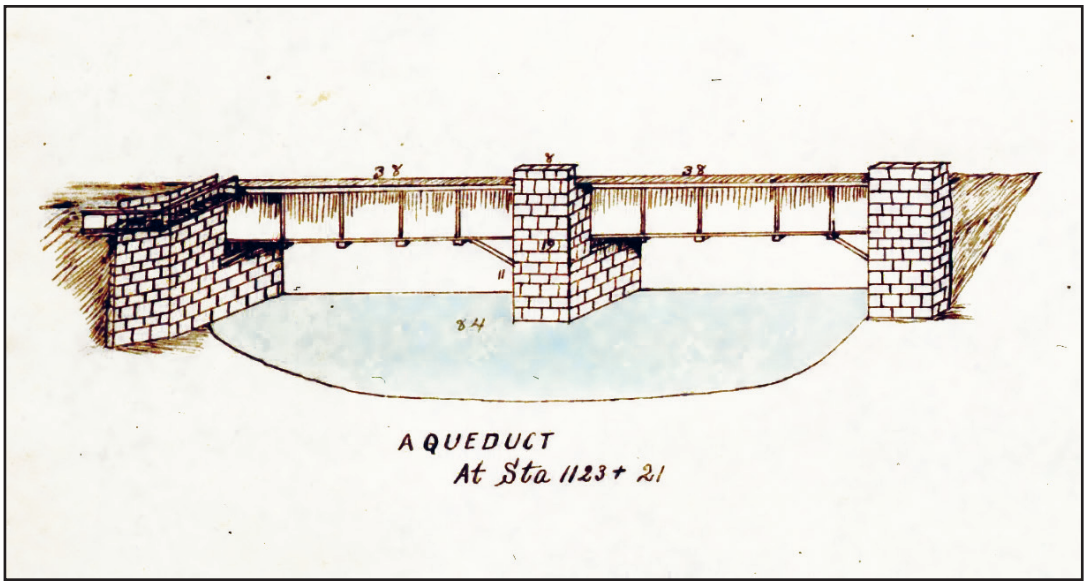


Figure 27. Illustration of Peninsula Aqueduct, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

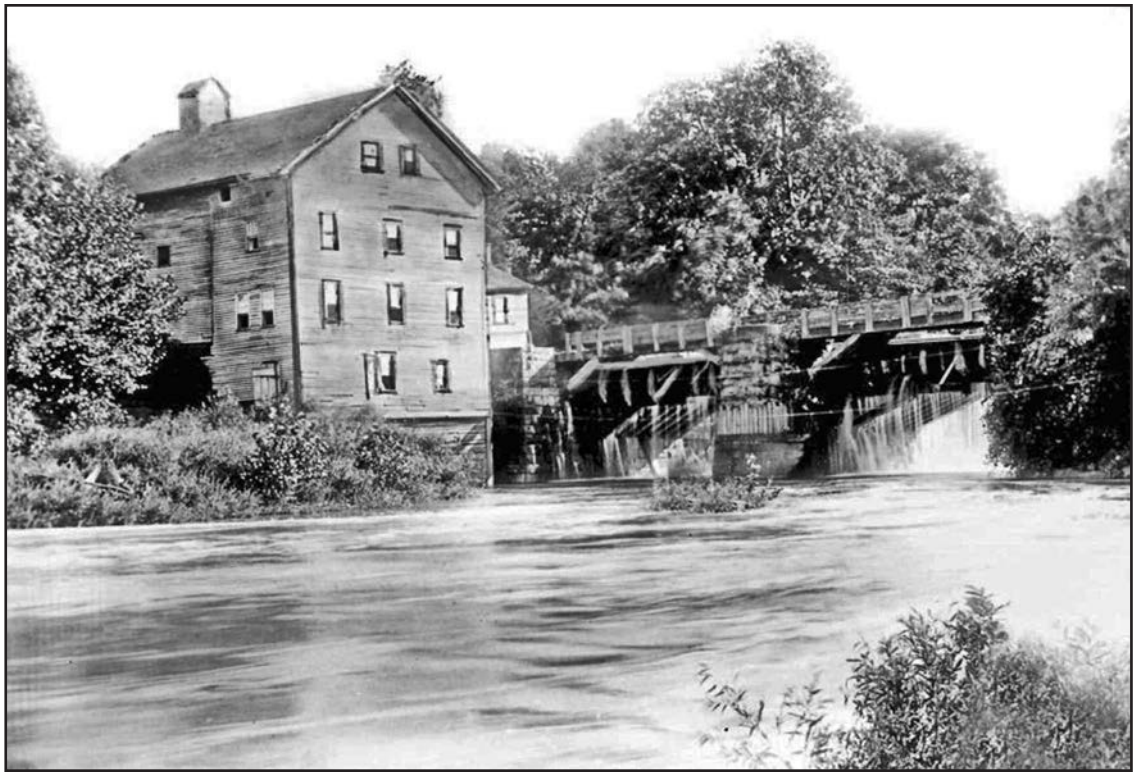

Figure 28. View of Peninsula Aqueduct in 1898 (*Source:* Louis Baus Canal Photograph Collection, OEC_119, The University of Akron, University Libraries Archival Services)

- 1898: A new trunk lining was installed on the bottom and part of one side of the aqueduct, as well as other repairs.

- 1900: Supporting bents were placed under the north span.

- 1901: The north span was rebuilt, and the south span and the masonry were repaired.

- 1904: The aqueduct was repaired.

- 1905: A contract was awarded to the King Bridge Company of Cleveland to construct a new aqueduct. The abutments were completely reconstructed from the bedrock up by state crews, and the central pier, which had reduced the effective flow of the Cuyahoga River, was removed. The new superstructure was to be a single span of 85 feet, consisting of steel trusses supporting a wooden trunk; the supports were modified to allow for a two- foot increase in trunk width. The actual design was at the discretion of the contractor, subject to approval by the State Engineer.[160]

- 1906: New planking and concrete were installed at the north end, and other minor repairs were made.

- 1913: The 1905 aqueduct was destroyed by the great flood of 1913 and was not rebuilt.

- Early 1990s: The National Park Service installed a single-span prefabricated pedestrian bridge to carry the towpath trail over the Cuyahoga River, utilizing the aqueduct's masonry abutments which were repaired.

Tinkers Creek Aqueduct (Figures 29 and 30)

- 1825: The contract for constructing Tinkers Creek Aqueduct was awarded to Leander Ransom, John Flinn, and John Johnson of Rochester, New York, on September 17. Johnson and Flinn also received the contract for the Peninsula Aqueduct but could not finish that job. The original Tinkers Creek Aqueduct featured a wooden trunk with timber framing supported by uncut masonry abutments and central pier. The timber and uncut stone were extremely susceptible to deterioration, necessitating replacement of the framing and trunk in 1837 and of the pier in 1841-1842.

- 1837: The aqueduct was rebuilt, presumably on a plan similar to that discussed by the Canal Commissioners in 1836.[161]

- 1841-1842: The pier was rebuilt and other repairs made to the aqueduct.

- 1844-1845: The aqueduct was severely deteriorated by 1844, and it had become apparent that the location of the aqueduct along Tinkers Creek was undesirable during

160. Ohio Board of Public Works, *67th Annual Report*.
161. Ohio Board of Public Works, *2nd Annual Report of the Board of Public Works of Ohio* (December 1837), 5.

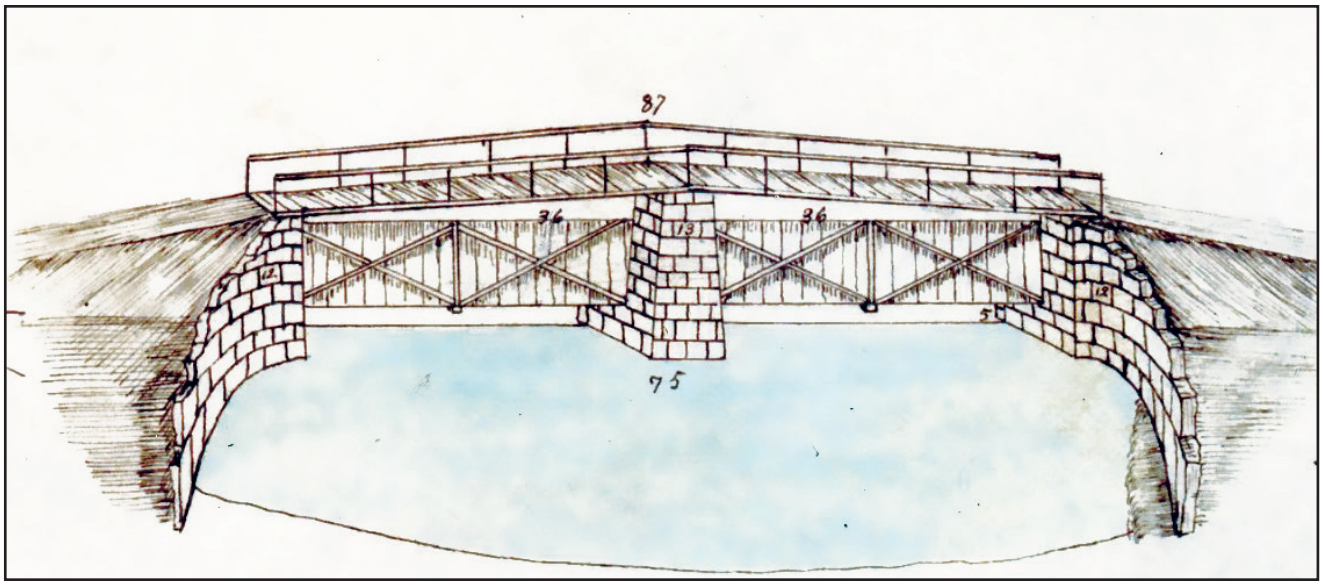


Figure 29. Illustration of Tinkers Creek Aqueduct, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

Figure 30. View of Tinkers Creek Aqueduct, 1916 (*Source*: Howard R. Klepinger photograph, Ohio Department of Public Works, Canals Photograph Collection. State Archives Series 936 AV)

flood conditions since several times water from the creek had broken over the aqueduct's embankments, causing damage to the canal. In the summer of 1844 a contract was awarded for construction of a new aqueduct located several chains to the north. The new two-span structure was completed in the spring of 1845 and was designed to avoid future overflows by placing the timber foundation four feet lower than the original structure. Otherwise it appears to have been similar to the original aqueduct.[162]

- 1863: The trunk of the aqueduct was almost completely rebuilt, although a few timbers that were found to be sound were retained. The old and unsafe braces were not removed, but new ones were inserted to provide sufficient support for the whole weight of the trunk.

- 1870: The trunk of the aqueduct was reconstructed again.

- 1885: In the spring it was noted that the Tinkers Creek Aqueduct appeared in danger of collapse and was shored up with new timbers and plank to make it safe for navigation.

- 1893: 1,150 feet of new two-inch plank were installed on sides and bottom, and the approaches were caulked.

- 1895: The aqueduct was repaired.

- 1896: The aqueduct was rebuilt.

- 1899: New flooring, floor timbers, and needle beams were installed. New planking was put on the bridge.

- 1905: The contract was awarded to the King Bridge Company of Cleveland to construct a new steel superstructure. Removal of the existing structure and repair of the abutments and pier were performed by state crews; the supports were modified to allow for a four-foot increase in trunk width. The new superstructure was to be a single span of 35.6 feet, consisting of steel trusses supporting a wooden trunk. General plans and performance specifications were prepared by the state; the actual design was at the discretion of the contractor subject to approval by the State Engineer.[163]

- 1907: New gate posts were installed.

- 1913-1974: The Tinkers Creek Aqueduct was maintained by the American Steel and Wire Company (later U.S. Steel) which used water from the canal for industrial purposes. The aqueduct underwent a major rehabilitation in the 1940s and again in the 1960s.

162. Ohio Board of Public Works, *8th Annual Report*, 8-9.
163. Ohio Board of Public Works, *67th Annual Report*.

- 1974: The National Park Service assumed management after creation of Cuyahoga Valley National Recreation Area. The aqueduct was repaired in 1975.

- 2002: The aqueduct had deteriorated to point where it could no longer hold water. The towpath trail across the structure already had been closed to traffic in 2000 due to safety concerns. Earthen dams were placed at both ends of the structure and three HDPE pipes were installed to carry water across Tinkers Creek.

- 2007: The truss superstructure, wooden trough, HDPE pipes, and towpath trail bridge were removed. Two new steel pipes were installed to maintain water flow. A new two-span towpath trail bridge was installed on the existing 1845 stone abutments and pier for the aqueduct.[164]

- 2009: The aqueduct was reconstructed, utilizing a two-span reinforced concrete through-girder and floor slab system which served as a trough with the same dimensions as the previous structure. New concrete stub abutments were installed to support the new superstructure, set 10 feet behind the existing stone abutments, which were rehabilitated but no longer support any load. The stone masonry pier was completely dismantled and rebuilt. Twin concrete columns within the stone core extend up from the pier footing to support the trunk. Reinforced concrete transition structures were built at each end of the aqueduct to provide a smooth hydraulic transition from canal to trough. Two 24-inch diameter cast-iron waste gates were installed in the west wall of the southern transition structure, with HDPE outfall pipes discharging downstream of the aqueduct.[165]

**Culverts**

The original contract specifications for the canal presented detailed descriptions for major canal components such as the prism, embankments, and locks, but provided no data for secondary structures such as culverts. These structures were handled on a case-by-case basis and specifications were generally handwritten into contracts by an acting commissioner or state engineer. In December 1826 the Canal Commissioners reported that six stone culverts and nine wooden culverts had been completed on the canal between Portage Summit and Cleveland, but they did not note the specific locations.[166] They apparently added more culverts since contracts were awarded for a total of 24 such structures in this section during initial construction of the canal.

Based on the original contracts, a list was compiled of all component structures built between 1825-1827 within what is now Cuyahoga Valley National Park; while this list includes 24 culverts, the specific locations of these structures are not identified nor are construction methods and materials.[167]

164. National Park Service and Bergmann Associates, *Environmental Assessment for Tinkers Creek Aqueduct*, 5; Borelli, "Reconstruction of the Ohio & Erie Canal Aqueduct," 32-35.
165. National Park Service and Bergmann Associates, *Environmental Assessment for Tinkers Creek Aqueduct*; Borelli, "Reconstruction of the Ohio & Erie Canal Aqueduct," 32-35.
166. Ohio Board of Canal Commissioners, *5th Annual Report*, 237.
167. "Contracts," Series 1231, *Records of the Board of Public Works* (Columbus, OH: Ohio History Center).

| | | |
|---|---|---|
| Culvert | Section 35 | Between Locks Nos. 24 and 25 |
| Culvert | Section 36 | Between Locks Nos. 25 and 26 |
| Culvert | Sections 37-38 | North of Lock No. 26 |
| Culvert | Section 42 | South of Lock No. 27 (probably at Furnace Run) |
| Culvert | Section 43 | Vicinity of Lock No. 27 |
| Culvert | Section 44 | |
| Culvert | Section 48 | This probably was the 4-ft arch culvert at Station 1190+98, south of Lock No. 28 |
| Culvert | Section 50 | Vicinity of Lock No. 28 |
| Culvert | Sections 52-53 | Peninsula vicinity |
| Culvert | Section 56 | Vicinity of Lock No. 31 |
| Culvert | Sections 57-59 | |
| Culvert | Section 60 | Vicinity of Lock No. 32 |
| Culvert | Section 62 | Vicinity of Lock No. 33 (probably at Stanford Creek) |
| Culvert | Section 64 | |
| Culvert | Section 68 | |
| Culvert | Section 71 | Vicinity of Lock No. 35 |
| Culvert | Sections 73-74 | Vicinity of Lock No. 36 |
| Culvert | Sections 77-78 | |
| Culvert | Sections 79-80 | |
| Culvert | Sections 82 | Vicinity of Lock No. 37 |
| Culvert | Section 84 | Vicinity of Tinkers Creek Aqueduct |
| Culvert | Section 85 | |
| Culvert | Section 86 | Vicinity of Lock No. 38 |
| Culvert | Sections 89-90 | South of Lock No. 39 |

A report filed in 1833 was the first document to discuss structures on the canal in a comprehensive manner.[168] Detailed specifications provide a record of the methods and materials used in the construction of culverts between 1825-1833. They also served as a standard reference guide for the engineering corps and superintending personnel as they worked to operate and maintain the waterway. Arch culverts were formed of stone, cut in regular segments and laid in range work, with wing walls and parapet walls of cut stone; the masonry was erected on a floor of hewn timbers secured by sheet piling at both the head and the foot. Box culverts, constructed of broad pieces of timber, served as land drains or carried small springs under the canal; in general, apertures ranged from 8 to 16 inches square and placement was restricted to where the culvert would always be under water to reduce the possibility of premature decay.

Little information was recorded regarding culverts during the operational period of the canal. While periodic repairs to culverts were noted, in general there was no indication as to the extent of repairs or the location of the structures. One exception occurred in 1846 when cast iron arches were installed in culverts whose stone arches had deteriorated. The locations of these modified culverts are unclear.[169] During the winter months when navigation was

168. Ohio Board of Canal Commissioners, *11th Annual Report*, 43-53.
169. Ohio Board of Public Works, *10th Annual Report of the Board of Public Works of Ohio* (December 1846), 8.

suspended, crews performed regular maintenance such as removing debris and vegetation that obstructed the openings. These stone and submerged-wood structures however probably required much less maintenance than locks, dams, aqueducts, and flood gates which were more exposed and in some cases had moving wood and metal parts that were subject to rapid deterioration.

The first major rehabilitation of canal structures between Cleveland and Akron occurred in 1841-1842 and included repairs to many culverts.[170] Not long afterward, a June 1843 flood event in the Cuyahoga Valley overwhelmed some of the culverts which were unable to handle the large volume of water in streams passing under the canal, causing extensive erosion to the banks. In response, additional culverts were constructed in locations where small streams formerly had been allowed to flow into the canal. The largest of these, with a radius of 20 feet, was the Yellow Creek Culvert, built in 1844 to replace an earlier timber dam and waste weir arrangement which had become a chronic maintenance problem.[171]

In July 1858 a 20-foot section of the Furnace Run Culvert, just south of Lock No. 27, collapsed, requiring immediate repairs. This was only the latest of a series of problems with that culvert. The Board of Public Works reported in 1859:

> The Furnace Run Culvert, has, by constant watchfulness, together with temporary repairs, been made to sustain navigation during the past season. The culvert, as originally located and constructed, was of necessity placed much below the surface of the ground. The rapid and increasing quantity of water passing down this stream over a gravel and sandy soil, has for many years been making deposits in the culvert and the channel below, until the obstruction is so great as to make the culvert entirely inadequate to pass the volume of water coming down the stream during the freshets of the fall and spring. During the past season, the water raised to a height upon the berm or upper end of the culvert, so as to pass over the embankment into the canal, submerging a large number of acres of cultivated lands...

To solve this longstanding problem the Board elected to replace the culvert with a 40-foot long aqueduct which was completed in 1860 at a cost of $3,000.[172] The only other recorded instance of culvert construction or repairs in the 19th century occurred in 1879 when a new culvert was built below Lock No. 39.[173]

The first known document which records the location of culverts is a set of survey maps prepared in 1892 by D.C. Kennon which contains brief notes regarding the character of each culvert. A later set of maps which document a survey performed in 1912 by George Silliman (sheets were retraced in 1916 and in later years) reflect conditions after the 1905-1909 improvement of the northern division of the canal. It appears that most of the culverts within the northern division were replaced during this improvement program. Documentation suggests

170. Ohio Board of Public Works, *5th Annual Report*, 5; Ohio Board of Public Works, *6th Annual Report*, 5-6.
171. Ohio Board of Public Works, *8th Annual Report of the Board of Public Works of Ohio* (December 1844), 8-9.
172. Ohio Board of Public Works, *21st Annual Report*, 14-16.
173. Ohio Board of Public Works, *40th Annual Report of the Board of Public Works of Ohio* (December 1878), 37.

that most of the new structures were flat-topped box culverts constructed of concrete reinforced with steel rods, costing about $600 each.[174] A few older stone masonry culverts were left intact, most notably those at Yellow Creek, Brandywine Creek, and Stanford Creek North.

The 1912 survey mapping identifies 13 canal culverts within what is now Cuyahoga Valley National Park, including four along the presently watered section of canal and nine along the unwatered section. Ten of these also appear on the 1892 mapping. Three of them had been built since 1892, while five of the culverts shown in 1892 no longer existed in 1912. Of the thirteen culvert locations depicted on the 1912 survey mapping, culverts still exist at nine of them today, although three concrete culverts along the watered section have been replaced with new concrete box culverts since 2005.

After the abandonment of the canal as a waterway in 1913, the culverts along the watered section continued to be maintained since they also carried the streams beneath Canal Road located immediately east of the canal prism. In 1991 the National Park Service entered into a contract with Environmental Design Group (EDG), a multi-discipline architectural/ engineering firm, to perform an inspection and analysis of various structures along the watered portion of the canal within the Park; the three surviving culverts in that section were among the structures investigated. The EDG report concluded that the condition of the culverts ranged from fair to poor at the time of inspection, and all three were subsequently replaced.[175] Despite the recent replacements the culverts continue to play an important role in ensuring the continuity of both the waterway and the towpath in both the watered and unwatered sections.

The following section summarizes the construction and repair record for each of the nine extant culverts along the watered and unwatered canal sections in the Park, moving from south to north (see Section C for photographs and drawings). Unless otherwise noted, the information in this section is drawn from: "Ohio Canal Ledger," *A. Kelley's Register, 1825-1827*, Series 1239; "Contracts," Series 1231, *Records of the Board of Public Works*, Ohio History Center, Columbus; and various *Annual Reports of the Board of Public Works of Ohio*. Specific references related to the construction and repair history of the culverts can be found in the 1984 *Historic Structure Report: History Section* by Unrau and Scrattish.

<u>Yellow Creek Culvert, Station 1452+87</u>

- 1844: A masonry culvert was built to replace an earlier timber dam and waste weir arrangement that dated to the original canal construction. By the early 1840s the bed of Yellow Creek had become continually filled with sediment which required frequent cleaning, interrupting navigation. To address this problem the engineers constructed a new masonry culvert to carry Yellow Creek under the canal, together with a short feeder.[176]

174. Ohio Board of Public Works, *67th Annual Report*, 182.
175. Environmental Design Group, Inc., "Towpath Structures," Contract No. CX6000-0-0018, Task Order No. 12, Cuyahoga Valley National Recreation Area (Stow, OH: Environmental Design Group, Inc., 1991).
176. Ohio Board of Public Works, *8th Annual Report*, 8-9.

- 1892: A survey by D.C. Kennon shows an arch culvert and bridge at this location; the illustration depicted on the map resembles the existing structure (Figure 31). It also appears on the 1912 survey mapping as an 18-ft diameter culvert.

- 1930s: The canal prism in this vicinity was obliterated by the construction of Riverview Road.

Ira Road Culvert, Station 1383+00

- 1908: There is no evidence that a culvert existed at this location prior to 1908 when a concrete arch culvert was constructed during the improvement of the northern division. The work was performed by contractor C.A. Hovey and cost $4,288.00.[177] Although the 1912 survey mapping shows a "3-ft x 10-ft concrete arch culvert" the 1908 plans indicate that the arched opening measures 5 feet by 9 feet.

Arch Culvert, Station 1190+98

- 1825-1827: The stone culvert probably was built during the initial construction of the canal. The location seems to match that of the culvert on Section 48 which was built by contractors Volney Wallace and James W. Wallace of Boston, Ohio, who were awarded the contract on June 13, 1825.[178]

- 1892: The survey by D.C. Kennon shows a "4 x 6 arch culvert" at this location. It also appears on the 1912 canal mapping by George Silliman as a "4-ft stone arch culvert."

- There is no record that this culvert was repaired or replaced during the improvement of the northern division in 1905-1908. It is not listed in the summary of expenditures made during that improvement program.[179]

Stanford Creek Culvert South, Station 973+02

- Available documentation does not provide information regarding the construction of this culvert. The 1892 survey, however, does show a small culvert at this location; the 1912 canal mapping shows a "2-ft culvert."

Stanford Creek Culvert North, Station 961+94

- 1825-1827: The stone culvert probably was built in 1825-1827 during the initial construction of the canal. The location seems to match that of the culvert on Section 62 which was built by contractor Elias Cozad of Euclid, Ohio, who was awarded the contract on July 14, 1825.[180]

177. Ohio Board of Public Works, *71st Annual Report*, 71.
178. "Contracts," Series 1231, *Records of the Board of Public Works*, Ohio Historical Society, Columbus.
179. Ohio Board of Public Works, *70th Annual Report*, 71.
180. "Contracts," Series 1231, *Records of the Board of Public Works*, Ohio Historical Society, Columbus.

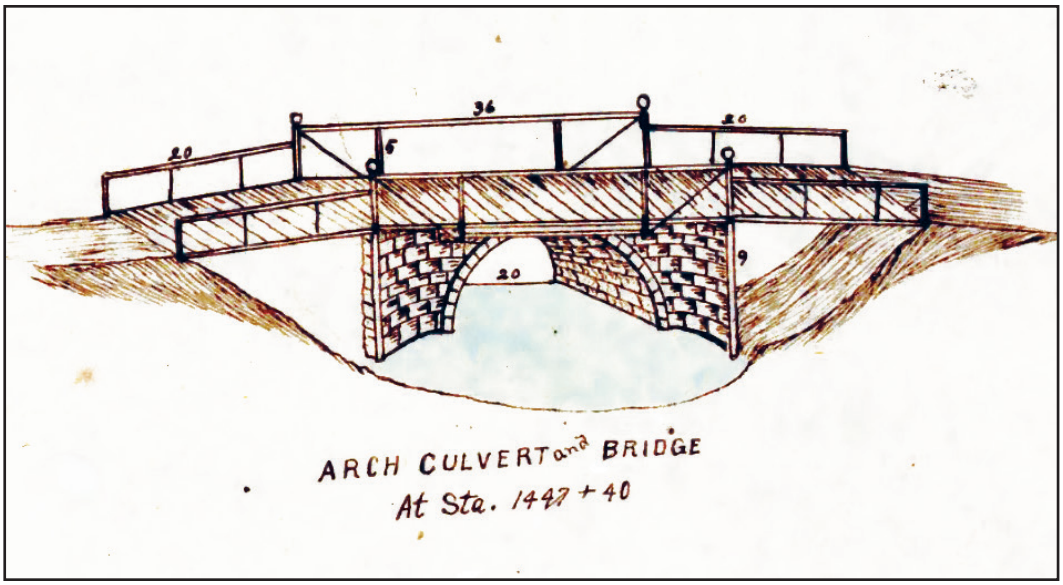


Figure 31. Illustration of Yellow Creek Culvert, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

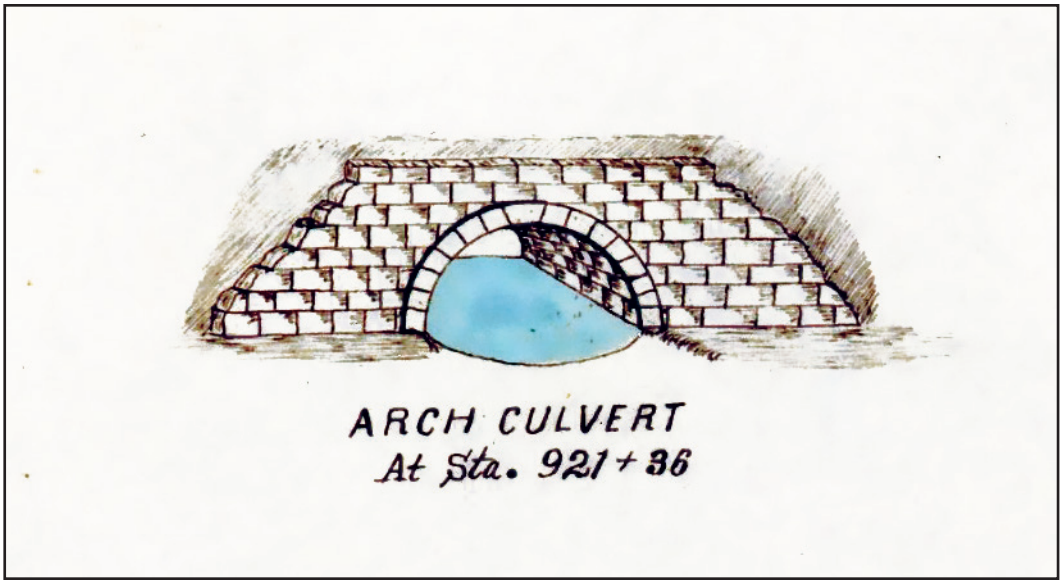


Figure 32. Illustration of Brandywine Creek Culvert, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

- 1892: The survey by D.C. Kennon depicts a culvert at this location. The 1912 survey mapping shows a "7-ft diameter arch culvert."

- 1905-1909: The culvert may have been repaired during the 1905-1909 program of improvements on the northern division, as the list of expenditures includes $60 for work performed by state workers on a culvert between Locks Nos. 32 and 33.[181] However that note could refer to the construction of the Stanford Creek Culvert South.

Brandywine Creek Culvert, Station 921+39

- Available documentation does not provide information regarding the construction of this culvert. The 1892 survey, however, does identify a "9-ft x 18-ft arch culvert" at this location; the illustration contained on the map closely resembles the existing structure (Figure 32). It appears on the 1912 canal mapping as a "14-ft diameter arch culvert."

- Cylindrical holes in the masonry indicate that this structure has been dismantled and relaid.

- We found no record that this culvert was repaired during the improvement of the northern division in 1905-1908. It is not listed in the summary of expenditures made during that improvement program.[182] However in *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* Tamburro and Hiner state that the Brandywine Culvert was partially rehabilitated in 1905.[183] If so, that probably is when concrete was added to the west headwall.

Sagamore Creek Culvert, Station 636+00

- A "5 x 9 stone arch culvert" is shown at this location on both the 1892 and 1912 surveys and probably was built during the original construction of the canal between 1825-1827.

- 1914: According to Cuyahoga County records, the stone arch culvert was replaced by a new concrete culvert in 1914 after the abandonment of the canal as a navigable waterway (Figure 33). The spillway probably was replaced at the same time.[184] This confirms that, unlike most of the culverts, this arch culvert was not replaced during the 1905-1909 improvement of the northern division.

- 1991: The 1914 culvert was investigated by Environmental Design Group, Inc. in 1991 and documented by Cossell in her 1993 draft HSR.

- 2009: The 1913 culvert was replaced by new concrete box culvert.[185]

181. Ohio Board of Public Works, *70th Annual Report*, 71.
182. Ohio Board of Public Works, *70th Annual Report*, 70.
183. Tamburro and Hiner, *A Survey of Canal Resources*.
184. Environmental Design Group, Inc., "Towpath Structures," 3:10.
185. Ohio Environmental Protection Agency, National Park Service-Cuyahoga Valley National Park, Ohio Department of Natural Resources, and US Army Corps of Engineers, *Cuyahoga River Ecosystem Restoration, Canal Diversion Dam Project, Environmental Assessment* (August 2016), Table 1.

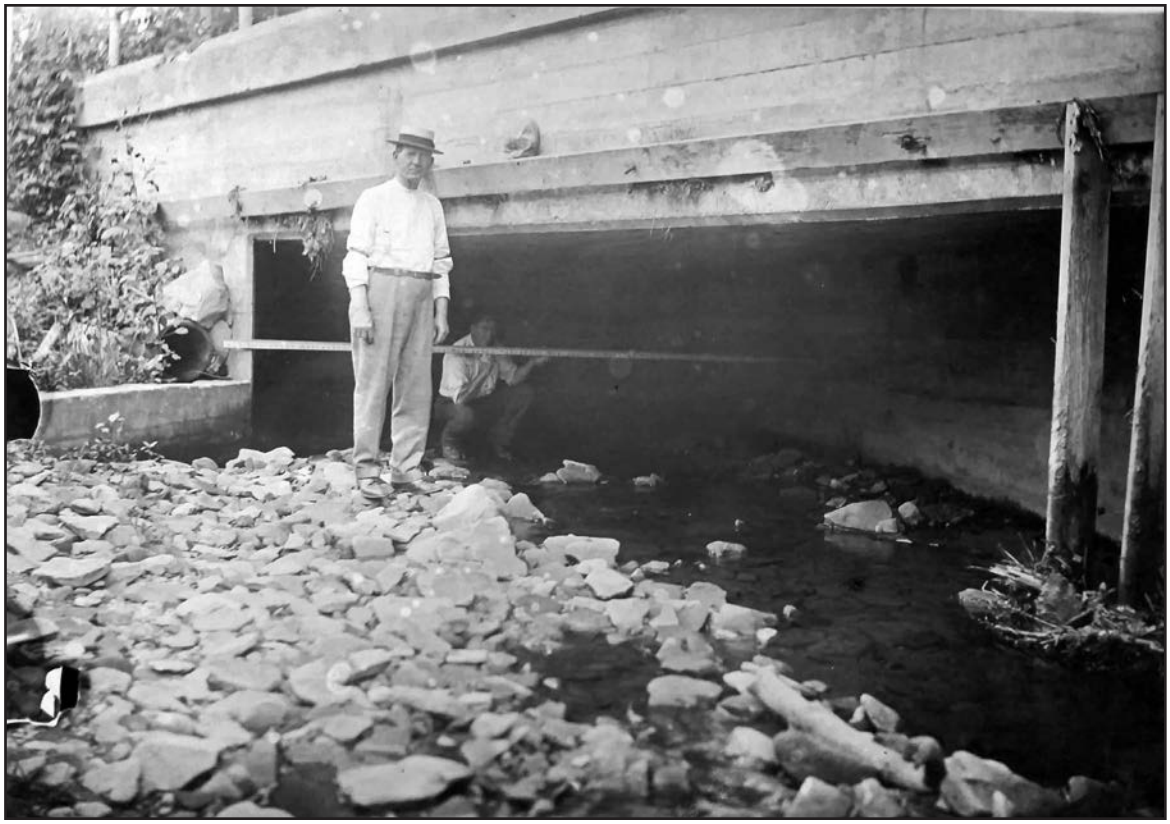

Figure 33. View of Sagamore Creek Culvert, 1916 (*Source*: Howard R. Klepinger photograph, Ohio Department of Public Works, Canals Photograph Collection. State Archives Series 936 AV)

Culvert, Station 504+88

- 1909: There is no evidence that a culvert existed at this location prior to 1909, when a single box concrete culvert was constructed during the improvement of the northern division. The list of expenditures includes funds for work performed by the Cuyahoga County commissioners on a culvert between Locks Nos. 38 and 39.[186]

- The 1912 survey shows a "Box Culvert 2 x 6."

- 1929: The structure was modified with the addition of a second box immediately to the south. At an unknown date, the north box was closed with concrete.[187]

- 1991: The 1909 culvert was investigated by Environmental Design Group, Inc. in 1991 and documented by Cossell in her 1993 draft HSR.

- 2005: The 1909 culvert was replaced by new concrete box culvert.[188]

Culvert, Station 478+90

- According to Cossell, a culvert probably existed here since the original construction of the canal in 1825-1827.

- The 1892 survey shows a "4 x 6 stone arch culvert" in this location.

- 1905: A new double box concrete culvert was constructed during the improvement of the northern division and is shown as "Culvert - 2 Boxes 5 x 6" on the 1912 survey. Documentation suggests that the culverts built at that time were flat-topped box culverts constructed of concrete reinforced with steel rods, costing about $600 each.[189]

- 1950: The 1905 culvert was last modified in 1950 with the addition of a closed drainage system at the inlet.[190]

- 1991: The 1905 culvert was investigated by Environmental Design Group, Inc. in 1991 and documented by Cossell in her 1993 draft HSR.

- 2005: The 1905 culvert was replaced by new concrete box culvert.[191]

186. Ohio Board of Public Works, *70th Annual Report of the Board of Public Works of Ohio* (December 1909), 70.
187. Environmental Design Group, Inc., "Towpath Structures," 3:4.
188. Ohio Environmental Protection Agency et al. *Cuyahoga River Ecosystem Restoration*, Table 1.
189. Ohio Board of Public Works, *67th Annual Report of the Board of Public Works of Ohio* (December 1905), 182.
190. Environmental Design Group, Inc., "Towpath Structures," 3:3.
191. Ohio Environmental Protection Agency et al. *Cuyahoga River Ecosystem Restoration*, Table 1.

## Waste Structures

Waste structures are control components which regulate the level of the water within the canal and provide protection during conditions of high water. Such structures include flood gates and waste weirs. A flood gate is a sluice (a manmade channel for conducting water) with valves or gates that regulate the flow of water. A high-water waste weir is a dam that is located in line with the canal towpath bank and allows water to flow over it during flood events, discharging into the river. Today there are visible remains of eight waste structures in Cuyahoga Valley National Park, four each along the watered and unwatered sections of the canal.

The early reports and lists of specifications for the canal contained even less information about waste structures than culverts. Neither the commissioners' December 1826 report on the progress of construction nor their more detailed January 1833 report even mention waste structures.[192] The 1825 construction contracts for the 22 miles of canal within Cuyahoga Valley National Park note only one waste weir (Bolanz), located on Section 41 between Locks Nos. 26 and 27.[193] Like the wasteways at the locks and the water supply feeders, they may have been considered structures "of less pressing importance" that were deferred until a later time in the initial rush to get the canal ready for navigation.[194] As the commissioners and engineers began to understand the devastating consequences of flooding, they better appreciated the critical importance of waste structures and other mechanisms in controlling high water. Following the destructive flood of June 1843, additional waste gates and culverts were constructed to facilitate drainage during future flood events, but their locations are unknown. We do know that damaged waste weirs were repaired in 1844.[195] A rare reference to a specific waste structure occurred in 1887 when a new weir was constructed between Locks Nos. 24 and 25, consisting of sheet piling backed up with 65 yards of protection stone.[196] Interestingly, this weir does not appear on the canal mapping prepared only five years later, so the reference may be to the bypass channel around the two locks.

The 1892 mapping of the Ohio and Erie Canal is the first definitive record that we have regarding the locations of individual waste structures. It shows seven waste weirs in the Park, with one weir located between Locks Nos. 26 and 27 (Bolanz); one just south of Brandywine Creek, one between Locks Nos. 34 and 35 (Goose Pond); one south of the Pinery Narrows near Station Road; one at the Pinery Feeder; one between the Pinery Narrows and Lock No. 37; and one just south of Lock No. 39. The mapping shows two flood gates: one in the Pinery Narrows and one at Bolanz.

There is documentation of various repairs made in 1893. At the waste gates on the Long Pinery Level, a new stone wall was laid in cement under the mud sill, and 1,000 feet of new two-inch plank was put in the waste weir. A new waste gate and sluice were put in on the Goose Pond Level above Lock No. 35, using 3,000 feet of two-inch plank. The waste weir at

192. Ohio Board of Canal Commissioners, *5th Annual Report*, 237; Ohio Board of Canal Commissioners, *11th Annual Report*, 43-53.
193. "Contracts," Series 1231, *Records of the Board of Public Works*, Ohio History Center, Columbus.
194. Ohio Board of Canal Commissioners, *6th Annual Report of the Canal Commissioners* (January 27, 1828), 275-276.
195. Ohio Board of Public Works, *7th Annual Report*, 3-5; Ohio Board of Public Works, *8th Annual Report*, 8-9.
196. Ohio Board of Public Works, *49th Annual Report of the Board of Public Works of Ohio* (December 1887), 36.

Lock No. 36 (probably the waste gates for the Pinery Feeder) was reconstructed with 4,000 feet of timber and planking. The Yellow Creek waste weir was repaired with two boat loads of stone, two of gravel, and one of dirt. A new wooden trunk sluice was placed under the towpath on the Goose Pond Level "to wash Murphy's Bar."[197] In 1901 all of the "high water waste weirs" on the northern division were repaired, and a new towpath bridge was constructed at the Goose Pond waste weir. In 1903 four new waste gates were placed on the Long Pinery Level, and the Goose Pond waste weir was rebuilt after being destroyed by a flood.[198]

The massive improvement program of 1905-1909 included the construction of new waste structures and the repair of old ones. Like the other new construction on the northern division, the new flood gates and waste weirs were concrete structures (Figure 34). McGarry & McGowen were awarded the contract for work on the locks, sluices, waste weirs, and other structures between Locks Nos. 22 and 28; P.T. McCourt the section between Locks Nos. 28 and 36; and George W. Carmichael & Co. the section between Locks Nos. 36 and 42, but some of the waste weirs were constructed by state crews. In 1909 a new sluice gate was constructed on the Pancake Level.[199]

The 1912 survey shows fourteen waste structures, including eight flood gates, two waste weirs, and four combination structures. From south to north they include: a flood gate between the Yellow Creek Culvert and Lock No. 24; a flood gate between Ira Road and Lock No. 26; two flood gates between Locks Nos. 26 and 27; a flood gate between Locks Nos. 30 and 31; a combination structure (Goose Pond) and a flood gate (Hooker's Run) between Locks Nos. 34 and 35; a combination structure between Locks Nos. 35 and 36; three flood gates, one waste weir, and one combination structure between Locks Nos. 36 and 37; and a waste weir just south of Lock No. 39.

Today there are visible remains of eight of the fourteen waste structures shown in 1912. Many of the weirs and flood gates along the unwatered section of canal apparently were buried or destroyed by natural processes after the abandonment of the canal or, since they were no longer needed to maintain water levels in the canal, during construction of the towpath trail. Structures along the watered section were maintained by the American Steel and Wire Company until 1992.

The 1991 inspection and analysis by Environmental Design Group (EDG) examined the four surviving waste structures along the watered section of canal.[200] At the same time (1990-1993) the National Park Service constructed the towpath trail which required the installation of new pedestrian bridges across most of the extant waste structures in both the watered and unwatered sections.

197. Ohio Board of Public Works, *55th Annual Report of the Board of Public Works of Ohio* (December 1893), 32-36.
198. Ohio Board of Public Works, *63rd Annual Report of the Board of Public Works of Ohio* (December 1901), 58-59; Ohio Board of Public Works, *65th Annual Report of the Board of Public Works of Ohio* (December 1903), 98-99.
199. Ohio Board of Public Works, *67th Annual Report*, 181-183; Ohio Board of Public Works, *71st Annual Report*, 102.
200. Environmental Design Group, Inc., "Towpath Structures."

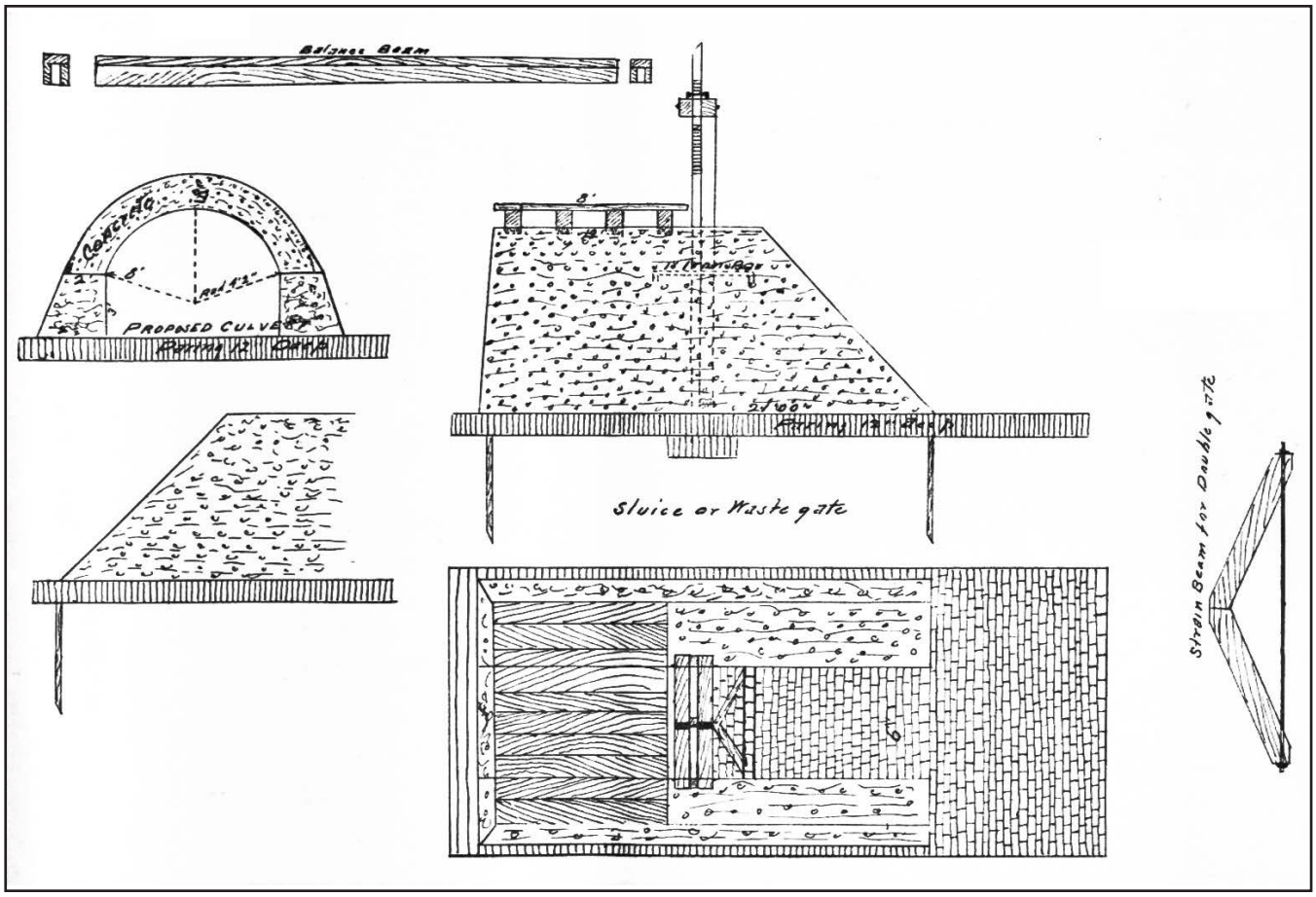


Figure 34. Plan for rebuilt flood gates on the Ohio and Erie Canal northern division, 1905 (*Source*: Contract for the Improvement of the Northern Division of the Ohio Canal between the Board of Public Works of Ohio and McGarry & McGown, February 14, 1905 and Contract for the Improvement of the Northern Division of the Ohio Canal between the Board of Public Works of Ohio and P.T. McCourt, February 14, 1905, "Contracts," Records of the Board of Public Works of Ohio, Series 1231, Ohio Historical Society, Columbus)

The following section summarizes the record of construction and repair for each of the surviving waste structures along the watered and unwatered canal sections in the Park, moving from south to north. Unless otherwise noted, the information in this section is drawn from the "Ohio Canal Ledger," *A. Kelley's Register, 1825-1827*, Series 1239; "Contracts," Series 1231, *Records of the Board of Public Works*, Ohio History Center, Columbus; and various *Annual Reports of the Board of Public Works of Ohio*, as referenced in the 1984 *HSR: History Section* by Unrau and Scrattish and the 1993 *HSR: Architectural Data Section* by Cossell.

Flood Gate, Station 1378+31

- No waste structure is shown in this location on the 1892 mapping.
- 1905-1909: A concrete flood gate was constructed during the 1905-1909 improvement of the northern division by contractor McGarry & McGowan.
- 1913: It was abandoned following the 1913 flood.
- 1991: It was buried during construction of towpath trail.

Bolanz Flood Gate, Station 1305+25

- 1826: A masonry and wood flood gate was constructed by contractor William Van Slyke of the State of New York. Documentation suggests that this was the only waste structure built during the original construction of the canal within what is now Cuyahoga Valley National Park.
- 1893: The flood gate broke and was repaired with 1,000 feet of two-inch oak plank and 100 yards of gravel.
- 1905-1909: Cylindrical holes in the masonry indicate that the structure was dismantled and relaid, presumably during the 1905-1909 improvement of the northern division. The work was performed by contractor McGarry & McGowan.
- 1913: It was abandoned following the 1913 flood.
- 1991: Masonry walls were rebuilt and a pedestrian bridge installed during the construction of the towpath trail.

Goose Pond Waste Weir and Flood Gate, Station 863+00

- 1892: Canal mapping shows a waste weir in this location, depicted on the mapping as a simple wooden bridge supported by posts with no abutments (Figure 35).
- 1898: A new towpath bridge was constructed.
- 1899: The towpath bridge was repaired.

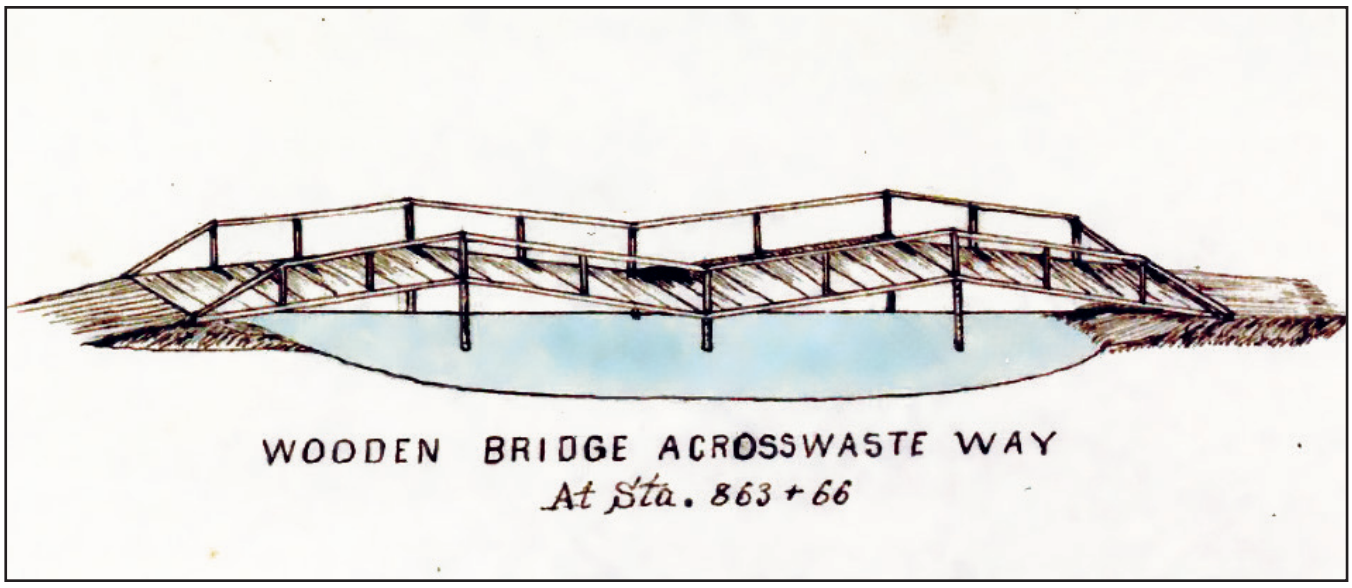


Figure 35. Illustration of Goose Pond Waste Weir, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

- 1901: A new towpath bridge was constructed.
- 1903: The waste weir was destroyed by a flood and rebuilt. A new towpath bridge was built.
- 1904: The waste gates were renewed.
- 1905-1909: The earlier stone and timber waste weir was replaced by a new concrete combination waste weir/flood gate. It was constructed by state forces.
- 1913: It was abandoned following the 1913 flood.
- 1990: A pedestrian bridge was installed during construction of the towpath trail.

Hooker's Run Flood Gate, Station 838+34

- No waste structure is shown in this location on the 1892 canal mapping.
- 1905-1909: A concrete flood gate was constructed during the 1905-1909 improvement of the northern division by contractor P.T. McCourt.
- 1913: It was abandoned following the 1913 flood.
- 1990: Masonry walls were rebuilt and pedestrian bridge installed during the construction of the towpath trail.

Sagamore Creek Flood Gate/Waste Weir, Station 638+10

- 1892: The canal survey shows a "wasteway with flat bridge" in this location.
- 1905: The earlier stone and timber waste weir was replaced by a new concrete combination waste weir/flood gate (Figure 36). It was constructed by contractor Carmichael & Co.
- 1912: The Silliman mapping shows a waste weir in this location. After the abandonment of the canal as a navigational waterway, the waste weir was maintained by the American Steel and Wire Company.
- 1971: The American Steel and Wire Company replaced the flood gates and guide timbers.[201]

201. Letter from Smith to Gienow (November 13, 1970).

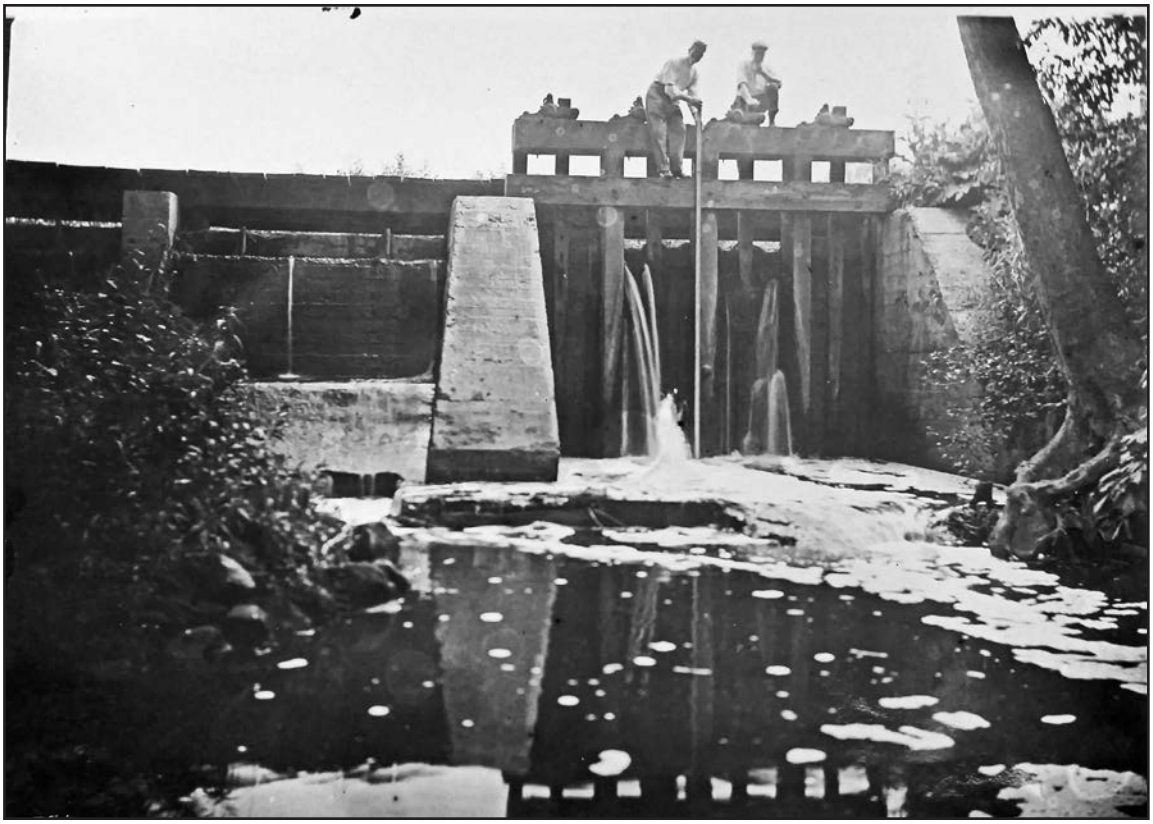

Figure 36. View of Sagamore Creek Flood Gate, 1916 (*Source*: Howard R. Klepinger photograph, Ohio Department of Public Works, Canals Photograph Collection. State Archives Series 936 AV)

- 1991: The 1905 structure was investigated by Environmental Design Group, Inc. in 1991 and documented by Cossell in her 1993 HSR.

- 1991: A pedestrian bridge was installed during construction of the towpath trail.

Sagamore Creek Waste Weir, Station 636+10

- No waste structure is shown in this location on the 1892 canal mapping.

- 1914: The concrete waste weir probably was constructed at the same time as the adjacent Sagamore Culvert, following the devastating 1913 flood.[202] The functions of the two structures are interrelated. After the abandonment of canal as a navigational waterway, the waste weir was maintained by the American Steel and Wire Company.

- 1991: The structure was investigated by Environmental Design Group, Inc. in 1991 and documented by Cossell in her 1993 HSR. The structure was incorporated into the towpath trail constructed by the National Park Service.

Flood Gate, Station 613+00

- No waste structure appears in this location on the 1892 canal survey.

- 1905: A concrete flood gate was constructed during the 1905-1909 improvement of the northern division. It was constructed by contractor Carmichael & Co.

- 1912: The Silliman survey shows a waste weir in this location. After the abandonment of the canal as a navigational waterway, the waste weir was maintained by the American Steel and Wire Company.

- 1949: The discharge apron was extended (drawing prepared in November 1949).

- 1960: The four wooden gates were replaced (drawing prepared in October 1960).

- 1991: The flood gate was investigated by Environmental Design Group, Inc. in 1991 and documented by Cossell in her 1993 HSR.

- 2016: The National Park Service made emergency repairs to a canal breach on either side of the spillway, followed by more comprehensive rehabilitation of the flood gate, the bridge carrying the trail over the spillway, and the section of canal prism between the flood gate and adjacent Lock No. 37. Rehabilitation of the flood gate and spillway consisted of repair/replacement of damaged concrete in wing walls and abutments,

202. Environmental Design Group, Inc., “Towpath Structures,” 3:10.

repair/replacement of wooden members of gates and frames, reattachment of cast-iron gear teeth to new vertical posts, and towpath repairs.[203]

Waste Weir, Station 460+44

- 1892: The survey by D.C. Kennon shows a "wasteway with flat bridge" in this location.
- 1905: A concrete waste weir was built to replace the earlier structure. It was constructed by state forces. Rip-rap in the channel was replaced by concrete.[204]
- 1906: The new concrete waste weir near Lock No. 39 was cut down by one-foot.
- 1912: The Silliman survey shows a waste weir in this location. After the abandonment of the canal as a navigational waterway, the waste weir was maintained by the American Steel and Wire Company.
- At some point in the mid-20th century a culvert was installed to carry water away from the waste weir, replacing the earlier wasteway. Excess water was directed into a basin, then into the culvert which emptied into the Cuyahoga River. The culvert consisted of a 42-inch corrugated metal pipe discharging into a 72-inch reinforced concrete pipe.[205]
- 1991: The 1905 structure was investigated by Environmental Design Group, Inc. in 1991 and documented by Cossell in her 1993 HSR.
- 1990: The towpath trail was constructed slightly to the west, bypassing the waste weir.

**Dams and Feeders**

Feeders were required to ensure an adequate supply of water for the canal, particularly along higher sections of the line. On the Ohio and Erie Canal, a feeder complex consisted of a V-shaped timber crib-dam across the river to create an impoundment; a set of head gates that diverted water from the river into the feeder and regulated the flow of water; the feeder channel, a wide ditch that carried water from the dam to the canal; and the waste gates, which returned excess water to the river (Figures 37 and 38). By the early 1830s there were twelve feeders along the entire line of the Ohio and Erie Canal, including two within what is Cuyahoga Valley National Park: one, built in 1827, at the head of the Pinery Narrows, and the other, built in 1830, just downstream from the village of Peninsula. Another was located just north of Akron at "Old Portage," near Lock No. 21, where the canal entered the south end of the Cuyahoga Valley.

203. Categorical Exclusion Form, PEPC Project No. 64265, Lock 37 Spillway/Floodgate Rehabilitation and Towpath Trail Approach Repairs, May 31, 2016, Cuyahoga Valley National Park, Resource Management Division files.
204. Cuyahoga Valley National Park, "Lock 39 Wasteway Draft," Structure-Single Entry Report," Cuyahoga Valley National Park, Resource Management Division files.
205. Environmental Design Group, Inc., "Towpath Structures," 3:2.

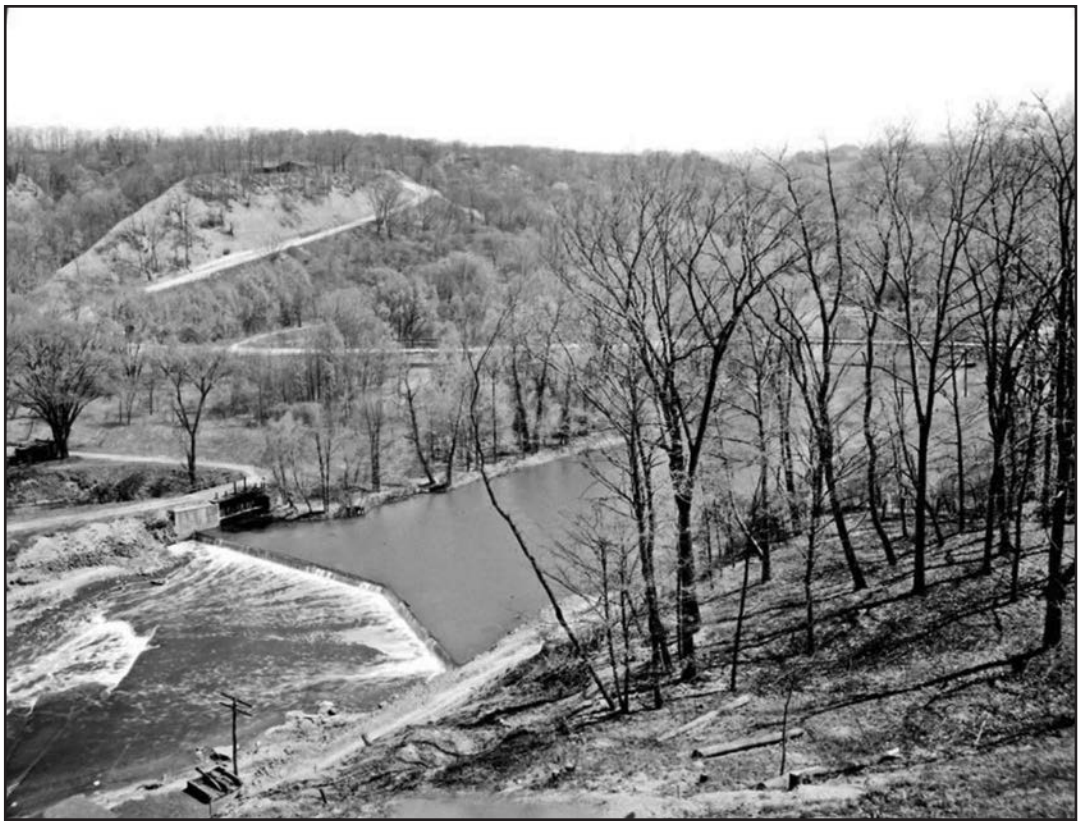

Figure 37. View of Pinery Dam and Feeder about 1930 (*Source:* Louis Baus Canal Photograph Collection, OEC_109, The University of Akron, University Libraries Archival Services)

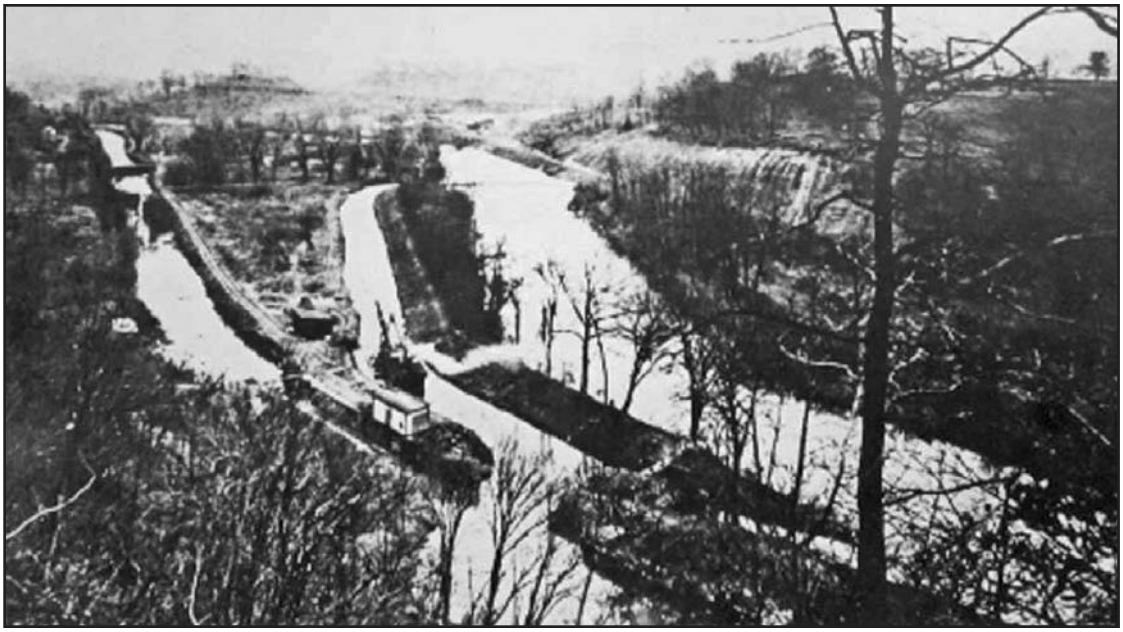

Figure 38. View of Pinery Feeder and Lock No. 36 in 1907, looking south (*Source:* Cuyahoga Valley National Park Resource Management Division)

In their rush to complete the canal and open it to navigation at the earliest possible date, the Commissioners postponed the construction of certain components that "were esteemed of less pressing importance," including the regulating weirs around locks and also the feeders which would divert water from the Cuyahoga River into the canal. These shortcuts interfered with the proper operation of the canal since it was impossible to provide an adequate water supply. It immediately became clear that the flow of water from the small streams that were allowed to flow into the canal would be insufficient to sustain canal operations, particularly during the summer season.

The Commissioners took steps to address this problem very quickly after the canal was opened to navigation on July 4, 1827, when they finally had the time to consider matters "of less pressing importance." They immediately ordered the construction of the feeder from the Little Cuyahoga River below Lock No. 21, about 35 miles south of Cleveland.[206] This work proceeded during the summer and fall. They also provided for construction of a temporary feeder from the Cuyahoga River at the "Pinery," while plans were developed for a more permanent feeder complex. On July 26 a contract was awarded to Henry R. Burnam of Boston, Ohio, to build a permanent dam and feeder at that location. According to the contract, Burnam would "construct a dam across the Cuyahoga River near the head of the first rapids below the mouth of Chippewa Creek, & a feeder from thence below the Lock [No. 36]...The walls at the head or guardgates to be built of stone masonry in the same manner as to the kind of work as Lock walls are required to be built on the Canal, the dam to be formed by timber bolted to the rock at the bottom of the river." The feeder was sufficiently completed to be put into use during the fall of 1827, but Burnam apparently was unable to complete the work since on December 6 a new contract was awarded to William Brown and Merrick Sawyer to finish the job.[207]

By 1830 it was determined that another feeder was needed to insure an adequate water supply for the Cleveland-to-Akron section of the canal. During that year the Peninsula Feeder was constructed about one-half mile below the Peninsula Aqueduct. The feeder complex was similar to the one at the Pinery Narrows; it consisted of a 135-ft long canal, a low brush and stone dam across the river, and a set of cut stone masonry headgates to regulate the flow of water from the river. According to the Canal Commissioners, the feeder was built to provide a permanent and ample supply of water to the northern sector of the canal and "to replenish in the shortest possible time" any loss of water resulting from breaches and "other accidental occurrences."[208]

Both the Pinery and Peninsula feeders were described in January 1833:

> Immediately below lock no. thirty-six, north of Portage summit, seventeen miles from Cleveland, a copious and constant supply of water is introduced from the Cuyahoga by means of a feeder of twelve chains in length, called the "Pinery Feeder." The surface of the rock which forms the bed of the river having about the same elevation as the water line of the level, into which

206. Kilbourne, *Public Documents,* 275-276.
207. Articles of Agreement between Henry R. Burnam and Alfred Kelley, July 26, 1827, "Contracts," *Records of the Department of Public Works of Ohio*, Series 1231, Ohio History Center, Columbus).
208. Kilbourne, *Public Documents,* 404-405; Ohio Board of Canal Commissioners, *11th Annual Report of the Canal Commissioners* (January 22, 1833), 9.

> the feeder is introduced, the dam at its head is required to be of no greater elevation than is necessary to divert the proper quantity of water from the river into the canal, and is formed by bolting timbers to the rock. Besides furnishing water for navigation, this feeder furnishes a large quantity which may be used for hydraulic purposes, both at Cleveland and at the intermediate locks, round which an ample stream constantly flows from one level to another.
>
> About half a mile below the aqueduct at the Peninsula, water is also introduced into the canal from the river, through a feeder of about two chains in length, called the "Peninsula Feeder." A low dam of brush and stone across the river diverts the necessary quantity of water into this feeder.
>
> Both these feeders are secured from the influx of too great a quantity of water, in times of flood, by head gates, supported by walls of cut stone masonry, founded on rock.[209]

During the canal era the dams at both feeder complexes were frequently damaged by floods and ice jams in the river. The feeder and head gates were more durable but still had to be rebuilt or repaired multiple times. The Pinery dam was rebuilt or repaired in 1857, 1868, 1875, 1899, 1902, and 1906, and other repairs or improvements were made in 1844, 1857, 1877, 1882, 1883, 1887, and 1893. The Peninsula dam was rebuilt or repaired in 1868, 1873, 1884, 1890, 1893, 1896, 1902, and 1906, and other major work occurred in 1844 and 1857.

The 1892 survey map of the Ohio and Erie Canal by D.C. Kennon provides an excellent view of both complexes as they existed at that time. The Pinery dam was a V-shaped structure pointing upriver, with two sections measuring 87 feet 10 inches and 91 feet, and a fish chute in the center. The head gates, adjacent to the dam, were spanned by a flat bridge. The feeder channel was about 850 feet long and 35 feet wide and extended north from the head gates to the lower end of Lock No. 36 where it discharged water into the canal. A waste weir near the lock returned excess water to the river. There was a long levee between the river and canal which was intended to protect the feeder complex from flood damage. The Peninsula feeder complex consisted of a V-shaped dam with two sections measuring 154 feet and 141 feet; a set of head gates adjacent to the dam abutment; and a 131-ft long feeder channel that discharged water into the canal just below Lock No. 30. There was a flood gate but no waste weir at Peninsula.

Extensive work occurred at the Pinery Feeder Complex in connection with the major improvement program on the northern division from 1905 to 1907. The dam was repaired with 220-ft timbers braced with stone. In 1906 the head gates, sluice gates, and weir were rebuilt, with "neat but massive concrete structures, resting on rock foundations, at the cost of about $2,500. They are about five feet higher than formerly; so as to largely avoid the high floods."[210] The Peninsula Feeder Complex was given a similar treatment the following year: the Engineer-in-Charge reported that "new head gates, sluice and a tow path bridge were built of stone and concrete in a very substantial manner making a better, and more efficient arrangement than it

209. Ohio Board of Canal Commissioners, *11th Annual Report*, 7-10.
210. Ohio Board of Public Works, *67th Annual Report*, 181-183.

ever was before. This will ensure a better water supply from Peninsula, north."[211] The masonry abutments of the towpath bridge were dismantled and relaid, and a new concrete deck installed. Forty-five feet of the dam also was torn out and rebuilt. Despite the improvements of 1905-1906, both complexes appear little changed on the 1912 survey mapping. While the principal structures had been rebuilt, their configurations remained essentially the same.

Like the rest of the canal south of the Pinery Narrows, the Peninsula Feeder Complex was abandoned following the devastating flood of 1913 which destroyed much of the canal between Akron and Brecksville. In contrast, the Pinery Feeder Complex and the canal section between Brecksville and Cleveland were repaired and continued to operate after the flood, since they supplied cooling water to the American Steel and Wire Company's Cuyahoga Works. Since at least 1899 that company had utilized water from the canal for its industrial operations, first at the Newburgh Steel Works, then at the Cuyahoga Works. The first known lease to AS&W was executed in 1922 and was renewed in October 1943 and periodically thereafter through 1995, even after the state transferred its canal lands within Cuyahoga Valley National Park to the federal government in 1989. The company, owned by U.S. Steel in the 20th century, performed routine maintenance on canal structures along the leased section of canal. In 1986 a new steel fabricating company acquired the Cuyahoga Works together with the rights to the American Steel and Wire Company name and assumed responsibility for maintaining the canal north of Brecksville including the feeder complex.[212]

In 1930-1931 Cuyahoga County built the Brecksville-Northfield High Level Bridge which spanned the valley and bisected the Pinery Feeder Complex; although Lock No. 36 and part of the canal south of the lock were filled in during construction, the massive bridge spanned the feeder channel, suggesting that it still served an important function. In 1949 AS&W replaced the 1905 feeder head gates with a new reinforced concrete head gate structure complete with new control valves. Two years later it replaced the old timber crib-dam with a new fixed-crest concrete weir dam located 120 feet downriver. The work was funded by AS&W but supervised by the Ohio Department of Public Works. The old dam was left in place with a 20-foot wide breach in the center to allow the water to flow through. The top of the new dam was one foot higher than the top of the crib-dam, which was now submerged beneath the surface of the pool.[213] The new structure was known as the Brecksville Diversion Dam.

The American Steel and Wire Company continued to maintain the Brecksville Diversion Dam and the associated feeder channel and head gates until the late 1980s. In 1988

211. Ohio Board of Public Works, *68th Annual Report of the Board of Public Works of Ohio* (December 1906), 58-59.
212. Peg Bobel and Lynn Metzger, "The Ditch and the Path in the Backyard," in *Canal Fever: The Ohio and Erie Canal, from Waterway to Canalway,* ed. Lynn Metzger and Peg Bobel, (Kent: Kent State University Press, 2009), 231-249; Historic American Engineering Record, *Ohio and Erie Canal: Selected Structures in the Cuyahoga Valley National Recreation Area* (HAER No. OH-59), Carol Poh Miller, Historian (Washington, DC: National Park Service, Historic American Engineering Record), 8; Lease between the State of Ohio and American Steel & Wire dated December 22, 1931, Canal Society of Ohio Collection, University of Akron Archives, Akron, Ohio. Lease covers the period 1932-1947 and refers to the original lease beginning January 17, 1922. Also see: Lease between the State of Ohio and U.S. Steel Corporation dated December 8, 1970, Cuyahoga Valley National Park, Resource Management Division files. Also see: Lease extensions dated July 24, 1985 and October 26, 1990, Tract File 101-33, Hawkins Library, Cuyahoga Valley National Park.
213. Roy Hampton and Heather Kenny, "National Register Assessment of the Brecksville Diversion Dam (SUM-3253-1) Cuyahoga Valley National Park, Summit and Cuyahoga Counties, Ohio" (Columbus, OH: Hardlines Design Company, 2006), 10; Sam Tamburro, "History of the Brecksville Dam." Unpublished manuscript, Cuyahoga Valley National Park, Resource Management Division files (2003), 6-7.

the National Park Service acquired the Ohio and Erie Canal Lands within Cuyahoga Valley National Park and assumed responsibility for maintenance of the feeder complex although the hydraulic lease continued for a few more years. The State of Ohio continued to own individual structures including the Brecksville Diversion Dam, head gates, and Pinery Dam remnant.[214]

The following section summarizes the physical history of the Pinery and Peninsula feeder complexes. Unless otherwise noted, the information in this section is drawn from: "Ohio Canal Ledger," *A. Kelley's Register, 1825-1827*, Series 1239; "Contracts," Series 1231, *Records of the Board of Public Works*, Ohio Historical Society, Columbus; and various *Annual Reports of the Board of Public Works of Ohio*. Specific references related to the construction and repair history of the locks can be found in the 1984 *Historic Structure Report: History Section* by Unrau and Scrattish.

Pinery Feeder Complex

- 1827: A temporary feeder was constructed in the summer, followed by construction of the permanent feeder complex which was completed by early 1828. Original contract was awarded to Henry R. Burnam, but on December 6 a new contract was awarded to William Brown and Merrick Sawyer to finish the job.

- 1844: Unspecified improvements were made to both feeders.

- 1857: Feeder complex was repaired after sustaining severe damage from floods during the winter of 1856-1857. The west half of the dam was rebuilt.

- 1868: Winter ice jams in the Cuyahoga River damaged the Pinery and Peninsula feeder dams, requiring repairs in the spring.

- 1875: Half of the Pinery feeder dam was rebuilt. The slope of the dam was resheeted and a stone abutment on one side of the dam was reconstructed.

- 1877: The Pinery feeder was rebuilt, including the large sluice and wasteway.

- 1882: A new towpath bridge was constructed.

- 1883: The feeder sustained heavy damage from the devastating flood in February. New head gates and frames were installed, the walls were relaid, and the feeder channel cleaned out. New waste gates also were installed.

- 1887: A new set of gates was installed with ratchets to hoist them.

- 1892: The entire length (830 feet) of the Pinery feeder was dredged.

214. Tamburro, "History of the Brecksville Dam," 7; Ohio Environmental Protection Agency et al. *Cuyahoga River Ecosystem Restoration*, 38.

- 1893: A new bridge over the Pinery feeder was installed.
- 1899: Repairs were made to the Pinery feeder dam.
- 1901: The feeder gates were repaired.
- 1902: The feeder dam was raised by 12 inches.
- 1904: Repairs were made to the Pinery feeder dam; the waste gate at the lower end of the feeder was repaired.
- 1906: Extensive work occurred at the Pinery Feeder Complex in connection with the major overhaul of structures on the northern division. The dam was repaired with 220-foot timbers braced with stone. The head gates, sluice gates, and weir were rebuilt, with "neat but massive concrete structures, resting on rock foundations, at the cost of about $2,500. They are about five feet higher than formerly; so as to largely avoid the high floods."[215]
- 1906: The dam was repaired with new timbers, also filled with concrete and replanked.
- 1913: Presumably, the complex underwent repairs following the flood of 1913. It continued to supply water to the canal for industrial purposes even after navigation on the canal was abandoned.
- 1949: New concrete head gates were installed by the American Steel and Wire Company.
- 1951: The American Steel and Wire Company constructed a new concrete fixed-weir dam approximately 120 feet north of (downriver from) the original Pinery crib-dam. The cost was $95,000.
- 1989: The National Park Service assumed maintenance responsibilities.
- 1990: The American Steel and Wire Company installed new gates in June 1990.[216]
- 2018: The entire feeder was dredged.[217]

<u>Peninsula Feeder Complex</u>

- 1830: The feeder complex was constructed at a cost of $900.00.
- 1844: Unspecified improvements were made to both feeders.

215. Ohio Board of Public Works, *67th Annual Report*, 181-183.
216. Meeting minutes, September 24, 1990, Cuyahoga Valley National Park, Resource Management Division files.
217. Categorical Exclusion Form, PEPC Project No. 55183, Ohio and Erie Canal-Dredging, Cuyahoga Valley National Park, Resource Management Division files.

- 1857: The feeder complex was repaired after sustaining severe damage from floods during the winter of 1856-1857.

- 1868: Winter ice jams in the Cuyahoga River damaged the Pinery and Peninsula feeder dams, requiring repairs in the spring.

- 1873: About 70 feet of the Peninsula feeder dam was destroyed by an ice jam, requiring rebuilding.

- 1884: The Peninsula feeder dam was reconstructed.

- 1890: The height of the feeder dam was raised six inches for a distance of 100 feet with two-inch planking. The west end of the dam was graveled and the feeder bank protected by a new riprap wall 43 feet long and 4.5 feet high.

- 1893: The Peninsula feeder dam was graveled and caulked for a distance of 125 feet; logs and other debris were removed.

- 1896: 61 feet of dam were "renewed."

- 1901: The feeder gates were repaired.

- 1902: The feeder dam was repaired.

- 1906: Extensive work also occurred at the Peninsula Feeder Complex in connection with the 1905-1907 overhaul of structures on the northern division: "At the Peninsula feeder new head gates, sluice and a tow path bridge were built of stone and concrete in a very substantial manner making a better, and more efficient arrangement than it ever was before. This will ensure a better water supply from Peninsula, north."[218] A 45-ft section at the west end of the dam was torn out and rebuilt, paved with stone and regraveled.

- 1909: The feeder dam was caulked with gravel.

- 1913: The Peninsula Feeder Complex was abandoned following the flood of 1913.

**Other Water Control Structures**

Mudcatchers were small dams or bulkheads placed at locations where minor streams were allowed to drain directly into the canal as a source of water to sustain canal operations. They were designed to hold back silt and debris that otherwise would have been deposited into the canal. Cleaning debris from the mudcatchers was part of routine canal maintenance performed by state crews.

218. Ohio Board of Public Works, *68th Annual Report*, 58-59.

Galley Run Mudcatcher

According to Tamburro and Hiner, the Galley Run Mudcatcher originally was built in 1826, however the work is not listed among the contracts awarded during the 1825-1827 period.[219] The *Annual Report of the Board of Public Works of Ohio* for 1895 suggests that the mudcatcher was constructed in that year, or it possibly was reconstructed. The original mudcatcher probably was a stone masonry structure.

In 1908 state crews reconstructed the Galley Run Mudcatcher as part of the major improvement program on the northern division. At the same time they constructed a new concrete bulkhead wall across Galley Run, the same structure that exists today. The cost of the work was $1,984.86.[220] There is no documentation of any repair or maintenance occurring on the structure during the period of the American Steel and Wire Company lease or following the transfer of the Canal Lands to the federal government.

**Bridges**

Bridges over the canal were common landscape features during the canal era. They included a variety of types, sizes, and materials, but they all had a common function: to facilitate movement and maintain local transportation networks by carrying roads, farm lanes, railroads, foot paths, and even the towpath itself over the new artificial waterway that bisected the landscape. As industrial and transportation technology evolved over the course of the 19th and early 20th century, the design of vehicular bridges also evolved: from simple wooden spans to wrought-iron and steel trusses to reinforced concrete and steel beam structures.

None of the 19th century bridges over the Ohio and Erie Canal within Cuyahoga Valley National Park survive today, although there are visible remains at several locations. Some of the canal-era bridges have been replaced by modern structures, while others were abandoned after the 1913 flood. In all cases the present structures post-date the Ohio and Erie Canal's period of significance (1825-1913) and are not significant within the canal context, however any remains of the earlier bridges, typically the stone abutments, are canal-era features that may contribute to the significance of the historic landscape.

Vehicular bridges were built at various points along the canal to carry public roads over the waterway. Most were part of the canal's original design, with locations and construction details determined by the Canal Commissioners and engineers. The early specifications stated:

> Road bridges across the canal shall be erected at such places as the acting commissioner shall designate. They should be built of good sound white oak timber, (or of other timber equally firm and durable,) and covered with plank of the same description, with the necessary embankments at the ends thereof. The whole to be done agreeably to a plan to be furnished for that purpose.[221]

219. Tamburro and Hiner. *A Survey of Canal Resources*.
220. Ohio Board of Public Works, *71st Annual Report*, 71.
221. Ohio Board of Canal Commissioners, *11th Annual Report*.

By December 1826 seven road bridges had been completed along the canal section from Portage Summit to Cleveland.[222] The 1892 canal mapping indicates that, within the Park, road bridges spanned the canal at Botzum (Station 1458+80), Ira Road (Station 1383+00), Bolanz Road (Station 1299+00), Streetsboro Road/Main Street in Peninsula (Station 1132+00), Boston Mills Road (Station 1005+26), Highland Road (Station 905+80), Station Road (Station 774+00), Fitzwater Road (Station 611+14), Tinkers Creek Road (Station 556+60), Hillside Road (Station 530+74), Stone Road (Station 477+25), and Rockside Road (Station 434+16). In 1892 the bridges were all short single-span structures consisting of a wood or wrought-iron truss superstructure with a wood deck, supported by stone masonry abutments (Figures 39-41). All were replaced at least once in the 20th century. The present Stone Road and Tinkers Creek Road bridges date to 1950 and 1953, respectively, and the crossings at Fitzwater Road and Hillside Road feature even more modern bridges built after 2000. At Fitzwater Road the circa 1922 concrete bridge/culvert over the canal was left in place when the new bridge was constructed. At some locations along the unwatered section of the canal, such as Bolanz Road, Boston Mills Road, Station Road, and Highland Road, the bridge has been eliminated in favor of highway fill placed in the canal prism.

There are visible remains of the 19th century road bridges over the canal at only two locations: 1) at Tinkers Creek Road the concrete superstructure of the current 1953 bridge rests on the cut stone abutments of an earlier structure; and 2) the wasteway of Lock No. 34 (Red Lock) is spanned by a small early 20th century concrete bridge resting on cut stone abutments associated with an earlier bridge. The latter structure formerly carried Highland Road prior to the relocation of the highway. Little is known concerning the construction and repair history of the 19th century bridge at either location, although the Tinkers Creek Road bridge was one of five county bridges that were raised in 1905 to achieve ten-foot clearance over the canal.[223]

Other bridges carried private farm lanes and foot paths over the canal, possibly constructed and maintained by the local landowners who relied on them to access their buildings and fields. The 1892 mapping indicates that these private bridges were simple wooden structures often supported by timber posts driven into the ground rather than masonry abutments (Figure 42). In 1892 there were six of these bridges at various points between Lock No. 26 (Pancake Lock) and Lock No. 33 (Wallace Lock). The Silliman survey mapping reveals that four of them were gone by 1912. Only one of them has visible remains today: the substantial stone abutments of a private farm bridge located at Station 1285+00 on the 1912 mapping, just south of Lock No. 27 (Figure 43). Nothing is known about its date of construction or any repairs that may have occurred during the canal's period of operation. Another type of bridge was located at Station 632+80, south of Lock No. 37: this was a swing bridge, a low wooden structure which could be moved vertically or horizontally to allow boats to pass (Figure 44). Nothing remains of it today.

When the Valley Railway was constructed in 1880, two bridges were built at points north and south of Peninsula to carry the railroad line over the canal and river. Depictions of these bridges on the 1892 mapping indicates that they both were metal through-truss structures (Figure 45). The bridge south of Peninsula was supported by massive stone abutments while

222. Ohio Board of Canal Commissioners, *5th Annual Report*, 275-276.
223. Ohio Board of Public Works, *68th Annual Report*, 58-59.

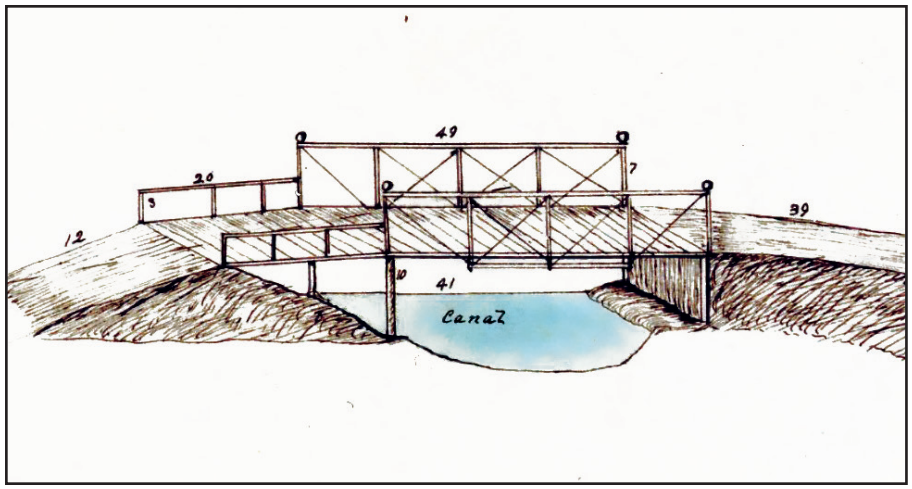


Figure 39a. Illustration of Ira Road bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

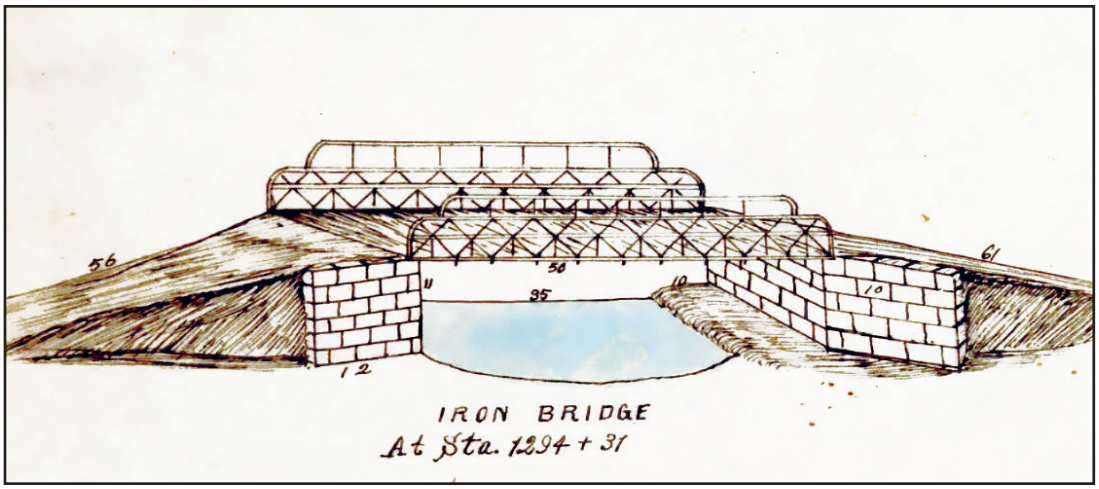


Figure 39b. Illustration of Bolanz Road bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

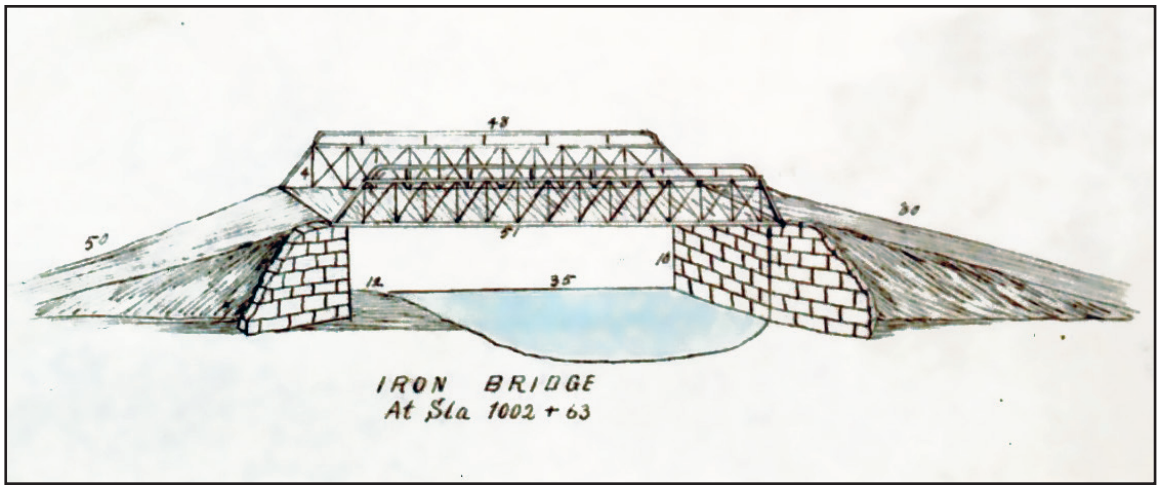


Figure 39c. Illustration of Boston Mills Road bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

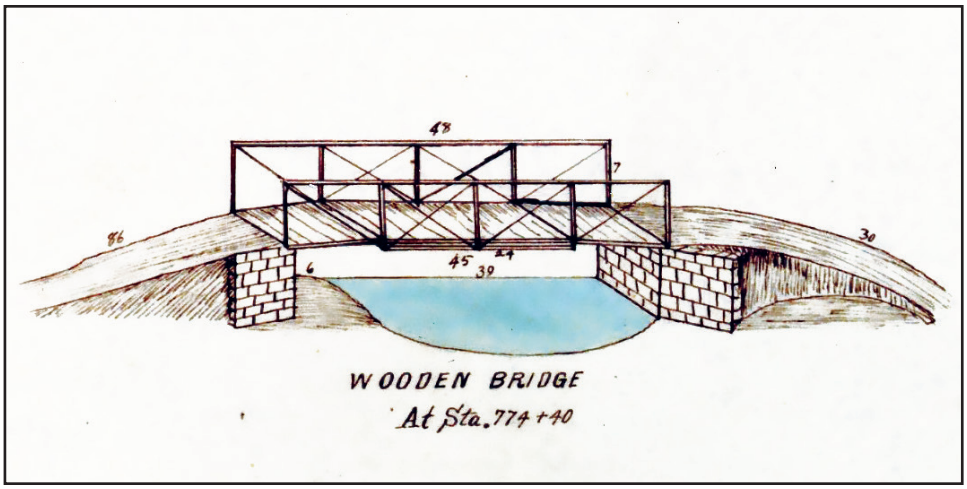


Figure 40a. Illustration of Station Road bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

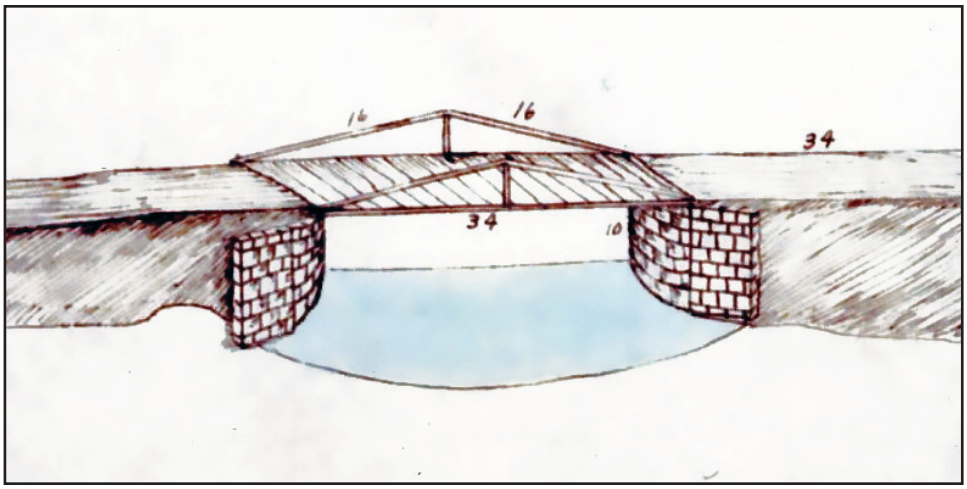


Figure 40b. Illustration of Fitzwater Road bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

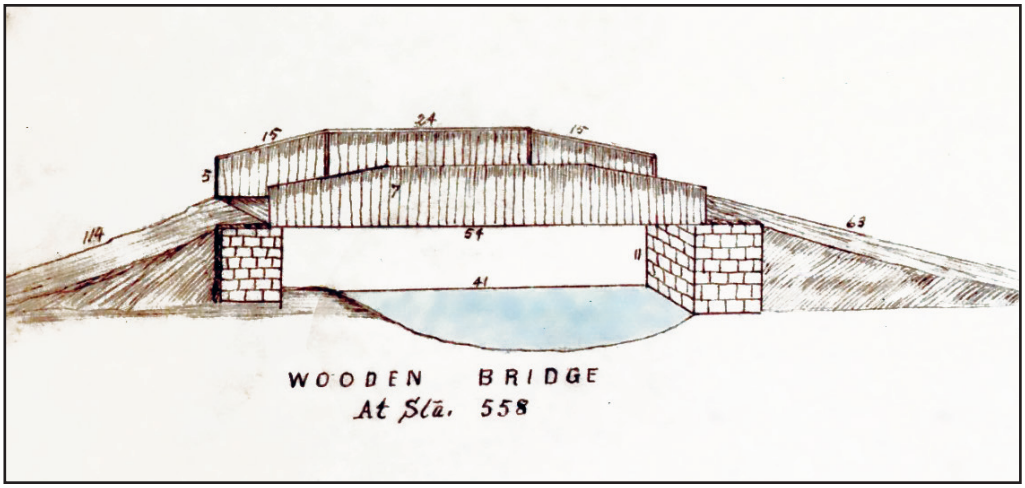


Figure 40c. Illustration of Tinkers Creek Road bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

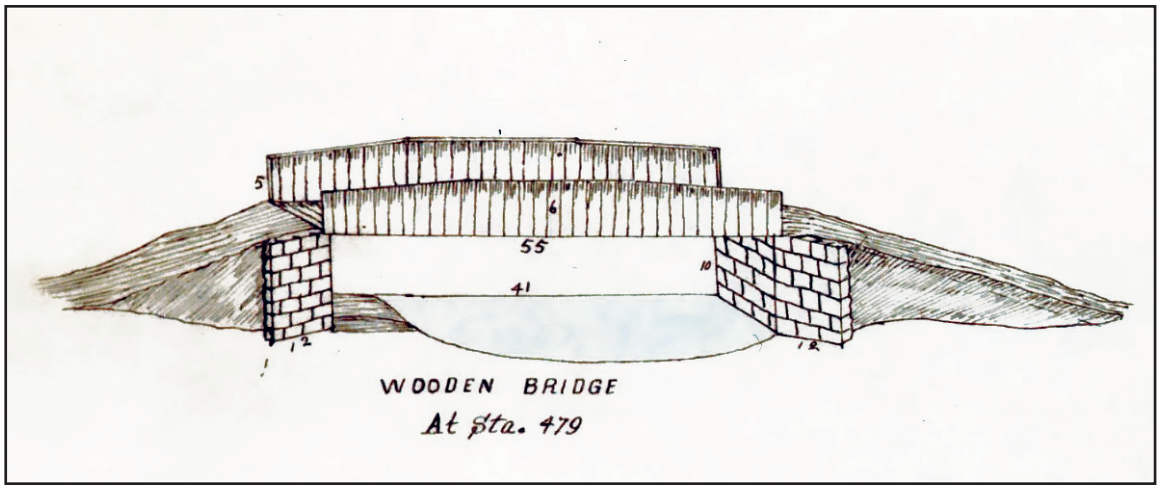


Figure 41a. Illustration of Stone Road bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

Figure 41b. View of Stone Road bridge, 1898 (*Source:* Louis Baus Canal Photograph Collection, OEC_46, The University of Akron, University Libraries Archival Services)

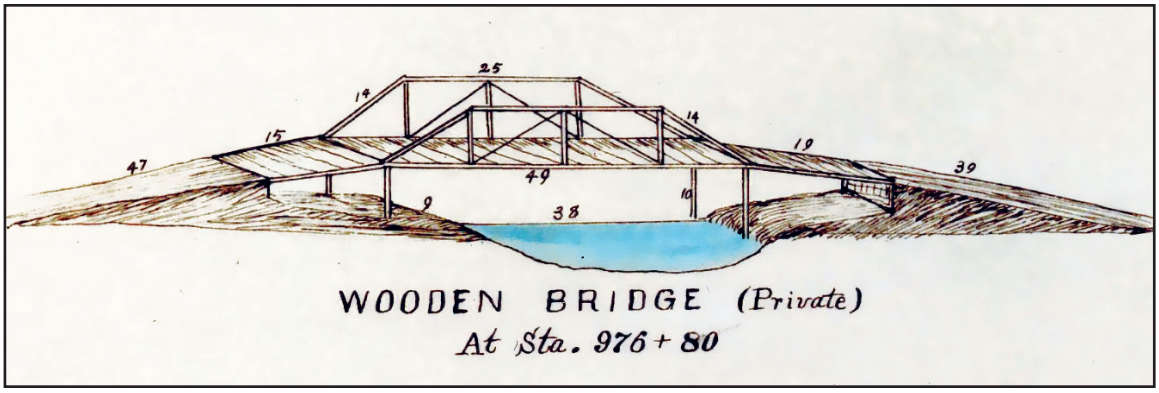


Figure 42. Illustration of private bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

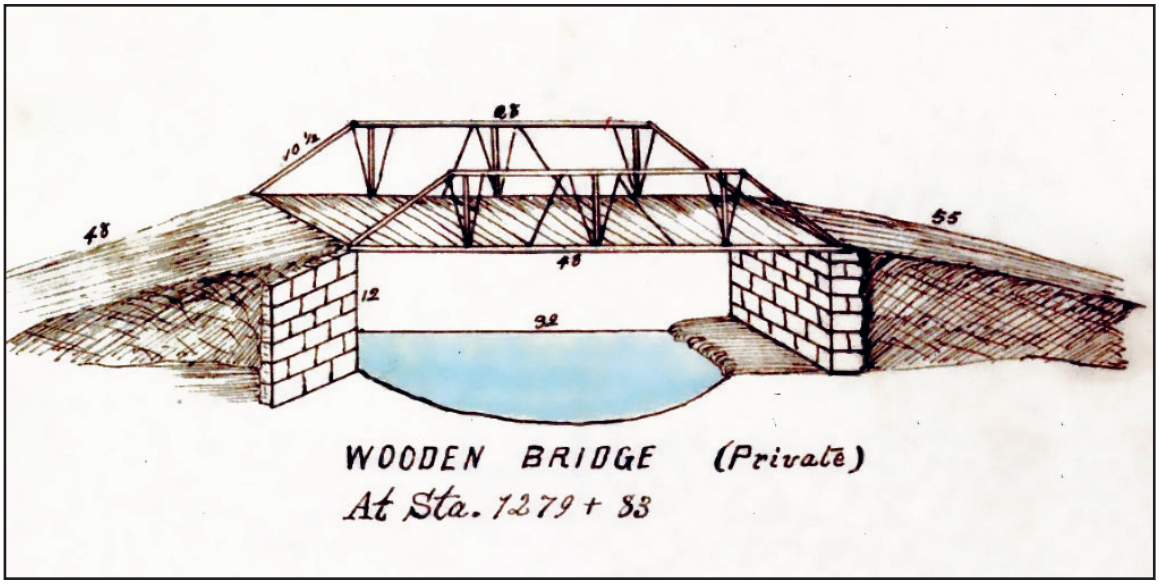


Figure 43. Illustration of private bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

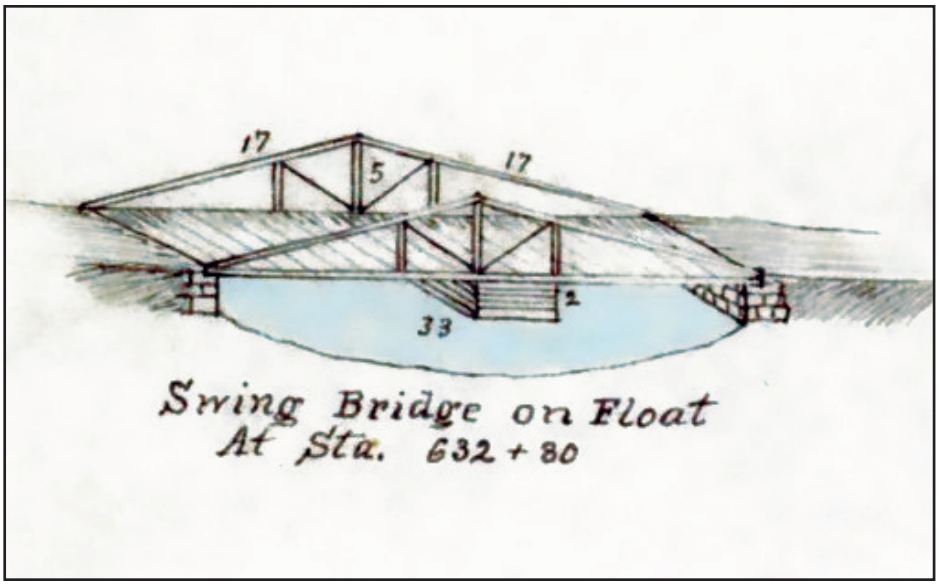


Figure 44. Illustration of swing bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

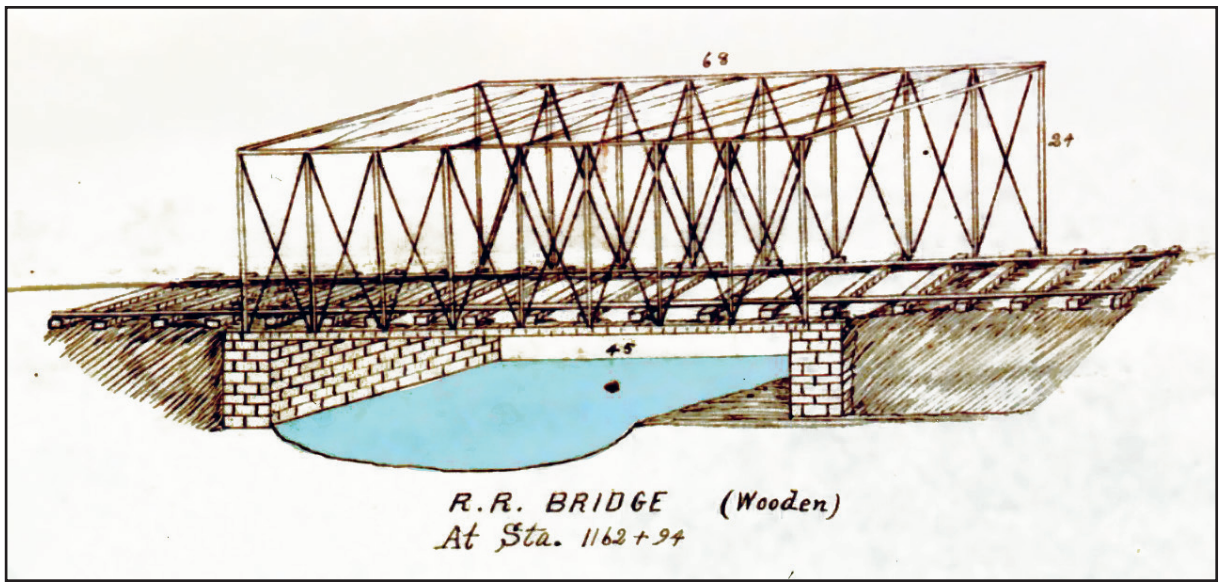


Figure 45. Illustration of railroad bridge, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

the bridge north of Peninsula was supported by insubstantial wood posts. Today the superstructures and substructures of both railroad bridges are long gone, replaced by concrete culverts which carry trail traffic under the tracks, but a stone retaining wall survives at Station 1167+00 which probably is associated with the former bridge.

Small wooden bridges carried the towpath over waste weirs, flood gates, and feeders. Aqueducts incorporated a wooden bridge for the towpath. Some locks had a small foot bridge that spanned the chamber, providing access to both sides of the lock. Like lock gates, aqueducts, and sluice gates, these minor bridges were among the wooden structures that required extensive repairs or reconstruction every six to nine years. They were built and maintained by contractors or state forces throughout the period of the canal's operation. Documented repairs on foot bridges and towpath bridges at locks, feeders, and aqueducts are listed in connection with the discussions of those components (above).

**Prism and Towpath**

The prism and towpath of the Ohio and Erie Canal closely parallel the Cuyahoga River as it flows south to north through Cuyahoga Valley National Park. The prism was a water-filled earthen channel through which boats moved as they navigated the canal, pulled by horses or mules walking on the towpath (Figure 46; also see Figure 10). The towpath bank was located on the side between the river and canal to avoid the danger of landslides, but this meant that it frequently suffered damage from floods and water action, requiring the construction of protective walls and rip-rap.

The prism derived its name from its distinctive shape, the top being wider than the bottom (Figure 47). It had to be wide enough for two boats to pass side-by-side. At their policy meeting in May 1825 the canal commissioners adopted the specifications used on the Erie Canal for the construction of the Ohio canals.[224] The Ohio and Erie prism was a minimum of 26 feet wide at the bottom and 45 feet wide at the water line. The towpath was usually 10 feet wide and the opposite "berm" bank not less than six feet. Thus the entire canal—prism, berm, and towpath—was a minimum of 61 feet wide. In addition the land on both sides of the canal within 20 feet of the embankments was completely cleared of vegetation so fallen trees would not interfere with navigation. The water depth in the prism was to be at least 4 feet. Specifications required that the towpath bank be from 2 to 5 feet above the water line, and the towpath itself was graded so that the outside edge was 6 inches lower than the inner edge. As constructed, the actual dimensions often were much larger than the minimum, with the width of the prism varying from 60 to 150 feet and the depth of the water as much as 5 to 12 feet. The width of the towpath also was highly variable. In 1833 the canal commissioners reported that "it has been a standing rule in the construction of the canals, to increase their dimensions beyond the minimum, in all places where it could be done without materially enhancing the cost."[225] The standard dimensions of both the Ohio and Erie and New York's Erie Canal were slightly different from other contemporary canals such as the Pennsylvania Main Line Canal (40 feet wide at the water line and 28 feet wide at the base, with an 11-foot wide towpath) and the Chesapeake and Ohio Canal (60 feet wide with a 12-foot wide towpath).

224. Scheiber, *Ohio Canal Era*, 40; Woods, *Ohio's Grand Canal*, 8.
225. Ohio Board of Canal Commissioners, *11th Annual Report*, 6.

Figure 46. View of Ohio and Erie Canal in the Pinery Narrows, looking north, 1930 (*Source:* Louis Baus Canal Photograph Collection, OEC_108, The University of Akron, University Libraries Archival Services)

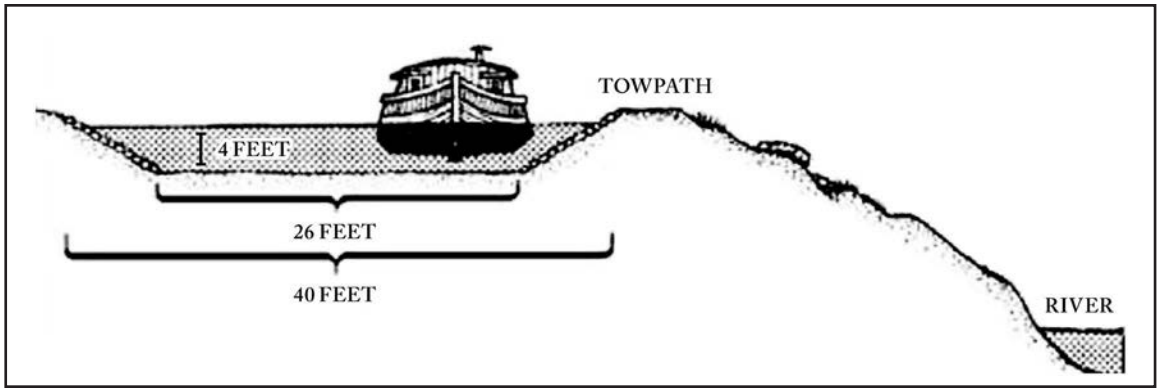


Figure 47. Idealized cross-section of canal prism and towpath (*Source:* Captain Pearl R. Nye collection (AFC 1937/002), American Folklife Center)

Contracts for the Ohio and Erie Canal were let by half-mile sections. Sections 35-91 were located within the present boundaries of Cuyahoga Valley National Park. On June 10, 1825 proposals were received for the 14-mile line north of Portage Summit to Lock No. 28. A month later, on July 9, about 7 miles of additional line extending northward to Lock No. 35 were put under contract. On August 29 the remainder of the line between Lock No. 35 and its termination near the lake at Cleveland was contracted, except for 1 mile at the northern end. Contractors for the various sections are listed in Table 1.[226]

The physical work involved in constructing a canal in the early 19th century is almost unbelievable by modern standards. Following the tedious process of grubbing a 60-foot wide swath along the canal route (33 feet from center on the towpath side and 27 feet from center on the berm side) and clearing trees and brush for an additional 15-20 feet on each side, earth was excavated by pick and shovel, and the banks were built up with earth hauled in by wheelbarrow. Blasting was necessary in many areas. The work required constant supervision by the engineers to ensure that the specifications were met.

Regarding the embankments, the canal commissioners directed: “All loose and porous materials and all much and vegetable earth used in the construction of any bank shall occupy the outward slope thereof only, and ten feet in breadth of each bank from top to bottom shall be formed of the most solid, compact, durable and water tight earth which the adjoining excavation will furnish; and that kind of earth which will form the driest, best and most durable towing path shall be placed on and near the surface of the towing path bank.”[227] In contrast to the Pennsylvania Main Line Canal and the Chesapeake and Ohio Canal, the specifications for the Ohio and Erie make no mention of puddling: the process of adding a thick (2 to 3 foot) layer of dense clay to the interior of the prism in order to make it watertight. Archeological cross-sections of the towpath performed in the 1980s revealed no evidence of puddling.[228] This probably accounts for the fact that many sections of the Ohio and Erie leaked like a sieve immediately upon letting water into the prism in 1828. In other areas the soils had not been compacted sufficiently, and the towpath embankment soon settled, making it necessary to reconstruct or raise the banks.

Only six months after the canal’s completion a major flood in January 1828 caused the river to overflow and break through the embankments in many places. The commissioners sought to avoid future problems by raising the banks one to two feet above the highwater mark of the January flood, which had been the worst in living memory. In other spots, stone was placed on the outer slopes of the towpath and berm banks to provide erosion protection.[229]

Flood damage and breaches were recurring problems that had to be addressed nearly every year. Superintending engineers directed state crews who were responsible for routine repairs to the prism and towpath, strengthening weak places in the banks and raising banks if

226. "Ohio Canal Ledger, A. Kelley's Register," [1825-1827], Series 1239, and “Contracts,” Series 1231, *Records of the Board of Public Works*, Ohio History Center, Columbus.
227. Ohio Board of Canal Commissioners, *11th Annual Report*, 43-53.
228. Vergil E. Noble, “Further Archaeological Investigations along the Ohio and Erie Canal Towpath, Cuyahoga Valley National Recreation Area, Summit County, Ohio” (Lincoln, NE: National Park Service, Midwest Archeological Center, 1989).
229. Ohio Board of Canal Commissioners, *7th Annual Report of the Canal Commissioners* (January 6, 1829), 325-327

Table 1. Contractors for Ohio and Erie Canal sections in Cuyahoga Valley National Park

| Section # | Contractor | Residence | Date of Contract |
|---|---|---|---|
| 35 | Abraham L. Beaumont & Henry F. Guy | Lyons and Lockport, NY | June 14, 1825 |
| 36 | Reuben Brackett | Lockport, NY | June 14, 1825 |
| 37-38 | Robert Blackstock & Daniel Van Slyke | State of New York | June 13, 1825 |
| “ | John Mason Fuller | | March 15, 1827 |
| 39-40 | Theophilus Pherson & Co. | | June 13, 1825 |
| 41 | Stephen Snyder | Lyons, NY | June 13, 1825 |
| 42, 45-46 | James Alcott & others | | June 13, 1825 |
| “ | Erastus Torrey | Portage, Ohio | August 15, 1826 |
| 43 | James Steward & Alexander McFarlan | Montgomery Co., NY | June 17, 1825 |
| 44 | John Hartwell & William Hartwell | Pittsford, NY | June 14, 1825 |
| 47 | James V. Cole | | June 13, 1825 |
| 48 | Volney Wallace & James W. Wallace | Boston, Ohio | June 13, 1825 |
| 49, 51, 61, 63 | Pat McNamara, Hugh McNamara, John Gallagher | | July 13, 1825 |
| 49, 51 | Volney Wallace & James W. Wallace | Boston, Ohio | November 21, 1825 |
| 50 | Samuel Y. Potter &Stephen N. Sergeant | Medina Co., Ohio | July 12, 1825 |
| 52-53 | John Johnson & John Flinn | Rochester, NY | July 13, 1825 |
| “ | Alanson Sweet & Horace Wood | | May 9, 1827 |
| “ | William Stow Jr. | | November 3, 1827 |
| 54 | Thomas Gannon, John Somers, & James Doyle | State of New York | July 13, 1825 |
| “ | Marshall Tompkins | Medina, Ohio | May 20, 1827 |
| 55 | Jeremiah Smith | Sandusky, Ohio | July 14, 1825 |
| 56 | Harvey Wellman | Cleveland, Ohio | July 14, 1825 |
| 57-59, 65 | Asa Randolph, William Brown, and Patrick Brannan | State of New York | July 12, 1825 |
| 60 | Patrick Mitton and James Whalen | | July 12, 1825 |
| 62 | Elias Cozad | Euclid, Ohio | July 14, 1825 |
| 64, 67 | Reuben Smith & Daniel Washburn | Cleveland, Ohio | July 12, 1825 |
| “ | William Brown & Merrick Sawyer | | November 6, 1826 |
| 66 | Archibald McEnaspy | Buffalo, NY | July 13, 1825 |
| 68 | Alanson C. Stewart | Rochester, NY | July 12, 1825 |
| “ | William Brown & Merrick Sawyer | | April 5, 1827 |
| 69-70 | James Whalen | Buffalo, NY | July 12, 1825 |
| 71 | Andrew Johnston & Samuel R. Richards | Boston, Ohio and Lockport, NY | September 8, 1825 |
| 72, 75-76 | John Drake Jr. & others | State of New York | October 21, 1825 |
| 73-74 | Rufus Wright & Spencer Wright | Cuyahoga County, Ohio | September 7, 1825 |
| 78 | Theophilus Pherson & John McWhinney | | May 10, 1827 |
| 79-80 | John Wightman & Frederick Ingram | | September 25, 1825 |
| “ | Theophilus Pherson & Co. | | October 15, 1826 |
| 82 | Augustus Southworth | Holley, NY | September 8, 1825 |
| 83 | William Van Slyke | State of New York | November 4, 1825 |
| 84 | Leander Ransom & others | Rochester, NY | September 17, 1825 |
| 86 | Stephen Snyder & others | State of New York | September 10, 1825 |
| “ | Harvey Wellman | Cleveland, Ohio | October 10, 1826 |
| 87 | John Smith & others | Boston, Ohio | September 5, 1825 |
| 89-90 | Joel Rosseter & Lawrence Barclay | | September 26, 1825 |
| 91 | William A. Harper | Harpersfield, Ohio | September 7, 1825 |

they had settled.[230] Another major problem was the accumulation of sediment in the prism which interfered with navigation. Sediment was brought into the canal by floods as well as the many small streams that emptied into the canal, and it periodically had to be removed by the maintenance crews; the sludge typically was placed on the towpath embankment to raise sections that had settled or eroded. Where the canal was excavated into a hillside, landslides might fill the prism with stone and soil.

The engineers' annual reports list the repairs and major maintenance activities that occurred each year, and they usually included dredging and repair of breaches. Information in this section is based on the *Annual Reports of the Board of Canal Commissioners* and the *Annual Reports of the Board of Public Works of Ohio*. Unless otherwise noted, specific references related to the construction and repair history of the prism and towpath can be found in the *Historic Structure Report: History Section* by Unrau and Scrattish.[231]

- 1836-1837: The protection walls and embankments along sections of the Ohio and Erie Canal that were close to the Cuyahoga River were subject to continued washing and undermining by the action of the rushing river water. To make those sections of the canal more secure, additional crib work, protection walls, and embankments were built along the river during the years 1836-38 at a cost in excess of $20,000.

- 1841-1842: During 1841-42 a major renovation effort was undertaken to enable the canal to function efficiently. Some of the main projects completed on the Cleveland-to-Akron sector included increasing the height and width of canal embankments and removing bars and deposits from canal prism and feeders. This enabled boats to carry maximum cargoes weighing more than 60 tons compared to previous averages of 30-40 tons. Other projects included extensions and repairs to culverts, protective walling where the canal was exposed to the action of the river, and repairs to locks and lock gates.

- 1843-44: A succession of floods along the Cuyahoga River and its tributaries in June 1843 caused considerable damage to the canal. The rain was so heavy and rapid that the culverts could not handle all the water in the streams passing under the canal. As a result the streams flowed across the canal, sweeping away both banks in many places. The Cuyahoga River also rose over the canal embankments and overflowed portions of the canal, resulting in nearly half of the line between Cleveland and Akron being under water. Sand from the hills and high embankments near Cleveland was swept into the canal, and in many places the prism was filled entirely. The canal was closed while the prism was cleaned out and the canal banks restored. Later in the summer several waste gates and culverts were constructed to facilitate draining water from the canal in places where bars and deposits required frequent removal. During 1844 more extensive repair operations were undertaken to renovate the line of the canal between Cleveland and Boston that had been damaged most seriously during the previous summer. Numerous deposits were removed from the prism, and other improvements were made to insure a depth of four feet. The tops and slopes of the canal embankments were repaired, drains

230. Kilbourne, *Public Documents,* 385.
231. Unrau and Scrattish, *Historic Structure Report,* 141-192, 224-227.

and drain ditches reopened, protective measures taken at exposed points, and waste weirs, locks, and lock gates renewed.

- 1858-59: High water levels of the Cuyahoga River in 1858 seriously undermined the canal embankments at many points between Cleveland and Lock No. 35. The commissioners requested an appropriation of $3,000 to place 600 wood piles and 1,400 perches of protection stone on that part of the line to prevent the more exposed portions of the canal from being entirely swept away.

- 1868: During the winter of 1867-68 a thick layer of ice formed on the Cuyahoga River. When the heavy ice broke up in early spring, it was accompanied by an unprecedented rise of water in the river. The flow of ice and water swept down the valley, badly damaging the Pinery and Peninsula feeder dams as well as large sections of the protective canal embankments along the river. Numerous breaks and bars occurred between Cleveland and Akron, and extensive portions of the towpath were inundated. The canal was repaired to the point that navigation was opened by April 20.

- 1875: All levels between Lock No. 14 and Peninsula Lock were dredged.

- 1883: During 1882 and 1883 heavy rains fell on the sector of the Ohio and Erie Canal between Cleveland and Akron. In February 1883 the highest flood on record for that part of the state occurred, causing serious damage to the canal embankments. Extensive dredging was required, especially near Lock No. 36.

- 1884: During the winter of 1883-84 another flood struck the Cuyahoga Valley, causing numerous breaks in the canal embankments and the formation of bars in the prism. In the spring of 1884 a narrow ridge of earth was put on various portions of the canal embankments over the 10-mile stretch of the waterway south of Cleveland. In June repair crews hauled earth to raise and widen the towpath to its proper dimensions.

- 1905: The major rehabilitation of the northern division of the Ohio and Erie Canal included dredging the prism to increase the minimum water level throughout the line to five feet, as recommended by Chief Engineer Charles Perkins (Figure 48). A three-quarter mile section south from Lock No. 39 was deepened by hand and featured a 30-foot wide base and carefully shaped banks, but the work proved to be too costly so the rest of the line was dredged instead. The dredging contract was awarded to D.E. Sullivan and Co. who completed the work in stages over the next three years (Figure 49). The company had to construct special dredging equipment which was able to pass through the narrow locks on the canal, which added to the time and expense required.

- 1907: The embankments were raised and repaired on the 11-Mile, 14-Mile, and Yellow Creek levels.

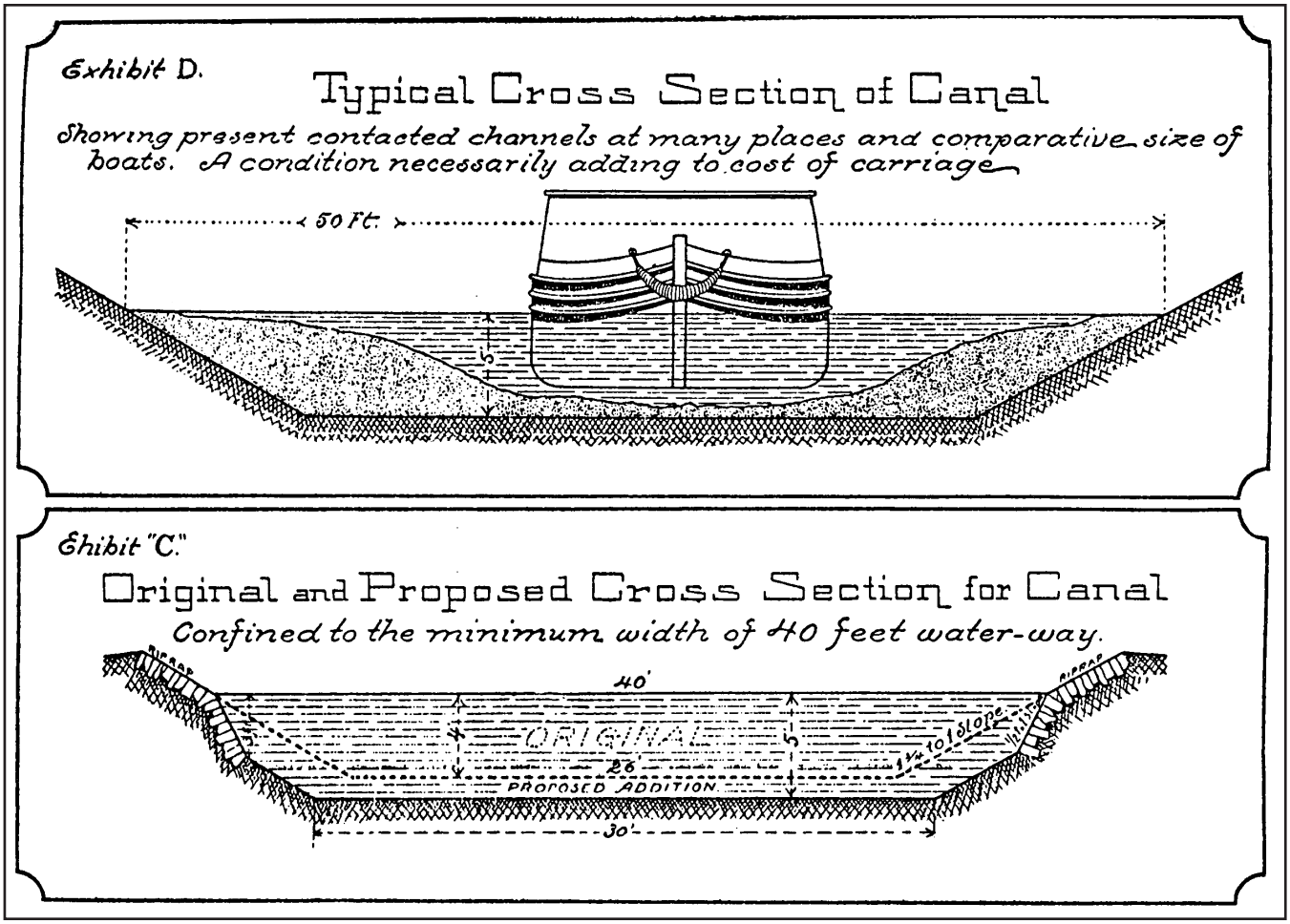


Figure 48. Existing and proposed canal improvements, 1905 (*Source:* Ohio Board of Public Works, *67th Annual Report*)

Figure 49. View of canal dredge, 1907 (*Source:* Ohio Board of Public Works, *69th Annual Report*)

- 1909: The embankments were raised and repaired on the 11-Mile and Goose Pond levels. Bars were removed from the 11-Mile, Long Pinery, Short Pinery, Goose Pond, Peninsula, Johnny Cake, and Yellow Creek levels.

- 1913: The flood of 1913 ended navigation on the Ohio & Erie Canal.

- 1913-1992: The canal north of the Pinery feeder was maintained by the American Steel and Wire Company (later U.S. Steel) which used water from the canal for industrial purposes. Periodic repairs were made to maintain water flow, but the work was poorly-documented. The canal south of the Pinery feeder was abandoned and no longer maintained, and many sections were destroyed by flooding and other natural processes. Other sections, such as those near the Jaite paper mill, the Ohio Turnpike bridges, and between Ira and Bath Roads, were completely obliterated by human activity. Many areas where the towpath remained intact were used for hiking and vehicular access long before the present multi-use trail was constructed by the National Park Service in the early 1990s. Where it was used as a vehicular access road, modifications were made over time.

- 1988: National Park Service personnel performed a field check of the entire towpath within Park boundaries. This work consisted of photo-documenting the resource, taking measurements, inventorying physical elements, and recommending treatments for various areas.[232]

- 1987-1990: National Park Service performed archeological surveys along the towpath prior to the development of a multi-use trail. Shovel tests were excavated in undisturbed areas adjacent to the canal towpath but not on the towpath itself. However cross-sections through the towpath were excavated in several locations to document construction techniques. In 1987 the team excavated one trench just north of Lock No. 34 (Red Lock) and one trench between Lock Nos. 26 and 27 .5-mile north of Everett. The latter cut through both the towpath and the dry prism. In 1988 seven cross-sections were excavated between Boston and Jaite. These investigations revealed details of the original construction as well as later efforts to repair and increase the height of the towpath.[233]

- 1990-1993: The National Park Service and its partner entities constructed a 10-foot wide, compacted aggregate multi-use trail along the full length of the former towpath through Cuyahoga Valley National Recreation Area. Washed-out sections of the towpath embankment were repaired and raised in height, but little if any work occurred

232. Cuyahoga Valley National Recreation Area, Division of Technical Assistance and Professional Services, "Task Directive, Ohio and Erie Canal Towpath Trail, 10-238 Package No. 119 (October 1989), Cuyahoga Valley National Park, Resource Management Division files.
233. Vergil E. Noble, "Final Report on a Phased Archaeological Survey along the Ohio and Erie Canal Towpath in Cuyahoga Valley NRA, Summit and Cuyahoga Counties, Ohio." Midwest Archaeological Center Technical Report No. 13 (1992), National Park Service, Midwest Archeological Center, Lincoln, NE. This report summarizes all the towpath archeological investigations with emphasis on the 1990 survey.

in the canal prism. Most of the work was performed by Park personnel in a three-year phased development.[234]

**Basins**

Basins were intentionally widened sections of canal where boats could turn around, wait to pass through a lock, and take on or unload cargo. Most of the larger towns along the canal had a basin where boats could stop overnight or transfer passengers and freight. Wharfs and slips were built along the edge of the basins, sometimes with adjacent warehouses for the storage of goods by commission merchants. Akron and Cleveland both had extensive wharf and warehouse facilities at their basins. There also were wharfs at various loading points between towns, and farmers sometimes had their own landings. There were no written standards for constructing basins, and little mention of them in the engineers' correspondence and annual reports of the Board of Canal Commissioners and Board of Public Works. Most may have been privately financed and built by local contractors.

Maintenance of the basins was similar to that of the canal itself. They had to be dredged periodically to ensure adequate water depth for boats, and the wharves and retaining walls, if present, required regular repairs.[235] By the 1880s, following a series of devastating floods and the completion of the Valley Railway, some of the basins along the Cuyahoga Valley section of the Ohio and Erie Canal had been abandoned. They became the final resting places of decrepit boats, especially after the flood of 1913 which ended canal navigation once and for all. The remains of one such boat were discovered protruding from the river bank at Stumpy Basin by archeological survey crews in 1990 and further investigated in 1992 and 1993. The archeologists suspected that there might be other sunken boats in the basin.[236]

Twelve basins appear on the 1892 mapping by D.C. Kennon and the 1912 mapping by George Silliman. From south to north:

- The 1912 survey shows a small basin and a larger basin at Stations 1202+00 and 1195+00, about 0.5 mile south of Deep Lock Quarry and Lock No. 28. The 1892 survey depicts them only as swampy depressions, but their rectangular shapes and regular dimensions (they are carefully measured and recorded) in 1912 suggests that they had been converted into basins since 1892, possibly as part of the recent improvement of the northern division. There is only a slight depression to mark the location today.

- The Peninsula Basin (Stations 1133+00 to 1136+00) was about 300 feet long and located just south of the Route 303 (Streetsboro Road) bridge in the village of Peninsula. It appears on the 1892 mapping with the notation "old basin filled" and is not depicted at all on the 1912 mapping. The 1909 annual report stated that in the past year "some of the old dock timbers that had fallen down along Peninsula level were pulled

234. Cuyahoga Valley National Recreation Area, Division of Technical Assistance and Professional Services, "Task Directive (October 1989).
235. Jennifer Betsworth and Bruce G. Harvey, *Field Guide for Identifying Historic Canal Structures along Ohio's Miami and Erie Canal* (Columbia, SC and Syracuse, NY: S & ME, Inc. and Harvey Research and Consulting, 2012), 29-30.
236. Noble, "Final Report on a Phased Archaeological Survey," 14-15; Finney, *Calumet, Canal, and Cuyahoga*, 270.

out and burned." The remains of the basin are clearly visible today, together with some adjacent foundations.

- Stumpy Basin (Stations 1051+00 to 1060+00) between the villages of Peninsula and Boston was the largest basin in the Park and appears on both the 1892 and 1912 canal mapping. It is located just north of Lock No. 34 (Lonesome Lock) and in fact the downstream end of the bypass sluice for the lock empties into the old basin. The name is derived from the relict stumps protruding from the water after the construction of the canal and basin. For many years the harvesting of winter ice from the pond was a major activity, and two icehouses are depicted on the 1892 mapping.[237] As noted above, the remains of a canal boat were discovered and documented in 1990. Today Stumpy Basin is a large wetland, easily identifiable as a former basin.

- The 1892 and 1912 surveys both show a small basin at Stations 1210+50 to 1012+00 about 500 feet south of Boston Mills Road and the village of Boston. It may have been more of an incidental feature created during canal construction than a true basin. Little or no trace of it survives.

- There were two basins at the village of Boston, one at each end of Lock No. 32 (Boston Lock). A drydock and boatyard were adjacent to the smaller one south of the lock. The 1912 mapping reveals that the larger basin north of the lock was a remnant of an even larger basin since it shows an adjacent swampy area bearing the notation "old basin filled." Both basins are still visible in the landscape.

- The 1912 survey shows what appears to be a large basin at Stations 889+00 to 897+50, but the 1892 survey depicts it as an extensive swamp formed in a bypassed channel of the Cuyahoga River. It may have been deepened and used as a basin during the final years of canal navigation. Few traces of it survive today.

- A small basin was located at Stations 870+00 to 873+00, 600 feet south of the Goose Pond Waste Weir/Flood Gate, according to both the 1892 and 1912 mapping. A depression marking its location can still be discerned today.

- The 1892 and 1912 surveys both show a moderate-sized basin a few hundred feet south of Lock No. 36 (Pinery Lock). The north end of the basin had been filled by 1912 but the southern 400 feet remained. Much of the rest was filled in with debris during the construction of the Brecksville-Northfield High Level Bridge in 1931, but portions remain intact.

- There was a large basin at Stations 622+00 to 630+00, about 0.2-mile south of Lock No. 37 (14-Mile Lock). It appears on both the 1892 and 1912 surveys but was filled in during 20th century improvements to Canal Road.

237. Finney, *Calumet, Canal, and Cuyahoga*, 288.

- The 1892 survey shows a small basin at Stations 600+00 to 603+00, but there was no trace of it on the 1912 mapping. No evidence of it survives today.

- A small basin was located just south of Tinkers Creek Road at Stations 556+50 to 559+75, probably associated with a nearby store. The basin appears on both surveys. It has been completely filled in, and no traces are visible.

- The 1892 survey shows a basin at Stations 521-525, about 800 feet north of Lock No. 38 (12-Mile Lock). Although it does not appear on the 1912 survey and much of it was filled in during past widening of Canal Road, a depression along the road is still visible.

## C. PHYSICAL DESCRIPTION AND CONDITION ASSESSMENT

Approximately 22 miles of the Ohio and Erie Canal passes through Cuyahoga Valley National Park, following the course of the Cuyahoga River between Akron and Cleveland (Figure 50). The southern 16 miles of canal in the Park, from the Indian Mound Trailhead to Route 82, are no longer watered, but the prism and towpath are still easily discernible for most of the distance. The northern 6 miles of canal in the Park, from Route 82 to Rockside Road, remain in a watered condition, supplied with water by the Brecksville Diversion Dam (1951) and a short feeder located near Route 82. Both the watered and unwatered sections of canal include the remains of numerous historic structures such as locks, aqueducts, culverts, flood gates, and waste weirs, linked by the canal prism and towpath.

During the development of the towpath trail in the early 1990s the National Park Service stabilized certain canal structures that would support pedestrian bridges for the trail, including Lock No. 29, the Peninsula Aqueduct, and several waste weirs and flood gates. As a separate project, Lock No. 38 was restored to its 1907 appearance. Most of the other canal structures remain essentially unaltered from their appearance during the period of significance (1825-1913) although a few of the locks and the flood gate near Lock No. 37 received low-level preservation treatment in recent years.

Most of the concrete and stone masonry structures were documented and evaluated in the 1993 draft Historic Structure Report. Section 1C of the present report updates the documentation and condition assessment for each structure based on a new comprehensive field survey performed during October-December 2017, with supplemental field survey completed in March and July 2018. The update incorporates descriptive information from the draft report as appropriate but expands the documentation to include several concrete and stone masonry structures not discussed in the 1993 draft HSR, as well as important earthen canal structures such as basins, feeder channels, and the canal prism itself. Most photographs were taken by the author during October-December 2017; exceptions are noted. As in Section IB the discussion is organized by structure type: Locks; Aqueducts; Culverts; Waste Structures; Feeders and Dams; Other Water Control Structures; Bridges; Prism and Towpath; and Basins. It proceeds from south to north, beginning at the southern boundary of the Park and ending at Rockside Road. This report considers all extant structures that were once integral components of the canal system and for which the Park has maintenance responsibilities (Figure 50). It does not consider structures that postdate the canal's period of significance such as the Brecksville Diversion Dam and head gates, or several contributing culverts that were replaced recently.

The 52 extant canal structures discussed in this section (not including the canal prism and towpath) represent slightly more than half of the structures depicted on the 1892 and 1912 survey mapping of the Ohio and Erie Canal (Table 2). The others—mainly culverts, waste structures, bridges, and basins—have left no visible traces above ground but should be treated as potential archeological resources which must be considered during planning for future projects in the Park. In addition there almost certainly are subsurface remains of other early structures predating the 1892 survey mapping; since historical documentation is incomplete there is potential for canal-related archeological resources at virtually any point along the canal.

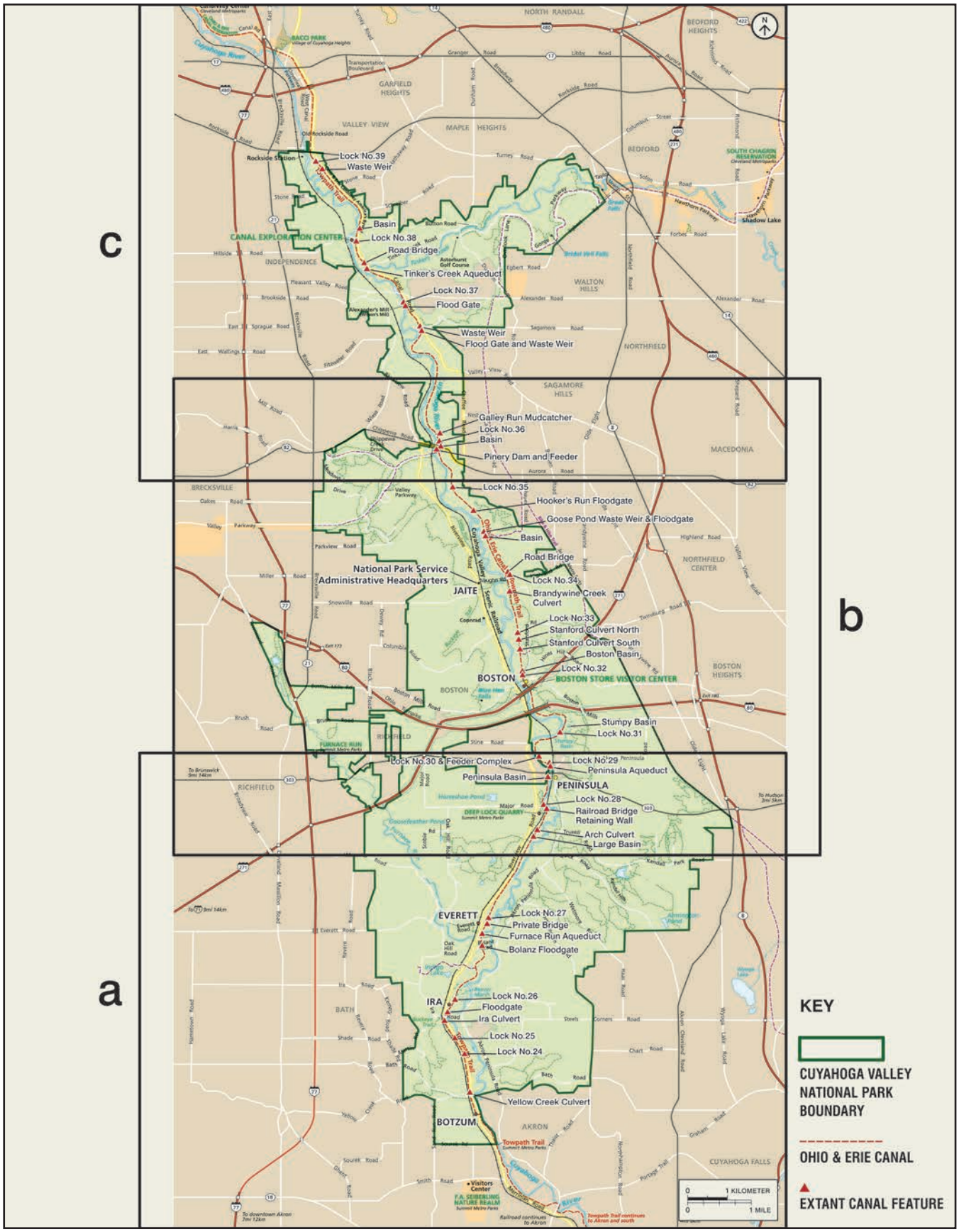


Figure 50(INDEX). Map of existing canal structures in Cuyahoga Valley National Park (*Source for base map:* National Park Service)

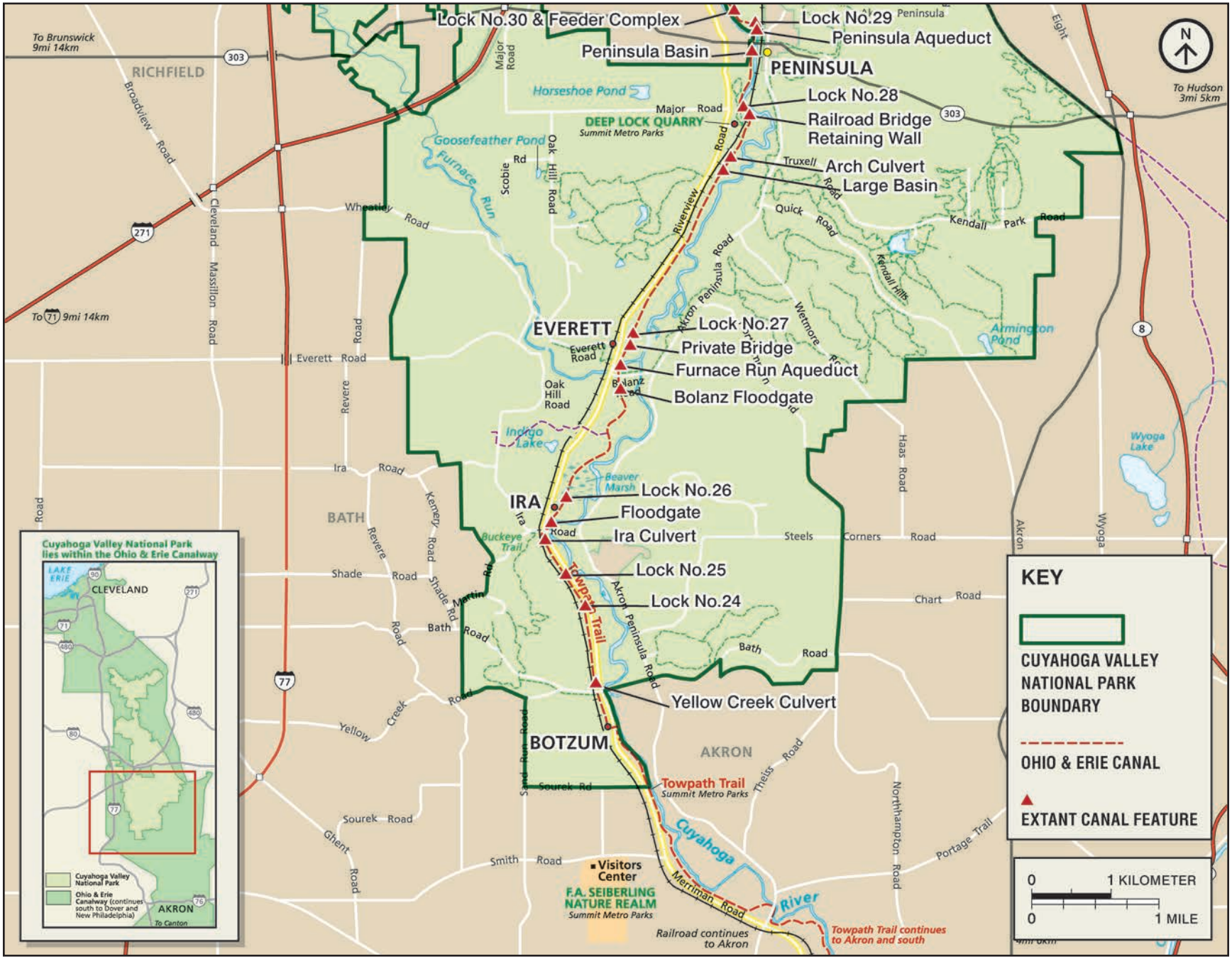


Figure 50a. Map of existing canal structures in Cuyahoga Valley National Park (*Source for base map:* National Park Service)

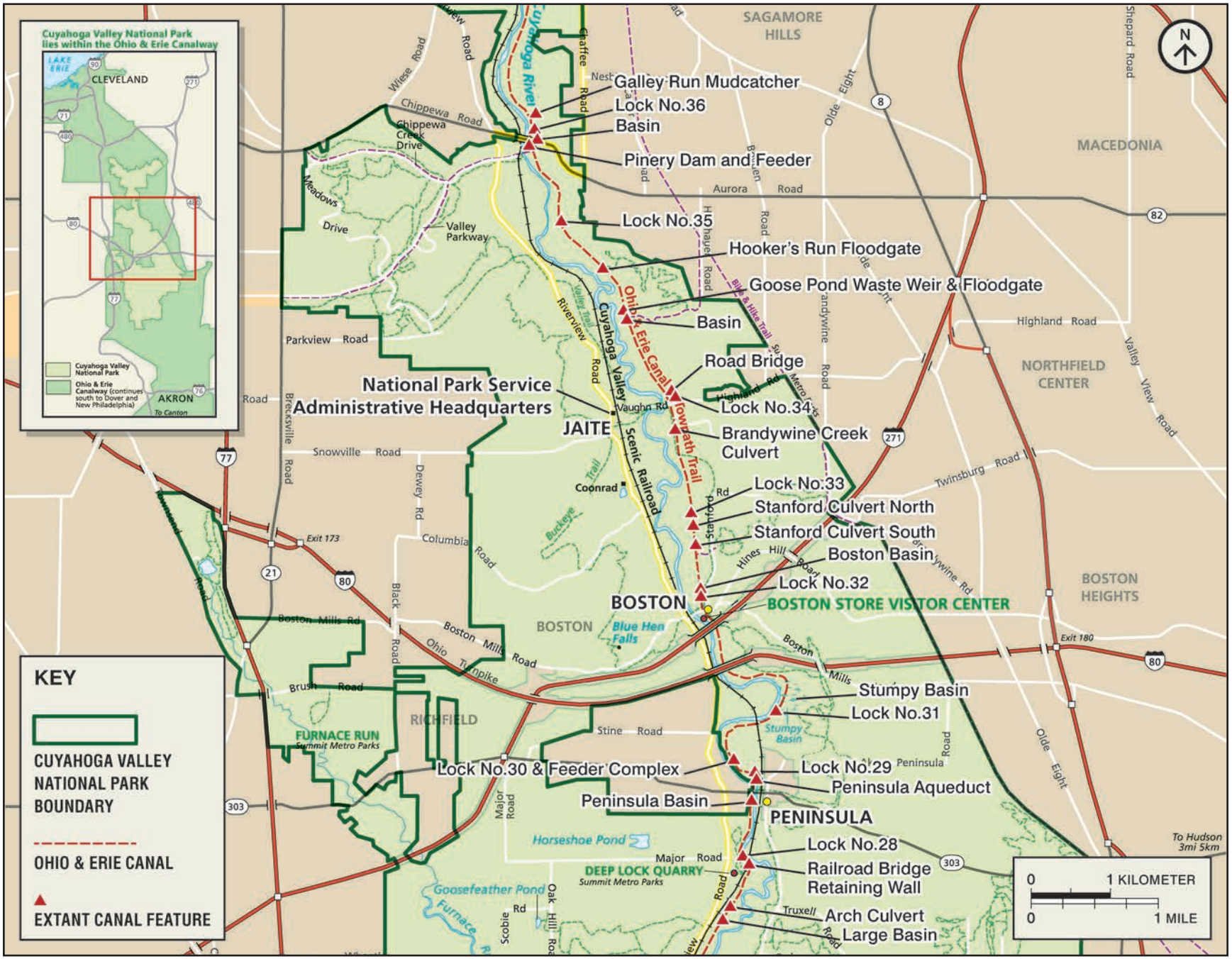


Figure 50b. Map of existing canal structures in Cuyahoga Valley National Park (*Source for base map:* National Park Service)

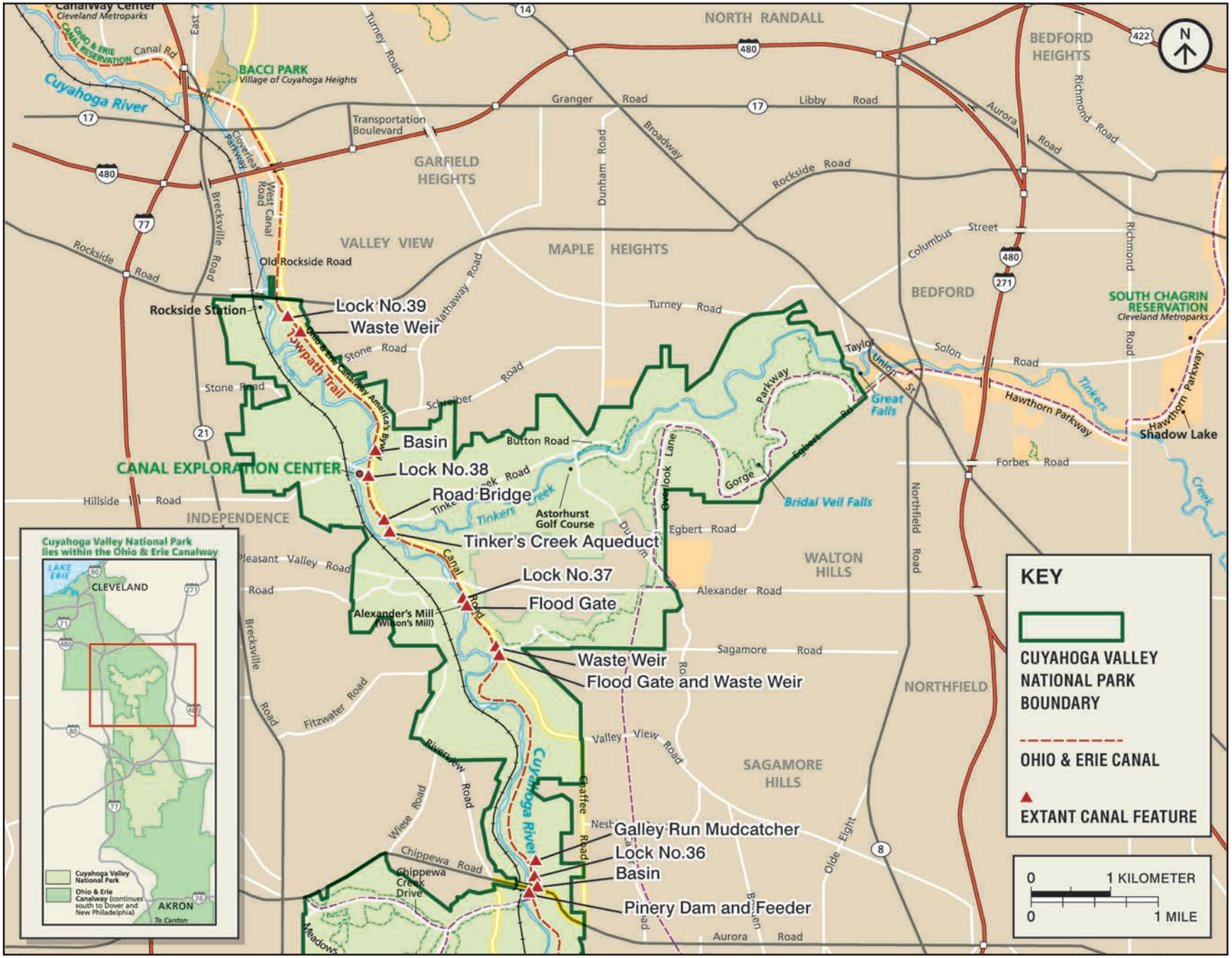


Figure 50c. Map of existing canal structures in Cuyahoga Valley National Park (*Source for base map:* National Park Service)

Table 2. Ohio & Erie Canal Structures, 1825-1913 (Period of Significance), shown on 1892 and 1912 survey maps

| Resource Name (shaded features are extant) | Location 1912/1916/1928 mapping | Location 1892 mapping | OHI # | HS # LCS # | 2009 Landscape Inventory | 1993 HSR | Visible Remains? |
|---|---|---|---|---|---|---|---|
| Road Bridge (Botzum) | Sta 1458+79 | Sta 1453+49 | | | | | No |
| Yellow Creek Culvert | Sta 1452+87 | Sta 1447+50 | SUM-0052-07 | HS-101 011148 | X | X | Yes |
| Flood Gate | Sta 1426+11 | no | | | | | No |
| Lock No 24 & Spillway (Niles/Botzum Lock) | Sta 1419+54 | Sta 1414+50 | SUM-0051-07 | HS-102 011149 | X | X | Yes |
| Lock No. 25 & Spillway (Mudcatcher Lock) | Sta 1406+42 | Sta 1401+50 | SUM-0050-07 | HS-103 011150 | X | X | Yes |
| Arch Culvert | no | Sta 1391+50 | | | | | No |
| Ira Culvert | Sta 1383+00 | no | SUM-3245-07 | | X | | Yes |
| Ira Road Bridge | Sta 1382+10 | Sta 1377+22 | | | | | No |
| Flood Gate | Sta 1378+31 | no | | | | | Yes |
| Lock No. 26 & Spillway (Pancake Lock) | Sta 1365+40 | Sta 1360+40 | SUM-0029-07 | HS-104 011151 | X | X | Yes |
| Culvert | no | Sta 1351+10 | | | | | No |
| Arch Culvert | Sta 1346+98 | Sta 1342+00 | | | | | No |
| Flood Gate | Sta 1344+59 | no | | | | | No |
| Arch Culvert | Sta 1331+31 | Sta 1326+80 | | | | | No |
| Private Bridge | Sta 1318+60 | Sta 1313+68 | | | | | No |
| Bolanz Flood Gate | Sta 1305+25 | Sta 1300+00 | SUM-3244-07 | | X | X | Yes |
| Road Bridge (Bolanz Road) | Sta 1299+00 | Sta 1294+31 | | | | | No |
| Furnace Run Aqueduct | Sta 1294+00 | Sta 1289+33 | SUM-0049-07 | HS-105 011152 | X | X | Yes |
| Private bridge | no | Sta 1279+83 | | | | | Yes |
| Lock No. 27 & Spillway (Johnny Cake Lock) | Sta 1282+50 | Sta 1277+75 | SUM-0027-04 | HS-106 011153 | X | X | Yes |
| Culvert | no | Sta 1247+80 | | | | | No |
| Private bridge | Sta 1242+59 | Sta 1236+33 | | | | | No |
| Foot bridge | no | Sta 1226+73 | | | | | No |
| Small basin | Sta 1202+00 | no | | | | | No |
| Large basin | Sta 1194-1197 | no | | | | | Yes |
| Arch Culvert | Sta 1190+98 | Sta 1186+70 | | | | | Yes |
| Railroad Bridge Retaining Wall | Sta 1167+00 | Sta 1162+94 | | | | | No |

| Resource Name (shaded features are extant) | Location 1912/1916/1928 mapping | Location 1892 mapping | OHI # | HS # LCS # | 2009 Landscape Inventory | 1993 HSR | Visible Remains? |
|---|---|---|---|---|---|---|---|
| Lock No. 28 & Spillway (Deep Lock) | Sta 1164+04 | Sta 1160+25 | SUM-0026-04 | HS-107 011154 | X | X | Yes |
| Peninsula Basin | no | Sta 1130+00 | | | | | Yes |
| Road Bridge (Streetsboro Road) | Sta 1132+00 | Sta 1128+35 | | | | | No |
| Foot Bridge | no | Sta 1124+60 | | | | | No |
| Peninsula Aqueduct | Sta 1126+84 | Sta 1123+21 | SUM-0056-04 | HS-110 011157 | | X | Yes |
| Lock No. 29 (Peninsula Lock) | Sta 1125+91 | Sta 1122+50 | SUM-0056-04 | HS-110 011157 | X | X | Yes |
| Lock No. 30 & Spillway (Peninsula Feeder Lock) | Sta 1109+48 | Sta 1106+50 | SUM-0025-04 | HS-111 011158 | X | X | Yes |
| Peninsula Feeder Complex | Sta 1109+75 | Sta 1106+50 | SUM-3243-04 | | X | X | Yes |
| Railroad Bridge | Sta 1083+50 | Sta 1080+55 | | | | | No |
| Flood Gate | Sta 1082+00 | no | | | | | No |
| Lock No. 31 & Spillway (Lonesome Lock) | Sta 1069+76 | Sta 1067+00 | SUM-0024-04 | HS-112 011159 | X | X | Yes |
| Stumpy Basin | Sta 1051-1060 | Sta 1048-1060 | SUM-0060-04 | | | | Yes |
| Arch Culvert | no | Sta 1012+70 | | | | | No |
| Small basin | Sta 1010-1012 | Sta 1010+00 | | | | | No |
| Road Bridge (Boston Mills Road) | Sta 1005+26 | Sta 1002+63 | | | | | No |
| Dry Dock | Sta 1001+50 | Sta 999+00 | | | | | No |
| Lock No. 32 (Boston Lock) | Sta 997+60 | Sta 995+25 | SUM-0053-04 | HS-114 011161 | X | X | Yes |
| Boston Basin | Sta 990+50-997+00 | Sta 992+00-995+00 | | | | | Yes |
| Private Bridge | no | Sta 976+80 | | | | | No |
| Stanford Creek Culvert South | Sta 973+02 | Sta 970+60 | SUM-3249-01 | | X | X | Yes |
| Stanford Creek Culvert North | Sta 961+94 | Sta 959+80 | SUM-3250-01 | | X | X | Yes |
| Lock No. 33 & Spillway (Wallace Lock/Lost Lock) | Sta 958+28 | Sta 956+00 | SUM-0028-01 | HS-115 011162 | X | X | Yes |
| Culvert | no | Sta 943+80 | | | | | No |
| Brandywine Creek Culvert | Sta 921+39 | Sta 921+36 | SUM-3262-01 | | X | X | Yes |
| Lock No. 34 & Spillway (Red Lock) | Sta 906+16 | Sta 906+50 | SUM-0044-01 | HS-116 011163 | X | X | Yes |
| Road Bridge (Highland Road) | Sta 905+80 | Sta 905+80 | | | | | No |
| Road Bridge over Lock No. 34 Waste Way | Sta 905+80 | Sta 906+80 | | | | | Yes |

| Resource Name (shaded features are extant) | Location 1912/1916/1928 mapping | Location 1892 mapping | OHI # | HS # LCS # | 2009 Landscape Inventory | 1993 HSR | Visible Remains? |
|---|---|---|---|---|---|---|---|
| Basin | Sta 889-897+50 | no | | | | | No |
| Basin | Sta 870-873 | Sta 870-873 | | | | | Yes |
| Culvert | no | Sta 869+72 | | | | | No |
| Goose Pond Waste Weir/ Flood Gate | Sta 863+50 | Sta 863+66 | SUM-3248-01 | | X | X | Yes |
| Arch Culvert | Sta 856+00 | Sta 856+39 | | | | | No |
| Hooker's Run Flood Gate | Sta 838+34 | no | SUM-3247-01 | | X | X | Yes |
| Lock No. 35 & Spillway (Kettlewell/Whiskey Lock) | Sta 812+30 | Sta 813+00 | SUM-0043-01 | HS-117 011164 | X | X | Yes |
| Waste Weir/Flood Gate | Sta 776+19 | Sta 778+00 | | | | | No |
| Road Bridge (Station Road) | Sta 774+00 | Sta 774+40 | | | | | No |
| Pinery Dam | Sta 771+50 | Sta 772+00 | | | X | | Yes |
| Pinery Head Gates (after period of significance) | Sta 771+50 | Sta 772+00 | SUM-3246-01 | | X | | Yes |
| Brecksville Dam (after period of significance) | Sta 771+25 | Sta 771+80 | SUM-3253-01 | | X | | Yes |
| Basin | Sta 767-771 | Sta 768-771 | | | | | Yes |
| Pinery Feeder | Sta 763-771+50 | Sta 763+50-772 | SUM-3254-01 | HS-133 | X | | Yes |
| Lock No. 36 & Spillway (Pinery Lock/17 Mile Lock) | Sta 763+43 | Sta 764+00 | SUM-3252-01 | HS-118 011165 | X | X | Yes |
| Galley Run Mudcatcher | Sta 758+00 | no | SUM-3251-01 | HS-132 | X | | Yes |
| Flood Gate | Sta 713+50 | no | | | | | No |
| Flood Gate | Sta 687+87 | no | | | | | No |
| Sagamore Creek Flood Gate & Waste Weir | Sta 638 +10 | Sta 639+80 | CUY-6535-19 | HS-130 | X | X | Yes |
| Sagamore Creek Culvert | Sta 636+00 | Sta 637+00 | CUY-6534-19 | | X | X | Replaced 2009 |
| Sagamore Creek Waste Weir | Sta 636+10 | ? | CUY-6533-19 | | | X | Yes |
| Swing Bridge | no | Sta 632+80 | | | | | No |
| Basin | Sta 622-630 | Sta 625-631 | | | | | No |
| Flood Gate | Sta 613+00 | no | no | | | X | Yes |
| Lock No. 37 & Spillway (14 Mile Lock) | Sta 611+46 | Sta 613+00 | CUY-0463-19 | HS-121 011168 | X | X | Yes |
| Road Bridge (Fitzwater Road) | Sta 611+14 | Sta 612+30 | | | | | Yes |
| Basin | no | Sta 600-603 | | | | | No |
| Tinkers Creek Aqueduct | Sta 566+00 | Sta 567+00 | CUY-0462-19 | HS-123 011170 | X | X | Yes |

| Resource Name (shaded features are extant) | Location 1912/1916/1928 mapping | Location 1892 mapping | OHI # | HS # LCS # | 2009 Landscape Inventory | 1993 HSR | Visible Remains? |
|---|---|---|---|---|---|---|---|
| Basin | Sta 557+00 | Sta 560+00 | | | | | No |
| Road Bridge (Tinkers Creek Road) | Sta 556+60 | Sta 558+00 | | | | | Yes |
| Lock No. 38 & Spillway (12 Mile Lock) | Sta 533+75 | Sta 535+50 | CUY-0461-19 | HS-126 011173 | X | X | Yes |
| Road Bridge (Hillside Road) | Sta 530+74 | Sta 532+40 | | | | | No |
| Arch Culvert | Sta 524+63 | no | | | | | No |
| Basin | no | Sta 521-525 | | | | | Yes |
| Culvert | Sta 504+88 | no | CUY-6537-19 | | X | X | Replaced 2005 |
| McMillan Dry Dock | | | | | | | No |
| Arch Culvert | Sta 478+90 | Sta 481+00 | CUY-6287-19 | | X | X | Replaced 2005 |
| Road Bridge (Stone Road) | Sta 477+25 | Sta 479+00 | | | | | No |
| Waste Weir | Sta 460+44 | Sta 462+29 | CUY-6282-19 | HS-129 | | X | Yes |
| Lock No. 39 & Spillway (11 Mile Lock) | Sta 455+00 | Sta 457+00 | CUY-0460-19 | HS-128 011175 | X | X | Yes |
| Slip | Sta 436+31 | Sta 438+07 | | | | | No |
| Road Bridge (Rockside Road) | Sta 434+16 | Sta 436+32 | | | | | No |
| | | | | | | | |
| O & E Canal Bolanz Rd to Ira Rd | | | SUM-3260-07 | HS-100 | | | Yes |
| O & E Canal Lock 28 to Bolanz Rd | | | SUM-3259-04 | HS-100 | | | Yes |
| O & E Canal Lock 31 to Valley RR Grade | | | SUM-3258-04 | HS-100 | | | Yes |
| O & E Canal Ohio Turnpike Bridges to Stumpy Basin | | | SUM-3257-04 | HS-100 | | | Yes |
| O & E Canal Boston Mills Rd to I-271 Bridge | | | SUM-2016-04 | HS-100 | | | Yes |
| O & E Canal Highland Rd to Lock 32 | | | SUM-3256-04 | HS-100 | | | Yes |
| O & E Canal SR 82 to Highland Rd | | | SUM-3255-04 | HS-100 | | | Yes |
| O & E Canal Rockside Rd to Route 82 Bridge | | | CUY-6536-19 | HS-100 | | | Yes |

# LOCKS

**Locks: Description and Function**

Lift locks were used to raise and lower boats when they passed from one level of the canal to another. They were essentially stone and timber boxes slightly larger than a canal boat, with wooden gates at each end which were opened and closed by hand to allow boats to enter and exit. The gates contained sluices that could be adjusted to control water flow, either raising or lowering the water level in the lock chamber. In this way boats could climb or descend to different elevations. In later years the locks were rebuilt using poured concrete over the original stone masonry, but their operation remained the same.

There were 44 lift locks on the Ohio and Erie Canal between Akron and Cleveland, overcoming a change in elevation of nearly 400 feet in 38 miles. Sixteen of them were within the present limits of Cuyahoga Valley National Park (Lock Nos. 24-39 inclusive), all dating to the original construction of the canal during the period 1825-1827. The locks were constructed of sandstone walls with wooden foundations, floors and gates. The lift varied from 5.5 feet (Lock No. 26) to 17 feet (Lock No. 28) but in most cases was 8 or 9 feet. The specifications are outlined in the original construction contracts archived in the *Records of the Department of Public Works of Ohio*, Series 1231, at the Ohio History Center. Most of the materials used for lock construction were obtained locally, including the sandstone which came from nearby quarries such as the Deep Lock Quarry south of Peninsula.

The primary structure of the lock consists of a stone chamber with two parallel walls. While there are slight dimensional variations, the lock proper is approximately 90 feet in length, measured from gate to gate in the closed position, with inner faces of the walls set 15 feet apart. Extensions of the main chamber at both the downstream and upstream ends contained shallow recesses to accommodate the wooden gates in their open position. The ends of the lock are typically protected by wing walls; in some instances, however, the lock walls terminate abruptly at the ends of the gate recesses. The drawings of Locks Nos. 29, 37, 38, and 39 (Figures 51-54), prepared by a HABS/HAER team in the summer of 1986, provide documentation of subtle variations among the lock structures.

In all cases except Lock No. 29, which is constructed entirely of cut stone, the visible face of the lock walls is composed of masonry and poured concrete. The lower portion of the wall consists of hammer-dressed sandstone blocks laid in courses of uniform height; the stones are set in a mortared bed, and joints are tooled. Stonework in the upper portion has been removed and replaced with a face of concrete. The poured-in-place concrete, segmented by control joints, has chamfered edges; the surface features evidence of the rough-sawn planks used to form the concrete, most notably at the outer corners of the recessed areas. The face of the concrete and stone are flush. Although the line of transition varies, the concrete generally extends to just below the low-level water line.

While historical data provide inconsistent information regarding specific construction details of the walls, the documentation does support some basic assumptions. The lock walls are battered; typical of gravity retaining walls, the width increases toward the bottom of the lock. While the significant increase occurs on the back face, there is also a slight battering on the inner face of the chamber. The face stones contain intermittent headers which extend back

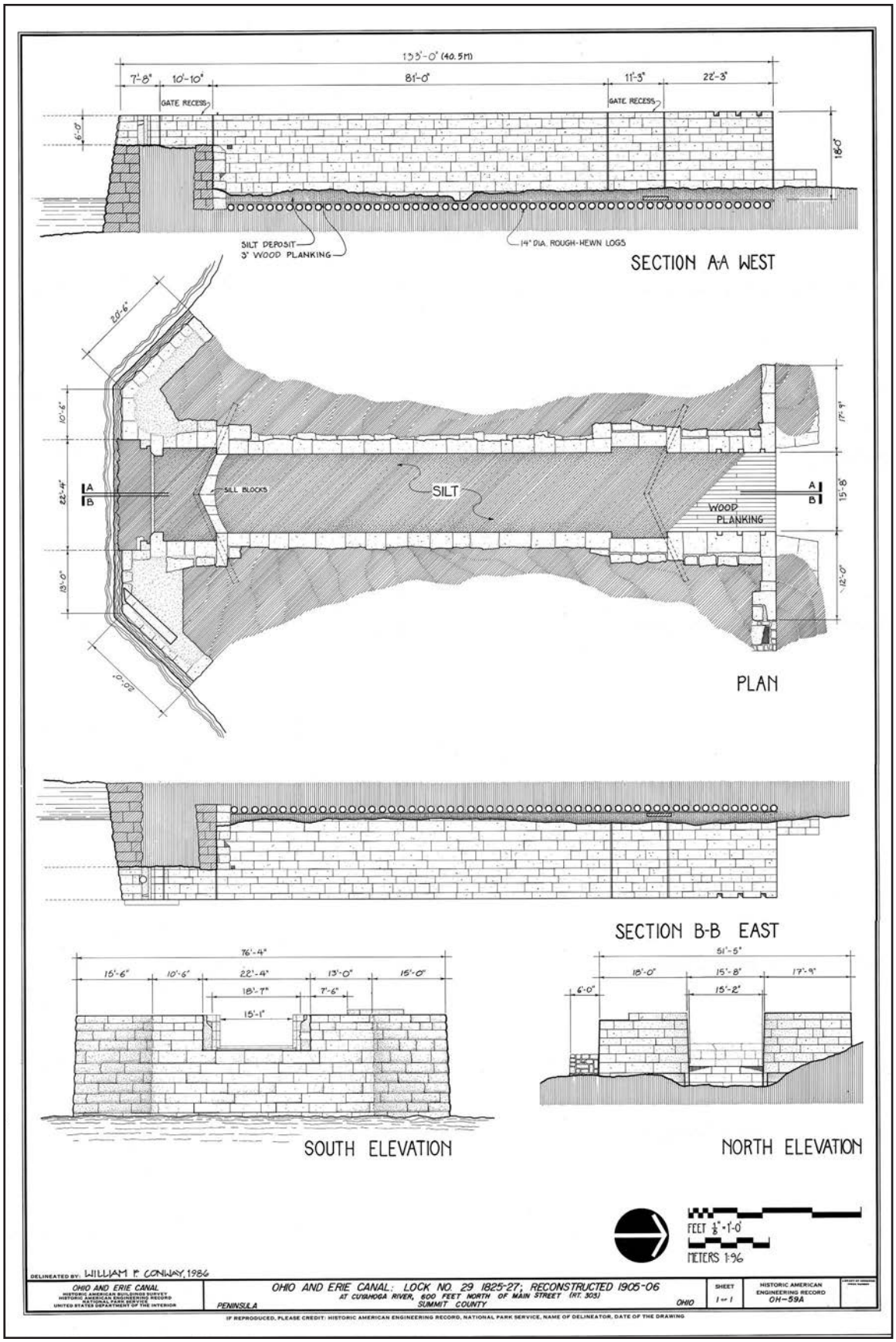


Figure 51. Measured drawings of Lock No. 29 (*Source:* Historic American Engineering Record, National Park Service. William F. Conaway, Delineator, 1986)

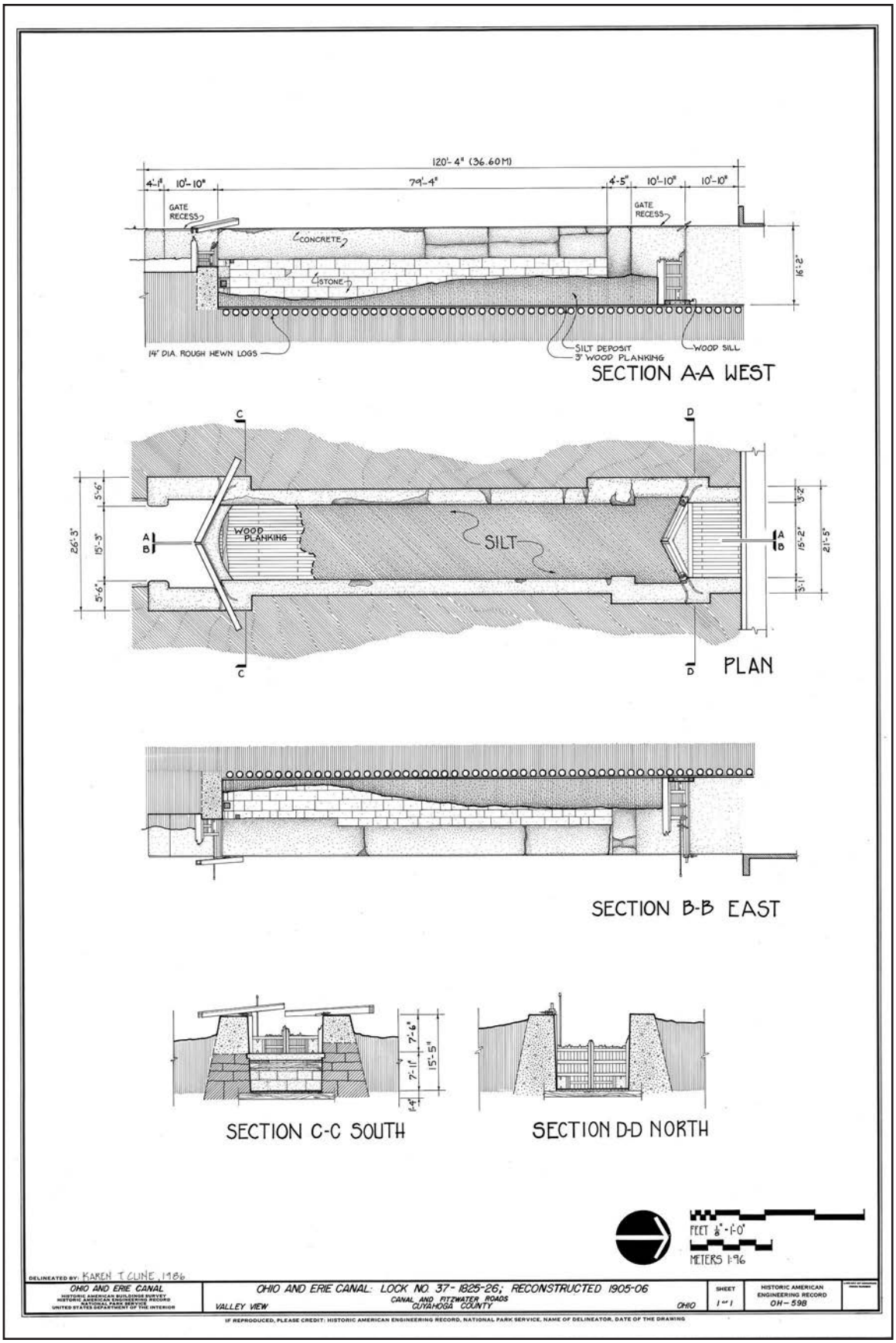


Figure 52. Measured drawings of Lock No. 37 (*Source:* Historic American Engineering Record, National Park Service. Karen T. Cline, Delineator, 1986)

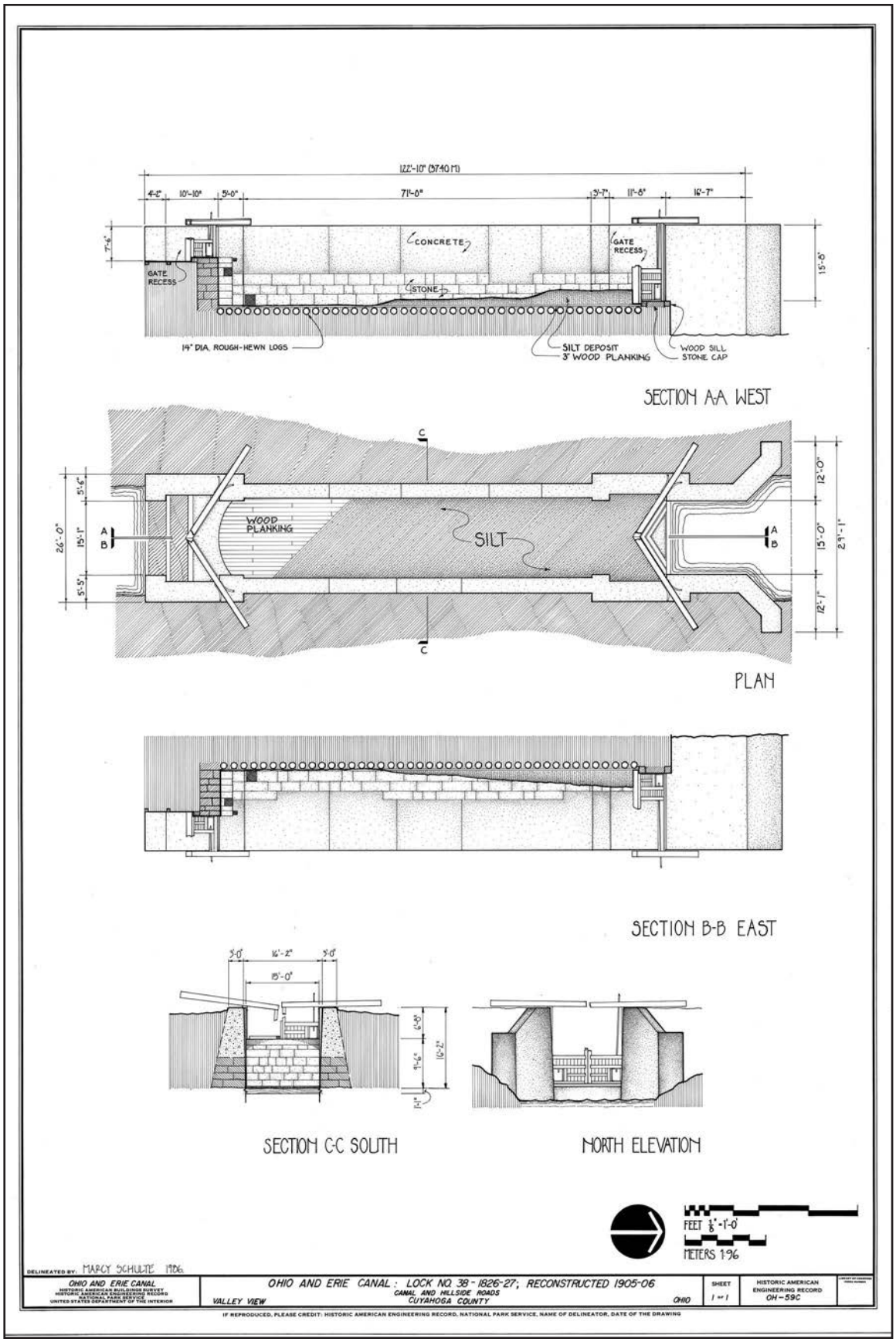


Figure 53. Measured drawings of Lock No. 38 (*Source:* Historic American Engineering Record, National Park Service. Marcy Schulte, Delineator, 1986)

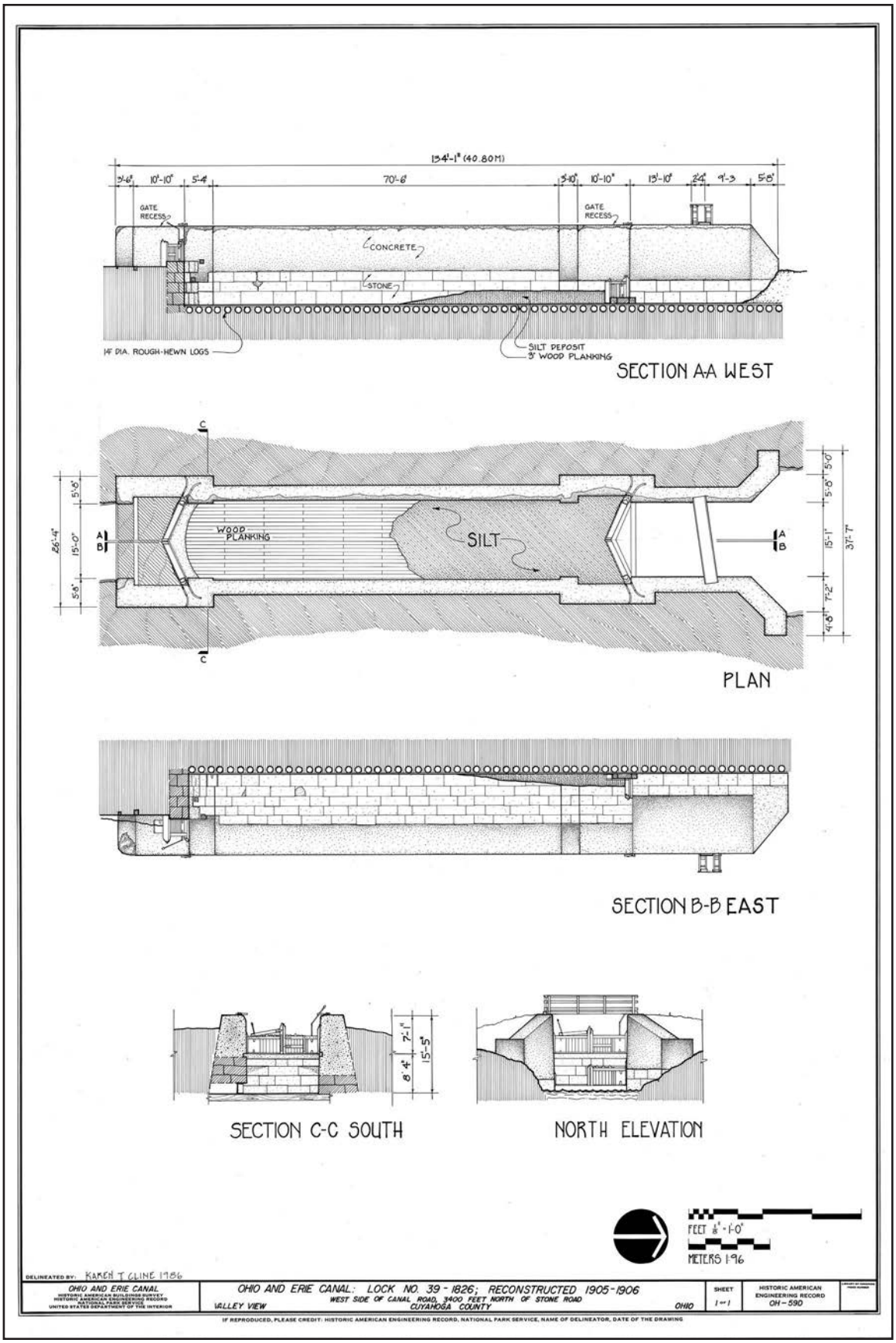


Figure 54. Measured drawings of Lock No. 39 (*Source:* Historic American Engineering Record, National Park Service. Karen T. Cline, Delineator, 1986)

through the inner wall of backing stone. The concrete applied to the upper portion of the wall is a minimum of eight inches thick. The actual cross-section of the lock walls, however, can only be determined by physical investigation which includes core boring and extensive excavations.

The upper recess is terminated at the downstream edge by a breast wall which extends transversely across the chamber and ties into the main walls. The breast wall is constructed of masonry and is semi-circular in design. With a top elevation set approximately equivalent to the floor of the upstream canal prism, this wall forms the vertical step, or lift, between the levels of water. One course of masonry is recessed to accommodate a heavy timber, one of two bumping beams which protect the breast wall; the main lock walls contain indentations which receive the end of a second bumping beam. A lock culvert, a provision for controlling the flow of water from the upper canal level into the lock chamber, is often constructed within the masonry of the berm wall. The inlet, located in the upstream gate recess, features a wicket gate controlled by a stem or reach rod which penetrates the top of the lock wall through a metal sleeve. The discharge, a rectangular opening, is located within the upstream portion of the chamber at the bottom of the lock wall.

The gates are constructed of white oak timbers secured with iron hardware. Drawings prepared by the Historic American Engineering Record in 1987 based on 1905 plans illustrate the construction details (Figures 55 and 56). The structural system of the lock gates is composed of a half-cylindrical heel post and mitered toe post joined by horizontal rails; the connections are mortise and tenon secured with metal straps. Vertical planking is applied to the upstream face. Sluice gates, located at the bottom of each lock gate adjacent to the heel post, control the flow of water into and out of the lock. The design is similar to a butterfly-type valve, consisting of a flat metal plate which rotates around a central stem attached to the face of the gate by iron straps. The sluice gate is operated by a detachable wrench, a long handle which attaches to the reach road above the balance beam. The gates with butterfly-type valves were later replaced by a modified design featuring paddle valves.

The rounded portion of the heel post is received by a hollow quoin, a wood member with a quarter-round arc located at the downstream interior corner of each recess. The gate pivots on a gudgeon at the base of the heel post. A ring bolted to anchor straps, referred to as a “goose neck” or “goon neck,” secures the heel post to the top of the lock wall and acts as a first-class fulcrum. Gate movement is controlled by a balance beam which, to provide leverage, extends well past the heel post.

In the closed position when viewed from above, the gates form an angle pointed upstream; the mitered toe post provides a seal, and water pressure ensures that the gates remain closed. The angle also facilitates gate operations by reducing the arc of the gate between the open and closed position. A miter sill is located at the downstream edge of both the upper and lower recesses and provides a stop against which the bottom of the lock gates rest in a closed position, preventing leakage of water under the gate. The sills are constructed of wood timbers with concrete infill or poured concrete with a steel channel face.

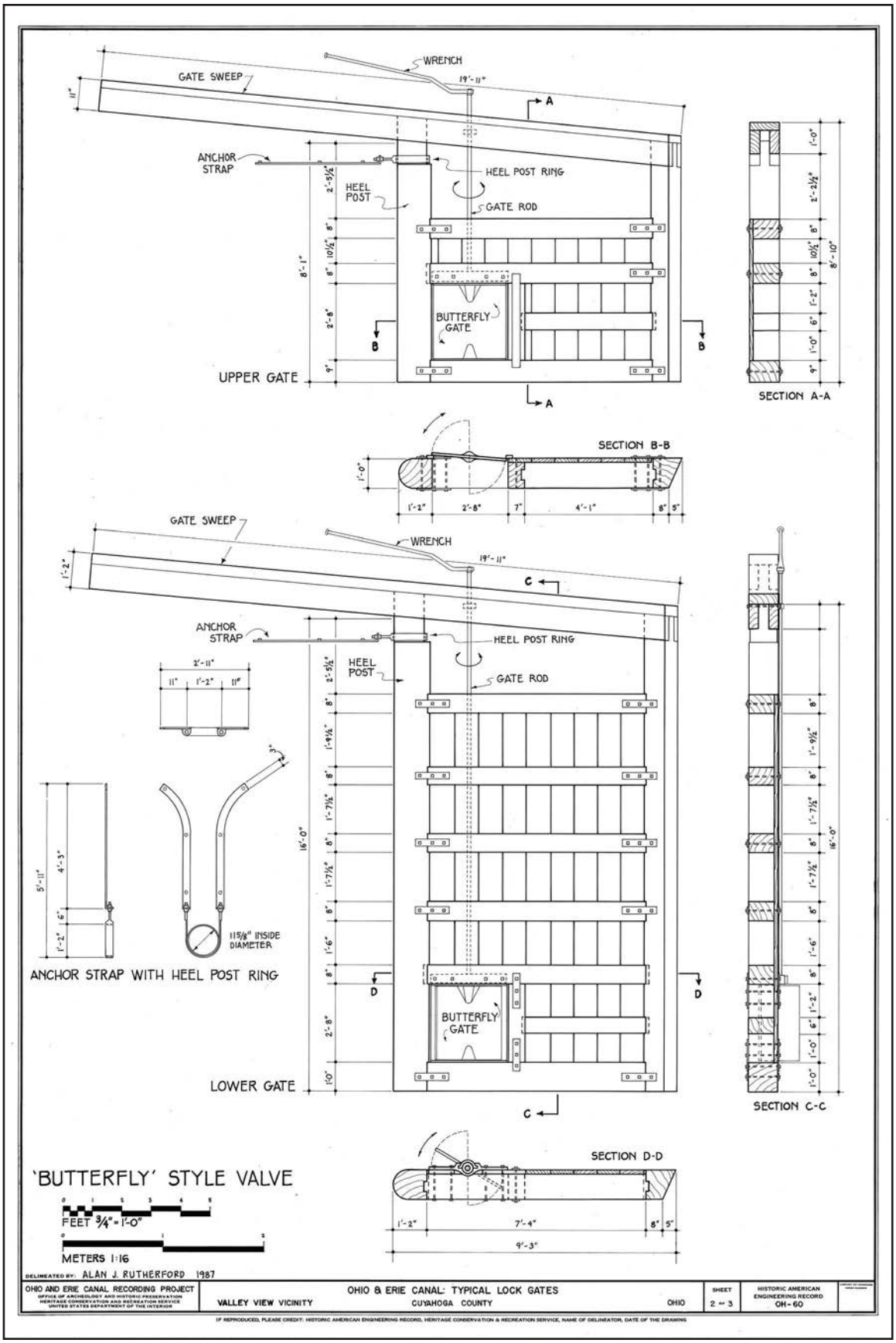


Figure 55. Typical lock gates with butterfly style valves (*Source:* Historic American Engineering Record, National Park Service. Alan J. Rutherford, Delineator, 1987)

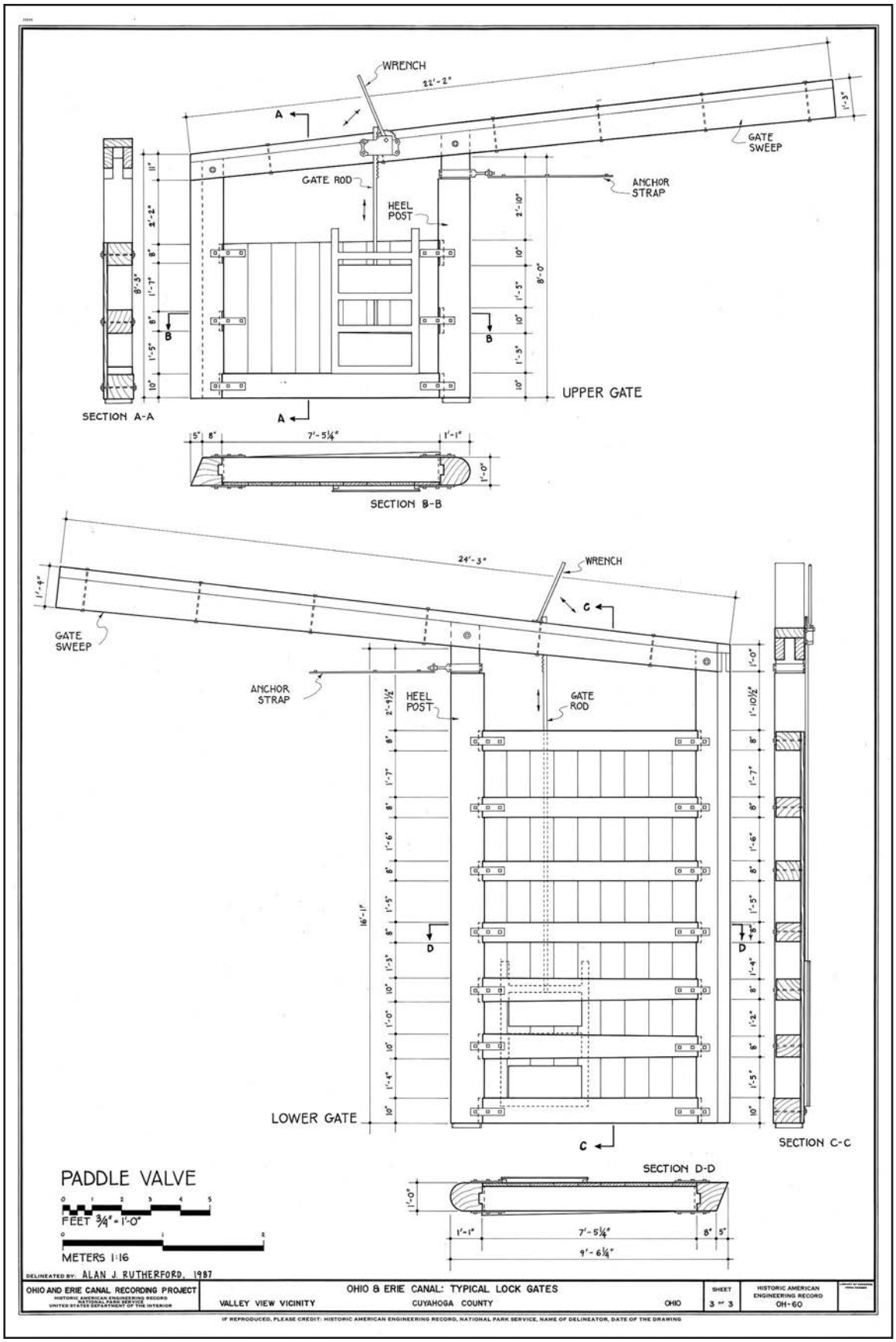


Figure 56. Typical lock gates with paddle valves (*Source:* Historic American Engineering Record, National Park Service. Alan J. Rutherford, Delineator, 1987)

Given that the most observable features of the lock conform to the early specifications, it is reasonable to assume that the substructure of the lock is also consistent in its similarities. The masonry lock walls are constructed on timber foundations. Where necessary, rows of sheet piling composed of planks are set into the ground across the foundation, or piles are driven to form a secure foundation. Square hewn timbers, not less than one foot in thickness, lie horizontally across the lock pit extending beyond the line of the lock walls. These timbers are "well puddled" with a tempered mixture of clay or similar material used as a watertight lining.

Early specifications call for two layers of flooring. Three-inch thick oak planks were to be "trunneled" (fastened with cylindrical pins of hardware) or spiked to the timbers; this first layer was to be placed longitudinally across the entire foundation extending beneath the lock walls. A second layer of two-inch thick planks secured with spikes was installed lengthwise between the lock walls. Physical investigation of existing fabric at Lock No. 38, however, revealed only one layer of flooring: three-inch thick planks placed lengthwise between the lock walls, trunneled and spiked to the timbers. Flooring upstream from the breast wall consisted of timbers with concrete infill. Composition of flooring at other locks is not known and would require similar investigations as that performed at Lock No. 38 during its restoration.

Waste ways are located on the berm side, the bypass channel running approximately parallel to the lock. "Tumbles" consist of a low wall which extends transversely across the channel and ties into concrete sidewalls. This low wall forms the vertical fall between the levels of the channel. The sidewalls are protected on the upstream end by wing walls.

Some locks had wooden footbridges at the lower end to allow movement from one side of the lock to the other. They were placed at the lower end of the chamber rather than the upper end so that boats had adequate clearance to pass underneath. Although all the footbridges disappeared long ago, indentations in the chamber walls and surface mark their former locations.

**Defining Features**

Character-defining features of lift locks include: surviving elements of the structure's basic form and design as a concrete or stone masonry chamber with gates at each end; the vertical and horizontal dimensions of the lock; the concrete or stone walls including the surface treatment; the concrete or stone coping on top of the walls; the wooden substructure/ foundation; the wooden flooring; surviving components of the wooden gates and gate posts together with the valves and the metal hardware that supported the gates and controlled the valves; the breast wall and miter sills; the recesses in the walls which accommodated the gates when open, including the hollow quoins; the internal culvert at the upper end of the lock, including the inlet and discharge openings; the concrete or stone wing walls; the waste way around the lock including the tumble and spillway; and any evidence of craftsmanship and construction techniques such as mason's marks, quarrying marks, formwork marks, and recesses/indentations for the bumping beams, goose neck hardware, snubbing posts, and former bridges spanning the lock chamber.

## Inventory

The following 16 lift locks in Cuyahoga Valley National Park are historic features dating to the Ohio and Erie Canal's period of significance (1825-1913) and are discussed in this section. All the locks that were in use during the period of significance are still extant, although their physical condition varies widely. Thirteen of the locks (Nos. 24-36) are located within the unwatered section of canal and three (Nos. 37-39) within the watered section. For consistency the stationing is the same as stated in the 1993 draft HSR, derived from the 1912 Silliman survey. It generally refers to a point near the upper end of the lock.

- Lock No. 24 (Niles/Botzum Lock), Station 1419+54
- Lock No. 25 (Mudcatcher Lock), Station 1406+42
- Lock No. 26 (Pancake Lock), Station 1365+40
- Lock No. 27 (Johnny Cake Lock), Station 1282+50
- Lock No. 28 (Deep Lock), Station 1164+04
- Lock No. 29 (Peninsula Lock), Station 1125+91
- Lock No. 30 (Feeder Lock), Station 1109+48
- Lock No. 31 (Lonesome Lock), Station 1069+76
- Lock No. 32 (Boston Lock), Station 997+60
- Lock No. 33 (Wallace Lock/Lost Lock), Station 958+28
- Lock No. 34 (Red Lock), Station 906+16
- Lock No. 35 (Whiskey Lock/Kettlewell Lock), Station 812+30
- Lock No. 36 (Pinery Lock/17 Mile Lock), Station 763+43
- Lock No. 37 (14 Mile Lock), Station 611+46
- Lock No. 38 (12 Mile Lock), Station 533+75
- Lock No. 39 (11 Mile Lock), Station 455+00

Locks Nos. 24 through 36 are located along the unwatered section of canal. Situated in line with the canal prism, each lock provides a lift ranging from 5.5 feet to 17 feet. North of Peninsula the towpath is on the west side of the canal, and the waste ways are located to the

east. At Peninsula the canal crosses the Cuyahoga River, and from there south the towpath is on the east side and the waste ways are located to the west. Since the abandonment of the canal for navigational purposes in 1913, modern development has impacted only a few of the locks; the majority remain unaltered, affected only by the natural deterioration processes.

Locks Nos. 37 through 39 are located along the watered section. In all three cases the towpath is on the west side of the canal, and the waste way is on the east side. The masonry and concrete components of these locks are in much better condition than most of the unwatered locks, although the wooden components of Nos. 37 and 39 are missing or severely deteriorated. In 1991-1992 Lock No. 38 was completely restored to its 1907 appearance during the development of the Canal Exploration Center.

Since all the locks were constructed and reconstructed according to standard specifications and are physically and functionally similar to each other (see above), individual physical descriptions are not provided. Instead this section will focus on condition assessments.

## Lock No. 24 or Niles/Botzum Lock, Station 1419+54

Location

Lock No. 24 is located near the southern end of the Park, 0.72-mile south of Ira Road between Mile Markers 29 and 30. It had a lift of 10 feet (Figures 57 and 58). Construction was complete by spring 1827, and there were documented repairs in 1828, 1859, 1887, 1895, and 1898. The lock was rebuilt with concrete in 1905-1906 and abandoned in 1913.

The canal segment between Bath and Ira Roads was obliterated by the construction of Riverview Road in the 1930s under the Works Progress Administration. The east wall of the lock was removed, and the west wall is now adjacent to the east shoulder of the roadway. By necessity this portion of the towpath trail was redirected to pass through the former lock chamber since the former towpath now lies under Riverview Road.

Previous Documentation

Only the west wall and adjacent tumble of Lock No. 24 survive today, since the east wall was demolished during the construction of Riverview Road. At the time of the 1993 draft HSR the remnants of Lock No. 24 were in poor condition (Photo 1), though not as deteriorated as nearby Lock No. 25. The report states:

> A significant portion of finish surface remains, and evidence of the formwork is apparent. Severe spalling, resulting in exposure of the rough sandstone back-up, is limited to an area of the upper gate chamber and the southeast [note: should be southwest] wing wall. Horizontal cracking is prevalent, and there are three significant vertical cracks indicative of movement. The lock culvert inlet is visible. The back face of the southeast [southwest] wing wall has been exposed by the erosion of adjacent soil.
>
> ...The encroachment of vegetation is generally limited to areas of deterioration. The deteriorated top surface of the walls is supporting the growth of grass. Vines and other vegetation with invasive root systems have taken hold at vertical cracks, areas of exposed sandstone backup and behind delaminated finish surfaces.
>
> There is evidence of two tumbles associated with these locks; one is situated approximately midway between the structures, and the other is located to the south of Lock 24. The concrete surface of both tumbles is in extremely poor condition, and a significant amount of rough sandstone back-up is exposed. Portions have been undermined by the loss of lower fabric, the back face of the walls are exposed, and there is vertical cracking indicative of movement. The encroachment of vegetation is severe.[238]

238. Cossell, *Ohio and Erie Canal*, 99-100.

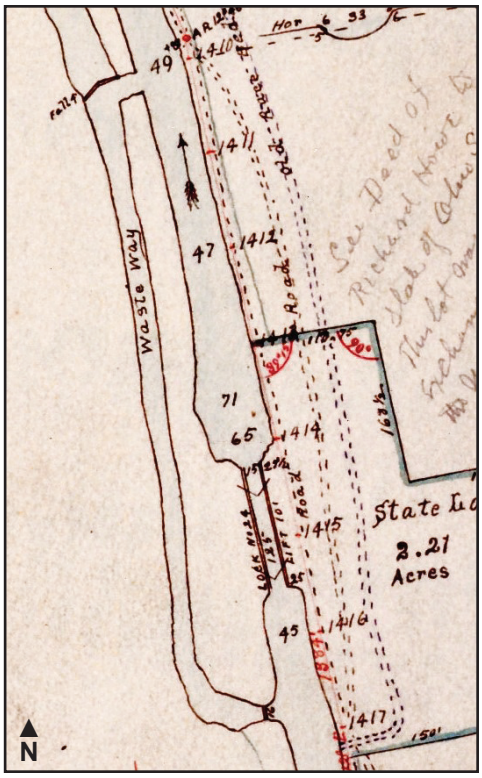


Figure 57. Survey map of Lock No. 24, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

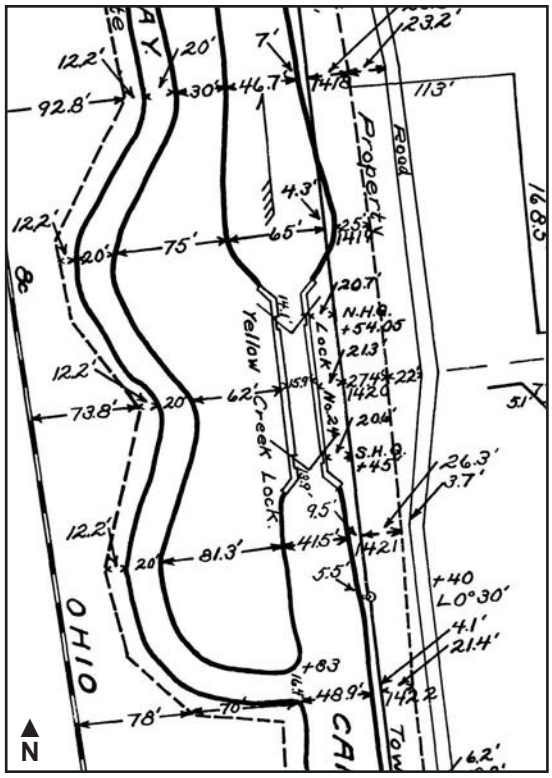


Figure 58. Survey map of Lock No. 24, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 1. Lock 24: view looking northwest in 1993

Photo 2. Lock 24: view looking northwest in 2017

Lock No. 24 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0051-07. It is #011149 in the Park's List of Classified Structures.

Existing Conditions

The 2017 field survey suggested that the condition of Lock No. 24 has not changed significantly since 1993 (Photo 2). The southwest wing wall and the vicinity of the upper gate recess are in very poor condition with severe delamination of the concrete finish and exposure of the rubble stone backup, together with one of the large vertical cracks noted by Cossell in 1993 (Photos 3 and 4). The top of the west portion of the breast wall is visible at grade; the rest of the breast wall appears to have been removed when the east lock wall was demolished. The other two large vertical cracks noted by Cossell are located at the lower gate recess, but there is much less delamination of the concrete finish than at the upper gate recess (Photo 5), and the adjacent wing wall is intact (Photo 6). The concrete coping on top of the wall also generally is in good condition (Photo 7). Vegetation is no longer a serious issue at Lock No. 24 and seems to be controlled successfully through routine maintenance. The tumble to the south of Lock No. 24 and the adjacent wing walls remain in very poor condition, with no apparent repairs or maintenance since 1993. There are large cracks in the spillway surface, the side walls have pulled away from the front wall, and the soil behind the walls is heavily eroded (Photos 8 and 9).

Photo 3. Lock 24: west wall, upper gate recess

Photo 4. Lock 24: west wall, upper gate recess, culvert inlet

Photo 5. Lock 24: west wall, lower gate recess

Photo 6. Lock 24: northwest wing wall

Photo 7. Lock 24: west wall coping

Photo 8. Lock 24: tumble, looking southwest

Photo 9. Lock 24: tumble, sluice and side wall

## Lock No. 25 or Mudcatcher Lock, Station 1406+42

Location

Lock No. 25 is located 0.25-mile north of Lock No. 24 and approximately 0.45-mile south of Ira Road near Mile Marker 29. It had a lift of 8 feet (Figures 59 and 60). Construction was complete by spring 1827, and there were documented repairs in 1828, 1859, 1887, 1895, and 1898. The lock was rebuilt with concrete in 1905-1906 and abandoned in 1913.

This segment of the canal was mostly destroyed by the construction of Riverview Road in the 1930s. Like Lock No. 24 the east wall of the lock was removed, and the remaining west wall is adjacent to the east shoulder of the roadway. The towpath trail passes through the former lock chamber.

Previous Documentation

Only the west wall of Lock No. 25 survives today; the east wall was demolished during the construction of Riverview Road in the 1930s. The 1993 draft HSR states:

> The concrete face of Lock 25 is in extremely poor condition. Deterioration has resulted in a significant loss of historic fabric. While isolated patches of the finish surface remain, without exception this fabric is delaminated from the inner concrete. The balance of the surface is spalled, and large areas of the rough sandstone back-up have been exposed by the complete degradation of the concrete face. Horizontal and vertical cracking are apparent. The lock culvert inlet is visible."[239]

Lock No. 25 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0050-07. It is #011150 in the Park's List of Classified Structures.

Existing Conditions

The 2017 field survey suggested that the condition of Lock No. 25 may be slightly worse than in 1993; its condition remains very poor, with no apparent repairs made since then (Photos 10 and 11). There has been a small amount of additional mortar and concrete loss since 1993. About 90 percent of the surface finish is delaminated, exposing rough concrete and rubble stone backup (Photos 12 and 13). There are several massive vertical cracks in the wall. Stones and chunks of concrete lie at the base of the wall. The lower gate recess is fairly intact though delaminated, while most of the concrete has fallen away from the upper gate recess, exposing the large stones underneath (Photos 14 and 15). The top part of the culvert inlet is visible at grade (Photo 16). The concrete coping on top of the wall is delaminated or missing in most places. Above the lower gate recess there are several metal pins that once secured the goose neck hardware for the lock gates (Photo 17). Vegetation is no longer a serious issue at Lock No. 25 and seems to be controlled through routine maintenance.

239. Cossell, *Ohio and Erie Canal*, 99.

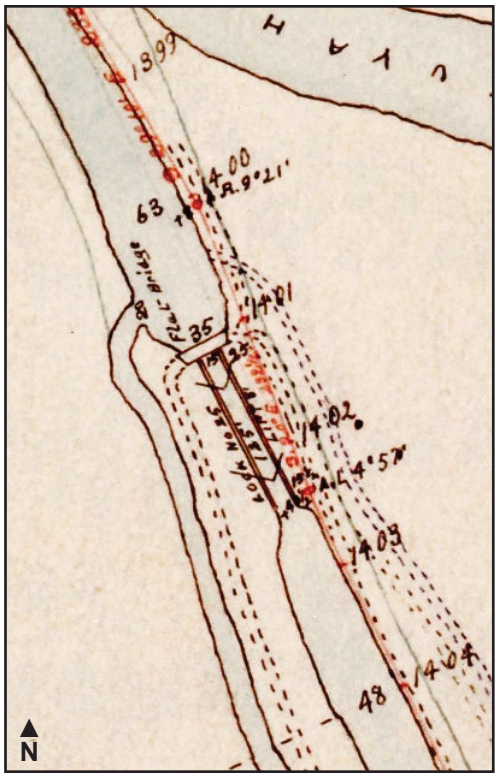


Figure 59. Survey map of Lock No. 25, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

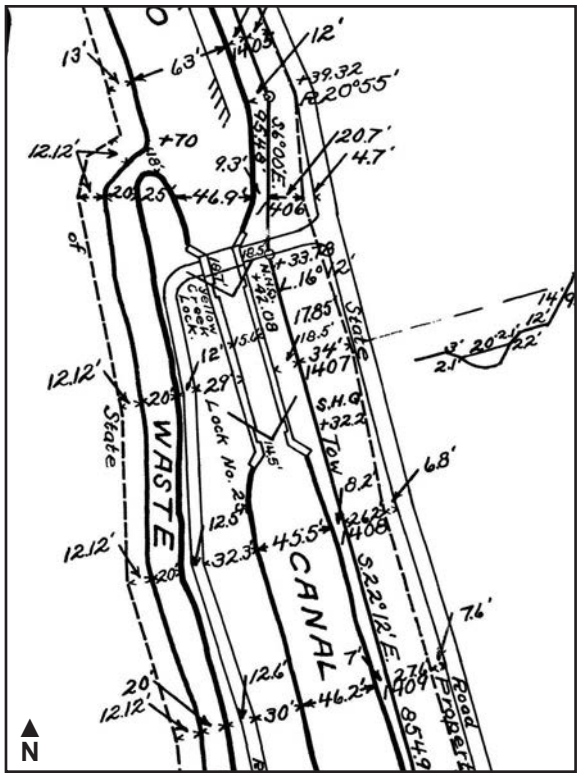


Figure 60. Survey map of Lock No. 25, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 10. Lock 25: view looking northwest in 1993

Photo 11. Lock 25: view looking northwest in 2017

Photo 12. Lock 25: view of west wall looking north

Photo 13. Lock 25: view of west wall and northeast wing wall looking south

Photo 14. Lock 25: west wall, upper gate recess

Photo 15. Lock 25: west wall near upper gate recess

Photo 16. Lock 25: west wall, upper gate recess, culvert inlet

Photo 17. Lock 25: pins for gate goose neck hardware

## Lock No. 26 or Pancake Lock, Station 1365+40

Location

Lock No. 26, also known as "Pancake Lock," is located 0.32-mile north of Ira Road at the southern end of the Beaver Marsh between Mile Markers 28 and 29 (Figures 61 and 62). The canal to the north of Lock No. 26 for 0.2-mile has been destroyed and is now part of the marsh. The lock is heavily visited due to its proximity (600 feet) to the Ira Trailhead and the Beaver Marsh, which is popular among birdwatchers and naturalists. Lock No. 26 had a lift of 5.5 feet, the smallest lift of all the locks in the Park. Construction was complete by spring 1827, and there were documented repairs in 1828, 1859, 1887, and 1895. The lock was rebuilt with concrete in 1905-1906 and abandoned in 1913.

Previous Documentation

At the time of the survey for the 1993 draft HSR, Lock No. 26 was in poor condition. Although it is located along the unwatered section of canal there was (and is) standing water in the lock chamber due to its location at the edge of the Beaver Marsh. This causes freezing and thawing in the winter, which has damaged the concrete of the lock walls. The 1993 report stated:

> The condition of the concrete face varies within this structure. In general, the east lock wall is more deteriorated than the west wall. A significant portion of the west wall's finish surface is intact, however, some of this fabric is delaminated from the inner concrete. Visual indications of deterioration on the west wall are generally limited to surface-related concerns such as horizontal cracking, vertical cracking, spalling and efflorescence. Although there has been a significant loss of fabric on the east wall, no areas of rough sandstone back-up have been exposed. The finish surface which remains at the top of the east wall is delaminated and, in general, undermined by the loss of lower fabric. Due to the presence of water within the lock chamber, the breast wall is not visible.
>
> The only remains of the south wing walls consist of a limited amount of rubble. The north wing walls are concrete. The lock culvert inlet is visible and metal pins protrude above the top surface of the east wall where a gate was secured.
>
> The encroachment of vegetation is severe along the top surface of the west wall and the lower gate chamber of the east wall. Vines and other vegetation with invasive root systems are prevalent.[240]

Lock No. 26 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0029-07. It is #011151 in the Park's List of Classified Structures.

240. Cossell, *Ohio and Erie Canal*, 96-97.

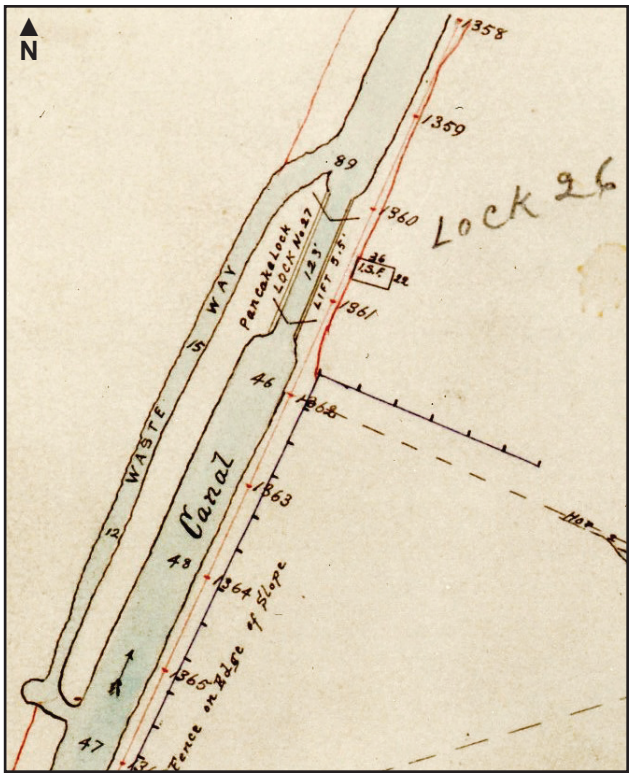


Figure 61. Survey map of Lock No. 26, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

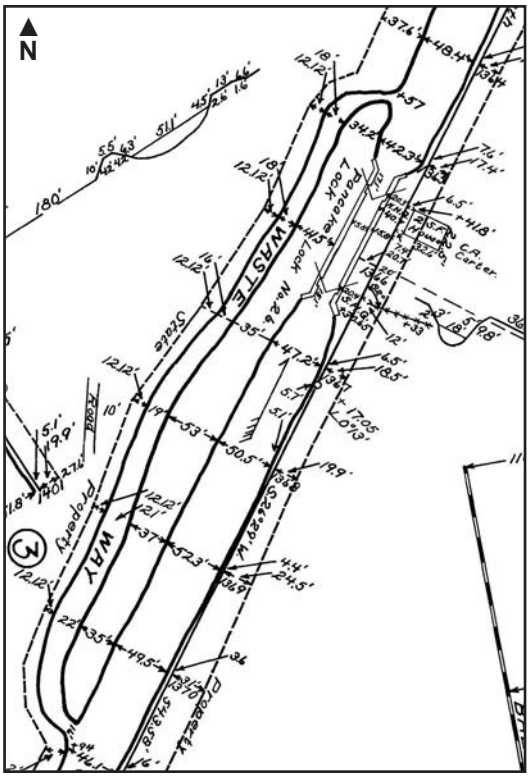


Figure 62. Survey map of Lock No. 26, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Existing Conditions

The lock remains in poor condition today although there have been extensive repairs made to the concrete coping on top of the east wall (Photos 18 and 19). The coping is now in good condition although the repairs resulted in the removal of the metal pins at the lower gate recess, which were noted by Cossell. The repaired coping protects the east wall and improves visitor safety, which is an important consideration due to the proximity of the towpath trail and the dangers posed by water in the chamber (Photo 20). Below the coping the east wall is in approximately the same condition as in 1993. In general vegetation on and near the east wall is well controlled because it is easily accessible. The south end of the east wall is an exception due to large pine tree roots and dislodged stones which make mowing difficult. Here the tree roots and other vegetation have caused, and continue to cause, extensive damage to the masonry (Photos 21 and 22). No repairs have been made to this section.

The west wall may be in somewhat worse condition than in 1993, with extensive delamination of the surface concrete which has exposed some of the stone backup (Photos 23 and 24). The concrete coping is 90 percent intact, and the lower gate recess and the north end of the wall are in relatively good condition (Photos 25 and 26). The northwest wing wall however exhibits large cracks and surface delamination, and an area of stone backup is exposed at the water line (Photo 27). As in 1993 there is extensive encroachment of vegetation on top of the west wall, including large shrubs and small trees. This vegetation is allowed to grow due to the water in the chamber which makes it difficult to perform routine maintenance on the inaccessible west wall.

The tumble for the waste way is eroded but visible, but the waste way itself merges with the Beaver Marsh wetland and is no longer recognizable.

Photo 18. Lock 26: overview in 1993, looking south

Photo 19. Lock 26: overview in 2017, looking south

Photo 20. Lock 26: overview looking north

Photo 21. Lock 26: upper end looking south

Photo 22. Lock 26: upper end, dislodged stones and tree roots

Photo 23. Lock 26: overview of west wall showing extensive delamination

Photo 24. Lock 26: detail of west wall showing concrete deterioration and stone backup

Photo 25. Lock 26: west wall, lower gate recess

Photo 26. Lock 26: east wall, lower gate recess and replaced coping

Photo 27. Lock 26: north wing walls

**Lock No. 27 or Johnny Cake Lock, Station 1282+50**

Location

Lock No. 27, informally known as "Johnny Cake Lock", is located at the once-thriving village of Everett, formerly a depot stop on the Valley Railway. It is just north of Everett Road and 1.6 miles north of Lock No. 26 between Mile Markers 26 and 27 (Figures 63 and 64). To the east of the lock and towpath are cultivated fields. Lock No. 27 had a lift of 10 feet. Construction was complete by spring 1827, and there were documented repairs in 1828, 1859, 1886, 1892, 1895, 1899, 1901, and 1902. The lock was rebuilt with concrete in 1906 and abandoned in 1913.

Previous Documentation

The 1993 draft HSR reported:

> The concrete face is in poor condition. While a significant portion of the finish surface is intact, some of this fabric has delaminated from the inner concrete. Spalling is most severe at the southwest wing wall and random areas on the east lock wall. There has, however, been no exposure of the rough sandstone back-up. Efflorescence is prevalent. Horizontal and vertical cracking are apparent. Physical abrasion is limited to areas along the existing water line and is most severe at the northeast wing wall. The masonry breast wall is visible, as is the deteriorated concrete miter sill with steel channel.
>
> The northwest wing wall is constructed of masonry and the joints are open with mortar deeply eroded.
>
> The lock culvert inlet is visible. Metal pins protrude from the top surface of the lock wall where the upper gate was secured to the east wall. The goose neck remains at the northwest and the southwest. Indentations which received the ends of bumping beams are apparent.
>
> Erosion of adjacent soil has exposed limited portions of the back face of the southwest wing wall and the west lock wall. The encroachment of vegetation is most severe at the northwest wing wall. Moss and vines are prevalent along the top surface of all walls. Several trees are growing immediately adjacent to the lock walls outside of the chamber.
>
> The concrete tumble, located to the southwest, is in fair condition. While there is some surface deterioration, marks left by the formwork are still visible. The encroachment of moss and vines is relatively limited.[241]

241. Cossell, *Ohio and Erie Canal*, 94-95.

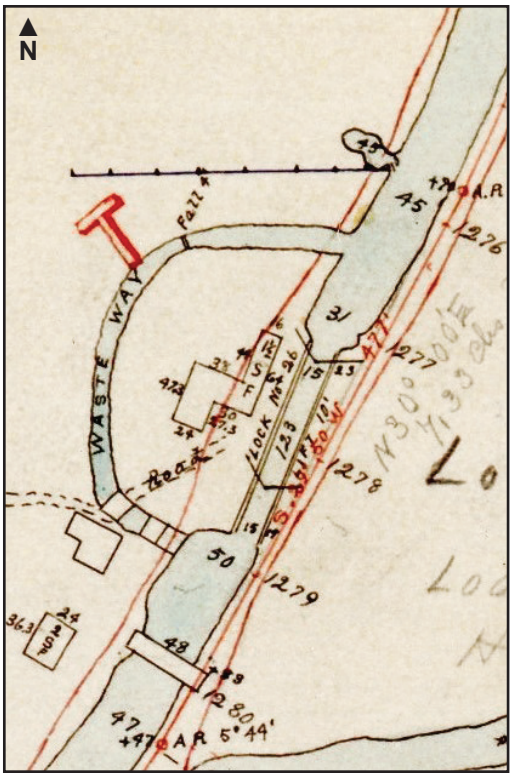


Figure 63. Survey map of Lock No. 27, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

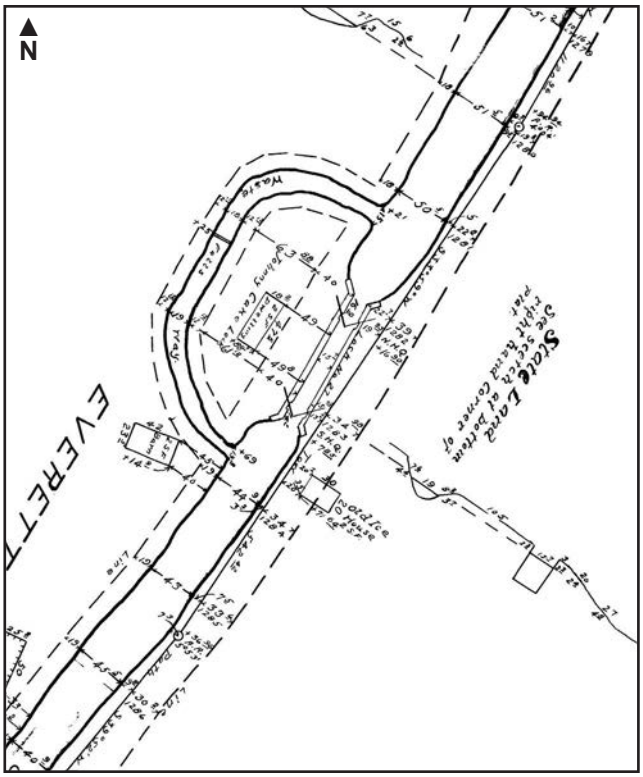


Figure 64. Survey map of Lock No. 27, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Lock No. 27 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0027-04. It is #011153 in the Park's List of Classified Structures.

Existing Conditions

The 2017 survey indicated that Lock No. 27 is in approximately the same condition as in 1993 (Photos 28 and 29). There is no evidence of any repairs. The lock was visited twice during the 2017 field survey, once in May and again in October; at both times it contained stagnant water. The west wall is in somewhat better condition than the east wall, which exhibits significant surface delamination, exposing the stone backup in one location near the southeast corner (Photos 30-32). Delamination of the surface concrete is severe at the water line, probably due to freezing and thawing in winter. The upper gate recesses are in fairly good condition with just minor delamination and cracking (Photos 33-35); the breast wall and culvert inlet are entirely visible and in good condition, as are the indentations for the bumping beams as noted by Cossell. The lower gate recesses are in good condition with only minor delamination (Photo 36). The goose necks are intact at the northwest and southeast recesses (not the northwest and southwest as reported by Cossell). As she states, the northwest wing wall is constructed of stone masonry, and mortar is missing from some of the joints, leading to accelerated deterioration (Photo 37). The soil behind the west wall is eroded about one-foot below the top, exposing the back of the wall (Photo 38). The concrete tumble remains in fair condition although it is heavily overgrown, and the adjacent soil is badly eroded (Photo 39). Vegetation is a serious problem at this lock, especially on the west wall, where vines hang over the surface and grow from cracks in the concrete; on a positive note, at least one large tree on top of the east wall has been cut off at ground level since the 1993 draft HSR.

Photo 28. Lock 27: overview looking north in 1993

Photo 29. Lock 27: overview looking north in May 2017

Photo 30. Lock 27: southeast wing wall and upper gate recess looking northwest

Photo 31. Lock 27: upper gate recess and goose neck hardware

Photo 32. Lock 27: east wall looking northeast

Photo 33. Lock 27: breast wall and upper gate recess

Photo 34. Lock 27: breast wall

Photo 35. Lock 27: east wall, upper gate recess

Photo 36. Lock 27: east wall, lower gate recess

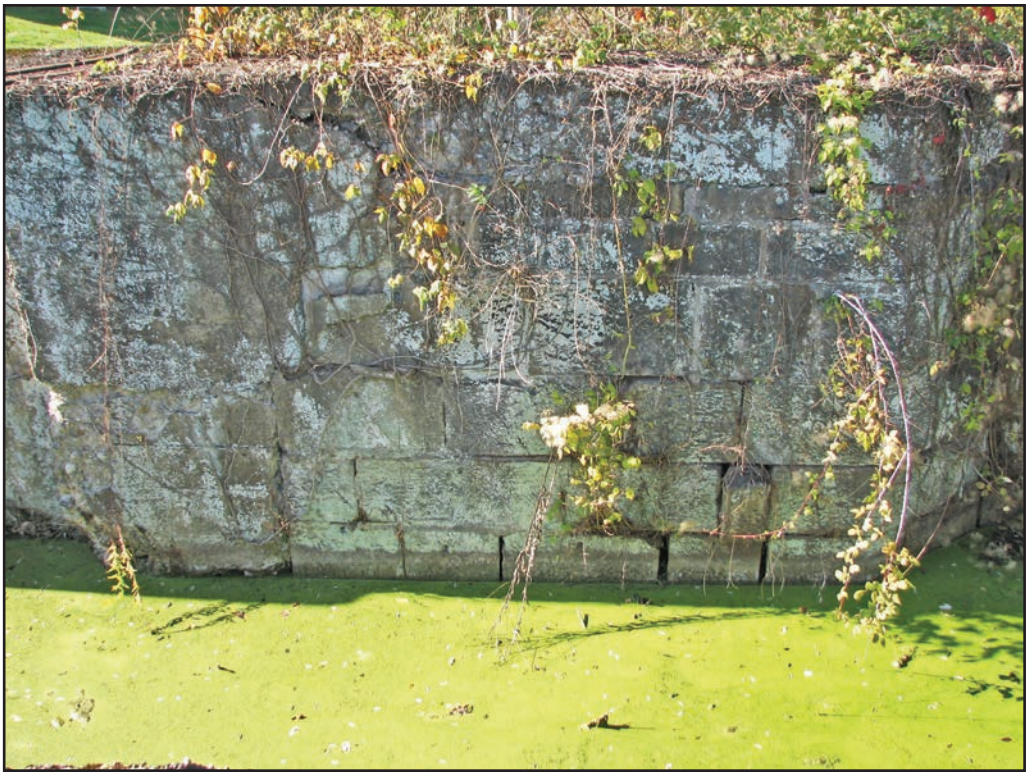

Photo 37. Lock 27: northwest wing wall

Photo 38. Lock 27: eroded soil behind west wall

Photo 39. Lock 27: tumble

## Lock No. 28 or Deep Lock, Station 1164+04

Location

Lock No. 28 was known as "Deep Lock" because its lift of 17 feet was the greatest of all locks on the Ohio and Erie Canal.[242] The lock is located between Mile Markers 24 and 25, approximately 0.5-mile south of State Route 303 and the village of Peninsula, in Deep Lock Quarry Metro Park, a unit of Summit Metro Parks which is responsible for its maintenance (Figures 65 and 66). It is visible and accessible not only from the towpath trail but also from a system of other trails within the Metro Park.

Construction of Lock No. 28 was complete by spring 1827, and there were documented repairs in 1828, 1859, 1886, 1887, 1895, 1898, 1899, and 1902. The lock was rebuilt with concrete in 1905-1906. Major repairs were required in 1909 due to defective concrete used during 1905-1906 reconstruction: the lower 14 feet of the lock was refaced with a 12-inch layer of concrete, and the upper 6 feet was completely rebuilt in concrete, reinforced with horizontal and vertical half-inch iron rods; the upper wing walls were underpinned with concrete; the northeast wing wall was dismantled and rebuilt; and the top courses and coping of the northwest wing wall were relaid.[243] Lock No. 28 was abandoned in 1913 and acquired by the Summit County Metropolitan Park District in 1934 along with the 41-acre quarry site.

Previous Documentation

In 1986 the Historic American Engineering Record recorded Lock No. 28 through large-format photography prior to development of the towpath trail; this work was part of project HAER-OH-59 (Figure 67). Recordation did not include preparation of measured drawings.

The 1993 draft HSR noted that Lock No. 28 was in fair condition at that time (Photo 40):

> The finish surface is generally intact within the lock chamber and deterioration is restricted to surface-related concerns. While efflorescence is prevalent, horizontal cracking and crazing are relatively limited. Spalling is most severe at the upper gate chamber and the south wing walls; although a great deal of the surface has been affected, virtually no rough sandstone back-up has been exposed. The masonry breast wall is visible and the joints are deteriorated. The concrete miter sill with steel channel is in good condition.
>
> There is a significant vertical crack indicative of movement at both south concrete wing walls. The north wing walls are constructed of masonry and there are visible cylindrical holes associated with the 1909 reconstruction; joint

242. Some sources state that the lift was 12 feet, for example, Theobald W. Kasper, "Locks from the Old Portage to the Pinery," *Towpaths* 22 (1984),24.
243. Ohio Board of Public Works, *71st Annual Report of the Board of Public Works of Ohio* (1910), 76-77, 100-101.

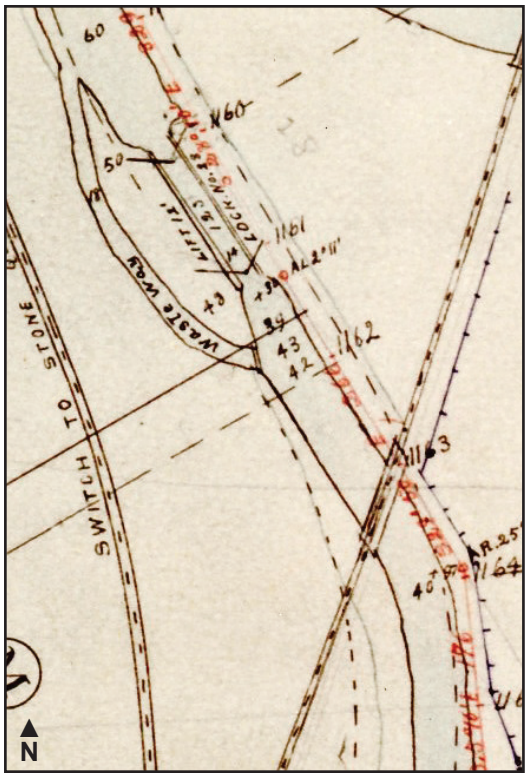


Figure 65. Survey map of Lock No. 28, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

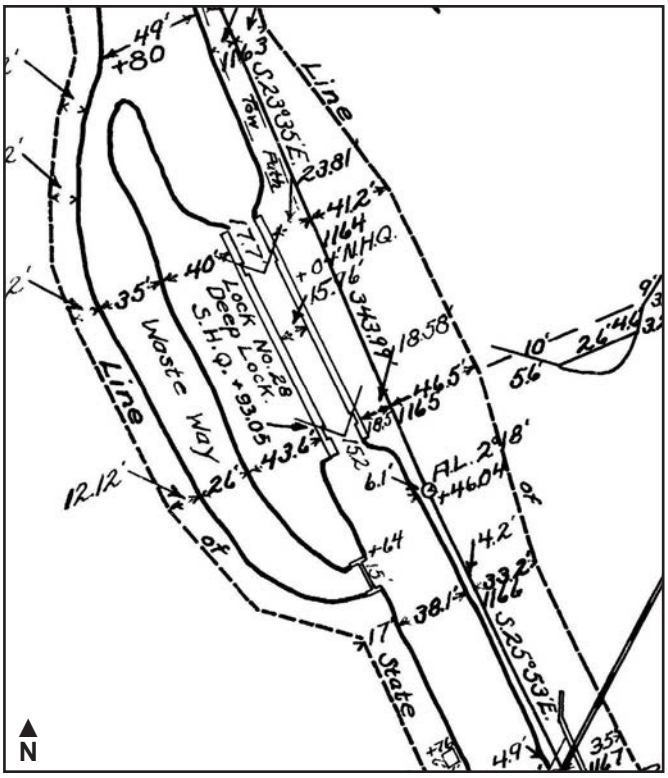


Figure 66. Survey map of Lock No. 28, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1928

Figure 67. Lock No. 28 in 1986 (*Source:* Historic American Engineering Record, National Park Service, HAER No. OH-59)

Photo 40. Lock 28: breast wall and upper gate recess in 1993

> deterioration is most severe at the lower courses. There is limited exposure of the back face at each wing wall due to the erosion of adjacent soil.
>
> The lock culvert inlet has been infilled with wood boards. Metal pins protrude above the top of the lock wall and an indentation of the goose neck is visible at all four locations where a gate was secured. Notches in the coping stones just north of the lower gate chamber are indicative of a bridge across the lock chamber.
>
> The encroachment of vegetation is most severe within joints of the breast wall and the northeast wing wall. Moss is prevalent along the top surface of the walls of the lock chamber and the lower gate chamber.
>
> The concrete tumble, located to the southwest, is in fair condition. Deterioration is limited to surface-related concerns.[244]

Lock No. 28 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0026-04. It is #011154 in the Park's List of Classified Structures.

Existing Conditions

The 2017 survey revealed that conditions have not changed significantly since the survey for the 1993 draft HSR (Photos 41-52). There is no evidence of any repairs made since then. The lock remains in fair condition, with the same details noted in the 1993 draft report except that stone backup is now exposed in the southeast gate recess (Photo 46). Vegetation appears to be fairly well controlled although there are plants growing from open mortar joints, and there is moss on the top coping stones; vegetation is most invasive at the southwest gate recess (Photo 47) and on the lower wing walls (Photos 50 and 51). The concrete tumble is severely overgrown with vegetation (Photo 52), but the entire waste way is intact and in fairly good condition.

244. Cossell, *Ohio and Erie Canal*, 92-93.

Photo 41. Lock 28: overview looking northwest

Photo 42. Lock 28: lock chamber and west wall, looking south

Photo 43. Lock 28: lock chamber and east wall, looking south

Photo 44. Lock 28: view looking north from upper gates

Photo 45. Lock 28: breast wall and upper gates, looking southeast

Photo 46. Lock 28: east wall, upper gate recess

Photo 47. Lock 28: west wall, upper gate recess, culvert inlet

Photo 48. Lock 28: east wall, lower gate recess

Photo 49. Lock 28: west wall, lower gate recess

Photo 50. Lock 28: northwest wing wall

Photo 51. Lock 28: northeast wing wall

Photo 52. Lock 28: tumble

**Lock No. 29 or Peninsula Lock, Station 1125+91**

Location

Lock No. 29 is located on the right (north) bank of the Cuyahoga River at the village of Peninsula, immediately adjacent to the ruins of the Peninsula Aqueduct (Figures 68 and 69). It is one of the most highly visible and visited locks in the Park due to its location near the village and a major trailhead. Lock 29 had a lift of 12 feet and is the only lock constructed entirely of masonry. Its history differs from that of the other locks within the Park, due in part to its proximity to both the Cuyahoga River and the aqueduct which caused all manner of serious maintenance issues. The lock is structurally integrated with the north abutment of the aqueduct.

The original lock was completed in 1827 and repaired in 1828, 1859, and 1869. In 1882 the original lock was removed, and a masonry lock was constructed of new material. During a flood in 1883 the flow of the river was restricted by the pier of the aqueduct and the river rechanneled itself across the canal just north of the lock. The foundation of the lock was undermined, and a process of steady decline began. Repairs to the new lock were made in 1883, 1885, and 1902. At the time of the 1905-1909 improvement of the northern division, the central portion of the foundation timbers had completely failed, causing the walls to lean inward. Unlike the other locks, Lock No. 29 was dismantled and reconstructed as outlined in Section 1B. A channel which had run along the west side of the lock was abandoned, and a culvert was integrated into the construction of the west wall. Lock No. 28 was abandoned in 1913.

Previous Documentation

The Historic American Engineering Record prepared large-format photographs and measured drawings of Lock No. 29 in 1986 prior to development of the towpath trail; this work was part of project HAER-OH-59 (see Figure 70; also see Figure 51).

Just prior to the 1993 draft HSR the towpath trail was constructed through Peninsula, and Lock No. 29 received preservation treatment. Before this work the lock walls were eroded, and there were large trees growing in and near the lock chamber; these issues were rectified. Continuity of the towpath trail also required the installation of a bridge over the Cuyahoga River where the Peninsula Aqueduct once stood, as well as the construction of a pedestrian bridge over the lock chamber itself.

The 1993 draft HSR noted that Lock No. 29 was in reasonably good condition, which is confirmed by photographic documentation:

> The masonry is in excellent condition. The individual stones are well cut and the stonework exhibits a master level skill. Joint deterioration, however, is prevalent. While repointing was performed during the recent improvements, this work was generally limited to the lower gate chamber and the north wing walls; some of the new mortar, however, has failed. Throughout the remainder of the lock, a number of the joints are open with deeply eroded mortar.

Figure 68. Survey map of Lock No. 29, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

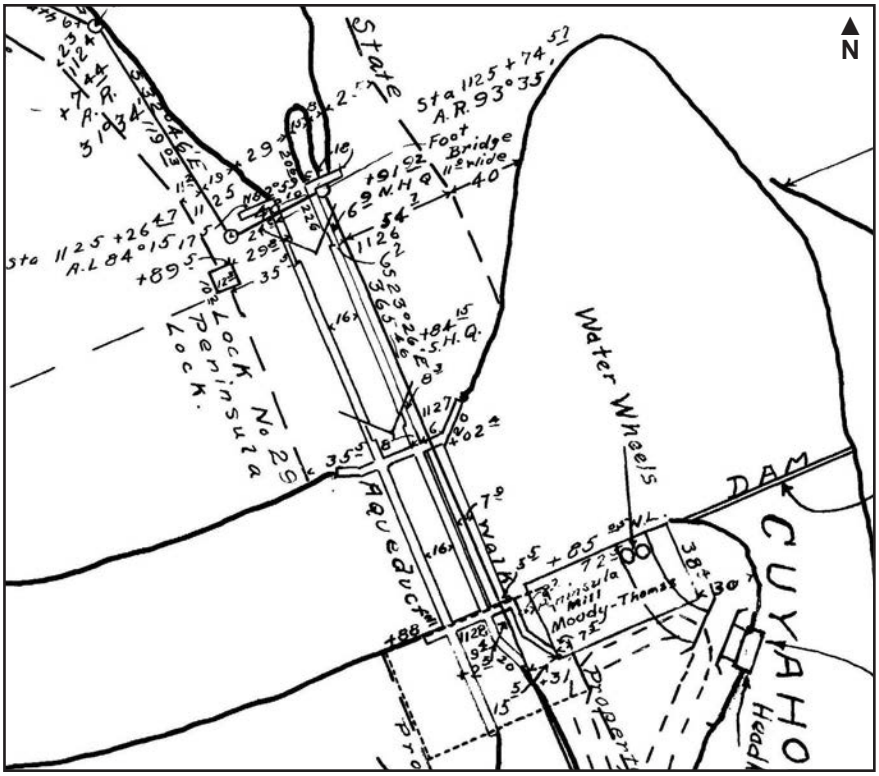


Figure 69. Survey map of Lock No. 29, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

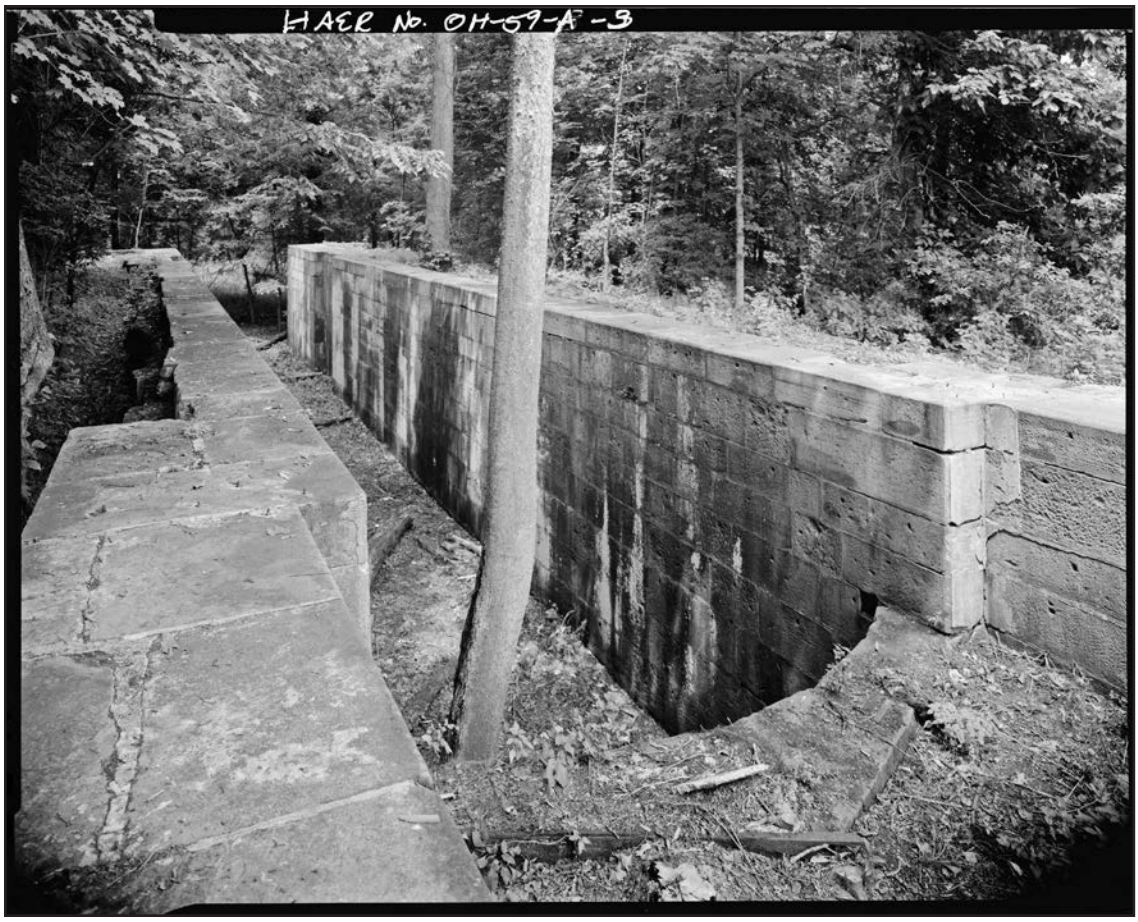


Figure 70. Lock No. 29 in 1986 (*Source:* Historic American Engineering Record, National Park Service, HAER No. OH-59)

> The entire structure appears to be stable and there are no indications of movement. The erosion of adjacent soil, however, has resulted in exposure of the back face of the walls. While the earthen embankments were reestablished at certain locations during recent improvements, the rough sandstone back-up is exposed along the west lock wall and the southwest wing wall.
>
> The lock culvert inlet, a circular steel channel, is apparent just above the upper gate recess on the east wall. The masonry housing of the discharge is located adjacent to the northeast wing wall. Just below the lower gate recess are notches in the coping stones where the towpath bridge was supported. Indentations which received the ends of bumping beams are apparent. Metal pins protrude above the top of the lock wall and an indentation of the goose neck are visible at all four locations where a gate was secured; the indentation has been filled with concrete at the northeast and northwest. At the lower corners of the gate chambers, there is evidence of the thin coat of grout used to seal behind the hollow quoins; a piece of metal fastener remains at the northeast.
>
> The encroachment of vegetation is limited. Random clusters of plants have taken hold in joints. There is an accumulation of organic material and vegetation within the upper gate chamber and on the masonry miter sill. The most severe encroachment is at the lock culvert discharge and the exposed rubble back-up along the west lock wall and the southwest wing wall. A tree within the lock chamber immediately north of the breast wall and several trees outside the chamber adjacent to the lock walls were removed during the recent improvements.[245]

Lock No. 29 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0056-04. The lock and aqueduct are #011157 in the Park's List of Classified Structures.

Existing Conditions

The condition of Lock No. 29 has not changed significantly since 1993 (Photos 53 and 54). Both chamber walls are in very good condition except for some open joints between stones where vegetation is flourishing. Many of the stones exhibit quarrying marks and mason's marks as noted on the interpretive sign within the lock chamber. The breast wall is completely intact, but the growth of destructive vegetation is especially pronounced there (Photos 55 and 56), as it also is on the adjacent gate recess where the situation is much worse than in 1993 (Photos 57 and 58). The lower gate recesses and wing walls are in excellent condition (Photos 59 and 60). It does not appear that there has been any action to address the erosion that has exposed the stone backup along the outside edge of the west lock wall, noted in the 1993 draft HSR. The adjacent section of canal to the north has been completely destroyed by flood action, and no evidence of it remains for hundreds of feet (Photo 61).

245. Cossell, *Ohio and Erie Canal*, 86-90.

Photo 53. Lock 29: view of chamber in 1993, looking north

Photo 54. Lock 29: view of chamber in 2017, looking south

Photo 55. Lock 29: west wall, looking southwest

Photo 56. Lock 29: breast wall

Photo 57. Lock 29: west wall, upper gate recess, heavily overgrown in July 2018

Photo 58. Lock 29: west wall, upper gate recess in 1993

Photo 59. Lock 29: lower gate recess

Photo 60. Lock 29: lower end of lock looking south

Photo 61. Lock 29: lower end of lock, looking north, canal prism destroyed

## Lock No. 30 or Feeder Lock, Station 1109+48

Location

Lock No. 30 is located at the Peninsula Feeder, less than 0.5-mile north of State Route 303 and the village of Peninsula, between Mile Markers 23 and 24 (Figures 71 and 72). Lock No. 30 had a lift of 9 feet. The contracts for this lock were relet several times, but construction was complete by spring 1828. There were documented repairs in 1828, 1859, 1882, 1886, 1887, 1895, 1898, and 1902. The lock was rebuilt with concrete in 1905-1906 and abandoned in 1913. The structural components of the feeder are located immediately to the west, and the lock figures prominently in this complex of cultural resources.

Previous Documentation

The draft HSR documented the condition of Lock No. 30 in 1993:

> The condition of the concrete varies within this structure. In general, the west lock wall is more deteriorated than the east wall. Visual indications of deterioration on the east wall are generally limited to surface-related concerns such as horizontal cracking, vertical cracking, spalling and efflorescence; the significant loss of concrete and exposure of the rough sandstone back-up are limited to the wing walls, both of which are slightly undermined. Virtually all of the surface of the concrete face, however, is missing on the west wall and there are numerous large areas where the rough sandstone back-up is exposed. The southwest wing wall has a significant vertical crack indicative of movement and the remaining fabric is severely deteriorated.
>
> While the masonry breast wall is exposed, apparently a thin concrete coating was applied to the courses of masonry at the lower portion of the walls. Joints are open with mortar deeply eroded. The lock culvert inlet is visible and a metal sleeve is flush with the top surface of the wall. Metal pins protrude from the top surface of the lock wall at all four locations where a gate was secured. To the north of the lower gate chamber, the wall features a rectangular indentation perhaps indicative of a bridge across the chamber.
>
> The encroachment of vegetation is not severe and is generally limited to the masonry breast wall and areas where deterioration has created a ledge. A large stump remains on the top surface of the east wall where a mature tree was recently removed.
>
> To the east of the southeast wing wall, remains of the tumble are evident. The tumble, constructed of masonry, is obscured by moss and dense vegetation.[246]

246. Cossell, *Ohio and Erie Canal*, 84-85.

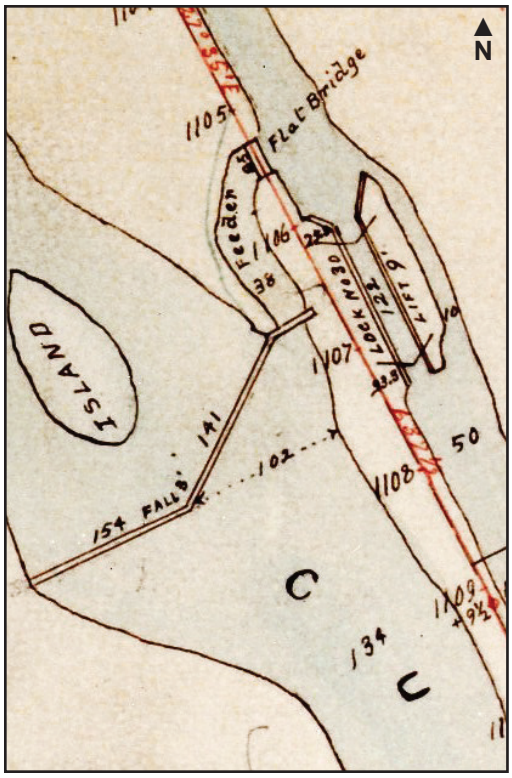


Figure 71. Survey map of Lock No. 30, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

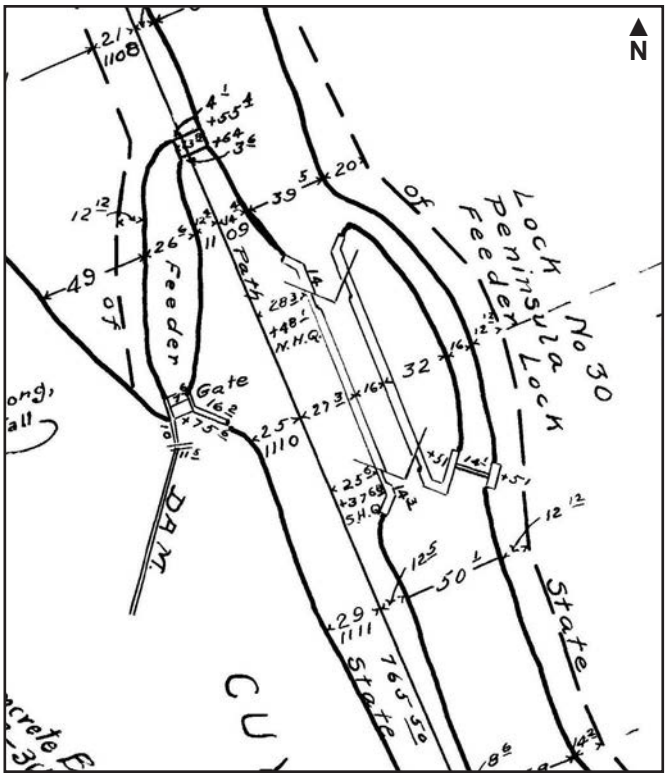


Figure 72. Survey map of Lock No. 30, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Lock No. 30 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0025-04. It is #011158 in the Park's List of Classified Structures.

Existing Conditions

The 2017 survey indicated that the conditions noted in 1993 still generally apply (Photos 62-66). The only visible repairs made subsequent to the 1993 draft report are the replacement of the concrete coping at the top of the west wall, which protects the wall and improves visitor safety but resulted in the removal of the metal pins adjacent to the northwest gate recess (Photo 67). Both walls exhibit serious vertical cracks. The upper gate recesses are both in poor condition with extensive delamination of the surface concrete and a major vertical crack above the culvert inlet, not noted in the 1993 draft HSR (Photos 68 and 69). The masonry breast wall is in very good condition other than extensive moss growth (Photo 70). The lower gate recesses are in better condition, especially the northeast recess (Photo 71). The short north wing walls are in fairly good condition and display an indentation for a former bridge (Photo 72), but the southeast wing wall is badly delaminated (Photo 73), and the northeast wing wall has completely collapsed (see Photo 62). The concrete tumble and stone-lined waste way on the east side of the lock are visible and in fairly good condition (Photo 74). About 75 feet north of the north end of the lock are the masonry and concrete remnants of a bridge that carried the towpath over the feeder channel (Photo 75).

Photo 62. Lock 30: upper end of lock in 1993, looking north

Photo 63. Lock 30: upper end of lock in 2017, looking north

Photo 64. Lock 30: view of chamber from upper gates

Photo 65. Lock 30: west wall from upper gates showing concrete deterioration and exposure of stone backup

Photo 66. Lock 30: east wall from upper gates showing delamination

Photo 67. Lock 30: view looking south showing east wall and replaced coping on west wall

Photo 68. Lock 30: east wall, upper gate recess and culvert inlet

Photo 69. Lock 30: west wall, upper gate recess

Photo 70. Lock 30: breast wall

Photo 71. Lock 30: east wall and lower gate recess

Photo 72. Lock 30: east wall, lower end, note indentation for former bridge

Photo 73. Lock 30: southeast wing wall

Photo 74. Lock 30: wasteway

Photo 75. Lock 30: towpath bridge over feeder

## Lock No. 31 or Lonesome Lock, Station 1069+76

Location

Lock No. 31, also known as "Lonesome Lock" due to its relatively remote location, is located 1.2 miles north of State Route 303 and the village of Peninsula, and 1.2 miles south of the village of Boston (Figures 73 and 74). It lies midway between Mile Markers 22 and 23. Lock No. 31 had a lift of 10 feet. Construction was complete by spring 1827. There were documented repairs in 1828, 1859, 1886, 1887, and 1902. The lock was rebuilt with concrete in 1905-1906 and abandoned in 1913.

Previous Documentation

The 1993 draft HSR describes Lock No. 31 as being in fair condition at that time:

> The concrete is in fair condition. While horizontal cracking, spalling and efflorescence exists, deterioration of the concrete face has not resulted in exposure of the rough sandstone back-up. There is, however, a significant vertical crack at the west wall within the lower gate chamber. Erosion of adjacent soil has exposed a small area of the rubble back-up along the west lock wall. The masonry breast wall and one course of the lower masonry are visible. Joints are open with mortar deeply eroded.
>
> The most significant loss of concrete is on the southwest wing wall. The concrete back face of the southeast wing wall is exposed. Both north wing walls are constructed of masonry and, while joint deterioration is prevalent, these walls appear to be relatively stable.
>
> The lock culvert inlet is discernible and a metal sleeve penetrates the top of the lock wall. A portion of the culvert discharge is also visible. Indentations which received the ends of the bumping beam are apparent. Metal pins protrude from the top surface of the lock wall and an indentation of the goose neck is visible at all four locations where a gate was secured. A segment of the goose neck anchor strap remains at the southeast.
>
> The encroachment of vegetation is rather limited. Moss is prevalent along the deteriorated top surface of the lock walls and a tree is growing within the upper gate chamber immediately adjacent to the breast wall.
>
> Historic data suggests that a tumble was not constructed within the regulating weir of this structure. There is, however, a large pile of sandstone blocks covered with dense vegetation located to the east of the lower portion of the lock chamber.[247]

247. Cossell, *Ohio and Erie Canal*, 82-83.

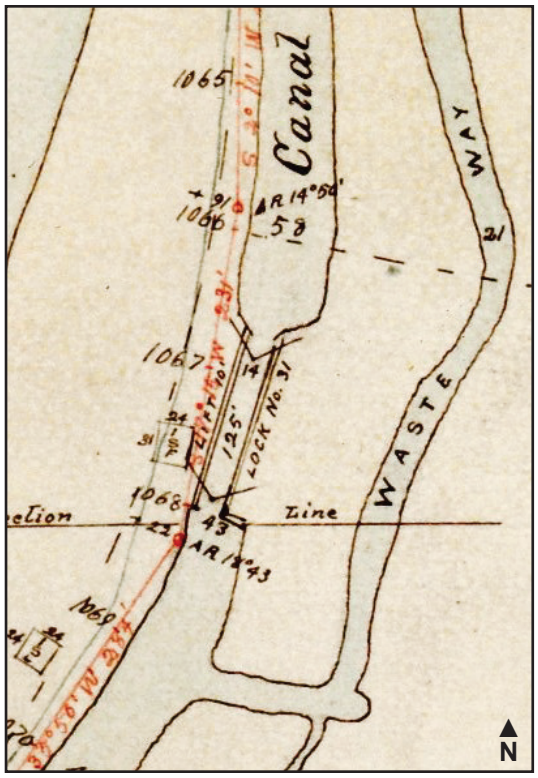


Figure 73. Survey map of Lock No. 31, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

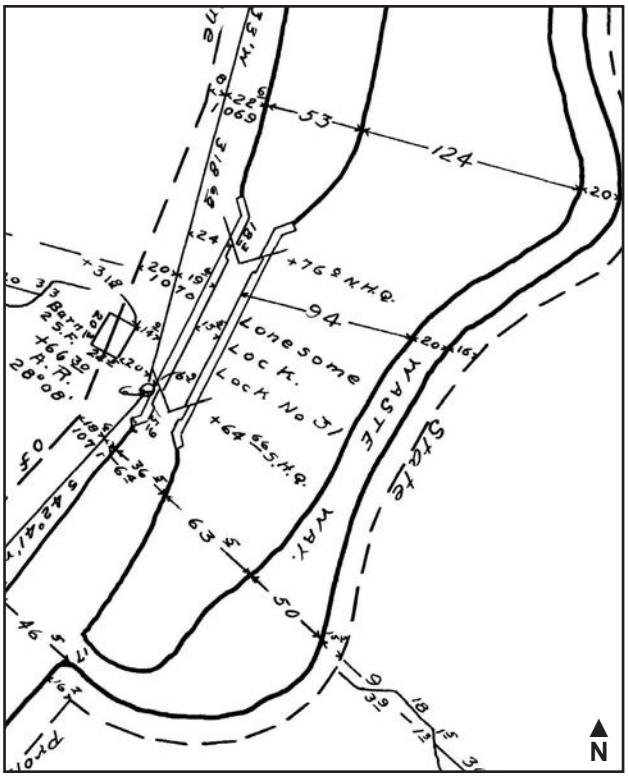


Figure 74. Survey map of Lock No. 31, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Lock No. 31 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0024-04. It is #011159 in the Park's List of Classified Structures.

Existing Conditions

Lock No. 31 remains in fair condition today although there seems to be some additional concrete deterioration since 1993 (Photos 76 and 77). Significant concrete repairs were made to Lock No. 31 after 1993, including the replacement of some of the coping at the top of both lock walls and stabilization of the south wing walls, which were extremely deteriorated (Photos 78 and 79). This work was guided by the philosophy that repairs should be made in-kind but should be easily distinguishable from the historic fabric.

The upper gate recesses appear to be in the same condition as in 1993 with 90 percent delamination in the southeast recess (Photos 80 and 81), and indentations for the goose necks are still visible in the top coping. The breast wall is barely visible above the marsh vegetation that fills the lock chamber but appears to be in good condition. The lower gate recesses exhibit about 50 percent delamination (Photos 82 and 83). The remainder of the walls also exhibit significant delamination and cracking, and multiple vertical cracks were observed, in contrast to the single vertical crack noted in 1993. The masonry north wing walls are in good condition except for some open joints between stones (Photos 84 and 85). Except for the marsh grass growing in the chamber, invasive vegetation does not appear to be an issue at present. A massive tree stump within the lock adjacent to the southwest gate recess however indicates that it has been in the past (Photo 86).

Although there is no tumble at Lock No. 31 the waste way is in relatively good condition. It continues downstream to Stumpy Basin.

Photo 76. Lock 31: overview of lock looking northeast

Photo 77. Lock 31: overview of chamber from lower end, looking southwest, note indentation for goose neck in coping

Photo 78. Lock 31: southeast wing wall showing repairs

Photo 79. Lock 31: southwest wing wall showing repairs

Photo 80. Lock 31: view of east wall, upper gate recess and culvert inlet in 1993

Photo 81. Lock 31: view of east wall, upper gate recess and culvert inlet in 2017

Photo 82. Lock 31: east wall, lower gate recess

Photo 83. Lock 31: west wall, lower gate recess

Photo 84. Lock 31: northwest wing wall

Photo 85. Lock 31: northeast wing wall

Photo 86. Lock 31: view looking north from upper gates, note tree stump

**Lock No. 32 or Boston Lock, Station 997+60**

Location

Lock No. 32 is located at the village of Boston, approximately 800 feet north of Boston Mills Road between Mile Markers 21 and 22 (Figures 75 and 76; Photo 87, compare with Figure 20). It had a lift of 8 feet. Construction was complete by spring 1827, and there were documented repairs in 1828, 1859, 1881, 1886, 1887, 1892, 1899, and 1902. The lock was rebuilt with concrete in 1905-1906 and abandoned in 1913. When the towpath trail was constructed in the early 1990s, a wooden bridge was installed across the lower end of the lock chamber.

Previous Documentation

According to the 1993 draft HSR Lock No. 32 was badly deteriorated (Photo 88):

> The concrete face is in poor condition. Large areas have spalled and, in some cases, a limited portion of the rough sandstone back-up is exposed. While areas of the finish surface remain, generally at the wing walls, some of this fabric is delaminated from the inner concrete. The masonry breast wall and one to two courses of the lower masonry are visible. Joints are open with mortar deeply eroded. Areas of the stonework have been improperly repointed; mortar extends far beyond the limits of the joints.
>
> There are significant vertical cracks indicative of movement at the southern wing walls and erosion of adjacent soil has exposed the concrete back face of the southwest wing wall. A small area of the northeast wing wall is undermined.
>
> The lock culvert inlet is discernible and a metal sleeve penetrates the top of the lock wall. On the southeast wall, an indentation which received the end of a bumping beam is visible. Metal pins protrude above the top surface of the lock wall where the upstream east gate was secured to the lock.
>
> The encroachment of vegetation is most severe at the masonry breast wall and the deteriorated top surface of the walls. Random clusters of plants have taken hold in areas where deterioration has created a ledge.
>
> A tumble of standard construction is located to the east. The concrete is in fair condition. Deterioration is limited to surface-related concerns.[248]

Lock No. 32 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0053-04. It is #011161 in the Park's List of Classified Structures.

248. Cossell, *Ohio and Erie Canal*, 80-81.

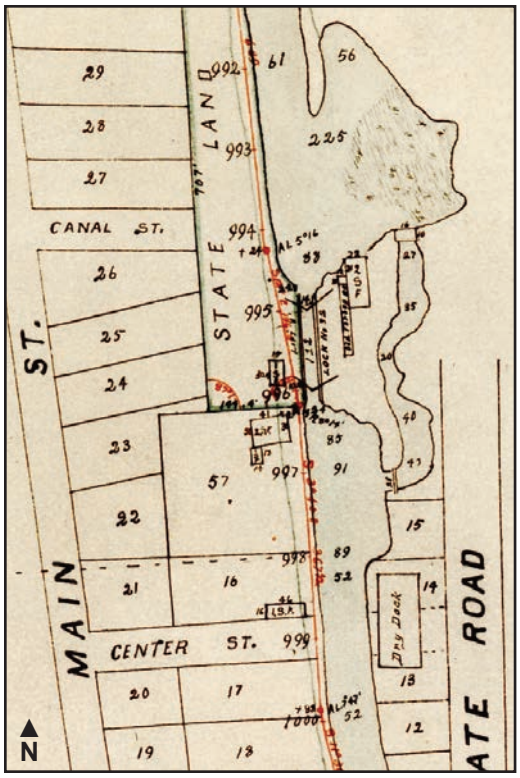


Figure 75. Survey map of Lock No. 32, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

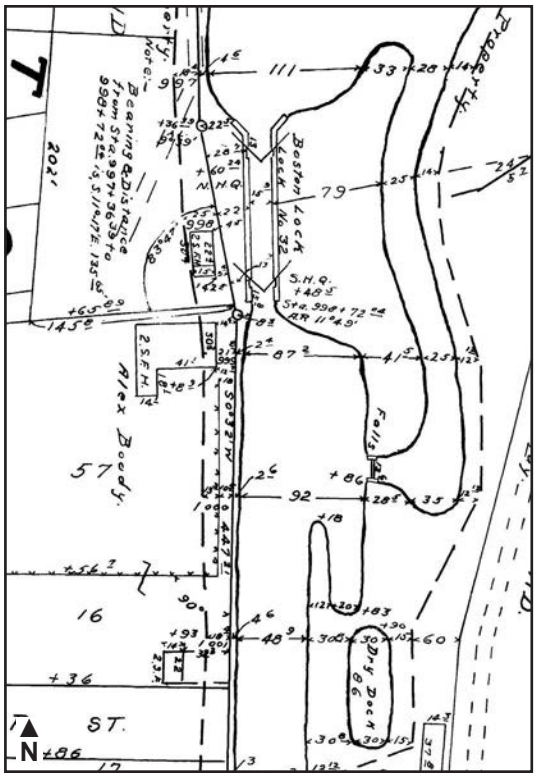


Figure 76. Survey map of Lock No. 32, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 87. Lock 32: overview of lock chamber from upper gates, looking south

Photo 88. Lock 32: view of lock chamber in 1993, looking north

Existing Conditions

In 1996 the National Park Service performed badly-needed site improvements and repairs at Lock No. 32, including removal of vegetation, installation of new concrete coping on both chamber walls, and minor concrete repairs to the walls (Photos 89 and 90). These repairs are documented in the Park's Resource Management Division files.[249] As at Lock No. 31 the work was guided by the philosophy that repairs should be made in-kind but should be easily distinguishable from the historic fabric.

Despite these repair efforts, the 2017 field survey indicated that serious structural problems persist. Delamination of the surface concrete on both chamber walls is approximately 90 percent, and the stone backup is visible in several locations (Photos 91 and 92). There are multiple vertical cracks in the chamber walls indicative of movement (Photo 93). The exposed masonry at grade have open joints between stones as noted in the 1993 draft HSR. Three of the wing walls exhibit major vertical cracks at their junction with the chamber walls (Photos 94 and 95). The gate recesses have extensive surface delamination but otherwise are in relatively good condition, and the culvert inlet in the southeast recess is visible and intact (Photo 96). Replacement of the concrete coping destroyed all vestiges of the goose necks and pins used to secure the gates. The top course of masonry in the breast wall is visible, but the condition of the wall cannot be assessed without excavation.

Vegetation is a serious issue at Lock No. 32. Although conditions were relatively good during the field survey in the late fall of 2017, in July 2018 the chamber was choked with vegetation, and there was extensive growth of vines on the walls (Photos 97 and 98). This condition will continue to cause significant long-term damage if not addressed.

To the southeast of the lock is a relatively well-preserved concrete tumble, but the bypass channel is badly eroded (Photos 99 and 100). The waste way empties into a large basin at the lower end of the lock.

249. Memos dated September 24, 1996 and October 31, 1996, Lock 32, Cuyahoga Valley National Park, Resource Management Division files.

Photo 89. Lock 32: coping replacement on west wall, looking north

Photo 90. Lock 32: coping repairs on east wall, looking north

Photo 91. Lock 32: south end of lock, looking northeast

Photo 92. Lock 32: overview of chamber from lower gates, note concrete repairs

Photo 93. Lock 32: northeast wing wall

Photo 94. Lock 32: southeast wing wall

Photo 95. Lock 32: southwest wing wall

Photo 96. Lock 32: east wall, upper gate recess and culvert inlet

Photo 97. Lock 32: overview of chamber from lower gates, July 2018, note heavy vegetation growth (compare with Photo 92)

Photo 98. Lock 32: west wall, July 2018, showing heavy vegetation growth

Photo 99. Lock 32: tumble

Photo 100. Lock 32: tumble

**Lock No. 33 or Wallace Lock/Lost Lock, Station 958+28**

Location

Lock No. 33, historically known as "Wallace Lock" or "Lost Lock," is located midway between Highland and Boston Mills Roads, 1.0 mile south of the former and 0.9-mile north of the latter (Figures 77 and 78). It had a lift of 7 feet. Construction was completed in 1827, and repairs were made in 1828, 1859, 1881, 1882, and 1892. The lock was rebuilt with concrete in 1905-1906 (see Figure 21), and the tumble was lowered in 1908. Lock No. 33 was abandoned in 1913.

Previous Documentation

Lock No. 33 was very badly deteriorated when documented in the 1993 draft HSR:

> The concrete face is in extremely poor condition. Deterioration has resulted in a significant loss of historic fabric. While small isolated patches of the finish surface remain, generally along the top of the walls, without exception this fabric is delaminated from the inner concrete. The balance of the surface is spalled, and large areas of the rough sandstone back-up have been exposed by the complete degradation of the concrete face.
>
> There are areas of severe deterioration where virtually all fabric is missing and only a limited amount of rubble remains. Missing elements include the following: the entire wing wall and a portion of the gate chamber at the northeast, and a section of the west wall which encompasses portions of the wing wall and the lower gate chamber. The entire wing wall, a portion of the gate chamber, and the tumble at the southeast are also likely missing, although some remaining fabric may be obscured by dense vegetation. In all instances, the adjacent walls are undermined by the loss of lower fabric. Due to a significant accumulation of earth and organic material within the chamber, the breast wall is not visible.
>
> The segment of the northwest wing wall which remains is in poor condition; virtually all of the concrete face is missing, erosion of adjacent soil has exposed the back face of the rubble back-up, and the remaining fabric is undermined. Erosion of adjacent soil has also exposed the concrete back face of the southwest wing wall.
>
> The encroachment of vegetation is severe. The deteriorated top surface of walls are supporting the growth of grass. Vines and other vegetation with invasive root systems are prevalent, especially where the rubble back-up is exposed. A tree and numerous large shrubs are growing within the lock chamber.[250]

250. Cossell, *Ohio and Erie Canal*, 78-79.

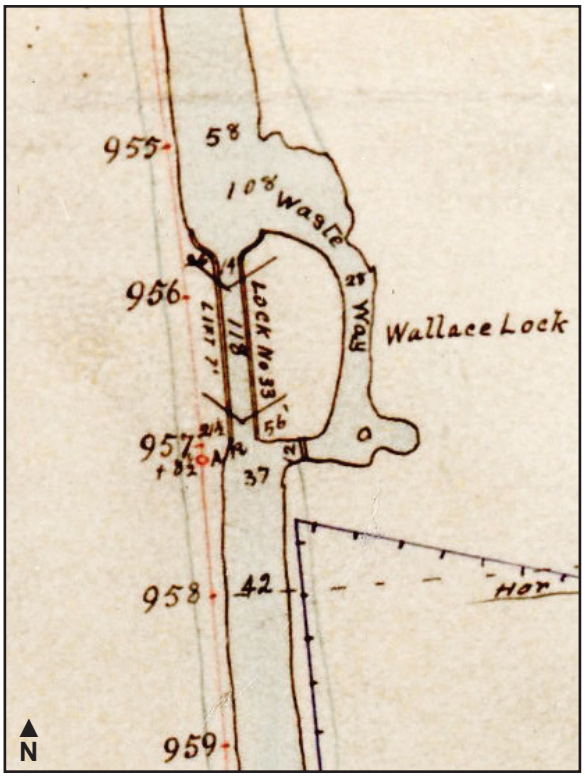


Figure 77. Survey map of Lock No. 33, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

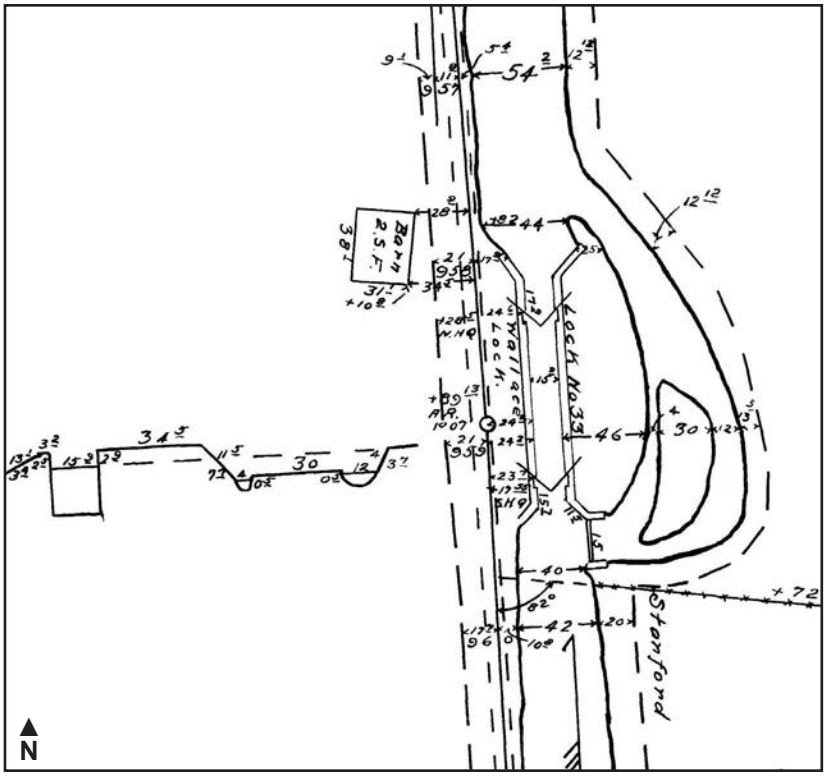


Figure 78. Survey map of Lock No. 33, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Lock No. 33 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0028-01. It is #011162 in the Park's List of Classified Structures.

Existing Conditions

No repairs have been made to Lock No. 33 since 1993, and its deterioration has continued unabated (Photos 101-109). All the conditions described in 1993 still apply today except that the tree and large shrubs growing in the lock chamber are gone. The immediate vicinity of the lock is kept mowed, but very dense vegetation obscures the tumble and waste way if they exist. With the exception of Locks Nos. 24 and 25, which were partially destroyed by highway construction, Lock No. 33 is in the poorest condition of all locks in the Park.

Photo 101. Lock 33: overview of lock in 1993, looking south

Photo 102. Lock 33: lower gate recess in 1993 showing extreme deterioration

Photo 103. Lock 33: view looking north from upper gates

Photo 104. Lock 33: view looking south from lower gates

Photo 105. Lock 33: deteriorated coping on east wall

Photo 106. Lock 33: view looking north from upper gates

Photo 107. Lock 33: east wall showing exposed stone backup

Photo 108. Lock 33: southeast wing wall

Photo 109. Lock 33: west wall, upper gate recess

**Lock No. 34 or Red Lock, Station 906+16**

Location

Lock No. 34 or "Red Lock" is located immediately to the north of Highland Road and is visible from the roadway (Figures 79 and 80). There is convenient access from a trailhead to the east. This lock had a lift of 9 feet. Construction was completed in 1827, and repairs were made in 1828, 1859, 1882, 1887, 1892, 1893, and 1895. The lock was rebuilt with concrete in 1906, and the tumble was lowered in 1908. Lock No. 34 was abandoned in 1913. Highland Road formerly passed just north of the lock but has been rerouted to the south. An early 20th century single-span concrete bridge that once carried Highland Road over the lock's waste way is still extant and now carries an access trail.

Previous Documentation

The 1993 draft HSR reported:

> The concrete face is in poor condition. While isolated areas of the finish surface remain, without exception this fabric has delaminated from the inner concrete. The balance of the surface is spalled. Vertical and horizontal cracking are apparent. Complete deterioration of the concrete face has resulted in numerous areas of exposed rough sandstone back-up, but is most severe at the south wing walls. The masonry breast wall is visible and joints are open with mortar deeply eroded.
>
> Although severely deteriorated, the steel channel remains on the concrete miter sill. There are no wing walls to the north; these were likely removed during improvements to Highland Road which once ran immediately north of the lock. While concrete wing walls remain to the south, significant vertical cracks indicative of movement have developed.
>
> The lock culvert inlet is visible and a metal sleeve protrudes from the top surface of the lock wall. Indentations which received the ends of bumping beams are apparent. Metal pins protrude above the top surface of the lock walls where the upper gate was secured to the lock.
>
> Erosion of adjacent soil has resulted in a significant exposure of the back face of the east wall. Large areas of sandstone back-up are exposed along the northern portion. The encroachment of vegetation is most severe at the southern portion of the lock. The vertical crack in the wing walls and areas of exposed sandstone back-up are supporting the growth of vines and other vegetation with invasive root systems. Stumps remain, both within the chamber and immediately adjacent to the lock walls, where trees have recently been removed.

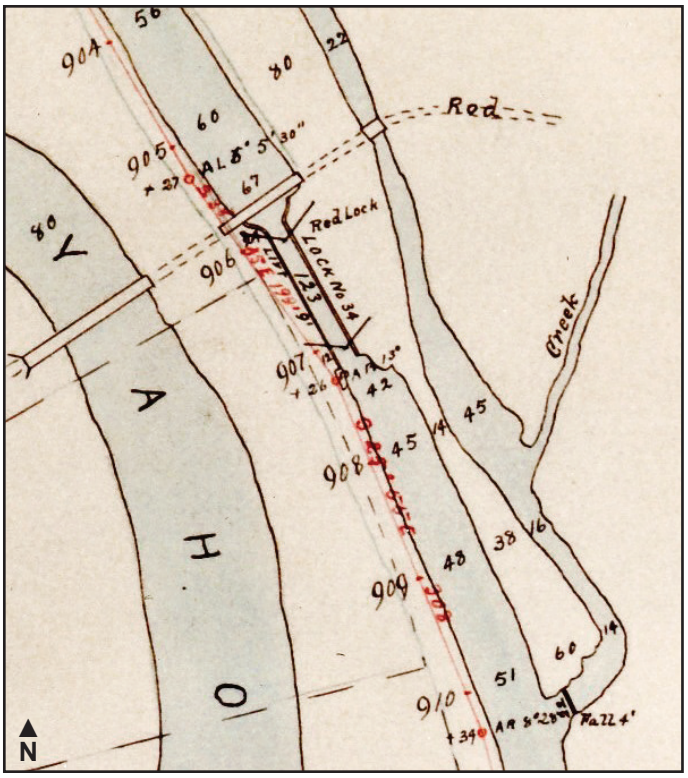


Figure 79. Survey map of Lock No. 34, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

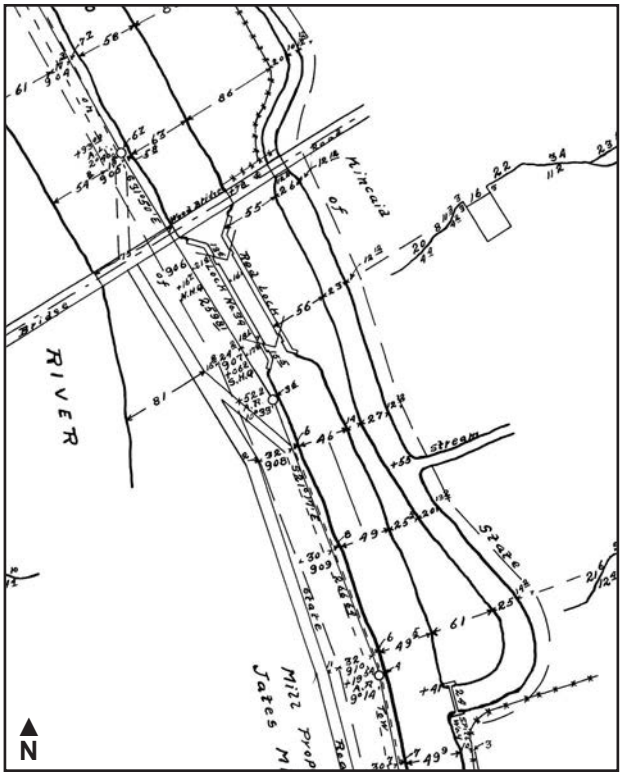


Figure 80. Survey map of Lock No. 34, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

> The tumble, located to the south of Highland Road, is in extremely poor condition. The concrete sections which remain standing are severely deteriorated.[251]

Lock No. 34 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0044-01. It is #011163 in the Park's List of Classified Structures.

Existing Conditions

No notable repairs have been made to Lock No. 34 since 1993, and the description presented in the draft HSR still applies, although invasive trees and some vegetation have been removed from the lock chamber and walls (Photos 110-117). Vegetation however is still a serious issue at this lock and needs to be better controlled through routine maintenance (Photos 118 and 119). Deterioration of the concrete and masonry has continued unabated since 1993, and the walls remain in poor condition especially at the north end, where the stone backup is completely exposed and the mortar is crumbling, leaving open joints between the stones where vines and other vegetation can get a foothold.

251. Cossell, *Ohio and Erie Canal*, 76-77.

Photo 110. Lock 34: view of lock chamber in 1993, looking south

Photo 111. Lock 34: view of lock chamber in 2017, looking south

Photo 112. Lock 34: view of lock chamber from upper gates, looking north

Photo 113. Lock 34: breast wall and upper gate recess, July 2018

Photo 114. Lock 34: east wall, upper gate recess and culvert inlet

Photo 115. Lock 34: southwest wing wall showing delamination

Photo 116. Lock 34: north end of east wall

Photo 117. Lock 34: north end of west wall

Photo 118. Lock 34: overview of chamber in July 2018, showing heavy vegetation growth

Photo 119. Lock 34: north end of east wall in July 2018, showing vegetation growth

**Lock No. 35 or Whiskey Lock/Kettlewell Lock, Station 812+30**

Location

Lock No. 35, historically known as "Whiskey Lock" or "Kettlewell Lock," is located approximately 0.75-mile south of Station Road between Mile Markers 17 and 18 (Figures 81 and 82). This lock had a lift of 9 feet. Construction was completed in 1827, and repairs were made in 1828, 1859, and 1892. The lock was rebuilt with concrete in 1906, and the tumble was rebuilt in 1909. Lock No. 35 was abandoned in 1913.

Previous Documentation

Lock No. 35 was in overall poor condition when it was documented in the 1993 draft HSR:

> The concrete face is in poor condition. Although random areas of the finish surface remain, the majority of this fabric has delaminated from the inner concrete. The balance of the surface is spalled; vertical cracks and subsequent erosion are apparent. Complete deterioration of the concrete has resulted in exposure of the rough sandstone back-up at the northwest wing wall and the east wall of the lower gate chamber. The exposed back-up at the east is undermined. Due to the accumulation of organic material within the lock chamber, the breast wall is not visible.
>
> The southwest wing wall has a severe vertical crack indicative of movement. The northeast wing wall is constructed of masonry and the joints are open with mortar deeply eroded.
>
> A portion of the lock culvert inlet is discernible and a metal sleeve protrudes above the top surface of the lock wall. With the exception of the northeast, metal pins are visible at locations where a gate was secured to the lock wall. An indentation of the goose neck is apparent at both south locations; a portion of the goose neck anchor strap remains at the southeast.
>
> Erosion of adjacent soil has resulted in exposure of the back face of both south wing walls and a small portion of the west chamber wall. The majority of exposed material is concrete. The encroachment of vegetation is generally limited to areas where deterioration has created a ledge and the top surface of the lock walls. Trees adjacent to the walls outside the chamber have been removed.[252]

Lock No. 33 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0043-01. It is #011164 in the Park's List of Classified Structures.

252. Cossell, *Ohio and Erie Canal*, 74-75.

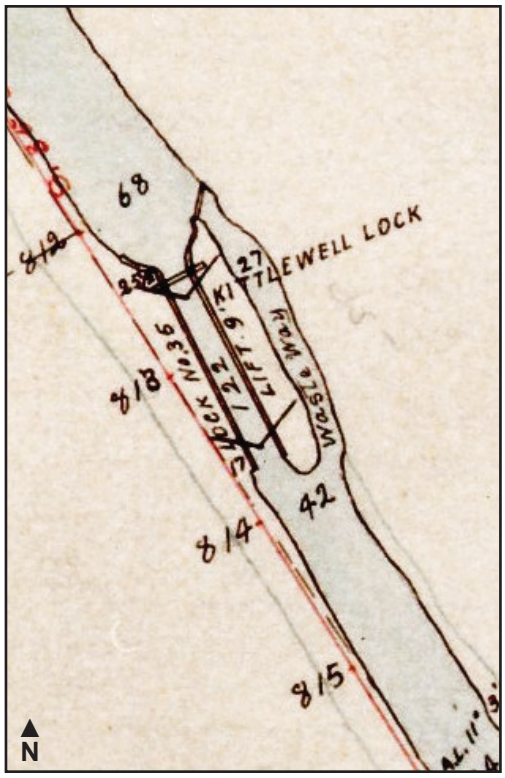


Figure 81. Survey map of Lock No. 35, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

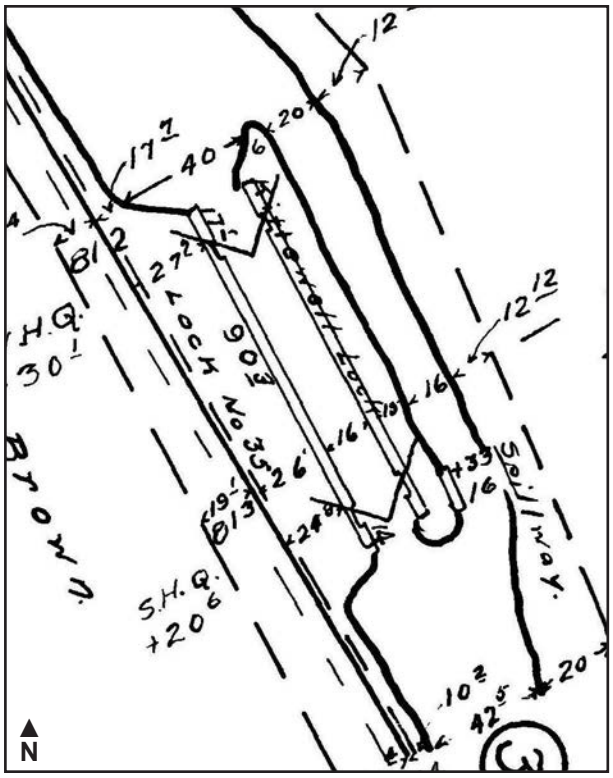


Figure 82. Survey map of Lock No. 35, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Existing Conditions

The condition of Lock No. 35 appears to have deteriorated somewhat since it was last documented in 1993, although the vegetation is now well-controlled through routine maintenance (Photos 120-122). The chamber walls and three of the four wing walls are in poor condition. Delamination of the surface concrete is at least 80 percent, and the stone backup is exposed at several locations (Photos 123-128). There are multiple large vertical cracks indicative of movement (Photo 129). The northeast wing wall is constructed of cut stone and is in better condition (see Photo 121). The backs of the wing walls are exposed by erosion as noted in 1993. The coping at the top of the west wall is in very poor condition, but on the east wall it is more intact and retains the metal pins and part of the goose neck where the gates were attached at the southeast gate recess (Photo 130). Pins and indentations for goose necks also survive at other corners as noted by Cossell in 1993. The chamber is filled with sediment to within four feet of the top of the walls, and the breast wall is buried. The culvert inlet at the southeast gate recess is visible but extremely deteriorated. The concrete tumble is barely visible in the vegetation to the southeast of the lock, but the waste way is apparent (Photo 131).

Photo 120. Lock 35: view of lock chamber in 1993, looking south

Photo 121. Lock 35: view of lock chamber in 2017, looking south

Photo 122. Lock 35: overview of lock chamber from upper gates, looking north

Photo 123. Lock 35: southeast wing wall

Photo 124. Lock 35: east wall, upper gate recess and culvert inlet

Photo 125. Lock 35: west wall, upper gate recess, showing delamination

Photo 126. Lock 35: detail view of west wall

Photo 127. Lock 35: east wall showing exposed stone backup

Photo 128. Lock 35: east wall, note large vertical cracks

Photo 129. Lock 35: west wall, note large vertical cracks

Photo 130. Lock 35: goose neck hardware and metal sleeve at gate

Photo 131. Lock 35: wasteway

## Lock No. 36 or Pinery Lock/17-Mile Lock, Station 763+43

Location

Lock No. 36, located at the southern end of the Pinery Narrows and less than 0.25-mile north of Station Road, is situated immediately south of where the watered portion of the canal begins (Figures 83 and 84). The Pinery Feeder, which passes water from the Cuyahoga River to the canal, is situated to the east and runs approximately parallel with the lock; the outlet from feeder to canal is adjacent to the north end of the lock and is spanned by a pedestrian bridge that carries the towpath trail.

Lock No. 36 was completed in 1827, and documented repairs were made in 1828, 1859, 1893, 1898, and 1902. In 1905-1906 the lock was reconstructed using concrete, and in 1913 it was abandoned. Most of Lock No. 36 was filled in when the Route 82 High-Level Bridge was constructed in 1931. Only the northwest wing wall and a portion of the top coping of the west lock chamber wall are visible, but presumably the rest of the lock remains intact below grade. The northwest wing wall now serves as the south abutment for the pedestrian trail bridge.

Previous Documentation

The 1993 draft HSR states: "The northwest wing wall is entirely exposed. The concrete surface of the north face is in relatively good condition. Visual indications of deterioration are limited to surface- related concerns such as horizontal cracking, spalling and efflorescence...The back south face of the wing wall, however, is also exposed. This face consists of sandstone rubble with weak mortar and was not designed to resist weathering. Joint deterioration is prevalent and the encroachment of vegetation is relatively severe."[253]

Lock No. 36 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-3252-01. It is #011165 in the Park's List of Classified Structures.

Existing Condition

Since it is almost completely buried, the overall condition of Lock No. 36 is impossible to assess without archeological investigation, but the condition of the small portion that is visible does not appear to have changed since 1993 (Photos 132-134).

253. Cossell, *Ohio and Erie Canal*, 73.

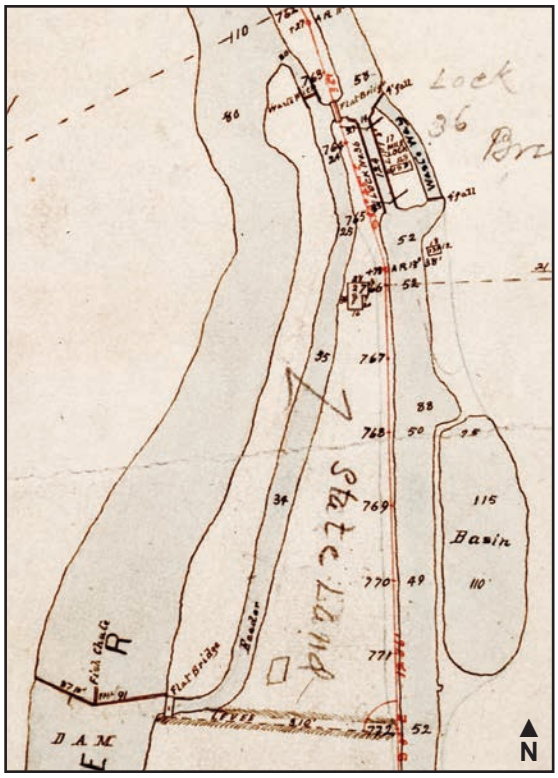


Figure 83. Survey map of Lock No. 36, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

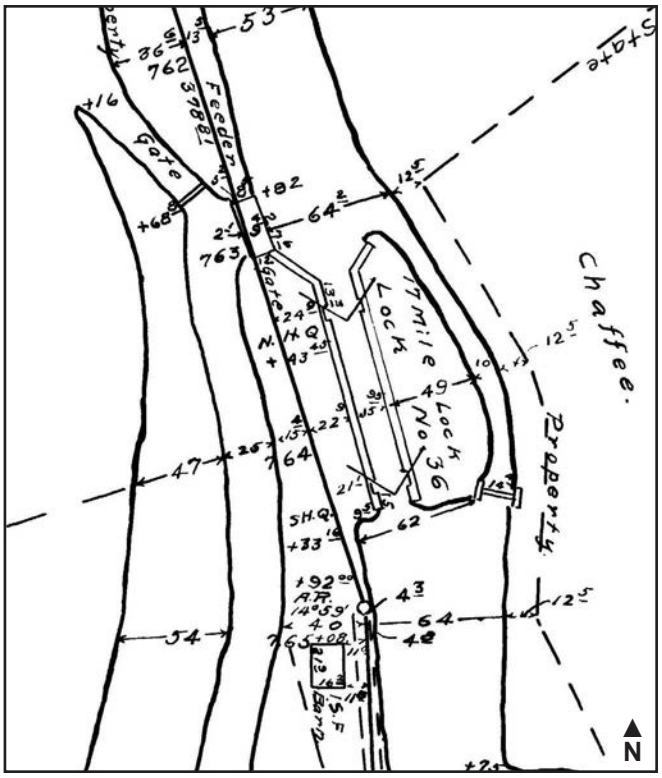


Figure 84. Survey map of Lock No. 36, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 132. Lock 36: view of northwest wing wall in 1993

Photo 133. Lock 36: overview of northwest wing wall and pedestrian bridge

Photo 134. Lock 36: detail view of northwest wing wall

## Lock No. 37 or 14-Mile Lock, Station 611+46

Location

Lock No. 37, also known as "14-Mile Lock" based on its distance from the northern terminus of the Ohio and Erie Canal in Cleveland, is located immediately southwest of the intersection of Fitzwater and Canal Roads on the watered section of canal (Figures 85 and 86). About 2010 the culvert and bridge carrying Fitzwater Road over the canal and waste way were replaced by new structures farther to the north, but the old concrete culvert was left in place. The historic Alexander/Wilson Mill is located immediately southeast of the lock; the waste way is integrated into the mill's water-power system, which is no longer functional (Figure 87). A still-functional flood gate is located a short distance south of the lock.

Lock No. 37 had a lift of 8 feet. Construction was completed in 1827, and documented repairs were made in 1828, 1859, 1887, 1893, 1895, and 1896. In 1905-1906 the lock was reconstructed using concrete. It was abandoned for navigational purposes after the 1913 flood but continued to carry water under the terms of the state's hydraulic lease to the American Steel and Wire Company. Undocumented periodic repairs may have been made between 1913 and 1992, but these could have been limited to the waste way and tumble.

Previous Documentation

In 1986 Lock No. 37 was recorded to the standards of the Historic American Engineering Record, including large-format photography and measured drawings (see Figure 52).

Lock No. 37 was in fair condition when it was documented in 1991 prior to preparation of the 1993 draft HSR.[254] While the lower stone masonry portion of the lock was generally in good condition, the upper portion of the west wall was badly deteriorated with stone backup visible, and the southeast gate recesses were severely eroded. There was no southwest wing wall, but instead there was steel piling that continued to the nearby flood gate. There was a large mound of silt in the middle of the chamber (Photo 135). Remnants of the gate posts and even the lower portions of the gates themselves survived at all four corners (Photo 136).

Lock No. 37 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation CUY-0463-19. It is #011168 in the Park's List of Classified Structures.

Existing Conditions

After the 1993 draft HSR, the National Park Service performed interim water control measures in 1994. The upper gates had deteriorated to such an extent that they no longer regulated the water flow, so water constantly flowed through the lock. The project removed salvageable historic fabric from upper gate area and placed it in storage, then installed wide

254. Savitra Henry, Field notes dated August 21, 1991, Lock 37, Cuyahoga Valley National Park, Resource Management Division files.

Figure 85. Survey map of Lock No. 37, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

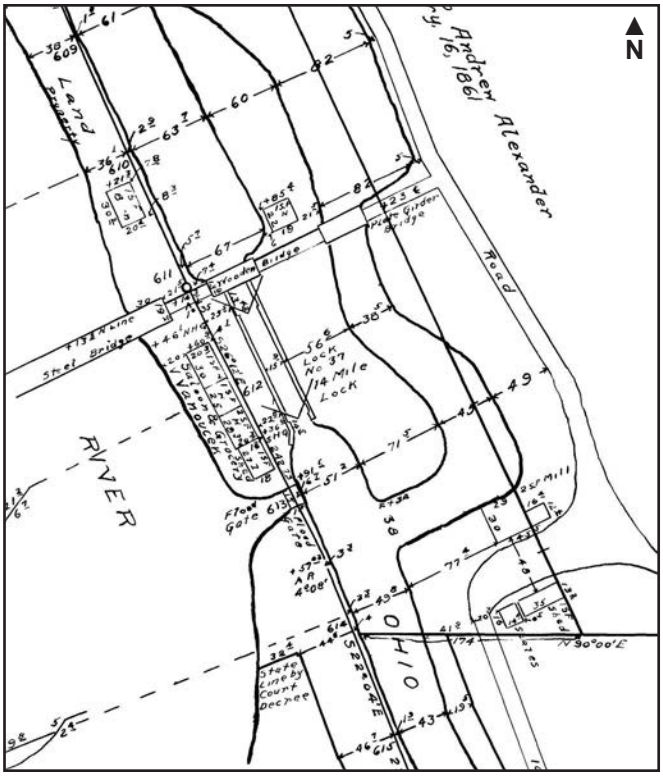


Figure 86. Survey map of Lock No. 37, from *Map of the Ohio Canal, Cuyahoga County, Ohio,* G.W. Silliman, 1912, retraced 1916

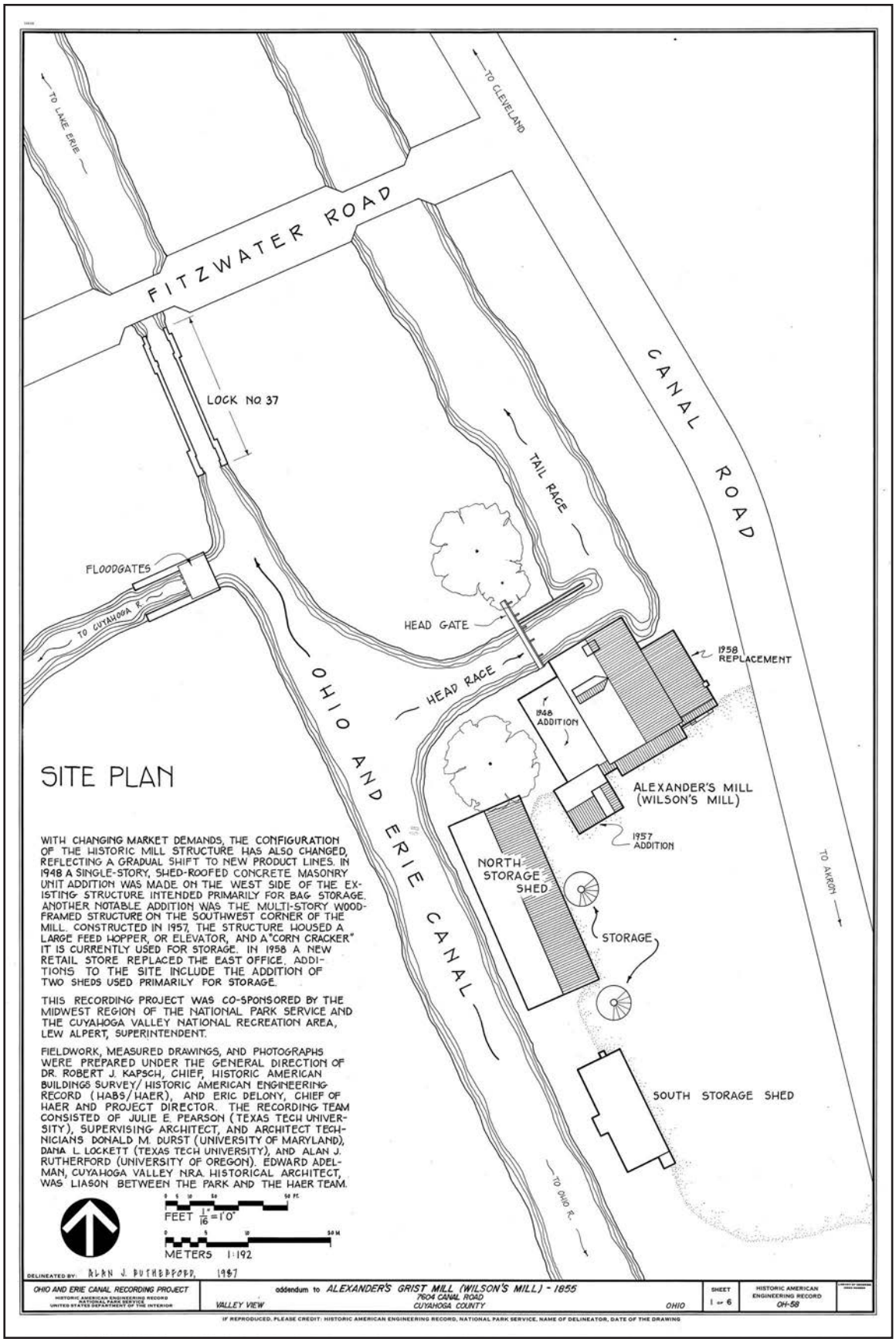


Figure 87. Site Plan, Alexander's Grist Mill (Wilson's Mill) (*Source:* Historic American Engineering Record, National Park Service. Alan J. Rutherford, Delineator, 1987)

Photo 135. Lock 37: overview of lock from lower gates in 1993

Photo 136. Lock 37: breast wall and upper gates in 1993

flange sections and stop logs on top of the breast wall to direct water away from the lock into the waste way. This action restored the water flow and raised the water level between Locks Nos. 36 and 37 to a more historically appropriate depth.[255]

In 2016 a breach in the towpath occurred adjacent to the nearby flood gate, requiring emergency repairs to the surrounding area. Lock No. 37 was not damaged, but it was necessary to dredge the canal between the lock and flood gate and temporarily remove the stop logs at the upper end of the lock to facilitate water flow.[256]

Inspection of Lock No. 37 in November 2017 indicated that the lock remains in approximately the same condition as it was when documented in 1991 except for the subsequent alterations to the upper gate area and dredging of the chamber (Photos 137 and 138). It typically contains water. The lower portion of the walls, consisting of cut stone, are in good condition except for numerous open joints between stones; however the upper concrete portions exhibit numerous vertical and horizontal cracks as well as surface delamination that has exposed the stone backup in the middle of the west wall (Photo 139). Vines and other vegetation are rooted in the cracks and are a serious problem. The upper portions of the concrete walls show considerable efflorescence and staining (Photo 140). The concrete coping at the top of the west wall is extremely deteriorated and crumbling (Photo 141). The upper (south) gate recesses are in very poor condition; the southeast recess is completely delaminated, exposing wire reinforcement (Photo 142), while the southwest recess is eroded at and above the water line. A metal plate covers the culvert inlet, which is completely covered with silt (Photo 143). The goose necks still survive at both of the upper recesses. There are no wing walls at the upper end of the lock; instead there is a line of sheet piling between the lock and the flood gate as noted in 1991 (Photo 144). The breast wall is in good condition, and indentations in the chamber walls for the bumping beam are visible (Photo 145). The lower gate recesses are both in good condition, and remnants of the wooden gate posts as well as the goose neck hardware are intact (Photos 146 and 147).

The concrete culvert that formerly carried Fitzwater Road over the canal is located immediately north of the lower lock gates and utilizes the lock's wing walls as its abutments. The culvert was left in place when the road was relocated to avoid impacts to the lock. The wing walls are in good condition (Photos 148 and 149). The waste way is located east of the lock and is in good condition since it has been maintained in connection with the hydraulic lease to American Steel and Wire; portions of the cut stone abutment of the former Fitzwater Road Bridge over the waste way are intact (Photo 150). The concrete tumble is located adjacent to the Alexander/Wilson Mill and was an essential component of its water power system; it appears to be in good condition.

255. Assessment of Actions Having an Effect on Cultural Resources, Lock 37 (HS-121)-Interim Water Control, December 8, 1994, Cuyahoga Valley National Park, Resource Management Division files.
256. Categorical Exclusion Form, PEPC Project No. 64265, Lock 37 Spillway/Floodgate Rehabilitation and Towpath Trail Approach Repairs, May 31, 2016, Cuyahoga Valley National Park, Resource Management Division files.

Photo 137. Lock 37: view of east wall from upper gates

Photo 138. Lock 37: view of west wall from upper gates

Photo 139. Lock 37: detail view of west wall showing vertical and horizontal cracks

Photo 140. Lock 37: detail view of east wall showing breast wall and upper gates

Photo 141. Lock 37: detail view of west wall showing deterioration

Photo 142. Lock 37: south end of east wall showing exposed rebar

Photo 143. Lock 37: south end of west wall showing delaminated surface

Photo 144. Lock 37: upper gates looking southwest toward flood gate

Photo 145. Lock 37: breast wall and upper gates

Photo 146. Lock 37: east wall, lower gate recess, note gate post remnant and hardware

Photo 147. Lock 37: west wall, lower gate recess, note gate post remnant and hardware

Photo 148. Lock 37: north end of west wall, culvert formerly carried Fitzwater Road

Photo 149. Lock 37: culvert formerly carried Fitzwater Road, looking south

Photo 150. Lock 37: wasteway and abutment for former Fitzwater Road Bridge

**Lock No. 38 or 12-Mile Lock, Station 533+75**

Location

Lock No. 38, also known as "12-Mile Lock" based on its distance from the northern terminus of the Ohio and Erie Canal in Cleveland, is immediately south of the intersection of Hillside and Canal Roads on the watered section of canal (Figures 88 and 89). In the 20th century Hillside Road, historically well-removed from the lock, was realigned to the south and now crosses the canal and waste way just to their north. On the west side of the lock is a canal-era building that has been rehabilitated by the National Park Service to function as the Park's Canal Discovery Center (Photo 151).

Lock No. 38 had a lift of 8 feet. Construction was completed in 1827, and documented repairs were made in 1828, 1859, 1887, 1893, and 1896. In 1905-1906 the lock was rebuilt using concrete. It was abandoned for navigational purposes after the 1913 flood but continued to carry water under the terms of the state's hydraulic lease to the American Steel and Wire Company. Between 1913 and 1992 there were changes to the gates, balance beams, and spillway but no record of any improvements to the chamber.[257]

Previous Documentation and Restoration

In 1986 Lock No. 38 was recorded to the standards of the Historic American Engineering Record, including large-format photography and measured drawings (see Figure 53). In 1991-1992 it underwent a comprehensive restoration to its 1907 appearance by crews from the National Park Service's Williamsport Preservation Training Center (Photo 152). A desire to return Lock No. 38 to operating condition (and ultimately Locks Nos. 37 and 39 as well) was the guiding principal behind planning and restoration. Prior to this work all three locks were in similar condition. The PTC team documented existing conditions; removed and either reused or replicated hardware and wooden elements; applied a new surface layer of concrete to the walls; restored the internal culvert; and installed new gates and balance beams. Examination of concrete cores taken from the walls indicated that surface patching would be inadequate and it would be necessary to completely replace the entire surface layer, but the deeper layers of concrete were sound. Although the lock was dewatered during construction, crews maintained 18 inches of water in the chamber at all times in order to keep the wood flooring and foundation timbers submerged and preserved.[258]

In 1993 minor modifications were made to both the upper and lower gates to address leakage issues; adjustments included attaching steel sweeps to upstream side of each gate and neoprene strips acting as gaskets to the downstream side. Gates were adjusted via the goose necks to create a better seal. In a separate project, a crew from the Williamsport Training Center installed a new footbridge at the north end of the lock.[259]

257. Bobel, "The 1991-1992 Restoration of Lock 38," 37.
258. Bobel, "The 1991-1992 Restoration of Lock 38," 37-48; Cossell, *Ohio and Erie Canal*, 29.
259. Memo from Douglas C. Hicks to Rob Bobel Regarding Lock Gate Modifications at Lock #38, June 8, 1993; Memo from Don H. Castleberry to W. Ray Luce Regarding Proposed Construction of Foot Bridge at Lock #38, Cuyahoga Valley National Park, Resource Management Division files.

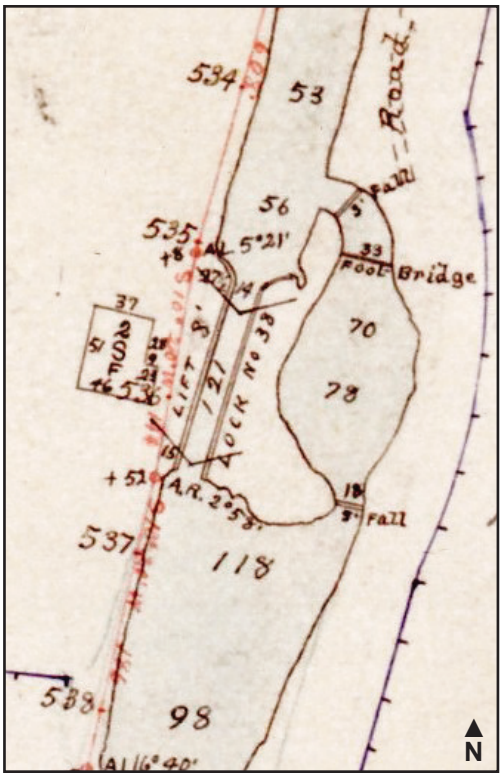


Figure 88. Survey map of Lock No. 38, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

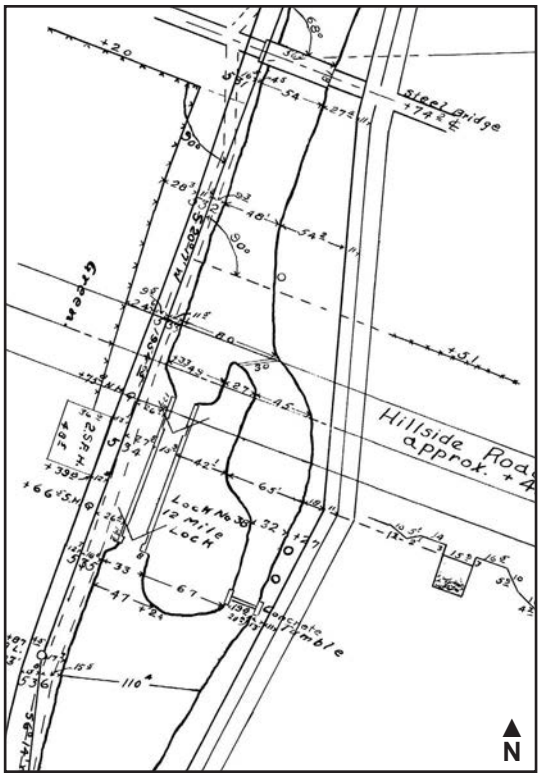


Figure 89. Survey map of Lock No. 38, from *Map of the Ohio Canal, Cuyahoga County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 151. Lock 38: overview of lock, looking south, Canal Exploration Center at right

Photo 152. Lock 38: reconstructed lock in 1993, looking south

Photo 153. Lock 38: overview of lock chamber in 2017, looking south

Lock No. 38 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation CUY-0461-19. It is #011173 in the Park's List of Classified Structures.

Existing Conditions

Twenty-six years after its restoration, Lock No. 38 is again showing its age. Below the high-water line, the concrete surface applied in 1991-1992 has delaminated, and there are both horizontal and vertical cracks throughout the surface of both chamber walls (Photos 153-155). Freeze/thaw cycles in winter are likely responsible since the walls above the water line are still in good condition. The masonry courses at the bottom of the walls are good except for open joints between some of the stones which need to be repointed. The breast wall and the upper gate recesses, as well as the gates themselves, are in good condition (Photos 156 and 157). The upper wing walls appear to be in good condition above the water line although they are eroded, and the surface is delaminated at their base (Photo 158). The lower gate recesses exhibit the same delamination and cracking as the chamber walls but otherwise are in good condition, as are the gates and other wooden components (Photo 159). The northeast wing wall is constructed of cut stone masonry and appears to be in excellent condition, but the concrete northwest wing wall exhibits spalling and cracking (Photos 160-162). Invasive vegetation is not a serious problem at the lock, but the same is not true for the adjacent concrete tumble, which is overgrown and covered with moss though otherwise in good condition (Photos 163-165).

Photo 154. Lock 38: west wall from lower gates

Photo 155. Lock 38: east wall from upper gates

Photo 156. Lock 38: breast wall and upper gates

Photo 157. Lock 38: upper gates

Photo 158. Lock 38: view from south

Photo 159. Lock 38: west wall, lower gates and gate recess

Photo 160. Lock 38: view from north, lower gates and wing walls

Photo 161. Lock 38: northeast wing wall

Photo 162. Lock 38: northwest wing wall

Photo 163. Lock 38: tumble and wasteway

Photo 164. Lock 38: tumble, spillway and side wall

Photo 165. Lock 38: tumble, spillway

## Lock No. 39 or 11-Mile Lock, Station 455+00

Location

Lock No. 39, also known as "11-Mile Lock" based on its distance from the northern terminus of the Ohio and Erie Canal in Cleveland, is located approximately 0.4-mile south of Rockside Road near the northern boundary of Cuyahoga Valley National Park (Figures 90 and 91). Lock No. 39 had a lift of 8 feet. The construction contract was re-let several times, but the lock was completed in 1827. Documented repairs were made in 1828, 1859, 1886, and 1892. In 1905-1906 the lock was reconstructed using concrete. It was abandoned for navigational purposes after the 1913 flood but continued to carry water under the terms of the state's hydraulic lease to the American Steel and Wire Company. In 1972 the company replaced the lock gates and repaired spalled concrete.[260]

Previous Documentation and Restoration

In 1986 Lock No. 39 was recorded to the standards of the Historic American Engineering Record, including large-format photography and measured drawings (Figure 92; also see Figure 54). The structure was in fair condition when it was documented in 1991 prior to preparation of the 1993 draft HSR (Photos 166 and 167).[261] While the lower stone masonry portions of the lock were generally in good condition, the upper concrete sections of both walls were badly deteriorated with extensive spalling, cracking, and surface delamination. The concrete coping on top of the walls was relatively intact on the east side but mostly missing on the west side. The breast wall and miter sill were in good condition, but the wooden components were about to collapse. The corners of the upper gate recesses were eroded and crumbling. The masonry foundation of the northeast wing wall exhibited signs of failure as individual stones had rotated out of alignment while the concrete portions of both lower wing walls were deteriorated. The steel bridge spanning the lower end was rusted and in urgent need of replacement.[262]

Lock No. 39 was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation CUY-0460-19. It is #011175 in the Park's List of Classified Structures.

Existing Conditions

The current condition of Lock No. 39 appears to be worse than its condition when last documented in the early 1990s, and there is no evidence of any structural repairs made in the interim other than replacement of the footbridge at the lower end (Photo 168). Vegetation is a problem at this lock, with numerous vines and small plants growing from cracks in the concrete and stonework.

260. Letter from Smith to Gienow (November 13, 1970).
261. Savitra Henry, Field notes dated August 20, 1991, Lock 39, Cuyahoga Valley National Park, Resource Management Division files.
262. Henry, Field notes dated August 20, 1991; Cossell, *Ohio and Erie Canal*, 29.

Figure 90. Survey map of Lock No. 39, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

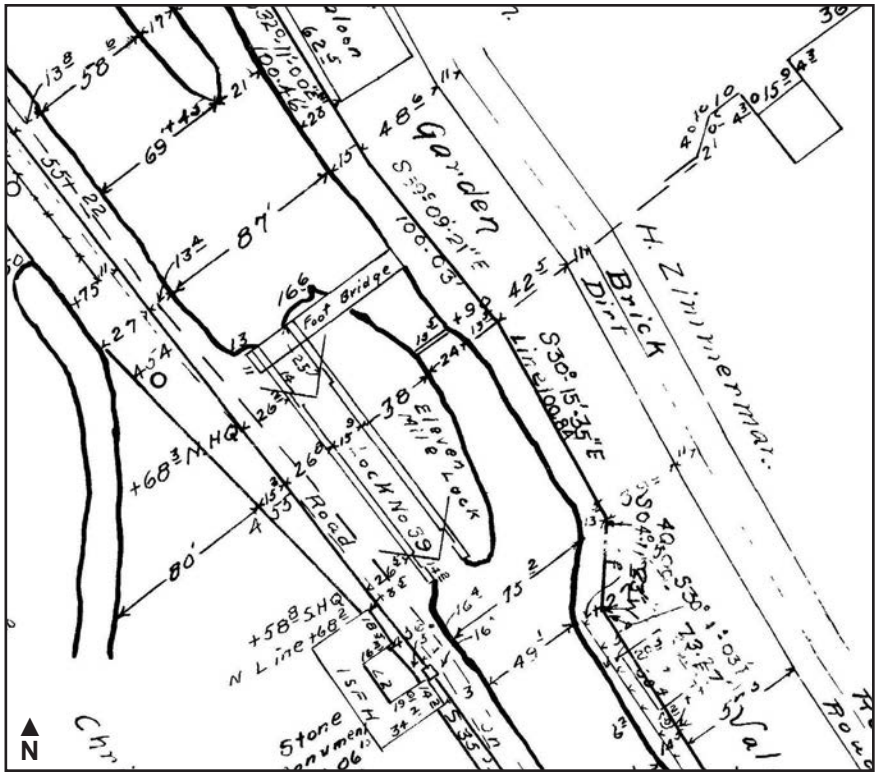


Figure 91. Survey map of Lock No. 39, from *Map of the Ohio Canal, Cuyahoga County, Ohio,* G.W. Silliman, 1912, retraced 1916

Figure 92. Lock No. 39 in 1986 (*Source:* Historic American Engineering Record, National Park Service, HAER No. OH-59)

Photo 166. Lock 39: overview of chamber from lower gates in 1993, looking south

Photo 167. Lock 39: view of wall and goose neck hardware in 1993

Photo 168. Lock 39: view from south

The east chamber wall is stone masonry to the height of the top of the breast wall and concrete above, while on the west wall the concrete extends nearly to the water line (Photos 169-171). The masonry portions appear to be structurally stable and are in relatively good condition except for open joints between stones where vines and other vegetation have found a foothold (Photo 172). Some areas of stonework have been repointed but the workmanship was poor, and the mortar extends far beyond the limits of the joints. The concrete surface is in poor condition with deep horizontal cracks, delamination, and spalling which extends nearly to the stone backup, although the backup is not yet exposed. In each wall there is a significant vertical crack near the lower gate recess. One change since 1993 is that the concrete coping is now missing from virtually the entire wall on each side. The breast wall is in good condition; as at Lock No. 37 an arrangement of vertical steel I-beams and horizontal planks has been installed on top of the breast wall to create a dam that directs water away from the lock into the waste way, restoring the water flow and raising the water level between Locks Nos. 38 and 39 to a historically appropriate depth (Photo 173). The upper gate recesses are mostly under water, but the visible part of the southwest recess exhibits a major horizontal crack in the concrete (Photo 174), and the south end of the east wall has suffered so much concrete loss that the stone backup is visible (Photo 175). The lower gate recesses are in somewhat better condition; both retain their goose neck hardware on the top of the wall, and the bottom part of the gate post is still in place though extremely deteriorated (Photos 176 and 177). The northwest recess is in reasonably good condition despite some spalling and delamination of the surface concrete, while the northeast recess is more severely deteriorated including major spalling of the edges of the pocket. The east wall between the gate recess and the wing wall is in very poor condition with stone backup exposed (Photo 178). In the northeast wing wall itself the foundation stones are out of alignment, as noted in the 1993 draft HSR, and the concrete surface of the upper wall is spalled and contains a horizontal crack (Photo 179). The northwest wing wall is in even worse shape including a significant vertical crack indicative of movement (Photo 180).

The concrete tumble is located adjacent to the north end of the lock (Photo 181). It seems to have been replaced fairly recently and appears structurally sound (Photos 182 and 183).

Photo 169. Lock 39: overview of chamber from lower gates, looking south

Photo 170. Lock 39: east wall from lower gates, looking southeast

Photo 171. Lock 39: west wall from lower gates, looking southwest

Photo 172. Lock 39: east wall at upper gates showing cracks, open joints, and delamination

Photo 173. Lock 39: breast wall and upper gates

Photo 174. Lock 39: west wall, south end, gate recess

Photo 175. Lock 39: east wall, south end, gate recess

Photo 176. Lock 39: west wall, north end, gate recess

Photo 177. Lock 39: east wall, north end, gate recess

Photo 178. Lock 39: view from north, wing walls

Photo 179. Lock 39: northeast wing wall

Photo 180. Lock 39: northwest wing wall

Photo 181. Lock 39: view from north, lock and tumble

Photo 182. Lock 39: tumble

Photo 183: Lock 39: tumble, spillway

# AQUEDUCTS

## Aqueducts: Description and Function

Aqueducts carried the canal across the Cuyahoga Valley's larger streams. On the Ohio and Erie Canal the aqueducts were wooden troughs or "trunks" supported by masonry piers and abutments, rather than solid, but very expensive masonry structures as were found on some other contemporary canals. They were among the Ohio and Erie's most troublesome structures, requiring frequent repairs and sometimes complete reconstruction, which could disrupt traffic for extended periods. Their relatively long spans, exposed locations, and the combined weight of materials, water, and traffic posed extraordinary challenges for canal engineers.

Originally there were two canal aqueducts within the present limits of Cuyahoga Valley National Park: one spanning the Cuyahoga River at the village of Peninsula and the other over Tinkers Creek. In 1860 a third aqueduct was built at Furnace Run to replace a stone culvert which had proved inadequate for passing water under the canal. During the major 1905-1909 improvement program for the northern division of the canal, the Peninsula Aqueduct was completely rebuilt with new abutments, and the center pier was removed. The abutments of the Tinkers Creek Aqueduct were repaired. Each aqueduct received a new superstructure consisting of steel trusses supporting a wooden trunk. The Furnace Run Aqueduct, which had been replaced ten years earlier, did not require major work.

The Peninsula and Furnace Run aqueducts were destroyed by the flood of 1913 and were not rebuilt. In the early 1990s the National Park Service installed a pedestrian bridge to carry the towpath trail over the Cuyahoga River at Peninsula, repairing and utilizing the old aqueduct abutments. At Furnace Run the NPS constructed a new pedestrian bridge adjacent to the remains of the former aqueduct. In each case the former aqueduct is interpreted as a ruin. In contrast the Tinkers Creek Aqueduct still survives and functions today, albeit in modified form. Located within the watered portion of the canal, the aqueduct is a critical element in maintaining the continuity of the waterway and the towpath trail. By 2002 it had deteriorated to the point where it could no longer hold water and in 2009 was reconstructed as a two-span concrete trough with the same dimensions as the previous structure. New concrete stub abutments supported the new superstructure, but the existing masonry pier was dismantled and rebuilt and the stone abutments were refurbished, conveying the illusion that they supported the trunk.

## Defining Features

The defining features of a historic canal aqueduct are related to its function of carrying an elevated section of canal over a stream or river. Key elements of the original design with later modifications (if dating to the period of significance) are character-defining features. The location, the length of the span, the height of the structure, the dimensions of the trough, and evidence of construction methods are character-defining features. For the substructure (stone abutments and piers), important features include the stone itself, the way it was cut and shaped, and the manner in which it was laid-up. In the case of the three canal aqueducts in Cuyahoga Valley National Park, the substructure is the only surviving historic fabric.

## Inventory

Two aqueducts are located along the unwatered section of canal and one along the watered section. Remnants of these aqueducts are historic features dating to the Ohio and Erie Canal's period of significance (1825-1913) and are discussed in this section:

- Furnace Run Aqueduct (Station 1294+00)
- Peninsula Aqueduct (Station 1126+84)
- Tinkers Creek Aqueduct (Station 566+00)

**Furnace Run Aqueduct, Station 1294+00**

Location

The stone abutments of the Furnace Run Aqueduct are located approximately 500 feet north of Bolanz Road and 0.2-mile south of Everett Road near Mile Marker 27. The aqueduct is depicted on both the 1892 and 1912 survey mapping of the canal (Figures 93 and 94). During construction of the towpath trail in the early 1990s the trail was realigned to the east and a pedestrian bridge installed adjacent to the aqueduct abutments to provide for continuity of the towpath over Furnace Run.

As discussed in Section 1B the 40-foot long aqueduct was constructed in 1860, replacing an earlier culvert. The abutments were constructed on mud sills and proved to be extremely susceptible to the hydraulics of Furnace Run. In 1866 the north abutment was destroyed by a flood and a new abutment was constructed on a pile foundation. The aqueduct was completely rebuilt in 1877 and 1895, partially rebuilt in 1883, and repaired in 1892, 1902, and 1906. In 1912 the aqueduct was badly damaged when the north abutment was undermined; a new north abutment was constructed, the south abutment repaired, new retaining walls constructed, and the truss replaced. The following year it was destroyed by the flood of 1913 and abandoned.

In 2018 the National Park Service replaced the towpath bridge over Furnace Run.

Physical Description

The north and south abutments are composed of ashlar, dressed sandstone with tooled margins. The abutments are protected by wing walls which splay outward to contain the canal prism, towpath, and berm. Much of the fabric above the level of the aqueduct bed is missing. A pile of sandstone blocks, located to the south, likely contains a portion of the dislodged fabric.

Previous Documentation

The Historic American Engineering Record prepared measured drawings of the remains of the Furnace Run Aqueduct in 1986 prior to development of the towpath trail (HAER OH-61). Copies of the drawings are archived in the Park's Resource Management Division flat files.

The Furnace Run Aqueduct was documented in 1993 as part of the draft HSR for the Ohio and Erie Canal. The HSR stated:

> The remaining masonry is generally in fair condition. Although joint deterioration is prevalent, severe movement of the remaining fabric is limited to the southwest wing wall, where individual stones have rotated out of alignment. The bed of the stream has eroded and the foundation of the north abutment, consisting of wood planks and timbers, is visible beneath the water line of the stream.

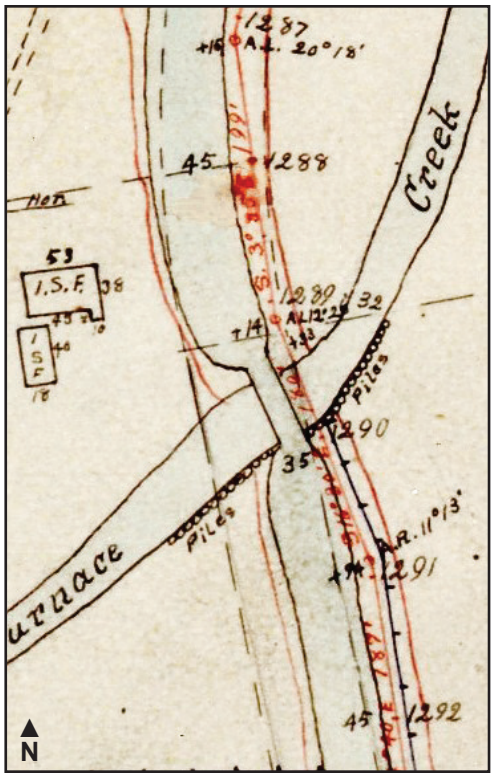


Figure 93. Survey map of Furnace Run Aqueduct, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

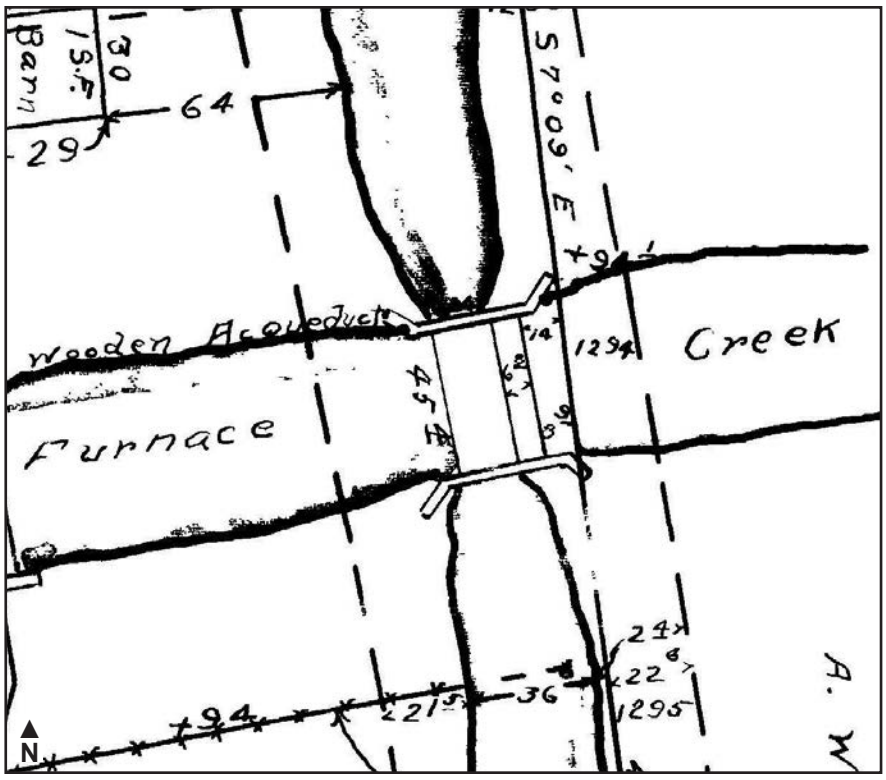


Figure 94. Survey map of Furnace Run Aqueduct, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

> Metal tabs protrude from joints at locations where the aqueduct was secured to the abutments; a length of metal rod remains at the southeast and the northeast. Profiled stonework at the north abutment, forming indentations to either side of the aqueduct bed, is apparent.
>
> The encroachment of vegetation is most severe at the north abutment. Vines and other vegetation with invasive root systems are prevalent at the top surface of the remaining fabric. Two large trees have fallen on the masonry, and trees are growing within the bed of the aqueduct and on the northwest wing wall.[263]

The Furnace Run Aqueduct was not included in the 2000 inventory *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation SUM-0049-07 however, and it is #011152 in the Park's List of Classified Structures.

Existing Conditions

The condition of the Furnace Run Aqueduct has deteriorated since 1993 as several stones in the north abutment, visible in the 1993 photographs, are now missing, and severe vegetation issues remain (Photos 184-189). The joint deterioration and movement of stones noted in 1993 have not been addressed. The same trees described in 1993, and others, are still growing on both abutments, together with vines, shrubs, and other vegetation; these will cause significant damage to the masonry unless they are removed. The submerged wooden substructure of the north abutment (pilings, sills, and planking) is clearly visible from the pedestrian bridge and offers an excellent view of the construction details of a canal aqueduct abutment.

263. Cossell, *Ohio and Erie Canal*, 118-119.

Photo 184. Furnace Run Aqueduct: view of north abutment in 1993

Photo 185. Furnace Run Aqueduct: view of north abutment in May 2017

Photo 186. Furnace Run Aqueduct: detail view of north abutment in 1993

Photo 187. Furnace Run Aqueduct: detail view of north abutment in May 2017

Photo 188. Furnace Run Aqueduct: view of south abutment in 1993

Photo 189. Furnace Run Aqueduct: view of south abutment in 2017

**Peninsula Aqueduct, Station 1126+84**

Location

The stone masonry abutments of the Peninsula Aqueduct are located just north of State Route 303 (Streetsboro Road) in the village of Peninsula (Figure 95). At this point the Ohio and Erie Canal, which was on the left (west) bank of the Cuyahoga River between Akron and Peninsula, crossed the river and continued north on the right (east) bank. The aqueduct is depicted on both the 1892 and 1912 survey mapping of the canal (Figures 96 and 97).

As discussed in Section 1B, the original structure was completed in 1827 and included a wooden trunk with timber framing, supported by masonry abutments and a central pier in the river. It was repaired many times and was rebuilt in 1844 and 1872. In 1905 the King Bridge Company completely rebuilt the Peninsula Aqueduct as part of the improvement of the northern division, constructing new abutments from the bedrock up and removing the central pier. The new structure was completely destroyed by the 1913 flood and was not rebuilt. In the early 1990s the National Park Service installed a single-span prefabricated pedestrian bridge to carry the towpath trail over the Cuyahoga River, utilizing the aqueduct's masonry abutments which were repaired.

Physical Description

The north and south abutments are composed of ashlar, dressed sandstone with tooled margins (Photos 190 and 191). The north abutment is protected by wing walls which splay outward to contain the canal prism, towpath, and berm. It forms the south end of Lock No. 29 which is immediately adjacent to it (Photos 192 and 193). The south abutment terminates abruptly in a squared corner at its west end (Photo 194), and to the east it butts against a massive buttressed masonry retaining wall for the former Moody and Thomas Mill (Photo 195).

Previous Documentation

In 1986 the Historic American Engineering Record prepared measured drawings of the adjacent Lock No. 29. It prepared written documentation for the Peninsula Aqueduct but did not prepare measured drawings or photographic documentation of the abutments (part of HAER No. OH-59).

The 1993 draft HRS described the condition of the Peninsula Aqueduct at that time:

> The masonry is generally in good condition. Signs of decay are restricted to the cracking and chipping of individual stones at random locations. Cylindrical holes, the result of the 1905 reconstruction, are apparent. Joint deterioration is relatively limited. Missing mortar and the subsequent lack of bonding between stones, however, has resulted in individual stones rotating out of alignment at the west portion of the south abutment. Along the east edge of the south abutment, there is a vertical crack indicative of movement.

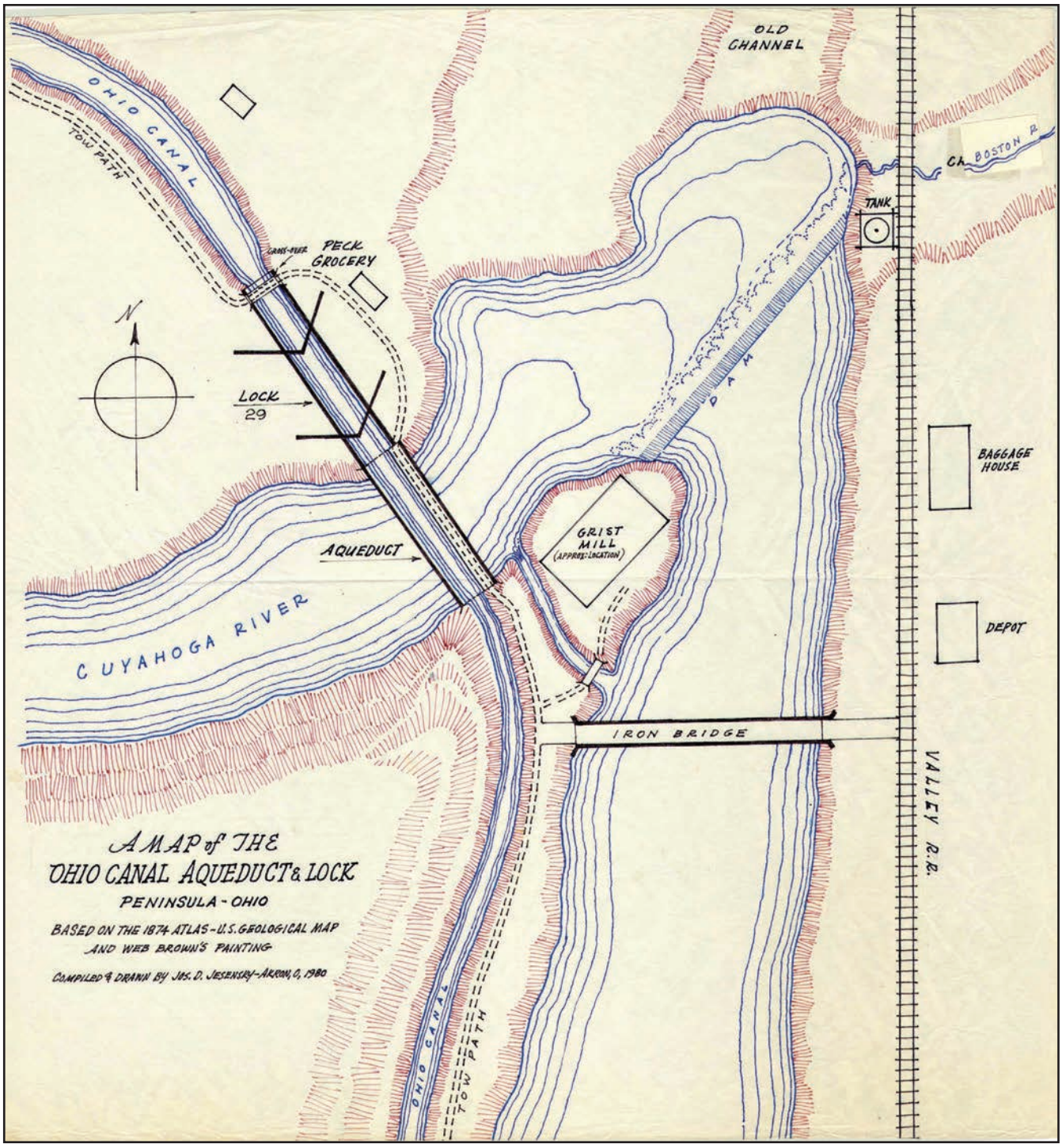


Figure 95. Site plan, Peninsula Aqueduct and vicinity (*Source:* Joseph D. Lesensky, 1980)

Figure 96. Survey map of Lock No. 29 and Peninsula Aqueduct, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

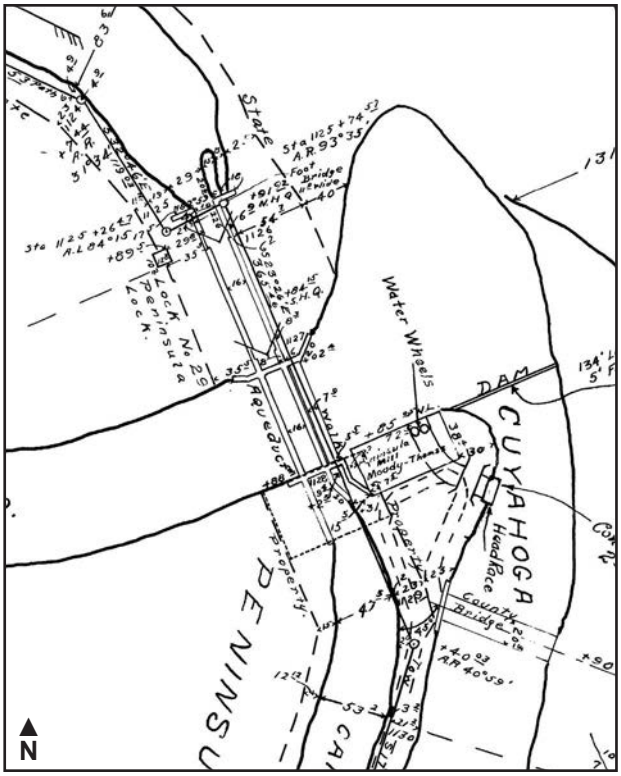


Figure 97. Survey map of Lock No. 29 and Peninsula Aqueduct, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 190. Peninsula Aqueduct: overview looking south

Photo 191. Peninsula Aqueduct: view looking south, south abutment and pedestrian bridge

Photo 192. Peninsula Aqueduct: north abutment with Lock No. 29 beyond

Photo 193. Peninsula Aqueduct: detail view of north abutment

Photo 194. Peninsula Aqueduct: detail view of south abutment

Photo 195. Peninsula Aqueduct: retaining wall of mill, aqueduct at right

> The encroachment of vegetation is most severe at the southwest wing wall. Vines and other vegetation with invasive root systems are prevalent at the top surface of walls and areas of joint deterioration.[264]

The Peninsula Aqueduct was not included in the 2000 inventory *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. Together with Lock No. 29 it has the Ohio Historic Inventory designation SUM-0056-04. The two structures are designated #011157 in the Park's List of Classified Structures.

Existing Conditions

The present condition of the masonry abutments for the Peninsula Aqueduct appears to be approximately the same as documented in 1993, and both appear to be structurally sound (Photos 196 and 197). The stonework in both abutments remains in good condition although the south abutment is badly in need of repointing. The vertical crack in the south abutment noted in the 1993 draft report actually is in the retaining wall for the mill, rather than in the aqueduct abutment itself. The greatest preservation issue for the Peninsula Aqueduct is vegetation encroachment. In the summer months both abutments are covered with vines and other dense vegetation growing on top of the walls and in the numerous cracks between stones (Photos 198-201). This condition has not changed since 1993.

264. Cossell, *Ohio and Erie Canal*, 104.

Photo 196. Peninsula Aqueduct: view of south abutment about 1990

Photo 197. Peninsula Aqueduct: view of north abutment in 1993

Photo 198. Peninsula Aqueduct: view of south abutment, July 2018

Photo 199. Peninsula Aqueduct: detail view of south abutment showing vegetation, July 2018

Photo 200. Peninsula Aqueduct: view of north abutment showing vegetation, July 2018

Photo 201. Peninsula Aqueduct: view of north abutment showing vegetation, July 2018

**Tinkers Creek Aqueduct, Station 566+00**

Location

The Tinkers Creek Aqueduct is located along the watered section of the canal between Locks Nos. 37 and 38, approximately 0.2-mile south of Tinkers Creek Road near Mile Marker 13. It carries the canal waterway and towpath over Tinkers Creek just upstream from the confluence of that stream and the Cuyahoga River. The aqueduct is depicted on both the 1892 and 1912 survey mapping (Figures 98 and 99).

The original Tinkers Creek Aqueduct was located slightly south of the existing structure and featured a wooden trunk with timber framing supported by uncut masonry abutments and a central pier. In 1845 it was replaced by a new structure in a new location. The aqueduct was repaired and rebuilt many times over the next 60 years and in 1905 was reconstructed again as part of the improvement of the northern division. The new superstructure consisted of steel trusses supporting a wooden trunk. From 1913 to 1974 the Tinkers Creek Aqueduct was maintained by the American Steel and Wire Company which used water from the canal for industrial purposes. The aqueduct underwent a major rehabilitation in the 1940s and again in the 1960s. By 2002 it had deteriorated to point where it could no longer hold water, and pipes were installed to maintain water flow for industrial hydraulic purposes. In 2007 the National Park Service constructed a new pedestrian towpath bridge supported by the aqueduct's abutments and pier, and in 2009 it reconstructed the aqueduct itself.

Physical Description

The 2009 reconstruction featured a 96-foot long two-span reinforced concrete through-girder and floor slab system which serves as a trough with the same dimensions as the previous structure. The design was guided by the philosophy that the new structure should be easily distinguishable from the historic fabric, a requirement of the Ohio State Preservation Office. The goal was to create a "contemporary-but-compatible structure using the historic abutments and center pier," rather than attempting to duplicate the appearance of the historic structure. In addition concrete is a durable material that requires less maintenance than wood and steel and also is better able to withstand flood waters.

New concrete stub abutments were installed to support the new superstructure, set 10 feet behind the existing stone abutments which were rehabilitated but no longer support any load. The abutments are composed of ashlar, dressed sandstone with tooled margins. As part of the project the stone masonry pier was completely dismantled and rebuilt. Twin concrete columns within the stone core extend up from the pier footing to support the trunk. Reinforced concrete transition structures at each end of the aqueduct provide a smooth hydraulic transition from canal to trough. There are two 24-inch diameter cast-iron waste gates in the west wall of the southern transition structure with HDPE outfall pipes discharging downstream of the aqueduct.[265]

265. National Park Service and Bergmann Associates, *Environmental Assessment for Tinkers Creek Aqueduct*; Borelli, "Reconstruction of the Ohio & Erie Canal Aqueduct," 32-35.

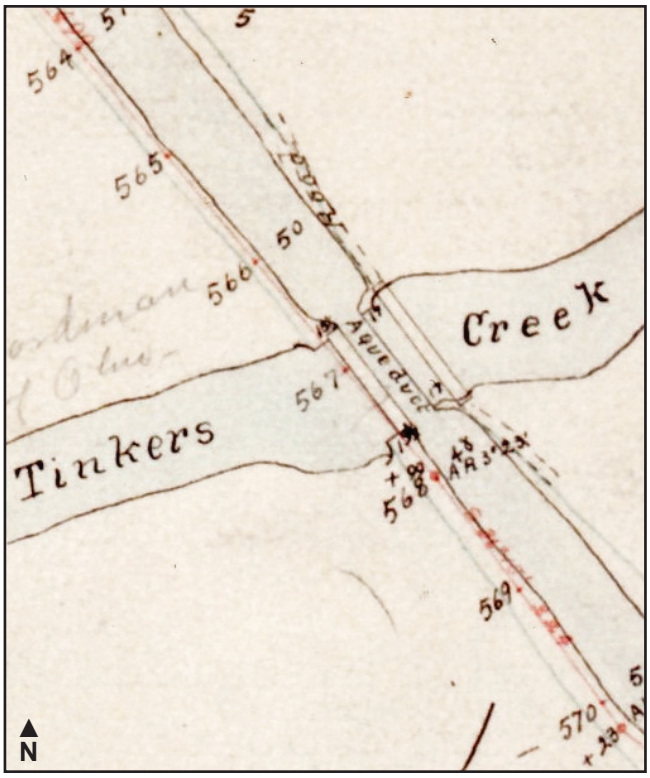


Figure 98. Survey map of Tinkers Creek Aqueduct, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

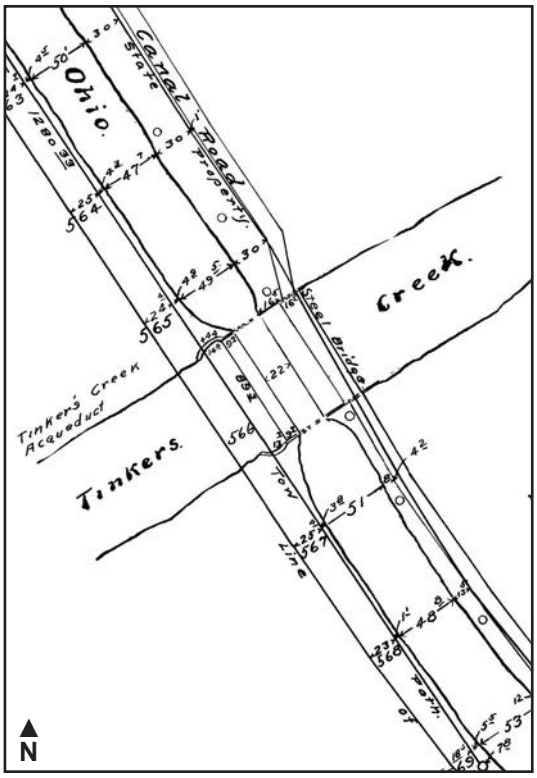


Figure 99. Survey map of Tinkers Creek Aqueduct, from *Map of the Ohio Canal, Cuyahoga County, Ohio,* G.W. Silliman, 1912, retraced 1916

Previous Documentation

In 1986 the Historic American Engineering Record documented the 1905 Tinkers Creek Aqueduct through large-format photography and reproduction of historic plans created by the American Steel and Wire Company (Figure 100).[266] The HAER documentation was part of project HAER-OH-59. The old aqueduct also was documented as part of the 1993 draft HSR (Photo 202). It was most recently documented in the 2000 inventory *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner, and it has the Ohio Historic Inventory designation CUY-0462-19. It is #011170 in the Park's List of Classified Structures.

Existing Conditions

The 2017 field survey indicated that the reconstructed aqueduct is in good condition and functioning as designed. The concrete trunk, reconstructed pier, and towpath bridge are all new components that appear to be structurally sound (Photos 203-206). The two stone masonry abutments, which were not dismantled and rebuilt as part of the aqueduct reconstruction project, represent the structure's only remaining historic fabric. They are in fair condition: some stones are out of alignment, and there are many open joints between stones which support the growth of vines and other vegetation with invasive root systems (Photos 207 and 208). The masonry in the abutments requires repointing and removal of vegetation to avoid continued deterioration.

266. Historic American Engineering Record, *Ohio and Erie Canal: Selected Structures in the Cuyahoga Valley National Recreation Area, Valley View, Cuyahoga County and Peninsula, Summit County, Ohio, HAER-OH-59* (Washington, DC: National Park Service, Historic American Engineering Record, 1986).

Figure 100. Tinkers Creek Aqueduct in 1986 (*Source:* Historic American Engineering Record, National Park Service, HAER No. OH-59)

Photo 202. Tinkers Creek Aqueduct: overview in 1993

Photo 203. Tinkers Creek Aqueduct: overview from south in 2017

Photo 204. Tinkers Creek Aqueduct: east side

Photo 205. Tinkers Creek Aqueduct: west side

Photo 206. Tinkers Creek Aqueduct: pedestrian walkway looking north

Photo 207. Tinkers Creek Aqueduct: south abutment looking south

Photo 208. Tinkers Creek Aqueduct: north abutment looking north

# CULVERTS

**Culverts: Description and Function**

Culverts carried small streams beneath the canal prism and towpath. Typically 80 to 120 feet long, their diameter varied based on their length as well as the volume of the stream. Some existed through the canal's entire period of operation, while others were eliminated or added at various times as the local hydrology changed. During the initial construction of the canal in 1825-1827, contracts were awarded for a total of 24 culverts along the canal section in Cuyahoga Valley National Park. The 1892 survey by D.C. Kennon shows 16 culverts in the Park, including two along the presently watered section and 14 along the presently unwatered section. A number were eliminated, replaced, or repaired as part of the improvement of the northern division in 1905-1909. The 1912 Silliman survey, as reflected in the traced maps of 1916 and 1928, shows 13 culverts, including four in the watered section and nine in the unwatered section. Ten of these also appear on the 1892 mapping. Three of them had been built since 1892, while five of the culverts shown in 1892 no longer existed in 1912.

Culverts still exist at 9 of the 13 culvert locations depicted on the 1912 mapping, although 3 early 20th-century culverts along the watered section have been replaced with new concrete box culverts since 2005. Since the abandonment of the canal, the water courses and the associated watersheds have changed dramatically, requiring the construction of modern culverts of appropriate capacity along the watered section. Along the unwatered section most of the structures were left unaltered, affected only by natural deterioration processes.

There are two types of canal culverts in the Park: arch culverts and box culverts. The 19th- century arch culverts are essentially smaller versions of stone arch bridges, formed of stone cut in regular segments and laid in range work, with wing walls and parapet walls of cut stone. The masonry was laid in hydraulic cement and erected on a floor of hewn timbers secured by sheet piling at both the head and the foot. The carefully-shaped and fitted arch stones, known as *voussoirs*, were erected on heavy timber formwork which then was removed prior to construction of the rest of the structure. The vertical stone facewall above the arch is called the *parapet,* and the facewall wall to each side of the arch is called the *spandrel*. Earth and rock fill was placed within the walls to load and strengthen the arch. The best surviving examples of 19th-century masonry arch structures are those at Yellow Creek and Brandywine Creek. Small box culverts, constructed of broad pieces of timber, served as land drains or carried small springs under the canal; in general, apertures ranged from 8 to 16 inches square, and placement was restricted to where the culvert would always be under water to reduce the possibility of premature decay. No 19th-century timber box culverts are known to survive in the Park.

Structures built in the early 20th century were constructed of reinforced concrete rather than stone and timber. Most were flat-topped box culverts formed of concrete reinforced with steel rods; none survive today. There is one early 20th-century concrete arch structure: the Ira Road Culvert at Station 1383+00, the longest of all the extant historic culverts at 138 feet.

## Defining Features

Culverts are fairly simple structures composed of only a few materials: stone, mortar, concrete, and earth/rubble fill. For both stone and concrete culverts, key elements of the original design with later modifications (if dating to the period of significance) are character-defining features. For stone culverts, these include the stone itself, the way it was cut and shaped, and the manner in which it was laid-up to form the arch, facewalls, and wing walls. For concrete culverts the surface finish and the dimensions of the opening are character-defining features. The earthen/rubble fill within the walls is not significant.

## Inventory

The following extant culverts within Cuyahoga Valley National Park are historic features dating to the Ohio and Erie Canal's period of significance (1825-1913) and are discussed in this section. All are located along the unwatered section of canal.

- Yellow Creek Culvert (Station 1452+87)
- Ira Road Culvert (Station 1383+00)
- Arch Culvert (Station 1190+98)
- Stanford Creek Culvert South (Station 973+02)
- Stanford Creek Culvert North (Station 961+94)
- Brandywine Creek Culvert (Station 921+39)

Three early 20th-century concrete culverts along the watered section of canal were documented in the 1993 draft HSR but were replaced by modern structures from 2005 to 2009. Although they are listed as extant and contributing historic features in the 2009 Cultural Landscape Inventory[267] they should not be considered contributing components of the Ohio and Erie Canal since they do not date to the canal's defined period of significance.

- Sagamore Creek Culvert (Station 636+00), replaced 2009
- Box Culvert (Station 504+88), replaced 2005
- Double Box Culvert (Station 478+90), replaced 2005

After 1990 the National Park Service constructed several other concrete box culverts at various points along the towpath trail, but they are not contributing components of the Ohio and Erie Canal since they do not date to the canal's defined period of significance.

267. National Park Service, *Cultural Landscape Inventory*, 75-76.

**Yellow Creek Culvert, Station 1452+87**

Location

This stone arch culvert is located approximately 600 feet north of Bath Road near Mile Marker 30. It is approximately 550 feet from the Cuyahoga River. The culvert currently carries Yellow Creek beneath the Valley Railway, the towpath trail, and Riverview Road. In this area the former canal prism was filled during the construction of Riverview Road in the 1930s, and no evidence of it survives. The towpath trail now occupies the site of the canal prism.

The stone arch culvert was constructed in 1844. The canal originally crossed Yellow Creek on an embankment extending across the channel, and flood water was passed around the embankment by a dam and waste weir. By the early 1840s the bed of the creek had become filled with deposits, and navigation on the canal was frequently interrupted, requiring the construction of a culvert. The 1892 mapping shows a culvert and towpath bridge at this location (Figure 101); the accompanying illustration resembles the existing structure (see Figure 31). The 1912 mapping (as retraced in 1916) shows an 18-foot diameter, 94-foot long culvert (Figure 102).

This structure is incorrectly identified in the List of Classified Structures as Yellow Creek Aqueduct. There is no record of an aqueduct at this location at any time. Although the 1883 annual report refers to repairs made to the abutments, trunk, and superstructure of the Yellow Creek Aqueduct, the location of that structure is unknown.

Physical Description

The Yellow Creek Culvert is a semicircular arch culvert constructed of cut sandstone blocks. Both the inlet and outlet headwalls are constructed of ashlar, dressed sandstone, and feature curved wing walls. The opening on each side is well-formed by voussoirs, wedge-shaped units whose converging sides are cut as radii of the center of the arch. The keystones, while not embellished, protrude slightly from the surrounding stones.

The west headwall has been extended in height with an additional five courses of stonework, probably when the Valley Railway was constructed. Stones in the upper wall are significantly larger than those below, and the profile of the wall changes, creating a ledge at the top surface of the original wing walls (Photos 209 and 210). These modifications date to the period of significance and should be considered part of the historic fabric. More recently, the east headwall was extended in height with the addition of a poured concrete wall. This modification was made after the 1993 draft HSR and is not part of the historic fabric (Photos 211-213). Limestone rip-rap has been placed on both sides of the channel east of Riverview Road, possibly at the same time as the headwall extension. A major flood event in 2002 put water over the roadway and caused extensive damage.

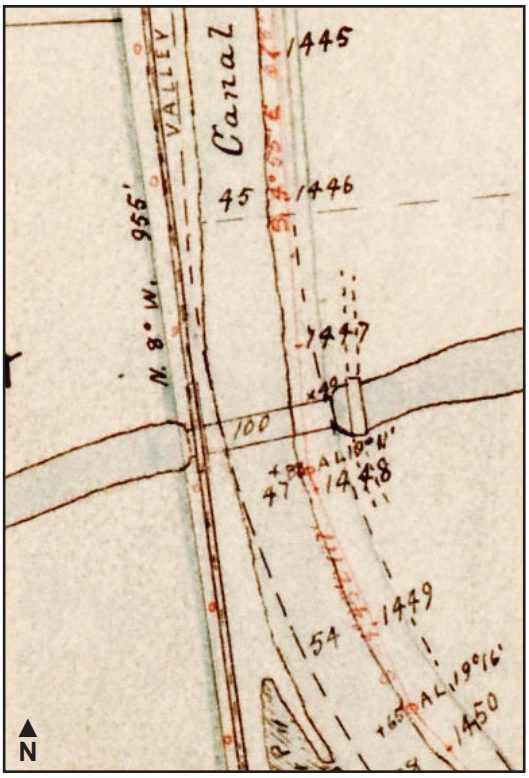


Figure 101. Survey map of Yellow Creek Culvert, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

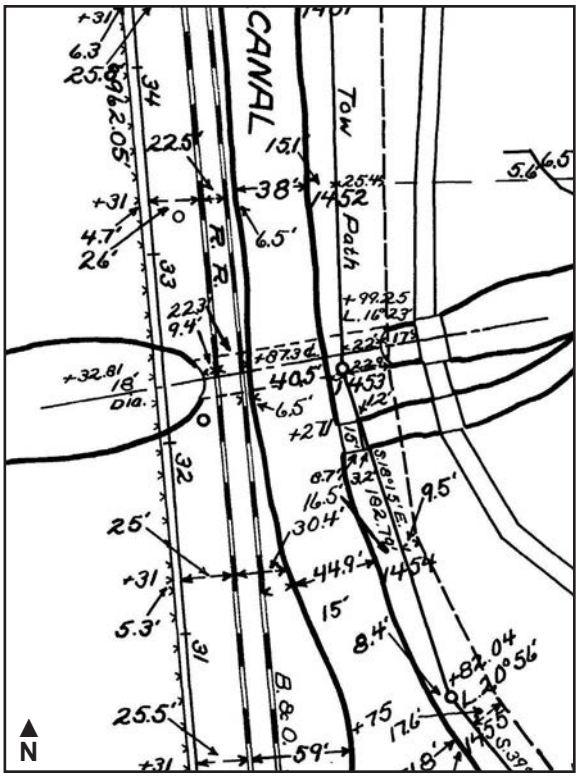


Figure 102. Survey map of Yellow Creek Culvert, from *Map of the Ohio Canal, Cuyahoga County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 209. Yellow Creek Culvert: west side

Photo 210. Yellow Creek Culvert: west side, detail view of abutment

Photo 211. Yellow Creek Culvert: view of east side in 1993

Photo 212. Yellow Creek Culvert: view of east side in 2017

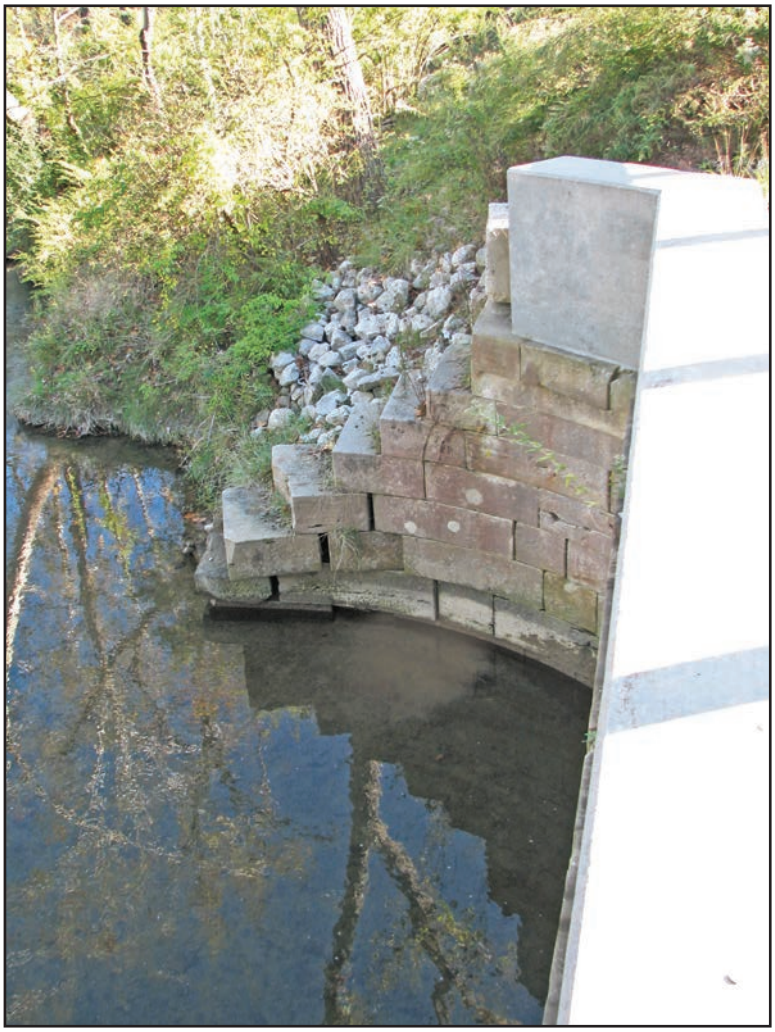

Photo 213. Yellow Creek Culvert: east side, abutment and concrete headwall extension

Previous Documentation

The Yellow Creek Culvert was discussed in the 1993 draft HSR. It was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation SUM-0052-07. It is #011148 in the Park's List of Classified Structures.

Existing Conditions

The masonry of both headwalls is in fair condition. Joint deterioration is prevalent. Missing mortar and the subsequent lack of bonding between stones has resulted in individual stones moving out of alignment, although the arch itself appears to be structurally sound and in good condition (Photos 214 and 215). Signs of masonry decay, including cracking and spalling, are apparent at both headwalls. At the time of the 1993 draft HSR the southwest wing wall was in the worst condition; numerous stones were missing, and much of the remaining fabric was displaced (Photo 216). During subsequent repairs many of the missing stones were put back in their original locations, and others were realigned; unfortunately the mortar joints of the new stonework do not match the original construction (Photo 217). At the same time limestone rip-rap was placed on the banks of the stream channel as erosion protection, and the channel appears to have been straightened (Photo 218). This work probably was done at the same time as the east headwall was extended.

There is evidence of continuing structural problems with the culvert and roadway, as the pavement has cracked and settled, indicating instability of the base (Photo 219). The culvert opening appears to be too small for the volume of water in Yellow Creek during flood events. Vegetation is becoming a serious problem for the culvert as vines and shrubs are encroaching on the west headwall (Photo 220).

Photo 214. Yellow Creek Culvert: view of west side showing open joints

Photo 215. Yellow Creek Culvert: west side, culvert arch

Photo 216. Yellow Creek Culvert: west side, view in 1993

Photo 217. Yellow Creek Culvert: west side, view of mortar repairs

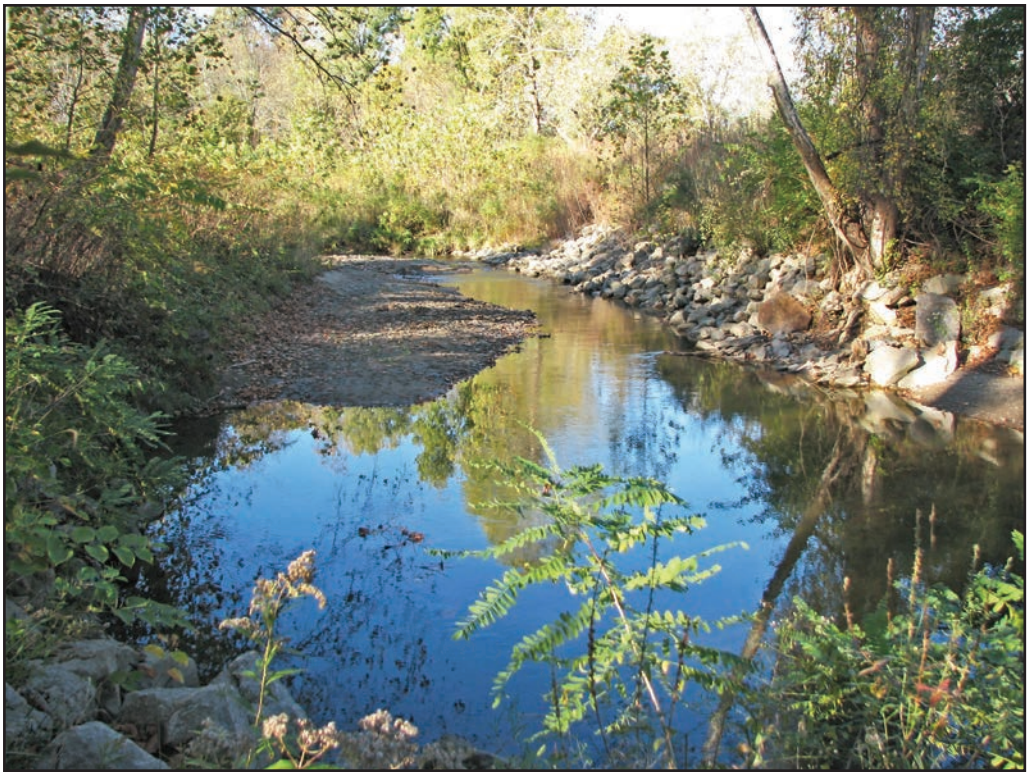

Photo 218. Yellow Creek Culvert: west side, Yellow Creek channel

Photo 219. Yellow Creek Culvert: east side, roadway subsidence above culvert

Photo 220. Yellow Creek Culvert: west side showing vegetation growth

**Ira Road Culvert, Station 1383+00**

Location

The Ira Road Culvert is the only historic concrete arch canal culvert in the Park. It is located approximately 100 feet south of Ira Road between Mile Markers 28 and 29. The culvert carries a small stream beneath the towpath trail and Riverview Road and drains directly into the Cuyahoga River (Figure 103). An adjacent concrete culvert carrying the same stream under the Valley Railway, 137 feet to the west, was replaced in 2003. In this area the former canal prism was filled during the construction of Riverview Road in the 1930s, and no evidence of it survives. The towpath trail and Riverview Road now occupy the site of the canal prism.

The Ira Road Culvert was constructed in 1908 as part of the improvement of the Ohio and Erie Canal's northern division. Prior to that time the stream was diverted to the south by the canal embankment, and there was no culvert at this location. The contractor was E.C. Hovey, and the cost was $4,288.00.

Physical Description

The 1908 design plans for the Ira Road Culvert are available in the Resource Management Division's flat files (Figure 104). The reinforced concrete arch culvert measures 5 feet by 9 feet and is 138 feet long between headwalls. The inlet features a 6-foot high headwall, two end walls measuring 16 feet 3 inches and 14 feet 0 inches, and a 14-foot concrete apron. The outlet has two end walls both measuring 24 feet 6 inches, and a 23-foot apron. As designed, there was a 5-foot by 8-foot manhole just east of the canal's towpath bank.

Previous Documentation

This culvert was not listed or discussed in the 1993 draft HSR for reasons that are not clear. There also is no mention of it in the Park files related to the construction of the towpath trail. The Ira Road Culvert was documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation SUM-3245-07. It is not included on the Park's List of Classified Structures.

Existing Conditions

The concrete at the inlet headwall, wing walls, and apron is in poor condition with extensive cracking and spalling (Photos 221 and 222). There are several large trees growing from the top of the headwall. The outlet is in better condition and appears to have been replaced fairly recently (Photos 223 and 224). There is extensive encroachment by vegetation at the outlet including small trees adjacent to the end walls and moss growth on the concrete.

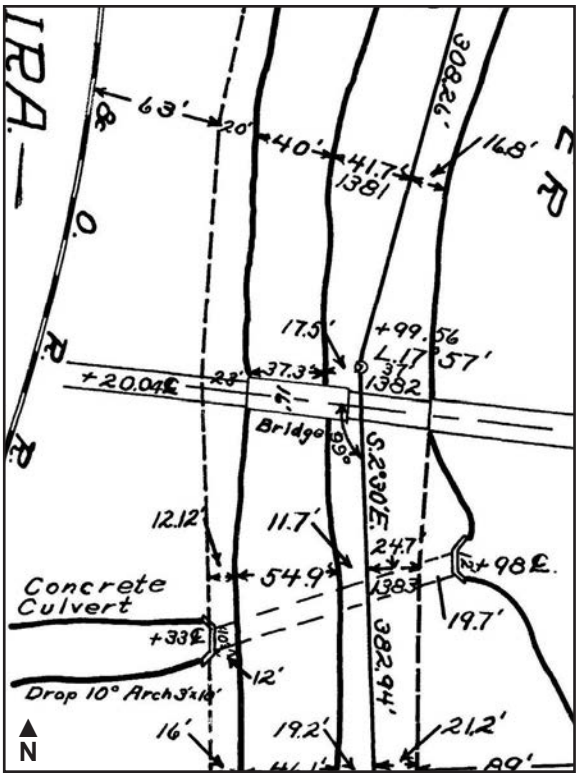


Figure 103. Survey map of Ira Road Culvert, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

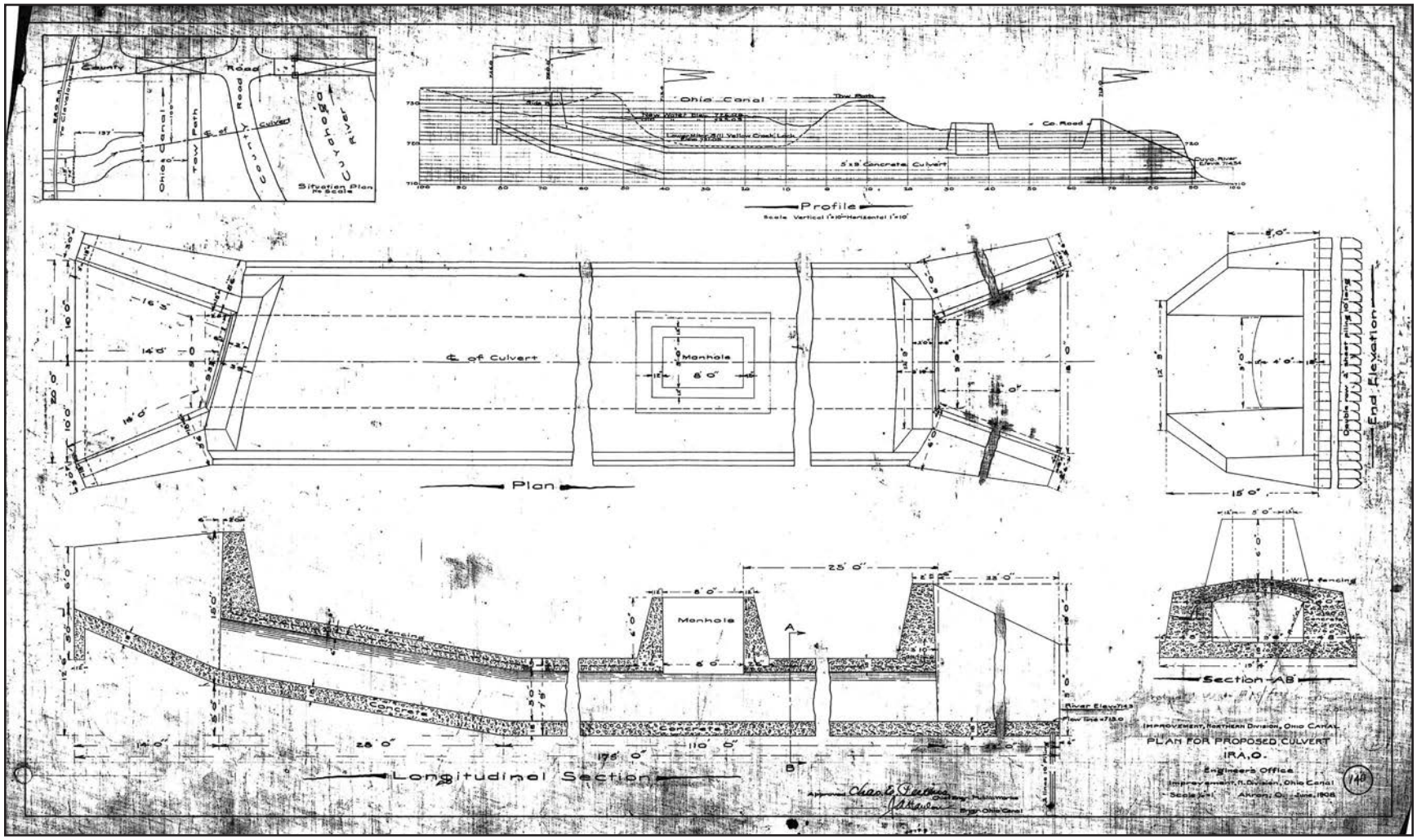


Figure 104. 1908 design plans, Ira Road Culvert (*Source:* Engineers Office Ohio Canal, *Plan for Proposed Culvert, Ira, O.,* Cuyahoga Valley National Park, Resource Management files)

Photo 221. Ira Road Culvert: west side, headwall and arch

Photo 222. Ira Road Culvert: west side, headwall

Photo 223. Ira Road Culvert: east side, outlet into river

Photo 224. Ira Road Culvert: east side, detail view of outlet into river

## Arch Culvert, Station 1190+98

Location

This stone arch culvert is located approximately 0.5-mile south of Lock No. 28, near Mile Marker 25. It is approximately 600 feet west of the Cuyahoga River and just east of the Valley Railway. The culvert originally carried an unnamed stream beneath the canal prism and towpath but became clogged with silt long ago, and the stream now cuts through the remains of the prism and towpath, exposing the top of the culvert.

The culvert probably dates to the initial construction of the canal in 1825-1827. The 1892 mapping shows a 4-foot by 6-foot arch culvert at this location (Figure 105). The 1912 mapping (as traced in 1928) shows a 4-foot wide, 75-foot long stone arch culvert extending from the toe of the outer towpath bank to the toe of the outer berm bank; a second culvert carried the stream under the Valley Railway, with a 46-foot wide wetland lying between the two culverts and between the canal and railroad (Figure 106).

Physical Description

The existence of the culvert was not known until November 2017, when it was discovered during the field survey for this project. The unnamed stream has deeply scoured the canal prism in this area, exposing the top of the culvert arch which once was several feet below the base of the prism (Photo 225). The exposed portion consisted of carefully fitted sandstone blocks, 3 stones wide and 5 stones long (approximately 3 feet by 8 feet).

In July 2018 a National Park Service crew investigated the culvert under the direction of archeologist Jeffrey Richner. This work was done in connection with the replacement of the adjacent towpath trail bridge which required construction of new concrete abutments. Most of the intact section of culvert (approximately 40 feet long) was exposed and documented (Photos 226 and 227). The investigation revealed that the east end of the culvert had been impacted by the construction of the abutment for the original towpath trail bridge which destroyed the east headwall and part of the arch (Photo 228). The archeologists traced the culvert to the west but had to suspend work due to water infiltration and unstable soils. It is unknown whether the west headwall survives.

Previous Documentation

This culvert was not listed or discussed in the 1993 draft HSR. Evidently it was either not visible or not recognized as a canal structure at that time. There also is no mention of it in the Park files related to the construction of the towpath trail and pedestrian bridge, or in *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It does not have an Ohio Historic Inventory number and is not included on the Park's List of Classified Structures.

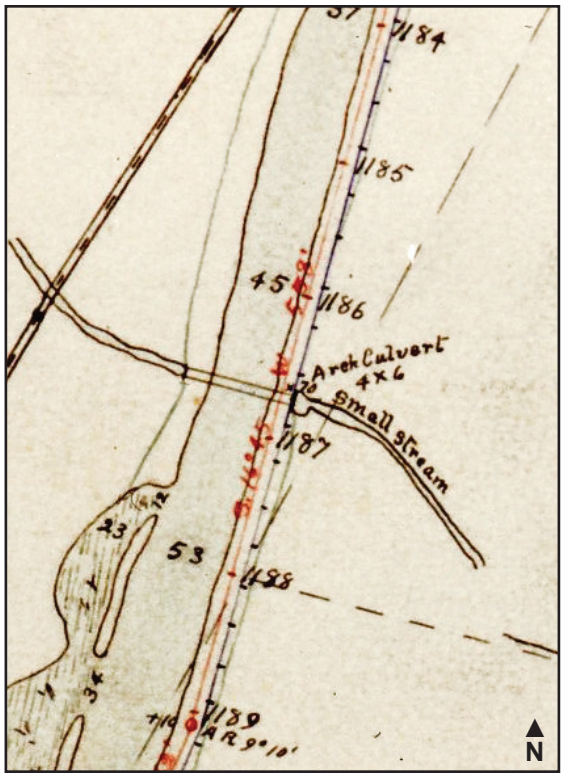


Figure 105. Survey map of Arch Culvert at Station 1190+98, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

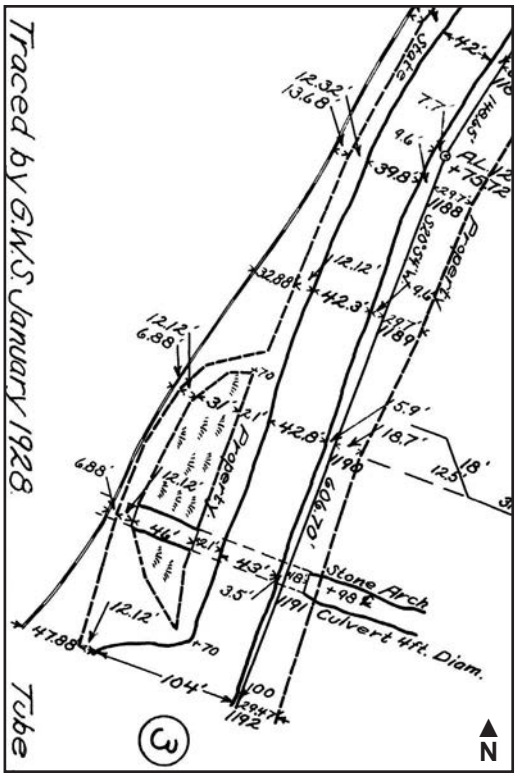


Figure 106. Survey map of Arch Culvert at Station 1190+98, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 225. Arch Culvert at Station 1190+98: view in November 2017

Photo 226. Arch Culvert at Station 1190+98: exposed top of culvert, July 2018

Photo 227. Arch Culvert at Station 1190+98: exposed top of culvert, July 2018

Photo 228. Arch Culvert at Station 1190+98: impacts caused by 1990s bridge abutment

Existing Conditions

The condition of the buried portion of the culvert appears to be relatively good, although it is completely filled with silt. The east headwall and adjacent section of the arch were destroyed by towpath trail bridge construction in the early 1990s. The existence and condition of the west headwall is unknown. The Park currently is considering various means to protect the exposed section of the culvert.

**Stanford Creek Culvert South, Station 973+02**

Location

This culvert is located 0.6-mile north of Boston Mills Road, between Mile Markers 21 and 22. It is approximately 0.3-mile south of Lock No. 33 and 0.2-mile south of Stanford Creek Culvert North. The Cuyahoga River is approximately 500 feet west. Both culverts were built to carry branches of Stanford Creek beneath the canal prism and towpath. Available documentation does not provide any definitive information regarding the construction of these culverts. The 1892 survey shows a 79-foot long culvert at this location, and the 1912 survey shows an 87-foot long culvert (Figures 107 and 108). During the 1905-1909 improvements to the northern division, state forces performed $60 worth of improvements to one of the Stanford Creek culverts.[268] The concrete headwalls suggest that it was this structure.

Physical Description

Stanford Creek Culvert South is a circular pipe culvert. The headwalls are constructed of poured concrete with clear evidence of formwork. While the west headwall is rectangular, the east headwall slopes downward to either side of the opening and features a protruding lip at the top surface of the wall.

Previous Documentation

The Stanford Creek Culvert South was discussed in the 1993 draft HSR. It was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation SUM-3249-01. It is not included on the Park's List of Classified Structures.

Existing Conditions

The concrete of the west headwall is in poor condition (Photos 229 and 230). There is a loss of finish surface immediately surrounding the culvert opening, and the balance of the fabric is spalled. There is no significant encroachment of vegetation.

The east headwall could not be examined in 2017 due to standing water and impenetrable vegetation in the canal prism. The 1993 draft HSR reported that most of the concrete of the east headwall was in fair condition with a loss of finish surface below a horizontal line extending from the top of the culvert opening (Photo 231). At that time the encroachment of vegetation was limited to moss along the top surface of the east headwall.

The culvert no longer carries Stanford Creek which has rechanneled itself to the south. It currently functions as a land drain.

268. Ohio Board of Public Works, *70th Annual Report*, 71.

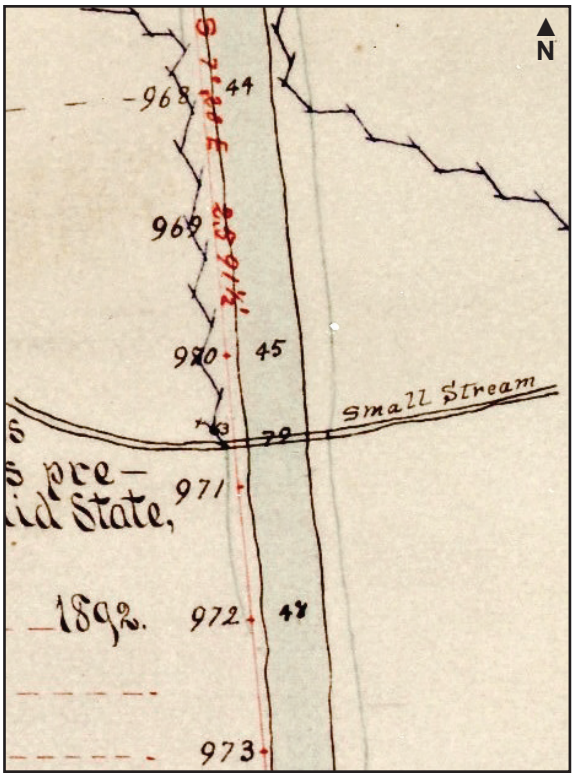


Figure 107. Survey map of Stanford Creek Culvert South, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

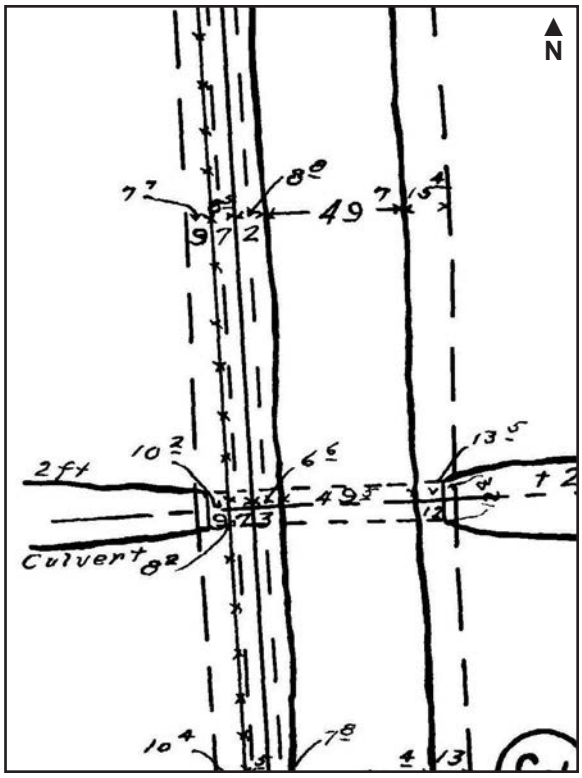


Figure 108. Survey map of Stanford Creek Culvert South, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 229. Stanford Creek Culvert South: west side, headwall and pipe

Photo 230. Stanford Creek Culvert South: west side, rear of headwall

Photo 231. Stanford Creek Culvert South: view of east side in 1993

**Stanford Creek Culvert North, Station 961+94**

Location

This stone arch culvert is located 0.8-mile north of Boston Mills Road, between Mile Markers 21 and 22. It is approximately 400 feet south of Lock No. 33 and 0.2-mile north of Stanford Creek Culvert South. The Cuyahoga River is approximately 500 feet west. Both culverts were built to carry branches of Stanford Creek beneath the canal prism and towpath. Available documentation does not provide any definitive information regarding the construction of these culverts, but this structure, the larger of the two, could date to the original construction of the canal in 1825-1827. The 1892 survey shows an 84-foot long culvert at this location, and the 1912 survey shows a 92-foot long culvert with a 7-foot diameter arch (Figures 109 and 110).

Physical Description

The Stanford Creek Culvert North is a semi-circular stone arch culvert. The headwalls are constructed of cut and dressed sandstone. On the west side the opening was completely submerged at the time of the 2017 survey, but the 1993 draft HSR describes it as being well-formed by voussoirs, wedge-shaped units whose converging sides are cut as radii of the center of the arch. The east headwall could not be examined in 2017 due to standing water and impenetrable vegetation in the canal prism.

Previous Documentation

The Stanford Creek Culvert South was discussed in the 1993 draft HSR. It was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation SUM-3250-01. It is not included on the Park's List of Classified Structures.

Existing Conditions

The west headwall of the culvert is in relatively poor condition. Joint deterioration is prevalent, and numerous stones have slipped out of alignment (Photos 232 and 233). The 1993 draft HSR noted that the encroachment of vegetation was severe, and this had not changed in 2017. There are several moderate-sized trees growing on top of the west headwall, forcing apart and dislodging the stones. They should be removed as soon as possible to avoid further damage. The section of culvert that passes under the prism has collapsed, leaving a void. The culvert no longer carries Stanford Creek which has rechanneled itself to the south. It currently functions as a land drain. A February 27, 1984 memorandum in the Park's resource

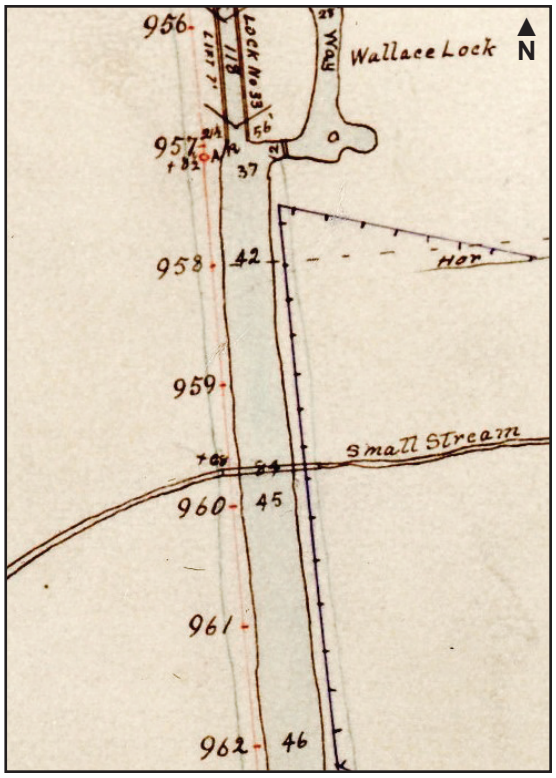


Figure 109. Survey map of Stanford Creek Culvert North, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

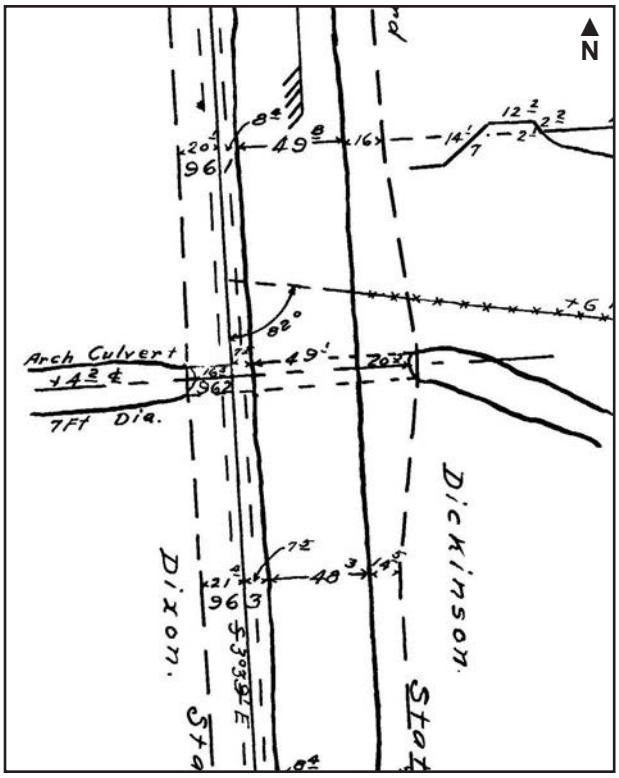


Figure 110. Survey map of Stanford Creek Culvert North, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 232. Stanford Creek Culvert North: west side, headwall

Photo 233. Stanford Creek Culvert North: west side, headwall

management division files noted that the culvert was completely blocked with silt. It stated that: "The stream has created a new channel north along the canal several hundred yards and then has broken out to the river, cutting away a 10-foot section of the towpath...The best solution would be to restore the original culvert so that the proper drainage can occur."[269] However there is no record that any substantial repairs were made, although the culvert may have been cleaned out.

269. Memorandum from Chief, Technical Assistance and Professional Services, to Assistant Superintendent, Operations, February 27, 1984, Cuyahoga Valley National Park, Resource Management Division files.

**Brandywine Creek Culvert, Station 921+39**

Location

This stone arch culvert is located approximately 0.3-mile south of Lock No. 34 and Highland Road, between Mile Markers 19 and 20. It carries Brandywine Creek beneath the towpath trail and the former towpath, which was later widened and converted into an access road to the nearby Jaite Paper Mill. The canal prism in the immediate area was obliterated by the construction of the access road in the early 20th century.

Although available documentation does not provide information regarding the construction or repair of this culvert, it appears to be an early structure possibly dating to the original construction of the canal in 1825-1827. The 1892 survey depicts a "9-ft x 18-ft arch culvert" at this location, and the illustration contained on the map closely resembles the existing structure (Figure 111; also see Figure 32). The 1912 mapping describes it as a "14-ft diameter arch culvert" (Figure 112). This culvert is not listed among the structures that were repaired during the improvement of the northern division in 1905-1908, but cylindrical holes in the masonry indicate that it was dismantled and re-laid at some point.

Physical Description

The Brandywine Creek Culvert is semicircular in form. The east headwall is constructed of cut and dressed sandstone and features curved wing walls (Photos 234 and 235). The opening is well-formed by voussoirs, wedge-shaped units whose converging sides are cut as radii of the center of the arch, which protrude from the headwall. The keystone, while not embellished, extends slightly beyond the voussoirs.

The central portion of the west headwall has been faced with concrete, possibly in 1905. The surface is smooth with no evidence of formwork (Photos 236 and 237). Curved masonry wing walls remain to either side. The masonry wing walls of the west headwall are in poor condition. Joint deterioration is prevalent and numerous stones have rotated out of alignment. Significant cracks, indicative of movement, exist in the concrete portion of the west wall. There is a metal pipe railing on top of the wall, associated with the access road.

Previous Documentation

The Brandywine Creek Culvert South was discussed in the 1993 draft HSR. It was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation SUM-3262-01. It is not included on the Park's List of Classified Structures.

Existing Conditions

The Brandywine Creek Culvert has continued to deteriorate since it was documented in 1993 and is in very poor condition (Photo 238). There is now significant encroachment of vegetation, mainly on the top surface of both headwalls and on the ledge created by the

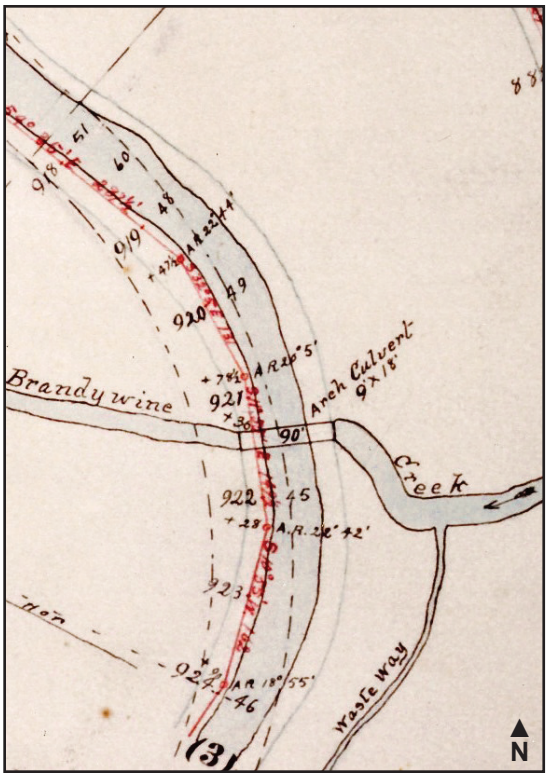


Figure 111. Survey map of Brandywine Creek Culvert, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

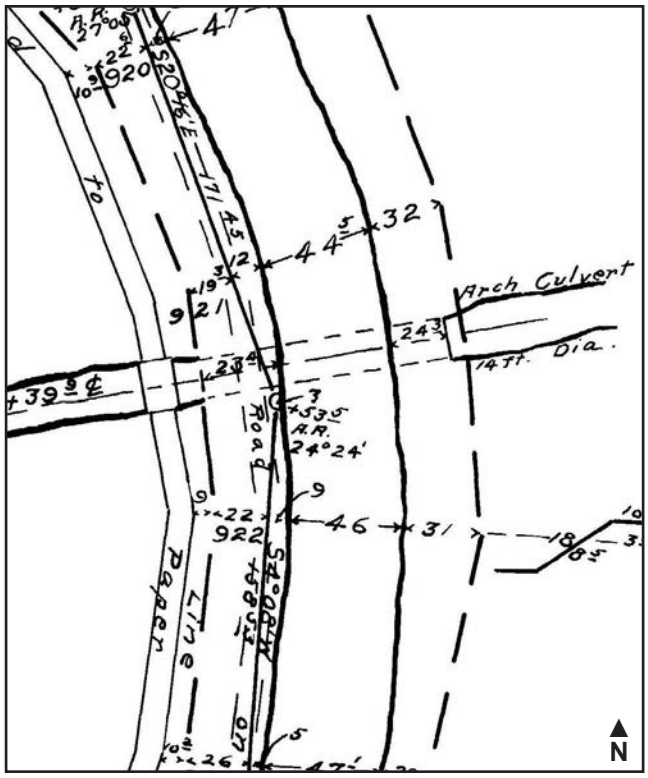


Figure 112. Survey map of Brandywine Creek Culvert, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 234. Brandywine Creek Culvert: east side

Photo 235. Brandywine Creek Culvert: east side

Photo 236. Brandywine Creek Culvert: west side

Photo 237. Brandywine Creek Culvert: west side

Photo 238. Brandywine Creek Culvert: view of west side in 1993

Photo 239. Brandywine Creek Culvert: west side, view of damage caused by tree

protruding voussoirs on the east headwall. There is a small tree growing out of each wing wall on the west side of the culvert, forcing apart and dislodging the stones (Photo 239). Other trees are growing from the top of the structure.

Masonry of the east headwall is in relatively good condition. Joint deterioration is limited to isolated areas but is more pronounced than in 1993. Missing mortar and the subsequent lack of bonding between stones has resulted in individual stones moving out of alignment in the lower portion of the southeast wing wall, and there is a large crack near the end of the wing wall which extends through four courses of the stonework.

The masonry wing walls of the west headwall are in poor condition. Joint deterioration is prevalent and numerous stones have rotated out of alignment so that neither wall is vertical. Significant cracks, indicative of movement, exist in the concrete portion of the west wall. A section of concrete has spalled from the wall, exposing the stones underneath.

Brandywine Creek exhibits obvious evidence of recent flooding, erosion, and lateral channel migration which have adversely affected the structural integrity of the culvert. Gravel and concrete have been placed behind the headwalls and wing walls as a short-term repair to replace soil washed away by floods (Photos 240 and 241). More comprehensive repairs are urgently needed, including masonry repairs, removal of trees and other vegetation, and stream channel improvements.

Photo 240. Brandywine Creek Culvert: west side, view of eroded soil behind headwall

Photo 241. Brandywine Creek Culvert: east side, view of eroded soil behind headwall

# WASTE STRUCTURES

## Waste Structures: Description and Function

Waste structures are control components that regulate the level of the water within the canal and provide protection during conditions of high water. They include both flood gates and waste weirs, in some cases combined in a single structure. A flood gate is a sluice (a manmade channel for conducting water) placed in a dam or embankment, with valves or gates that regulate the flow of water. A waste weir is a low dam located in line with the inner edge of the canal, which allowed excess water to flow over it and into a waste way that returned it to the river; its purpose was to avoid erosion and damage to the towpath caused by high water overtopping the banks in an uncontrolled manner. The high-water waste weirs should not be confused with the waste ways around the locks, which also were commonly called "waste weirs." Both high-water waste weirs and flood gates are generally located in places where the canal and river are close to each other to make the waste way as short as possible.

Seven of the eight surviving waste structures were built during the 1905-1909 improvement of the northern division, in some cases replacing earlier stone masonry structures that served the same purpose. The only exception is the Bolanz Flood Gate, a stone masonry structure dating to the original construction of the canal but completely rebuilt by the National Park Service about 1990. The early reports of the canal commissioners and engineers provide very little information concerning the original waste structures, and no plans for them have survived (see Section 1B). The 1825 construction contracts for the 22 miles of canal within Cuyahoga Valley National Park mention only one waste weir (Bolanz). The documentary record contains general references to others, but their precise locations are unknown prior to 1892. The 1892 survey mapping of the Ohio and Erie Canal is the first definitive record that we have regarding the locations of individual waste structures. It shows seven waste weirs and two flood gates in the Park, none of which have survived.

The 1912 mapping shows fourteen waste structures, including eight flood gates, two waste weirs, and four combination structures. Today there are visible remains of eight of the fourteen. Some structures along the unwatered section of canal apparently were buried or destroyed by natural processes after the abandonment of the canal or, since they were no longer needed to maintain water levels in the canal, during construction of the towpath trail. Structures along the watered section were maintained by the American Steel and Wire Company until 1992.

## Defining Features

Except for the Bolanz Flood Gate, all of the waste structures in the Park are constructed of concrete poured into wooden forms. For both stone and concrete structures, key elements of the original design with later modifications (if dating to the period of significance) are character defining features. These design elements include the surface finish and the dimensions of the opening, together with the concrete or masonry guides for the gates, even if the gates and operating mechanisms are no longer extant. For structures along the watered section of canal, any surviving components of the wooden gates and operating mechanisms that date to the period of significance are character defining features.

## Inventory

The following extant waste structures within Cuyahoga Valley National Park are historic features dating to the Ohio and Erie Canal's period of significance (1825-1913) and are discussed in this section. There were others which have no visible remains and are not discussed. The first four listed structures are located along the unwatered section of canal and the last four are along the watered section.

- Flood Gate (Station 1378+31)
- Bolanz Flood Gate (Station 1305+46)
- Goose Pond Waste Weir (Station 863+50)
- Hooker's Run Flood Gate (Station 838+34)
- Sagamore Creek Flood Gate and Waste Weir (Station 638+10)
- Waste Weir (Station 636+10)
- Flood Gate (Station 613+00)
- Waste Weir (Station 460+44)

**Flood Gate, Station 1378+31**

Location

Possible buried remains of a concrete flood gate are located at Station 1378+31 between Mile Markers 28 and 29, about 400 feet north of Ira Road and 0.25-mile south of Lock No. 26 (Figure 113). This flood gate was constructed during the improvement of the northern division between 1905 and 1909. It is not shown on the 1892 survey mapping, and there is no other documentation to indicate that a waste structure existed at this location prior to the 1905-1909 improvement program.

Physical Description

The remains of this structure may have been buried during construction of the towpath trail in the early 1990s. A small square section of degraded concrete is visible at the present towpath surface, immediately adjacent to the trail (Photo 242). It conforms to the location of the flood gate depicted on the 1912 Silliman survey mapping. The degraded concrete could be the top of one of the side walls or it could be rubble.

Previous Documentation

This possible buried flood gate was not documented in the 1993 draft HSR, and its existence was not known prior to the 2017 survey. It has no Ohio Historic Inventory number and is not included on the Park's List of Classified Structures.

Existing Conditions

The condition of the former flood gate is unknown and cannot be assessed without archeological investigation. It should be treated as a potential archeological resource which dates to the period of significance for the Ohio and Erie Canal and should be considered a potential contributing feature.

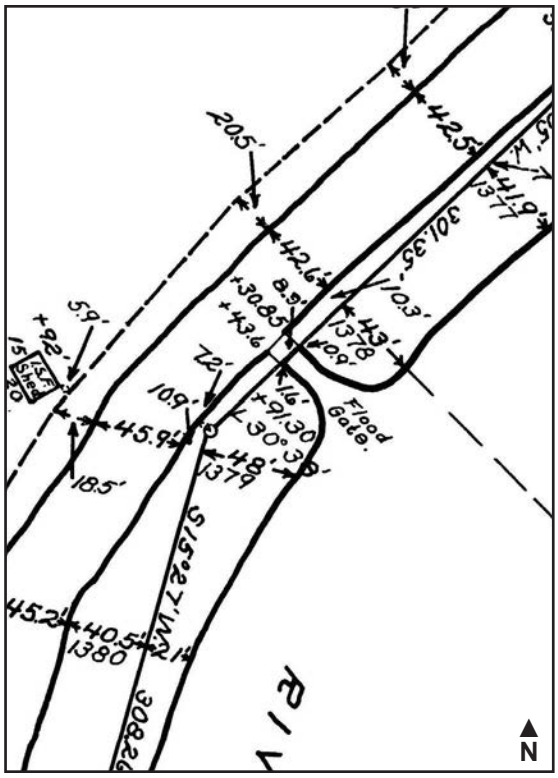


Figure 113. Survey map of Flood Gate at Station 1378+31, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 242. Flood Gate at Station 1378+31: top of buried concrete structure

**Bolanz Flood Gate, Station 1305+46**

Location

The Bolanz Flood Gate, located 625 feet south of Bolanz Road and 0.44-mile south of Lock No. 27 near Mile Marker 27, is the only existing waste structure in the Park which is known to date to the original construction of the Ohio & Erie Canal in 1825-1827. Unlike others it was not replaced by a new concrete structure during the improvement of the northern division in 1905-1909. It appears on both the 1892 and 1912 mapping (Figures 114 and 115).

Physical Description

The flood gate consists of a masonry sluice composed of parallel walls which decrease in height towards the discharge. Wing walls placed perpendicular to the side walls are located along the canal berm. Cylindrical holes in the masonry indicate that the structure was dismantled and re-laid, presumably during the 1905-1909 improvement of the northern division. The 1892 mapping indicates that a waste weir formerly was located just north of the flood gate, but no evidence of it survives today.

Previous Documentation and Restoration

Shortly before the field survey for the 1993 draft HSR report and during construction of the towpath trail, this structure was completely dismantled and rebuilt. The 1993 report noted:

> Recent improvements, associated with the development of the towpath, include stabilization of the historic fabric and the installation of a bridge across the channel of the masonry sluice.
>
> Prior to recent improvements, the historic structure was in extremely poor condition. Missing mortar and the subsequent lack of bonding between stones had resulted in individual stones rotating out of alignment. Numerous stones had been dislodged and were located within the stream bed. The masonry had deteriorated and cracked corners were rounded by physical abrasion. No evidence of profiled stonework that may have received a flood gate was apparent.
>
> The structure was dismantled and re-laid; dislodged stones were incorporated. A drainage system was installed behind the walls. While deterioration of the stones resulted in joints wider than that historically appropriate, the structure has been returned to a stable condition and contributes to the overall historic character of the corridor.[270]

270. Cossell, *Ohio and Erie Canal*, 118-119.

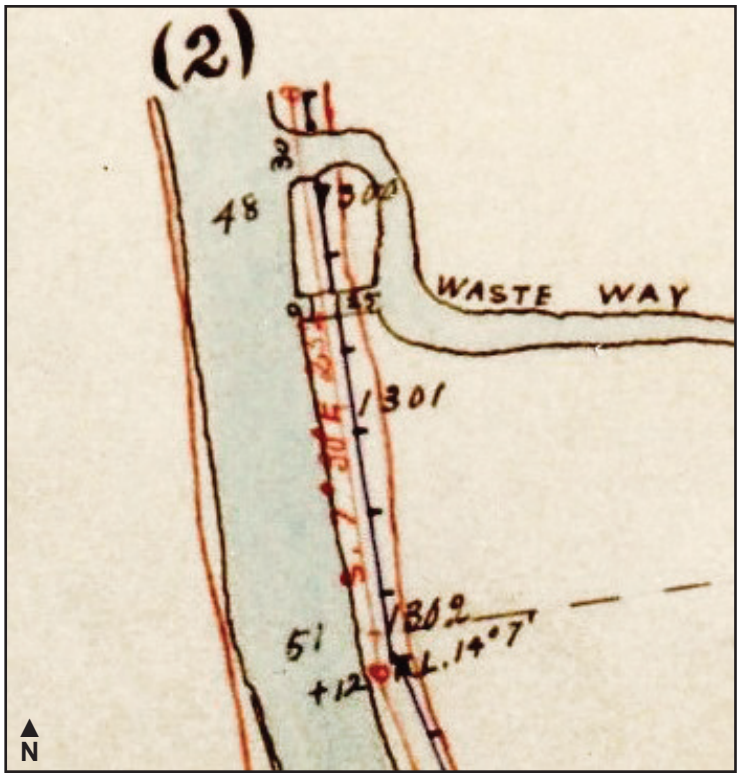


Figure 114. Survey map of Bolanz Flood Gate, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

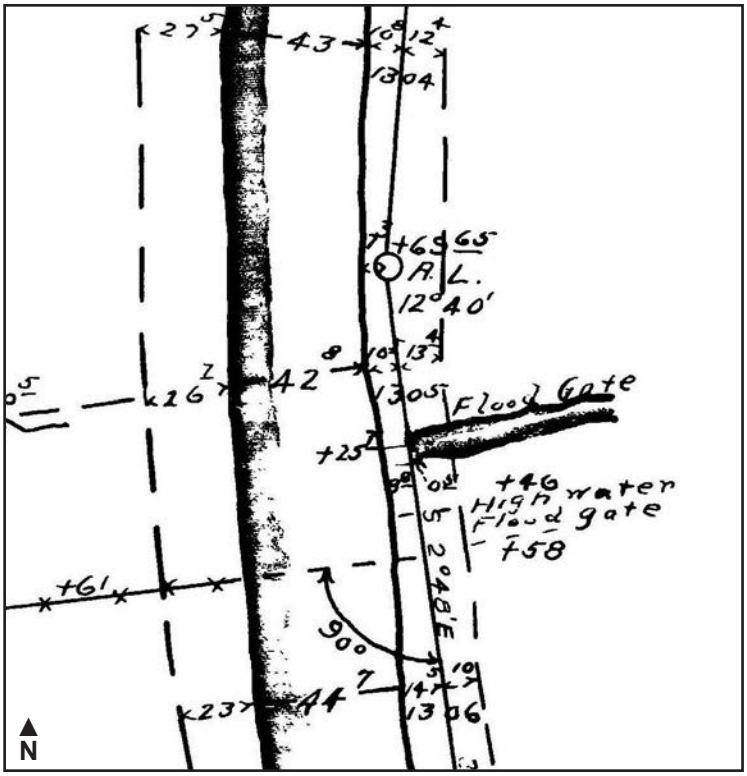


Figure 115. Survey map of Bolanz Flood Gate, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

The Bolanz Flood Gate was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation SUM-3244-07. It is not included on the Park's List of Classified Structures.

Existing Conditions

The 2017 field survey revealed the reconstructed flood gate to be in overall fair condition (Photos 243-247). Scouring within the stream channel has undercut both side walls; at the time of the field survey the water level was very low, exposing courses of unreconstructed, unmortared masonry below the reconstructed walls. There is evidence of settling in the form of a horizontal crack in the mortar between stones in the southeast wall. Some stones in the downstream wing walls are unmortared but appear to be stable. Vegetation is growing on top of the walls and from some of the joints between unmortared stones. The upstream side of the structure is in good condition with no deterioration or undercutting. Rubble stone in the downstream channel appears to have been laid in as rip-rap erosion protection during reconstruction. The wood deck of the 1992 pedestrian bridge is deteriorated.

Photo 243. Bolanz Culvert: view from east

Photo 244. Bolanz Culvert: detail view of reconstructed south sidewall, looking southwest

Photo 245. Bolanz Culvert: detail view of north reconstructed north side wall, looking northwest

Photo 246. Bolanz Culvert: west side looking east

Photo 247. Bolanz Culvert: vegetation on top of walls

## Goose Pond Waste Weir and Flood Gate, Station 863+50

Location

The Goose Pond Waste Weir and Flood Gate is located 0.8-mile north of Highland Road near Mile Marker 19 (Figure 116). It was constructed during the 1905-1909 improvement of the northern division. The present concrete structure replaced an earlier waste weir, shown on the 1892 survey mapping as a wooden bridge supported by stone abutments. The original weir was repaired in 1898 and 1899, and a new towpath bridge was constructed in 1901, prior to its complete replacement in 1907-1909.[271] It was not repaired or altered during construction of the towpath trail although the National Park Service installed a wood deck on top of the piers to carry the trail across the weir.

Physical Description

The structure is composed of two integrated components, a waste weir to the north and a flood gate to the south (Figure 117). The waste weir consists of a low concrete wall segmented by four piers and two abutments which rise above the wall to support a deck. The weir portion of the structure is 60.0 feet long and 13.5 feet high with openings that vary from 9.5 feet to 12.0 feet wide. The southernmost pier serves as a side wall of the flood gate, a concrete sluice which once supported wood gates. The flood gate opening is 6.0 feet wide. The Resource Management Division's flat files contain a 1907 plan of the structure.[272]

A wood deck installed by the Park Service spans the piers and abutments, providing continuity of the towpath trail (Figure 118).

Previous Documentation

The 1993 draft HSR stated:

> The historic structure appears to be relatively sound and no indications of movement are evident. While the concrete is exhibiting signs of deterioration, there has not been a significant loss of fabric. The finish surface remains virtually intact and evidence of the formwork is visible. Indentations which received the flood gate are apparent and a steel rod protrudes from the indent on the north sidewall. Although efflorescence is prevalent, horizontal cracking and spalling are limited. The encroachment of vegetation is generally restricted to the presence of moss, which is most severe on the west face of each pier."[273]

271. Unrau and Scrattish, *Historic Structure Report,* 164.
272. Engineers Office Ohio Canal, "Improvement, Northern Division, Ohio Canal, Plan of Sluice and Spill, Sta. 865" (April 1907), Cuyahoga Valley National Park, Resource Management Division files.
273. Cossell, *Ohio and Erie Canal*, 117.

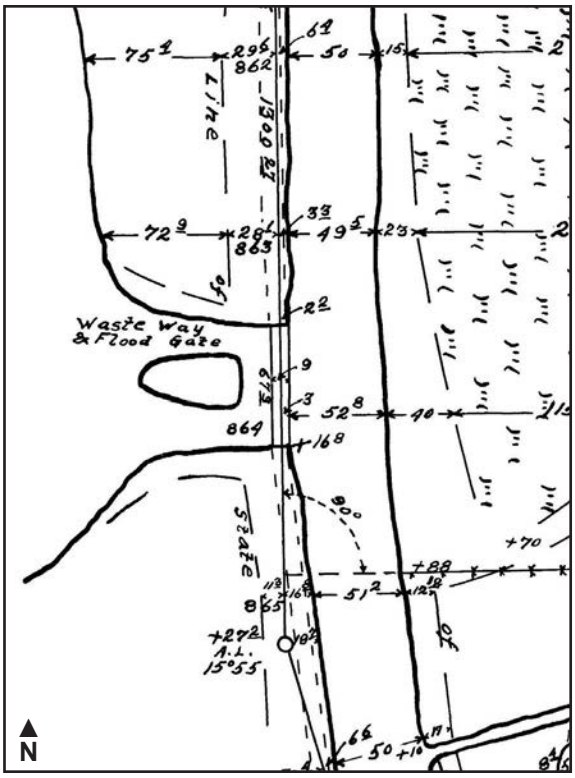


Figure 116. Survey map of Goose Pond Waste Weir, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

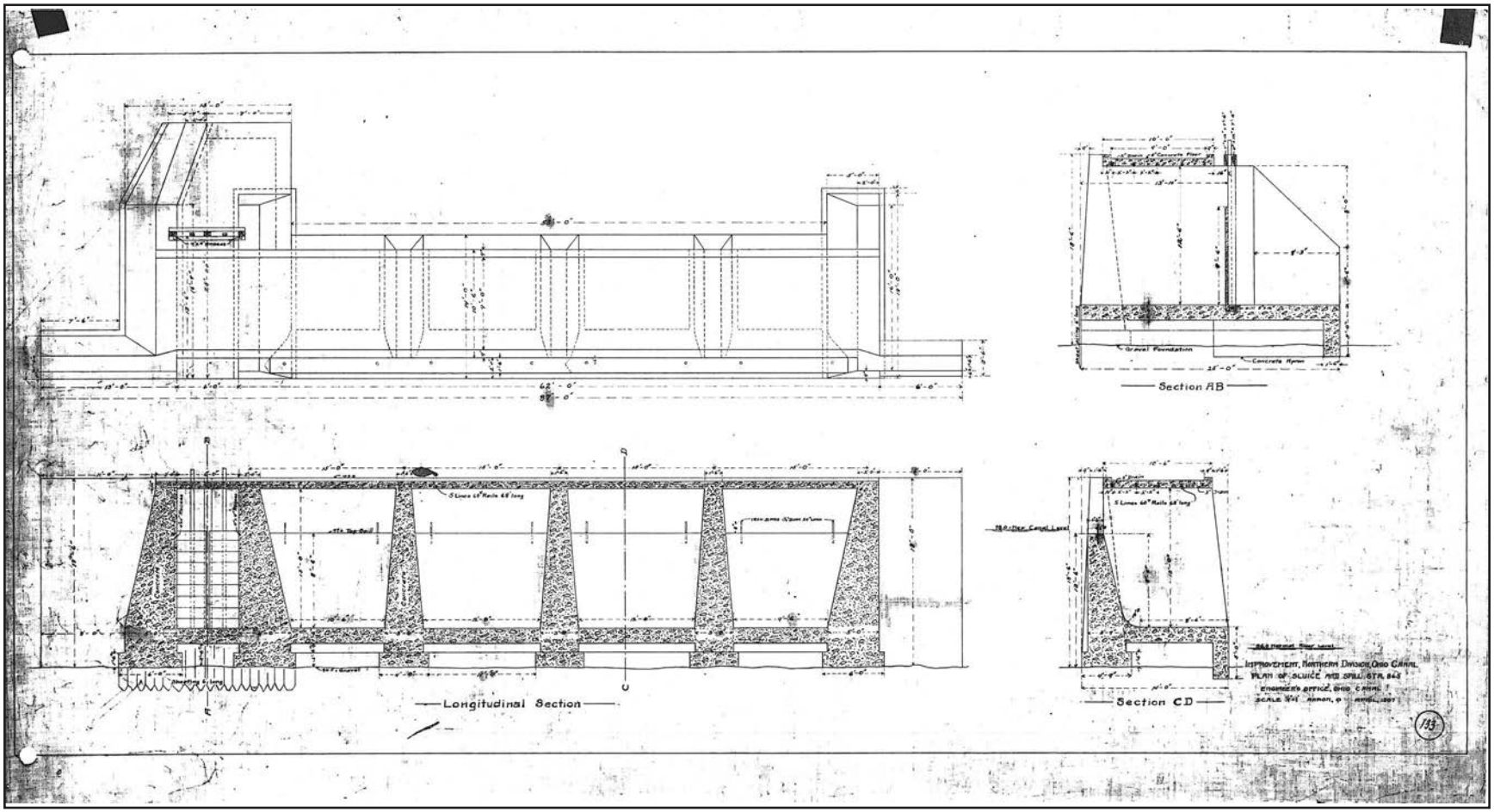


Figure 117. 1907 design plans, Goose Pond Waste Weir and Flood Gate (*Source:* Engineers Office Ohio Canal, *Plan of Sluice and Spill, Sta. 865*, Cuyahoga Valley National Park, Resource Management Division files)

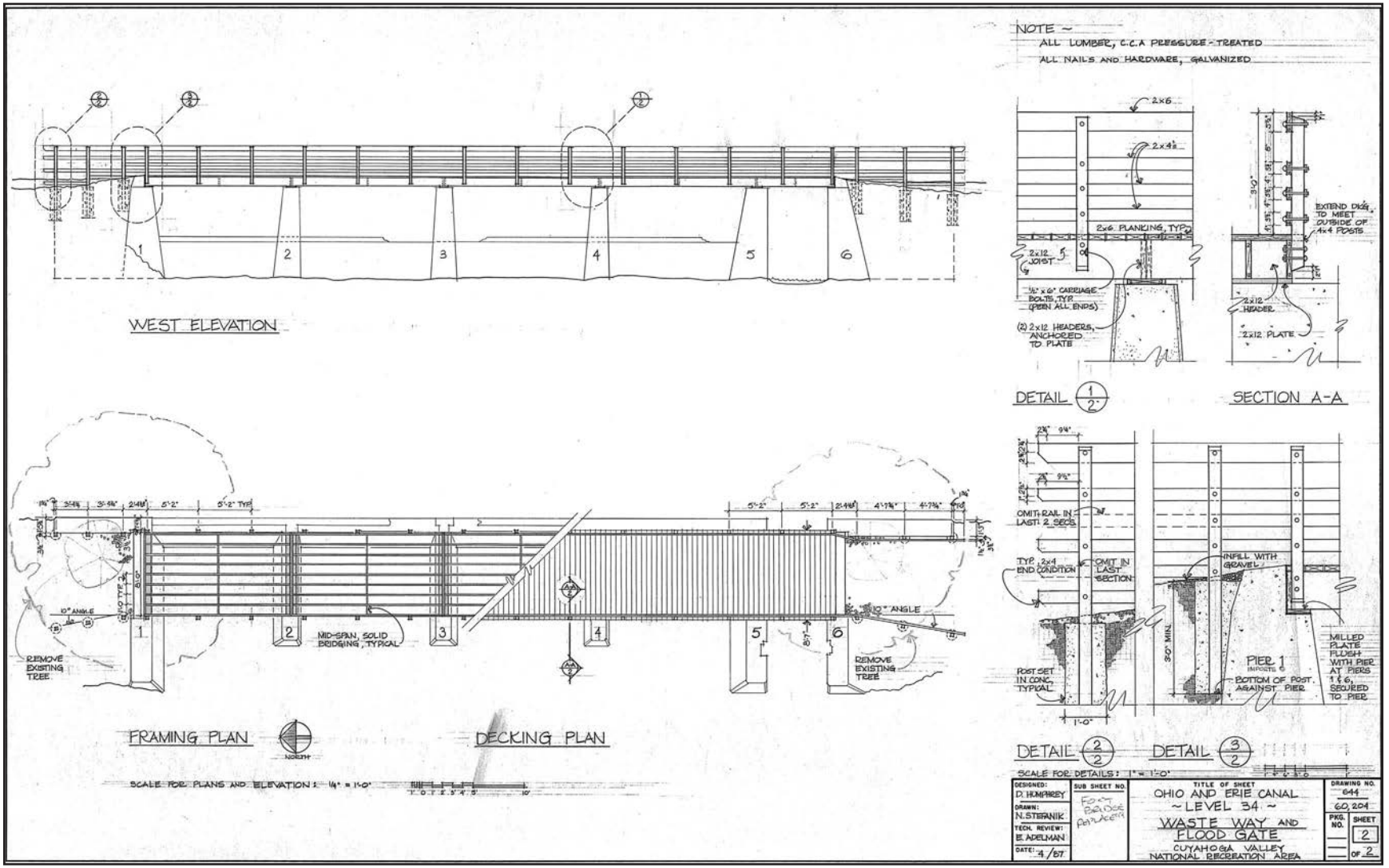


Figure 118. 1987 design plans for bridge at Goose Pond Waste Weir and Flood Gate (*Source:* Cuyahoga Valley National Recreation Area, *Ohio and Erie Canal Level 34, Waste Way and Flood Gate,* Cuyahoga Valley National Park, Resource Management Division files)

The Goose Pond Waste Weir and Flood Gate was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation SUM-3248-01. It is not included on the Park's List of Classified Structures.

Existing Conditions

The 2017 field survey suggested that the condition of the Goose Pond Weir has not changed significantly since 1993 (Photos 248-256). The growth of moss and other invasive vegetation continues to be an issue on the top and sides of the piers. One of the piers exhibits considerable spalling of the concrete and has a large horizontal crack.

Photo 248. Goose Pond Waste Weir: west side, view looking north across structure

Photo 249. Goose Pond Waste Weir: east side, view looking north across structure

Photo 250. Goose Pond Waste Weir: view of waste weir looking northwest

Photo 251. Goose Pond Waste Weir: detail view of weir looking west, note horizontal crack in pier

Photo 252. Goose Pond Waste Weir: detail view of weir, south end, view looking west

Photo 253. Goose Pond Waste Weir: detail view of weir, looking northeast

Photo 254. Goose Pond Waste Weir: detail view of flood gate, looking north

Photo 255. Goose Pond Waste Weir: detail view of flood gate looking south

Photo 256. Goose Pond Waste Weir: view of flood gate looking east

**Hooker's Run Flood Gate, Station 838+34**

Location

This flood gate, located 1.3 miles north of Highland Road and 0.5-mile south of Lock No. 35 between Mile Markers 18 and 19, is among the many waste structures constructed during the improvement of the northern division between 1905 and 1909 (Figure 119). It is not shown on the 1892 survey mapping, and there is no other documentation to indicate that a waste structure existed at this location prior to the 1905-1909 improvement program.

Physical Description

The waste structure consists of a concrete sluice which presumably once featured wood flood gates and served as abutments for a towpath bridge (Photo 257). The sluice features two parallel concrete walls which decrease in height toward the discharge. Wing walls, placed perpendicular to the side walls, are located along the interior side of the towpath. A wood towpath bridge installed by the National Park Service in the early 1990s spans the channel of the concrete sluice (Photo 258).

Previous Documentation

The 1993 draft HSR noted:

> The historic fabric is in relatively good condition. The finish surface of the poured concrete is generally intact and evidence of the formwork is apparent. Indentations which received the gate are visible and a steel rod protrudes from the indent on the south wall.
>
> Deterioration is limited to surface-related concerns. Spalling is most severe at the lower portion of the southeast wing wall and the south sidewall. An area of the north sidewall was previously underpinned with an apron of concrete; the creek bed is now lower and the apron is undermined. The encroachment of vegetation is limited to moss and vines along the top surface of the discharge walls.
>
> Visible improvements to the historic structure are limited to the installation of supplemental concrete at the deteriorated top surface of the walls.[274]

The Hooker's Run Flood Gate was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation SUM-3247-01. It is not included on the Park's List of Classified Structures.

274. Cossell, *Ohio and Erie Canal*, 114.

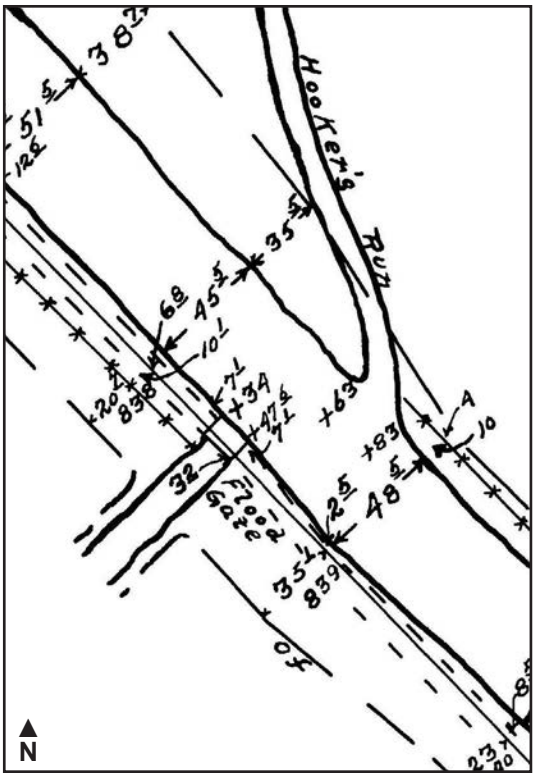


Figure 119. Survey map of Hooker's Run Flood Gate, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 257. Hooker's Run Flood Gate: view of west side looking northeast

Photo 258. Hooker's Run Flood Gate: view of pedestrian bridge and trail looking south

Existing Conditions

The 2017 field survey revealed that the Hooker's Run Flood Gate has deteriorated somewhat since 1993. It appears that some additional stone rip-rap was placed adjacent to the southeast wing wall as erosion protection (Photo 259), but there continues to be serious scouring at the bottom of both side walls, especially on the upstream side (Photos 260 and 261). This is causing fabric loss and undercutting of the foundations of the walls. There are horizontal cracks in both the north and south side walls that are not visible in the 1993 photographs, possibly related to the undercutting. The creek bed has now eroded well below the level of the concrete apron and gate recesses (Photo 262). The concrete repairs at the top of the walls on the upstream side, noted in the 1993 report, seem to be holding up well (see Photo 259). A few vines and plants are growing on top of the walls and from cracks in the sides and will cause damage over time (Photo 263).

Photo 259. Hooker's Run Flood Gate: east side looking south, note concrete repairs

Photo 260. Hooker's Run Flood Gate: north wall looking northeast

Photo 261. Hooker's Run Flood Gate: south wall looking northeast

Photo 262. Hooker's Run Flood Gate: indentations in north side wall

Photo 263. Hooker's Run Flood Gate: detail view of south side wall, showing vegetation

**Sagamore Creek Flood Gate and Waste Weir, Station 638+10**

Location

This combination flood gate and waste weir is located along the watered section of canal, approximately 2.4 miles north of Lock No. 36 and 0.5-mile south of Lock No. 37, between Mile Markers 14 and 15 (Figure 120). It was constructed in 1905 during the improvement of the northern division. This concrete structure replaced an earlier "waste way with flat bridge" shown on the 1892 mapping. There is no documentation to suggest that a flood gate existed at this location prior to 1905.[275] Since it is located on the watered section of canal it continued to be maintained after the 1913 flood by the American Steel and Wire Company, which replaced the flood gates and guide timbers in 1971.[276] It was not repaired or altered during construction of the towpath trail, although in 1991 the National Park Service installed a wooden deck on top of the piers to carry the trail across the weir.

Physical Description

The structure is composed of two integrated components: a flood gate to the south and a waste weir to the north (see Figure 35). The flood gate consists of a concrete sluice with 4 wooden gates each individually controlled by a rack and pinion operator. This structure is virtually identical to the flood gate at Station 613+00. The waste weir consists of a concrete wall which extends from the north sidewall of the flood gate terminating at a concrete wing wall approximately 20 feet to the north and is segmented by a centrally located pier. This wall, located in line with the west berm and equal in height to the natural water line of the canal, regulates the level of water within the prism. Excess water is directed by a waste way into Sagamore Creek just upstream of the confluence of the creek and the Cuyahoga River.

A wooden bridge extends across both components providing continuity of the towpath. The bridge consists of steel stringers and beams supported by the side walls of the sluice and the pier and wing wall of the waste weir. The deck is composed of treated random-width boards.

Previous Documentation

The structure was inspected and evaluated by the Environmental Design Group (EDG) in 1991. EDG rated its structural condition as poor but concluded that it did not require replacement and could be returned to a state of full utility through repair.[277]

The 1993 draft HSR indicated that the structure was very deteriorated at that time:

> The overall condition of the concrete is poor. Erosion and disintegration of concrete caused by physical abrasion and weathering is prevalent. In severely

275. Unrau and Scrattish, *Historic Structure Report,* 164.
276. Letter from Smith to Gienow (November 13, 1970).
277. Environmental Design Group, Inc., "Towpath Structures."

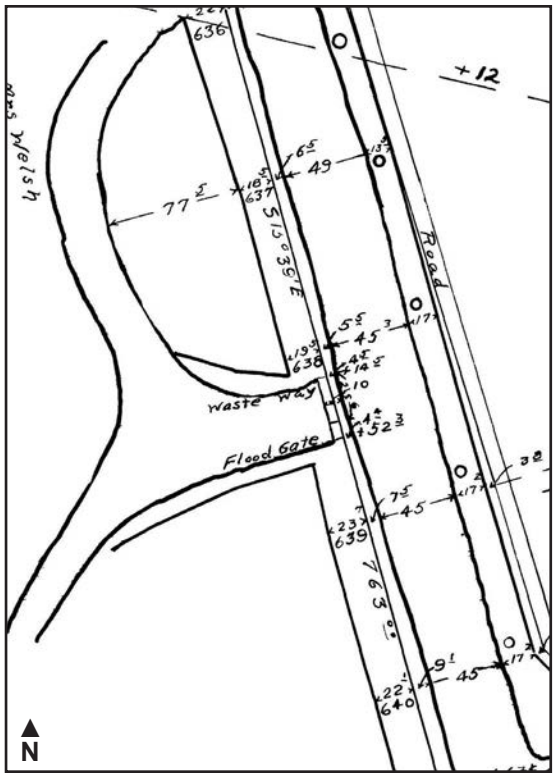


Figure 120. Survey map of Sagamore Creek Flood Gate and Waste Weir, from *Map of the Ohio Canal, Cuyahoga County, Ohio,* G.W. Silliman, 1912, retraced 1916

> affected areas, the damage ranges from 4 to 9 inches in depth and has resulted in a significant loss of concrete.
>
> Adjacent to the wooden gates, the concrete has completely eroded. Horizontal cracking exists on both sidewalls of the sluice; while the cracks vary in severity, the location and pattern indicates that the cracks are the result of inadequate bonding between pours of concrete forming a cold joint. The most severe crack extends completely through the cross section of the northern sidewall, which is currently held in place by gravity.
>
> The gates and associated framework, as with all wood elements, are prone to deterioration and are exhibiting signs of decay. The towpath bridge, although in relatively good condition, is restricted in its load rating due to the lack of lateral bracing on the stringers and the bearing capacity of the concrete supports. [278]

The flood gate and waste weir was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation CUY-6535-19. It is not included on the Park's List of Classified Structures.

Existing Conditions

The 2017 field survey revealed that the conditions described in 1993 continue today with no evidence of any significant repairs made during the interim. The wooden components are much more deteriorated than in 1993, with one set of flood gates completely missing, making the structure non-functional (Photos 264 and 265). The mechanism for raising and lowering the gates also is missing. Steel sheeting has been installed between the structure and the canal so that water does not enter the flood gate and weir. The concrete components are severely spalled and have several large horizontal cracks that compromise their structural integrity (Photos 266-270). The concrete apron is very deteriorated. Vegetation is a major issue at this structure, with small trees and shrubs growing adjacent to the abutments and vines and moss covering the concrete surfaces (Photo 271).

278. Cossell, *Ohio and Erie Canal*, 54-55.

Photo 264. Sagamore Creek Flood Gate and Waste Weir: overview in 1993 looking east

Photo 265. Sagamore Creek Flood Gate and Waste Weir: overview in 2017 looking east

Photo 266. Sagamore Creek Flood Gate and Waste Weir: detail view of weir looking northeast, note large horizontal crack in pier

Photo 267. Sagamore Creek Flood Gate and Waste Weir: detail view, south wall of flood gate

Photo 268. Sagamore Creek Flood Gate and Waste Weir: deterioration of pier

Photo 269. Sagamore Creek Flood Gate and Waste Weir: detail view of flood gate sidewall, note horizontal cracks

Photo 270. Sagamore Creek Flood Gate and Waste Weir: indentations for stringers

Photo 271. Sagamore Creek Flood Gate and Waste Weir: east side looking south

## Sagamore Creek Waste Weir, Station 636+10

Location

This waste weir is located near the intersection of Canal and Sagamore Roads along the watered section of canal, approximately 0.5-mile south of Lock No. 37. The structure is immediately south of the Sagamore Creek Culvert (the original concrete culvert was constructed in December 1913 just after the end of canal navigation and replaced in 2005). It appears that the weir was integral to the function of the 1913 culvert; during flood conditions, the flow of Sagamore Creek exceeded the capacity of the old culvert, and water flowed over Canal Road into the canal prism. This weir provided an area where the excess water could escape the canal without causing damage to the towpath.

There is no documentation to suggest that a weir existed at this location prior to the construction of the concrete culvert in 1913. Both the culvert and the weir were constructed shortly after the devastating flood of that year.

Physical Description

The weir consists of a section of the towpath bank which is reduced in height and protected by a covering of concrete. For approximately 85 feet, the towpath is set at a lower elevation and is surfaced with a concrete slab (Photo 272). This lower area of the towpath is introduced at both ends by a concrete ramp flanked by low concrete walls with chamfered edges (Photo 273). The slab slopes down to the west generally conforming to the topography of the bank forming a discharge apron (Photos 274 and 275). Excess water is directed into a basin at the foot of the weir which is contiguous with the downstream channel of Sagamore Creek.

Previous Documentation

The 1993 draft HSR noted:

> The concrete of the weir is generally in good condition. There are several cracks which extend the full length of the sloped portion. The entire structure, however, has been lifted; this displacement is the result of freeze-thaw cycles. When water in the canal approaches the crest of the weir, water flows through the cracks. During periods when water in the canal is lower, water flows beneath the bottom edge of the sloped weir slab. These conditions indicate that the west bank of the canal is breached in this area.
>
> The basin at the foot of the weir has been significantly reduced in area by sediment. Sizeable trees are present in what used to be the basin, indicating that the conditions have existed for a considerable time. In addition, the alignment of Sagamore Creek has also been altered and now flows along the foot of the weir undercutting the base of the structure.

Photo 272. Sagamore Creek Waste Weir: overview looking north

Photo 273. Sagamore Creek Waste Weir: detail view looking south

Photo 274. Sagamore Creek Waste Weir: detail view looking north

Photo 275. Sagamore Creek Waste Weir: overview of discharge apron looking east

> ....Based on existing conditions, the structure is in fair condition and does not require replacement, but can be returned to a state of full utility through repair. [279]

The waste weir was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation CUY-6533-19. It is not included on the Park's List of Classified Structures.

Existing Conditions

The 2017 field survey suggested that the condition of the waste weir may be somewhat worse than in 1993. The concrete surface remains cracked and spalled (Photo 276). There is no evidence of any repairs made since 1993. The greatest threat to this structure is invasive vegetation, as small shrubs and plants are growing from every crack and spall in the concrete; if left unchecked their roots will continue to cause damage to the surface (Photos 276 and 277). This problem could be remedied fairly easily by patching the concrete.

279. Cossell, *Ohio and Erie Canal*, 52-53.

Photo 276. Sagamore Creek Waste Weir: detail view of discharge apron looking east

Photo 277. Sagamore Creek Waste Weir: view of cracks and invasive vegetation

**Flood Gate, Station 613+00**

Location

This concrete flood gate, located immediately south of Lock No. 37 and Fitzwater Road, is among the many waste structures constructed during the 1905-1909 improvement of the northern division (Figures 121 and 122). There is no documentation to indicate that a waste structure existed at this location prior to that time. Documented improvements after the abandonment of the canal as a waterway include an extension of the discharge apron (drawing prepared in November 1949) and replacement of the four wooden gates (drawing prepared in October 1960). These construction drawings are noted in the 1993 draft HSR but could not be located for the present survey.

Physical Description

The flood gate consists of a concrete sluice with four wooden gates each individually controlled by a rack and pinion operator. The sluice serves as the abutments for a wooden bridge which provides continuity of the towpath over the channel (Photos 278 and 279).

The upper portion of the sluice is comprised of a flat concrete slab and parallel side walls which decrease in height toward the discharge (Photo 280). The lower extension of the discharge apron, constructed of reinforced poured concrete, slopes downward generally conforming with the topography of the adjacent earthen hillside; the side walls splay outward and terminate in wing walls which are parallel to the flood gates. Excess water is directed by a waste way into the Cuyahoga River.

The gates are constructed of horizontal boards secured by vertical wood slats. The centrally located vertical member extends upward forming a stem on which a stationary gear rack is mounted. Rotating gear pinions, mounted approximately level with the towpath bridge, move the gates up or down within the associated wood framework. Horizontal boards, placed above the gates in their closed position, act as stop logs to prevent the flow of water through the sluice. The towpath bridge is supported by steel stringers laid unattached on the concrete abutments. The deck is composed of treated random-width boards.

Previous Documentation and Recent Repairs

The flood gate is not included on the Park's List of Classified Structures. It was inspected and evaluated by the Environmental Design Group (EDG) in 1991. EDG rated its structural condition as fair but concluded that it did not require replacement and could be returned to a state of full utility through repair.[280]

The 1993 draft HSR indicated that the flood gate was in fair condition at that time:

> The concrete sluice is exhibiting signs of deterioration. Significant cracking exists within the portions that serve as abutments for the bridge. This cracking is

280. Environmental Design Group, Inc., "Towpath Structures."

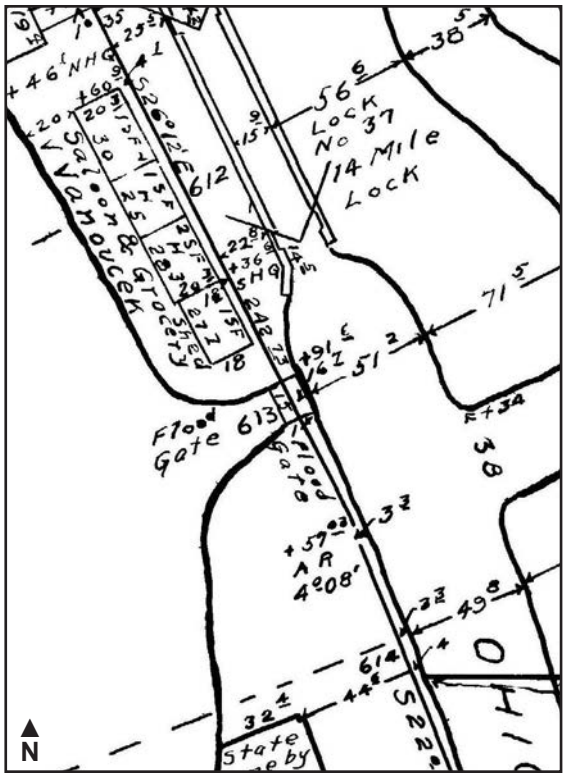


Figure 121. Survey map of Flood Gate at Lock No. 37, from *Map of the Ohio Canal, Cuyahoga County, Ohio,* G.W. Silliman, 1912, retraced 1916

Figure 122. Undated view of Lock No. 37 and Flood Gate, looking north (*Source:* Gieke, *A Photo Album of Ohio's Canal Era*, 66)

Photo 278. Flood Gate at Station 613+00: overview of flood gate looking south

Photo 279. Flood Gate at Station 613+00: view of flood gate looking west

Photo 280. Flood Gate at Station 613+00: view of flood gate and sluice looking east

> most severe on the south abutment which is currently braced by a wood board attached to the framework of the south gate. The location and pattern indicate that these cracks are the result of inadequate bonding between pours of concrete forming a cold joint. The remainder of the sluice appears structurally stable. Visual indications of deterioration are limited to surface-related concerns such as isolated areas of spalling and superficial cracking. Erosion and disintegration of surface concrete caused by physical abrasion is limited to those areas subjected to flowing canal water and is most apparent at the natural water line.
>
> The gates and associated framework, as with all wood elements, are prone to deterioration and are exhibiting signs of decay. The towpath bridge, although in relatively good condition, is restricted in its load rating due to the lack of lateral bracing on the stringer. [281]

In 2016 the National Park Service made emergency repairs to a canal breach on either side of the spillway, followed by more comprehensive rehabilitation of the flood gate, the bridge carrying the trail over the spillway, and the section of canal prism between the flood gate and adjacent Lock No. 37. Rehabilitation of flood gate and spillway consisted of repair/replacement of damaged concrete in the wing walls and abutments, repair/replacement of wood members of gates and frames, reattachment of cast-iron gear teeth to new vertical posts, and towpath repairs.[282]

Existing Conditions

The 2017 field survey indicated that the wood and metal components of the flood gate are in good condition after the 2016 repairs, and the structure is fully functional (Photos 281-283). However, concrete repairs seem to have been limited to the tops of the walls on the canal (east) side where it was necessary to provide a secure seat for the stringers that support the towpath bridge (Photo 284). The lower portions of the abutments remain very deteriorated with large horizontal cracks, especially in the southern abutment. On the river (west) side of the sluice, the concrete apron, side walls, and wing walls appear to be in approximately the same condition as in 1993, with only superficial cracks and spalling (Photos 285-288). Vegetation encroachment is limited mainly to the growth of moss on the side walls, especially the south wall, but a tree growing adjacent to the south wing wall will eventually cause damage and should be removed.

281. Cossell, *Ohio and Erie Canal*, 52-53.
282. Categorical Exclusion Form, PEPC Project No. 64265, Lock 37 Spillway/Floodgate Rehabilitation and Towpath Trail Approach Repairs, May 31, 2016, Cuyahoga Valley National Park, Resource Management Division files.

Photo 281. Flood Gate at Station 613+00: view of flood gate and side walls looking east

Photo 282. Flood Gate at Station 613+00: top of flood gate showing mechanism

Photo 283. Flood Gate at Station 613+00: gate mechanism from towpath trail bridge

Photo 284. Flood Gate at Station 613+00: view of flood gate looking west, note concrete repairs

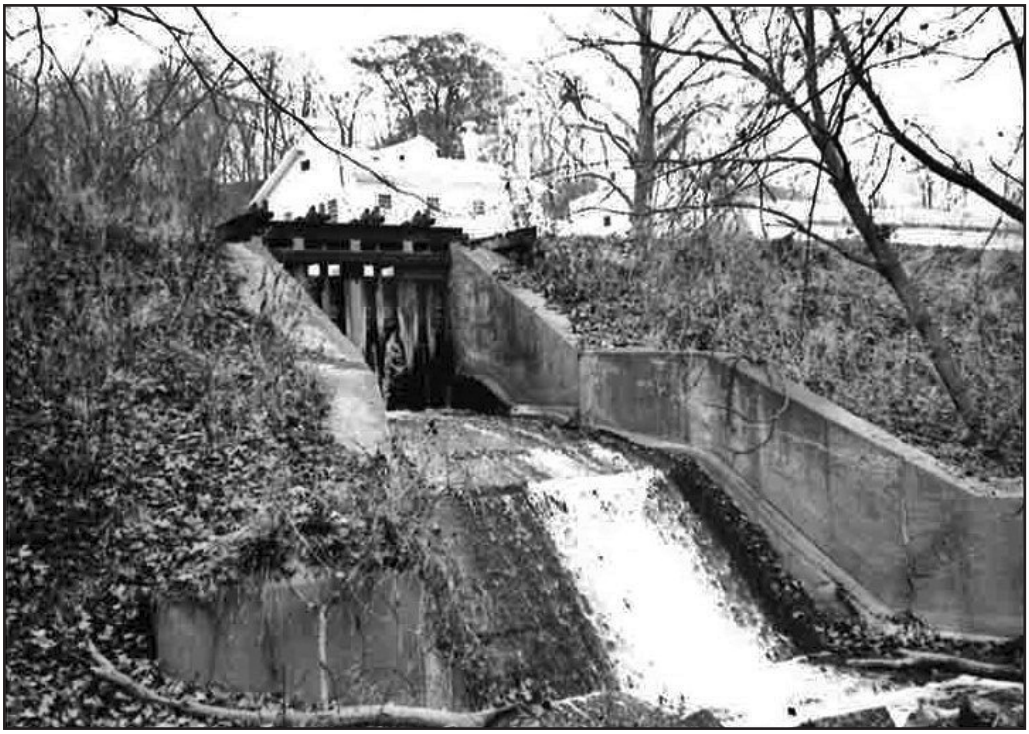

Photo 285. Flood Gate at Station 613+00: view of flood gate and sluice in 1993, looking southeast

Photo 286. Flood Gate at Station 613+00: north sluice sidewall

Photo 287. Flood Gate at Station 613+00: south sluice side wall

Photo 288. Flood Gate at Station 613+00: view of sluice from towpath trail bridge

**Waste Weir, Station 460+44**

Location

This waste weir is located approximately 550 feet south of Lock No. 39 along the watered section of canal (Figure 123). It was constructed during the 1905-1909 improvement of the northern division and replaced an earlier waste weir shown on the 1892 mapping as a wooden bridge supported by stone abutments. Sometime in the mid-20th century the associated waste way, which carried excess water to the Cuyahoga River, was replaced by a culvert.[283] The towpath formerly crossed the weir on a concrete deck, but the trail has been relocated to the west due to safety concerns.

Physical Description

The concrete weir consists of a low wall segmented by six piers which rise above the wall to support a deck (Photo 289). The wall, equal in height to the natural waterline in the canal, regulates the level of water within the prism. The piers are rectangular with chamfered vertical edges and evidence of formwork used during construction. Placed perpendicular to the canal, the piers support a reinforced concrete deck which served as a towpath bridge.

When the water level in the canal rises, water overflows into a basin located immediately to the west. The water is directed into a 42-inch corrugated metal culvert which was at one time tar coated. This pipe extends westward where it connected to a 72-inch reinforced concrete pipe that discharges into the Cuyahoga River. Approximately 50 feet of the pipe is exposed in an oxbow of the river.

Previous Documentation

The culvert was inspected and evaluated by the Environmental Design Group (EDG) in 1991. EDG rated the culvert's structural condition as fair but did not investigate the waste weir. The report concluded that the culvert did not require replacement and could be returned to a state of full utility through repair.[284]

The 1993 draft HSR stated:

> The structure appears to be relatively sound and no indications of movement are evident. The concrete, however, is exhibiting signs of deterioration. Most significant is horizontal cracking which exists at the mid point of the deck; the location and pattern indicate that the cracks are the result of inadequate bonding between pours of concrete forming a cold joint. While the surface of the concrete is spalling in isolated areas, there has not been a significant loss of material.

283. Environmental Design Group, Inc., "Towpath Structures," 3:2.
284. Environmental Design Group, Inc., "Towpath Structures."

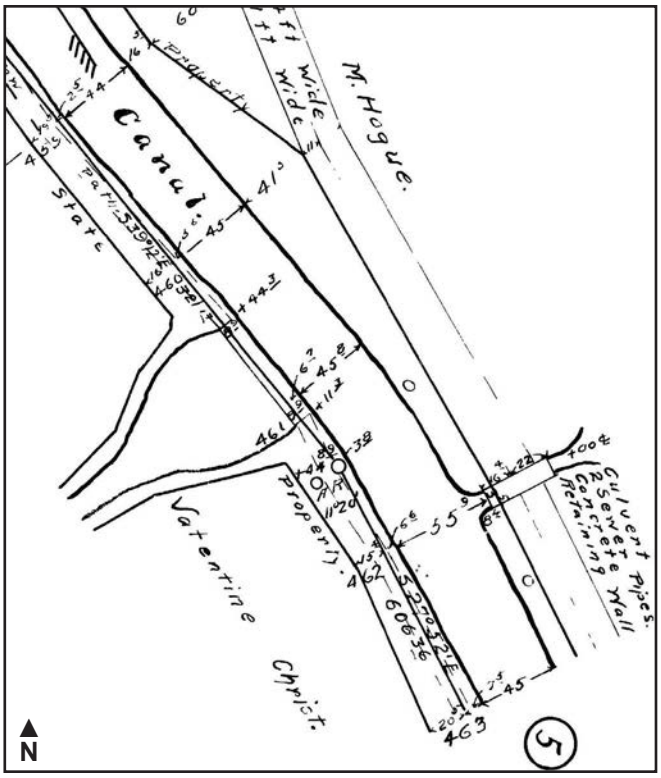


Figure 123. Survey map of Waste Weir at Station 460+44, from *Map of the Ohio Canal, Cuyahoga County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 289. Waste Weir at Station 460+44: overview from south

> Physical evidence to the west of the waste weir, including a shifted manhole cover and an accumulation of leaves and debris, suggests that the culvert is underdesigned. The towpath directly above the culvert shows signs of settlement and ponding, indicating that the crown may be damaged and material is being washed into the pipe. An exposed 6 inch gas line which crosses the basin is no longer utilized, but is maintained as an emergency supply line. [285]

The waste weir was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation CUY-6282-19. It is not included on the Park's List of Classified Structures.

Existing Conditions

The 2017 field survey revealed that the conditions described in 1993 are still present today with no evidence of any significant repairs made during the interim. Deterioration does not appear to be more advanced since 1993, and the structure seems to be functioning normally (Photos 290-294). The presence of water on the floor of the weir suggests that water is slowly leaking through cracks in the concrete. Vegetation growth is limited mainly to the apron and basin.

285. Cossell, *Ohio and Erie Canal*, 48-49.

Photo 290. Waste Weir at Station 460+44: overview from south in 1993

Photo 291. Waste Weir at Station 460+44: view looking northeast

Photo 292. Waste Weir at Station 460+44: view looking southeast

Photo 293. Waste Weir at Station 460+44: detail view looking east

Photo 294. Waste Weir at Station 460+44: view looking north, former towpath bridge over weir

# DAMS AND FEEDERS

## Dams and Feeders: Description and Function

Feeders were built to ensure an adequate supply of water for the canal, particularly along higher sections of the line. On the Ohio and Erie Canal, a feeder complex consisted of a V-shaped timber crib-dam across the river to create an impoundment; a set of head gates that diverted water from the river into the feeder and regulated the flow of water; the feeder channel, a wide ditch that carried water from the dam to the canal; and the waste gates, which returned excess water to the river. Sometimes there also were flood gates to protect the feeder from high water during periods of flooding. By the early 1830s there were twelve feeders along the entire length of the Ohio and Erie Canal, including two within what is Cuyahoga Valley National Park: one, built in 1827, at the head of the Pinery Narrows, and the other, built in 1830, just downstream from the village of Peninsula.

## Defining Features

The physical configuration and relationships of individual structures within a feeder complex are critical aspects of its design and function and thus are the most important character-defining features. For stone and concrete structures such as sluices, head gates, flood gates, and waste weirs, key elements of the original design with later modifications (if dating to the period of significance) are character-defining features. These design elements include the surface finish and the dimensions of the opening, together with the concrete or masonry guides for the gates, even if the gates and operating mechanisms are no longer extant. For timber crib-dams, important defining features include the length, height, and key elements of the original design with later modifications. For feeder channels the overall dimensions and the appearance as an earthen ditch for water transport are the character-defining features.

## Inventory

The two feeder complexes within Cuyahoga Valley National Park are discussed in this section.

- Peninsula Feeder Complex (Station 1109+75)
- Pinery Feeder Complex (Stations 771+50 to 163+00)

**Peninsula Dam and Feeder, Station 1109+75**

Location

The remains of the Peninsula feeder complex are situated along the unwatered section of the canal, immediately west of Lock No. 30 and approximately 0.4-mile north of State Route 303 (Streetsboro Road) between Mile Markers 23 and 24. The feeder complex is depicted on both the 1892 and 1912 survey mapping (Figures 124 and 125). The location is relatively remote, and there have been no improvements other than the development of the towpath as a multi-purpose trail. The trail has been slightly redirected from the original alignment of the towpath to bypass the deteriorated remains of the towpath bridge over the feeder channel.

The feeder was constructed in 1830 to provide an additional supply of water for the Cleveland-Akron section of the canal. The original complex consisted of a low brush and stone dam across the Cuyahoga River, which diverted water into the canal through a man-made channel approximately 132 feet in length. Head gates regulated the flow of water into the canal, and flood gates protected this short waterway from high water; the gates were supported by sluices constructed of cut stone. A bridge carried the towpath across the feeder. In 1906, during the improvement of the northern division, a new concrete feeder sluice was constructed, and the masonry flood gate sluice was dismantled and re-laid. The masonry abutments of the towpath bridge were also dismantled and re-laid and a new concrete deck installed. The Resource Management Division's flat files contain a circa 1905 plan of the sluices and gates (Figure 126).[286]

Physical Description

Surviving structural components of the complex include the concrete feeder sluice, the cut stone masonry flood gate sluice, the feeder channel, and the towpath bridge (Figure 127). A shallow spot in the river and a little rubble stone is all that remains of the dam (Photo 295).

The feeder sluice, which supported the head gates and directed water into the feeder channel, consists of parallel concrete walls topped by concrete coping (Photo 296). These walls decrease in height within the feeder and are extended by low masonry walls constructed of rubble (Photos 297 and 298). At the mouth of the feeder, the east wall of the sluice is protected by a concrete wing wall; the west wall is integral with the north wall of the flood gate sluice which meets the feeder sluice at a 58-degree angle and is composed of ashlar, dressed sandstone with tooled margins (Photos 299 and 300). The side walls of the flood gate sluice step down toward the river. The side walls of both sluices contain channels that once were fitted with wooden gates.

The towpath bridge consists of masonry abutments supporting a concrete deck reinforced with steel rails and wire netting (Photo 301).

286. Engineers Office Ohio Canal, "Improvement of Northern Division, Ohio and Erie Canal, Sluice Gate and Feeder at Peninsula Dam" (1905), Cuyahoga Valley National Park, Resource Management Division files.

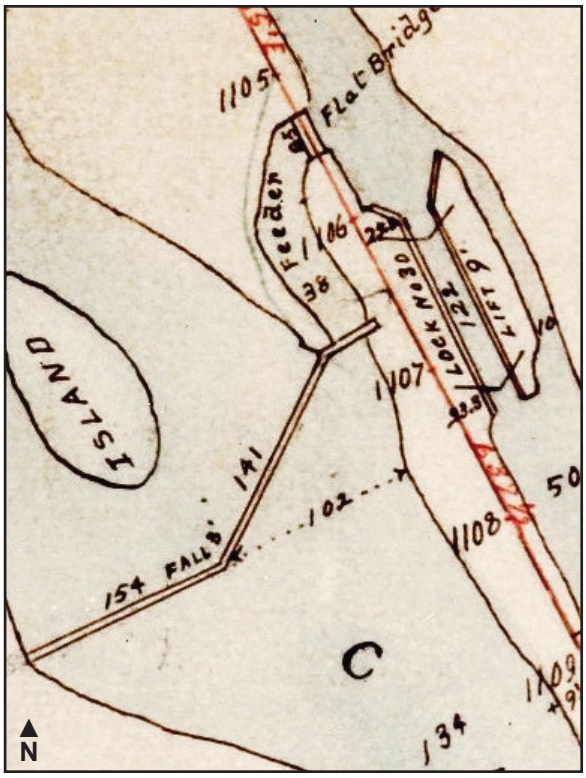


Figure 124. Survey map of Peninsula Feeder, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

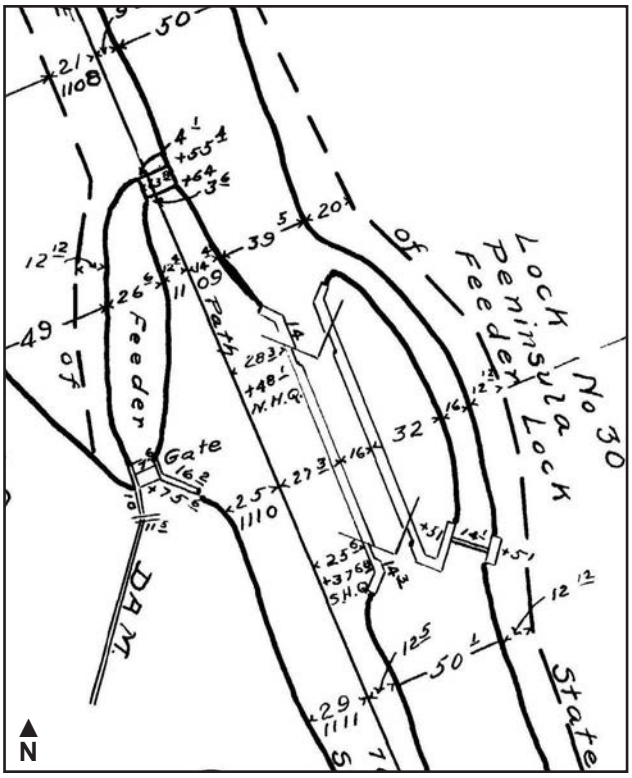


Figure 125. Survey map of Peninsula Feeder, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

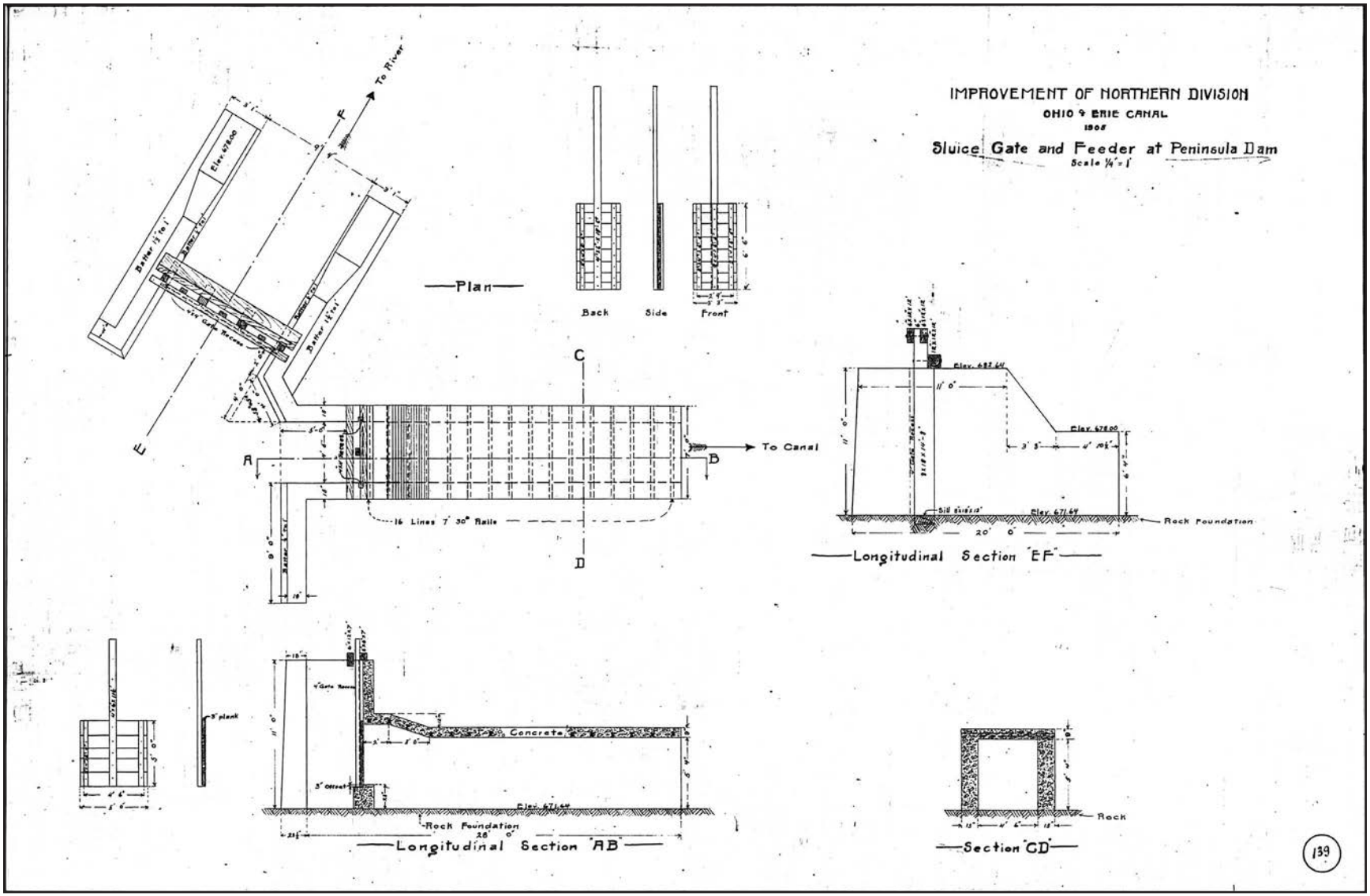


Figure 126. 1905 design plans, Peninsula Feeder (*Source:* Engineers Office Ohio Canal, *Plan of Sluice Gate and feeder at Peninsula Dam*, Cuyahoga Valley National Park, Resource Management Division files)

Figure 127. Site plan, Peninsula Feeder (*Source:* Cuyahoga Valley National Park)

Photo 295. Peninsula Feeder: site of former dam looking west

Photo 296. Peninsula Feeder: view of concrete sluice gate (right) and stone flood gate (left), looking north

Photo 297. Peninsula Feeder: view of feeder sluice looking northwest

Photo 298. Peninsula Feeder: view of feeder sluice looking south

Photo 299. Peninsula Feeder: flood gate looking west

Photo 300. Peninsula Feeder: flood gate looking east

Photo 301. Peninsula Feeder: towpath bridge over feeder looking east

Previous Documentation

> The 1993 draft HSR recorded the condition of the feeder complex at that time:
>
> The concrete feeder is in poor condition. While areas of the finish surface remain, spalling and horizontal cracking have resulted in a relatively significant loss of fabric. Indentations which held the head gate, however, are still apparent. The back face of the walls have been exposed by the erosion of adjacent soil. The encroachment of vegetation is limited to a mature tree within the northern end of the feeder sluice.
>
> The masonry sluice appears to [be] stable and is in fair condition. Profiled stonework, which received the flood gate, is apparent. The encroachment of vegetation is most prevalent at the top surface of the walls and at the back faces which have been exposed.
>
> The deck of the towpath bridge is in poor condition. Horizontal cracking and subsequent erosion have resulted in exposure of the steel rails. Although the masonry abutments appear to be relatively stable, the mortar has failed and individual stones are deteriorated. The back face of each abutment, exposed by the erosion of adjacent soil, [is] undermined. The encroachment of vegetation is severe. [287]

The Peninsula Feeder Complex was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. It has the Ohio Historic Inventory designation SUM-3243-04. It is not included on the Park's List of Classified Structures.

Existing Conditions

The condition of the Peninsula Feeder Dam Complex appears to be much the same as it was in 1993 (Photos 302 and 303). There is no evidence of any recent repairs or site work. The concrete side walls of the feeder sluice are extremely deteriorated with less than 50% of the surface finish remaining and the underlying concrete severely eroded (Photo 304; also see Photo 296). In contrast the cut stone side walls of the adjacent flood gate are in good condition despite a few small vertical cracks and some open joints between stones (Photos 305 and 306). The former earthen embankments have been completely destroyed during past flooding episodes so that both faces of all walls are exposed. The large tree in the center of the feeder sluice remains; if it is not removed it is likely to cause extensive damage to the structure. Other than the large tree, invasive vegetation is limited to the growth of moss and grass on the tops and sides of the concrete and stonework.

The condition of the towpath bridge does not appear to have changed significantly since 1993. It remains in very poor condition and is heavily overgrown.

287. Cossell, *Ohio and Erie Canal*, 110-112.

Photo 302. Peninsula Feeder: overview of feeder in 1993

Photo 303. Peninsula Feeder: view of towpath bridge in 1993

Photo 304. Peninsula Feeder: flood gate and feeder gate looking northwest

Photo 305. Peninsula Feeder: flood gate looking west

Photo 306. Peninsula Feeder: flood gate looking south

**Pinery Dam and Feeder, Stations 763+00 to 771+50**

Location

The remains of the Pinery feeder complex are located at the south end of the watered section of canal, just north of Station Road between Mile Markers 16 and 17. The feeder complex is depicted on both the 1892 and 1912 survey mapping (Figures 128 and 129). The location is easily accessible from the Station Road Trailhead. Although the present dam and head gates date to the mid-20th century, the feeder is fully functional and still supplies water to the canal north of this point as it has since 1827. The Resource Management Division's flat files contain the 1949 and 1951 plans for the new dam and head gates, which depict the overall configuration of the complex before and after the improvements (Figure 130).[288]

As discussed in Section 1B, the original Pinery feeder complex consisted of a V-shaped dam in the river; head gates to regulate the flow of water from the river into the feeder; the feeder channel itself; and a waste weir to return excess water to the river. The structures were rebuilt or repaired many times between 1844 and 1906. After the 1913 flood the Pinery Feeder and the canal section between Brecksville and Cleveland were repaired and continued to operate since they supplied water to the American Steel and Wire Company's Cuyahoga Works. In 1949 AS&W replaced the 1905 feeder head gates with a new reinforced concrete head gate structure complete with new control valves. Two years later it replaced the old timber crib-dam with a new fixed-crest concrete weir located 120 feet downriver. The old dam was left in place with a 20-foot wide breach in the center to allow the water to flow through. The top of the new dam was one foot higher than the top of the crib-dam which was now submerged beneath the surface of the pool.[289] The 1951 structure is known as the Brecksville Diversion Dam.

In 1988 the National Park Service acquired the Ohio and Erie Canal Lands within Cuyahoga Valley National Park and assumed responsibility for maintenance of the feeder complex. New head gates were installed in 1990. The State of Ohio continued to own individual structures including the Brecksville Diversion Dam, the head gates, and the Pinery Dam remnant.[290]

Physical Description

The 1892 mapping depicts the Pinery Dam as a V-shaped structure pointing upriver, with two sections measuring 87 feet 10 inches and 91 feet, and a fish chute in the center (also see Figure 37). The head gates, adjacent to the dam, were spanned by a flat bridge. The feeder channel was about 850 feet long and 35 feet wide and extended north from the head gates to the

288. State of Ohio Department of Public Works, "Dam Across Cuyahoga River at Brecksville Ohio, General Arrangement" (1951), Cuyahoga Valley National Park, Resource Management Division files.
289. Hampton and Kenny, "National Register Assessment of the Brecksville Diversion Dam," 10; Sam Tamburro, "History of the Brecksville Dam." Unpublished manuscript, Cuyahoga Valley National Park, Resource Management Division files (2003), 6-7.
290. Tamburro, "History of the Brecksville Dam," 7; Ohio Environmental Protection Agency et al. *Cuyahoga River Ecosystem Restoration*, 38.

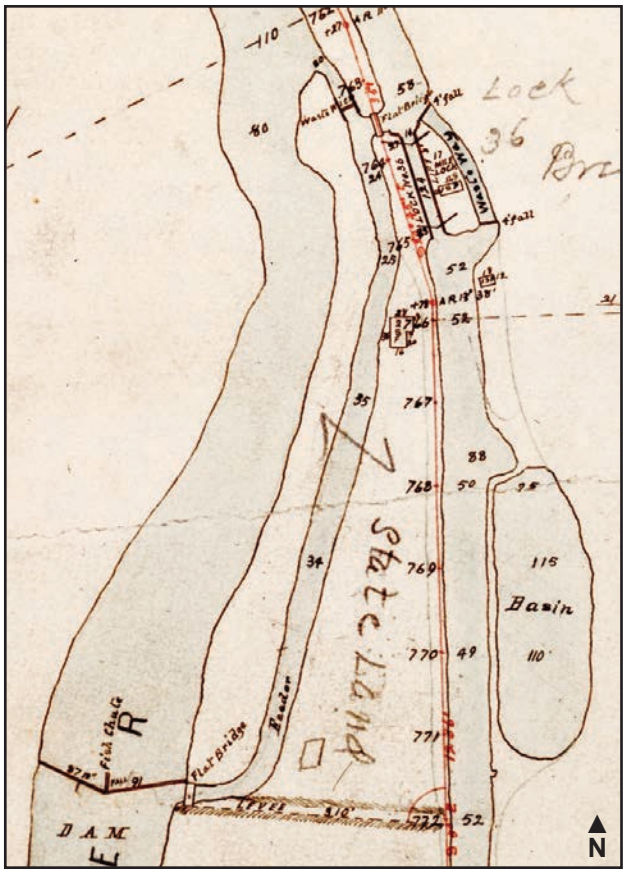


Figure 128. Survey map of Pinery Feeder, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

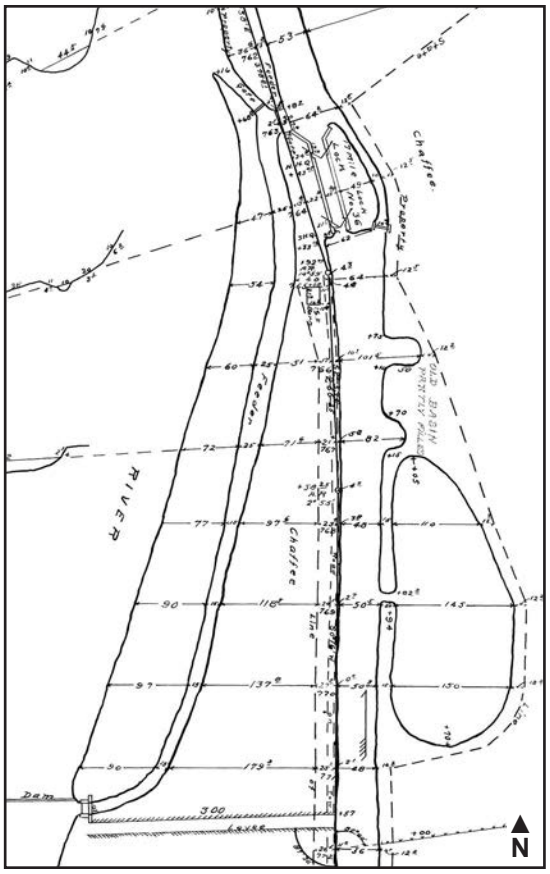


Figure 129. Survey map of Pinery Feeder, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

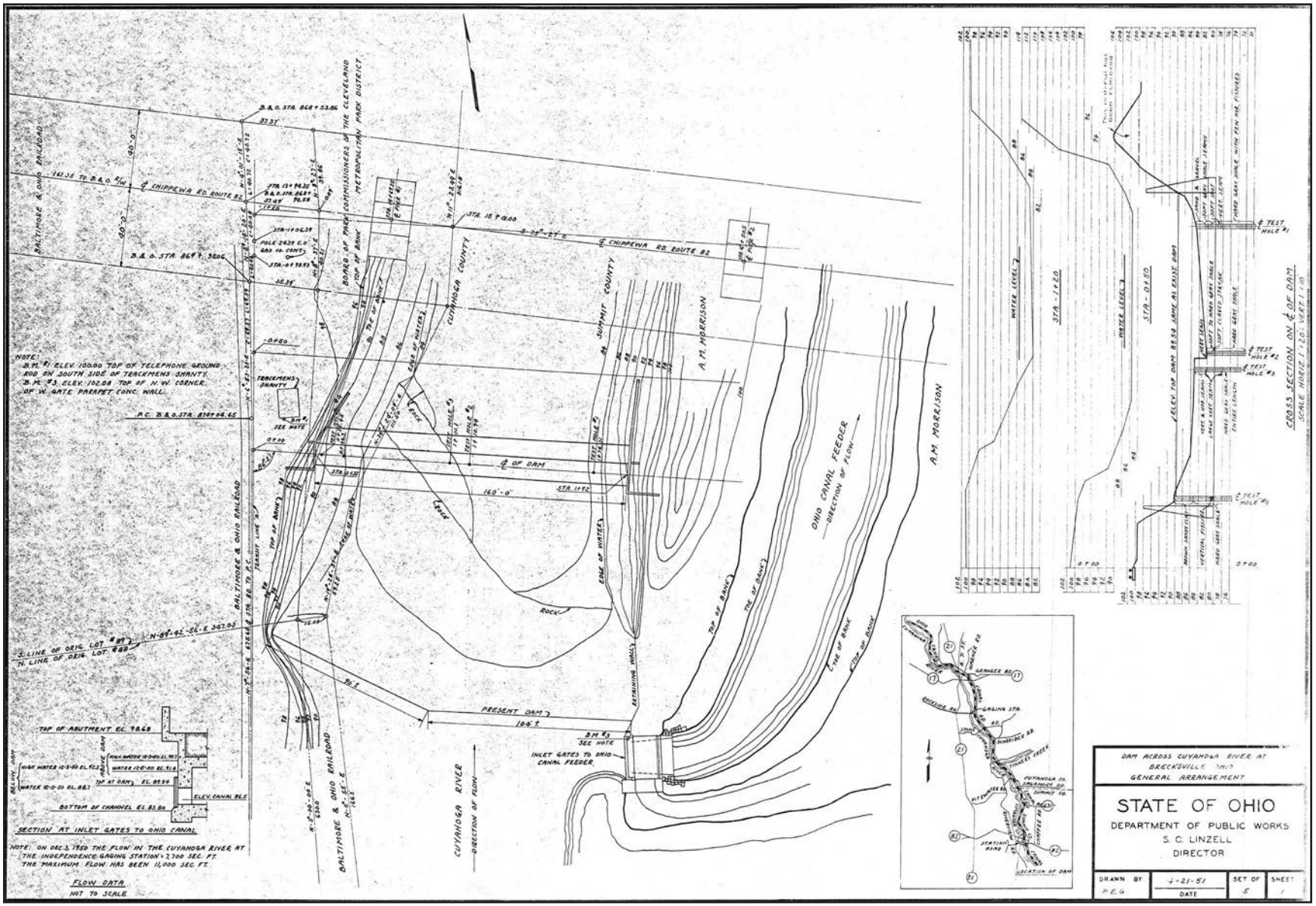


Figure 130. 1951 site plan, Brecksville Diversion Dam (*Source:* Ohio Department of Public Works, *Dam Across Cuyahoga River at Brecksville, Ohio, General Arrangement*, Cuyahoga Valley National Park, Resource Management Division files)

lower end of Lock No. 36 where it discharged water into the canal. A waste weir near the lock returned excess water to the river. There was a 310-ft long levee between the river and canal which was intended to protect the feeder complex from flood damage.

Today the Pinery Dam is submerged in the pool behind the Brecksville Diversion Dam and is not visible at any season of the year (Photo 307). In 2010 a geophysical investigation determined that the dam still exists and is intact except for the breach in the center.[291] The 1951 Brecksville Diversion Dam and the 1949/1990 head gates and sluice continue to function as designed (Photos 308-310). The feeder channel has the same configuration as in the canal era although it has been dredged periodically, most recently in 2018 (Photo 311). A concrete abutment for the present trail bridge over the feeder may be a remnant of the former waste weir (Photo 312).

The Brecksville Diversion Dam and the adjacent head gates postdate the Ohio and Erie Canal's period of significance and are not contributing features of the NRHP-eligible resource. The only extant features dating to the 1825-1913 period are the feeder channel and the submerged Pinery Dam.

Previous Documentation

The Pinery feeder complex is not included on the Park's List of Classified Structures. It was not discussed in the 1993 draft HSR, probably due to the mid-20th century construction date of the current dam and headgates, but it was documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner. In 2003 National Park Service historian Sam Tamburro prepared a brief history of the Pinery and Brecksville dams, and in 2006 Hardlines Design Company completed a NRHP eligibility assessment for the Brecksville Diversion Dam, concluding that the dam and head gates are not eligible for the NRHP under any criteria.[292]

Future Documentation

Both the Brecksville Diversion Dam and the Pinery Dam are scheduled to be removed in late 2018 in connection with the Cuyahoga River Ecosystem Restoration Project. Prior to their removal both dams as well as the head gates and feeder channel (both of which will remain) will be documented to the standards of the Historic American Engineering Record.

Existing Conditions

At the time of the 2017 field survey the feeder channel was choked with silt and vegetation, and the water level was very low. The possible waste weir remnant is in poor condition due to deterioration of the concrete, multiple cracks, and heavy vegetation growth

291. D. Bates and J. Peck, "Ground Penetrating Radar Survey to Find and Delineate the Pinery Dam in the Cuyahoga River, Near Ohio State Route 82" (Akron, OH: Department of Geology and Environmental Science, University of Akron, 2010).
292. Tamburro, "History of the Brecksville Dam;" Hampton and Kenny, "National Register Assessment of the Brecksville Diversion Dam," 13-23.

Photo 307. Pinery Feeder: overview of feeder complex from Route 82 bridge

Photo 308. Pinery Feeder: Brecksville Dam and intake gates looking east

Photo 309. Pinery Feeder: intake gates, constructed 1949

Photo 310. Pinery Feeder: intake gates looking north

Photo 311. Pinery Feeder: feeder channel looking northeast

Photo 312. Pinery Feeder: wing wall for former weir

including a small tree on top of the wall. The other components of the complex are not discussed here since they either are submerged and not visible (Pinery Dam) or do not date to the canal's period of significance (Brecksville Diversion Dam and head gates).

# OTHER WATER CONTROL STRUCTURES

## Other Water Control Structures: Description and Function

Mudcatchers were small dams or bulkheads placed at locations where minor streams were allowed to drain directly into the canal as a source of water to sustain canal operations. They were constructed of stone or concrete and were designed to hold back silt and debris that otherwise would have been deposited into the canal. Water was impounded behind the dam and sediment fell to the bottom while clean water flowed over the dam and into a sluice which carried it to the canal.

### Defining Features

Like waste structures, which are functionally and structurally similar, the later mudcatchers were constructed of concrete poured into wooden forms. Key elements of the original design with later modifications (if dating to the period of significance) are character defining features. These design elements include the surface finish and the dimensions of the opening, together with the concrete guides for the gates and the apron and side walls of the sluice.

### Inventory

There is only one extant mudcatcher within Cuyahoga Valley National Park. At one time there may have been others for which there is no documentation, and there are no visible remains. No others are depicted on the 1892 or 1912 survey mapping. The following structure is discussed in this section.

- Galley Run Mudcatcher (Station 758+00)

## Galley Run Mudcatcher, Station 758+00

Location

The Galley Run Mudcatcher is located at the south end of the Pinery Narrows between Mile Markers 16 and 17, a short distance north of Lock No. 36. It is situated along the east side of the watered section of the canal at the point where a small stream known as Galley Run flows into it (Figure 131; Photo 313).

Although *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* states that the original Galley Run Mudcatcher was built in 1826, the work is not listed among the contracts awarded during the 1825-1827 period.[293] The *Annual Report of the Board of Public Works of Ohio* for 1895 suggests that it was constructed or reconstructed in that year. The original mudcatcher may have been a stone masonry structure. In 1908 state crews constructed a new concrete bulkhead wall across Galley Run, the same structure that exists today.[294] There is no documentation of any repair or maintenance by either the American Steel and Wire Company or the federal government.

Physical Description

The Resource Management Division's flat files contain a 1908 plan of the Galley Run Mudcatcher.[295] According to the plan the structure consists of a 2-foot thick wall or bulkhead of reinforced concrete 78 feet long and 22 feet high, extending completely across the narrow ravine that carries Galley Run. At the center of the high wall is a 12-foot wide notch above a lower wall, 17-feet high; above the low wall was a wooden gate that operated within guides formed in the concrete walls, similar to the action of a flood gate. The gate could be raised or lowered as necessary. Water flowed over the low wall and dropped 17 feet into a 12-foot wide sluice composed of a concrete apron and side walls and then flowed into the canal (Figure 132).

Previous Documentation

The Galley Run Mudcatcher was documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and is designated SUM-3251-01 in the Ohio Historic Inventory. For reasons that are not clear, it was not discussed in the 1993 draft HSR. It is not included on the Park's List of Classified Structures.

Existing Conditions

The 2017 field survey revealed that this structure is in very poor condition overall (Photos 314-321). Erosion and disintegration of concrete caused by weathering is prevalent, especially near the gate opening and along the top edge of the bulkhead. In severely affected

293. Tamburro and Hiner. *A Survey of Canal Resources*, 52.
294. Ohio Board of Public Works, *71st Annual Report*, 71.
295. Superintendent's Office, "Northern Division Ohio Canal, Improvement, Northern Division, Ohio Canal, Plan for Proposed Abutment Across Ravine 1 Mile North of Brecksville, O." (July 1908), Cuyahoga Valley National Park, Resource Management Division files.

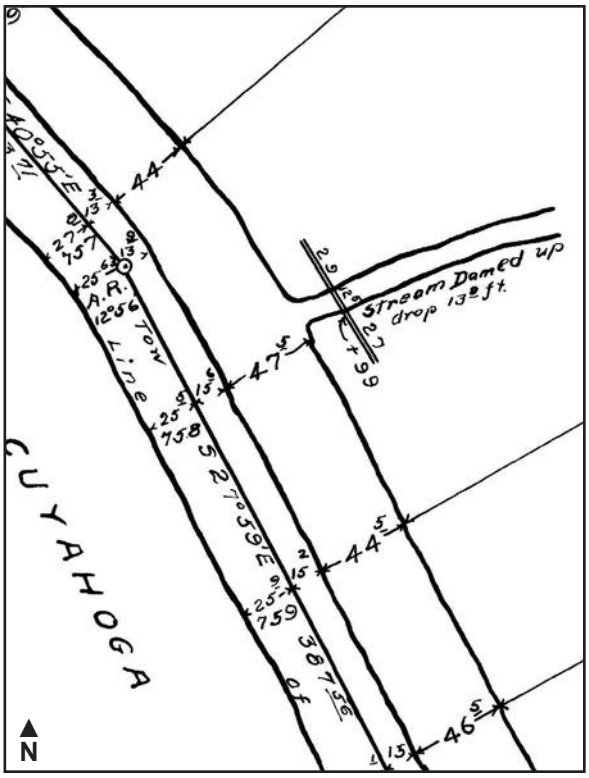


Figure 131. Survey map of Galley Run Mudcatcher, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 313. Galley Run Mudcatcher: overview looking east

Photo 314. Galley Run Mudcatcher: view of mudcatcher looking east

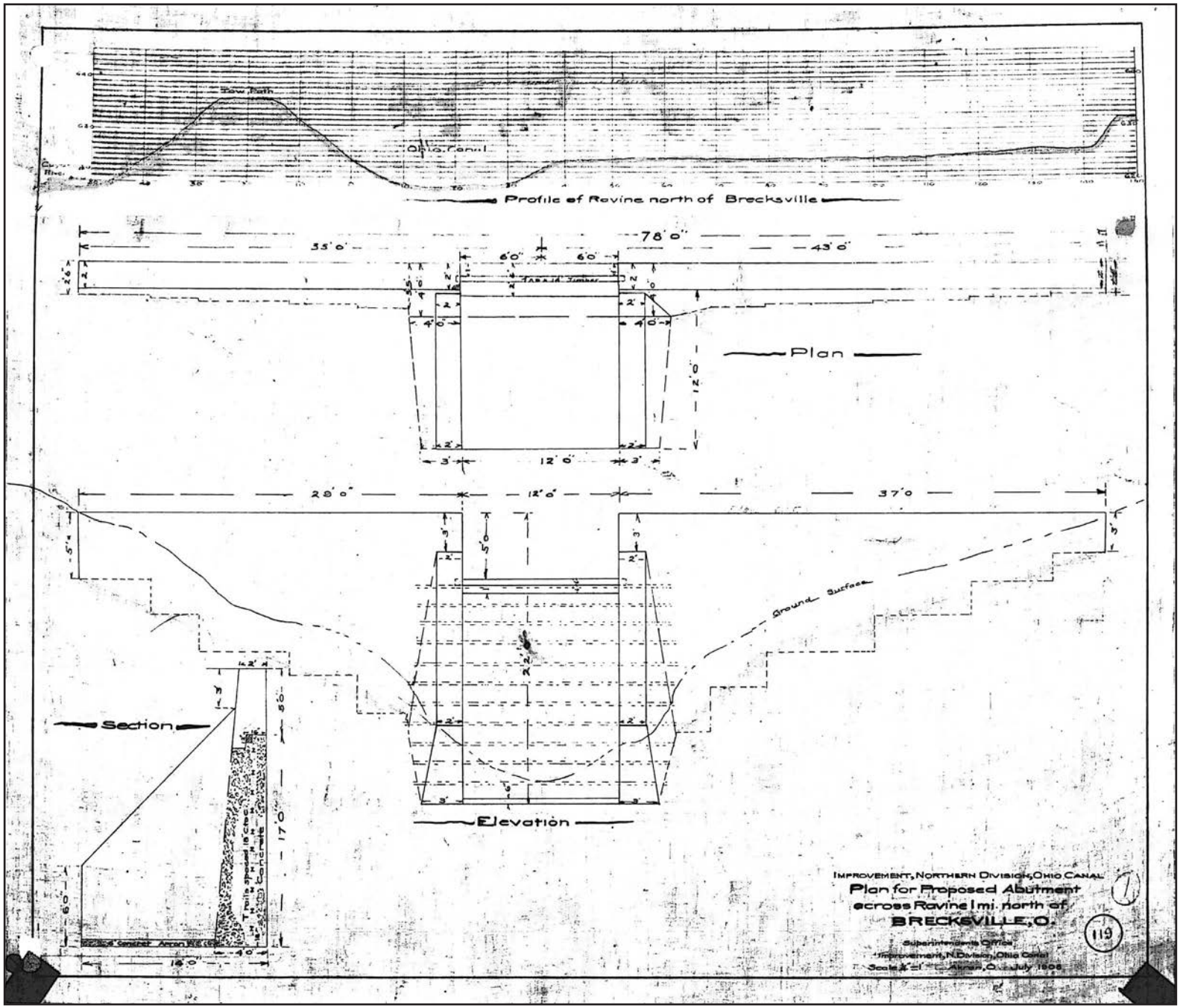


Figure 132. 1908 design plans, Galley Run Mudcatcher (*Source:* Engineers Office Ohio Canal, *Plan for proposed Abutment across Ravine 1 mi. north of Brecksville, O*, Cuyahoga Valley National Park, Resource Management Division files)

Photo 315. Galley Run Mudcatcher: detail view of mudcatcher looking east, note horizontal cracks

Photo 316. Galley Run Mudcatcher: west side looking southeast

Photo 317. Galley Run Mudcatcher: overview of west side looking southeast

Photo 318. Galley Run Mudcatcher: east side looking south

Photo 319. Galley Run Mudcatcher: east side looking west, note accumulated silt

Photo 320. Galley Run Mudcatcher: south end of mudcatcher showing indentation for gate

Photo 321. Galley Run Mudcatcher: north end of mudcatcher looking northwest

areas, the damage has resulted in a significant loss of concrete. There are large horizontal cracks on both sides of the bulkhead, most of which extend the entire length of the wall and completely through the cross section. The location and pattern indicate that the cracks are the result of inadequate bonding between pours of concrete forming a cold joint. However even in badly damaged areas there is still visible evidence of wooden formwork as well as the indentations which received the gate (Photo 320).

There is as much as 10 feet of sediment on both sides of the bulkhead so that most of the sluice is not visible. The condition of the apron and side walls could not be assessed. The silt and sediment form a fan that extends far into the canal, obstructing the flow of water. To return the mudcatcher to working order it would be necessary to repair the bulkhead and remove the sediment from both sides of the wall.

There are numerous trees growing adjacent to the structure and a large amount of moss on the top and sides of the wall. The trees will cause further damage to the mudcatcher unless they are removed.

# BRIDGES

## Bridges: Description and Function

Bridges carried roads, farm lanes, railroads, foot paths, and even the towpath itself over the canal. As industrial and transportation technology evolved over the course of the 19th and early 20th century, the design of vehicular bridges also evolved: from simple wooden spans to wrought-iron and steel trusses to reinforced concrete and steel beam structures. Vehicular bridges were built at various points along the canal to carry public roads over the waterway. These bridges are described in Section 1B. There are visible remains of 19th-century road bridges over the canal at only two locations: 1) at Tinkers Creek Road the concrete superstructure of the current 1953 bridge rests on the cut-stone abutments of an earlier structure; and 2) the wasteway of Lock No. 34 (Red Lock) is spanned by a small early 20th century concrete bridge resting on the cut-stone abutments for an earlier bridge. The latter structure formerly carried Highland Road prior to the relocation of the highway.

Other bridges carried private farm lanes and foot paths over the canal. They may have been constructed and maintained by the local landowners who relied on them to access their buildings and fields. The 1892 mapping indicates that these private bridges were simple wooden structures often supported by timber posts driven into the ground rather than masonry abutments. Only one of them has visible remains today: the substantial stone abutments of a private farm bridge located just south of Lock No. 27.

When the Valley Railway was constructed in 1880, two bridges were built at points north and south of Peninsula to carry the railroad line over the canal and river. Depictions of these bridges on the 1892 mapping indicates that they both were metal through-truss structures. Today the superstructures and substructures of both railroad bridges are long gone, replaced by concrete culverts which carry trail traffic under the tracks, but a stone retaining wall survives at Station 1167+00 which probably is associated with the former bridge.

Small wooden bridges carried the towpath over waste weirs, flood gates, and feeders, and the aqueducts that spanned the larger streams included an integral wooden bridge for the towpath. Some locks had a small footbridge that spanned the chamber, providing access to both sides of the lock. These structures required frequent replacement and disappeared long ago.

## Defining Features

The only surviving canal-related bridge components in the Park are stone masonry abutments and retaining walls. Character-defining features include the stone itself, the way it was cut and shaped, and the manner in which it was laid-up to form the walls.

## Inventory

None of the 19th century bridges over the Ohio and Erie Canal within the present limits of Cuyahoga Valley National Park survive today, although there are visible remains at several locations. Some of the canal-era bridges have been replaced by modern structures, while others were abandoned after the 1913 flood. In all cases the present structures post-date the Ohio and Erie Canal's period of significance (1825-1913) and are not significant within the canal

context. The stone abutments of the earlier bridges however are canal-era features that may contribute to the significance of the historic landscape.

The following bridge-related resources are extant historic features dating to the Ohio and Erie Canal's period of significance (1825-1913) and are discussed in this section.

- Private Bridge (Station 1285+00)
- Railroad Bridge Retaining Wall (Station 1167+00)
- Bridge over Lock No. 34 Waste way (Station 905+80)

The cut-stone abutments of the Tinkers Creek Road Bridge date to the period of significance but are not discussed here since the National Park Service does not have management responsibility for this county-owned bridge.

**Private Bridge, Station 1285+00**

Location

The stone abutment of a private farm bridge is located on the east side of the canal and towpath trail approximately 150 feet south of Lock No. 27. The 48-foot long bridge appears on the 1892 canal survey mapping but not on the 1912 mapping (see Figure 133). There is no documentation concerning its history of construction and repair during the canal's period of operation.

Physical Description

The east abutment of this bridge is 22 feet wide with wing walls at each end, measuring 6 feet wide and 7.5 feet long (Photos 322 and 323). It is constructed of three courses of large sandstone blocks. The 2 lower courses supported the bridge's wooden superstructure, while the top course is set back 2 feet from the face and is backed by an earthen ramp. One stone bears a mason's mark (Photo 324).

The west abutment is buried under a mound of fill and rubble and is obscured by dense vegetation, but cut stones are visible in the sides of the mound, and the abutment may be intact underneath.

Previous Documentation

This structure has not been documented previously. It was not discussed in the 1993 draft HSR. It has no Ohio Historic Inventory number and is not included on the Park's List of Classified Structures.

Existing Conditions

The unmortared masonry of the east abutment is in good condition. Although grass is growing on top of the some of the stones, vegetation is not a serious issue and seems to be well controlled through routine maintenance.

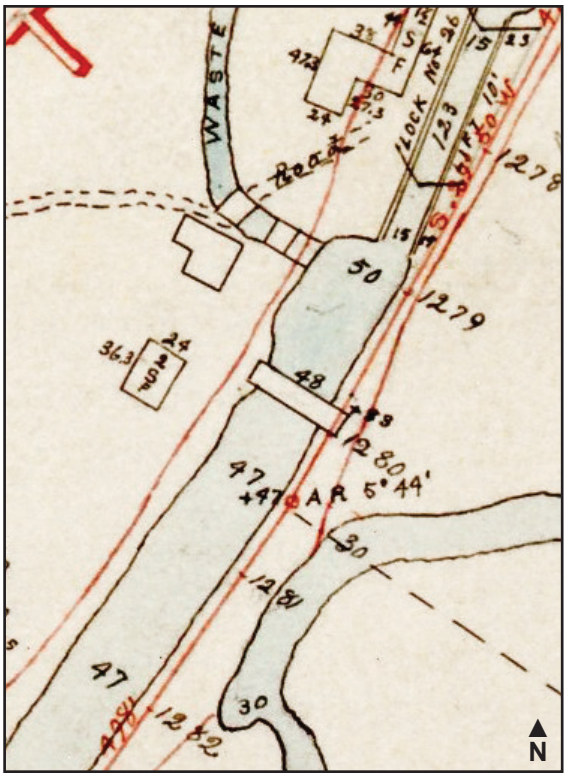


Figure 133. Survey map of private bridge at Station 1285+00, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

Photo 322. Private Bridge: east abutment looking northeast

Photo 323. Private Bridge: east abutment looking southeast

Photo 324. Private Bridge: mason's mark on east abutment stone

**Railroad Bridge Retaining Wall, Station 1167+00**

Location

The railroad bridge at Station 1167+00, approximately 300 feet south of Lock No. 28, is no longer extant, and a concrete culvert now carries the towpath trail under the Valley Railway tracks (Figure 134; Photo 325). A short section of stone retaining wall along the west side of the canal prism north of the railroad however may be associated with the former bridge abutment.

Physical Description

The retaining wall consists of six or seven courses of dry-laid rubble stone masonry beginning about five feet above the bottom of the canal prism, which probably corresponds to the former water line in the canal (Photo 326). The wall extends north from the railroad grade to the tumble adjacent to Lock No. 28.

Previous Documentation

This structure has not been documented previously. It was not discussed in the 1993 draft HSR. It has no Ohio Historic Inventory number and is not included on the Park's List of Classified Structures.

Existing Conditions

The unmortared masonry of the retaining wall is heavily overgrown but appears to be structurally stable and in fairly good condition. There is no attempt to control vegetation in the prism or near the wall.

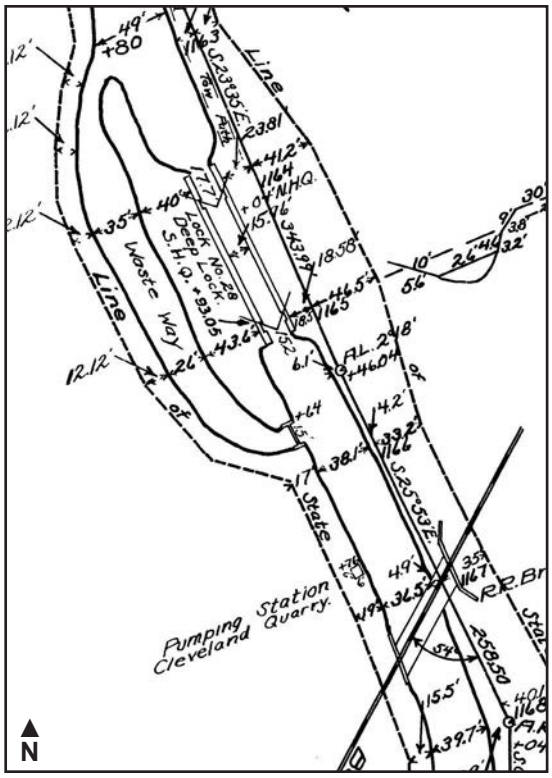


Figure 134. Survey map of Lock No. 28 and Railroad Bridge, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1928

Photo 325. Railroad Bridge Retaining Wall: location of former railroad bridge south of Lock No. 28

Photo 326. Railroad Bridge Retaining Wall: view of retaining wall looking southwest

**Bridge over Lock No. 34 Waste Way, Station 905-80**

Location

A 12-foot single-span concrete bridge once carried Highland Road over the waste way for Lock No. 34 (Red Lock), immediately north of the lower end of the lock (Figure 135). Highland Road was realigned in the 20th century, and the old pavement is now a connecting trail linking the towpath trail and the Red Lock Trailhead parking lot (Photo 327). The former bridge over the canal has been removed and replaced by fill.

Physical Description

The bridge abutments are constructed of roughly shaped stone masonry, with three courses visible. While the present concrete bridge probably post-dates the canal's period of significance (1825-1913) the stone abutments appear to be older, associated with an earlier bridge at the same location.

Previous Documentation

This structure has not been documented previously. It was not discussed in the 1993 draft HSR. It has no Ohio Historic Inventory number and is not included on the Park's List of Classified Structures.

Existing Conditions

The masonry abutment appears to be structurally stable and in fairly good condition although portions of the surface are covered with moss and there are open joints between stones (Photo 328).

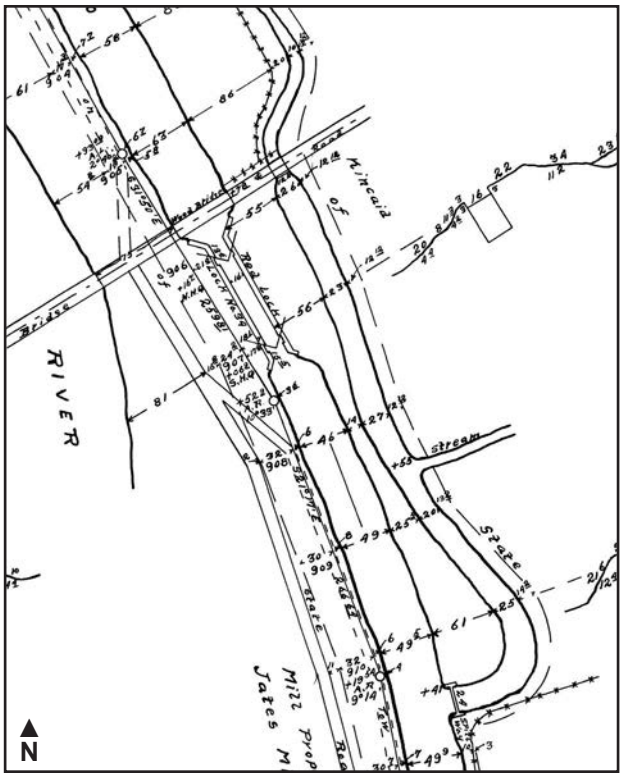


Figure 135. Survey map of Lock No. 34 and Highland Road Bridge, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 327. Bridge over Lock No. 34 Wasteway: view looking east

Photo 328. Bridge over Lock No. 34 Wasteway: detail view of east abutment for former bridge

# CANAL PRISM AND TOWPATH

## Canal Prism and Towpath: Description and Function

The prism and towpath of the Ohio and Erie Canal closely parallel the Cuyahoga River as it flows south to north through Cuyahoga Valley National Park. The prism was a water-filled earthen channel through which boats moved as they navigated the canal, pulled by horses or mules walking on the towpath. The towpath bank was located on the side between the river and canal, while the opposite side was called the "berm bank." Based on standard specifications adopted in 1825, the Ohio and Erie Canal's prism was a minimum of 26 feet wide at the bottom and 45 feet wide at the water line. The towpath was usually 10 feet wide and the opposite "berm" bank not less than six feet. Thus the entire canal—prism, berm, and towpath—was a minimum of 61 feet wide. Initially the minimum depth of water was 4 feet, but this was increased to 5 feet in 1905. As constructed, the actual dimensions often were much larger than the minimum, with the width of the prism varying from 60 to 150 feet and the depth of the water as much as 5 to 12 feet. The width of the towpath also was highly variable.

The prism and towpath were constructed entirely of soil and loose rock, although stone facing often was placed on the outer face of the towpath bank as erosion protection in areas where the canal and river were close to each other. The towpath typically was built up from the soil and rock excavated from the adjacent section of prism, although materials could be brought from a more distant source if necessary. The engineers sought to make the inner banks as solid and watertight as possible, but leaks were a recurring problem. Neither the engineers' reports nor archeological cross-sections of the towpath performed in the 1980s revealed any evidence of puddling, the common process of adding a thick (2 to 3 foot) layer of dense clay to the interior of the prism to make it watertight.[296]

The prism and towpath were modified frequently during the canal's period of operation. The repair of flood damage and breaches, the raising of banks that had settled or eroded, and periodic dredging of the prism to remove silt and sediment all combined to alter the contours of the canal even though its route and overall dimensions did not change over time. Along the watered section of canal these processes continued even after the 1913 flood ended navigation on the waterway. Along the unwatered section, natural processes such as flooding, stream erosion, and road-building caused significant destruction in some areas. During the development of the multi-use trail in the early 1990s, the towpath was filled, widened, and carried over streams and breaches by pedestrian bridges. No portion of the canal remains in its pristine, as-built condition. All sections are modified to one degree or another.

Today the appearance of the watered section of canal is fairly similar to its appearance during the period of significance, although much of it contains excessive silt and vegetation that restricts the flow of water. The condition of the unwatered section varies widely. Many portions are easily recognizable as a canal despite the growth of trees and brush in the prism; some of them even contain water during some seasons of the year. Other portions have been affected more by sedimentation and erosion and are visible only as shallow depressions. Still others have been destroyed completely by road construction and other modern activities. During development of the multi-use trail, the top of the towpath bank was repaired and widened to its original 10-foot width, but the prism was not restored.

296. Vergil E. Noble, "Further Archaeological Investigations."

## Defining Features

Like railroads and highways, historic canals are linear transportation corridors that contain a concentration of significant inter-related resources. Even though they have been modified both during and after their period of operation, the Ohio and Erie Canal's prism and towpath continue to connect all the other functionally related features in the corridor, including locks, aqueducts, culverts, waste structures, dam and feeder complexes, and basins. They also link other concentrations of historic resources in the villages, towns, and farms along the route. The prism and towpath are important primarily for their function as a linear connecting route rather than for specific construction details which likely were replaced or substantially modified over time.

Character defining features of the prism and towpath include the historic location, the overall dimensions and shape as shown on the 1892 and 1912 survey mapping, and the appearance as a man-made earthen ditch and adjoining earthen embankment topped by a level path for the movement of draft animals. The ability to hold water is not a character-defining feature.

## Inventory

The prism and towpath were not specifically discussed and documented in the 1993 draft HSR. It is included in *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner, which divides the Ohio and Erie Canal within the Park into eight sections, each with its own Ohio Historic Inventory number.[297] From south to north:

- Bolanz Road to Ira Road (SUM-3260-07)
- Lock No. 28 to Bolanz Road (SUM-3259-04)
- Lock No. 31 to Valley Railway Grade (SUM-3258-04)
- Ohio Turnpike Bridges to Stumpy Basin (SUM-3257-04)
- Boston Mills Road to I-271 Bridge (SUM-2016-04)
- Highland Road to Lock No. 32 (SUM-3256-04)
- SR 82 to Highland Road (SUM-3255-04)
- Rockside Road to Route 82 Bridge (CUY-6536-19)

297. Tamburro and Hiner. *A Survey of Canal Resources*, 21, 56-62.

**Unwatered Section of Canal: Botzum to Pinery/Brecksville Dams**

Location

The southern 16 miles of canal in Cuyahoga Valley National Park are presently in an unwatered state. This section begins at the southern end of the Park at Botzum and extends north to the Pinery/Brecksville Dams and the Route 82 High Level Bridge.

Existing Conditions

The condition of the prism is highly variable through the unwatered section, ranging from completely destroyed to very intact. This discussion divides it into segments based on general condition, moving from south to north.

*Indian Mound Trailhead to Bath Road (Stations 1472+00 to 1459+00)*

The 0.25-mile of canal at the southern end of the Park lies between Riverview Road and the Cuyahoga River. The trail is on the opposite side of the road from the canal. The prism in this section is in very good condition, but the towpath is in variable condition due to past flooding. Several hundred feet of towpath at the north end are severely eroded, but the remainder is in excellent condition, rising 10 feet above the prism.

*Bath Road to Ira Road (Stations 1459+00 to 1382+00)*

This 1.5-mile section of canal was mostly destroyed by the construction of Riverview Road in the 1930s (Photo 329). The west walls of Locks Nos. 24 and 25 and a few small depressions are all that survive. By necessity the trail deviates from the towpath in this section since the towpath is under the road.

*Ira Road to Lock No. 26 (Stations 1382+00 to 1365+10)*

The prism is well-defined in this 0.3-mile section although overgrown with vegetation. Some portions contain water, others are dry (Photos 330 and 331). The trail follows the towpath.

*Lock No. 26 to north end of Beaver Marsh (Stations 1365+10 to 1355+00)*

The canal to the north of Lock No. 26 for 0.2-mile has been mostly destroyed and is now part of the marsh (Photo 332). The trail follows the towpath and a boardwalk over the marsh.

*North end of Beaver Marsh to Lock No. 29 at Peninsula (Stations 1355+00 to 1125+91)*

This 4.3-mile section is generally in fairly good condition although the prism is filled with large trees and other vegetation (Photos 333-335). It has well-defined towpath and berm banks. Most of the portion between the Beaver Marsh and the Hale Farm Trail contains water

Photo 329. View looking north at Yellow Creek, canal destroyed

Photo 330. View of Canal near Ira Trailhead, looking north

Photo 331. View of Canal south of Lock No. 26, looking north

Photo 332. View of Canal looking north from Lock No. 26

Photo 333. View of Canal north of Beaver Marsh, looking south

Photo 334. View of Canal near Station 1220+00, looking south

Photo 335. View of Canal at Station 1195 looking south

but to the north the prism is mostly dry. The 2017 field survey revealed no trace of the bridges, culvert, and flood gate shown on the 1912 mapping at Stations 1242+59, 1318+60, 1331+31, and 1344+59; their remnants may lie under the towpath trail. The trail follows the towpath throughout this section.

*Lock No. 29 at Peninsula to Lock No. 30 (Stations 1125+91 to 1109+48)*

This section of canal has been completely destroyed by past flooding to a point 500 feet south of Lock No. 30 (Photo 336). It has been subject to frequent flood scouring due to the proximity of the Cuyahoga River. The trail deviates from the towpath in some places.

*Lock No. 30 to Stumpy Basin (Stations 1109+48 to 1051+00)*

This 1.1-mile section is still recognizable as a canal for much of the distance, but some parts are in poor condition due to the proximity of the Cuyahoga River. The portion north of the railroad crossing is in much better condition than the portion between the railroad crossing and Lock No. 30, and some of it contains water. Throughout the section the prism is filled with large trees and other vegetation. The trail follows the towpath to a point north of Lock No. 31, where it exits the towpath and crosses Stumpy Basin on a boardwalk. A well-defined embankment separates the canal from the basin, as depicted on the 1912 Silliman survey mapping.

*Stumpy Basin to Boston (Stations 1051+00 to 1005+00)*

This 0.9-mile section has been completely destroyed by past flooding and highway construction. No visible evidence of the canal survives, and the trail deviates from the former towpath location.

*Boston to Pinery/Brecksville Dams and Route 82 (Stations 1005+00 to 763+00)*

The prism generally is in fairly good condition throughout this 4.6-mile section with well-defined towpath and berm banks (Photos 337-339). The trail follows the towpath for most of the distance. The portion from Boston Mills Road to Lock No. 33 is in good condition with well-defined towpath and berm banks although it was dry at the time of the field survey. Toward Lock No. 33 it becomes less well defined due to sedimentation and erosion. Much of the portion between Locks Nos. 34 and 35 contains water. Many areas contain large trees, and others such as near the Stanford Creek Culverts are choked with grasses and wetland vegetation. The prism and towpath near the former Jaite paper mill were impacted by construction of an access road to the mill, and from Boston to Jaite the towpath was widened to construct a roadway after the abandonment of the canal.[298] The 2017 field survey revealed no trace of the waste weir and flood gate at Station 776+19 just south of Station Road, shown on the 1912 Silliman survey mapping and also documented in the Resource Management Division's resource files; its remnants may have been buried during construction of the towpath trail.

298. Noble, "Further Archaeological Survey," 6.

Photo 336. View of Canal looking north from north end of Lock No. 29, Peninsula

Photo 337. View of Canal at Boston

Photo 338. View of Canal at Station 855 near Goose Pond

Photo 339. View of Canal at Station 838 near Hooker's Run

**Watered Section of Canal: Pinery/Brecksville Dams to Rockside Road**

Location

The 6.2-mile long watered section begins at the Pinery Feeder and proceeds north to the northern boundary of the Park at Rockside Road. The condition of the prism is much different from the unwatered section although its appearance depends on the season of the year and the supply of water.

Existing Conditions

*Pinery/Brecksville Dams to Sagamore Creek (Stations 763+00 to 636+00*

The 2.4-mile stretch of canal through the Pinery Narrows is one of the best-preserved sections in the Park, providing a close approximation of the canal's appearance during its period of operation (Photos 340 and 341). During the field survey in the fall of 2017 however, the water level was so low that the canal was entirely blocked by silt entering from Galley Run (Photo 342). Low water levels in the watered section of the canal were due partly to dry weather but also to a heavy accumulation of silt in the Pinery Feeder which obstructed the gates and restricted the flow of water to the canal; dredging of the feeder channel in 2018 addressed this issue.

During the field survey, careful inspection revealed no evidence of the flood gates at Stations 687+87 and 713+50 which appear on the 1912 Silliman survey mapping; they must have been destroyed by floods or buried during construction of the towpath trail. Stone erosion protection on the riverbank is intact between Mile Markers 15 and 16. The trail follows the towpath throughout this section.

*Sagamore Creek to Rockside Road (Stations 636+00 to 434+16)*

The remainder of the watered section north to Rockside Road (3.8 miles) is in generally good condition although much of it is in urgent need of dredging and removal of aquatic vegetation (Photos 343-347). The field survey was performed over a period of several months in the fall followed by additional visits in the spring of 2018 so that the canal could be documented under a variety of conditions. At one point the flow of water was reduced to a trickle (Photo 348). In 2017 federal and state agencies completed a major riverbank restoration project north of Lock No. 38 to address severe encroachment by the river on the canal. The historic canal culverts along this section were replaced from 2005 to 2009, but numerous other canal-related structures remain. The trail follows the towpath throughout this section.

Photo 340. View of Canal in the Pinery Narrows, Mile Marker 16

Photo 341. View of Canal in the Pinery Narrows, Mile Marker 15

Photo 342. View of Canal at Galley Run Mudcatcher looking south

Photo 343. View of Canal at Sagamore Creek Culvert looking south

Photo 344. View of Canal south of Lock No. 37 looking north

Photo 345. View of Canal north of Lock No. 38 looking north

Photo 346. View of Canal at Lock No. 39 looking north

Photo 347. View of Canal at Station 439+00 looking south

Photo 348. View of Canal at Tinkers Creek Aqueduct looking north

# BASINS

## Basins: Description and Function

Canal basins were places where boats could turn around, wait to pass through a lock, and take on or unload cargo. There were basins in the larger towns where boats could stop overnight or transfer passengers and freight. There also were wharfs at various loading points between towns, and farmers sometimes had their own landings. There were no written standards for constructing basins and little mention of them in the official correspondence and reports of the canal commissioners and engineers. Twelve identifiable basins appear on the 1892 and 1912 survey mapping. They were of all sizes and shapes, ranging from the expansive Stumpy Basin located between the villages of Peninsula and Boston to mere wide sections of canal that were barely large enough for one or two boats.

By the 1880s, following a series of devastating floods and the completion of the Valley Railway, some of the basins along the Cuyahoga Valley section of the Ohio and Erie Canal had been abandoned. The remaining basins were abandoned after the 1913 flood permanently ended navigation on the canal. Today some of them have been totally erased from the landscape while others are still recognizable as shallow depressions adjacent to the canal prism despite containing much sediment and usually heavily overgrown with vegetation.

## Defining Features

The canal basins in Cuyahoga Valley National Park are now silt-filled depressions with no identifiable structural features of concrete, stone, or wood. Character defining features include the overall dimensions of the basin and its physical relationship to the canal prism.

## Inventory

This section discusses seven basins within Cuyahoga Valley National Park that are still visible in the landscape. The other basins depicted on the 1892 and 1912 mapping could not be distinguished during the 2017 field survey.

- Basins (Station 1194+00 to 1197+00)
- Peninsula Basin (Station 1133+00 to 1136+00)
- Stumpy Basin (Stations 1051+00 to 1060+00)
- Boston Basins (Stations 990+50 to 997+00)
- Basin (Stations 870+00 to 873+00)
- Basin (Stations 767+00 to 771+50)
- Basin (Stations 523+00 to 527+00)

**Basins, Stations 1194+00 to 1197+00**

Location

This is the larger of two basins depicted on the 1912 Silliman survey which were located west of the canal between Stations 1202+00 and 1195+00, about 0.5-mile south of Deep Lock Quarry and Lock No. 28 and near Mile Marker 25 (Figure 136). The 1892 mapping shows them only as swampy depressions, but their rectangular shapes and regular dimensions (they are carefully measured and recorded) in 1912 suggests that they had been converted into basins since 1892, possibly as part of the recent improvement of the northern division.

Physical Description

A shallow depression marks the location of the larger of the two basins (Photo 349). There is little or no trace of the smaller basin.

Previous Documentation

The basin has not been documented previously.

Existing Conditions

The former basin is filled with sediment and contains many trees, shrubs, and grasses.

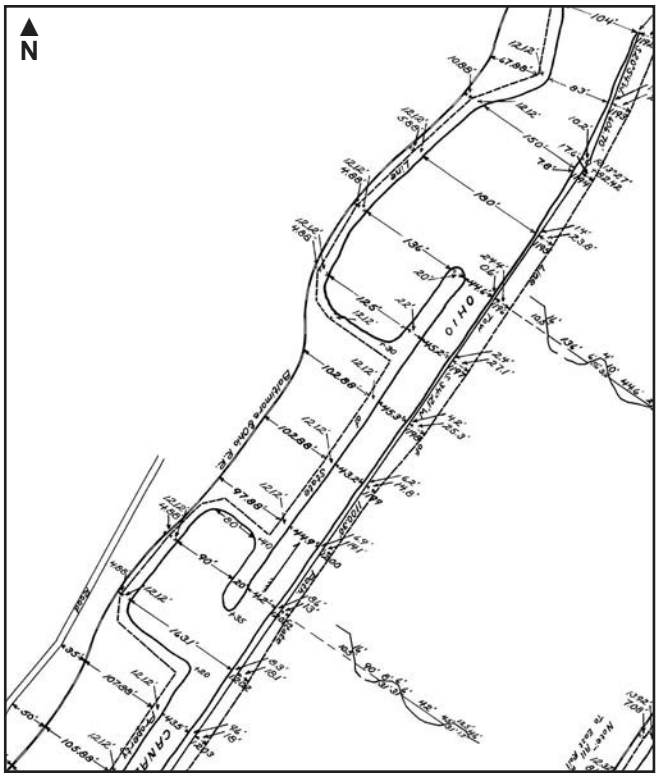


Figure 136. Survey map of basins at Stations 1194+00 to 1197+00, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1928

Photo 349. View of former basin at Station 1195

**Peninsula Basin, Stations 1133+00 to 1136+00**

Location

The Peninsula Basin was about 375 feet long and located west of the canal just south of the Route 303 (Streetsboro Road) bridge and the village of Peninsula (Figure 137). On the 1892 mapping it appears between Stations 1129+00 to 1132+00 with the notation "old basin filled" and is not depicted at all on the 1912 mapping. The 1909 annual report stated that in the past year "some of the old dock timbers that had fallen down along Peninsula level were pulled out and burned."

Physical Description

The rectangular basin appears as a shallow depression between the canal prism and a steep slope to the west.

Previous Documentation

The basin has not been documented previously.

Existing Conditions

The former basin is overgrown with dense vegetation including trees, shrubs, and grasses (Photo 350). The remains of the basin nevertheless are clearly visible today, together with some adjacent foundations.

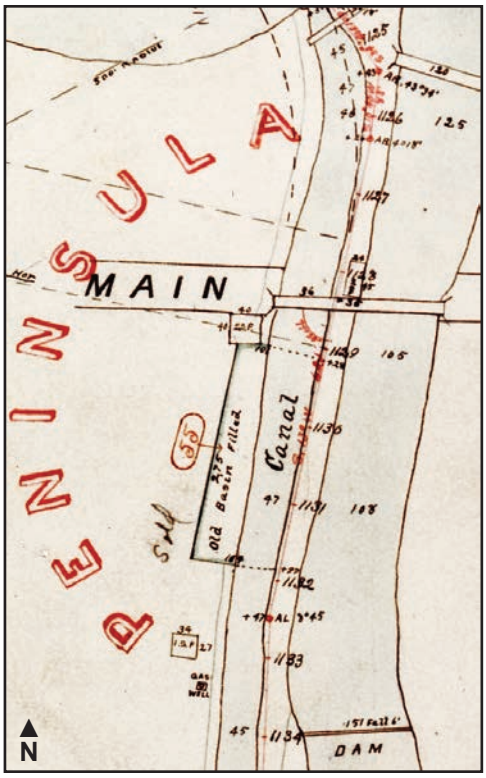


Figure 137. Survey map of Peninsula Basin, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

Photo 350. View of former Peninsula Basin

**Stumpy Basin, Stations 1051+00 to 1060+00**

Location

Stumpy Basin, located between the villages of Peninsula and Boston, was the largest basin in the Park and appears on both the 1892 and 1912 canal mapping. It is located just north of Lock No. 34 (Lonesome Lock), and in fact the downstream end of the waste way for the lock empties into the old basin. The name is derived from the relict stumps protruding from the water after the construction of the canal and basin. For many years the harvesting of winter ice from the pond was a major activity, and two icehouses are depicted on the 1892 mapping (Figure 138).[299]

Stumpy Basin was an original and important component of the canal, functioning as a wide-water turnaround and winter shelter for canal boats. It was abandoned following the 1913 flood. The remains of a buried canal boat were discovered at the southern edge of Stumpy Basin during archeological investigations conducted in 1990 prior to the construction of the towpath trail.

Physical Description

During the canal's period of operation, the basin measured approximately 1,200 feet long by 550 feet wide, according to the 1892 map. A 1976 field inventory of Classified Structures described Stumpy Basin as "30 acres of flat bottom land covered with a forest of small trees" and recommended that it remain in a natural state. Kent State University now has a biological field station there. The towpath trail crosses this biologically-sensitive wetland via an elevated boardwalk to reduce trail-related impacts. The basin is completely silted-in and contains water only during episodes of flooding from the nearby Cuyahoga River. Although it bears little resemblance to its appearance during the canal era, its condition has not changed significantly since it was last assessed (Photos 351 and 352).

Previous Documentation

Stumpy Basin was last documented in 2000 for *A Survey of Canal Resources in the Ohio & Erie Canal National Heritage Corridor* by Tamburro and Hiner and has the Ohio Historic Inventory designation SUM-0060-04. It was not discussed in the 1993 draft HSR.

Existing Conditions

Today Stumpy Basin is an active wetland ecosystem populated by numerous small trees, woody shrubs, and grasses. Despite extensive sedimentation and re-vegetation, the location is still identifiable as a former basin.

299. Finney, *Calumet, Canal, and Cuyahoga*, 288.

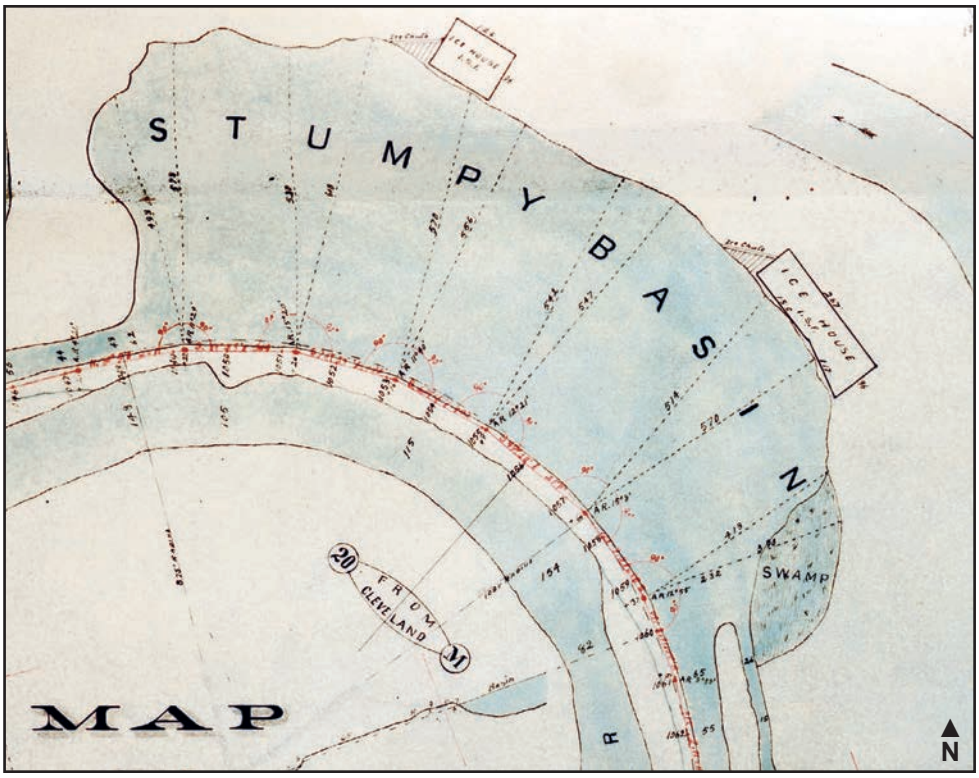


Figure 138. Survey map of Stumpy Basin, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

Photo 351. View of Stumpy Basin and boardwalk

Photo 352. View of Stumpy Basin

**Boston Basins, Stations 990+50 to 997+00**

Location

There were two basins in the village of Boston, one at each end of Lock No. 32 (Boston Lock). Both were on the east side of the canal. A drydock and boatyard were adjacent to the smaller one south of the lock (Figure 139). The 1912 mapping reveals that the larger basin north of the lock was a remnant of an even larger basin since it shows an adjacent swampy area bearing the notation "old basin filled" (Figure 140). Both basins are easily accessible from the towpath trail and the Boston Store Visitor Center.

Physical Description

In 1912 the smaller basin, south of the lock, measured about 200 feet long by 90 feet wide (including the canal itself) and the larger basin, north of the lock, measured approximately 225 feet by 250 feet.

Previous Documentation

The basins have not been documented previously.

Existing Conditions

Today the basins appear as well-defined depressions to each end of Lock No. 32 (Photos 353 and 354). The smaller basin contains large trees, shrubs, and brush, while the large basin is mostly open and grassy. Both contain shallow water during rainy periods. They are easily identifiable as former basins and have considerable interpretive value.

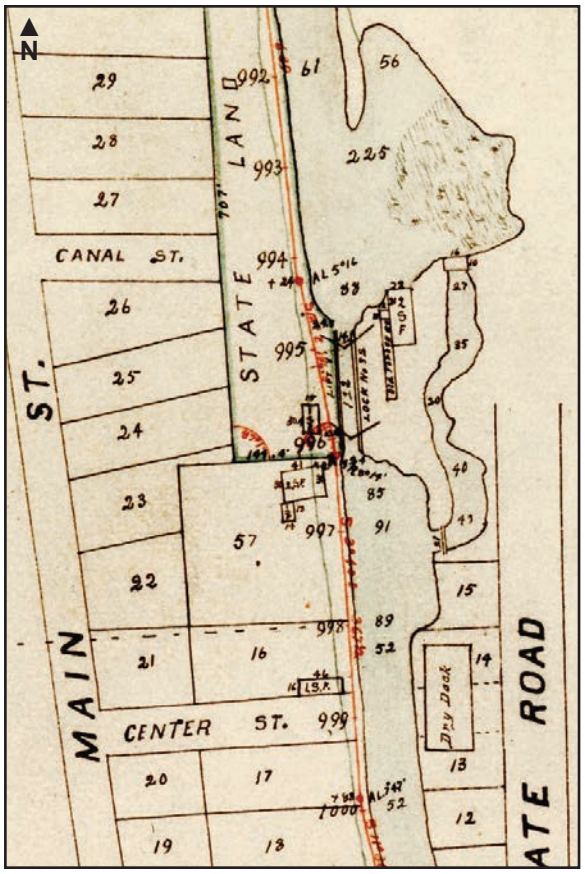


Figure 139. Survey map of Boston basins, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

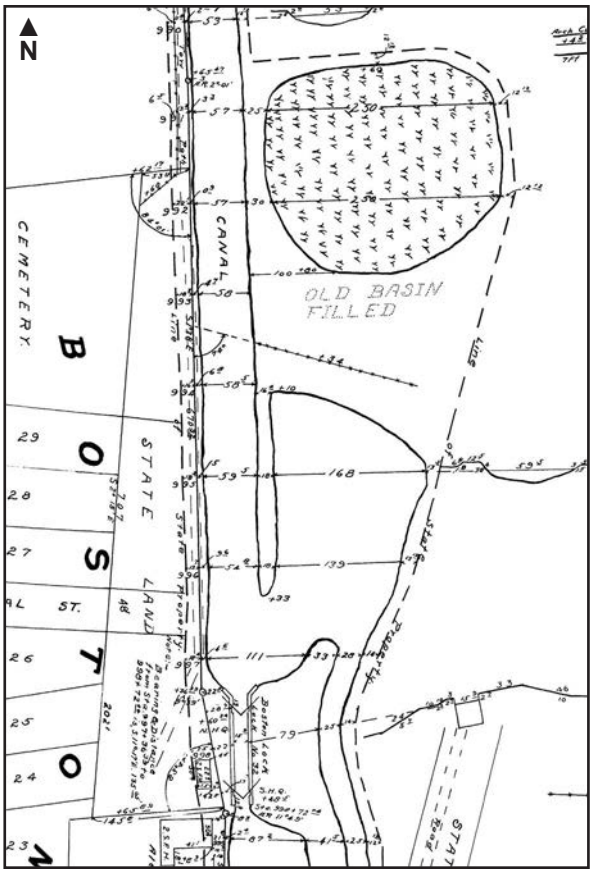


Figure 140. Survey map of Boston basins, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

Photo 353. View of Boston Basin, south of lock

Photo 354. View of Boston Basin, north of lock

**Basin, Stations 870+00 to 873+00**

Location

A small basin was located at Stations 870+00 to 873+00 near Mile Marker 19, about 600 feet south of the Goose Pond Waste Weir/Flood Gate, according to both the 1892 and 1912 mapping (Figures 141 and 142). It was located on the east side of the canal.

Physical Description

The 1912 mapping indicates that the triangular shaped basin's maximum dimensions were 300 feet by 175 feet including the canal prism itself.

Previous Documentation

The basin has not been documented previously.

Existing Conditions

The former basin is filled with sediment and is heavily wooded, but a depression marking its location can still be discerned today.

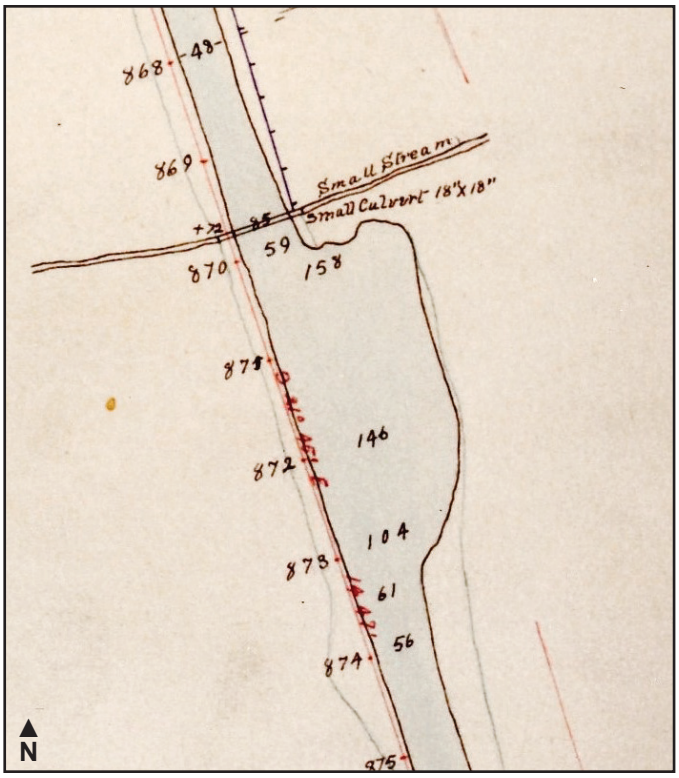


Figure 141. Survey map of basin at Stations 870+00 to 874+00, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

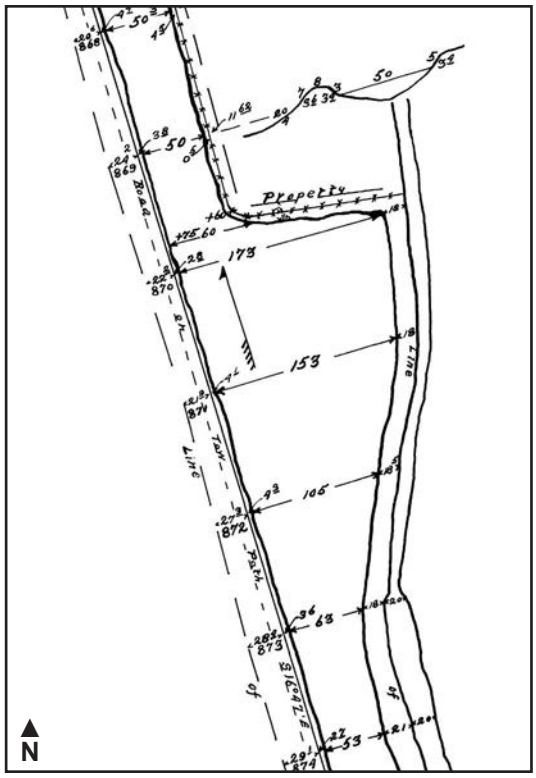


Figure 142. Survey map of basin at Stations 870+00 to 873+00, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

### Basin, Stations 767+00 to 771+50

Location

The 1892 and 1912 mapping both show a moderate-size basin between Station Road and Lock No. 36 south of the Pinery Narrows (Figures 143 and 144). It was located on the east side of the canal. The north end of the basin had been filled by 1912, but the southern 400 feet remained. Much of the rest was filled in with debris during the construction of the Brecksville-Northfield High Level Bridge in 1931, but portions remain intact. It is accessible from the towpath trail and the Station Road Trailhead.

Physical Description

The 1912 mapping indicates that the basin was oval-shaped and measured about 375 feet long by 145 feet wide. A narrow causeway separated the basin from the canal with only a single narrow opening for boats to enter and exit.

Previous Documentation

The basin has not been documented previously.

Existing Conditions

Most of the former basin is filled with rocky debris from construction of the nearby High Level Bridge, but part of it can still be distinguished in the landscape.

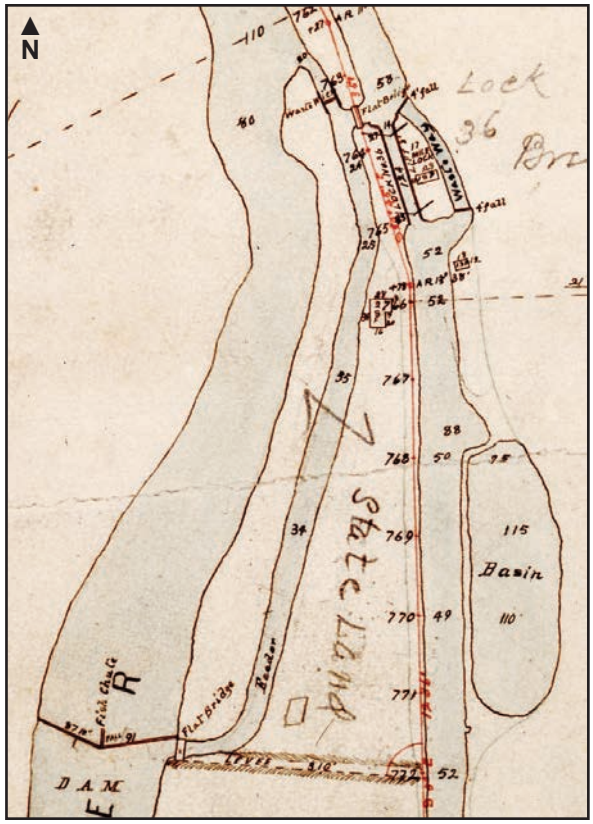


Figure 143. Survey map of Pinery Basin, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

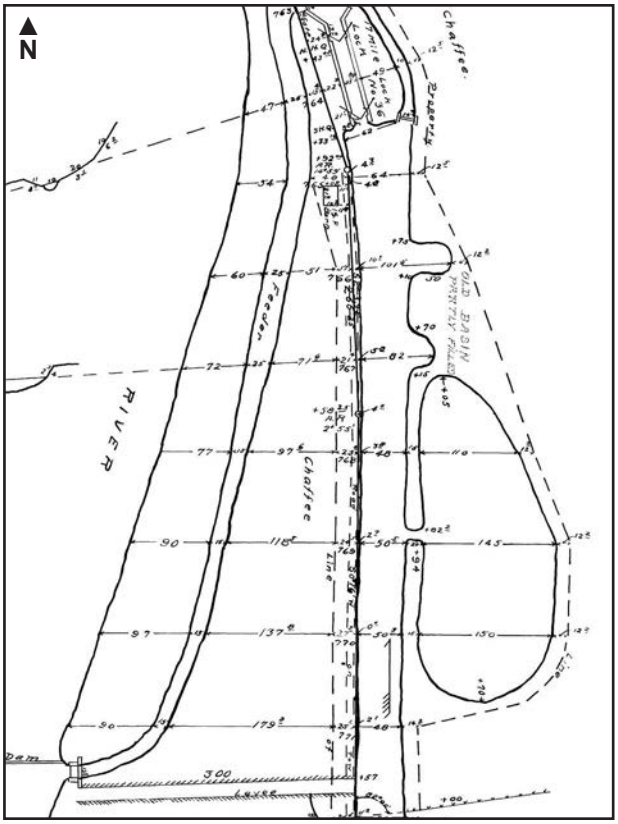


Figure 144. Survey map of Pinery Basin, from *Map of the Ohio Canal, Summit County, Ohio,* G.W. Silliman, 1912, retraced 1916

**Basin, Stations 523+00 to 527+50**

Location

The 1892 mapping shows a basin at Stations 521-525, about 800 feet north of Lock No. 38 (Figure 145). It was located on the east side of the canal. It does not appear on the 1912 mapping, and much of it was filled in during past widening of Canal Road. It is easily accessible from the road.

Physical Description

The 1892 mapping indicates that the basin was semicircular in shape and measured about 450 feet long by 200 feet wide. By 1892 Canal Road passed between the canal and the basin so that there no longer was any boat access to it. This suggests that it had already been abandoned.

Previous Documentation

The basin has not been documented previously.

Existing Conditions

The former basin is filled with sediment and overgrown, but a large depression on the east side of Canal Road marks its location (Photo 355).

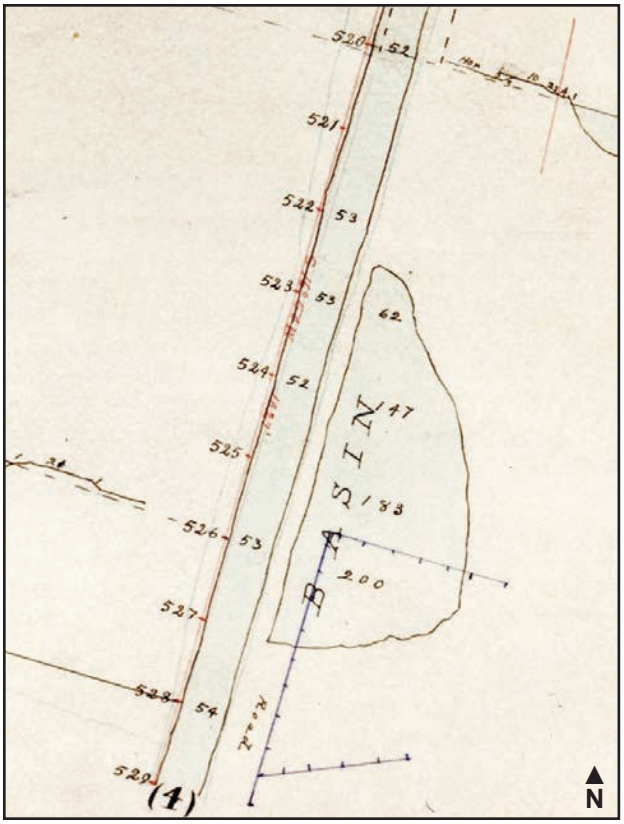


Figure 145. Survey map of basin at Stations 523+00 to 527+00, from *Map of the Ohio Canal, Cuyahoga and Summit Counties, Ohio,* D.C. Kennon, 1892

Photo 355. View of former basin at Stations 523 to 527

# PART II – TREATMENT AND USE

## A. ULTIMATE TREATMENT AND USE

### Centrality of Ohio and Erie Canal to Purpose and Mission of Park

Cuyahoga Valley National Park was established for the purposes of preserving and interpreting the natural, historic, scenic, and recreational values of the Cuyahoga River Valley. The single most important historical development in the Cuyahoga Valley was the construction of the Ohio and Erie Canal, a corridor of communication and commerce that linked a formerly isolated region to distant cities and markets. Today the numerous canal-related structures in the Park are remnants of the construction and evolution of this nationally significant transportation system during the 19th and early 20th century. Once part of a statewide and regional network of canals, this portion of the Ohio and Erie Canal reflects a now vanished era.

The entire 22-mile length of the canal in Cuyahoga Valley National Park is eligible for the National Register of Historic Places, and part of it is a National Historic Landmark. Beyond its National Register and NHL status, the importance of the canal is demonstrated by its pervasiveness in the Park's planning documents. The preservation and use of the Ohio and Erie Canal are the greatest cultural resource management priority in the Park. Preservation, maintenance, and interpretation of the canal are central to the mission of Cuyahoga Valley.

Public Law 93-555 established Cuyahoga Valley National Recreation Area on December 27, 1974. On October 11, 2000 Public Law 106-291 changed the name to Cuyahoga Valley National Park. The enabling legislation described its mission: "to preserve and protect for public use and enjoyment the historic, scenic, natural, and recreational values of the Cuyahoga River Valley, to maintain the open space necessary for the urban environment, and to provide for the recreational and educational needs of the visiting public."

Public Law 104-333, enacted on November 12, 1996, established the Ohio and Erie Canal National Heritage Corridor, renamed the Ohio and Erie National Heritage Canalway in 2008. One of the defined goals of its *Management Plan* is to preserve significant historic structures and other resources associated with the Ohio and Erie Canal.[300]

### Key Park Planning Documents

Every unit of the national park system is required to have a formal statement of its core mission that provides basic guidance for all planning and management decisions: a "foundation for planning and management." The *Foundation Document* for Cuyahoga Valley National Park was published in July 2013. Its description of the purpose of the Park is identical to the statement of mission contained in the enabling legislation: "to preserve and protect for public use and enjoyment the historic, scenic, natural, and recreational values of the Cuyahoga River Valley, to maintain the open space necessary for the urban environment, and to provide for the

300. George, Preethy, Mary Anne Myers, Abiola Ogunbiyi, and Johanna Dubsky, *Ohio and Erie National Heritage Canalway Evaluation Findings* (Rockville, MD: Westat, 2012), 3-39; Ohio and Erie Canal Association, *Ohio and Erie Canal National Heritage Corridor Management Plan* (Peninsula, OH: Ohio and Erie Canal Association, 2000), 55.

recreational and educational needs of the visiting public." The Foundation Document identifies the Ohio and Erie Canal as one of the fundamental resources and values of Cuyahoga Valley National Park. Among the defined planning and data needs it lists "a canal management plan for detailed assessment of canal structure condition and specific treatment recommendations for watered and unwatered sections of the canal." This includes: (1) an assessment of each canal structure condition and recommended treatment in the watered section to keep it functional for maintaining water levels; and (2) an assessment of each canal structure condition and recommended treatment in the unwatered section to arrest the continued deterioration and erosion of ruins.[301] This *Ohio and Erie Canal History and Historic Structure Assessment* is intended to help meet this defined need.

The *General Management Plan (GMP)*, approved in February 1977, states that "the National Park Service will faithfully preserve all significant historic and archaeological resources and will provide for their interpretation, use, and/or protection through adequate research and programming." It calls for developing the northern, watered portion of the canal into a major interpretive area. The plan recommends further study to determine the appropriate long-range level of treatment and that this level is to be consistent for the entire section. The immediate level of treatment proposed for features are ongoing maintenance and stabilization as necessary to ensure resource preservation until more intense levels of treatment are undertaken. The canal structures in the southern, unwatered portion are identified in the GMP as structures which merit protection and interpretation; the proposed level of treatment is stabilization to stop or slow deterioration.[302]

The *Resources Management Plan (RMP)*, approved in September 1986, proposes specific use and treatments for individual structures. In addition to Project C-23 which involves the completion of the Historic Structure Report for the Ohio and Erie Canal, the plan includes two other projects specifically related to canal research, development, and maintenance. Project C-33 addresses the northern, watered portion of the canal. The recommended course of action is restoration of the canal from Rockside Road to Route 82 to evoke the canal era. The intent, as presented in the RMP, is not full-scale restoration. The plan instead recommends that evocation of the canal in this segment is the most appropriate and cost-effective way to preserve it and present it to the visiting public. Project C-34 addresses the southern two-thirds of the canal, from Route 82 to Bath Road. The recommended course of action is low-level stabilization of the deteriorated canal structures. While the RMP addresses the treatment of certain canal components, recommendations presented are not comprehensive in nature. The RMP was later updated and revised. Project 313.00 addresses both the watered and unwatered portions of the canal and contains recommendations similar to those presented above.[303]

301. National Park Service, *Foundation Document Cuyahoga Valley National Park* (Brecksville, OH: Cuyahoga Valley National Park, 2013), 46.
302. National Park Service, *Final General Management Plan, Cuyahoga Valley National Recreation Area, Ohio* (Denver, CO: National Park Service, 1977),
303. National Park Service, *1984 Resource Management Plan and Environmental Assessment for the Cuyahoga Valley National Recreation Area, Ohio* (Brecksville, OH: National Park Service, 1984).

## Secretary of Interior's Standards for the Treatment of Historic Properties

*The Secretary of the Interior's Standards for the Treatment of Historic Properties* are a series of concepts for maintaining, repairing, and replacing historic materials and making alterations and new additions.[304] The Standards describe four broad treatment approaches that may be applied to historic properties: Preservation, Rehabilitation, Restoration, and Reconstruction. Codified as 36CFR68, they apply to a wide variety of historic properties including buildings, sites, structures, objects, districts, and landscapes. The regulations state that "one set of standards—preservation, rehabilitation, restoration, or reconstruction—will apply to a property undergoing treatment, depending upon a property's significance, existing physical condition, the extent of documentation available and interpretive goals, when applicable." The National Park Service defines the four approaches as follows:

> ***Preservation*** is defined as the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction.
>
> ***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.
>
> ***Restoration*** is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period.
>
> ***Reconstruction*** is defined as the act or process of depicting, by means of new construction, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location.

## Ultimate Treatment and Use

The Park's planning documents establish the historic preservation objective (Ultimate Treatment and Use) for structures in the unwatered section of the canal as *Preservation*. For structures in the watered section of the canal the historic preservation objective is a combination of *Preservation* and *Restoration*.

<u>Unwatered Section</u>

The recommended level of treatment for abandoned structures along the unwatered section of the canal is preservation; this is consistent with that proposed for the structures

304. National Park Service, *The Secretary of the Interior's Standards for the Treatment of Historic Properties*, 3. https://www.nps.gov/tps/standards.htm

which are presently included in the List of Classified Structures (Table 3). Although no longer water-charged, this portion of the canal is, for the most part, still discernible as a formerly navigable waterway. Taken as a group, these deteriorated structures retain sufficient form and material to convey their original use and function. Their historical significance and integrity dictate that these structures be preserved.

Although historical documentation and existing fabric are adequate to permit accurate restoration, such treatment would not be in accordance with established criteria for restoration projects included in NPS policies and guidelines. Restoration of these structures is not essential for public understanding and appreciation of the Park's historical and cultural associations. The public is provided the opportunity to view restored, operational canal structures within the watered portion of the canal. The existing conditions of the structures along the unwatered portion of the canal allow for satisfactory protection, maintenance, use, and interpretation, as well as conveying a desirable sense of evolution reflecting the abandonment of the canal and the subsequent decline of structural components. Restoration, therefore, is not recommended. Adequate interpretation of these abandoned structures can be imparted through preservation. Preservation also would have minimal impact on natural resources near the historic canal structures.

Watered Section

The recommended level of treatment for locks in the watered section is restoration; this is consistent with that proposed in the List of Classified Structures (Table 4). Restoration of Lock No. 38 already has been completed. As defined by the Secretary of the Interior, restoration is the process of accurately recovering the form and details of a property and its setting as it appeared during a particular period by the means of removal of later work or the replacement of missing earlier work. Restoration to the 1907 appearance is recommended, as it will allow for the integrity of the locks to be preserved while returning the structures to an operational condition. Restoration to this period will permit the preservation or stabilization of concrete wall surfaces, an alteration of historical value which conveys a desirable sense of evolution and minimize removal of existing fabric. Enough historic documentation and fabric exists to accurately reconstruct missing or severely deteriorated elements, such as lock gates, enabling the locks to be functional. The results will not only increase the life of the structures and their value as a cultural resource but also will provide a beneficial contribution to the historic scene thereby enhancing the historic integrity of the Ohio and Erie Canal National Historic Landmark.

Except for the Pinery Dam which is scheduled to be removed in summer 2019, the recommended level of treatment for all other structures in the watered section (waste structures, feeder, mudcatcher, prism, and basins) is preservation; as these structures are not identified on the current List of Classified Structures, this recommendation is not in conflict with any previously proposed treatment.[305] Their historical significance and integrity, as well as their existing physical condition, dictate that these structures be preserved. There have been no major alterations to any of them since their construction. While limited changes have occurred,

305. Preservation is also the recommended treatment approach for the Tinkers Creek Aqueduct, but this applies only to the abutments. The trunk and pier of the aqueduct were reconstructed in 2009, removing or altering all historic fabric.

Table 3.
Listing of Ohio & Erie Canal structures in Cuyahoga Valley National Park, unwatered section

| Structure | HS # / LCS # / Station | Recommended Treatment |
|---|---|---|
| Yellow Creek Culvert | HS-101 / LCS #011148 | Preservation |
| Lock No. 24 | HS-102 / LCS #011149 | Preservation |
| Lock No. 25 | HS-103 / LCS #011150 | Preservation |
| Ira Road Culvert | Station 1383+00 | Preservation |
| Flood Gate | Station 1378+31 | Preservation |
| Lock No. 26 | HS-104 / LCS #011151 | Preservation |
| Bolanz Flood Gate | Station 1305+25 | Preservation |
| Furnace Run Aqueduct | HS-105 / 011152 | Preservation |
| Private bridge | Station 1285+00 | Preservation |
| Lock No. 27 | HS-106 / LCS #011153 | Preservation |
| Basin | Stations 1194-1197 | Preservation |
| Arch Culvert | Station 1190+98 | Preservation |
| Railroad bridge retaining wall | Station 1167+00 | Preservation |
| Lock No. 28 | HS-107 / LCS #11154 | Preservation |
| Peninsula Basin | Stations 1133-1136 | Preservation |
| Peninsula Aqueduct | HS-110 / LCS #011157 | Preservation |
| Lock No. 29 | HS-110 / LCS #11157 | Preservation |
| Lock No. 30 | HS-111 / LCS #11158 | Preservation |
| Peninsula Feeder | Station 1109+75 | Preservation |
| Lock No. 31 | HS-112 / LCS #11159 | Preservation |
| Stumpy Basin | Stations 1051-1060 | Preservation |
| Lock No. 32 | HS-114 / LCS #11161 | Preservation |
| Boston Basins | Stations 990+50-997+00 | Preservation |
| Stanford Creek Culvert South | Station 973+02 | Preservation |
| Stanford Creek Culvert North | Station 961+94 | Preservation |
| Lock No. 33 | HS-115 / LCS #011162 | Preservation |
| Brandywine Creek Culvert | Station 921+39 | Preservation |
| Lock No. 34 | HS-116 / LCS #011163 | Preservation |
| Bridge over Lock 34 Wasteway | Station 905+80 | Preservation |
| Basin | Station 870-873 | Preservation |
| Goose Pond Waste Weir/Flood Gate | Station 863+50 | Preservation |
| Hooker's Run Flood Gate | Station 838+34 | Preservation |
| Lock No. 35 | HS-117 / LCS #011164 | Preservation |
| Basin | Stations 767-771 | Preservation |
| Lock No. 36 | HS-118 / LCS #011165 | Preservation |
| Prism | Continuous | Preservation |

Table 4.
Listing of Ohio & Erie Canal structures in Cuyahoga Valley National Park, watered section

| Structure | HS # / LCS # / Station | Recommended Treatment |
|---|---|---|
| Pinery Dam | Station 771+50 | To be removed |
| Pinery Feeder | Stations 763+00-771+50 | Preservation |
| Galley Run Mudcatcher | HS-132 | Preservation |
| Sagamore Creek Flood Gate/Waste Weir | HS-130 | Preservation |
| Sagamore Creek Waste Weir | Station 636+10 | Preservation |
| Flood Gate | Station 613+00 | Preservation |
| Lock No. 37 | HS-121 / LCS #011168 | Restoration |
| Tinkers Creek Aqueduct | HS-123 / LCS #011170 | Preservation |
| Lock No. 38 | HS-126 / LCS #11173 | Restoration |
| Basin | Stations 523-527 | Preservation |
| Waste Weir | HS-129 | Preservation |
| Lock No. 39 | HS-128 / LCS #011175 | Restoration |
| Prism | Continuous | Preservation |

such as the extension of the discharge apron and repairs to the flood gate at Station 613+00, the alterations are minor and do not have an adverse impact on the qualities for which the canal is significant. Preservation will permit the retention of such features, which not only convey a desirable sense of evolution but also are typically required for efficient operations and minimize the removal of existing fabric. As is the case for the unwatered section, preservation would have fewer potential impacts on natural resources near the historic canal structures than other treatment options.

## B. REQUIREMENTS FOR TREATMENT

### Legal Requirements and DOI/NPS Policies and Regulations

The relevant laws, regulations, and National Park Service policy documents pertaining to the treatment of historic properties include:

Section 106 of National Historic Preservation Act (NHPA) as amended

The National Historic Preservation Act of 1964 and its implementing regulations 36CFR800 require federal agencies, including the National Park Service, to take into account the effects of their actions on properties listed in or eligible for listing in the National Register of Historic Places and give the Advisory Council on Historic Preservation an opportunity to comment.

NPS Cultural Resources Management Guideline (Director's Order #28)

Director's Order #28, effective June 11, 1998, requires planning for the protection of cultural resources on park property; integration of cultural resource concerns into other park planning and management processes; and avoidance or minimization of adverse effects on cultural resources.

Chapter 4 of the guideline lists internal standards for stewardship of cultural resources, including: (1) pending planning decisions, cultural resources are preserved and protected in their existing forms; (2) every treatment project is supported by an approved proposal, plan, or report appropriate to the proposed action; and (3) the appropriate level of Section 106 compliance is accomplished before executing a treatment project. Chapter 4 goes on to consider issues related to public accessibility, preservation maintenance management, and public safety.

Chapter 8 discusses the management of historic and prehistoric structures, including the preparation of historic structure reports. It states that "the historic structure report (HSR) is the primary guide to treatment and use of a historic structure...In no case should restoration, reconstruction, or extensive rehabilitation of any structure be undertaken without an approved HSR, Parts 1 and 2." The guideline provides an outline and standards to be followed when preparing an HSR.

NPS General Management Policies (2006)

The National Park Service General Management Policies (2006) guide the overall management of historic properties in the parks. Section 5.3.5 (Treatment of Cultural Resources) states:

> The preservation of cultural resources in their existing states will always receive first consideration. Treatments entailing greater intervention will not proceed without the consideration of interpretive alternatives. The appearance and condition of resources before treatment and changes will be documented... Pending treatment decisions reached through the planning process, all resources will be protected and preserved in their existing states.
>
> As a basic principle, anything of historical appearance that the National Park Service presents to the public in a park will be either an authentic survival from the past or an accurate representation of that once existing there. Reconstructions and reproductions will be clearly identified as such.

According to Section 5.3.5.4, "the treatment of historic and prehistoric structures will be based on sound preservation practice to enable the long-term preservation of a structure's historic features, materials, and qualities. There are three types of treatment for extant structures: preservation, rehabilitation, and restoration. A structure will be preserved in its present condition if (1) that condition allows for satisfactory protection, maintenance, use, and interpretation; or (2) another treatment is warranted but cannot be accomplished until some future time. A historic structure may be rehabilitated for contemporary use if (1) it cannot adequately serve an appropriate use in its present condition; and (2) rehabilitation will retain its essential features and will not alter its integrity and character or conflict with approved park management objectives."

The treatment of historic properties may require consideration of potential effects on natural resources such as wetlands, streams, and native plant species. The consistent message of the NPS policy guidance is the need to consider both the continuity of natural processes and the preservation of historic, cultural, and recreational features.

EO 11990 (Protection of Wetlands)

While they do not pertain to the treatment of historic properties, Executive Order 11990 and NPS policies for implementing the executive order are relevant to the development of treatment plans for canal structures due to the nature and location of those structures, particularly the canal prism and watered locks. EO 11990 directs federal agencies to minimize impacts and mitigate the destruction, loss, or degradation of wetlands; to preserve and enhance the natural and beneficial values of wetlands; and to avoid direct and indirect support of new construction in wetlands unless there are no practicable alternatives and the proposed action includes all practicable measures to minimize harm. NPS policies for implementing the Executive Order are contained in Director's Order 77-1 (Wetland Protection) and Section 4.6.5 of the NPS General Management Policies (2006).

## C. RECOMMENDATIONS FOR TREATMENT

Treatment of the Ohio and Erie Canal in Cuyahoga Valley National Park will be guided by the historic preservation objectives defined in previous Park planning documents and by *The Secretary of the Interior's Standards for the Treatment of Historic Properties*. Of the four treatment approaches outlined in the Standards, preservation is the preferred approach for structures located along the unwatered section of canal, and a combination of restoration and preservation is the preferred approach for structures along the watered section.

### Standards for Preservation

The National Park Service states: "When the property's distinctive materials, features, and spaces are essentially intact and thus convey the historic significance without extensive repair or replacement; when a depiction at a particular period of time is not appropriate; and when a continuing or new use does not require additions or extensive alterations, Preservation may be considered as a treatment. The *Standards for Preservation* are as follows:

1. A property will be used as it was historically or be given a new use that maximizes the retention of distinctive materials, features, spaces and spatial relationships. Where a treatment and use have not been identified, a property will be protected and, if necessary, stabilized until additional work may be undertaken.

2. The historic character of a property will be retained and preserved. The replacement of intact or repairable historic 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. Work needed to stabilize, consolidate and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection and properly documented for future research.

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. The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color, and texture.

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. Archaeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken. [306]

**Standards for Restoration**

According to the National Park Service, "When the property's design, architectural, or historical significance during a particular period outweighs the potential loss of extant materials, features, spaces, and finishes that characterize other historical periods; when there is substantial physical and documentary evidence for the work; and when contemporary alterations and additions are not planned, Restoration may be considered as a treatment. Prior to undertaking work, a particular period, i.e., the restoration period, should be selected and justified, and a documentation plan for Restoration developed." The *Standards for Restoration* are as follows:

1. A property will be used as it was historically or be given a new use that interprets the property and its restoration period.

2. Materials and features from the restoration period will be retained and preserved. The removal of materials or alteration of features, spaces and spatial relationships that characterize the period will not be undertaken.

3. Each property will be recognized as a physical record of its time, place, and use. Work needed to stabilize, consolidate and conserve materials and features from the restoration period will be physically and visually compatible, identifiable upon close inspection and properly documented for future research.

4. Materials, features, spaces, and finishes that characterize other historical periods will be documented prior to their alteration or removal.

5. Distinctive materials, features, finishes, and construction techniques or examples of craftsmanship that characterize the restoration period will be preserved.

6. Deteriorated features from the restoration period 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.

7. Replacement of missing features from the restoration period will be substantiated by documentary and physical evidence. A false sense of history will not be created by adding conjectural features, features from other properties, or by combining features that never existed together historically.

8. 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.

306. National Park Service, *The Secretary of the Interior's Standards*.

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

10. Designs that were never executed historically will not be constructed. [307]

**Recommendations for Treatment, Unwatered Section**

Preservation is the recommended treatment approach for all structures located along the unwatered section of canal, including both earthen structures (prism, basins) and concrete and stone masonry structures (aqueducts, culverts, waste structures, bridges, and the Peninsula Feeder). The two classes of structures require different treatment approaches.

Preservation: Earthen Structures

The preservation of the canal prism and former basins along the unwatered section will require little direct action to meet the NPS Standards for Preservation. The emphasis should be on retaining and preserving the general historic character of the prism and basins, focusing on the character-defining features listed in Section 1C. For the prism these include the historic location, the overall dimensions and shape as shown on the 1892 and 1912 survey mapping, and the appearance as a man-made earthen ditch and adjoining earthen embankment topped by a level path for the movement of draft animals. The prism and towpath are important primarily for their function as a linear connecting route rather than for specific construction details which likely were replaced or substantially modified over time. For basins, the character defining features include their overall dimensions and physical relationship to the canal prism.

The present appearance of the prism and basins is much different from their appearance during the canal's period of significance. A century of abandonment and neglect has resulted in extensive and ongoing natural deterioration, including erosion, sedimentation, and vegetation growth. Long stretches are heavily forested. An extreme example of natural deterioration is found at the Beaver Marsh where the former canal has merged into an expansive wetland complex. Other sections have been altered by human activity, such as at the former Jaite paper mill and between Bath and Ira Roads where the prism and towpath were obliterated by road construction. It is not necessary to reverse or arrest the natural deterioration of these earthen structures to meet the Standards for Preservation. It is necessary only to avoid changes to their form, materials, and appearance that would detract from their ability to convey their original use and function. Such changes might include new construction or fill deposition within the prism and basins, or changes to the overall dimensions of the towpath bank.

An appropriate management and maintenance program for the prism and basins throughout most of the unwatered section would include the routine removal of modern intrusions such as architectural debris, signage, fencing, relict features such as drain pipes and posts, hazardous trees, and general trash. Removal of living trees and other vegetation from the prism and basins is not necessary to meet the historic preservation objective and the Standards for Preservation and it could potentially impact natural resources such as wetlands, native plants, wildlife, and water quality. On the other hand, this action might enhance interpretation

307. National Park Service, *The Secretary of the Interior's Standards*.

and visitor appreciation of the Ohio and Erie Canal, especially if it were done selectively in historically sensitive areas such as the Everett Village, Boston Mills, and Peninsula historic districts where the canal is fading into the landscape. An appropriate management and maintenance program for the prism and basins in these areas would consist of vegetative management including routine removal of invasive vegetation, brush and non-woody vegetation, and small trees with a trunk diameter under 6 inches. Mature trees (over 6 inches in diameter) should remain. When working in the prism, NPS should assume the presence of an existing or emergent wetland and should restrict the use of heavy equipment, instead relying on hand tools and manually controlled power tools. No trees should be removed between April and October 1 to avoid any impacts to threatened and endangered species. This program of selective vegetative management would not apply to the immediate vicinity of concrete and stone canal structures where routine removal of virtually all vegetation is recommended.

Preservation: Concrete and Stone Masonry Structures

Extensive deterioration of most concrete and stone masonry structures along the unwatered section, as described in Section 1C, generally precludes comprehensive stabilization. Most of the structures in their present condition are not inherently durable or weather-resistant. Extensive intervention would be required to arrest deterioration and reestablish the structural integrity and weather-resistant conditions. Such treatment would significantly alter the appearance and historic character of these structures. This would be counter to the NPS Standards for Preservation outlined above.

The recommendation for preservation, therefore, includes low-level stabilization intended to retard deterioration without adversely impacting the historic character of the structure. In their present conditions the structures are visible, accessible to the public, and able to convey their historic appearance and function, thus satisfying the requirements of the established interpretive program. Without intervention however continued deterioration will result in a limited life span. The intent is to extend the life expectancy of these structures while disturbing the existing form and the site to the least extent possible.

Treatment is divided into two categories: *immediate preservation* and *long-term preservation*. Work recommended as immediate preservation is aimed at reducing the rate of deterioration by limiting deleterious factors. Long-term preservation presents a methodology to establish a program which will manage, passively or actively, the inherent decline of these abandoned structures. The general recommendations presented below apply to all concrete and stone masonry structures along the unwatered section. A specific treatment plan for each individual structure should be developed by park planners in accordance with the general methodology outlined here.

*Immediate Preservation Treatment*

The following measures should be implemented as soon as possible to diminish immediate threats to these structures. While extensive intervention would be required to arrest deterioration completely, several factors that accelerate deterioration can be addressed with a minimum of intervention. Immediate preservation treatment should include the following:

1. Remove vegetation:

These abandoned canal structures are extremely susceptible to the encroachment of vegetation. Management of vegetation is essential to diminish the ongoing and accelerating deterioration and to extend the life expectancy of these structures. All existing vegetation should be removed from the top and vertical surfaces of walls and a program of periodic plant removal should be established and implemented.

In general, all vegetation should be removed using hand tools and manually controlled power tools. Where possible, vines and other vegetation with invasive root systems should be cut at the base and allowed to dry before removal. In some instances, where roots continue to grow, the use of herbicides may be required. All organic debris should be cleared from the structures; while removing vegetation will discourage further growth, the elimination of a conducive environment is necessary to preclude all growth.

Tree removal must be evaluated on a case-by-case basis. In some instances, mature trees which provide support for unstable structural components or which prevent significant erosion should not be removed during this initial phase of stabilization. The program for vegetation management, however, should allow the retention of trees only when removal would be more damaging. In all cases of tree removal, the subsequent decay of extensive root systems will result in ground settlement and periodic inspections should be performed to determine if remedial work is required.

2. Grade adjacent ground surfaces:

While exposure to moisture in the form of precipitation, runoff, and ground water is unavoidable in a riverine and canal environment, adverse effects can be diminished by limiting the amount of infiltration. Measures designed to reduce, although not completely eliminate, moisture infiltration will significantly slow the rate of deterioration and extend the life expectancy of these structures.

Ground surfaces should be graded where necessary to slope away from the structures. Positive drainage of storm water will decrease the amount of water directed towards the structures and will minimize the saturation of soil adjacent to the structures, reducing moisture infiltration. In most instances seeding of these areas will prevent erosion. Additional soil erosion control, however, may be required at certain locations.

3. Protect components highly susceptible to weathering:

Site conditions under which these structures were intended to function have changed dramatically since the abandonment of the canal. The erosion of adjacent embankments and the lack of water within the canal prism pose serious threats which can be eliminated through proper management of the site. Structural components not designed to resist weathering are extremely susceptible to rapid deterioration if exposed to the elements.

The rubble backup of lock walls was intended to provide mass to prevent movement resulting from lateral pressure of the earth and was not designed to resist weathering. The stones were often loosely laid with weak or no mortar and if exposed, provide areas for water infiltration which will rapidly deteriorate the rubble backup and accelerate deterioration of the associated face wall. The rubble back up will lose its capacity to act as a homogenous structural component resulting in ultimate failure of the entire wall. Areas where earthen embankments have eroded, revealing the rubble backup, should be reestablished when damage to the wall will not result. Significant cracks and voids in the back face of these walls should be filled with grout prior to backfilling. The eroded embankments should be filled first with a layer of granular material. This layer will act as a french drain and reduce hydrostatic pressures against the back of the wall.

Wood components are inherently prone to decay if subjected to conditions of differing moisture content. Timber foundations and flooring were intended to function with a watered lock chamber or below grade. If exposed to air the wood will deteriorate rapidly, leading to instability and ultimate failure of the entire structure. Adequate protection, such as a sufficient layer of soil, should be provided to ensure against deterioration associated with prolonged exposure. In the case of the Furnace Run Aqueduct abutments, which are supported by timber pilings and planking, the site should be monitored closely during dry seasons to ensure that the wood components remain below the water level in the stream.

*Long-Term Preservation Treatment*

The measures recommended as immediate preservation treatment will slow but not stop deterioration. Moisture infiltration and surface weathering will cause continued degradation of the material, and there will be additional loss of historic fabric. The following measures are recommended as an ongoing program to manage, actively or passively, the decline of these abandoned structures:

1. Determine rate of deterioration:

While deterioration is apparent, the rate at which the structures are deteriorating has not been established. Empirically it can be expected that deterioration will accelerate. Each structure should be documented, noting the location and extent of deterioration. A long-term monitoring program should be established and implemented. The program should include a yearly condition survey and documentation of deterioration. The comparison of observations to previous years will ascertain the rate of deterioration. The present report is a good starting point for such a program since it documents deterioration and other changes that occurred between the preparation of the draft HSR in 1993 and the update in 2018.

2. Establish acceptable amount of deterioration:

A primary value of the abandoned structures is to enhance public understanding and appreciation of the canal. Taken as a group the structures are critical to the Park's resource management program and interpretive program. The interpretive value of the individual structures however varies considerably. Accordingly the acceptable amount of deterioration varies with each structure. Numerous factors should be taken into consideration when establishing the acceptable amount of deterioration, including the uniqueness of the structure, the integrity of the form, and the condition of the materials. The one extreme, where continued deterioration may be acceptable, is represented by Locks Nos. 24 and 25; the locks are of standard construction, a significant portion of the historic fabric has been lost, and the remaining material is in poor condition. The other extreme, where any deterioration may be unacceptable, is represented by Lock No. 29 in Peninsula; this structure is the only example of stone masonry lock construction, the overall form has not been modified, the materials are in good condition, and the lock is in a highly visible and heavily visited location.

In addition to the above, special consideration must be given to structures or components which serve as bridge abutments or as retaining walls for the towpath. Those which serve as bridge abutments were stabilized during the development of the towpath trail and should not be permitted to deteriorate. These structures should undergo routine periodic inspection and maintenance to insure their continued capacity to function as load bearing elements. Examples include the Peninsula Aqueduct, the north wing wall of Lock No. 36, the Goose Pond Waste Weir/Flood Gate, and the Hooker's Run Flood Gate.

Components which serve as retaining walls for the towpath trail have not been addressed comprehensively. While the existing conditions of these elements, which include numerous lock walls, are adequate to retain the earthen embankment of the towpath, the situation should be closely monitored. The lack of water pressure in the canal prism to equal the pressure of the earthen embankments has contributed to the decline of these structures and may ultimately lead to instability. As deterioration continues, these walls may not have the integrity to be self-sustaining, thus jeopardizing continuity of the towpath trail. Extensive intervention may be required to stabilize these walls to insure the continued safe operation of the trail.

3. Develop preservation alternatives

The selection of a long-term preservation treatment for each structure must take several factors into consideration. Issues include the intended use of the specific structure, the acceptable amount and rate of deterioration, and the acceptable level of intervention. In general, further intervention is not recommended for structures that appear to be relatively stable with a slow rate of deterioration. Where the progression of deterioration is found to be unacceptable, additional preservation treatment should be implemented. Each structure must be protected and if necessary, stabilized, until a specific treatment plan is developed.

Additional preservation treatment would likely impact the historic fabric and the overall appearance of the structure. In each instance, several alternatives having different degrees of intervention should be explored. The intent is to extend the life expectancy and/or enhance the capacity of the structure with the minimum of intervention.

The remainder of this section briefly discusses preservation concepts, outlining a general approach for dealing with these abandoned structures and offering guidance to be used in developing individual long-term treatment plans.

1. General considerations:

The replacement of intact or repairable historic materials or alteration of features, spaces, and spatial relationships that characterize a property should be avoided. The maximum feasible amount of historic fabric should be retained, and stabilization work should detract as little as possible from the structure's appearance. In general, new material should match the existing fabric in composition, design, color, texture, and other visual qualities. Chemical or physical treatments, if appropriate, should be undertaken using the gentlest means possible; treatments that cause damage to historic materials should not be used. All repairs should be documented, including both the extent of work and the process undertaken. The planning process must recognize that, while preservation treatment will achieve greater durability, the structures will continue to deteriorate. Archeological resources should be identified, protected, and preserved in place; if disturbance to such resources is unavoidable, mitigation measures must be undertaken.

2. Concrete surfaces:

Stabilization of concrete surfaces will be required where the rate of deterioration is determined to be unacceptable. Areas where the concrete finish surface is missing are extremely susceptible to further degradation resulting from moisture infiltration and vegetation growth. Unfortunately, effective preservation treatments are extremely limited.

Stabilization requires repairing cracks and spalls. In most cases, the associated erosion and weakening of adjacent material is severe. Treatment with minimal intervention, therefore, will typically result in a short-term solution. Cracks could be epoxy injected, but the continued erosion of surrounding concrete will eventually expose the epoxy. Surfaces could be treated with a protective coating such as a water repellent, but such coatings are generally not durable unless applied to sound material.

Therefore, in most cases treatments with maximum intervention will be required for effective long-term stabilization. All deteriorated or damaged concrete should be removed back to sufficiently sound material and the affected areas patched. Repairs should match the form, texture, and color of the original fabric. The corrosion of

embedded steel is a serious threat to concrete. If reinforcing is exposed during concrete removal, the steel should be cleaned or replaced if necessary.

The selection of treatment should be carefully analyzed for each affected area. Maximum intervention may not be warranted on vertical surfaces of concrete where exposure to water is generally limited to wind-driven rain and accumulation of snow. Horizontal surfaces, however, are extremely susceptible to water infiltration introduced by rain, snow, and ice. Special consideration should be given to areas where the top surface of a wall is extremely deteriorated, and water is permitted to gravitate throughout the wall interior. Based on existing conditions, this is likely to be a common problem shared by virtually all structures whose rate of deterioration is determined to be unacceptable. While extensive intervention may be required to stabilize the top surface of a wall, treatment will be limited to a specific area of historic fabric yet will significantly extend the life-expectancy of the entire structure. A sensitive design applied consistently to all structures requiring such repair will reduce the impact on the historic character of the corridor.

The treatment already applied by NPS to Locks Nos. 26, 30, 31, and 32 is an effective preservation treatment illustrating these concepts. Consideration should be given to its use at other locks along the unwatered section.

3. Stone masonry

The life-expectancy of stone masonry components where the rate of deterioration is determined to be unacceptable can generally be extended by treatment with a minimum of intervention. In most cases the stones are in good condition, and deterioration is characterized by missing or weakened mortar and subsequent movement of individual stones or wall sections.

Cleaning and repointing of joints will reduce moisture infiltration, discourage the growth of vegetation, and protect against further structural failure. New mortar should match the original material in composition, color, and texture. Other work may involve securing loose stones and filling cavities or voids. Where the intent is to arrest further movement and correction of prior movement is not required, individual stones or entire sections which have rotated out of alignment should be stabilized at their existing location.

More extensive intervention may be required where elements or areas have significantly deteriorated, and it is necessary to return them to a monolithic state. In these cases, stonework should be taken down to stable stone, and all loose mortar, rubble, or other undesirable material removed. The stones should be carefully dismantled, and the areas reconstructed using original stone with mortar to match the original material. Damaged stones, inappropriate for reuse, should be replaced with new stone that match the original. Voids in the back face of the walls should be filled with grout. Depending on the conditions it may be necessary to supplement the masonry with a concrete substructure and/or to install a drainage system.

4. Missing structural fabric

Reinforcement of areas undermined by the complete decay of supporting fabric may be required where the rate of deterioration is found to be unacceptable. The extent of missing structural fabric includes a range of conditions. The concrete surface has completely eroded in some cases, resulting in the exposure of rubble backup stones which form protruding ledges. In extreme cases structural fabric is missing for the entire width of the wall, including both the concrete surface and rubble back up. This latter condition is most prevalent at lock wing walls. The remaining unsupported fabric is unstable and threatens the structural integrity of the structure.

Here again effective preservation treatments are extremely limited. Support of these undermined areas will require underpinning. The level of intervention will be directly related to the amount of missing fabric and the condition of the adjacent historic fabric. All deteriorated or damaged fabric should be removed back to sound material and the remaining fabric underpinned. When repair occurs at the base of a wall, the associated foundation should be inspected for load bearing capacity and if necessary supplemented. Repairs should consist of poured concrete compatible in color and texture with the original surface fabric. The form however should clearly distinguish the repair from remaining historic fabric. Where practical, these areas should be stabilized in their existing location and not returned to their original alignment.

Reinforcement of these areas will affect the adjacent historic fabric and the appearance of the structure. The repairs however will significantly increase the stability and life expectancy of the entire structure. While the level of intervention can be reduced by limiting the affected areas to an absolute minimum, restricting treatment will directly impact the effectiveness of repair. Underpinning will not arrest deterioration of the remaining historic fabric. The intent is, by stabilizing the component so that it does not collapse, to retain the existing form for the longest period possible. A sensitive design applied consistently to all structures requiring such repair will reduce the impact on the historic character of the entire corridor.

5. Safety improvements

The NPS Management Policies (2006) emphasize that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks. Section 8.2.5.1 reads: “While recognizing that there are limitations on its capability to totally eliminate all hazards, the Service and its concessionaires, contractors, and cooperators will seek to provide a safe and healthful environment for visitors and employees...The Service will strive to identify and prevent injuries from recognizable threats to the safety and health of persons and to the protection of property by applying nationally accepted codes, standards, engineering principles, and the guidance contained in Director’s Orders #50B, #50C, #58, and #83 and their associated reference manuals. When practicable and consistent with congressionally designated purposes and mandates, the Service will reduce or remove known hazards and apply other appropriate measures, including closures, guarding, signing, or other forms of education. In doing

so, the Service's preferred actions will be those that have the least impact on park resources and values."

Improvements may be required at various structures to eliminate or reduce inherent safety hazards. Precautions should be taken to protect the public from hazards associated with significant changes in elevation and the presence of standing water, such as at lock chambers, or with extremely deteriorated conditions. Measures to be considered include the installation of railings, barriers, or warning signage along the towpath trail. The selection of treatment should be that which has the least level of intervention on both the appearance of the structure and the public's ability to appreciate the resource but adequately addresses the hazardous condition. New elements should be compatible with the overall appearance of the corridor yet distinguishable from historic fabric. Existing contemporary elements along the towpath should be examined as a design precedence for these types of improvements. A standardized approach should be developed for similar situations and applied in a consistent manner.

The installation of railings, barriers, and signage would have the added advantage of reducing visitor-related damage and wear to the historic canal structures by discouraging visitors from walking and climbing on structural features. Currently there are no restrictions on visitor access. Visitors feel free to stand, walk, and climb on lock walls and other structures which not only poses a significant safety hazard but also contributes to the deterioration of already damaged and unstable masonry.

**Recommendations for Treatment, Watered Section**

The preferred treatment approach for structures located along the unwatered section of the canal is a combination of preservation and restoration. The Ultimate Treatment and Use for the three locks is restoration, while for all other structures it is preservation. The 1993 draft HSR recommended rehabilitation as the preferred treatment approach for culverts along the watered section, but since all the historic culverts were replaced by new culverts between 2005 and 2009, they are no longer contributing components of the National Register/NHL resource and thus not an issue.

Like the unwatered section, preservation applies to both earthen structures (prism, basins, feeder) and concrete and stone masonry structures (aqueducts, waste structures, mudcatcher). The two classes of structures require different treatment approaches. Although preservation is the preferred approach along both the unwatered and watered sections, conditions are quite different for the two sections. The unwatered section has been abandoned for over a century, and its structures have received no maintenance and are very deteriorated; in addition it is no longer necessary for any of the structures in the unwatered section to function as water control devices. In contrast the watered section has been maintained to a limited extent due to the need for continued water flow to meet the terms of the hydraulic lease, so its structures are in somewhat better condition. The prism and feeder must be able to carry water, and its concrete and stone masonry structures must be able to function for the canal to operate efficiently as an active waterway.

Restoration: Locks Nos. 37, 38, and 39

In 1991-1992 Lock No. 38 was restored to its 1907 appearance by crews from the NPS Williamsport Preservation Training Center. While consideration was given to preservation, that level of treatment was found to be inadequate. NPS determined that restoration was essential for public understanding and appreciation of the park's historical and cultural associations. In accordance with NPS policy and guidelines, the project rigorously applied the Standards for Restoration to the Lock No. 38 project. Alteration of the existing fabric was minimized. Historical, architectural, and archeological documentation guided the replacement of missing fabric and was sufficient for accurate restoration with a minimum of conjecture. All changes made during the restoration were recorded. When it was necessary to remove elements important to a technical understanding of the structure, they were accessioned and preserved. The methodology employed for this successful project should guide future restoration of Locks Nos. 37 and 39. The Project Record for Lock No. 38 provides a comprehensive description of the restoration process.

Preservation: Earthen Structures

The recommended treatment for abandoned basins is the same on both the unwatered and watered sections of the canal. A more active approach will be required for the prism and feeder on the watered section since the canal remains an active waterway which resembles its appearance during the period of significance. The emphasis again should be on retaining and preserving the general historic character of the prism, feeder, and basins, focusing on the character defining features listed in Section 1C. Sedimentation and invasive vegetation are the primary preservation challenges for the watered section since they adversely affect the dimensions and historic appearance of the canal, as well as its ability to carry water effectively.

An appropriate management and maintenance program for both the Pinery Feeder and the prism throughout the watered section would include periodic dredging; routine removal of logs and other intrusions; and vegetative management including routine removal of invasive vegetation, brush and non-woody vegetation, and small trees. It should be noted that the growth of obstructive grasses was an enormous problem during the canal's period of operation, requiring constant removal efforts by state crews. It remains so today. A program of carefully planned and executed dredging will not affect the integrity and character-defining features that enable the canal to convey its historical significance as long as the form and dimensions of the prism and towpath are maintained. The canal has been dredged, rebuilt, and repaired repeatedly during its period of use so no significant features will be destroyed or damaged by future dredging. Dredging in fact will improve the water flow and capacity of the canal, thereby enhancing the operation of the locks and other structures and ensuring that their wooden components are protected by consistent water levels.

The banks of the canal should be monitored regularly to detect leaks and damage caused by weather events and animals. Damaged areas should be repaired promptly in a manner that conforms to *The Secretary of the Interior's Standards for the Treatment of Historic Properties*. Encroachment on the towpath by the Cuyahoga River should be addressed through carefully

planned and executed stream bank restoration projects that follow both the *Standards* and the provisions of Section 106 of the National Historic Preservation Act.

Preservation: Concrete and Stone Masonry Structures

The same immediate preservation measures recommended for concrete and stone masonry structures in the unwatered section should be applied to structures in the watered section. These include the implementation of a program of vegetation removal, grading of the adjacent ground surfaces to reduce moisture infiltration and erosion, and protection of components that are highly sensitive to weathering. Other recommended preservation measures are discussed below. Care should be taken to recognize and then either preserve or repair the structures' character defining features described in Section 1C.

*Tinkers Creek Aqueduct*

The Tinkers Creek Aqueduct was completely reconstructed in 2009. As described in Section 1C the two stone masonry abutments are the structure's only remaining historic fabric. Despite the recent work it appears that there are still some issues with the abutments: some stones are out of alignment, and there are many open joints between stones which support the growth of vines and other vegetation with invasive root systems. The masonry in the abutments requires repointing and removal of vegetation to avoid or minimize continued deterioration. New mortar should match the original material in composition, color, and texture. Other work may involve securing loose stones and filling cavities or voids. It may be necessary to move some stones back to their original positions.

*Galley Run Mudcatcher*

Unlike the other structures along the watered section the Galley Run Mudcatcher has received little or no maintenance for many years, so its condition resembles that of the structures along the unwatered section. Although the presence of a large quantity of silt in the canal at this location indicates that such a structure is needed, the mudcatcher probably cannot be returned to a state of utility through repair. Its advanced state of deterioration and possible structural instability would require a high level of intervention which likely would remove or alter a substantial amount of historic fabric. This would be counter to the NPS Standards for Preservation. For the structure to function properly it would be necessary to remove the accumulated silt on both sides of the bulkhead and establish a maintenance program that would include routine silt removal. Due to the mudcatcher's state of extreme disrepair, the removal of accumulated silt is likely to pose a threat to the structure. For these reasons it is recommended that the mudcatcher be treated like the abandoned concrete structures along the unwatered section, employing the same short-term and long-term preservation measures described in that section.

*Waste Structures*

As outlined in Section 1C the waste structures along the watered section have deteriorated but can be returned to a state of utility through repair. The overall character and

form of the structures should be preserved, but rehabilitation of specific elements is required to improve their utility and function. The results will not only extend the life of the structures but will also enhance their presently limited ability to function as control structures which provide protection to the balance of the waterway.

In 2016 the National Park Service rehabilitated the flood gate at Station 613+00 together with the towpath trail bridge and the adjacent section of towpath bank. Rehabilitation of the flood gate and spillway included repair/replacement of damaged concrete in the wing walls and abutments, repair/replacement of wooden members of gates and frames, reattachment of cast-iron gear teeth to new vertical posts, and towpath repairs. The work followed the NPS Standards for Preservation, and the structure can now once again function as designed. A similar program of repair is appropriate for the other waste structures.

The remainder of this section briefly discusses preservation concepts as they apply to the waste structures.

1. Concrete:

   Concrete stabilization is required to reestablish structural integrity and slow further deterioration. This work is generally limited to the repair of cracks and spalls; however, in isolated cases complete replacement of specific elements may be required. All deteriorated or damaged concrete should be removed back to relatively sound material and the affected areas patched. If steel reinforcement is exposed during concrete removal, the steel should be cleaned or replaced if necessary. In general all repairs should match the composition, form, texture, and color of the original fabric. Routine maintenance should include removal of vegetation which may be deleterious to the concrete.

   In addition to concrete repairs, the waste weir at station 636+10 will require stabilization of the adjacent canal bank to curtail water flow beneath and through the structure. The source of the water can be determined by performing additional investigation, such as successive dye-testing, thereby reducing the extent of bank stabilization required.

2. Gates and mechanisms:

   The wooden gates and associated control mechanisms at each of the flood gates require periodic repair or replacement. The existing fabric is not original. Historic photographs of these gates as well as detailed drawings for similar structures built during the same period reveals that the existing gates resemble the historic gates. The existing control mechanisms, which are evidence of the period when the canal was used solely for industrial purposes, are consistent with the utilitarian nature of these waste structures. The existing elements in general are compatible in both design and material with the structures' overall appearance and do not detract from the historic character of the corridor. As with all unprotected operable mechanisms, these features will require aggressive routine maintenance. The gates, like all wooden elements, will require

periodic replacement. New material should match the form, texture, and color of the existing fabric; care however should be taken to eliminate deficiencies of design and material.

3. Provisions for water flow:

Improvements are required to ensure that the structures will function at their full capacity during flood conditions. The waste ways should be cleared of vegetation, including brush and second growth timber, and debris. Stone protection should be installed at areas of high scour, such as at the point of discharge and at abutments within the canal prism. Additional erosion control measures may be required in areas adjacent to the structures. The stone protection should be visually appropriate to the historic resource, matching the color and appearance of the stone masonry used in canal structures.

The waste weir at station 636+10 requires more extensive intervention. The basin at the foot of the weir should be reestablished and lined with stone protection. To eliminate the present undermining of the base, the downstream channel of Sagamore Creek must be excavated to direct water away from the waste weir.

The culvert which has replaced the waste way of the weir at Station 460+44 requires additional improvements. The metal segment at the inlet is apparently under-designed. The capacity of the concrete segment at the outlet should be calculated to determine the appropriate size of the inlet pipe. Installation of a new inlet should include the construction of a headwall to eliminate the potential erosion of adjacent land. A headwall should be constructed at the outlet and stone protection or gabions installed to stabilize the culvert and prevent scour.

4. Safety considerations:

To provide for safe use of the towpath as a multi-purpose trail, modifications may be required to comply with applicable codes and regulations. Components which provide continuity of the towpath, such as bridges, must be carefully reviewed; use requirements of both visitors and service vehicles must be taken into consideration. Bridges should be supplemented or replaced to provide systems that can support the desired loading. The existing decking, however, should be reinstalled or replaced with similar fabric, thereby virtually eliminating the visual impact of such modifications.

Improvements to specific features are also required to achieve compliance with regulations such as handicapped accessibility guidelines including edge protection and maximum slope requirements. The most extensive intervention in this regard is likely to occur at the waste weir at station 636+10 where the approach ramps exceed the allowable maximum slope. New elements, where necessary, should be compatible with the structures' appearance and the overall character of the corridor, yet distinguishable from historic fabric upon close inspection.

Design precedence for these types of improvements can be found by examining details of the existing structures. Where practical, similar situations should be treated in a consistent manner.

Consideration should be given to installing railings, barriers, and signage at certain locations to discourage the public from walking and climbing on canal structures. This is desirable for both safety and preservation reasons as discussed in connection with the unwatered section of the canal.

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# APPENDIX A

# CONDITION DEFINITIONS

# APPENDIX A: CONDITION DEFINITIONS

## Concrete Structures (Locks, Culverts, Waste Structures, Mudcatcher):

Very Good: Structure is stable with no evidence of movement; may be minor surface-related concerns such as small horizontal and vertical cracks, isolated spalling, and efflorescence, but little or no delamination of finish surface and no exposure of rubble stone backup; visual evidence of formwork is common; concrete coping, gate recesses, and culvert inlets of locks are intact; all or most metal hardware and pins survive; breast wall is visible and intact; vegetation is well controlled.

Good: Structure is stable with no evidence of movement; minor surface damage including small horizontal and vertical cracks, spalling, and some efflorescence; 10-25 percent delamination of finish surface but no exposure of rubble stone backup; concrete coping, gate recesses, and culvert inlets of locks are mostly intact; some metal hardware and pins survive; vegetation is generally well controlled.

Fair: Some components such as wing walls or aprons may display evidence of movement; more extensive spalling of concrete; 25-50 percent delamination of finish surface; concrete efflorescence is prevalent; may be minor exposure of rubble stone backup in a few areas; moderate horizontal and vertical cracks; concrete coping is delaminated or cracked; erosion of soil behind walls; some metal hardware and pins may survive; presence of invasive vegetation including vines and shrubs is typical.

Poor: Major spalling of concrete; 50-75 percent delamination of finish surface; concrete efflorescence is prevalent; exposure of small areas of rubble stone backup; moderate to large horizontal and vertical cracks, some of them indicative of movement; concrete coping dislodged, delaminated, or missing; severe erosion of soil behind walls exposing the back face; presence of invasive vegetation including small to moderate trees is typical.

Very Poor: Portions of walls may have collapsed and in some cases they are undercut by scouring; severe spalling of concrete; exposure of large areas of rubble stone backup; 75-100 percent delamination of finish surface; large vertical cracks indicative of movement; concrete coping dislodged, delaminated, or missing; metal hardware and pins completely or mostly missing; severe erosion of soil behind walls exposing the back face; in some cases one or more wing walls are missing; presence of extensive invasive vegetation including moderate to large trees is typical.

## Stone Masonry Structures (Locks, Abutments/Piers, Culverts):

Very Good: Structure is stable with no evidence of movement; stonework is intact; few areas with open joints and missing mortar; vegetation is well controlled; breast wall of locks is visible and intact.

Good: Structure is stable with no evidence of movement; stonework is intact; some areas with open joints and missing or degraded mortar; small vines and plants growing in open joints.

Fair: Portions of structure appear unstable; open joints with missing mortar are prevalent; presence of invasive vegetation including vines and shrubs is typical.

Poor: Dislodged and missing stones; cracked stones; open joints with missing mortar are typical; moderate vertical cracks indicative of movement; severe erosion of soil behind walls; presence of invasive vegetation including small to moderate trees is typical.

Very Poor: Collapsed walls, in some cases undercut by scouring; dislodged and missing stones; cracked stones; open joints with missing mortar; large vertical cracks indicative of movement; severe erosion of soil behind walls; presence of extensive invasive vegetation including moderate to large trees is typical.

**Earthen Structures (Prism, Towpath, Basins):**

Good/Very Good: Watered section of canal contains abundant aquatic vegetation and unwatered section is mostly wooded, but the functions of structures are clearly evident with well-defined contours and relatively little erosion and sedimentation; top of towpath extends 4 feet or more above prism; even in the unwatered section large stretches contain water for at least part of the year. Both watered and unwatered sections in Good/Very Good Condition are ideal for public interpretation and even, with dredging, could be restored to working condition.

Fair: Areas of extensive erosion and sedimentation but function of structure is recognizable; some sections are completely choked with vegetation.

Poor: More extensive erosion and sedimentation. Identification of function requires a trained eye.

Very Poor: Widespread extensive erosion and sedimentation have compromised integrity of structure and render it very difficult to distinguish in the landscape; some sections completely destroyed by river action, highway construction, or intentional filling.

# APPENDIX B

# NPS REVIEW COMMENTS AND RESOLUTIONS

**REVIEW COMMENTS**

**Park: Cuyahoga Valley National Park**
**Project: Review 18-33 Ohio and Erie Canal, Cuyahoga Valley National Park, Ohio Historic Structure Report DRAFT**
**Reviewer: Tim Schilling**
**Comments Due: October 16, 2018**

**REPORT**

| No. | Page | Paragraph (or Line) | Review Comment | Comment Resolution |
|---|---|---|---|---|
| 1. | | | | For Team Use Only |
| 2. | 1 | 3 | Missing the word Historic between State and Preservation | Change was made: see p. 1 |
| 3. | 1 | Footer | Remove final s from Structures | Report title was changed so comment is now moot. |
| 4. | 10 | 2 | Check the reference information for Finney. The document is an archeological overview and assessment submitted to MWAC in Lincoln, NE. | Change was made: see p. 10. |
| 5. | 41 | 3 | What is the reference when the author refers to “Archeological evidence from house sites…” | Reference was added: see p. 41. |
| 6. | 56 | 2 | Relay should be re-lay is you mean they put the bricks back in the same place | Change was made: see p. 56. |
| 7. | 95 | 2 | Better to refer to state workers as workers rather than forces. | Change was made: see p. 95. |
| 8. | 352 | 3 | When was the bridge replaced? We should be know better than just the early 1990s. | Reworded: see p. 352. |
| 9. | 377 | 2 | The physical description needs work. The current description is largely conjecture rather than fact based. What is actually there? | Section was rewritten: see p. 377. |
| 10. | 377 | 4 | Why should the gate be considered an archeological resource? The extant information does not allow you to make this judgment. | Reworded to describe the feature as a potential archaeological resource: see p. 377. |

**REVIEW COMMENTS**

**Park: Cuyahoga Valley National Park**
**Project: Review 18-33 Ohio and Erie Canal, Cuyahoga Valley National Park, Ohio Historic Structure Report DRAFT**
**Reviewer: Roberta Young**
**Comments Due: October 16, 2018**

**REPORT**

| No. | Page | Paragraph (or Line) | Review Comment | Comment Resolution |
|---|---|---|---|---|
| 1. | -- | | Consider adding a subheading to the report title to indicate that this document is "A Field Survey of Canal Watering Structures and Recommended Treatment" | Title of report was changed to "Ohio & Erie Canal History and Historic Structure Assessment" as requested by the same reviewer on 2/20/19. |
| 2. | 5 | | Consider indicating that each structure was visually inspected and assigned a condition based on the field survey and to define the treatment needs and techniques necessary to meet the SOI standards/definitions.<br>Consider adding the treatment definitions to this page/section to ensure readers are understanding the terminology correctly. Also include a definition for stabilization. | Paragraph was rewritten to incorporate suggested changes: see p. 5. Treatment definitions were added for the four approaches. Treatment standard for stabilization and its definition have been deleted from the SOI Standards so are not added here. |
| 3. | 5 | | When using the term restoration- as in lock 38 has already been restored – consider elaborating by provide additional information such as Lock 38 was restored to the (year) period of significance identified in the (year) National Register Nomination) and functions (or is interpreted) as it did in (year) | Suggested change was made: see p. 6. |
| 4. | 5 | | To align with the SOI standards for restoration, consider avoiding the term "fabric and elements" and consider using the terms "materials, features, finishes, and construction techniques/craftsmanship" instead. | Suggested change was made: see p. 6. |
| 5. | 6 | | Consider adding the NHL date in parenthesis the first time it is referenced in the document. | Suggested change was made: see p. 4. |

| No. | Page | Paragraph (or Line) | Review Comment | Comment Resolution |
|---|---|---|---|---|
| 6. | 6 | | Consider adding a footnote on why the Pinery Dam is scheduled to be removed in Fall of 2018, how it contributed to the canal and the record of decision related to the pending removal. | Change was made to text to reflect change in project date and a new footnote #1 was added: see p. 6. This made it necessary to renumber all subsequent footnotes in the document. |
| 7. | 7 | | Consider elaborating/clarifying on what the UTM and Lat/Long are for – are they the two end points on the canal? | Suggested change was made for clarification: see p. 7. |
| 8. | 7 | | Consider Elaborating on the origin and direction of the identification numbers. For instance LCS ID will be obsolete by the end of the calendar year – consider adding a foot note that explains how LCS ID equates to Resource ID, that HS# equates to structure ID in the CRIS- Cultural Resources Inventory System. | Suggested change was made for clarification: see p. 7. |
| 9. | 7 | | Consider clarifying where the Feature ID number is derived from? Is this a number from the cultural landscapes inventory, the national register, or the park's GIS? | Suggested change was made for clarification: see p. 7. |
| 10. | 12 | | Consider adding a graphic or graphics that show the NHL portion of the canal and how chronological listing of the sections – visually show which section is NHL, which sections is a listed district, which section only has a concurrence determination on eligibility from the SHPO, and which sections are considered not eligible. Even Figure 7 modified with the terms overlaid or color coded would visual explain the eligibility status. | Figure 1 already depicts the NHL and NR-listed/eligible canal sections in the Park. The entire canal within the Park is listed/eligible for the National Register and must be treated as a significant resource. The text fully describes the history of eligibility determinations for various sections. Consultant and Park staff suggest that adding another map would be both confusing and unnecessary. |

| No. | Page | Paragraph (or Line) | Review Comment | Comment Resolution |
|---|---|---|---|---|
| 11. | 59 | | The complexity and length of the canal including the similarity of the constructed features means readers will need to consistently be re-oriented. Consider adding a map location and at least one current photo of each lock/feature described add historic photos or drawing (as available) for visual comparison. | Section C contains current photos and historic drawings for all canal features. Figures 50a-c show the locations of all features. The reader can easily refer to Section C and Figures 50a-c for orientation; a reference was added to the text: see p. 59. Author suggests that including essentially the same photos and drawings in this section would be redundant. |
| 12. | 89 | | See comment for page 59 | Same as above. |
| 13. | 133 | | Consider referencing Figure 50 in the narrative | Figure 50 already referenced in 3rd paragraph. However we added a reference in the 1st paragraph: see p. 133. |
| 14. | 154 | | Consider adding the condition definitions at the beginning of the inventory – when a features is rated as fair what does that mean? Consider adding FMSS # and condition to each evaluation to facilitate cross referencing. | Reference Appendix A for condition definitions. |
| 15. | 159 | | Example – readers need to understand what "very poor" means; NPS facilities need to understand the FMSS # and condition and what treatment has been or should be applied. How should each structure be treated individually? (Ideally this section with the FMSS data could become a back pocket guide for facilities staff to reference before preforming long term treatment of routine maintenance) | Reference Appendix A for condition definitions as suggested by this reviewer on 2/20/19. Specific treatment for each structure will be addressed in future CLR or ultimate treatment guideline. |

| No. | Page | Paragraph (or Line) | Review Comment | Comment Resolution |
|---|---|---|---|---|
| 16. | 535 | | For this document to adequately inform facilities and associated compliance what the treatment recommendations look like at each structure's location is important to define – for instance hypothetically is vegetation removal/thinning appropriate or even applicable at the Bolanz Flood Gate Station? Does the Tinker Creek Aqueduct require concrete repairs? Would refabricating the mechanism at Lock xx be the best treatment for functionality or interpretation? Could installation of the mechanism damage existing materials? What is the best method for treating spalling concrete at lock xx? | Beyond scope of present document. Will be addressed in future CLR or ultimate treatment guideline. |
| 17. | -- | | Consider merging existing conditions section with treatment and add specific treatment recommendations for each location. Doing so would facilitate project work orders for implementing stabilization/treatment and facilitate 106 compliance for work being performed on and in the vicinity of each structure. | Specific treatment recommendations for each location will be addressed in future CLR or ultimate treatment guideline. |
| 18. | --- | | Most HSRs provide alternatives for treatment – no alternatives appear to be presented because preservation and restoration was pre-defined by other park planning documents. Consider adding a paragraph explaining why alternative treatments (other than preservation/restoration) for induvial structures were not considered. For example – explain why rehabilitation/adaptive re-use of canal watering structures are not the most appropriate treatment and explain why preservation and restoration are the most appropriate treatments. | Yes, preservation and restoration are the treatments pre-defined in the Park's GMP and RMP. See p. 526-529 for explanation of why preservation is considered the appropriate treatment for all structures in the unwatered section, and a combination of restoration and preservation the appropriate treatments for all structures in the watered section. |
| 19. | -- | | Consider adding class C cost estimates for recommended treatment at each structure location | Beyond scope of present document. Will be addressed in future CLR or ultimate treatment guideline. |

| No. | Page | Paragraph (or Line) | Review Comment | Comment Resolution |
|---|---|---|---|---|
| 20. | -- | | Consider recommendations for material analysis of concrete, wood, metal to inform in-kind preservation and restoration project work at each structure location. | Beyond scope of present document. Will be addressed in future CLR or ultimate treatment guideline. |
| 21. | --- | | Consider referencing NCPTT material testing and maintenance guidelines for example –<br>https://www.ncptt.nps.gov/blog/historic-concrete-and-masonry-assessment-by-the-air-coupled-impact-echo-method-2012-04/<br>https://www.ncptt.nps.gov/blog/university-concludes-100-year-concrete-study/ | Beyond scope of present document. Will be addressed in future CLR or ultimate treatment guideline. |