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Cultural Landscape Report
Paw Paw Tunnel

Part I
September 2024

Resource Stewardship and Science
Division of Cultural Resources, National Capital Region

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Cover Image: South Portal cut, towpath, and Tunnel Hill Trail, Paw Paw Tunnel, Chesapeake & Ohio Canal, pre-1924. (Chesapeake & Ohio Canal National Historical Park Archives, Digital Collections, CHOH 1634-155.78-7)

Cultural Landscape Report

Part I: Site History | Analysis & Evaluation

September 2024

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Part I: Site History | Analysis & Evaluation

Introduction

Purpose and Scope

This Cultural Landscape Report (CLR) provides a vision and cultural landscape management plan for the Paw Paw Tunnel Cultural Landscape. In accordance with §110 of the National Historic Preservation Act of 1966, as amended, the project identifies, evaluates, and documents cultural landscape elements, in order to inform and support future projects in this historic landscape. This CLR builds on the 2020 NPS-NCA condition assessment visit, previous CRIS inventory, 1979 National Register of Historic Places (NRHP) Nomination, and 2015 NRHP Additional Documentation & Boundary Increase. The CLR is the primary planning document for the treatment of the cultural landscape and provides resource managers, staff, and others engaged in cultural landscape preservation with a comprehensive understanding of the physical evolution of the cultural landscape, and guidance for the future landscape management.

The need for a CLR reflects NPS cultural resource management efforts to respond to recent and continued impacts to the historic landscape at Paw Paw, evidenced by 2017 emergency stabilization of slopes in Tunnel Hollow and additional hazard mitigation measures from 2020.[1] This urgent need informs cultural landscape preservation treatment foci or treatment options at an informational and spatial scale suitable for planning, to guide detailed development and implementation. It does not include construction documents, cost scheduling, or similar design-related media.

[1] NPS-CHOH, Rock Fall Mitigation at the Chesapeake & Ohio Canal National Historical Park, Environmental Assessment (2017); Improve Visitor Safety and Mitigate Rockfall Hazards in the Paw Paw Tunnel Hollow, Chesapeake & Ohio Canal National Historical Park, Environmental Assessment (2020).

The CLR project scope includes identifying distinct character areas to spatially organize groupings of features for site analysis and for recommended treatments establishing a record of selected, general changes in the evolution of the landscape as it developed historically; documenting existing conditions; and providing guidelines and preferred treatment recommendations for future management of this historic landscape.

Landscape Description

The Paw Paw Tunnel cultural landscape, approximately 493-acres, is a historically significant and modified landscape located within the Chesapeake & Ohio Canal National Historical Park (CHOH) in Allegany County, Maryland (fig. 1). The Paw Paw Tunnel landscape ranges between Mile Markers (MM) 153.13 and 156.30 on Park lands. It is defined through much of its extent by the historically significant canal prism structure, towpath, and associated resources and topography within the natural minor drainage (draw) of the Potomac River above Paw Paw Bends and Purslane Run, between Town Hill Mountain [lower Green Ridge] and the main Potomac channel.[2] This segment of the canal comprises a corridor from Maryland State Route 51 north by the Paw Paw Campground and Superintendent's House; Paw Paw and Tunnel Hollows (cuts), including Upstream and Downstream Portals of the Paw Paw Tunnel; Locks 66, 64-2/3, 63-1/3 62, 61, wasteweir, Sorrel Ridge Campground, and Culvert 210; and spoils depositions associated with the Twigg Hollow and Gross Hollow areas, including the Outdoor Club Road terminus. Park land in this area is bordered along much of its western extent by Maryland's Green Ridge Sate Forest, and by the Potomac River channel to the east and south.

[2] Southworth et al, 2008; "Allegany," *Martenet's Map of Maryland* (Baltimore, MD: S.J. Martenet, 1866), David Rumsey Map Collection. Martenet's color relief atlas also references this area within the county's District No. 8 of the time, labelled "Little Orleans" District.

As a cultural landscape, Paw Paw Tunnel encompasses a variety of historic and cultural resources, many of which factored in the gradual development of the Chesapeake & Ohio Canal (C&O Canal) watercourse and operations during much of the system's commercial lifespan (1828–1924). Some surviving features are therefore located beyond the immediate plane of the canal prism and towpath. These include those associated with the survey transit established in 1835 to guide drilling of shafts through Tunnel Hill along the intended canal alignment, or quarry cuts and numerous spoils depositions (debris piles) relating to periods of contracted excavation and construction, as well as possible later repairs.

Paw Paw Tunnel is historically significant as a distinctive engineering and architectural achievement linked with the waterway, now preserved as part of the larger 184.5-mile canal system managed by Chesapeake & Ohio Canal National Historical Park (NPS-CHOH). The tunnel itself comprises a 3,118-foot long historic canal tunnel engineered by the C&O Canal Company, to enable commercial boats to bypass a 6-mile-long, winding stretch of the Potomac River (known colloquially as the 'Paw Paw Bends') and the adjacent steep cliffs along the company's planned route from sea level to a Cumberland, Maryland, terminus at 605 feet elevation. This engineering scheme reflected the primacy of waterways in the transport of American agricultural goods during the early 19th century, as well as the market for bituminous coal extracted in the region. For an eastern U.S. economy, the venture also sought to open a competitive conduit for lumber, masonry, foodstuffs, and other farm products assessed as toll freight.[3] Within the canal mileage system, the tunnel is located between MM 155 and 156, near the town of Paw Paw, West Virginia, from which the tunnel derived its name. Construction on the tunnel began in 1836 and continued until 1842 when funding for the project was exhausted, following national economic turbulence. Progress remained hampered through this period by company financial instability, ethnic

[3] Chesapeake & Ohio National Historical Park, *Foundation Document*, 2013.

rivalry and conflict, and wage labor tensions. Construction eventually resumed in 1847 and the tunnel was finally completed in 1850. The tunnel remained a part of canal operations until 1924 when it fell into disuse, in the wake of repeated flood events, deferred maintenance, evolving freight technologies, and the protracted financial pressures which terminated C&O Canal Company operations in bankruptcy. The canal was purchased by the federal government in 1938 following receivership, and in the mid-1950s the NPS began improvements to stabilize and repair the condition of the tunnel and the towpath and stabilize adjacent rock faces. Additional NPS stabilization and repair efforts included projects in 1966, 1979–80, the mid-1990s, and 2001. NPS efforts continue as a key aspect of Park stewardship today.

The following statement is excerpted from the 2013 Foundation Document:

> C&O Canal became a national monument in 1961, and in 1971, Public Law 91-664 established the Chesapeake and Ohio Canal National Historical Park "to preserve and interpret the historic and scenic features . . . and develop the potential of the canal for public recreation." Further guidance was included in the introduction section of the 1976 general plan [sic], which stated, protecting for public enjoyment a historical park which will, increasingly, become an outlet for urban seekers after outdoor recreation will be the difficult task facing the National Park Service in its stewardship of this limited resource.
>
> Today, the remnants of the C&O Canal route, the spirit of its builders and operators, and a legacy of outdoor recreation and educational opportunities endure in this national park unit. Annually, millions of hikers, bicyclists, and runners enjoy the canal's 12-foot-wide towpath, originally built for mule travel, and the park's numerous access points, which provide visitors the opportunity to experience the rich history and natural resources of the Potomac River Valley. Watered sections of the canal provide further recreation for canoeists, boaters, and anglers" (NPS 2013: 3-4).

Regional Landscape Context Graphics

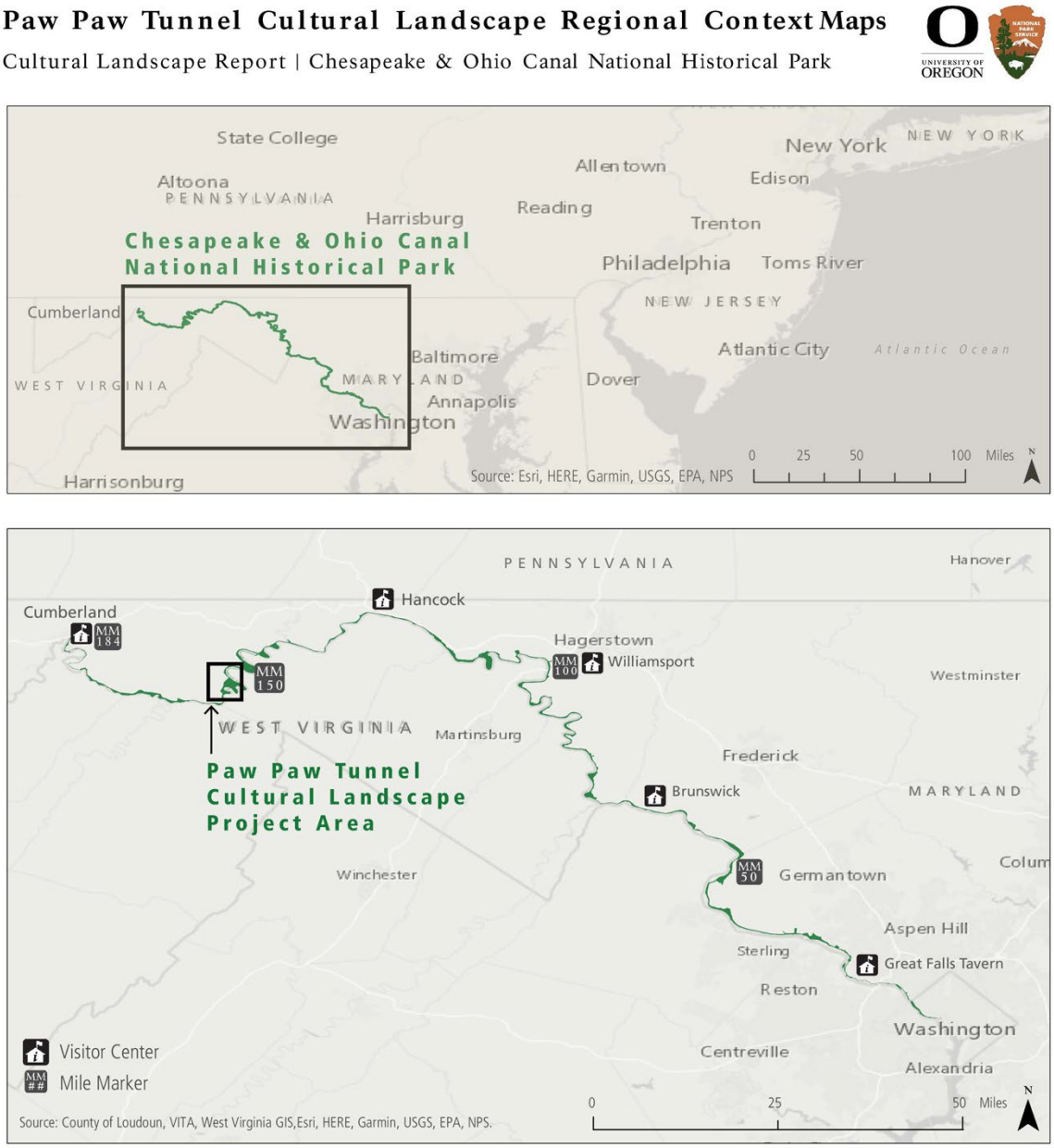


Figure 1. Regional Context Plan, relative to NPS-CHOH waypoints. (UO-CLRG, 2023)

Location Map Graphic Information

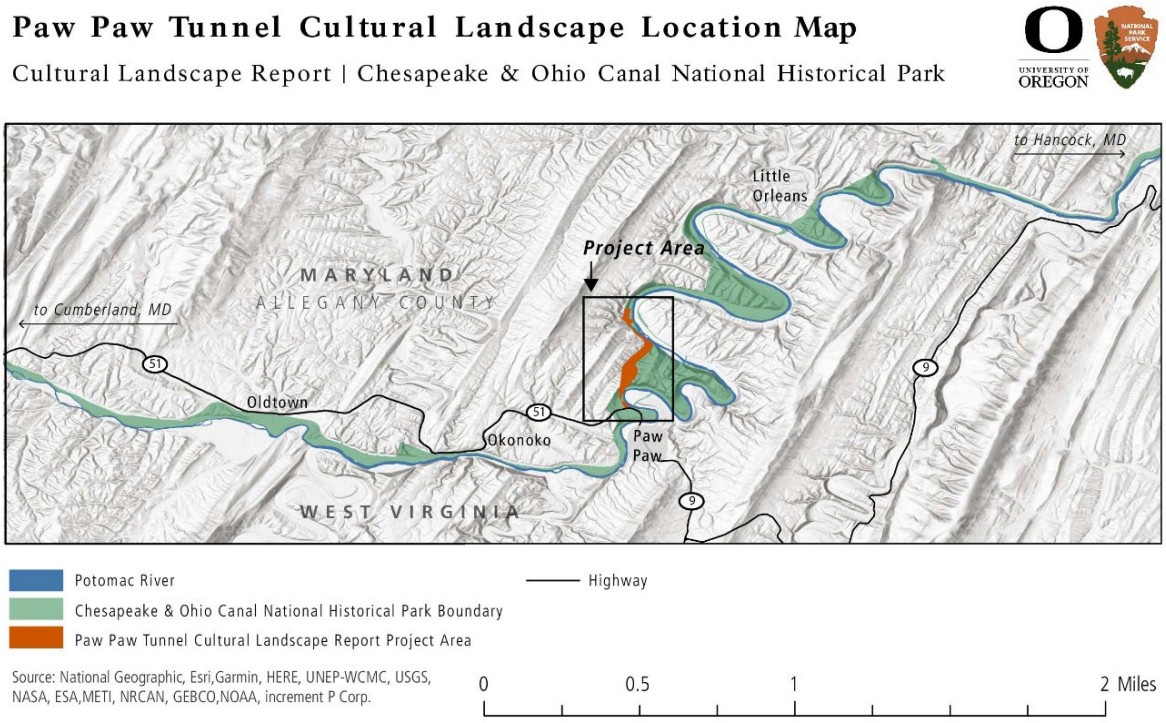


Figure 2. Location Map highlighting project area, including its topographic setting. (UO-CLRG, 2023)

Project Team

The project team consisted of University of Oregon staff from the Cultural Landscapes Research Group, including Robert Z. Melnick, Noah P. Kerr, Hannah Six, Peter Olson, and Eva Kahn, with support from Chesapeake & Ohio Canal National Historical Park staff, including Justin Ebersole, Kevin Stanfield, Katherine Boyle, and Christopher Stevens. Additional archival research was undertaken by Noah Kerr. Additional support was provided by NPS National Capital Region staff Julie McGilvray, Madeline Laub, Courtney Magill, and Angelina Ribeiro Jones.

Report Methodology

The National Park Service utilizes the CLR as the primary tool to inform long-term cultural landscape management decisions. A CLR Part I includes the site history, existing conditions, analysis, and evaluation. Part II focuses on the treatment of the cultural landscape, including the preservation strategy for its long-term management based on its significance, existing conditions, and use. The methodology used in this report follows *A Guide to Cultural Landscape Reports: Contents, Process, and Techniques* (1998), NPS-28: Cultural Resource Management Guideline (1998), the Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes (1996), and Landscape Lines 17: Cultural Landscapes and NPS Facility Management.

In order to prepare this CLR, archival research, remote analysis, field investigation, and a series of meetings with park staff were undertaken in 2023–24. A follow-up workshop with park staff was held in January 2024 to discuss site management goals and treatment options, and to identify challenges and opportunities in this cultural landscape.

The on-site documentation of existing conditions, conducted in September 2023, was undertaken by University of Oregon Cultural Landscape Research Group (UO-CLRG) project staff, Noah P. Kerr and Hannah Six. Photographic images were recorded using a Nikon D5600 DSLR platform and selected Nikkor lens equipment, Solocator iOS imaging applications and 26mm lens platform, and a Sony APS-C Alpha A6000 and E 16mm F2.8 wide angle lens platform. GPS location data was collected and compared using ESRI Field Maps and Survey123 applications (Samsung tablet platform and linked Juniper GNSS receiver system), prior to compilation in ESRI ArcGIS Pro. Field reference materials included NPS (CRIS) geodata, topographic surveys, photographic transparencies and 1:1-scale prints, large format site surveys, and other written media. As a result of varied satellite tracking coverage above portions of the cultural landscape, additional baseline measurements were triangulated and used recorded magnetic bearings onsite.

Research for this report has been undertaken at an overall "thorough" level of investigation as defined by NPS-28, which included consultation of primary and secondary source materials. A wide range of materials were reviewed, including unpublished reports, historic maps, historic images, and aerial photographs. The analysis of existing conditions draws from a review of findings presented in previous historic preservation documentation, together with comparisons among NPS administrative records, NPS-CHOH archival sources, photographic analysis, rephotographic study, Allegany County and USGS remote (geospatial) imaging, and field investigation. Access to historical and relevant archival records was made possible by NPS CHOH cultural resource management staff at Park headquarters in Williamsport, Maryland, U.S. National Archives registrar and archivist staff in College Park, and library services staff at the University of Oregon MAP Library.

Description of Study Boundary

As developed during the task phase, Landscape Character Areas (LCAs) were identified as a means of narrowing investigation and highlighting distinct cultural landscape features within the park cultural landscape boundary (see Overview of Landscape Character Areas). The study area focuses on selected cultural landscape resources north and south of Paw Paw Tunnel, extending from Maryland State Route 51; including Paw Paw campground and Superintendent's House, Paw Paw Hollow and the Upstream (South) Portal of the Paw Paw Tunnel; Downstream (north) Portal through the Tunnel Hollow, along Locks 66, 64-2/3, 63-1/3, & 62 and Culvert 210; to the Gross-Twigg Hollow area and Lock 61. The study area is contained within the jurisdiction of the Chesapeake & Ohio Canal National Historical Park fee simple boundary.

Cultural Landscape Terminology

The following cultural landscape terms are used throughout this document, supporting description and analysis of resources within the study area:

Historic character

The sum of all visual aspects, features, materials, and spaces associated with a cultural landscape's history, i.e., the original configuration together with losses and later changes. These qualities are often referred to as character-defining.

Landscape Characteristics

Tangible and intangible aspects of a landscape from the historic periods; these aspects individually and collectively give a landscape its historic character and aid in the understanding of its cultural importance.

Feature

The smallest self-contained element(s) of a landscape that contributes to the significance and that can be the subject of a treatment intervention. Tangible examples include walls, earthworks, basins, trees, or structures.

Character-defining feature

A prominent or distinctive aspect, quality, or characteristic of a cultural landscape that contributes significantly to its physical character. Land use patterns, vegetation, topographic elements, decorative details, views and vistas and distinctive materials may constitute this feature type. Character-defining features typically encompass elements which contribute directly to the significance of the landscape as a historic or cultural resource, and are essential to understanding the site as a distinctive place. These should receive priority among preservation planning consideration.

Treatment

Work carried out to achieve a particular historic preservation goal. Treatments may denote direct, tangible interventions in the material condition of landscape features, such as appropriate repairs or pruning. Treatments may also encompass practices used to develop ongoing management or stewardship decision-making, including closures in access, cyclic monitoring, historical research, and detailed documentation.

Site History

Introduction

The history of the Paw Paw Tunnel cultural landscape recalls an early chapter in American civil engineering, the movement of goods by waterborne transit, and the intricate, fragile system it required. In part, it considers the human modification of an environment for economic gain, and its successes and failures. The resulting cultural landscape is both a product of, and a vehicle for, continuing change over time. The dynamic processes illustrated by historical changes at Paw Paw remain apparent nearly two centuries later; these inform Park cultural resource stewardship today.

Previous historical studies orient and guide current C&O investigation at Paw Paw. Notable among these is research authored by Harlan D. Unrau (1974), John F. Luzader (1965), Barry Mackintosh (1991), and the Quinn Evans firm (Smith et al 2004), each of which communicates the substantial scale of the canal undertaking. Together, these studies reveal the development of the tunnel landscape as an endeavor fraught with complexity, conflict, delay, and troubleshooting. Relevant to Paw Paw Tunnel, in particular, Unrau's analysis of primary sources regarding construction and management of the canal prism and towpath clarifies both design intentions and the conditions which developed as a result of the tunnel's construction.

Situated in the broader historic arc of the C & O Canal system (1828–1924), Paw Paw Tunnel development can be considered as a subset, encompassing roughly 1835–1850. This period begins with the C&O Company's determination to align the tunnel route through a natural draw at Athy's Hollow, subsequently modifying its topography in order to reduce overall construction mileage and limit rising costs of progressing toward a terminus at Cumberland, Maryland. As an alternative to implementing further slackwater navigation facilities, a tunnel program held financial appeal in eliminating approximately 5 miles of watercourse construction at the 'Paw Paw Bends'—meanders of the Potomac River in

Allegany County. Political motivations may also have played a role in selecting an approach which did not entail use of the West Virginia side of the river. In considering solutions to circumvent the combined topographic obstacles and river meander in this area, canal engineers Ellwood Morris and Thomas Purcell also proposed varied strategies to limit development costs and complexity, including slackwater navigation alternatives to tunneling.[4] Luzader has fairly criticized the inconsistent logic shown by C&O Canal Company directors in pursuit of a tunnel-focused alignment at Paw Paw, which both assured itself of easy excavation progress through local blue slate and worried over further added infrastructure required to support its feasibility and presumed cost savings.

[4] Luzader 1965:2.

Geomorphology and Precontact History

The Paw Paw Tunnel Cultural Landscape is situated within the Ridge and Valley Physiographic Province. Bedrock within the project area "includes Ordovician to Mississippian marine and terrestrial sedimentary lithologies that were deposited within the Appalachian Basin, and subsequently deformed during the late Paleozoic Alleghany Orogeny."[5]

For more than 13,000 years, humans have inhabited the Potomac River Valley. Most of the present understanding of Native and Indigenous connections in this region has been through the lens of scholarly archeology.[6] In previous studies of this region, Indigenous voices have not been sought out and are notably absent.

The C&O Canal NHP is leading regional efforts to develop a broader understanding of which Indigenous tribes may be traditionally affiliated with the land that is currently occupied by the park. As of this writing, a Tribal Affiliation Study is underway to help the park increase communication with tribes who may have an important stake in federal understanding of their prior and current relationships with the land discussed in this study.

Tunnel and Canal Works at Athy's Hollow, 1835–1850

By 1835, canal planning under the company's chief engineer, Charles B. Fisk, was forced to contend with working conditions and geological materials differing from those which characterized the eastern sections of the project. The Western extent of the surveyed canal route passed into alluvial landscapes of Maryland's Valley and Ridge Province, characterized by terraces and deposits which included unstable shale such as the Devonian

[5] Reed et al., 2024; Southworth et al. 2008.
[6] Bedell et al., 2011; Handsman 1977; Kavanagh 1984; Kavanagh and Ebright 1988; Larrabee 1963; Pousson 1983. This is not an exhaustive list of reports. However, it does provide baseline understanding of precontact archeology at the C&O Canal National Historical Park.

Brallier Formation. Localized within the canal system, this geomorphology characterized land areas located above the recently completed Dam No. 5 (MM 106.7). Limited availability of quality construction materials near Paw Paw, including quarry stone, are reflected in the extensive use of slate and rubble materials incorporated into various earthworks. This limitation and the additional costs involved with sourcing acceptable stone may also have factored into the later appearance of composite building (or rebuilding) methods seen in the lock complexes downstream from the tunnel.

Although canal construction had been inaugurated downstream at the previous Little Falls, Maryland, canal in July 1828, with let contracts on many sections progressing simultaneously, by June 1834 overall operational progress to achieve a viable waterway extended only as far as Dam No. 4 (MM 84.4), between Mercersville and Cedar Grove in Washington County.[7] Expected overall costs had evidently escalated by the time of the canal system's planning reorganization, when chief Fisk's estimate more than doubled to nearly $2.43 million, likely further exacerbated by economic depression, sparked by the 1837 financial panic and rippling into the 1840s. Questionable financial solvency would plague C&O Company operations for decades, and almost certainly had direct and lingering effects on labor conditions, progress, and planning expectations at Paw Paw.

Ellwood Morris served as principal design supervisor for the Paw Paw facet of the canal works and tunnel, in his role as assistant or principal assistant to Fisk.[8] Remnants of Morris's correspondence, notes, and schematics are a compelling, if selective, source of detail for project planning and design at Paw Paw, still evident among surviving C&O

[7] Unrau 1974, 41-42. USGS researchers (Southworth et al, 2008) have claimed that 1834 progress had reached Woodmont, Maryland. Also known today as Taylor's Landing, Mercersville is an honorific, referring to the C&O Canal Company's first president, Charles Fenton Mercer.

[8] Fisk appears to have functioned more as project administrator than providing direct work as an engineer by this point in the venture, despite the implication of his name's inscription over one of the portal arch keystones.

Company papers preserved by the U.S. National Archives II in College Park, Maryland. Dated December 1, 1836, Morris's surviving elevation, section, and spoils calculations for tunneling "a single boatway" reveal cuts planned for roughly 16,000 and 120,000 cubic yards outside each of the intended tunnel portals (entrances), in addition to 52 distinct cut profiles through the interior (fig. 3).[9] The resulting 'Tunnel Residency' at Paw Paw ultimately encompassed half-mile Sections 299-311 under the reorganized hierarchy of canal sections after May 1838—a segment frequently omitted from engineering and superintendency progress reports through the end of the decade.[10] One 1841 ledger of bids cataloged more than 30 proposals from would-be contractors for Section 299 alone, including elevated costs itemized for "grubbing" (brush clearance and stump removal), excavation of rock and soil, and "puddling," a clay-based admixture used to line the canal prism interior with a watertight seal.[11]

[9] Ellwood Morris, *Paw Paw Tunnel Profile Book,* nd. RG79 P295, Volume 1. Although leaves of this volume include specific dates, their mixed contents, along with differing paper, inks, handwriting, and the binding type suggest that this is a later compilation of original sheets.

[10] Discussion of Section 212 in engineering and business correspondence suggests that this contract may well have been considered intrinsic to the tunnel locale by the late 1840s.

[11] *Section Bids – Dec. 1841*, NARA RG79, P303.

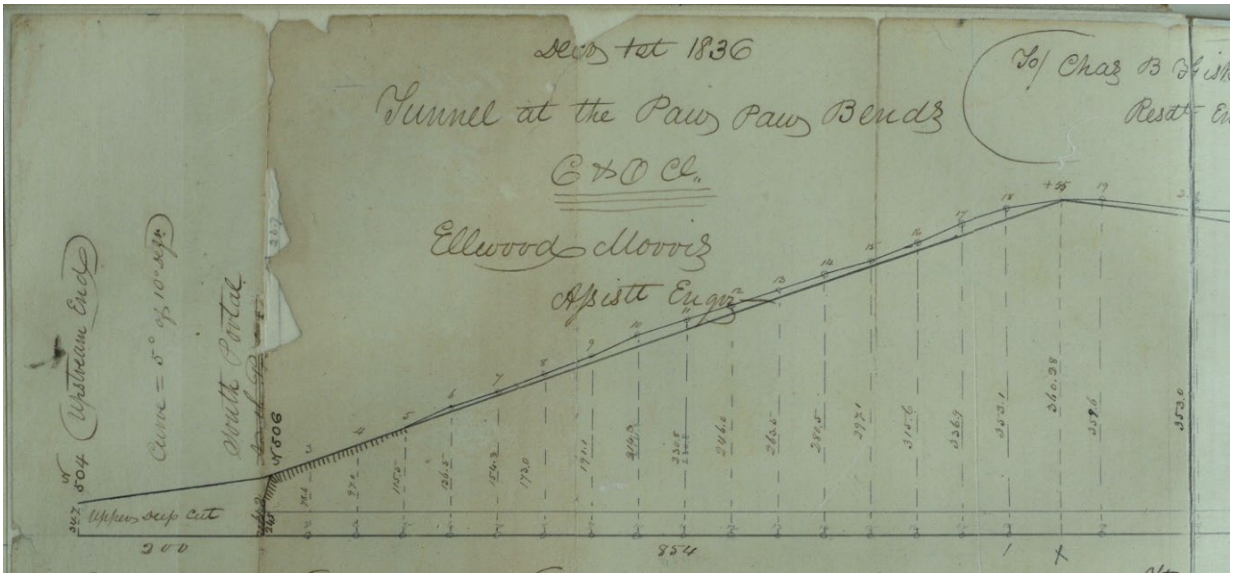


Figure 3. Excerpt from Ellwood Morris's survey record Tunnel at the Paw Paw Bends*, as compiled in* Paw Paw Tunnel Profile Book*, showing the South Portal and Paw Paw Hollow. [Note: The full drawing extends over three full leaves.] (NARA RG79, P295; photographed by UO-CLRG, 2023)*

Recognizing the scale and oversight required in developing the "Tunnel Residency," Morris drafted schematics for an office building in July 1838, specifying a plan dimension of 22 feet by 16 feet (figs. 4-5). Whether the extent of specifications detailed became a casualty of project shortages and delays or simply wishful thinking is unclear, although the basic format on paper bears some similarities to elements of the surviving Superintendent's House located upstream from the South Portal area. It is not certain whether this building was ever constructed as designed, particularly in light of the labor and funding volatility affecting tunnel works. By November 1838, Fisk reported to the Board that horizontal tunneling had progressed east and west from each of the four shafts sunk from the ravine drainages across the hill overlooking Mill Run (Tunnel Hill).[12] He had also hired James Thompson as section inspector downstream of the tunnel, for $1.50 per day.[13]

[12] Fisk, Letter No. 1055, November 5, 1838.

[13] Fisk, letter to Morris (No. 174), August 6, 1838, NARA RG79 P286, Box 1.

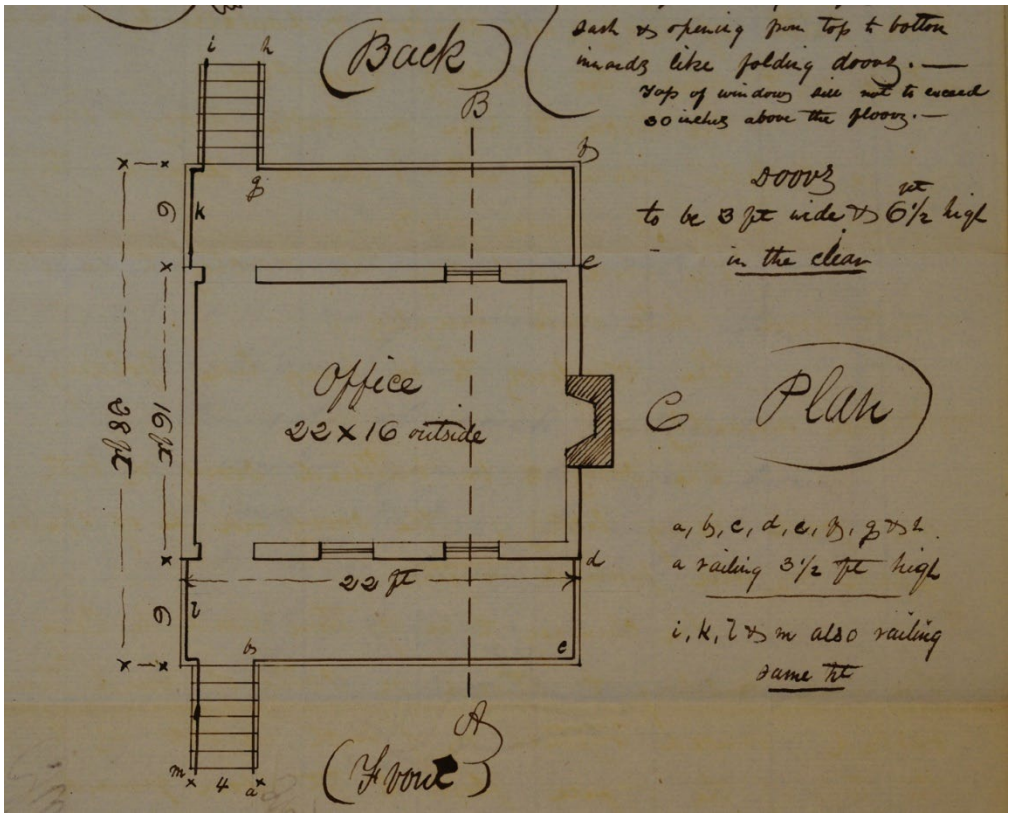


Figure 4. Morris, excerpt from "Plan for Office, Tunnel Residency" (No. 156), July 3, 1838. (RG79 P286, Box 1; UO-CLRG 2023)

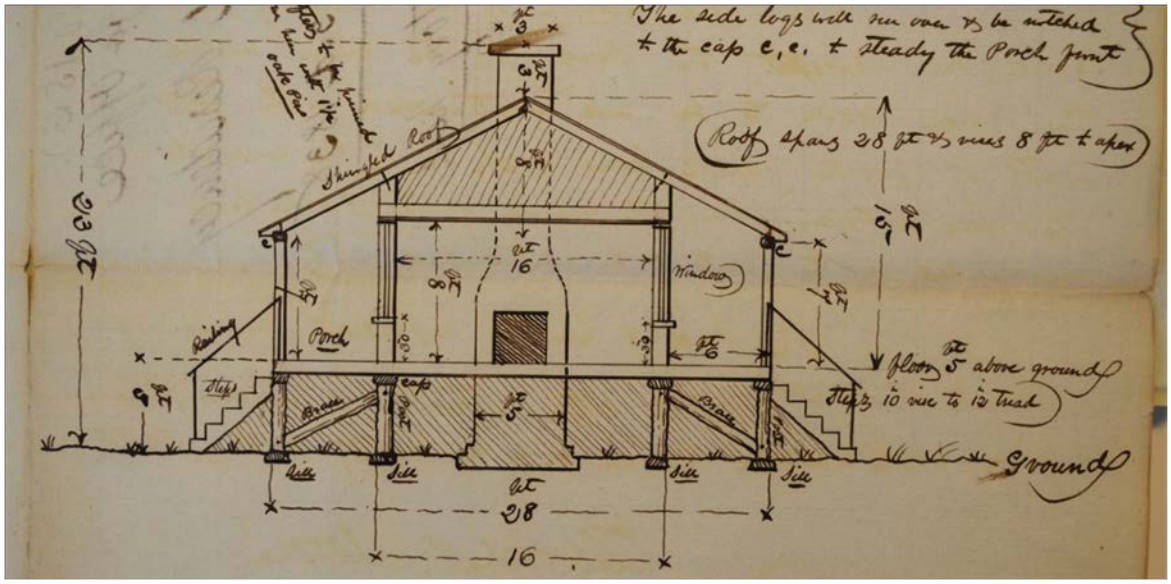


Figure 5. Morris, section excerpt from "Plan for Office, Tunnel Residency" (No. 156), July 3, 1838. (RG79 P286, Box 1; UO-CLRG 2023)

At least one engineering survey established a datum line for the tunnel and canal prism alignment through the ridges and ravines of Tunnel Hill through Athy's Hollow, along the Mill Run bottom. In order to site where each section of the canal works would be oriented and developed, this alignment was derived from key reckonings based on magnetic compass bearings, noted among Morris's calculations as "Magnetic Course… N 6 ½° E," or "Tunnel Course N6° 30′E" and plotted as a baseline to evaluate transverse section cuts measured along the planned tunnel route; a draftsman cataloged each cut profile across successive vellum leaves of *Paw Paw Tunnel*.[14] Cut stone blocks were placed along a series of visible intervals across the ridges of Tunnel Hill as survey markers. Each block was dressed, drilled, and engraved by a mason to support the use of survey equipment moving forward, which probably comprised a surveyor's compass and rod, perhaps together with a plane table (fig. 6). Field investigations made in July 2019 by NPS-CHOH resources staff sought to compare geolocated locations of extant survey markers *in situ*, illustrating a transect which remains remarkably close to this original datum line, together with possible locations for each of four tunneling shafts. Laborers employed by tunnel contractor Lee Montgomery sank vertical shafts from points within ravine drainages (i.e., present-day Tunnel Hill) beginning in June 1836, in order to minimize the necessary elevation before drilling horizontally, in turn linking with substantial exterior cuts excavated inward from Paw Paw Hollow and Athy's (Tunnel) Hollow.[15]

[14] *Paw Paw Tunnel Profile Book*, NARA RG79 P295. Reproduced in Morris, "Sketch of the Tunnel now under construction upon the Chesapeake and Ohio Canal, at the Paw Paw bend of the Potomac River," *Journal of the Franklin Institute* 23, no. 1 (January 1839), 24.

[15] The four shafts were sited and sunk in two pairs. In each pair, one shaft provided physical access to tunnel excavation faces below, enabling removal of spoils materials, while its mate provided ventilation to working areas (primarily through the Venturi effect).



Figure 6. Survey compass set manufactured by William Ewin of 53 South Street [Ewin & Heartte], Baltimore, circa late 1830s. (Compleat Surveyor / Uzes Collection, 2020)

Among the broader sequence of numbered C&O infrastructure, Locks 62-66 were originally sited to contend with elevation changes downstream from the tunnel site, in increments of eight feet. Lock 65 was eventually omitted from development, in turn apparently altering the respective spacing and nomenclature of 64 and 63 (64-2/3 and 63-1/3). The change tangibly affected excavation and construction for the lock pits, moreover; each now required additional depth for greater displacement, to accommodate a ten-foot drop amid the overall distribution of water level changes (drop height) across the remaining locks in the hollow (fig. 7). A possible explanation for these changes is a planning response to limited materials and labor by the time the Paw Paw locks were actually completed nearly a decade later, as a microcosm of cost-reduction pressures influencing canal development. In this estimation, savings in eliminating development of a full lock contrasted favorably with expanded specifications and material bills for each of the deepened locks (fig. 8).

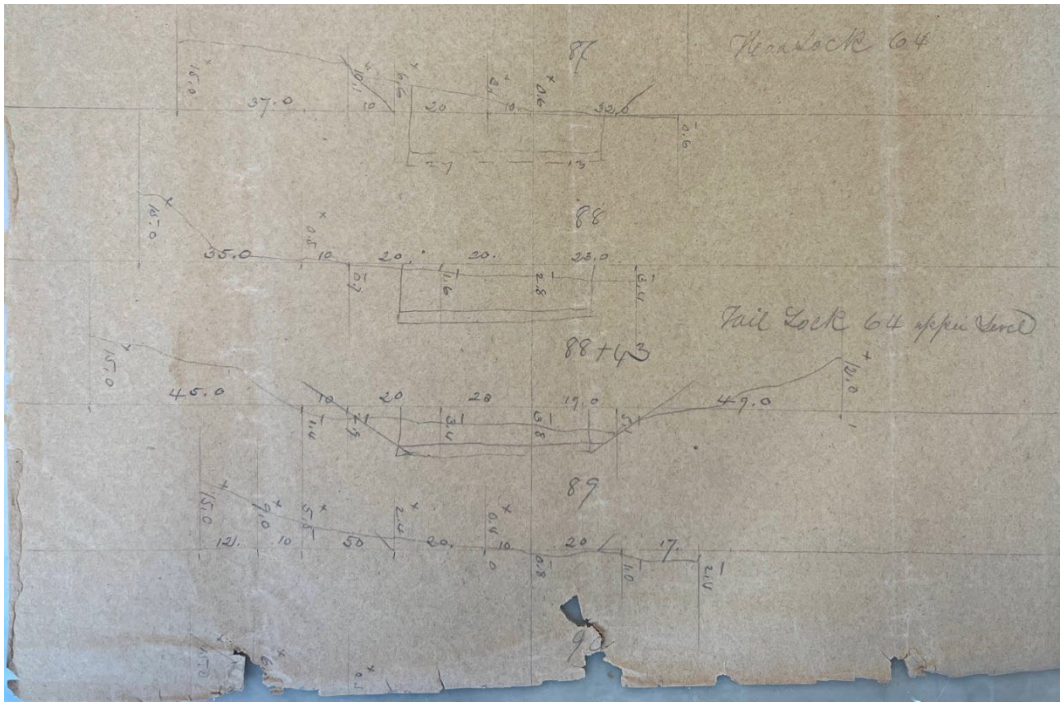


Figure 7. Morris, detail excerpted from field notes labelled "Profiles & calculations of Lock pits & locks in Athys Hollow," c.1838 (NARA RG79 P300, Box 5, 'Various Specifications, Notes;' image UO-CLRG, 2023)

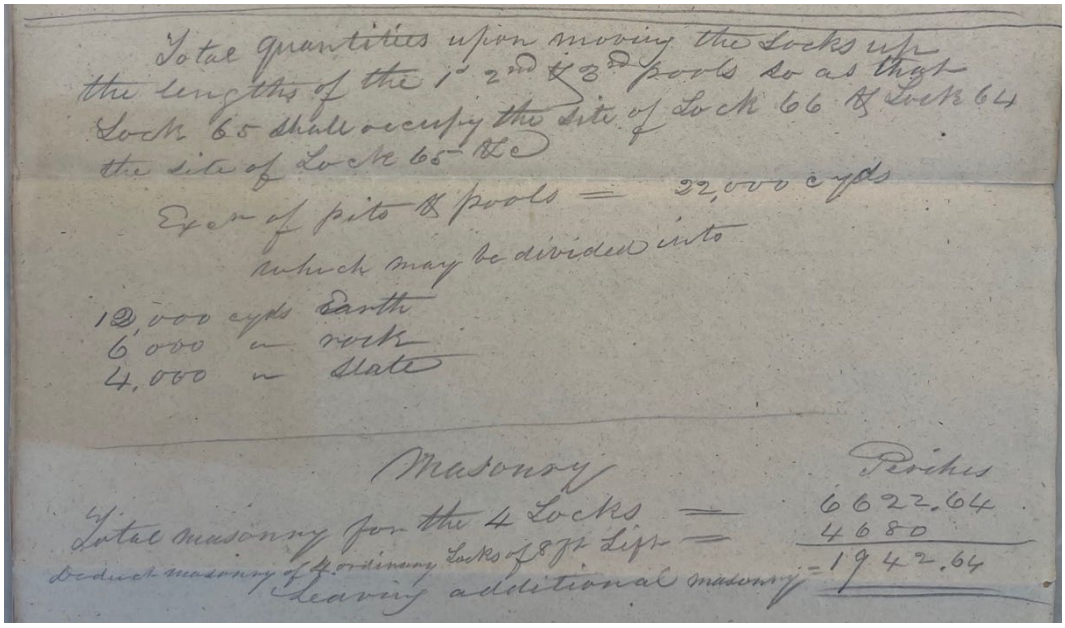
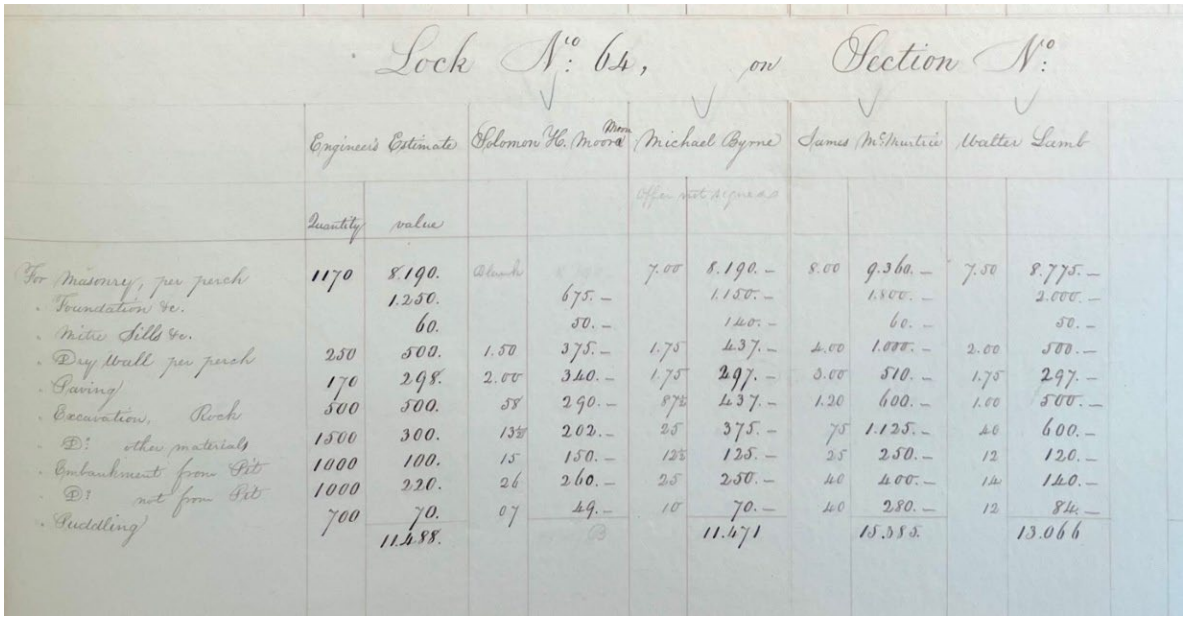


Figure 8. Morris, detail excerpted from field notes labelled "Exc. of Lock pits & pools in Athys Hollow." (NARA RG79 P300, Box 5, 'Various Specifications, Notes;' image UO-CLRG, 2023)

By 1836, C&O ledgers recorded bids solicited for the locks' construction in Athy's Hollow, then located within Section 293 on the company's hierarchy of canal Divisions and Sections. Lock 64 is typical among these (fig. 9), featuring an engineer's internal estimate as a control column for itemizing work quantity with costs. Proposed estimates included those received from prospective contractors Solomon H. Moon, Michael Byrne, James McMurtrie, and Walter Lamb, ranging between $11,471 and $15,385. Byrne's low figure was apparently awarded, based on a penciled clerical notation which also appears in conjunction with contracts let for several other locks: "offer not [yet] signed."[16] After repeated delays, work at Locks 61-66 ultimately advanced through contract with Hunter, Harris & Co., which in turn sourced cement from George Schafer's mill (Round Top Cement Mill) near Hancock, Maryland, and Charles Locker's operation in Cumberland.[17]



Lock N°: 64, on Section N°:

	Engineer's Estimate		Solomon H. Moon (Mon.)		Michael Byrne		James McMurtrie		Walter Lamb	
	Quantity	value			offer not signed					
For Masonry, per perch	1170	8190.	@ Lump		7.00	8.190.–	8.00	9.360.–	7.50	8.775.–
" Foundation &c.		1.250.		675.–		1.150.–		1.800.–		2.000.–
" Mitre Sills &c.		60.		50.–		140.–		60.–		50.–
" Dry Wall per perch	250	500.	1.50	375.–	1.75	437.–	4.00	1.000.–	2.00	500.–
" Paving	170	298.	2.00	340.–	1.75	297.–	3.00	510.–	1.75	297.–
" Excavation, Rock	300	300.	58	290.–	87½	437.–	1.20	600.–	1.00	500.–
" D: other materials	1500	300.	13½	202.–	25	375.–	75	1.125.–	40	600.–
" Embankment from Pit	1000	100.	15	150.–	12½	125.–	25	250.–	12	120.–
" D: not from Pit	1000	220.	26	260.–	25	250.–	40	400.–	14	140.–
" Puddling	700	70.	07	49.–	10	70.–	40	280.–	12	84.–
		11.488.				11.471		15.385.		13.066

Figure 9. "Lock No. 64," table excerpted from Sheet 7, CHESAPEAKE AND OHIO CO. BID FOR LOCKS, NO. 54-75, 1836. (NARA RG79, P302; imaging UO-CLRG, 2023)

[16] A canal contractor based in Frederick, Maryland, Byrne is also associated with the completion of Town Creek Aqueduct (MM162.4), completed 1848–50 following its abandonment by his predecessor a decade before. Washington County Library, "Historic Newspaper Index" Volume 1, No. 1. June 5, 2023.

[17] 20th Annual Report (1848); see also *Composite Locks*, 33.

Volumetric estimates for "perches" as units of mortar, clay soils, and other materials feature extensively among engineering and business records associated with C&O canal design (fig. 10). Considered equivalent to 75.25 square yards (25.29 square meters or 0.00625 acres), this unit was analogous to a square rod, and a rational extension of linear survey instrumentation and calculation. Estimations for embankment rock and soil fill specify materials sourced "from Pit" – possibly a means to limit transport distances and associated labor costs by recycling tailings at a lock site – although it is unclear whether this refers to one of more specific borrow pits or the void created in excavating the canal prism (channel).

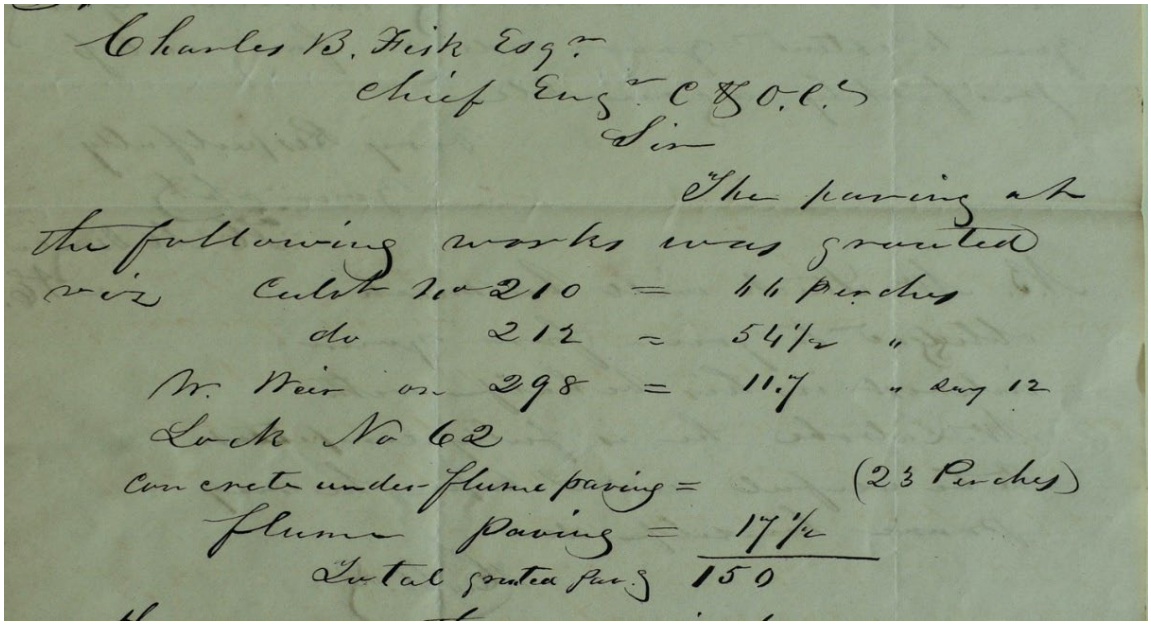

Charles B. Fisk Esqr.
Chief Engr. C&O.C.
Sir
The paving at
the following works was granted
viz Culvt No 210 = 44 Perches
do 212 = 54½ "
N. Weir on 298 = 11.7 " Aug 12
Lock No 62
concrete under-flume paving = (23 Perches)
flume paving = 17½
Total granted Pavg 150

Figure 10. Excerpt of paving material list authorized by H.M. Dungan for various Paw Paw works, including Culvert 210, wasteweir (Section 298), and Lock 62, May 23, 1850. Volumes are recorded in perches. (NARA RG79 P207; image UO-CLRG, 2023)

Analysis of known company records remains incomplete regarding the detailed operations of contract labor active in sourcing and placing finished masonry among the revised arrangement of locks (66, 64-1/2, 63-1/3, 62) downstream from the tunnel. Geological profiles of this landscape nonetheless lend insights into both the substrate and practical

challenges which informed actual excavation and construction of the prism, including local slate and soil materials seen in towpath, berm, and spoils depositions (piles) onsite at Paw Paw (Southworth et al 2008). Sandstone and shale, especially, have played key parts in the history of Paw Paw engineering, extending to the present day, and help to link a reckoning of local landforms (geomorphology) with the material composition of locks (fig. 11), embankment fill materials, and spoils in Twigg and Gross Hollows.

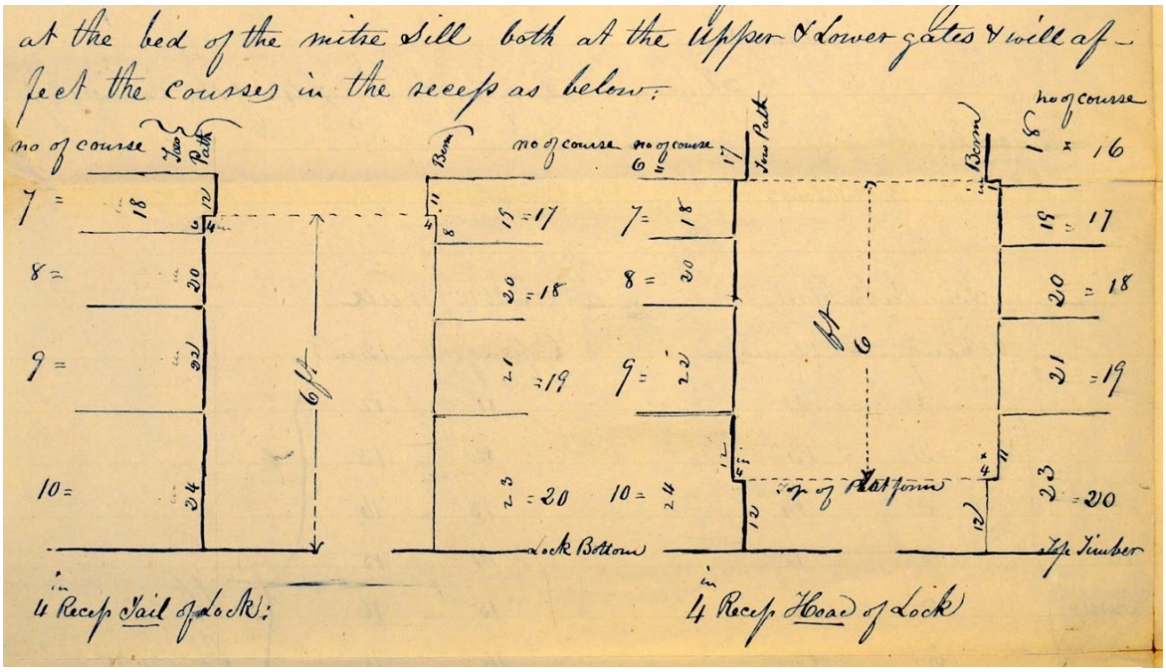


Figure 11. Excerpt of specifications drawn for masonry courses at Lock 61 head and tail, section view, by Ellwood Morris for contractor Michael Byrne, March 1839. (NARA RG79 P214, Sheet 295 image UO-CLRG, 2023)

Actual development of the tunnel and canal works at Paw Paw was marked by inconsistency throughout the period, particularly before 1847, and most notably due to what Unrau summarized as "the instability of the labor force."[18] A succession of strikes, prompted by delinquent pay and unsatisfactory living conditions, along with violent conflict among ethnic factions, exacerbated the already dangerous and demanding labor associated with hand-excavated canal works—black powder blasting, shafting, drilling,

[18] Unrau 1974, 41.

and casualties notwithstanding (fig. 12).[19] While developing two pairs of vertical shafts downward into the planned tunnel alignment, several Irish laborers died in Shaft D on November 27, 1838, apparently as a result of hoist equipment failure. In his notes examining the incident, Morris identified these men, listing E. Farrel, A. McDermont, and Will Duffe, together with respective mortal injuries resulting in a horse fatality. Various histories chronicle and typify ongoing, vocal dissatisfaction among laborers employed to the Paw Paw works, who were not paid well or consistently. This dissatisfaction stoked into violence by February 1837 and again in August 1839, among ethnic factions of Irish and German laborers, each looking on each other as a fundamental threat to job security and competitive wages. Such volatile tensions were similarly reflected in Lee Montgomery's contract recruitment of Cornish and Welsh coal miners to remediate tunneling progress.[20]

[19] Instability among black powder charges was a common safety hazard, compounded by the shrapnel of rock fragments created and propelled by their detonation.

[20] Bearss 1968; Unrau 1974; Mackintosh 1991; NPS 1984; Dan Whetzel, "The Paw Paw Tunnel: A Nineteenth-Century Worker's Monument," *Mountain Discoveries* [nd]: 23-27.

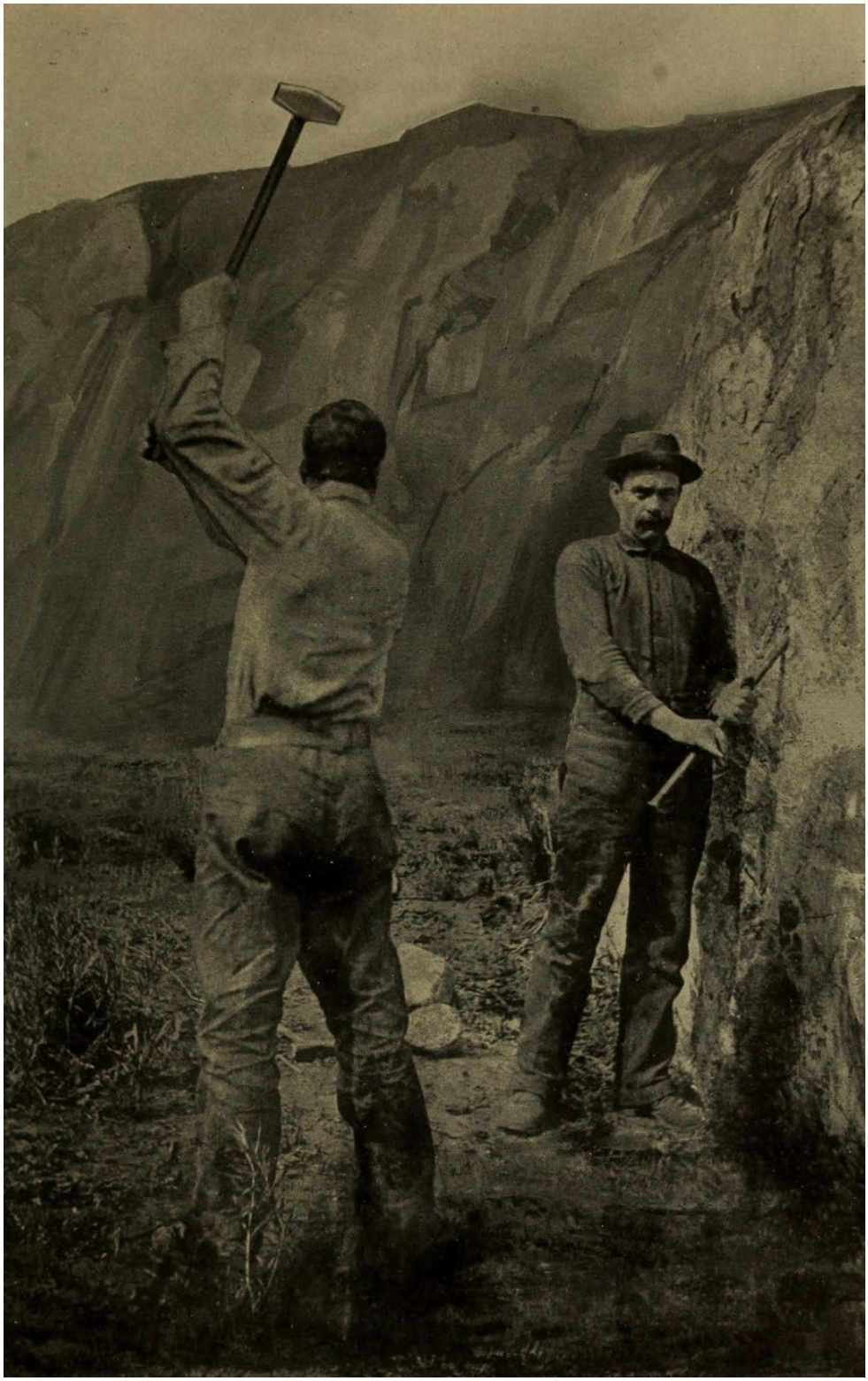


Figure 12. "Starting a tunnel by hand-drilling." Prior to advances in drilling technology, such as those utilizing compressed air, this procedure painstakingly developed a hole to receive a measured black powder charge, detonated in turn to dislodge larger rock mass. (Brunton & Davis, 1914)

A wave of Asiatic cholera in the Potomac region likewise plagued morale well into the late 1830s, understood both in the incidence of local casualties and a lingering reluctance on the part of surviving laborers to return to work or newly accept employment on the Upper Potomac during summer months. Compounding dissatisfaction among wage laborers, this probably remained a factor in ongoing delays in contracts to complete lock complexes above the tunnel, at least as late as 25 April 1850. "Masonry: no progress," "Masonry 0," and other similar summations form a regular pattern among progress reports made by Morris through the end of the decade. "The masonry progresses as quite slowly as usual," he reported for the Tunnel Residency in August 1839.[21] Similar delays apparently impacted the contemporary work of a crew under James Lambie at Twigg Hollow, tasked with building a rail line used in supplying quarry stone to lock construction sites in Tunnel Hollow.[22]

Tabulations and estimations of labor force are frequent within Morris's notes. Perhaps unsurprising given Company distress over the cost implications of fluctuating labor available at Paw Paw, these appear jotted onto the backs of his correspondence, and as marginalia among schematics. At Paw Paw, he apparently worried deeply enough over quantifying the relationship between human and livestock force to contribute an article on the subject in 1839 from Oldtown, Maryland.[23] In particular, his estimation highlights the difficulty in contending with friction in working surfaces, which would have been substantial among the works at Paw Paw. Specific to the Deep Cut, Morris's design for a horse-drawn, sawn dimensional lumber "railway" seems to respond directly to this concern (fig. 13), specified for construction in Athy's Hollow as well as the tunnel itself, anticipating the cyclic demand on the workforce to move substantial loads along the valley bottom. The precise alignment and extent of this route as it relates to the canal prism

[21] Morris, No. 371, August 7, 1839, Records of Principal Assistant Engineer Ellwood Morris, 1838–1840, Record Group 79, P286 (NAID 1157570), National Archives at College Park, Textual Reference.
[22] Bearss 1968, 5.
[23] Morris, "On the Tractive Power of the Horse," *Journal of the Franklin Institute* 24, no. 2 (July 1839).

remains unknown, although topography suggests that the implicit advantages in load capacity may have reached as far north as the Twigg Hollow quarry. As a side note, it is interesting to consider whether this sawn track could have been set on (or let into) the canal prism floor itself, wedged into place for the duration of construction. No apparent physical evidence survives to indicate its implementation as any on-grade components would almost certainly have deteriorated. No archival record is known to discuss any matter of later use or maintenance, or related needs such as livestock, tack, cars, etc.

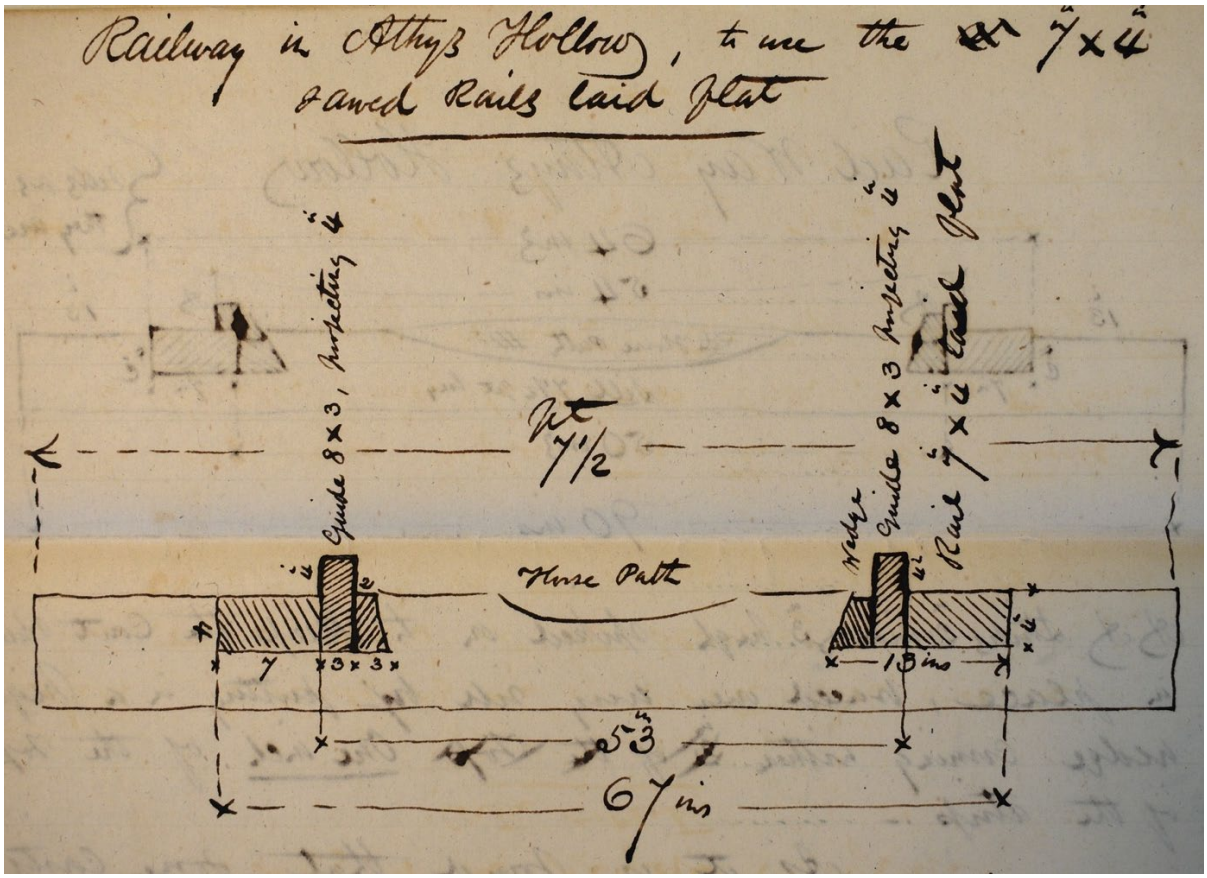


Figure 13. Morris, section detail from "Plan of Railway for Deep Cut Athys Hollow, June 21st 1838," Records of Ellwood Morris, No. 147. (NARA RG79, P214, Tray 295; image UO-CLRG, 2023)

Brickmaking, thought to have been focused near the upstream hollow cut (Paw Paw Hollow), reflected the implicit need for a substantial available stock in constructing the courses of tunnel lining and retaining the towpath in both cuts. Combined with the

availability of serviceable clay deposits and proximity to water and sand along the Potomac, brickmaking land uses seem to be associated primarily with the upstream end of the Tunnel Residency. Although a brick machine was implemented by tunnel contractor Lee Montgomery for this purpose, the exact location and extent of its operations remains unclear. A distinctive topographic feature near the Superintendent's House, within the present-day Paw Paw Campground, may be associated with brickmaking, kiln firing (brick clamp), or sorting. The nearby slope along the Potomac riverbank is also replete with concentrated deposits of low-fired bricks and fragments. Later, campground-era recreational priorities notwithstanding, the flattened surface plane of this area may also suggest the harvesting of clays or alluvial materials desirable for onsite manufacture.

Lock complexes

The former complex of buildings and structures sited at Lock 66 hosted vital infrastructure for realizing and maintaining canal facilities at Paw Paw, likely including fabrication of timber lock gates from white oak (*Quercus alba*) and plank facing from yellow pine (*Pinus sp*.).[24] Sited parallel to the canal prism between the lock pit and flume channel, the adjacent Carpentry Shop and creosote vat structure supplied and maintained parts required for the construction and repair of lock components (fig. 14), particularly with the adoption of Fisk's scheme incorporating "kyanized" (creosote-infused) wood to stave off deterioration

[24] "Yellow pine" has historically and colloquially referred to a variety of pine species in this region. Relative to construction at Tunnel Hollow, it may refer to one of several species of pine available in the state's Western and Piedmont timber stands prior to the Civil War, including loblolly (*P. taeda*) and longleaf (*P. palustris*). These sources were favored for durability and heartwood grain strength, and were largely depleted during the period of significance—particularly after the growth of steam-driven mills by mid-century. Jonathan S. Kays, "Maryland's Forests: Past, Present, and Future," Fact Sheet P95, Maryland Cooperative Extension, FS629, University of Maryland [nd]; Robert I. Schultz, *Loblolly Pine: The Ecology and Culture of Loblolly Pine,* Agriculture Handbook 713 (New Orleans: USFS Southern Forest Experiment Station, 1997).

and extend the performance of timber in the Paw Paw locks.[25] Composite construction, or the use of multiple material types in the lock structures likewise benefitted from this adaptation, in reducing the amount of quarried, dressed stone to be sourced. Archival records also show that timber coping was planned for the composite locks in April 1850, although it is not clear whether or how extensively this was implemented.[26]

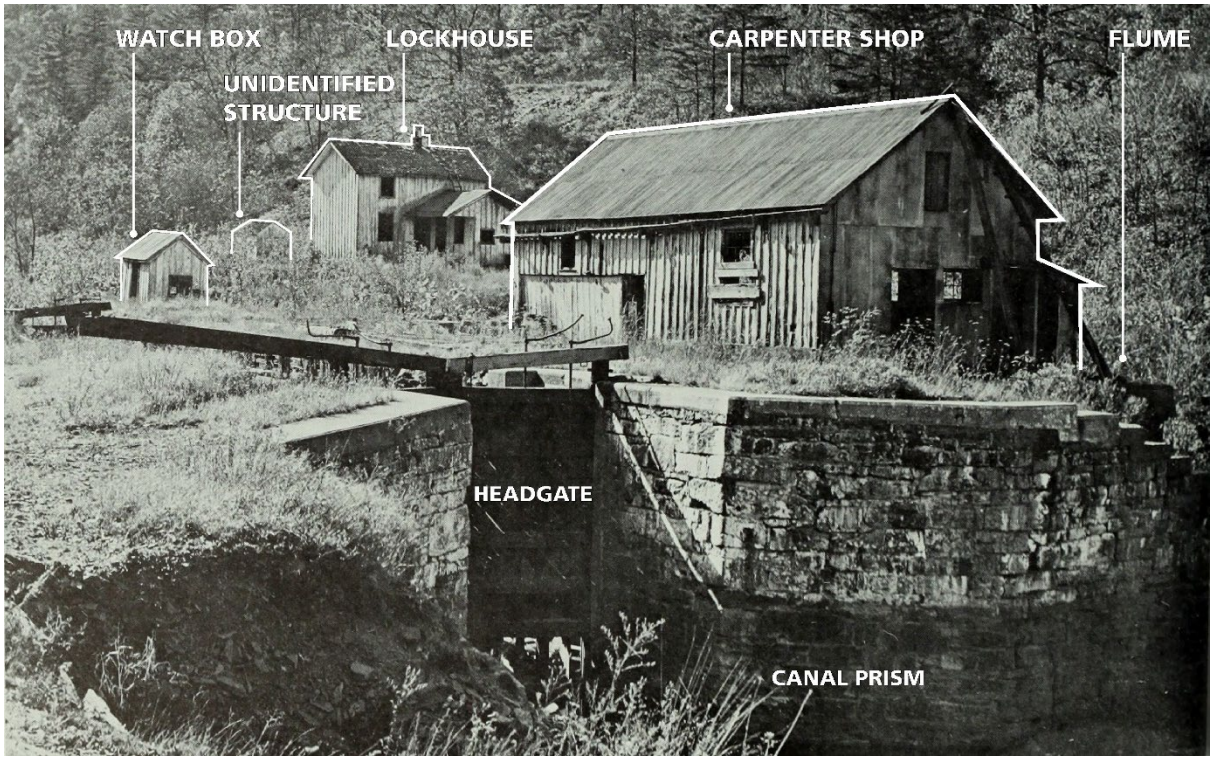


Figure 14. Lock 66 complex, c.1950. The Carpenter Shop is visible to the right, between the lock and flume, while the lock's watch box, lockhouse, and an unidentified building are visible behind. The creosote vat is occluded by the northwest corner of the shop building; blackened siding visible here may be the result of close proximity of the surface to the creosote vat retort, adjacent to the flume. (Hahn, 1985; annotations UO-CLRG, 2024)

[25] Bearss 1968, 58.

[26] Apparently sequential correspondence between assistant engineer John A. Bayers and Charles B. Fisk, dated April 17, 1850, and April 23, 1850, relate specifications, material bills, and rationale. Fisk RG79, P207, Tray 289.

Coping blocks, shaped to cap and reinforce lock walls and joinery were cut and shipped for all the Paw Paw locks by July 17, 1850. "Cut stone in the (New) Mountain Quarry," one C&O folio tabulates, "most of which are hauled to wharfes [sic] ready to haul on waggons [sic]." It is also worth noting that Locks 61-66 fall within sections labelled for "composite locks"; in 1851, a separate record tallies 302 blocks for composite locks from New Mountain Quarry. Except in the case of Lock 61, it remains unclear precisely where localized quarry operations at Twigg Hollow supplemented lock construction. This account may also suggest the possible use of the Potomac River channel for expedient stone conveyance, given that the cargo was necessary to complete the lock structures necessary for canal operation.

Popular history marks tunnel and canal construction at Paw Paw with the canal's formal opening in 1850 at Cumberland. Yet the papers of Morris, Fisk, and others reflect a more nuanced picture of site development during this time. In addition to ongoing financial shortfalls and labor unrest that affected the quality and quantity of progress among skilled laborers in the hollow, problems in completing a modified version of the "projecting towpath" (boardwalk) structure between both tunnel cuts lingered in difficulties sourcing sufficient framing timber (fig. 15). Correspondence between Fisk and assistant engineer H.M. Dungan reveals that other complications also belabored completion that summer, including a local deputy sheriff attempting to extract additional levy on building materials.[27] A month later, timber and sawn planks for the Deep Cut construction were apparently still awaited, before Fisk received word from G.W. Merchant that he required use of a scow (boat) in order to transport cross-ties and plank for use in the tunnel towpath.[28] Shortly before Christmas, on December 20th, the tunnel bricklayer had stopped work on the first three courses of brick to enable Merchant to continue work on the

[27] Dungan to Fisk, July 17, 1850. NARA RG79 P207.
[28] G.W. Merchant to Fisk, August 10, 1850; Merchant to Fisk, October 23, 1850. NARA RG79 P207, Tray 290.

towpath within the vault.[29] The tunnel was unfinished before 1851, apparently, as well as only nominally functional in its towpath rail and planking.

[29] H.M. Dungan to Fisk, December 20, 1850. NARA RG79 P207 Tray 290.

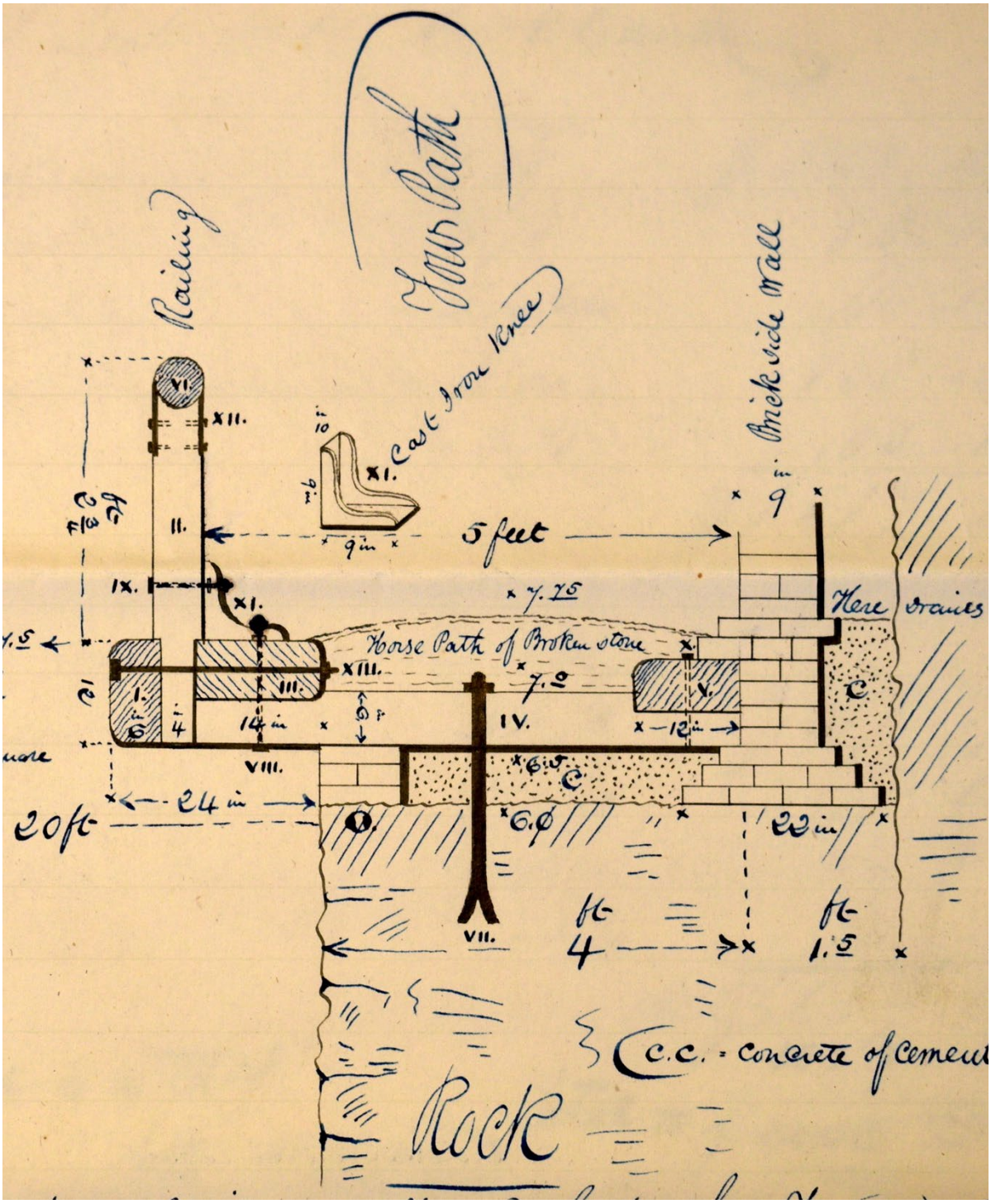


Figure 15. Ellwood Morris, "Being a design for a 'Projecting Tow Path for the Tunnel,'" March 1839. This design was further revised, and implemented in a simplified form. Note: the anchor detailed as "VII" is similar to the wrought-iron feature extant within the towpath alignment in Tunnel Hollow, north of North Portal. (Correspondence of Ellwood Morris #285; NARA RG79 P286, Box 1, Tray 296; image UO-CLRG, 2023)

Civil War and Post-Civil War

The Civil War (1861–1865) saw the canal take on both a strategic and tactical focus for Union and Confederate commands alike. For federal troops, the waterway was a supply line for important materials supporting the Northern war effort, if vulnerable in extent and construction. Consequently, Confederate units targeted key facilities along the route in hopes of damaging or destroying its freight operations. Several Union units were stationed on the Upper Potomac at Paw Paw Tunnel in defensive roles, specifically, including the 67th Ohio Infantry and 8th Ohio Volunteers attached to the commands of Generals Lander and Shields; Paw Paw townsite itself hosted a Union army depot during this period by January 1862.[30]

After the war, as commercial operations resumed at Paw Paw, a variety of schemes blossomed to manage navigation efficiency on the canal. Steam-powered navigation, permitted on the canal at limited speeds prior to the tunnel's completion, included a variety of packet, launch, and excursion craft identified by NPS ranger John McCarthy.[31] Another format, patented in 1872 by Georgetown planning mill owner J.L. Simms and machinist W.T. Duvall, and apparently entertained in the course of C&O correspondence, proposed to fit boats with a mechanical towing apparatus, pulling them upstream along an overhead track.[32] No evidence survives, however, to suggest that any serious attempts were ever made at to implement these, as the aftermath costs of the October 1866 floods may well have been prohibitive in this respect for C&O administrators as well as would-be

[30] Everett 1882, 246; Johnson 1879, 123.

[31] John P. McCarthy, "EXCURSION BOATS on the Chesapeake and Ohio Canal," June 2014, NPS-CHOH. PDF.

[32] J.L. Simms and W.T. Duvall, Improvement in Towing Canal Boats, U.S. Patent No. 130,080; U.S. Patent Office, *Specifications and Drawings of Patents Issued from the U.S. Patent Office: July 16, (Divisions B and C,)* [sic] *23, and 30, 1872*. (Washington, DC: Government Printing Office, 1872), 262-263.

innovators.[33] Ultimately, mules in harness (fig. 16) would remain the basic upstream propulsion system for the canal's commercial lifespan.



Figure 16. Mule team and driver on the canal towpath, possibly at Cumberland, c.1900. (NPS-CHOH)

A continuing succession of severe floods, spring freshets, and financial insolvency for canal operations eventually led the C&O Canal Company into bankruptcy in 1889. Increased pressures from rail freight competition may have accelerated with technological gains in railway engineering. Inherent limits on the canal system's geographic reach would have intensified this pressure, while rail network connections continued to expand into the Midwest after the Civil War and beyond. Paw Paw features were recorded among an 1894 survey of C&O assets, including quarries, culverts, and engineered drainages, in addition to the Locks and buildings (fig. 17). By 1917, vegetation, including grasses and other herbaceous cover, had heavily colonized the towpath shoulder along both tunnel portals. This can be understood as a direct indicator of declining navigation use, where the

[33] "Great Flood—Immense Loss of Property," *Evening Union*, Washington DC, October 11, 1866, 3; compiled in William Bauman, *Compilation of Canal Trade Articles*, Revision 3 [November 2020], 76.

downward angle of towropes moving along these surfaces had previously acted as a regular source of frequent ecological disturbance. Impacts of the 1924 flood, which wrought extensive, system-wide damage, played a central role in permanently closing the canal to commercial navigation and ending the company's operation. This flood event would not be the last. The Lock 61 lockhouse was "washed away" during the 1936 flood.[34] In 1938, the B&O Railroad, a major receiver for canal debt through previous bond mortgages, sold its canal assets to the U.S. Federal government for $2 million.

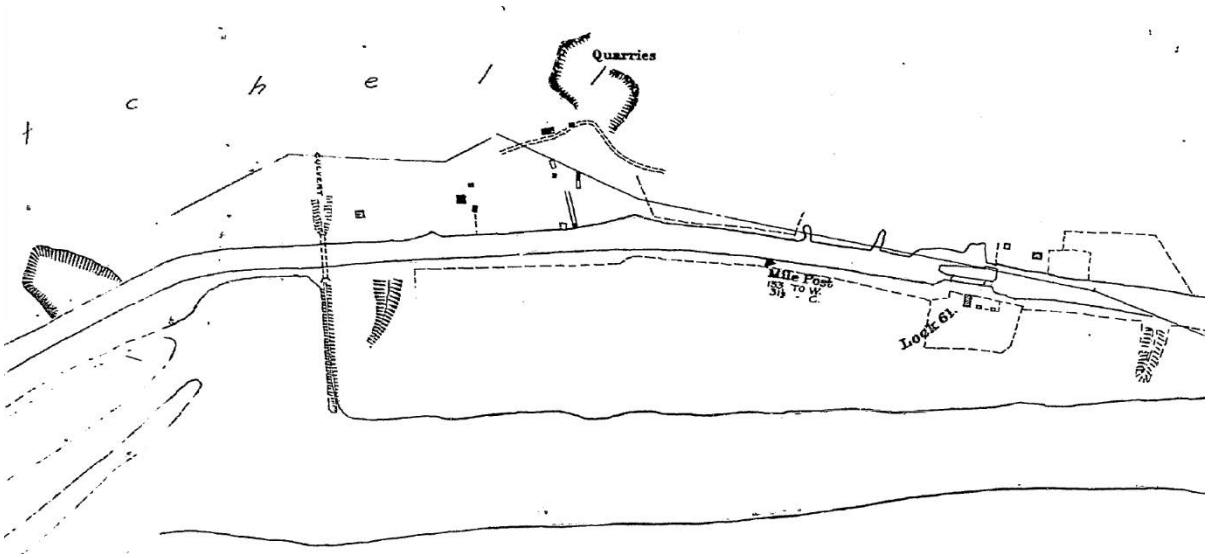


Figure 17. Excerpt from 1894 C&O Canal survey, illustrating assets between Gross Hollow, left, and Lock 61. (NPS-CHOH digital files)

An overlap in recreation and commercial use of the towpath in the late 19th century, introduces a scenic value beyond the base function of the conveyance of goods. While commercial use and consistent maintenance declined throughout the early 20th century, recreational use, including visitation to Paw Paw Tunnel appears to have grown somewhat during this time. Various archival photographs record moments among group excursions in the context of the tunnel (fig. 18), including by boat, as well as springs associated with

[34] Murray 1939, 3.

the canal on the east slope of Tunnel Hollow (fig. 19). The verso of one such tunnel photo claims that, while some sought alternative picnic destinations, the favored activities of particular groups correlated with their destination: "Heavy drinkers went to Paw Paw." Cumulatively, the growth of recreational interest coincided with the rise of "rustication" and similar leisure activities among urban Americans in rural settings (figs. 20-21).

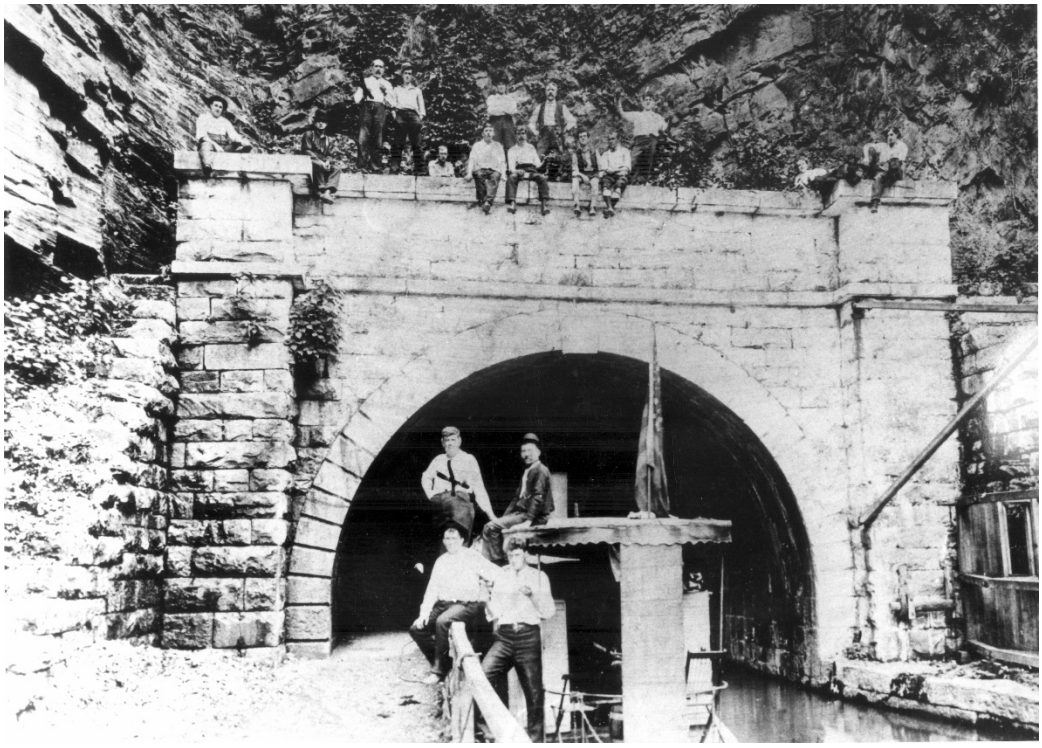


Figure 18. "Paw Paw Tunnel, Cumberland Men's Club Excursion, posing at east end portal; 1880s." Note derrick armature and watercourse barrier (right). (NPS-CHOH, Herman Miller Collection)

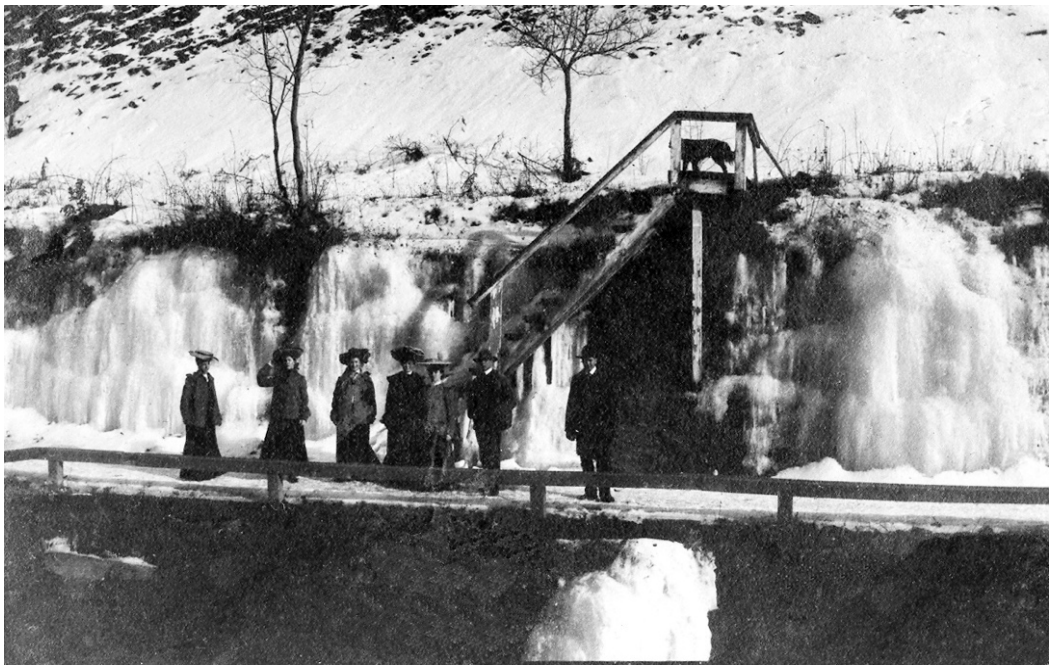


Figure 19. "Paw Paw Springs," c.1910–1920s. This image was likely recorded from the berm (west) side of the canal prism looking east toward the spring houses in Tunnel Hollow. Note towpath and low timber safety barrier. (NPS-CHOH)

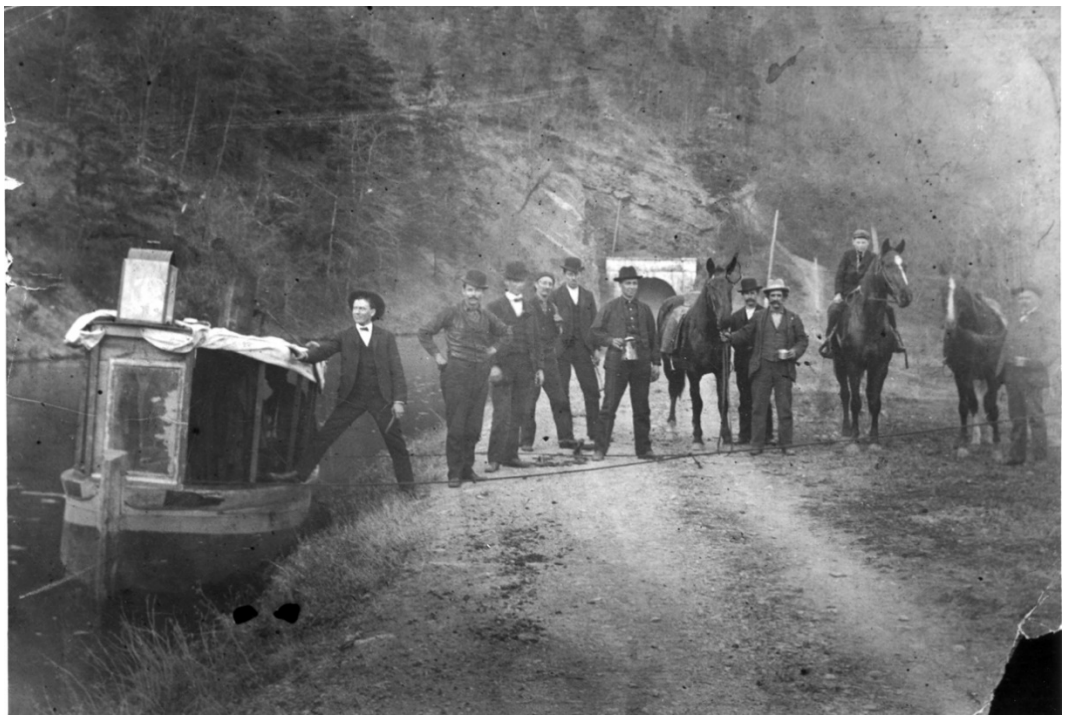


Figure 20. "Upstream portal—boat, men, horses," c.1900s. (NPS-CHOH)



Figure 21. "Camping Along Canal," c.1910–1920. (Ezra B. Thompson Collection, NPS History Collection, HFCA 1174)

Recreation activity along the towpath encompassed cycling by 1892, when Frank G. Lenz published dispatches from his tour from Cumberland to Williamsport.[35] In this account, the distance cyclist describes traversing the route as an alternative to the apparently poorly maintained National Road. "The scenery at some points is really grand," Lenz claimed, "and quite a compensation to those who cycle this way…the towpath is generally good, but rather rough riding where it has been repaired."[36] Lenz also noted the dearth of amenities then available to visitors between Cumberland and Hancock, including scarce fresh water and food,

[35] Frank G. Lenz, "AROUND THE WORLD WITH WHEEL AND CAMERA," *Outing* 20, no. 5 (August 1892): 341-343.
[36] Lenz, 342.

with lock keepers selling "only poor cake and tobacco."[37] Of riding south into the tunnel, Lenz admitted some hesitation:

> *I rode in confident enough, but it soon grew so dark that I was glad to dismount, and the walk I had then was one through mud and dripping water. Luckily, no canal boats entered the other end before I got through, otherwise I should have been compelled to turn back, for the path is too narrow to allow the mules to pass a bicycle*.[38]

Although Lenz did not specify the immediate locations for towpath repairs encountered downstream from the Tunnel, it is rather likely that these comprised C&O attempts to cope with the aftermath of damage from the 1889 flooding. The description of "dripping" conditions in the tunnel, too, is noteworthy, particularly set in the context of weather for the region; Allegany County recorded peak rainfall, exceeding 4.6 inches on June 4, 1892.[39] This suggests the distinct possibility that sustained percolation into the tunnel vault was already typical by this time.

[37] Lenz, Ibid.
[38] Lenz, 342-343.
[39] "Maryland Precipitation Extremes: Maximum 24-Hour/Daily Totals by Year, 1891–2024," July 2024; Maryland State Climate Extremes Committee (SCEC) Report, "Maryland Annual Precipitation," June 2019, https://ncdc.noaa.gov/extremes/scec/reports.

Early NPS Role at Paw Paw, 1938–1961

NPS surveys of the new federalized resources under Arno B. Camerer's direction in 1938–1939 began a new, systematic effort to take stock of the canal resources as federal property. Lawrence F. Murray's report for Paw Paw, "The Seventh, Or Cumberland Section of the Chesapeake and Ohio Canal," is notable, as it included both photographs and descriptions, although cursory, for locks as well as the tunnel. Notes for several locks included commentary on distinctive construction elements and material condition, including an attempt to classify locks in Tunnel Hollow based on types of concrete and timber. Although multiple Civilian Conservation Corps units were also active in federal stabilization and repairs on the canal after 1938, no CCC Companies or side camps ("spike camps") appear to have operated as far as Paw Paw vicinity, in contrast with work documented on the lowest 22 miles of the canal.

NPS stewardship concerns in canal resources deepened with discoveries of waste disposal and dumping by the B&O railroad by 1941, which continued for the next several years despite apparent attempts to intercede with rail administrators. Surveys of canal-related infrastructure continued in 1949.

From 1954, U.S. Supreme Court Justice William O. Douglas played a pivotal role in federal stewardship of canal resources. Justice Douglas openly led opposition to a popular congressional initiative to redevelop the canal alignment a motor parkway. Citing the impossibility of appreciating the former canal lands at vehicular speeds, while likening their experience to those of the earlier parks patron John Muir, Douglas countered this plan, garnering public support for the preservation of the canal system.[40] In particular, Douglas focused attention in leading an a well-publicized hike of advocacy leaders along the length of the towpath in March 1954, serving to underline the rich history, wildlife, and

[40] William O. Douglas, "Potomac Sanctuary" [Letters to the Editor, 14], *Washington Post*, January 19, 1954.

recreational opportunities; this event would be commemorated as the Douglas Hike.[41] The resulting C&O Canal Committee (evolving into the C & O Canal Association by 1957) ultimately galvanized political momentum to designate the C & O Canal as federal parkland.[42]

[41] C&O Canal Association, "Background," 2020.
[42] Mackintosh, 1991, 67-75.

Mission 66 and National Monument

Inspection of Paw Paw resource conditions in April 1956 showed extensive repair needs within tunnel brick (vault) masonry, towpath structure, and rockfall rubble. August 1956 saw work crews engaged in these tasks in the tunnel cuts, albeit with manufactured high-fired brick and concrete-based mortars which were not compatible with historic materials. Notably, this project also included constructing a new dry-laid rubble retaining wall in the North Portal cut.



Figure 22. Mission 66-era contractor work crew photographed at North Portal, view S, August 22, 1956. (NPS-CHOH)



Figure 23. Mission 66-era work crew drilling and clearing rockfall from the towpath and canal, north of Paw Paw tunnel. Note deciduous trees established in canal prism. (NPS-CHOH)

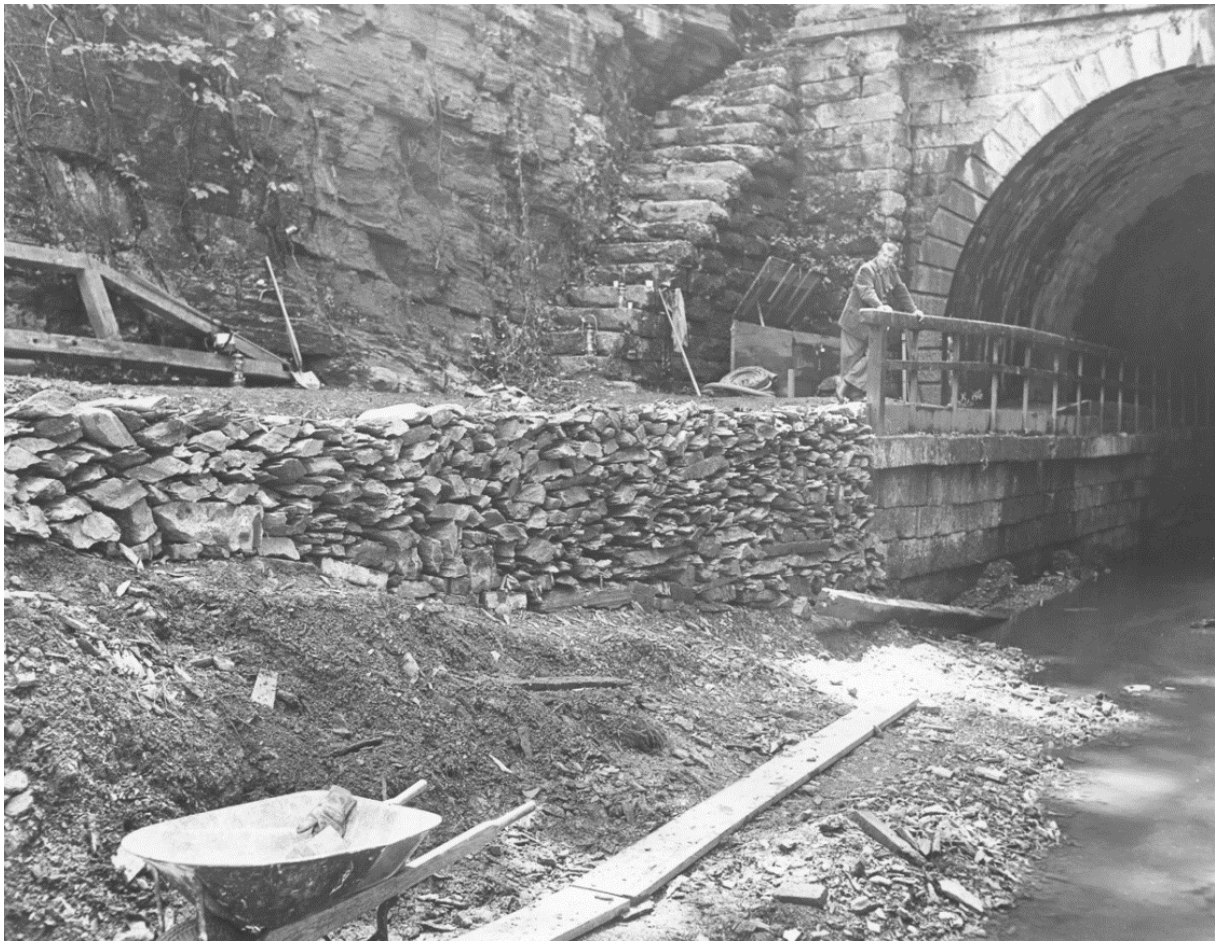


Figure 24. Dry-laid retaining wall under construction in Tunnel Hollow, view SE, August 22, 1956. (NPS-CHOH)



Figure 25. View of boardwalk framing elements roughed out as of September 18, 1956, at Tunnel Hollow near the North Portal. The north end of the historic towpath bedrock grade is visible in the foreground, although canopy cover has almost fully occluded longer views within the canal top. (NPS-CHOH)

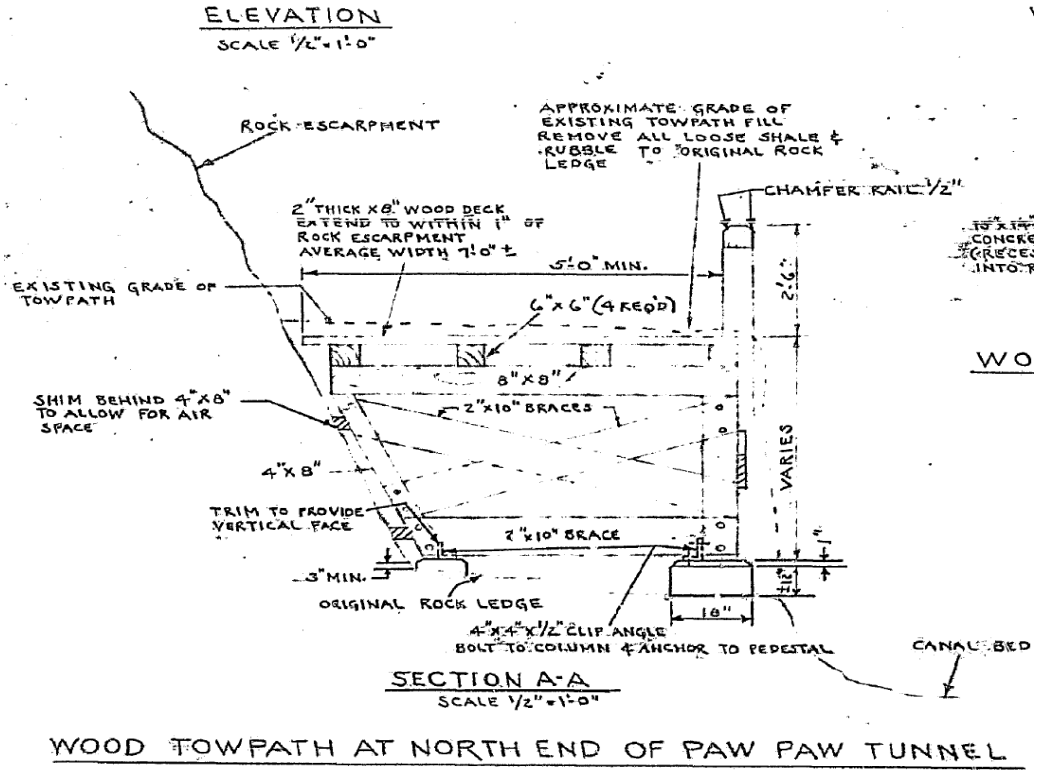


Figure 26. Excerpt from construction drawings for Paw Paw boardwalk repairs, c. late 1956. (NPS-CHOH)

In 1957, NPS administrators appointed Edwin Dale as Superintendent for the western reach of the canal (above Seneca), under the system advanced by the Worth administration the previous year.[43] During the period, recreational use continued to make inroads at Paw Paw, including hiking and motor tourism. Presumably, the proximity of the South Portal to Paw Paw campground and a low, wide towpath remnant made this segment of the towpath embankment an attractive route (or destination) for private motor vehicles (figs. 27-28). The towpath embankment may have been widened and flattened during this time, perhaps due to the enduring distinction of the tunnel as a local attraction, as well as impacts stemming from heavy machinery, re-grading, and masonry freight during and after 1956.

[43] Mackintosh, "Managing the Park," 1991.



Figure 27. Vehicles parked on river side of towpath surface, view S, as seen from above the South Portal cornice, c. 1960. (NPS-CHOH)



Figure 28."Canal portal from upstream," c.1960. Note vehicles in background, parked across towpath adjacent to Paw Paw Hollow. (NPS-CHOH)

The canal system was designated as a National Monument by President Dwight Eisenhower on January 18, 1961, under the authority of the 1906 Antiquities Act. After multiple failed attempts by supporters to secure organizing legislation for a congressional mandate, this proclamation and its timing were controversial—perhaps further hardening long-term opposition to a federal parkway oriented with the Potomac River course.

The 1965 Property Survey of C&O lands, conducted by J.B. Ferguson & Co., Inc., of Hagerstown, Maryland, includes notations of cultural resources relative to the canal alignment, tunnel, and adjoining parcels. Examples include an alignment for Tunnel Hill

Trail (fig. 29), mileposts, and notations on the disposition and condition of the original survey markers above the tunnel alignment. While the Ferguson survey must have afforded new legal and spatial clarity to Monument stewards, it likely also underscored the range of C&O period resources still in precarious condition or decline.

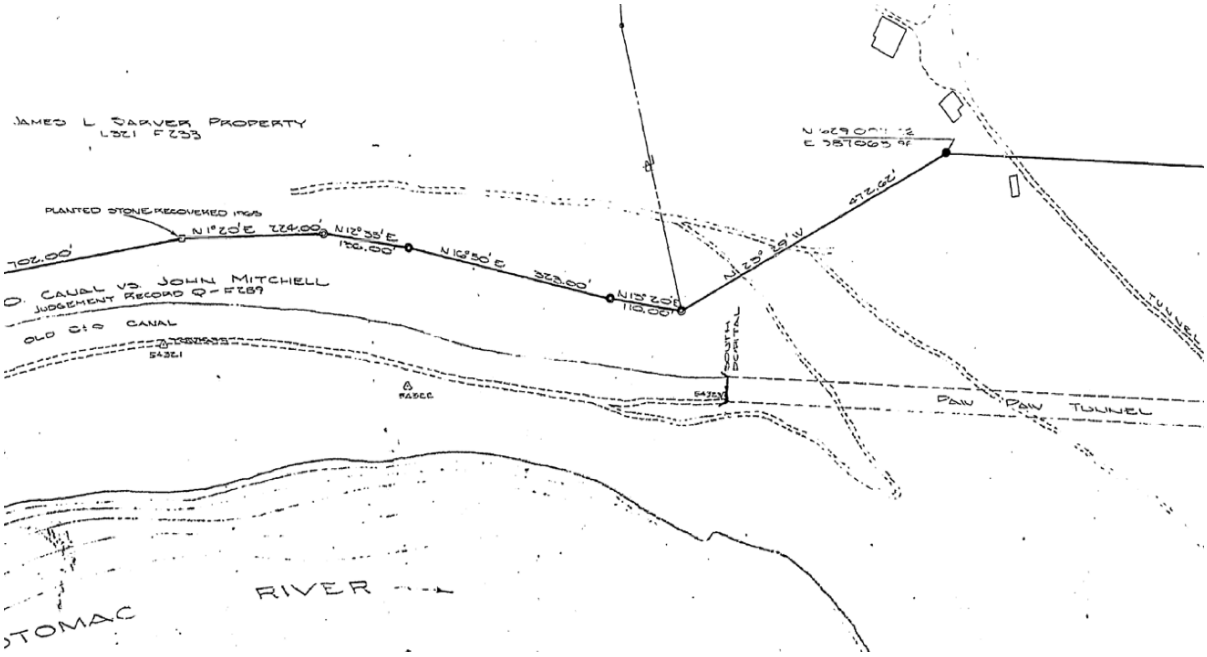


Figure 29. Sheet 65, "Property Survey, C&O Canal Near Paw Paw Tunnel, Allegeny [sic] County, Maryland," 1965. (NPS-CHOH)

The aftermath of rock slides evidently necessitated further repairs. Work performed between July and November 1966, under the aegis of Contract No. 14-10-6-412-2, "Towpath Reconstruction and Resurfacing," was overseen by civil engineer Edward A. Northrop. Various notes on daily tasks, equipment, and personnel of this project were detailed in an unattributed leatherbound pocket diary, possibly Northrop's.[44] In addition to "reinforcing the timber trestle bridge for towpath," "cleaning canal bed," and "building access ramp from canal bed to towpath," project crew also logged time with pneumatic equipment on August 2-3, "drilling holes for blasting large boulders."

[44] "Diary #1. Paw Paw Towpath," 1966, NPS-CHOH Archives. Several variety of systematic entries close with "E.A.N."



Figure 30. Photographic print labelled "Paw Paw 4/13/67." (Town Creek and Tonoloway Aqueducts, Paw Paw Tunnel 1968 Prints, C+O Canal, NPS-CHOH Archives)



Figure 31. Photographic print labelled "Paw Paw Tunnel 4/13/67." Note extended derrick armature (far right), and temporary prism barrier. (Town Creek and Tonoloway Aqueducts, Paw Paw Tunnel 1968 Prints, C+O Canal, NPS-CHOH Archives)

Additional measures were required after an estimated 15,000 cubic yards of shale filled the North portal in 1968 and extensively damaged the portal structure. The impacts of this event would linger for much of the following decade, as the Park was not able to undertake cleanup until 1976-77. Most likely, the scale and extent of this and related demands on Monument personnel and funding proved adverse for a Developed Area Plan underway through 1970, which anticipated expanded holdings, infrastructure, and uses focused around the Paw Paw Bends area (fig. 32). This planning effort augured a part for Paw Paw Tunnel in the realization of Potomac National River as a new NPS management unit, although no such entity was ever realized.

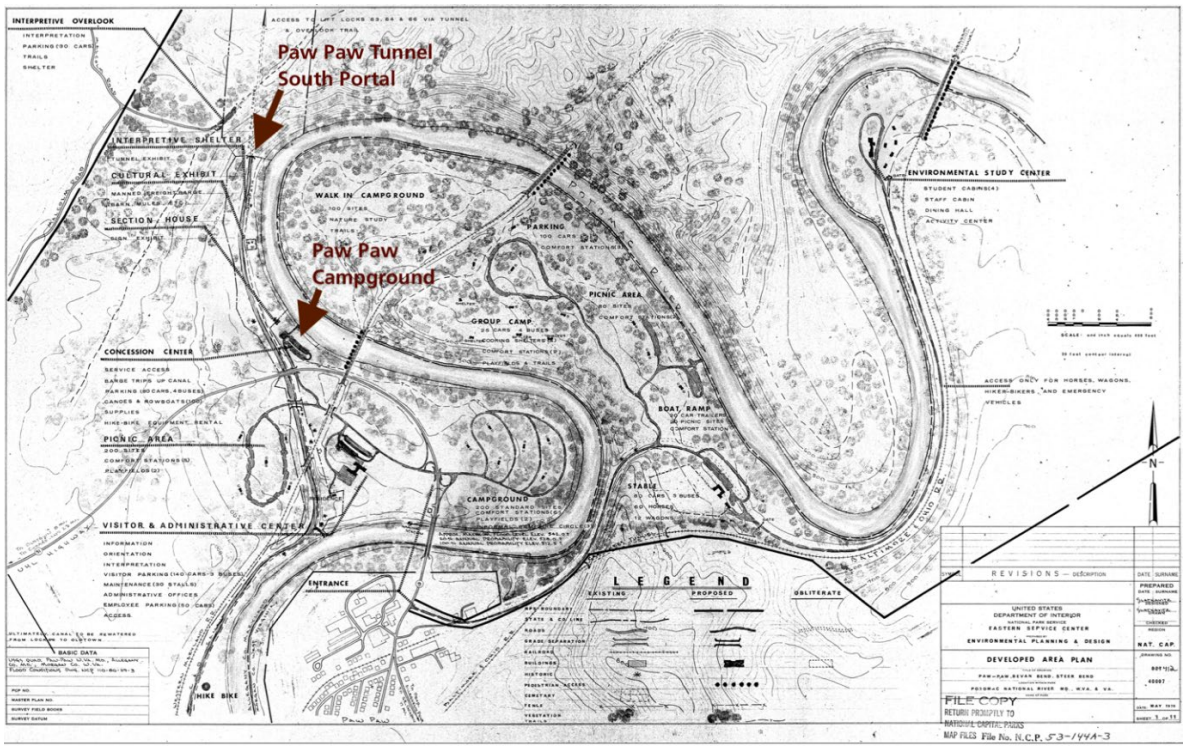


Figure 32. Developed Area Plan for PawPaw area of Potomac National River, 1970. (NPS-CHOH 412-400007-Z7, Sheet 3; annotated CLRG, 2023)



Figure 33. Hikers photographed from within the South Portal at Paw Paw Tunnel, 1972. (NPS-CHOH)

National Historical Park Era, 1971–1980s

Chesapeake & Ohio Canal National Historical Park was established under the authority of organizing legislation, *Chesapeake and Ohio Canal National Historic Park Act*, in 1971 (P.L. 91-644), acknowledging the progressive advocacy of Supreme Court Justice William O. Douglas. Developed as a politically favorable alternative to establishing a park unit broadly encompassing the Potomac River as a National River park unit in itself, National Historic Park status superseded the national monument; this purview encompassed both the canal and Paw Paw Tunnel.

Storm damage, brought on by Hurricane Agnes in June 1972, caused extensive impacts along the canal system. At Paw Paw, stormwater runoff impacts may have included silt accumulation within culverts and prism areas, erosion of the clay prism liner, culvert headwall damage near Gross Hollow, along with infill, erosion, and possible embankment and slope undercutting North of the tunnel (fig. 33). Unsurprisingly for the extent of needed stabilization and repair, costs to let contracting work approached $500,000 by 1979. The Park's 1976 *General Plan* identified the condition of Paw Paw's rubble locks as among the poorest of their kind on the upper canal, "near the point of collapse."[45] "The deep cut approach on the north end is in bad condition," environmental impacts chief John G. Parsons concluded, observing that "large slides have occurred and more can be expected."[46] Alongside, the boardwalk structure once again required extensive attention in the wake of damage, prompting drawings for a new "foot bridge" (fig. 34).

[45] Parsons, General Plan, 1976, 6-7.

[46] General Plan, 7.

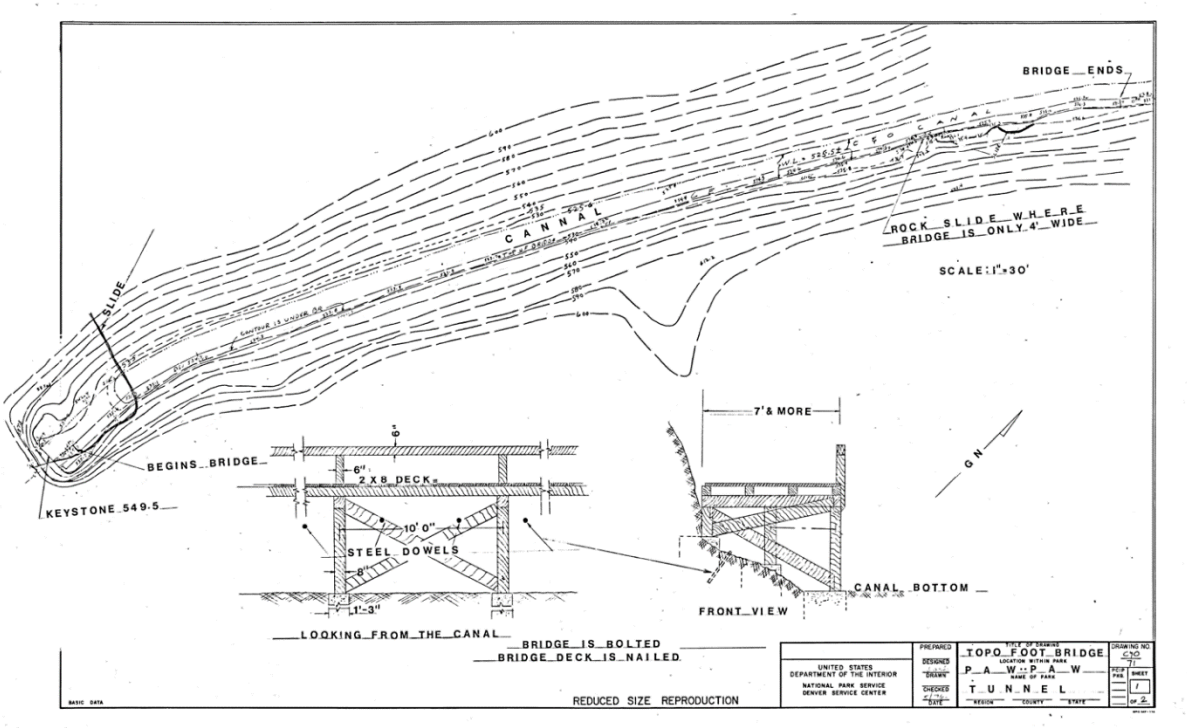


Figure 34. Plan, elevation, and section drawing, "TOPO FOOT BRIDGE, PAW PAW TUNNEL," prepared in May 1976 following impacts due to Hurricane Agnes. (NPS-DSC Drawing C70-71; NPS-CHOH 412-71)

By the end of the decade Paw Paw Campground functioned as an NPS visitor contact station. Within the largely open canopy parkland and turf cover, this use focused on a log-framed, single-story building sited adjacent to the parking lot, immediately north of the access road terminus (fig. 35). In this context, NPS facilities embodied a type of supervisory use consistent with the historic function of the nearby Superintendent's House. The turnout from the Maryland Route 51 right of way to the south, however, remained a distinct traffic hazard; this concern had been studied as early as 1964, in preparing unrealized designs to introduce an alternate access road and parking west of the towpath (fig. 36).



Figure 35. Paw Paw Campground and vehicular turnout adjacent to Maryland State Highway 51, view N, 1979. Along with the log contact station, the view includes the graded parking lot, utility poles, and parking barriers. (NPS-CHOH)

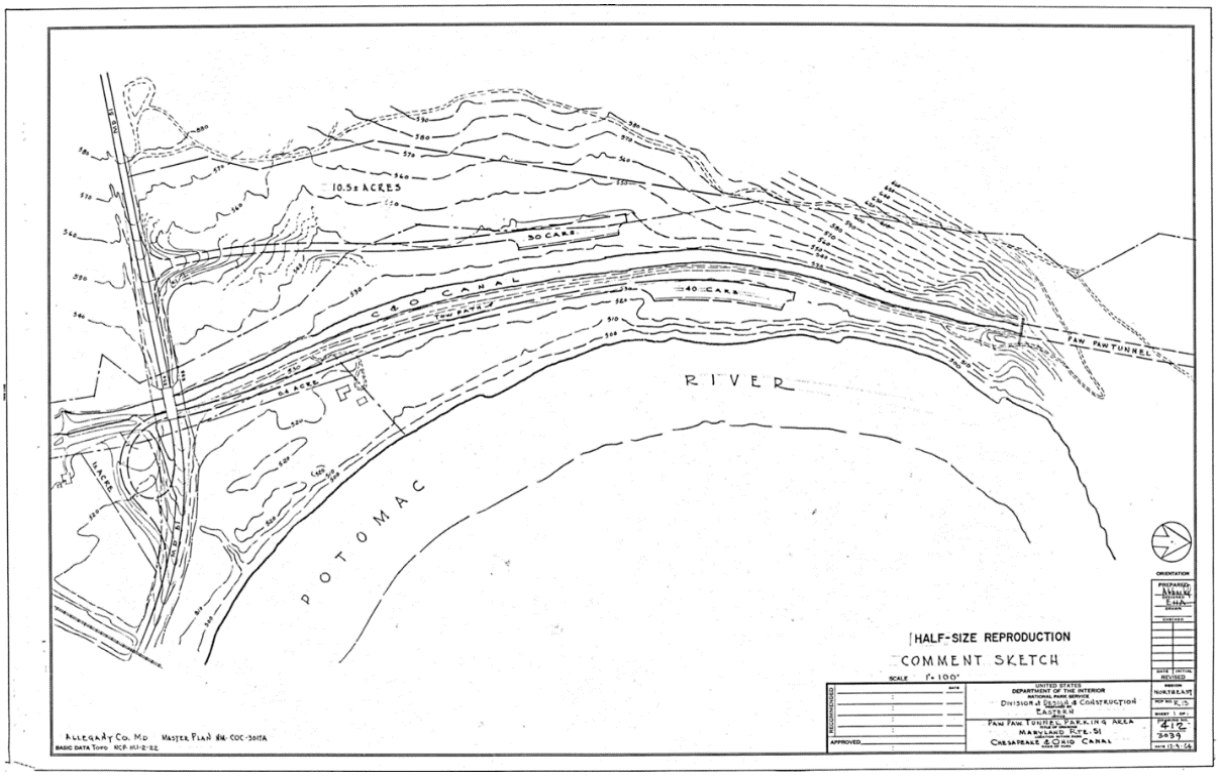


Figure 36. Preliminary study for "Paw Paw Tunnel Parking Area," drafted December 1964. (NPS-CHOH 412 3039A)

Further preservation repair efforts in 1979–80 (fig. 37) included measures to address the apparent worsening of erosion and rutting to the towpath profile and surfacing at Paw Paw.[47] Developed by the NPS Denver Service Center, construction documents called for the use of crushed shale as a fill material to amend the rutted and eroded embankment. Specifications here directed contractors to scarify substrate materials, loosening the existing surface and potentially impacting or entirely removing historical soil profiles; this design also sought to eliminate any "surface irregularities" throughout the finished surface of 10-12 feet within the project area, which may have exacerbated (or even guaranteed) the loss of a legible distinction between the distinctive routes of mule teams and their drivers

[47] "Paw Paw Tunnel, Phase II," IFB 3100-80B-R (Denver, CO: NPS Denver Service Center, 1980). [prepared by K. Bennett]

(fig. 38).[48] On balance, this management approach shows the emphasis placed on guaranteeing ease and safety for contemporary needs (recreation) across a contiguous route within the Park. Considered in the context of the well-intended 1958 clearance of the full towpath route following advocacy of the Douglas Committee the previous year however, the treatment appears to have been relatively modest in its application.



Figure 37. Contractors replace portal masonry elements in Paw Paw Hollow, c. 1979. The labels appended to this image are somewhat misleading; this work did not rebuild the tunnel itself. (NPS-CHOH-1657)

[48] Surviving photographs for Paw Paw overwhelmingly recorded the tunnel portal areas among subjects, tending to limit the extent of visual comparisons among period conditions for towpath ruts further along the hollow areas.

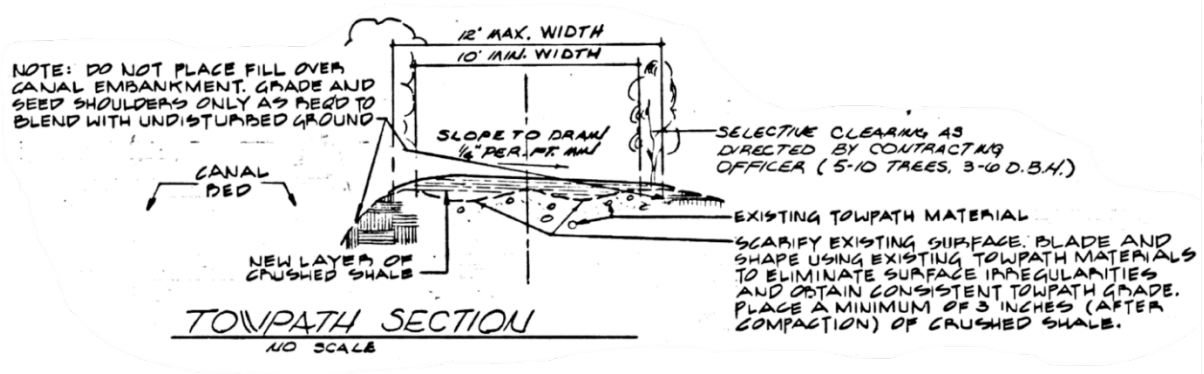


Figure 38. Detail from "Paw Paw Tunnel, Phase II" construction drawings, highlighting towpath conditions by 1980. (NPS-CHOH digital files)

NPS Stewardship, Recreation, and Keeping Above Water, 1980s-1990s

Repairs guided by 1978–1980 project planning for the Paw Paw Tunnel cultural landscape carried over into the following decade. At its outset, this time frame saw substantial efforts to clear backlogs relating to 1960s rock slides, while emerging impacts reiterated the consequences of the landscape's susceptibility to historical flood trends. A half-century had elapsed since NPS inherited responsibility for the site as part of an abandoned and semi-derelict commercial enterprise in 1938, while structures and engineered systems remained exposed to seasonal weathering and substantial climate events alike.

For Park and regional administrators, the Superintendent's House became a point of particular focus amid resource management concerns. Although NPS deputy planning director Freeman had countermanded a Park proposal to raze the building, citing its distinction in "the probable scene of extensive development for interpretation of the canal," its overall condition deteriorated noticeably by 1985.[49] By this time interested staff had urged Park Superintendent McClanahan to more deeply "appraise" the building's condition and a raft of building inspection reports in the interim attest to growing "visible damage," infestation, and repair recommendations, alongside "normal deterioration."[50] A series of job orders detail extensive repair line items concerning the foundation, chimney, cladding, fenestration, and trim, while hydrosol applications were specified to suppress molds and fungi.[51] The Park's maintenance staff recognized the need to address compromised floors as a part of stabilization efforts in 1983, supporting a programmatic proposal to adapt the Superintendent's House for contemporary NPS visitor contact with

[49] Raymond L. Freeman, memorandum to W. Dean McClanahan, May 28, 1971, H30-HH, NPS-CHOH archives.
[50] Antietam (C&O Canal Group), "Section House," Quarterly Building Inspection Reports, 1983–1993, NPS-CHOH files.
[51] M.M. Johnson, Job Order Request[s], 76-79 [NPS Form 10-577], NPS Allegheny District. NPS-CHOH files.

interior media and audio facilities.[52] Basic stabilization measures were implemented, although no implementation of the more ambitious interpretive measures is known to have occurred. It is possible that at least one application of Chlordane, a toxic pesticide, was used to treat insect infestation, most likely termites..[53]) By 1993, metal roof cladding was in place, although extensive repair needs had spread with the failure of most exterior paint finishes, renewed infestation, and visible "basement" damage and infestation.[54] Nonetheless, these assessments summarized buildings conditions as "good."

Advocacy interest in Paw Paw resources was underscored in the C&O Canal Association's entry into a trial agreement with the Park for the 1985 season, brokered by Superintendent Stanton's administration, where the Association would provide "overseer services" based at the campground and canoe launch area. The group's annual hike, cast in the tradition established by Justice Douglas's 1954 preservation-advocacy precedent, was focused on canal sections extending from Old Town through Paw Paw, "with happy hour in the [former] Arbaugh Cabin."[55] By 1998, similar activities had encompassed an annual overnight canoe trip fixed on Paw Paw bends. Impacts from the November 5, 1985 flood halted these initiatives at Paw Paw, washing the cabin from its foundation roughly 1,000 feet downstream and layering the campground under approximately two feet of silt; NPS project planning addressed silt removal the following Spring, alongside volunteer efforts.[56]

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[52] "DBS," untitled floor plan sketch [revised], January 25, 1983. NPS-CHOH files. This document appears to have been intended as an attachment to the second quarterly inspection report for 1983, and may have been authored or notated by Dale Sipes, then acting head of maintenance. Notably, Chlordane was banned outright by the EPA in 1988.

[53] ToxFAQs for Chlordane, CAS#12789-03-6 (2018); Agency for Toxic Substances and Disease Registry [ATSDR], Toxicological profile for chlordane (Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service, 2018).

[54] "Paw Paw 156.2, Section House," Quarterly Building Inspection Report, January 30, 1993.

[55] Bruce W. Wood, "Activities Continue," *Along the Towpath, 18.*

[56] Wood, "Remarks," *February 22, 1986.* C&O Canal Association; Mimi Eller, "Notes from the March 16 Association Board Meeting," C&O Canal Association, NPS-CHOH files; "ASSOCIATION'S ANNUAL MEETING HELD IN HARPERS FERRY," *Along the Towpath* 18, no. 2 (April 1986): 9, 16.

Extensive activity at Paw Paw in the mid-1980s also showed in adjacent work by the Maryland State Highway Administration, first staging and then completing replacement of the degraded Maryland State Highway51 Potomac bridge in 1984–1986.[57] It is possible that motorists' use of Paw Paw Campground declined during this time frame, given that vehicles' ingress and egress relied on the bridge embankment and right-of-way. Limits in site access may likewise have affected stabilization work authorized for the 1985 fiscal year at Lock 66, for which the Park authorized $11,200 and reflected the continuing decline of lock structure (including head gates) since mid-1960s repairs and documentation.[58]

Two severe flood events in 1996 proved to be distinctive among many impacts facing Park stewards during the period. Impacts stemming from a one-percent annual chance [then considered a 100-year flood event] occurring January 19-20, in the wake of heavy snowmelt, were exacerbated by September 7-8 runoff driven by the Category-3 Hurricane Fran as runoff carried substantial debris into the Paw Paw Bends area of the Potomac.[59] Flood recovery projects addressed Paw Paw cultural resources as two distinct line items, slating tunnel-focused recovery work for Spring and Summer 1999; associated projects appear to have extended to 2000–2001, including masonry and timber bumper repairs.[60] Consequent stabilization or repair needs downstream, which may have included Culvert 210 masonry and portions of the prism near Gross Hollow, were consigned an indefinite timeline in this hierarchy.[61] Volunteer "Level Walkers" organized by the C&O Canal Association, meanwhile, repeatedly noted and documented graffiti at the South Portal.[62]

[57] "…AND THE NEW HIGHWAY BRIDGE WILL BE ERECTED IN THE OLD RIGHT-OF-WAY," *Along the Towpath* 17, no. 2 (April 1985): 6.
[58] NPS-CHOH files.
[59] "The Great Flood of '96," [nd], NPS-CHOH files.
[60] NPS Flood Recovery Status Report, reproduced in *Along the Towpath* 30, no.5 (December 1998): 19.
[61] Ibid.
[62] Keith D. Kridenoff, "On the Level," *Along the Towpath* 18, no. 3 (September 1996): 12.

Increasing breadth among use types seen in visitation to Paw Paw also sustained pressure on cultural landscape resources throughout the period. Park officers tallied nearly 43,000 overnight stays through revised counting techniques in 1990, a figure which is realistically grounded at the Tunnel through NPS attempts to quantify the extent of public use beyond casual day use—in excess of 3,000 visits per mile above Great Falls.[63] Although interpretation-focused navigation in the canal prism was no longer plausible at Paw Paw Hollow, in contrast with Georgetown and Great Falls, new visitor amenities adjacent to Cumberland Terminus in 1985 probably buoyed interest in hiker-biker access to – and through – Tunnel Hollow alignment. The rising priority placed on recreation-centric uses during this period is apparent, highlighting the functional role of the canal towpath at Paw Paw as a continuous alignment, rather than a destination point. While counseling preservation fundraisers for the Monaquacy Aqueduct repairs in the wake of flood damage, Superintendent Faris noted Paw Paw Tunnel as tantamount to "a master-link in the continuity of the Park itself."[64] Scarce NPS resources committed to project undertakings at Paw Paw in late 1999 and 2000 reflected this, in particular, by prioritizing replacement of the Lock 66 footbridge and clearance of rock debris on the towpath adjacent to the North Portal, as well as grading of the towpath near Twigg Hollow.[65] Camping use fees were implemented at Paw Paw Campground in June 2000 alongside other vehicle-access sites, reinforcing the prevalence of recreation uses among Park resource management considerations by the end of the decade.

[63] Mackintosh, "Using the Park," *C&O Canal: The Making of a Park*, 1991.
[64] Doug D. Faris, letter to Carl Linden, January 1997. NPS-CHOH files.
[65] Bill Burton and Barbara Sheridan, "Lock 61 to Tunnel parking area," September 18, 1999, Level report 57-58, C&O Canal Association; Pat White, "Culvert 208 to Paw Paw Tunnel Parking," February 12-20, 2000, Level Report 56-58, C&O Canal Association.

Continued NPS Resource Management, 2001–2023

Extensive condition assessment and historic preservation-driven treatment investigations of the tunnel boardwalk in 2004, contracted with Quinn Evans, provided new insights into the makeup, condition, and preservation of key distinguishing tunnel elements. Likely originating with this period, a program of winter enclosure for the tunnel portals, using wood 'windbreak' panels (fig. 39), helped provide protection against freeze-thaw cycles and regulate climatic conditions within the tunnel vault. By this time, mineral efflorescence was apparent within the tunnel vault, together with results of incompatible mortar choices and brick hardness among historic and non-historic materials in the Paw Paw Hollow towpath retaining wall.

High-resolution documentation of the tunnel portals and boardwalk areas was contracted to VHB prior to 2016, with laser scanning and related imaging subcontracted to Michigan-based Wightman and carried out by Mike Pfaff (figs. 40-41). The current whereabouts of the resulting data and imaging remains unclear, despite attempts to identify its whereabouts among NPS-CHOH, NPS-NCA, and Wightman holdings.

Reopening from the previous rockfall closure and subsequent geotechnical fence stabilization at MM 155 (Tunnel Hollow) on April 17, 2013, the towpath remained passable until 2016.[66] A severe rockfall event in May 2016 again necessitated temporary closure for the tunnel and access to Tunnel Hollow, prompting an Environmental Assessment of conditions in order to design and stage extensive, multi-faceted stabilization of the Tunnel Hollow slopes along and overlooking the canal.[67]

[66] *Along the Towpath* 45, no. 2 (June 2013).

[67] Final draft of EA distributed 2020.



Figure 39. South Portal with "windbreak" covering, view N*, 2019. Note damage to portal cornice coping, accumulated leaf litter, and vegetation-colonized surfaces within the towpath cut. (NPS-CHOH, 2019)*



Figure 40. "Reality capture" laser scanning station set up to capture data, view N, as positioned in Tunnel Hollow at Paw Paw. (Wightman/Pfaff, pre-2016)



Figure 41. View of North Portal within Tunnel Hollow from the towpath, c. late 2013, following geotechnical stabilization. (NPS-CHOH)

Analysis & Evaluation of Existing Conditions

Introduction

For the purposes of investigation, documentation, and assessment, analysis of the Paw Paw Tunnel cultural landscape has been organized into a set of Landscape Character Areas (LCAs). Developed on the basis of site elements articulated in the 2020 NPS-NCA condition assessment and CRIS inventory, each LCA retains distinctive features which contribute to the historic character of the site as a whole, while highlighting specific park resources and locations for cultural resource managers. LCA boundaries are contiguous within NPS property and were drafted on the basis of fieldwork conducted by the project team in May 2023 in coordination with park staff.

Proceeding from south to north, the following LCAs have been identified:

1. Section House (Superintendent's House) / Paw Paw Campground
2. Canal Area South and Paw Paw Hollow
3. Paw Paw Tunnel
4. Tunnel Hill
5. Canal Area North / Tunnel (Athy's) Hollow
6. Twigg Hollow / Gross Hollow

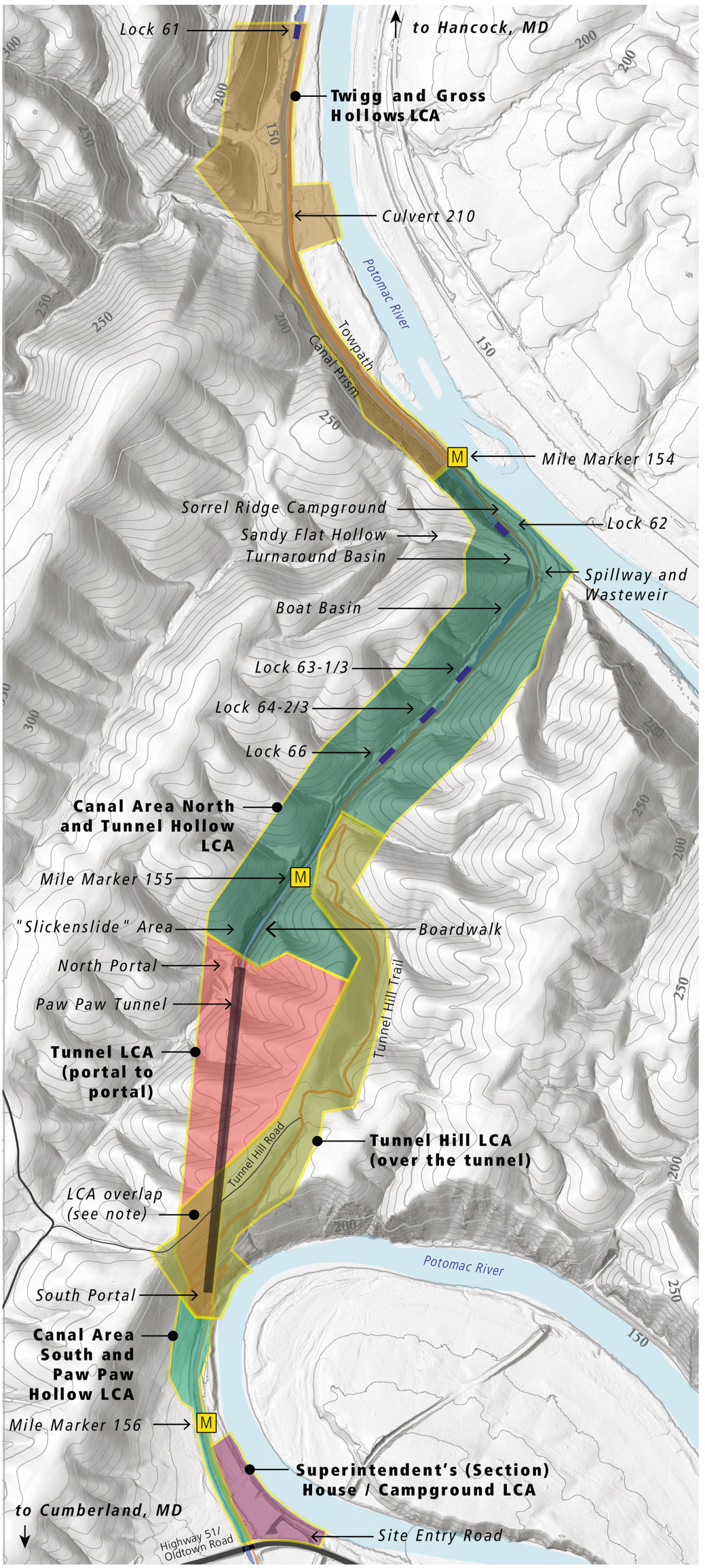
Within all areas, the NPS Cultural Landscape framework was applied to existing resources within NPS-CHOH purview, organized by cultural landscape characteristics (categories) where present: natural systems & features, topography, cluster arrangements, patterns of circulation, buildings & structures, vegetation, small-scale features, constructed water features, and archeological sites.

Recognizing the historically extensive, linear nature of the C&O Canal during the period of significance, several historic resources (or types) comprise features located in many (or all)

of the discrete LCAs. The two most recognizable features are the canal prism and towpath alignment, together extending throughout all LCAs and beyond, characterizing the former C&O system between the Cumberland, Maryland, terminus and Georgetown, District of Columbia. Other resources within the Paw Paw Tunnel cultural landscape, such as spoils depositions, are numerous and continue to be identified through both ongoing archeological survey efforts and remote imaging analysis (e.g., LiDAR). The tunnel itself is located at C&O Canal milepoints 155.2 – 155.8 in the canal system, while project LCAs span 153.13 (north) – 156.30 (south) in this sequence.

Paw Paw Tunnel Landscape Character Area Site Plan

Paw Paw Tunnel Cultural Landscape Report | Chesapeake & Ohio Canal National Historical Park



Landscape Character Areas (LCAs)

- Twigg and Gross Hollows
- Canal Area North and Tunnel Hollow (Athy's Hollow)
- Tunnel Hill (above tunnel)
- Tunnel (portal to portal)
- Canal Area South and Paw Paw Hollow
- Superintendent's (Section) House / Campground

Cultural Landscape Features

Circulation

- Towpath + Trails
- Roads

Buildings and Structures

- Paw Paw Tunnel

Constructed Water Features

- Locks
- Canal Prism

Natural Systems and Features

- Potomac River

Small Scale Features

- M Mile Marker (MM)

NOTE:Tunnel Hill (above tunnel) and Tunnel landscape character area boundaries overlap at the southern portion of the tunnel. This overlap allows for cultural landscape features associated with tunnel interior, and features above the tunnel, to be analyzed and evaluated separately.

See landscape character area insets for additional detail.

0 0.25 0.5 Miles

Source: NPS-CHOH Park geodata, NPS-NCR geodata, NPS open source geodata

Spatial Reference

Datum: WGS 1984,
Projection: Mercator Auxiliary Sphere

N

Summary Statement of Significance

The C & O Canal was administratively listed on the National Register of Historic Places (NRHP) in October 1966.[68] A formal National Register nomination was supported through additional NPS documentation of component sites through 1979 and updated in 2015, absorbing a compilation of historic resources determined eligible for NRHP listing in 1995–1996[69]. The canal's updated nomination advances a more comprehensive evaluation of numerous historic resources associated with the waterway and encompasses the Paw Paw Tunnel cultural landscape. The site is assessed as a designed landscape, with modification. Paw Paw Tunnel was previously evaluated in Historic Structures Reports (HSRs) emphasizing tunnel engineering and materials, including towpath boardwalk and shafts (1963, 1965). A rudimentary architectural survey by the Maryland Historical Trust (MHT) was conducted in 1976. Multiple historic resources at Paw Paw have also been detailed in Historic American Building Survey (HABS) MD-810, including measured drawings (1974) and photography (1966); detailed documentation of historic rope marks was added in a 2017 survey. Archeological investigations have likewise clarified historic and cultural significance.

Cohesively, the canal is nationally significant under NRHP Criteria A, C, and D, highlighting the areas of Transportation (19th Century Waterway in the Potomac Valley and Western Maryland); Engineering (Artificial Waterway); and Architecture along the C&O Canal; Ethnic Heritage & the Underground Railroad; Military History (Civil War Supply & Defense); and Postwar Commerce, Industry, Agriculture, & Community Development along the Canal. As a historic landscape oriented with the larger, 184.5-mile canal system, the Paw Paw Tunnel cultural landscape embodies these themes in microcosm.

[68] National Register Information System (NRIS) ID 66000036.

[69] NRIS ID 14001236

The property covers roughly 340 acres (137.6 hectares), within which the cultural landscape extends along the canal prism alignment between MM 153.13 and 156.30. The tunnel alignment itself extends 3,118ft, not including rock cuts engineered within the topographic hollows to the north and south. The canal's overarching period of significance spans 96 years, beginning at the outset of canal construction in 1828 and ending in 1924, the year that the waterway ceased commercial use and activity. Although the cultural landscape primarily derives its significance from the tunnel itself as an engineered work, the site encompasses stretches of the historic canal prism to the north and south, along with working areas which embody C&O system development and function during the period. These include the canal prism and towpath, Locks 61, 62, 63-1/3, 64-2/3, and the Superintendent's House, in addition to features associated with stormwater management, construction and excavation materials, views and vistas, and canal operations. Within the period of significance, this report highlights the period of 1835–c.1850 as specific to construction of the Tunnel Residency area.[70]

Paw Paw Tunnel cultural landscape is historically significant because it encapsulates the location of a major development effort within the canal system—a remarkable facet of the C&O Canal Company's efforts to realize a navigable commercial waterway between Washington, D.C., and Cumberland, Maryland. Tangible and spatially-explicit cultural landscape characteristics and features are integral to this significance. Features associated with the canal prism and towpath have been repeatedly modified during and since the period of significance, reflecting a place shaped over time by environmental processes and human effort alike. All features are retained within the boundaries of Chesapeake & Ohio Canal National Historical Park.

[70] Construction operations continued from 1836–1842, and resumed 1847–1850.

Integrity

Historic integrity is understood as a property's ability to convey its historic significance. Additionally, historic integrity is also understood as the authenticity of a property's historic distinctiveness, evidenced by the survival of physical elements that existed during the property's historic period. For the Paw Paw cultural landscape, the question is whether the C&O Canal's users, such as a company engineer, wage laborer, lock keeper, mule driver or others, would recognize that place as it exists today. Historic integrity is determined by analyzing distinct components, or "aspects" of integrity: location, design, setting, materials, workmanship, feeling, and association.[71] In the context of cultural landscape preservation, and according to NPS best practices, it is desirable but not essential for a property to retain all seven aspects of its historic integrity, provided that a clear, overarching sense of past conditions remains intact.

In practical terms, rigid preservation of period conditions in a cultural landscape is not possible, as framed as "Change and Continuity" in the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes*.[72] Multiple ecological, social, and physical forces have inevitably shaped a historic setting as drivers of change over time (and continue to do so in the present day). At Paw Paw, the system of canal infrastructure was exposed to successive flood events, rockslides, business

[71] Page, Gilbert, and Dolan, Guide to Cultural Landscape Reports (Washington, DC: NPS Park Historic Structures and Cultural Landscapes Program, 1998), 72.

[72] Charles A. Birnbaum and Christine Capella Peters, *Secretary of the interior's Standards for the Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes* (Washington. DC: U.S. Department of the Interior, National Park Service, Cultural Resource Stewardship and Partnerships, Heritage Preservation Services, Historic Landscape Initiative, 1996), 6. NPS management units reflect numerous instances applying this concept, from canal preservation to battlefield management. See also Schaible et al, Fence Lines, Fields, and Forests: Manassas National Battlefield Cultural Landscape Report. NPS National Capital Region (2013), 2-7.

decline, deferred maintenance, the emergence of motor tourism, along with numerous occurrences of runoff and freeze-thaw cycles.

Integrity of location, setting, design, and association remain well established. Integrity of materials, workmanship, and feeling have suffered beyond the tunnel, where the degradation or loss of stone masonry and timber construction in composite locks has resulted in a loss of clarity in the complexity and function of individual lock areas. This is primarily a byproduct of long-term changes in land use, compounded by geological processes, management limitations, and the physical scale of the landscape. Sedimentation and leaf litter remain broadly influential in the loss of legibility within the canal prism, while in some cases leaf litter also mitigates some exposure to weathering and erosion.[73] The following subsections discuss selected conditions bearing on integrity.

Integrity of Materials

Loss of historic materials through various, cumulative impacts include effects of weathering, erosion, and deferred maintenance. This is evident among lock structures within Tunnel Hollow, where the degradation of historic masonry elements and timber components has reduced the legibility of canal system design and function. It remains notable, however, that sandstone and slate materials used in period masonry construction – both in mortared and dry-stack configurations – are inherently subject to delamination. Masonry repairs made during the later years of canal operations, such as the extensive formed concrete components of Locks 61 and the Lock 62 lockhouse foundation, occurred within the period of significance as a response to severe flood impacts and maintenance backlogs, as opposed to later alteration. Examples of canal components within the Paw Paw landscape showing degraded or failed stone masonry

[73] As a part of seasonal and ongoing accumulation, leaf litter deposits may absorb and hold substantial amounts of moisture against historic masonry, limiting the ongoing ability of joints and surfaces to drain while exacerbating freeze-thaw, granular degradation, and biotic growth.

construction include multiple flume headwalls and spillway apron channels (walls) east of the towpath. These changes undermine, but do not wholly compromise the material integrity of the cultural landscape.

Integrity of Workmanship

Considered through the lens of mid-19th century canal construction technology, integrity of workmanship at Paw Paw encompasses the broad-scale engineering of the canal system and tunnel project, which remains evident in the extant condition and configuration of many designed components, despite the absence of most buildings associated with period construction and lock operations. Overall, this level of workmanship remains apparent, and well-articulated in Paw Paw Hollow, Tunnel Hollow, the tunnel vault, Tunnel Hill (shafts), and Sandy Flat, as well as many of the locks. At a more detailed scale, however, workmanship also entails evidence of skilled craft processes which fabricated and implemented fittings and finishes within the lock systems, such as milled wood facings and iron hardware within lock chambers and gates, most of which are missing or severely degraded. Loss of visible detail in such components at a pedestrian scale poses a concern for integrity of workmanship.

The slopes characterizing the deep cut in Tunnel Hollow have a history of instability, exacerbated by drilling and excavation during the period of significance. As a result, the profile and texture of various surfaces here have long remained in flux, experiencing repeated cycles of rockfall, stabilization, repair, and related changes as early as 1857. Subsequent and cumulative alterations to towpath profile, boardwalk, and deep cut, defy a clearcut sense of integrity at a detailed scale. These changes must be evaluated in the overall, functional context of tunnel development and operation; "workmanship" in this sense may be understood as the ongoing, periodic modification of Tunnel Hollow slopes flanking Mill Run. Recent NPS efforts to ensure sensitive stabilization measures are demonstrative here, as evident in the tinting of concrete

shear keys to minimize visual impact on integrity of feeling and design and to help retain integrity in a challenging environment.

Integrity of Feeling

Owing to successional growth and deferred maintenance of contributing features, decreased legibility now influences substantial areas of the cultural landscape. In many places canal infill continues to foster colonization by canopy and understory vegetation growth, in turn occluding or undermining canal features, such as lock structure masonry and quarry cuts. In this context, successional growth is understood as a challenge intrinsic to such extensive parkland and remains a notable source of deferred maintenance. Left untreated, the trajectory of vegetation change may result in loss of historic integrity and continue to limit the interpretive value of some associated features. There remains a lasting tension between the role of vegetation in accelerating, buffering, or slowing change among historic resources at Paw Paw.

This underscores the pattern of abandonment and decline which emerged at Paw Paw by 1924, following the closure of commercial operations in the wake of severe floods (and despite successive and ongoing NPS efforts to preserve the tunnel and other character-defining features). Although the same pattern undermines a lasting sense of the space as a contiguous waterway and active system, Park management of the towpath for contemporary, compatible recreation use sustains the legibility of this route in tandem with the canal prism alignment.

Loss of numerous buildings and structures at Paw Paw should be noted among considerations of condition and integrity. In particular, no lockhouses remain extant within the cultural landscape, while the Carpenter's Shop at Lock 66, watch boxes, and other small

frame structures have also been lost.[74] The Superintendent's House, located within the present-day Paw Paw Campground, remains an exception, although its current condition is a matter of concern. Archeological efforts remain an ongoing source of potential knowledge about the configuration, function, and condition of former structures, despite the limitations posed by ephemeral land uses and construction methods associated with construction labor housing and work sites during the period of significance. Ultimately, the loss of many buildings complicates the legibility of the cultural landscape at a human scale and poses challenges to the integrity of materials, workmanship, and feeling.

The canal system retains sufficient legibility to communicate its historic character, including site topography and views and vistas which serve to link Paw Paw Hollow, Tunnel Hill, Tunnel Hollow, and Paw Paw Bends. The orientation of lift lock systems, wasteweir, and culvert along the historic canal and towpath remains fundamentally oriented within Mill Run and the physical sequence and local scale of canal navigation. Although the towpath embankment and surface profile has been repeatedly altered (and may not retain historic integrity on its own), its overall alignment remains closely linked with the spatial organization of associated features. This in turn, underpins NPS management of the towpath as a contiguous, fundamental resource within the Park. The setting has remained largely rural in geography, terrain, and land cover. The cultural landscape retains overall integrity of location, design, setting, materials, workmanship, feeling, and association, with regard to the development of the tunnel and canal works during the period of significance.

[74] The Carpenter's shop is believed to have been damaged by arson after 1950, before its demolition by NPS in 1965. See Boucher, 1960; Hahn, 1985:90.

Overview of Landscape Character Areas

Landscape character areas (LCAs) are oriented with respect to the historic alignment of the towpath and canal prism, organizing site analysis efforts into spatial groupings of features. LCAs are listed from the cultural landscape's southernmost extent, proceeding north. The Paw Paw Tunnel Cultural Landscape's six LCAs include: (1) Section House (Superintendent's House) / Campground; (2) Canal Area South and Paw Paw Hollow; (3) the Tunnel (portal to portal); (4) the Tunnel Hill (above the tunnel), (5) Canal Area North and Tunnel (Athy's) Hollow; and (6) Twigg and Gross Hollow interface with Canal.

Tunnel Hill (above tunnel) and Tunnel landscape character area boundaries overlap at the southern portion of the tunnel. This overlap allows for cultural landscape features associated with the tunnel alignment and hollows, and features above the tunnel, to be analyzed and evaluated separately.

(1) Section House (Superintendent's House)/ Paw Paw Campground

The Section House (Superintendent's House) / Campground landscape character area is approximately 17.32 acres containing Paw Paw Campground, visitor parking area, vehicular site entry road, trail access to Potomac River, towpath, and canal prism. It also contains the viewpoints associated with viewsheds along the Potomac River, toward Paw Paw Bends and downriver.

(2) Canal Area South and Paw Paw Hollow

Canal Area South and Paw Paw Hollow landscape character area begins at the intersection of towpath/canal prism and Highway 51, at mile 156.30, and continues north to mile 155.26, meeting its northern terminus, just south of Paw Paw Tunnel. This LCA is approximately 15.12 acres.

(3) Tunnel (portal to portal);

The Tunnel LCA is approximately 98.08 acres, containing The North and South portals, tunnel interior (vault) including canal prism, tunnel towpath (with retaining wall), timber bumpers, and railing elements.

(4) Tunnel Hill (above the tunnel),

The Tunnel Hill LCA is approximately 101.27 acres consisting of features above (i.e., over) or associated with Paw Paw Tunnel. These features include Tunnel Hill Road, Tunnel Hill Trail, the topography of ridges and ravines, five transit markers, a network of spoils piles, a dry-laid masonry foundation,[75] four vertical shafts, and a stone retaining wall.

(5) Canal Area North and Tunnel (Athy's) Hollow

The Canal Area North and Tunnel Hollow (also known as Athy's Hollow) LCA is approximately 188.33 acres. It extends downstream from the North Portal (Deep Cut) to MM 154. This area includes four of the five lift lock complexes (Lock 62, Lock 63-1/3, Lock 64 1/3, and Lock 66), together with lockhouse foundation ruins, Carpenter Shop ruins, creosote vat; Turnaround Basin, spillway and wasteweir structure; Sandy Flat; MM 155 (historic location); "Slickenslide" area, towpath, boardwalk, collapsed spring houses, minor masonry ruins, and towpath drainage features.

(6) Twigg and Gross Hollow / Canal.

Twigg and Gross Hollow Canal LCA is approximately 88.27 acres, extending from MM 154 north to Lock 61 complex at MM 153.13. Prominent features include Culvert 210, topographic features associated with quarry operations and spoils in Twigg and Gross Hollow, Outdoor Club Road terminus topography, the Gross Hollow drainage alignment, and Lock 61 Complex. Gross Hollow refers to the southern hollow, while Twigg Hollow is the northern of the two primary drainages west of the canal prism and towpath.

[75] Not yet formally documented by NPS, but considered an associated feature.

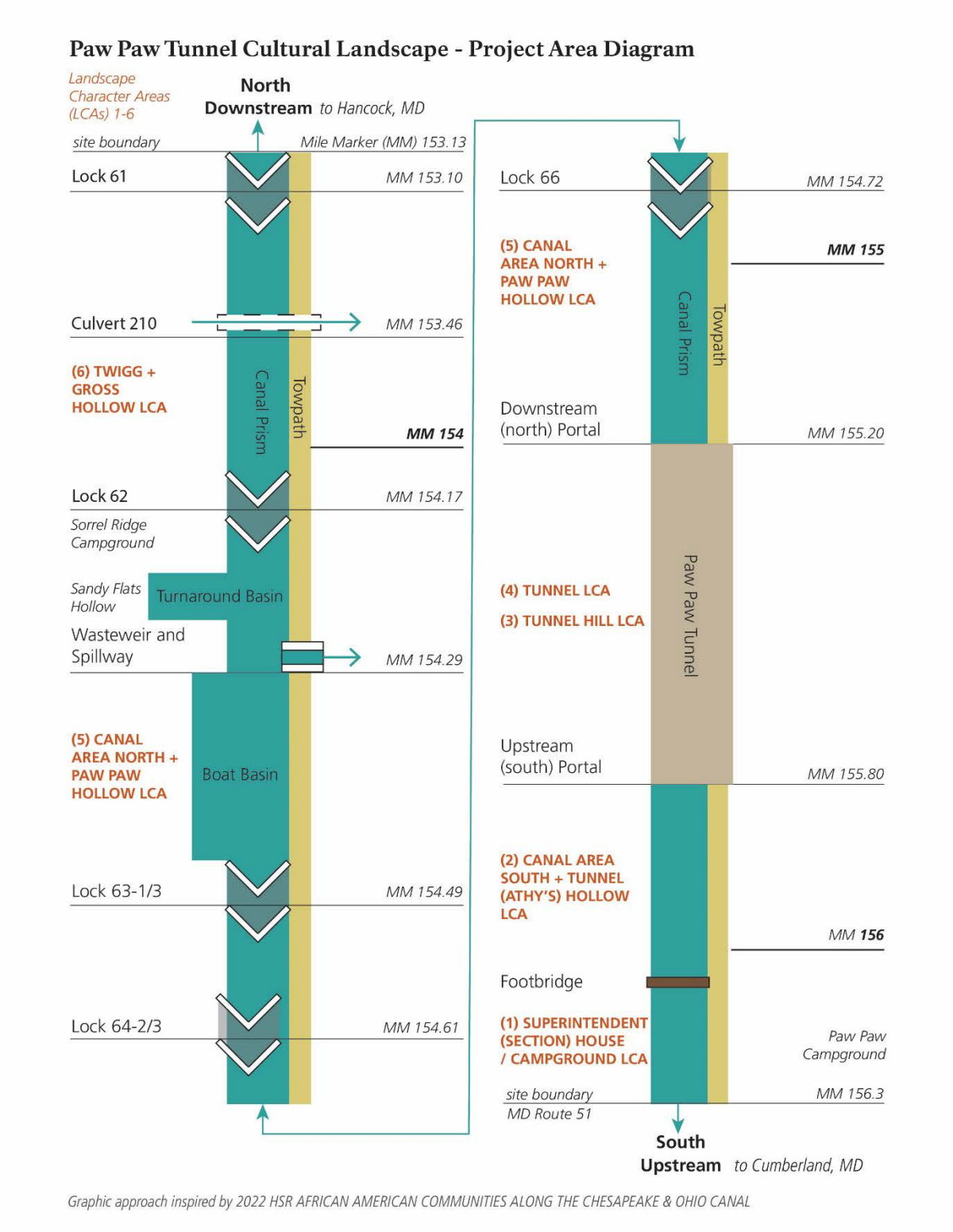


Figure 43. Paw Paw Tunnel Project Area Diagram (UO-CLRG, 2023)

Landscape Characteristics and Features

This section presents an analysis of landscape characteristics and their associated features and corresponding Cultural Resources Inventory System-Historic Structure (CRIS-HS) names and numbers, where applicable. This discussion also evaluates whether or not a particular feature contributes to the property's National Register eligibility within the period of significance (1828–1924), contributes to the property's historic character, or if it is noncontributing, undetermined, or otherwise managed as a cultural resource. If a feature is non-contributing, it is evaluated as "compatible" (visually congruent with the historic character of the landscape) or "incompatible" (visually incongruent with the historic character of the landscape).

The significance of the Paw Paw Tunnel Cultural Landscape is conveyed through several landscape characteristics, including the natural systems and features, spatial organization, cluster arrangement, views and vistas, buildings and structures, circulation, small scale features, and archeological sites. These characteristics continue to retain integrity and convey the significance of the site associated with the development and operation of the C & O Canal system during the period of significance (1828–1924).

Cultural landscape characteristics extend across, and are independent of, Landscape Character Areas (LCAs) designated in the scope of this project. Characteristics support the accepted NPS framework used to assess distinct resources distinguished by type (or category), whereas features are specific, tangible resources within the site. These occur at varying physical or spatial scales, ranging between broad landforms or patterns and discrete objects. In the case of character-defining features such as the canal prism and towpath, features may embody more than one distinct characteristic.

Analysis and Evaluation Summary

Cultural landscape resources present at Paw Paw Tunnel comprise a network of historically significant features, as a logical outgrowth of updated NRHP findings (2015). Cumulatively, these features embody tangible evidence of multiple, varied systems and functions associated with C & O Canal enterprise during the period of significance (1828–1924). As a cultural landscape, Paw Paw Tunnel articulates a distinctive facet of the broader system and extent of the Chesapeake & Ohio Canal National Historical Park. Surviving legibility of canal prism and towpath within the cultural landscape boundary retains Fundamental Resource Values (FRVs) in this locale.[76]

Character-defining features are present among all LCAs, and each are essential to the historical understanding of the canal in the processes and products of canal engineering and labor at Paw Paw. In addition to the engineered structure of Paw Paw Tunnel (with shafts) and adjacent portal cuts, these include overarching circulation, articulated according to alignments of the canal prism and towpath, respectively; topographic relationships among Paw Paw Bends, Tunnel Hill, and Tunnel (Athy's) Hollow; the series of lift locks and associated structures documented within Tunnel Hollow; views between the bank of the Potomac River (at Paw Paw Campground) and the Superintendent's House; and network of features associated with construction land use (quarry and spoils deposition). Numerous smaller-scale elements provide further detail to understand the development and operation of the canal as an engineered system within dynamic conditions.

[76] Fundamental resource values (FVRs) include: historic resources, scenic views ,recreational opportunities, Towpath continuity (alignment), and Interpretation / education opportunities. Additional Resource Values include hydrologic resources including riparian areas (NPS-CHOH Foundation Document, 2013).

Assessed cultural landscape features are discussed in the following sections, divided between overarching and specific features.

Overview of Sitewide Features

The canal prism and towpath both span a variety of cultural landscape characteristics in their space and function. To avoid unnecessary repetition or confusion among successive characteristics and features these are discussed separately below.

Canal Prism (Mile 156.30-153.13), contributing

As a primary component of the C&O Canal transportation system, the canal prism is a key distinguishing feature of the cultural landscape. Cohesively, the canal encompasses multiple landscape processes, both in its designed function as an engineered waterway and as a geographic sequence of development, adaptation, and repair during the period of significance. Since the C&O Canal Company issued contracts to multiple, varied builders in managing the excavation and construction of half-mile-long sections from 1828, in addition to numerous directives in applying design specifications, the physical character of the prism was never originally uniform. Successive flood events and maintenance lapses made it less so, particularly after 1889. Impacts which may have emerged in the wake of severe flood events in 1877, 1889, 1924, 1938, and thereafter, have also affected the stability and legibility of the prism structure, including deposition of sediments and debris, erosion and bank undercuts, environmental changes in local hydrology along slopes above the canal alignment. Repair contracts have been identified as early as 1840 on canal prism materials, both to remediate the effects of unsealed lime sinks and "defective materials."[77] Existing conditions show abundant variations among materials, dimensions, and details present between Lock 61 and Paw Paw Campground, in particular, featuring extensive use of local blue slate in stacked-course and rubble construction.

A basic cross-section of the canal prism helps characterize the components of the prism structure (Figure 44. Basic canal prism layout (diagrammatic section), oriented downstream

[77] Unrau 1974, 52.

(e.g. north). (UO-CLRG 2023)). To accommodate commercial freight navigation outside of locks and diversion points, the canal at Paw Paw was configured to guarantee a self-contained and operable waterway, distinct from the Potomac River or slackwater facilities. To sustain this function, a minimum depth of 5-6 feet was prescribed for contractor, excavated through soil, blue slate, silt, and other strata. The resulting spoils, or excavated materials, were removed by wage laborers with shovels, pry bars, and picks in cart loads, frequently repurposed as low-grade masonry or fill materials in subsequent construction tasks; enslaved laborers may also have been assigned to this workforce.[78] Other loads were deposited in piles within nearby hollows, cuts, or drainages, as was commonplace in the Tunnel Hill ravines (see Topography). This practice reshaped, and has resulted in lasting impacts to, local hydrology and stormwater management at Paw Paw.

One shoulder of the canal alignment was designated and developed as the towpath side, with a surface grade allowing for a 10-12 feet path width. Construction of this "embankment" was prescribed as a minimum elevation of 2.5 feet above water surface, with 1.5 feet elevation over the outer (riverside) bank face.[79] The opposite shoulder of the prism was constructed as a raised berm, where a combination of existing landforms, quarry rock, excavated spoils, and fill soil was used to supplement the grade adjoining the watercourse. Retaining walls were frequently added to further stabilize or reinforce the

[78] Workers may have had access to "Brainard" barrows, forerunner to the modern wheelbarrow. Patented in 1819 and successfully publicized from the following year, this tool increased the maneuverability of small loads, in turn reducing the complexity and labor of earthmoving work requiring cart loads. Contractor returns and correspondence offer little clarity as to whether the mixed workforce tasked with local canal construction included enslaved laborers; both the nature of the effort and the timeframe would suggest it remains possible in Maryland, if not certain. The canal later supported the transportation of enslaved persons, as well as escape route for fugitives.

[79] Unrau 1974. During construction, "embankment" referred to a variety of engineering approaches and materials, encompassing both fill and massed construction, as used among correspondence between C&O directors, engineers, and contractors. Some caution is necessary in adopting this term for purposes of general description.

prism structure and interior surfaces, as Unrau has noted, incorporating variations in masonry construction methods as well as material quality and workmanship.[80] These variations may also reflect the expedient nature of repairs incorporated intermittently, at various points along the Paw Paw stretch of canal, and serve as a reminder that both construction and maintenance of the canal remained a piecemeal affair throughout the lifetime of its operations—including after 1850.

Overarching dimensions intended for the canal prism derived from evolving specifications issued by the C&O boards of directors and engineers:

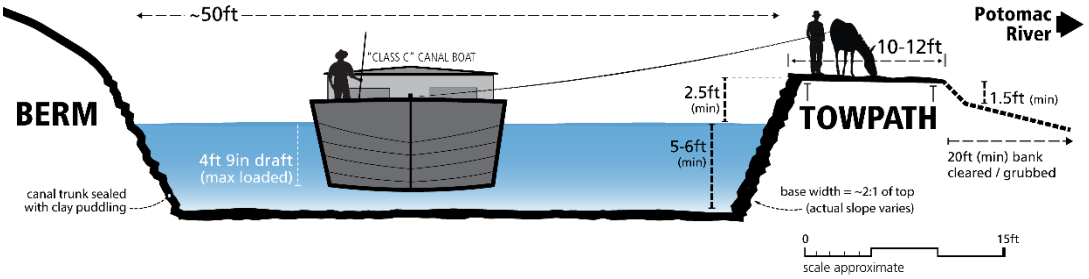


Figure 44. Basic canal prism layout (diagrammatic section), oriented downstream (e.g. north). (UO-CLRG 2023)

1. Banks 2.5 feet [0.61 meter] above water line
2. Bank "backside" (exterior slope) elevated 1.5 feet [0.46 meter] above water line
3. Minimum bank slope of 12 inch rise over 18 inch run [governing ratio of 1:1.5, expanded to 2:1 in 1837 for increased base stability]
4. Outer slopes of towpath bank cleared of vegetation, as well as grubbed of underlying roots, to a minimum distance of 20 feet.
5. Prism interior top width of approximately 50 feet [15.2 meter] [proportional interior floor width]

[80] Unrau 1974, 5.

Distinct from hydraulic lime-mortared masonry walls to buttress some prism areas, it is possible that diluted clay putty mix, or "puddling" was mixed by laborers for the purpose of surfacing the prism interior with a water-tight lining, thus helping to guarantee the water level needed for commercial operation. Following impacts related to decades of floods (events occurring in 1889, 1924, and 1936 are particularly noteworthy), wartime operations, piecemeal or deferred repairs, and eventual neglect, the actual prism section did not consistently retain its intended specifications throughout the cultural landscape. Rather, sedimentation, wind and water erosion, successional vegetation, retention wall failures, soil slump, and rockfall have all contributed to further disparities in prism profile and function (fig. 45). Blasting operations associated with Mission-66 rockfall clearance projects in Paw Paw and Tunnel Hollow may, too, have impacted the disposition of historic structure and profile. In addition, various and cumulative non-historic repairs to towpath structure and grading further altered the profile of the prism (figs. 46-47).[81] Concrete repairs to lock structures within the cultural landscape, made during the period of significance, meanwhile, have reinforced the legibility of canal prism alignment and orientation, as seen at Lock 61 (fig. 48).

Other features, identified within various LCAs, are associated with the canal prism as part of a broader network of stormwater management and flood protection measures. Each are distinct in construction and location, however, and are addressed in their role as Constructed Water Features. These reflect the nature, in part, of surface runoff, seeps, and spring flows draining into the canal's geologic valley, as well as the proximity of the Potomac River.

[81] Among a series of instances in Tunnel Hollow, measures designed to repair and dress the towpath in 1979–1980 included specifications to alter existing shoulder profiles.



Figure 45. Canal prism interior, view downstream (north-northwest)*, near the Superintendent's House. Note understory growth and trees colonizing the canal prism. (UO-CLRG, 2023)*



Figure 46. Canal Prism in Tunnel Hollow "Slickenslide" area, view north*, following recent rockfall mitigation work. Note fresh tailing fragments below towpath embankment. (UO-CLRG, 2023)*



Figure 47. Canal Prism at "Slickenslide" area, view north, near North Portal. Note in-process replacement of the towpath boardwalk, completed thereafter in 2023. (UO-CLRG, 2023)



Figure 48. Canal Prism interior, view northwest, below Lock 62 headwall. (UO-CLRG, 2023)

Canal Towpath (Mile 156.30-153.13), contributing

The towpath is an integral component of the overarching canal structure, embodying the system of mulepower used to propel canal craft and their freight loads. The towpath's alignment parallel to the canal prism, relative elevation above water level, and basic surface width and material composition are each essential to it as a character-defining feature of the cultural landscape. Much like the canal prism, the towpath extends throughout the length of the Paw Paw Tunnel cultural landscape. Within the tunnel approaches, milled timber guard rails are also a defining element during the period of significance; the profile of these rails reflected abrasive wear as an implicit by-product of friction from tow ropes sliding across upper and interior (prism-side) faces and edges.

Ensuring a stable and functional towpath comprised an ongoing and increasingly complex task for C&O operations after opening to commercial traffic. In addition to wartime impacts, deferred maintenance led Company reporting to conclude that little repair or improvement had been accomplished by 1869. An early 1870s inspection of conditions conducted by William R. Hutton advised widespread problems with earth-paved segments of the towpath, including apparent wash-outs, noting at the time how the route "becomes almost impassible [sic]" in periods of rainfall.[82] Hutton also recorded extensive problems associated with maintaining watertight functions in the construction of nearby masonry joints, in turn recommending the use of Portland cement as a repair material.[83] It is not clear whether any such repairs were implemented at Paw Paw outside of lock structures. Surfacing, as well as subsequent repairs, appears to have been developed with crushed and compacted shale material at Paw Paw.

Realistically, as a reflection of the company's declining financial condition by the 1920s, consistent towpath upkeep and repairs probably fell by the wayside prior to abandonment in 1924. Edison Manufacturing Company film footage recorded in 1917, possibly produced by George Kleine, shows the towpath shoulder entering the south tunnel cut colonized by well-established, unidentified grasses and herbaceous vegetation; scree and eroded soils are visible littering much of the boardwalk north of the tunnel, including towpath surface and canal bumpers. It is unlikely that these conditions were redressed prior to the closure of C&O operations, and the end of the period of significance. Similar encroachment, most likely fostered by groundwater seepage and runoff from Tunnel Hill and the windbreak afforded by portal cuts, advanced by 1938 (fig. 49); this growth largely obscured the South Portal towpath from the vantage of the canal prism within Paw Paw Hollow.

[82] Hutton 1872.

[83] Ibid.



Figure 49. Paw Paw Hollow and upstream portal cut, 1938. Verso information incorrectly identifies the subject as the "north entrance;" in fact, this is the South Portal. (NPS-CHOH; image UO-CLRG, 2023)

Early 20th century photography also records shrub-layer vegetation as well established in the tunnel cut, possibly fostered by a decline in towpath use as well as runoff from Tunnel Hill drainages and spring sources above. During the period of significance, various photos recorded evidence of distinct trails established at grade, within the towpath surfaces, through compaction and erosion. While a wider path, approximately 2-3ft, appears to have been associated with mule teams, a second, narrower path at times reflected the movement of mule drivers on foot, outside the bight of the towline (fig. 50). In addition to shaping the profile of the towpath surface over time, this physical evidence reflects a consistent pattern of circulation. This distinction is no longer legible at any point along the C&O Canal towpath, Paw Paw notwithstanding, and should not be mistaken for two-track automotive ruts, associated with more recent maintenance access by NPS vehicles and contractors.

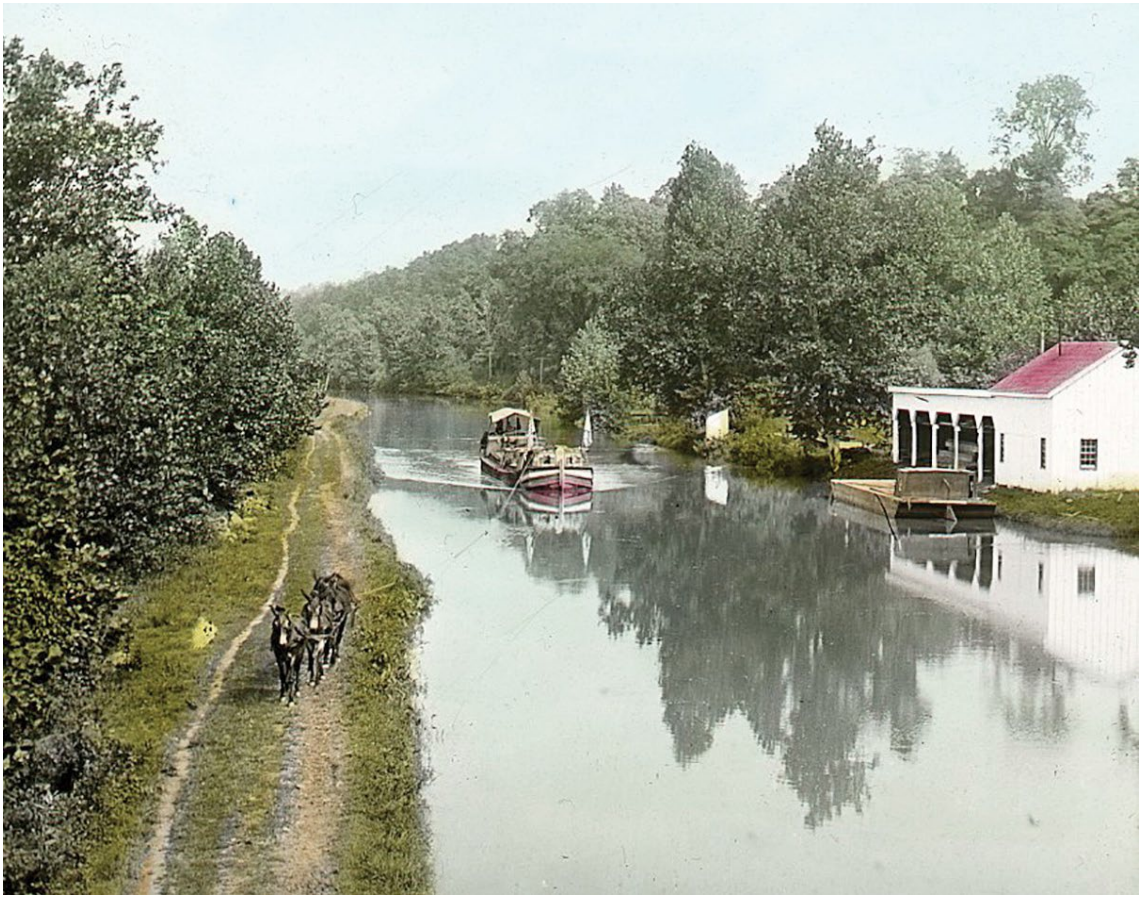


Figure 50. "C&O Canal and towpath below Paw Paw," view upstream, c. 1900, from colorized lantern slide. Surface ruts, distinct for mule team and driver paths, are visible at left, as is crushed shale surfacing material. (The American Surveyor/Spatial Media)

Despite Mission 66-funded attempts to clear, stabilize, and repair the towpath (including masonry retaining walls within the tunnel cuts) along with portal masonry in tunnel hollows in mid-1956, the condition and legibility of the towpath surface appears to have continued to diminish during mid-century NPS tenure. HABS documentation of Paw Paw Tunnel and nearby locks (HABS MD-810), initially conducted by NPS photographer Jack Boucher (1931–2012) in 1960, recorded the further encroachment of vegetation in the towpath and prism, together with erosion of the towpath embankment. Substantial loss of legibility in the period towpath surface is likely since 1980, resulting in a broader uniformity across the surface as recreation uses became a central consideration for resource

managers. Historic surface profiles may survive in varied locations today in the form of one or more subsurface strata, layered beneath crushed shale fill or top-dressed layers.[84]

With extensive contracting work to replace the NPS-era trestle boardwalk and towpath grade currently underway within Tunnel Hollow, the full extent of the towpath remained interrupted from the closed North Portal during 2023 CLR documentation. Recently completed construction reflects a boardwalk design similar in form and structure to at least two previous iterations of NPS-era design; a timber trestle format may have originated in 1966. During scaling and anchoring work within the towpath alignment, contractors partially exposed the upper portion of a wrought-iron spike embedded within the rock grade—quite probably a remnant of canal period construction.

(As of 2023, towpath condition and character are documented at several points in the study area, shown in Figs. 51 through Fig. 54.)

[84] 1979 project records suggest that fill and dress materials used to alter the towpath profile may have been contemporaneous to deposits near the surviving remnants of the Outdoor Club terrace feature, adjoining Twigg Hollow.



Figure 51. Towpath , view north, within Mile 156-157. (UO-CLRG, 2023)



Figure 52. Towpath at footbridge detour, view north, south of Paw Paw Hollow cut and South Portal. (UO-CLRG, 2023)



Figure 53. Towpath, view northwest, from concrete deck above the wasteweir. (UO-CLRG, 2023)



Figure 54. Towpath, view north, at Sorrel Ridge Campground. Note proximity to Potomac River channel, partially visible at center right. (UO-CLRG, 2023)

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Mile 153-154, Canal Prism	Contributing			045704	
Mile 154-155, Canal Prism	Contributing			045704	
Mile 155-156, Canal Prism	Contributing			045706	
Mile 156-157, Canal Prism	Contributing			045708	
Mile 153-154, Towpath	Contributing			045703	
Mile 154-155, Towpath	Contributing			045705	
Mile 155-156, Towpath	Contributing			045707	
Mile 156-157, Towpath	Contributing			045709	

Landscape Characteristic Narratives and Features

Natural Systems and Features

Natural systems and features are the environmental aspects that have influenced the development and physical form of a landscape and include aspects such as the geomorphology, geology, hydrology, ecology, climate, and native vegetation. Each of these aspects have shaped and articulated the landscape over time. In the broadest sense, the terrain and environmental processes of the Allegheny foothills and Paw Paw Bends were integral factors in C&O Canal development, forces affecting its commercial decline and demise, and its management as a system and network of historic features since.

Geology

Contributing natural systems and features to the tunnel cultural landscape include geology and geomorphology of the Tunnel Hill, Paw Paw and Tunnel Hollows, and Mill Run landforms, where elliptical strata of blue slate, soils, and other materials played a direct part in shaping canal excavations and construction.

Hydrology

Potomac River hydrology shaped a primary organizing influence on canal and tunnel location and function, remaining an intrinsic influence on water levels in and around the canal, and ultimately critical in closing the period of significance after repeated floods (notably 1889 and 1924). In addition, hydrology (drainages) of the Tunnel Hill ridges and ravines had an integral role in shaping tunnel development, including those areas and processes altered by excavation spoils deposited into ravines from the tunnel shafts.

Freshwater springs and seeps as a source of ground water certainly played a role in life on the canal, evidenced in the construction of at least two spring houses onsite. These were

apparently known and photographed as a tourist stop by the early 20th century, associated with early recreation along the canal as well as commerce (See fig. 19).

The hydrology of Tunnel Hill, characterized by several ravines which also contain tunnel shaft sites and extensive historic spoils deposition, remains a notable driver among perennial challenges confronting the stability and repair of the tunnel vault itself, together with individual shafts, engineered cuts, portals, interior towpath, and surrounding slopes. While these ravines are intrinsic to the character of the landscape, they should also be understood as a possible source of friction among contemporary Park resource values; protecting existing drainage patterns as a matter of natural resource or typical stormwater management approaches may prove adverse to the historic character of the tunnel. Period land use patterns associated with shaft excavation fundamentally altered these drainages during the period of significance, today a key driver for possible seepage, infiltration, and loading of the tunnel shafts and vault liner.

Native Vegetation

Native vegetation is not considered a contributing element, although conditions recorded in photographs through 1938 suggest that dynamic changes in land cover had occurred at the tunnel portals and Tunnel Hill areas. Early growth canopy appears to have been largely depleted or cleared during C&O local activity on Tunnel Hill and within the canal alignment throughout the landscape. Herbaceous ground covers would likely have colonized embankments well before the end of the period of significance, possibly providing a stabilizing role in disturbed soils, fill, and around lock pits as foot traffic localized or declined. Mule and horse manure may well have been a vector for invasive seed in proximity to towpath areas, in addition to work sites in Tunnel Hollow, on Tunnel Hill, Paw Paw Hollow, Twigg Hollow quarry, and elsewhere.

In addition to riparian plant communities associated with the Potomac River corridor and Sandy Flat wetland context, existing cover within the cultural landscape is broadly characterized by hardwood canopy. Notable plant communities assessed at Paw Paw include Oak-Hickory Forest and Shale Barren Woodland, distinctive in fostering chestnut oak (*Quercus montana*), Virginia pine (*Pinus virginiana*), pignut hickory (*Carya glabra*), and eastern red cedar (*Juniperus virginiana*) among sparse understory and endemic herbaceous cover. While ecologically important in makeup and function, these native plant communities contribute to the cultural landscape in retaining distinct contrast among canopy massing, particularly apparent in the slopes adjacent to Paw Paw Bends; the same visual contrast continues to highlight the massing and elevation of Tunnel Hill which confronted the hundreds of wage laborers, contractors, and company engineers at Paw Paw from 1835.

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
GEOLOGY:					
Tunnel Hill	Contributing				
Tunnel Hollow	Contributing				
Paw Paw Hollow	Contributing				
Mill Run	Contributing				
HYDROLOGY:					
Potomac River (Potomac Bends)	Contributing				
Tunnel Hill ridges and ravines	Contributing				
Tunnel Hollow freshwater springs	Contributing				

Spatial Organization

Spatial organization concerns the three-dimensional organization of physical forms and visual associations in the landscape, including the articulation of ground, vertical, and overhead planes that define and create space. Overarching spatial organization of the canal system at Paw Paw is primarily related to the existing orientation of Athy's (Tunnel) Hollow, a highly modified Potomac drainage; elevation gain of Tunnel Hill, including the location and upland terrain of the Paw Paw Bends area; 'deep cuts' adjoining the North and South tunnel ends, including the portal areas; Sandy Flat Hollow; and the compass-derived transit lines surveyed for the tunnel construction from 1835.

The canal prism and towpath comprise essential contributing features for circulation and are character-defining for the cultural landscape as a whole. Although the site boundaries do not fully encapsulate these in extent, as part of a substantially larger, 184.5-mile system, the prism and towpath both articulate fundamental and legible functions of how working spaces were organized for C&O canal planning, engineering and construction, and commercial use through 1924. In effect, the canal alignment at Paw Paw illustrated where the watercourse deviated from the Potomac as a distance- and cost-saving bypass route, before rejoining its contour downstream. Spatial organization here encompassed both organization of distance and elevation, in ordering the sequencing of locks, wastewater and stormwater management, mile points and freight travel rates, and canal section units (i.e., 299-311).

The engineered cuts and portals also contribute to the organization of space. Historically as well as today, they function as large-scale, wayfinding points in the canal sequence for navigation. During the period of significance, the cuts and portals also provided an inherent demarcation point in tunnel construction progress. Between portals, managed as a unique component of system development, the tunnel remained a distinct zone within the canal as a whole. Narrowing to the fully enclosed, single-width tunnel passage, tunnel cuts

marked the transitional zones where two-way traffic gave way to one-way navigation. For upstream traffic, this area also required a change of course as the canal alignment below the tunnel angled eastward, today visible in the orientation of the towpath retaining wall outside South Portal in the Paw Paw Hollow cut.

The basin at Sandy Flat contributes to the spatial organization of the landscape as a water feature which organized the movement and orientation of canal boat traffic. As a hydrologic feature adopted to help facilitate or impound the order and direction of travel among individual boats, this area provided an alternative to the comparatively tight confines of the canal prism closer to (and within) the tunnel. The feature also supported the management of water levels in selected portions of the canal system, providing potential catchment and short-term storage options for responding to quick-runoff stormwater scenarios.

At a smaller internal scale, space is organized in the configuration of individual locks. Each lock within the cultural landscape can be understood as a complex of features, together shaping the layout, function, and workflow of operating the canal in microcosm. Features which contribute to spatial organization of each lock include the head and tail gates, bypass flume, watch box sites, one or more snubbing post holes, foundations and remnants, and the topographic attributes which still help articulate these as distinct historic elements. All locks retain integrity of spatial organization within the canal alignment, although encroaching non-historic vegetation (primarily understory or shrub-layer, along with deciduous canopy in some places) continues to affect the condition and legibility of these configurations.

Paw Paw Campground, while not contributing to period operations as a recreation resource, does include contributing features of the cultural landscape in spatial organization. Here, the location and orientation of the Superintendent's House, together

with at least one historic road trace and areas potentially associated with brickmaking or material sourcing, contribute to the spatial organization of the canal, towpath, and Paw Paw Hollow, south of the tunnel (fig. 55). The existing border of the campground to the north and west, defined largely by the contrast between mown turf cover and dense, mixed understory shrub, does not likely reflect period organization of the space.



Figure 55. Paw Paw Hollow, view north, toward tunnel and towpath retaining wall. (UO-CLRG, 2023)



Figure 56. Tunnel Hollow, view south, including downstream (North) tunnel portal and boardwalk section of the towpath under construction. (UO-CLRG, 2023)

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Tunnel Hill / Sorrel Ridge	Contributing				
Paw Paw Bends	Contributing				
North Portal cut (Tunnel Hollow)	Contributing				
South Portal cut (Paw Paw Hollow)	Contributing				
Canal prism	Contributing				
Towpath	Contributing				
Tunnel alignment (vault)	Contributing				
Lock sites (61-66)	Contributing				

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Sandy Flat Basin	Contributing				
Superintendent's House site	Contributing				
Paw Paw Campground (and parking area)	Non Contributing				
Sorrel Ridge Campground	Non Contributing				

Topography

Topography is the three-dimensional configuration of the landscape surface characterized by features (such as slope and articulation) and orientation (such as elevation and solar aspect).

LiDAR imaging of the Paw Paw Tunnel landscape is replete with numerous canal-associated topographic features. Topographic alterations to the cultural landscape have occurred at multiple locations and scales, contributing to its historic significance. Contributing features include substantial, engineered cuts made both in Paw Paw and Athy's (Tunnel) Hollows beginning in 1836, ultimately shaping portal construction and watercourse alignment for tunnel passage. Spoils depositions in the drainages of Tunnel Hill also contribute to the cultural landscape, reflecting period working methods by contractors and their wage employees, and are fundamentally linked with long-term consequences of runoff into the tunnel cuts and hollows.

Athy's (Tunnel) Hollow retains contributing topography, as its overall shape and environmental conditions offered a desirable and practical alignment and elevation for

extending the canal bypass north of the tunnel site, between two ridgelines. Morris's 1835 tunnel survey is predicated on this alignment, evident in extant topography today as well as the magnetic transit (survey line) used to orient the tunnel itself.

Excavation of the canal prism, lock "pits" (chambers), and other associated infrastructure resulted in legible and lasting linear landforms, including embankments and engineered slopes. Borrow pits, spoils piles, terraces, or quarry cuts, such as those made at Twigg Hollow, lend shape and location to the methods used to extract building and repair materials, including varied sandstone and crushed shale. At a smaller scale in several locations along the locks, the foundation remnants of lock keepers' houses and other buildings and structures also retain topographic qualities.

Historic and non-historic topographic changes resulting from rockfall remain interwoven at Paw Paw, and were documented as early as November 1857, the following spring, and again in 1889 affecting the Deep Cut area, each closing canal traffic.[85] These include slopes and faces affected by successive rock slides within the Tunnel Hollow and "Slickenslide" area, as recent as 2016. These surfaces and slopes have been extensively and repeatedly modified, initially during a period between 1836 and 1850 as an integral part of the contributing tunnel engineering, consistent with period hand drilling and blasting techniques, and since; opening and destabilizing the curving rock profile (syncline and anticline) remains a long-term and problematic driver in multiple rock slides onto the canal and towpath alignment. Despite this, Paw Paw retains its integrity of topography. Non-contributing topography includes non-compatible, contemporary NPS spoils deposits, such

[85] Unrau, "Commerce on the C&O Canal" (1974), 466, 495.

as Gross and Twigg Hollows, adjacent to the Outdoor Club Road terminus, which may date to 1979–1980 or 1990s rockfall cleanup projects.[86]

Earthen Mound, Contributing

A mound is located approximately 50 feet west of Section House and 30 feet east of the Towpath (MM 156-157) in the Paw Paw Campground. The footprint of this rounded feature measures approximately 55-60 feet (16.8-18.3 meters) in diameter above grade and is maintained by mowing (fig. 57). Its development may be associated with brickmaking, kiln firing (brick clamp), or sorting operations, possibly contemporary with implementation of a brick machine by tunnel contractor Lee Montgomery during tunnel vault construction.[87] The material of the mound is undetermined, as no archeological testing has been conducted to identify the material contents. It is also possible for the mound to have comprised a stock piling or loading location for finished bricks, based less on its proximity to the building than to the towpath leading to Paw Paw Hollow.[88]

[86] Examination of spoils materials suggests the possibility that these deposits resulted from earlier, Mission 66-era stabilization projects prior to 1967, which utilized pneumatic drilling and blasting techniques.

[87] Mechanized techniques for brickmaking during this period would have focused primarily on either molding unfired clay-sand mixtures, which did not entirely eliminate wastage. Consistent with instances of period brick visible in the tunnel vault, Montgomery's machine was most likely a variant of hand- or horse-driven designs introduced in the northeast by Nathaniel Adams or Samuel Fox by 1840.

[88] This interpretation is derived from common working practices associated with this type of land use, rather than specific archival records. Prior to mid-century campground development, the relatively flat plane of the surrounding river terrace, south of Tunnel Hill, may likewise be associated with brickmaking land uses, such as clay extraction, drying, or kiln construction and firing.



Figure 57. Earthen mound, view southwests, within mown turf cover at Paw Paw Campground. (UO-CLRG, 2023)

Depression, Undetermined

A distinctive depression is located west of the Towpath (MM 156-157) and the canal prism. The depression's historic association and use remains unclear. Examination of this feature during leaf-out conditions in 2023 did not reveal diagnostic detail beyond existing NPS-CHOH archeological survey findings. Although the evidence is not conclusive, the depression's basic physical scale and proximity to the canal prism seem consistent with period land use patterns associated with canal development. Current conditions indicate that native and invasive cover is colonizing the soil surface within the feature, continuing to alter its legibility (fig. 58).



Figure 58. Surface depression, located west of Towpath. (UO-CLRG, 2023)

"Slickenslide" Area of Towpath, Contributing

The "slickenslide" area is a rock formation, distinct in its exposed surface plane, located along the towpath at the North Portal. This feature comprises much of the ravine slope adjacent to the canal prism. From the portal cut, this area extends approximately 800 feet north along the towpath (fig. 59). The "slickenslide" was heavily adapted during tunnel construction, resulting in cuts into and across the natural stratigraphy of the slate, leading to ongoing destabilization of the rockface, propelled by freeze thaw cycles. This slope has been repeatedly modified since the period of significance as part of efforts to stabilize and mitigate rockfall, yet retains its overall form and legibility within Tunnel Hollow topography.



Figure 59. "Slickenslide" area within Tunnel Hollow, view northwest, *as seen from Tunnel Hill overlooking the North Portal cut. (UO-CLRG, 2023)*

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Earthen Mound	Contributing				
"Slickenslide" Area of Towpath	Contributing		"Slickenslide" Area of Towpath	045632	
Depression	Undetermined				

Vegetation

Vegetation includes deciduous and evergreen trees, shrubs, vines, groundcovers, and herbaceous plants and plant communities, whether indigenous or introduced in the landscape. While human changes to native canopy at Paw Paw probably occurred during the period of significance, this appears to have remained exclusive to site clearing, grubbing of the embankment, and harvesting trees for local construction or fuels use. While intentional planting is not known to have occurred, it is possible, however, that small subsistence gardens were established and maintained by laborers or lock keepers as a matter of course.

Eastern Red Cedar at Superintendent's House, Undetermined

A mature red cedar (*Juniperus virginiana*) is located approximately 28 feet (8.5 meters) west of the Section House and approximately 60 feet southwest of the Mound. This mature cedar is recorded in HABS photographs of the Section House by Jack Boucher (figs. 60-61). Based on its size and form, this evergreen was likely present in 1924.



Figure 60. Mature red cedar established west of Superintendent's House, view northwest. (excerpted from HABS MD-807, 1966; LoC LCCN md0964)



Figure 61. Red cedar established west of Superintendent's House, view southwest. (UO-CLRG, 2023)

Mature Trees at Paw Paw Campground, Non-contributing

Sixteen mature deciduous trees are located within Paw Paw Campground. These include four pin oaks (*Quercus palustris*), one red maple (*Acer rubrum*), two American sycamores (*Platanus occidentalis*), seven black walnuts (*Juglans nigra*), one green ash (*Fraxinus pennsylvanica*) and one yellow [tulip] poplar (*Liriodendron tulipifera).* All sixteen trees are located within the Paw Paw Campground lawn area and provide shade for several campsites. Four pin oaks and a maple tree form a row flanking the western side of the campground, adjacent to Camping sites 1-5. One large sycamore is established centrally between the two rows of campsites, south-southeast of the Superintendent's (Section) House; where this tree serves as a prominent visual anchor (fig. 62). The sycamore is located south of campsite 1, north of Paw Paw parking area. The seven black walnut trees are grouped east- southeast of the Superintendent's House, at the northwestern corner of the campground; these trees surround the canoe launch (river) access path, adjacent to the Potomac River.



Figure 62. Mature deciduous canopy trees at Paw Paw Campground, view north. An American sycamore is distinctive here (center), though not a historic feature. (UO-CLRG, 2023)

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Eastern Red Cedar (Superintendent's House site)	Undetermined				
Mature Trees at Paw Paw Campground	Non-contributing				

Circulation

Circulation features that contribute to the cultural landscape include the canal prism, the canal towpath alignment, and the road trace west of the Superintendent's House. Non-contributing elements include the trail to the riverbank and canoe launch from Paw Paw campground; and contemporary social trails associated with lock complexes, such as the eroded social trail extending west onto the berm side slope at Lock 62, immediately adjacent to the flume channel and retaining wall. Tunnel Hill Road and Tunnel Hill Trail (overall alignments only) are both contributing features.

Tunnel Hill Road comprises an unimproved road alignment, following a historic footprint over the Tunnel Hill landmass with access to Tunnel Hollow. The road footprint is apparent in various locations through surface materials, soil compaction, and changes in elevation profile relative to the surrounding slope. A portion of the road stretches 3,000 feet from Malcolm Road to the intersection of Tunnel Hill Road and Tunnel Hill Trail. The road existed since the outset of tunnel construction in 1836, although the likelihood of numerous changes, including grading and non-historic improvements, suggests that this feature now contributes largely as a function of its alignment.

Multiple, steep switchbacks within the road alignment have experienced undercutting, as well as cumulative surface impacts which may be related to runoff and regular recent use by work vehicles. Evidence of a dry-laid stone retaining wall, visible beneath the existing road surface from the slope below, was still apparent in Spring 2023. Surface protection measures for this wall, provided by repair contractors, appeared poorly implemented. This feature has not yet been formally assessed or determined as individually significant according to NRHP evaluation.

Tunnel Hill Trail stretches 4,300 feet along a south alignment from the intersection with the towpath, varying in width between 6.5 and 14 feet (1.9 – 4.2 meters). Overall trail length measures approximately 2 mile (3.2 kilometers), and appears to have expanded in width over time at a variety of locations along this alignment; like Tunnel Hill Road, this circulation feature appears to have experienced repeated changes over time. This feature has not been determined as individually significant according to NRHP evaluation, although future investigation may confirm it as a contributing element within the Paw Paw Tunnel cultural landscape.

River Access Path (canoe launch access path) at Paw Paw Campground, undetermined

An informal trail connects the campgrounds lawn east of the section house to the shores of the Potomac River (fig. 63). This semi-linear trail follows the axis of a large topographic cut into the shoreline and is used for recreational river access (fig. 64). The topographic cut appears to have originated mid-century, as part of private commercial campground and recreational development, rather than period use; the cut appears to bisect an older shoreline brick dump (i.e., discarded clinker or damaged brick, a probable byproduct of brickmaking operations).



Figure 64. Canoe launch access path at Paw Paw Campground, view east. (UO-CLRG, 2023)



Figure 63. Canoe launch access path, view west, viewed from the Potomac River. (UO-CLRG, 2023)

Paw Paw Tunnel Towpath access trail, Non contributing

A 150-foot-long trail connects the Paw Paw tunnel parking area and towpath. The trail proceeds southwest and curves northwest to join the towpath. The trail widens below the towpath and expanding from approximately 3 to 10 feet (0.9-3 meters) wide. The trail accommodates pedestrian and vehicular access for maintenance and construction uses (fig. 65) and is surfaced with gravel.



Figure 65. Temporary towpath detour trail, view southwest, constructed to facilitate construction access, decommissioned following rockfall mitigation. (UO-CLRG, 2023)



Figure 66. Towpath access trail, view northeast, extending along north side of parking bollards. (UO-CLRG, 2023)

Tunnel Hill Trail, Contributing

Tunnel Hill Trail, also commonly referred to as "Tunnel Bypass Trail" or "Paw Paw Trail" extends approximately 1.87 miles (3 kilometers) long from Paw Paw Hollow. From this trailhead east of the tunnel approach, the trail forks from the towpath, approximately 150 feet (45.7 meters) south of the upstream (South) tunnel portal (fig. 67). Two switchbacks cross over the southern extent of the tunnel before proceeding northeast to join the towpath 0.5 miles north of the downstream (North) tunnel portal. The northern half of Tunnel Hill Trail overlaps with the historic Tunnel Hill Road alignment.



Figure 67. Tunnel Hill Trailhead, view north, forking east from towpath alignment (center) and non-historic canal prism access ramp (left). South Portal is visible within Paw Paw Hollow (rear). (UO-CLRG, 2023)

Tunnel Hill Road, Contributing

Approximately 1.58 miles (2.54 kilometers) of Tunnel Hill Road is contained within the project area. This segment runs parallel to Tunnel Hill Trail for half a mile along a ridge (fig. 68), before converging with Tunnel Hill Trail. The roadbed is approximately 10-12 feet (3-3.6 meters) wide. The Tunnel Hill Road alignment appears on topographic maps from late 1800s and early 1900s. This road alignment may have been constructed to provide access to domestic sites adjacent to the tunnel or for use by either the Baltimore and Ohio Railroad or the Western Maryland Railroad, supporting construction work in 1903–1906.



Figure 68. Tunnel Hill Road, view southwest, near east side of Tunnel Hill. (UO-CLRG, 2023)

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Tunnel Hill Road	Contributing				
Tunnel Hill Trail	Contributing				
Paw Paw Tunnel Towpath access trail	Non Contributing				
River Access Path at Paw Paw Campground	Undetermined				

Buildings and Structures[89]

Within the NPS cultural landscape framework, buildings are understood as landscape elements primarily constructed for sheltering any form of human activity, while structures are functional elements constructed for purposes other than sheltering human activity. In several instances, structures identified at Paw Paw are remnant features of buildings which existed between 1836 and 1924, including foundations, retaining walls, and a creosote vat. In the course of NPS management since 1938, these elements have also been investigated in the context of historic structures and archeology. A table of contributing features are listed at the end of this section.

Section / Superintendent's House, Contributing

The Paw Paw Superintendent's House was built in 1850 and served as the residence of the section superintendent from the construction of the canal until the close of commercial navigation on the canal in 1924 (fig. 69). It is a two-story, L-shaped frame structure with a brick foundation, located near the north end of the NPS-era Paw Paw Campground. Damage to the wood cladding near the sill is now extensive, while all window and door voids (fenestration) have been boarded to prevent unauthorized access. Porches, trim, and related materials are now missing, although the building does retain its historic orientation, overall massing, and open setting. The sealed masonry well is associated with this feature, as well as one or more mature cedar trees.

[89] Feature descriptions were initially drafted by NPS-CHOH cultural resources staff as a part of the June 2020 Environmental Assessment, "Improve Visitor Safety and Mitigate Rockfall Hazards in the Paw Paw Tunnel Hollow Chesapeake & Ohio Canal National Historical Park," adapted slightly here.



Figure 69. Superintendent's House, view southwest, as photographed by Jack Boucher. (HABS MD-807-3, 1966)



Figure 70. Superintendent's House, view southwest. (UO-CLRG, 2023)



Figure 71. Superintendent's House, view north-northeast. (UO-CLRG, 2023)

Milled Wooden Footbridge, Non-contributing

A Wooden Footbridge crosses the canal prism at MM 155.9 from the towpath surface, approximately 4,500 feet (1,371 meters) south of the upstream (South) portal. This footbridge is a contemporary addition installed by NPS in 2017, to provide alternate access to Tunnel Hill Trail from the towpath for hikers and cyclists (fig. 72). In June of 2023, this route was active as a detour during construction and stabilization projects. While it served to limit impacts within this portion of the canal interior, this alignment has also become a driver for surface erosion (partially addressed through crushed-gravel surfacing) across the berm-side canal shoulder, south of Paw Paw Hollow.



Figure 72. Non-historic wooden footbridge, view northwest, established across canal prism by NPS as part of tunnel bypass detour route. (UO-CLRG, 2023)

Brick Retaining Wall (South Portal), Contributing

The brick wall flanking the east side of the canal prism retains the towpath structure within the Paw Paw Hollow cut, including where the canal course turns eastward to meet the historic tunnel alignment (fig. 73). Sawn timber bumpers are mounted horizontally at gunwale height, and historically afforded a measure of protection to towpath masonry surfaces and joinery as the navigable canal width narrows; existing timber materials comprise a more recent, compatible, replacement, as seen in the size of saw kerf marks and relatively un-oxidized sawn faces of the timbers. Period surfaces and materials are still visible in lower brick courses and mortar joints below the timber bumpers (see fig. 75), although much of the retaining wall appears to date to Mission 66-era construction. Here, brick profiles differ somewhat in dimension and hardness, as well as patterning of mineral efflorescence due to extended exposure to moisture.



Figure 73. Brick retaining wall, view north, within the tunnel approach in Paw Paw Hollow. Period, common-bond brick construction is visible below the timber bumper (right), while courses of later repairs are apparent above (i.e. stretcher bond). Temporary pump equipment is associated with contracted repair efforts, and are not a part of the historic setting. (UO-CLRG, 2023)

Vegetation encroachment is apparent along the upper, horizontal surfaces of this feature, including fern, herbaceous cover, and grasses. In addition, the root structures and associated soils accumulated here retain runoff, resulting in lingering moisture which stresses feature materials. Along the most acute angle of the tunnel cut approach, brick courses have begun to crack, suggesting a shift in expansion or additional pressure from subsurface drainage or encroachment (fig. 74). The foundation of this retaining wall has also become undercut near this point, resulting in a void approximately 4 to 6 feet (1.2-1.8

meters) long and several courses deep where bricks and joints have failed structurally. Areas of the retaining wall may also have been parged at some point, although the precise makeup of this coating is unclear.



Figure 74. Brick retaining wall, view east, where the towpath alignment changes on approach to the Paw Paw Hollow tunnel cut (South Portal). Note continued loss of historic header and stretcher brick (lower left), along with cracking of wall surface masonry within at least 15 courses (right). (UO-CLRG, 2023)

Timber Bumpers (see also South Portal cut / Paw Paw Hollow), Contributing

Sawn timber bumpers are mounted alongside the canal prism at the north portal, and measure approximately 6 x 12 inch (full dimension) timber, butted to an additional 2 x 8 inch plank along its exterior face (i.e., canal prism-side). The condition of the east side bumpers are good to fair (fig. 75); however, a segment of the bumper is both degraded and largely missing along the outer edge. The timber bumper on the west side is in poor condition, and at risk of structural failure due to extensive biological growth, apparent rot,

and accumulated soils and litter retaining water along its upper surface. Despite existing conditions and previous repaired or replaced materials, these elements contribute to the significance of the site, reflecting distinct elements of tunnel engineering and canal operations during the period of significance.



Figure 75. Timber bumper components, detail view, showing desiccated and rotted end-grain, at North portal (i.e. berm-side wall). (UO-CLRG, 2023)

Upstream Portal of Paw Paw Tunnel (South), Contributing

Integral in the construction of Paw Paw Tunnel, the South Portal is a highly recognizable and historic engineered feature in the landscape. Together with North Portal, this feature has become emblematic of the tunnel structure (fig. 76). Its material components have been assessed previously in the context of the tunnel's Historic Structures Report research (1963–65) and has undergone multiple repairs in its cut-stone masonry structure. The basic

construction consists of coursed, scabbled stone block masonry, a ringed and keyed arch, and flanking wing-walls (with cornices configured as stairs) to retain each side of the tunnel near grade. Ring stones and keystones are dressed, with the key featuring the inscription "C.B. Fisk, Engineer."[90] A piped drainage system may have been incorporated into the Portal headwall and towpath as early as 1956, or possibly within the context of stabilization projects planned from 1976, although the precise extent and makeup remains difficult to confirm. Like the North Portal, this feature remains a character-defining feature for the cultural landscape as a whole and continues to serve as an essential wayfinding point for Park visitors.

Vegetation has begun to re-colonize dressed surfaces and bed joints of the portal headwall, including both understory species and mosses, symptomatic of high levels of seasonal moisture from storm runoff and possible groundwater sources. Mortar degradation and loss along portal courses facing the flanking steps has become apparent in several places (two distinct periods of mortar construction or repair are visible). Leaf litter, duff, and soils have built up above and behind the portal cornice, potentially altering the grade and amplifying the several hazards associated with pedestrian access to this area; this material may also be retaining standing moisture in wetter months as it accumulates and does not appear to drain readily at present. In wet conditions, the steps (stepped quarry block) are hazardous for pedestrian access, despite their popularity among visitors.

[90] A.W. Franzen suggested that this keystone (or that over North Portal) may have been hollowed out, a common commemorative practice to store dedication memorabilia. This possibility remains unexamined. Franzen, 1965, *Historic Structures Report, Part I: Architectural Data Section on the Paw Paw Tunnel, C & O Canal National Monument* (Philadelphia, PA: NPS Eastern Office, Design and Construction, Division of Architecture), 5.



Figure 76. South portal, view north, as seen from canal prism. Note encroaching understory vegetation on portal masonry surfaces, including ferns, mosses, and trees. (UO-CLRG, 2023)

Paw Paw Tunnel, Contributing

Paw Paw Tunnel extends 3,118 feet (950.3 meters) in length, oriented roughly north-to-south, with the northern portal oriented downstream into the alignment of Tunnel Hollow. Dressed-block masonry portals (formalized headwall systems) support each entrance (portal) while the arched interior tunnel vault itself is lined in brick. Integral to the tunnel structure are two pairs of shafts drilled vertically downward from ravine floors on Tunnel Hill, used to orient and expand drilling faces in the tunnel alignment, together with ventilation and spoils removal. With tunnel completion, each shaft was capped and sealed

by the vault liner in 1850–1851. Stability and continued preservation for all shafts is fundamentally intertwined with that of the tunnel vault itself.

The elevated towpath grade, parallel and adjacent to the canal prism in the tunnel, rests on an intentionally unexcavated stone bench faced with brick and timber, and initially designated by period engineers as a "projecting towpath." Long cuts excavated to the north and south of the tunnel, to accommodate the canal where the surface grade was not yet elevated to necessitate tunneling. The northern cut extends approximately 1,000 feet (304.8 meters) long while the southern cut is about 200 feet (60.9 meters) long; the depths of the cuts vary, but in some areas reach over 100 feet (30.5 meters) in depth.



Figure 77. Paw Paw Tunnel interior, view south-southwest, from Downstream (North) portal. Note distinctive rail and bumper construction, as well as extensive areas of efflorenscence on brick vault liner (right, above) and on towpath retaining wall (left). (UO-CLRG, 2023)

Downstream Portal of Paw Paw Tunnel (North), Contributing

The downstream portal is oriented into the Tunnel Hollow deep cut. This point served as a control checkpoint for canal traffic moving toward the tunnel passage from Lock 66 after 1850, as well as a point of distance for the calculation of canal rates by 1857. The structure was keyed into the brick courses of the tunnel vault lining, lending both tensile strength and a transition between material surfaces in the tunnel. This portal also dictated where the tunnel could be closed to traffic or drained for maintenance; its arch structure retains hardware from the pintle-mounted derrick which could be swung across the canal prism. Surfaces surrounding the portal structure have been repeatedly altered and stabilized, including multiple occasions of substantial rockfall (fig. 78). The North Portal also marks the upstream end of Tunnel (Athy's) Hollow as it exists today.

At present, mortar from non-historic repair work is failing, and is a factor in damage now visible on the portal cornice. Like the South Portal, accumulated debris covers much of the stair space and area behind the headwall, in some cases several inches deep. Biological growth, including unidentified mosses, have begun to colonize the outer faces of many masonry components (fig. 79), likely a result of moist conditions fostered by stormwater runoff from the ravine drainages above and possible groundwater sources.



Figure 78. North Portal, view south-southwest, photographed within the towpath alignment during replacement of the boardwalk structure. Note rock fall netting incorporated with current stabilization measures (upper left), designed to mitigate future rockfall hazards amid freeze-thaw cycles. (UO-CLRG, 2023)



Figure 79. North portal masonry structure, view south-southwest, including berm-side steps (right) and bumper in degraded condition. (UO-CLRG, 2023)

Towpath Boardwalk, Non-contributing (compatible)

The Boardwalk comprises a timber-framed trestle structure extending 750 feet (228.6 meters) north from the North Portal into Tunnel Hollow, parallel to the canal prism. The deck of this linear structure transitions from the towpath surface at grade in the Tunnel Hollow cut, is integrated with an engineered ledge (bulkhead) of bedrock, and transitions again, to the grade of the crushed-shale rubble towpath embankment in Tunnel Hollow.[91] During canal operations, a wooden boardwalk existed in the same footprint as the current boardwalk and served as the towpath. By design, this structure may have been anchored through the use of forged iron pins (resembling a reinforcement bar).

At some point between 1939 and 1955, the degraded remnants of any extant boardwalk were removed and replaced by a causeway of fill and rockfall tailings, probably in the wake of 1924 or 1936 flood impacts; deferred maintenance or simple neglect was most likely influential in its preceding decline. In 1956, NPS removed this fill causeway and reconstructed the wooden boardwalk while performing repairs to the Paw Paw Tunnel. Extensive repairs were evidently conducted by NPS in late 1966, including work on the timber structure and blasting of larger rockfall remnants. In 1976 and 1977, NPS removed 15,000 cubic yards of rockfall from the canal prism and again replaced the boardwalk.

The current, recently replaced, boardwalk structure is assessed as a non-contributing feature with regard to its material structure and details (figs. 80-81), although its alignment, massing, and basic surface elevation are compatible with the continuous towpath grade and alignment within the cultural landscape. Likewise, its use as circulation infrastructure parallel to the canal prism in Tunnel Hollow is consistent with period operations.

[91] The surface of the bedrock grade in the "Slickenslide" area appears to have been altered in the wake of rockfall damage on at least three occasions following the period of significance, including 1956, 1979–80, and 2020–2023.



Figure 80. Posts for timber trestle structure installed, view northeast, as a part of boardwalk replacement in Tunnel Hollow (since completed). (UO-CLRG, 2023)



Figure 81. Replacement towpath boardwalk under construction, view southwest, as seen from dry canal prism. (UO-CLRG, 2023)

Retaining Wall at Tunnel Hill Road, Contributing

A dry laid stone retaining wall is located along Tunnel Hill Road and Trail, east of the Tunnel Hill Road alignment and 0.60 miles (0.96 kilometers) from the Towpath along Tunnel Hill Road. This retaining wall is situated within a drainage ravine at the southernmost edge of a historic spoils pile. This structure is in fair condition. These features appear to be associated with the historic roadbed along the alignment, developed through cut-and-fill construction practices utilizing canal spoils or similar rubble, and features materials and building methods consistent with cost-conscious construction or repair during the period of significance.

In the context of 2023 construction, timber matting and gravel surfacing was laid on the roadbed as a protective measure to limit impacts anticipated from construction vehicle use. Overall, this feature remains relatively stable, in good condition, and continues to serve its historic function as a part of the road alignment, although the exposed outer shoulder of the existing road surface slopes over the wall face at a steep angle; this area may be exposed to seasonal runoff or surface erosion (fig. 82; fig. 85).



Figure 82. Stone retaining wall, view east taken from Tunnel Hill Road, supporting west shoulder of the road alignment. (UO-CLRG, 2023)

Retaining Wall at Tunnel Hill Road switchbacks, Non-contributing

A contemporary stone retaining wall is situated between the towpath and the first switchback of Tunnel Hill Road and Trail (figs. 83-85) west of the Tunnel Hill Road alignment at MM 154.86, on the ravine slope east of the canal alignment. In the early 2020s stone was piled here in slab courses by contractors, as a remedial measure following damage and destabilization of the rock-fill spoils due to equipment operator error. Underlying spoils materials are consistent with those derived from tunnel excavation prior to 1850. Condition of this feature is currently fair, while the quality of construction remains poor, partly on account of the original, crude construction method exacerbated through the lack of a feasible restoration in 2024. Contractors removed the upper course of slab stone during project demobilization at Tunnel Hollow. Erosion remains apparent on the slope beneath, with crushed rock and fragments tumbling down the slope as the wall footing becomes undercut by surface drainage along the slope. This structure is now in poor

condition as a result of incompatible stabilization by contractors, including undercuts apparent along the downslope face, although native vegetation has afforded some measure of soil stability.



Figure 83. View of retaining wall taken from towpath looking up to Tunnel Hill Road and Trail alignment. Note temporary stabilization measures placed on roadbed by contractors to protect historic alignment and material during construction. (UO-CLRG, 2023)



Figure 84. Contemporary retaining wall, detail view, between towpath and Tunnel Hill Road and trail, as seen from the towpath below. (UO-CLRG, 2023)

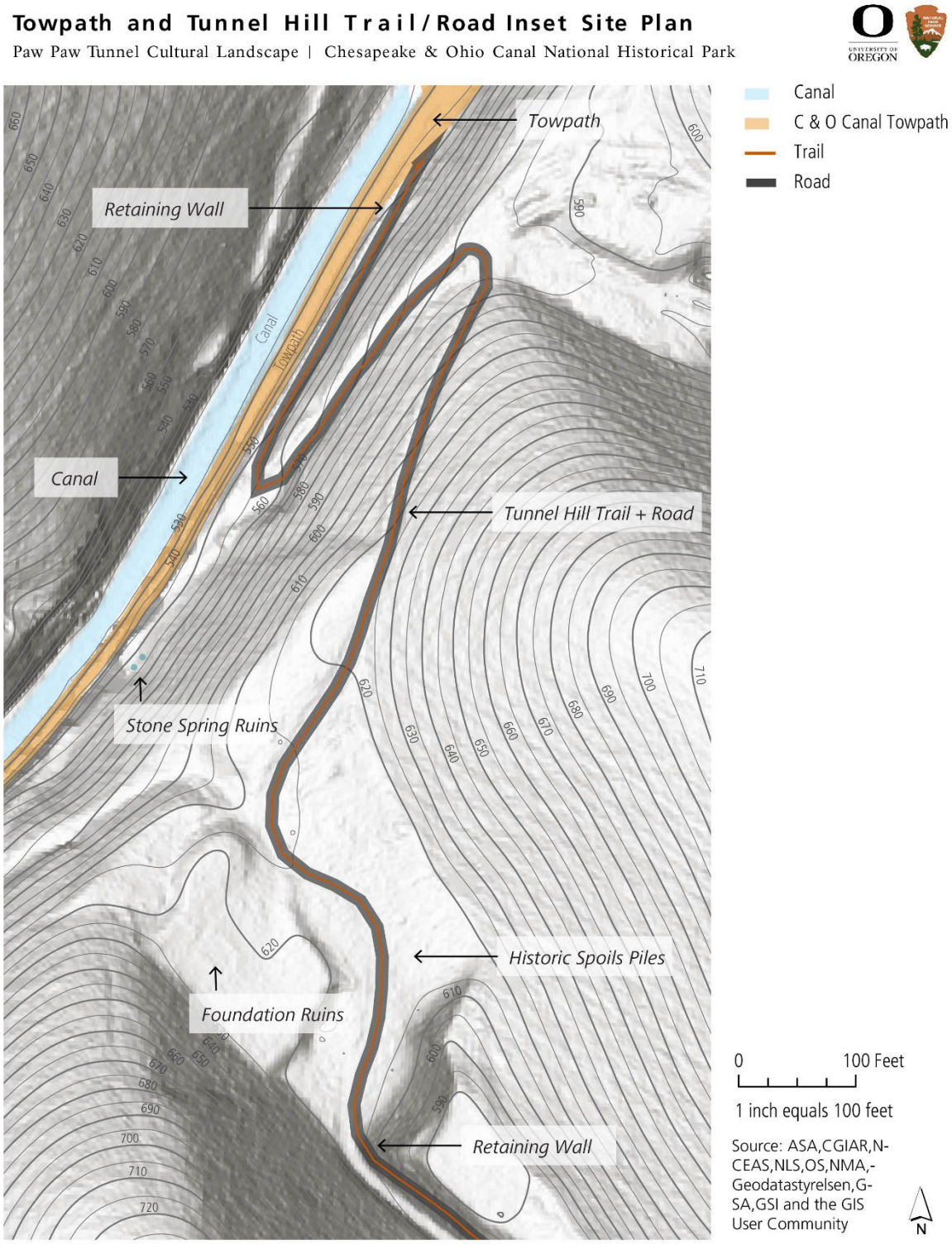


Figure 85. Inset site plan showing features at the intersection of Towpath and Tunnel Hill Trail/Road. Note two retaining wall locations. (UO-CLRG, 2024)

Creosote Vat associated with the carpenter's shop ruins at Lock 66, Contributing

A creosote vat is located at the northwest corner of the former Carpenter's Shop site, within the Lock 66 complex of features (between the lock gate and flume bypass). The vat consists of a ferrous metal retort, or tank, measuring approximately 8 feet (2.4 meters) tall with a 28-inch diameter (fig. 86). A concrete fire pit is constructed within the slope below the vat, which served as hearth to heat the tank interior. Its proximity to the lock contributes to an understanding of work involved in building, as well as maintaining timber elements in the working canal system.

The vat provided onsite treatment of wood materials, including sawn planks used as protective facings mounted within the lock chamber. Promoted by Charles Fisk, this was seen as a possible cost-saving measure, slowing the cycle of replacement otherwise needed within perennially wet lock chambers. Coal-tar creosote was valued during the period of canal development and operation for its properties as a wood preservative and pesticide, before its toxic and environmental harmfulness was well understood. Implementation of creosote heat-treatment processes at Lock 66 was that of a relatively new technology, patented by John Bethell in 1838.

While distinctive, the vat structure remains in fair condition. The major elements are in place and visible, although oxidation (rust) has begun to affect the retort fittings. The retort interior is filled with debris and leaf litter, and the loss of structural stability within the nearby flume headwall has affected the slope below. Elements of the poured concrete vat furnace show evidence of spall, as do upper edges of the board-formed (poured) concrete surround wall, which was likely constructed to shield the adjacent wood structure of the Carpenter's Shop. This surround is not part of the adjacent lock flume headwall, and was

constructed after the wall.[92] It is not known whether an exterior lid was ever fitted, or how planks were hoisted from the retort after treatment.[93]



Figure 86. Creosote vat, view southeast, at Lock 66. Note proximity to quarried block lock headwall (left), constructed prior to the formed concrete vat surround. (UO-CLRG, 2023)

Tunnel Shafts, Contributing

Four shafts were aligned and excavated in pairs within selected ravines across Tunnel Hill from 1836, based on Ellwood Morris's survey of the topography above the planned canal route the previous year.[94] Spoils from these shafts were excavated by hand, and hoisted up to the surface grade by means of a horse-powered gin structure (windlass). Design

[92] At its eastern end, the foot of the surround was poured to form a cold seam with existing headwall block profile at grade.
[93] A hoist apparatus may have been integrated with the Carpenter Shop structure, but insufficient archival or physical evidence survives to confirm this possibility.
[94] It is possible that Thomas F. Purcell participated in or oversaw survey efforts as resident engineer for the canal, prior to his resignation from the venture that year. Unrau 2007, 44.

specifications for the primary shafts measured 14 feet (4.3 meters) in diameter, although the actual dimension remains unknown; wastage may have altered this profile during excavation. Each shaft is also associated with the distinctive network of spoils piles deposited downhill into the narrow ravines extending west. Shafts are integral to the tunnel structure itself, but may also be considered distinct, contributing elements within the Tunnel Hill area, as important points in the spatial extent and configuration of survey, construction, and long-term management of the tunnel as a historic resource.

Shaft A and B are located approximately 494 feet south of the downstream (north) portal, while shafts D and C are 1,158 feet (352.9 meters) south of this portal. The two shaft site locations are located approximately 700 feet (213.3 meters) apart, on either side of the ridge associated by survey marker 4. Paired shafts were spaced 23 feet (7 meters) center to center and measured approximately 8 feet (2.4 meters) in diameter. These features were capped and sealed in the course of construction to seal the void beneath and limit additional weight on the tunnel lining below.

Existing conditions continue to raise concerns regarding the possibility of groundwater or stormwater runoff and infiltration within the ravines, to which the shafts are inherently vulnerable following the substantial alteration of localized Tunnel Hill hydrology patterns during period construction. NPS conducted hydrological drainage alterations in these areas to allow water to flow west bypassing the shafts and limiting the amount of water directed into tunnel by way of the shafts.

Retaining wall at Lock 64-2/3, Contributing

A coursed rubble retaining wall is extant on the river side of the towpath, opposite the downstream end of Lock 64-2/3. Although the structure associated with the retaining wall has collapsed, the retaining wall itself is intact.[95] This incorporates the retaining wall, two mounds of brick rubble, and some white granite support stones. Most likely, these are remnants of a log structure set on sill stones with a brick chimney. The dates of construction, occupation, and demolition of this structure remain unknown, although the materials and construction technique suggest that they are likely within the period of significance.



Figure 87. Retaining wall adjacent to the towpath near Lock 64-2/3, view SE. (UO-CLRG, 2023)

[95] This feature was designated as "Feature H" in the 1976 archeological survey of Tunnel Hollow.

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Brick Retaining Wall (South Portal)	Contributing				
Creosote vat associated with the carpenter's shop ruins at Lock 66	Contributing				
Downstream Portal of Paw Paw Tunnel (North)	Contributing		Downstream Portal of Paw Paw Tunnel	045630	
Paw Paw Tunnel	Contributing		Paw Paw Tunnel	045629	9388
Retaining wall at Lock 64-2/3	Contributing		Retaining Wall Ruins at Lock No. 64 2/3	045640	
Retaining Walls for Tunnel Hill Road	Contributing				
Retaining Wall at Tunnel Hill Road Switchbacks	Non Contributing				
Section/ Superintendent's House	Contributing		Section House	017224	9392
Timber Bumpers	Contributing				
Tunnel Shafts	Contributing				
Upstream Portal of Paw Paw Tunnel (South)	Contributing		Upstream Portal of Paw Paw Tunnel	045627	
Milled Wooden Footbridge	Non Contributing				
Towpath Boardwalk	Non Contributing – compatible			045631	

Cluster Arrangement

Cluster arrangements are the historical patterns which help understand how period features were grouped, developed in physical proximity to one another, or necessarily functioned together in space. This entails the location of structures with respect to smaller-scale elements, including associated spaces in the landscape. Cluster arrangements vary in size, shape, and complexity, and help to articulate broader spatial organization at a finer scale.

Distinct feature clusters which contribute to the cultural landscape include each of the five lift lock complexes within Tunnel Hollow, North and South Portal areas, Tunnel Hill depositions, and the Gross and Twigg Hollow area (including the Gross Creek drainage and Culvert 210 structure). Each cluster encompasses multiple cultural landscape features, along with the topographic and hydrologic attributes.

Lock complexes include the entirety of the lift lock structure, bypass flume, and shared headwalls, along with stone or concrete lockhouse foundation remnants or voids (61, 62, 64), discarded masonry, watch box or outbuilding site (66), holding basin (62), Carpenter shop foundation (66), creosote vat (66), snubbing post holes (64), and towpath alignment.

North Portal area cluster includes the space and surfaces defined by downstream portal masonry structures, towpath grade and bedrock massing, tunnel cut, "Slickenslide" area, canal basin, and rope burns. Non-historic rockfall stabilization elements are not specifically included, such as shear keys, steel pins, or wire-mesh screens, although these are encompassed within that space.

South Portal area cluster includes the space and surfaces defined by upstream portal masonry structures, towpath massing and retaining wall, and Paw Paw Hollow (tunnel cut), canal prism and Tunnel Hill Trail terminus (i.e., trailhead at towpath grade).

Grouped spoils features, established in proximity to the tunnel shaft, comprise a cluster associated with the tunnel survey transect, Tunnel Hill ravine topography, and drainages. Raised by "horse gin" from excavated shaft, laborers disposed of fragmented slate spoils in a group of linear piles. This grouping radiates outward and downward along the ravine and is linked with modified drainage patterns above Tunnel Hollow.

Gross and Twigg Hollows include the space delineated by the Gross Creek drainage, quarry cuts and spoils, tunnel excavation spoils piles (not including NPS-era crushed-shale surfacing piles, c.1979–80 or 1990s), the Outdoor Club Road terminus (terrace), Culvert 210 structure, canal prism, towpath alignment, and the historically open canopy between Hollows landforms.

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Five lift lock complexes within Tunnel Hollow	Contributing				
North and South Portal areas	Contributing				
Tunnel Hill depositions	Contributing				
Gross and Twigg Hollow area (including the Gross Creek drainage and Culvert 210 structure)	Contributing				

Views and Vistas

Within the framework of the CLR, views and vistas are assessed in terms of their character within the boundaries of the landscape. Views are the expansive and/or panoramic prospect of a broad range of vision(s), which may be naturally occurring or deliberately contrived. Vistas, on the other hand, define the controlled prospect of a discrete, linear range of vision, which may be deliberately contrived.

Two views situated within the cultural landscape, in particular, are evaluated as Fundamental Resource Values (FRVs) for Chesapeake & Ohio Canal National Historical Park. One, a view north from the riverbank, toward Paw Paw Bends and adjacent to Paw Paw Campground, is defined by the topography and land cover at Paw Paw Bends; similarly, an southeast view overlooking the river meander from the elevated prospect of Tunnel Hill takes in elements of landform and elevation change which informed C&O Canal Company decisions to excavate through, rather than bypass Tunnel Hill.
The following views contribute to the historic setting of the cultural landscape:

1. View north toward Paw Paw Bends river meander and Tunnel Hill (uplands are identifiable as contrasting canopy types during leaf-out seasons) from the Potomac riverbank adjoining Paw Paw campground. (fig. 88)



Figure 88. Paw Paw Bends river meander, view north, including Tunnel Hill (background). (UO-CLRG, 2023)

2. View south (downriver) toward Western Maryland Railroad trestle bridge from Potomac riverbank, adjacent to Paw Paw campground. (fig. 89)



Figure 89. Western Maryland Railroad bridge, view south, as seen from Potomac River adjacent to the Paw Paw Campground canoe launch. (UO-CLRG, 2023)

3. View north into Tunnel Hollow from Tunnel Hill slope above drainage, i.e., within transect at northernmost survey marker (Marker 5). (fig. 90)



Figure 90. Tunnel Hollow alignment, view north, as seen from above ravine drainage on Tunnel Hill. (UO-CLRG, 2023)

4. Partial views N-NE and S-SW along 1835–36 survey transect line, as defined at the vantage of ridge contours and survey markers (verified in 2023, this transect line extends from Lat 690281 x Long 899887, at Marker 1, through Lat 691985 x Long900093, at Marker 4). These views are now partially or entirely occluded by canopy cover. The transect would most likely have been relatively open or cleared during tunnel construction, to facilitate survey accuracy through clear sightlines, as a nearby fuel or timber source, or both. Little evidence of early-growth canopy cover remains on Tunnel Hill, with ridgelines colonized by mixed canopy (possibly third growth), retaining a largely open understory area.



Figure 91. Perspective near tunnel survey transect line on Tunnel Hill, view north-northeast, toward Tunnel Hollow. Period survey marker 5 is visible, now slightly downslope from the actual transect (foreground); understory and canopy partially occlude the sightline. (UO-CLRG, 2023)



Figure 92. Perspective along tunnel survey transect line from the vantage of a ridge on Tunnel Hill, view north-northeast, toward Tunnel Hollow. Period survey stone is visible (foreground); note baseplate compass used to orient sightline bearing. (UO-CLRG, 2023)

5. View north from cornice and steps at North Portal into Tunnel Hollow, as defined by Portal cut, slopes of "slickenslide" to the west, and ravine slopes to the north. Existing profile of stabilized rock faces above berm and towpath side, including tinted concrete shear keys and rock pins, are both assessed as compatible with this view, acknowledging change over time.



Figure 93. Tunnel Hollow, view north, as seen from North Portal cornice area. Visible on close inspection, tinted shear keys are compatible as an intervention within existing conditions. (UO-CLRG, 2023)

6. Views upstream along the canal alignment from head gate area of each lock, and downstream along the canal alignment from tail gate of each lock, roughly from the vantage of the watch box or lockhouse. Each view was integral to lock keepers' responsibility to maintain essential operations in supervising the safe arrival, entry, and departure of each craft through that lock complex.

   Several among this view type are now partially occluded by canopy- and shrub-layer cover established within the canal course, such as Lock 66, Lock 64-2/3, and Lock 62.



Figure 94. Downstream perspective from approximate former location of Lock 66 watchbox, view northeast. Note established vegetation within canal prism and adjoining towpath (right), obscuring a clear vista. (UO-CLRG, 2023)

7. View from towpath across berm side toward Gross Hollow and Twigg Hollow. Existing canopy and understory cover largely screens these areas, which most likely would have been more open during the period of canal construction, consistent with land use around quarry and (pre-NPS) spoils locations during this time.

Contributing vistas include the following:

1. Sightlines upstream *and* downstream within (and along the full extent of) the Paw Paw Tunnel interior, delineated from 5-6 feet above the towpath surface and 5-8 feet above water level (i.e., roughly deck height for canal boat classes). (fig. 95)

2. Sightlines defined by linear segments of the towpath shoulder upstream from Paw Paw Hollow, through the campground milepoint, including partial views toward adjoining canal and berm side.

3. Sightlines along towpath embankment and canal prism within Tunnel Hollow, defined by the excavated towpath cut (river-side) and ravine slope (berm-side), as well as a clearly defined towpath shoulder, from the perspective of the towpath. (fig. 96)



Figure 95. Downstream vista, view northeast, including Paw Paw Tunnel vault, canal prism, and towpath bulkhead. [Photograph recorded from approximate vantage of period canal boat deck within the prism, taking into account lowered water level.] (UO-CLRG, 2023)



Figure 96. Example of vista sight-line along towpath, view south-southwest, within Tunnel Hollow. Encroaching vegetation partially occludes this location, which would have been open during period canal operations. (UO-CLRG, 2023)

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Partial views N-NE and S-SW along 1835–36 survey transect line	Contributing				
View north toward Paw Paw Bends river meander and Tunnel Hill	Contributing				
View north from cornice and steps at North Portal into Tunnel Hollow	Contributing				
View north into Tunnel Hollow from Tunnel Hill slope above drainage	Contributing				
View south (downriver) toward Western Maryland Railroad trestle bridge	Contributing				
View from towpath across berm side toward Gross Hollow and Twigg Hollow	Contributing				
Views upstream along the canal alignment from head gate area of each lock, and downstream along the canal alignment from tail gate of each lock	Contributing				

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Sight-lines along towpath embankment and canal prism within Tunnel Hollow	Contributing				
Sight-lines of the towpath shoulder upstream from Paw Paw Hollow, through the campground milepoint, including partial views toward adjoining canal and berm side.	Contributing				
Sight-lines upstream and downstream within (and along the full extent of) the Paw Paw tunnel interior	Contributing				

Constructed Water Features

Constructed water features within a cultural landscape are built features and elements that utilize water for aesthetic or utilitarian functions in the landscape. Character-defining for the site, the canal prism may be broadly understood as a constructed water feature (see previous discussion). Historically, this also encapsulates the watercourse's extent and function throughout the cultural landscape, both within the tunnel alignment and between Maryland State Highway 51 and Lock 61, although portions of the canal prism are no longer watered.

Spring houses may likewise be considered contributing constructed water features, underscoring the essential function of freshwater access to builders, canallers, and later recreational visitors. By contrast, multiple non-contributing NPS-built drainage channels (box culverts) are cut and framed beneath the towpath grade along the east (river-side) slope beneath the spring house sites; it is not clear whether these later modifications are related to the former, milled-wood stair structure built into the slope nearby during the period of significance (fig. 97).



Figure 97. "Tunnel Hollow Spring," [nd] as photographed looking east across the towpath. Based on attire and towpath conditions, this view appears to have been recorded c.1900–1910. (NPS-CHOH)

Superintendent's House well, Contributing

A stone-lined well, believed to have been excavated during the period of significance, is located approximately 35 feet (10.6 meters) northeast of the Superintendent's House. This well is associated with development of the Superintendent's House. The feature is now enclosed with a prefabricated concrete cap (i.e., paver) (fig. 98); a contemporary well was installed near the campground parking area in the 1970s, and now serves as the primary water source for the campground area. While the well cap itself is in good condition, the concrete base surround shows evidence of spall. A section of the base surround is now missing along the well's northern edge, exposing the well interior. This feature has been closed and covered for public safety purposes but has not yet been fully decommissioned.



Figure 98. Superintendent's House well, detail view. (UO-CLRG, 2023)

Towpath drainage channels at upstream (south) portal, Non contributing

NPS incorporated a drainage system into the towpath structure in Paw Paw Hollow, south of the tunnel, behind the retaining wall near the base of the cut. Drain grates and outlet pipes are visible among the masonry courses of the cut-stone retaining wall and appears to have been incorporated during or after Mission-66-era NPS repairs, possibly 1979–1980. At present, physical extent and functional condition for this feature remain undetermined.

Stone Spring House Ruins, Contributing

Two collapsed spring houses are located between the last switchback on Tunnel Hill Road and the towpath, approximately 4,250 feet (1,295.4 meters) downhill from the NPS towpath access gate. These spring houses, with water flowing through each one, are sited approximately 15 feet (4.5) apart. A third spring house is located adjacent to a social trail established between the North Portal and the road switchback. Each are dry-laid

constructions of spoil rubble from the tunnel excavation, and they are built into a large spoils deposition (fig. 99).



Figure 99. Spring house, detail view, as constructed in Tunnel Hollow slope (river-side) above towpath. Note spoils materials within the interior (outfall) surface of the structure. (UO-CLRG, 2023)

Towpath culverts, Non-contributing

Three distinct drainage channels spanned by modern, wooden decks (essentially box culverts) are constructed within the existing towpath grade in Tunnel Hollow, cut into bedrock substrate, to prevent spring seepage from accumulating within the towpath cut. This construction post-dates canal development and was added by NPS; each is oriented within drainage below and between historic spring houses.

All three culverts are cut perpendicular to the towpath and canal prism alignment (fig. 100). The culverts are spaced approximately 25 feet (7.6 meters) apart along the towpath. Culvert channel interiors measure approximately 18-24 inches in width with a depth of 8 inches. Milled, unfinished wooden decking was situated at grade prior to 2024, and consisted of two 4 X 8-inch stretchers with 2 X 10-inch dimensional plank decking, joined with galvanized wire nails (10-12d). The milled timber decking serves a dual function, providing both a level crossing surface at grade and limiting channel infill beneath. Based on condition and profile examined in 2023, it is highly unlikely that these materials predate NPS towpath resurfacing in 1980. Park maintenance staff have replaced decking elements as of 2024, which increased material dimensions among milled timber elements (fig. 101).

Towpath Culvert 1 refers to the southernmost culvert.

Towpath Culvert 2 refers to the second and middle culvert.

Towpath Culvert 3 refers to the channel located directly west of the spring house and is the northernmost culvert. Significant water accumulation is present on east side of the towpath adjacent to this feature; pooling is likely related to the close proximity to the spring house, rather than general runoff.



Figure 100. Towpath culvert 1 (foreground), view south, with culverts 2 and 3 in background, prior to decking replacement in July 2023 by NPS.(UO-CLRG, 2023)



Figure 101. Towpath culvert 1 (foreground), view south, with culverts 2 and 3 in background, following decking replacement in 2023 by NPS Looking upstream (NPS, July 2023).

Lock 66, Bypass Flume, and Carpenter's Shop Foundation, Contributing

Lock 66 is a composite lift lock, sited at MM 154.7 of the canal prism. Composite locks were the result of cost saving measures and differed in material and design from the other locks on the C&O Canal. The composite locks in the Tunnel Hollow were constructed with materials sourced from local quarries which produced stone inferior to the material typically used in locks. To further reduce costs, the facing of composite locks consisted of "kyanized" (creosote-conditioned) sawn wood plank rather than stone; this process was carried out in the context of the Carpenter's Shop, where a vat was constructed to store and apply creosote to the planks (see feature description for the creosote vat). The contract for the construction of the locks in the Tunnel Hollow was awarded in 1837, but due to financial problems, labor conditions, and the technical difficulty of excavating the tunnel and Hollow, the locks were not resumed until 1847 and completed in 1850. Similar in size

to the others located within the cultural landscape, Lock 66 measures approximately 100 feet long, with 15-foot-wide chambers, per the standard period dimensions for lift locks on the canal.

Composite locks in Tunnel Hollow are masonry and timber structures on white oak timber (*Quercus alba*) foundations laid on bedrock.[96] Due to the overall change in elevation along the canal course over limited distance, these locks lift the water level over a differential of 10 feet (3 meters), in contrast to the average lift of 8 feet (2.4 meters) typical across other canal locks.[97] Lock 66 was constructed with red and grey sandstone from a quarry cut into Twigg Hollow, located north of Tunnel Hollow. Its gate recesses were faced with concrete in 1910 (fig. 101). The stone removed from the lock is piled on the river side of the towpath across from each lock gate. Sited as the southernmost lock within the hollow, the structure was inherently the farthest from the quarry area downstream and therefore entailed additional effort for masonry construction, underlining the rationale for a construction timber rail line within the canal.

Lock 66 remains in fair condition, with the wooden facing now fully degraded (iron fastening pins now protruding from the stone walls). Portions of lock gate timbers and hardware can be found downstream in the canal prism. The downstream, river-side wing wall of the lock joins with a 4-foot-high, 150-foot-long retaining wall (1.2 x 45.7 meters), also constructed with red and grey sandstone, which supports the towpath embankment. A depression between this lock and the towpath is also still legible, indicating the former void for a snubbing post (used to brake, secure, and regulate drift of canal boats within the lock interior).

[96] Morris to Michael Byrne, "Bills of Timber for the foundations of 5 Locks," December 15, 1838, Records of Ellwood Morris #266, NARA RG79, P214, Tray 295; Lock 62, notably, is a masonry and wood structure, yet portions of its foundation materials remain undetermined.
[97] See also History section, including discussion of eliminating "Lock 65."

The former sites of additional structures associated with Lock 66 as a working complex have been studied based on rephotographic comparisons, including an approximately 8 x 10-foot (2.4 x 3-meter) area where the watch box may have been sited, due west of the tail gate, and a potential woodshed or privy south of the former lockhouse site. These locations were derived from a c.1950 photo of the complex (reproduced by Hahn, 1985), recorded before the Carpenter's Shop burned. No structural elements are apparent today above grade, although their orientation with the canal, flume, and towpath is still apparent in surface imaging.



Figure 102. Lock 66, view southeast, showing towpath behind. (UO-CLRG, 2023)



Figure 103. Former location of the Lock 66 Carpenter Shop, view south. (UO-CLRG, 2023).

Lock 64-2/3 and Bypass Flume, Contributing

Lock 64-2/3 is a composite lift lock at MM 154.6. This lock was constructed of the same materials and in a similar fashion to Lock 66. The wooden facing has almost entirely degraded, with the exception of fragments suspended from one of the mounted iron supports. Chamber walls of the lock consist of gray and red sandstone from Twigg Hollow Quarry (fig. 103). Gate recesses here were replaced with concrete in 1910; stone from the lock is piled on the river side of the towpath. The downstream river side wing wall of the lock interfaces with a 4 foot-high, 100 foot-long (1.2 x 3-meter) retaining wall, also constructed with brown and grey sandstone, which supports the towpath. There is also a depression between the lock and the towpath where a snubbing post was once located.



Figure 104. Lock 64-2/3 chamber interior, view northwest. (UO-CLRG, 2023)

Lock 63-1/3 and Bypass Flume, Contributing

Lock 63-1/3 is a composite lift lock at MM 154.5. This lock was constructed at the same time and in a similar fashion to Locks 64 2/3 and 66 and provides 10 feet (3 meters) of lift. The coursed rubble walls of the chamber are constructed from white and grey sandstone from Twigg Hollow. Similar to the other locks in the Tunnel Hollow, the gate recesses and coping were replaced with concrete in 1910; remnants of the original coping stones are piled on the river side of the towpath. The wooden facing has completely degraded, leaving only the iron support bars (anchors). Additionally, joinery and courses within the chamber walls have cracked and bulged on the downstream inland (berm) side of the lock (fig. 104). The upstream river (towpath) side wing wall has cracked away from the lock; this element has failed structurally and is degrading into the prism. The downstream river side wing wall of the lock interfaces with a 4 foot-high, 100 foot-long (30.5 meter) retaining

wall, also constructed with white and grey sandstone, which supports the towpath. There is also a snubbing post hole located along the towpath side of the lock chamber. A masonry flanking wall extends from the upstream towpath wingwall, across the towpath to the base of the Tunnel Hollow slope.



Figure 105. Lock 63-1/3 interior, view south-southwest, from NPS footbridge. (UO-CLRG, 2023)

Boat Basin, Sandy Flat Hollow, Contributing

The boat basin is located south of the intersection of Sandy Flat Hollow drainage and the engineered canal prism (figs. 105-106). Sandy Flat Hollow is one of a few locations along the canal where the alluvial fan of a drainage converges with the canal prism to form a hydrologic basin. As a contributing feature, the basin space includes a distinct, adjacent turnaround area, measuring approximately 300 feet by 100 feet (91.4 by 30.5 meter) west to east, diverging from the typical, 50-foot prism dimension over a distance of roughly 1,200

feet (365.7 meters), permitting a boat to exit (and re-enter) the canal prism. NRHP evaluation has previously addressed the basin as one contiguous feature; the topographic profile and associated with the turnaround, meanwhile, shows possible evidence of additional modification of this inlet during the period of significance. During period operations, this portion of the waterway likely served numerous canal functions, as a navigational turnaround, a loading and unloading point for cargo, maneuvering space for barges, temporary wintering area for canal boats, passing zone, or as a rest stop.[98] A wasteweir and spillway structure, incorporated with the towpath embankment approximately 200 feet (60.9 meters) south of (and in line with) the turnaround, drains slopes from Sandy Flat Hollow through the canal prism, beneath the towpath, and into the Potomac River to the east. Notably, this is the only point within the Paw Paw site where natural drainages and runoff were specifically incorporated into the canal prism, rather than isolated from this controlled watercourse. It is also spatially and functionally distinct from the boat basin, sometimes referred to as a turnaround, which was completed in the last construction phase, between 1848 and 1850.[99]

Vegetation in this section of the towpath is currently a lush, wetland-type cover species composition, indicative of long periods of standing water. Existing cover appears to provide some measure of stabilization in the basin profile, particularly with respect to the towpath embankment, while seasonal growth patterns occlude or reveal varying levels of visibility within basin edges—probably similar to period conditions by 1924, as regular use and associated disturbances declined. Periods of drought may also have affected cover and related feature conditions since the period of significance; substantial local and regional drought events include those of 1930–1932, 1962–1969, and 1999–2002.[100]

[98] CRIS Entry, HS-CRIS #045638.

[99] 2015 Chesapeake and Ohio Canal National Historical Park Historic District NRHP Update.

[100] NOAA, "Historical Drought Conditions in Maryland," U.S. Drought Monitor, Allegany County, Maryland, National Integrated Drought Information System. Historical records informing the U.S. Drought Monitor extend only to 1895.



Figure 106. Boat Basin south of Sandy Flat Hollow, view southwest towards Lock 63 1/3. Note towpath (left). (UO-CLRG, 2023)

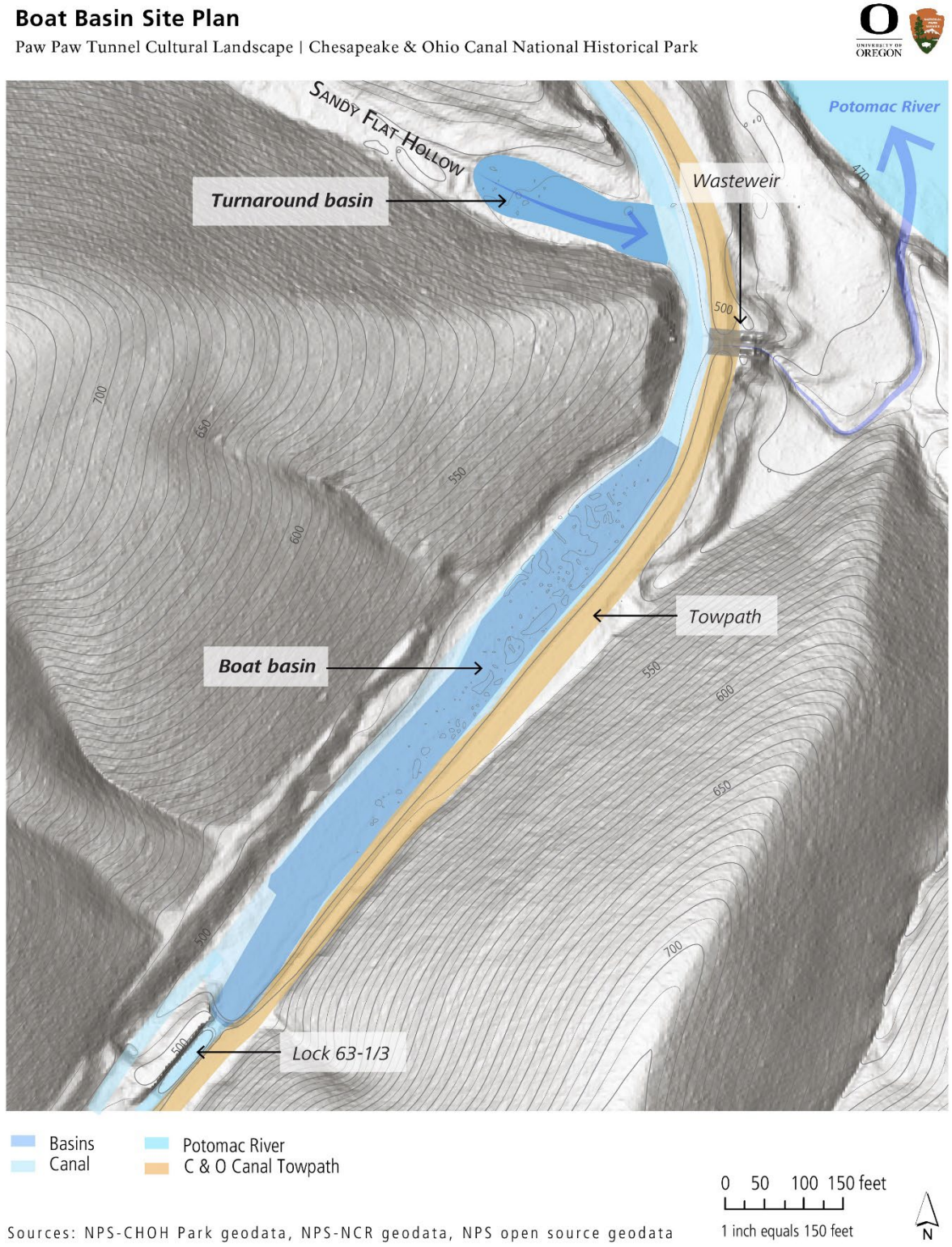


Figure 107. Boat Basin Site Plan showing spatial relationship between tunraround basin and boat basin north of Lock 63-1/3. (UO-CLRG, 2024)

Spillway and Wasteweir Combination, Contributing

The wasteweir, constructed to provide a local control mechanism for the water level of the canal, is located at MM 154.1, near the downstream end of the Tunnel Hollow. Here, water was channeled to continue along the canal past an aperture of horizontally-oriented timber planks, fitted into masonry, and later, concrete slots. Each plank could be removed or added as needed to alter the water level. The wasteweir was constructed in this location in the canal system as an outlet to quickly let off floodwaters eastward from the Sandy Flat Hollow drainage, in lieu of a culvert structure.

This structure measures 100 feet x 16 feet (30.5 x 4.9 meters) as originally constructed in 1850, and combines the configuration, orientation, and functions of wasteweir with those of two flanking spillways. A spillway denotes an area of the canal where the towpath has been lowered and hardened, providing an escape for floodwaters while preventing erosion. The spillways and wasteweir feed into the same chamber which is lined in stone and concrete and built into a shale outcropping. Previously, the spillways were filled in by eroded towpath materials, leaving only the flumes exposed; vegetation encroachment has further obscured these, particularly on the river side, while existing sandstone courses have degraded through exposure to the elements (figs. 107-9). The original construction was in coursed gray and red sandstone, probably cut from the Twigg Hollow Quarry. The 3-gate, board insert, stone and concrete wasteweir was built into the center of the spillway in 1913. The modern concrete deck spanning the spillway was later installed by NPS and features a clear contrast in aggregate and fines from period concrete construction extant elsewhere at Paw Paw, while the precise configuration of the historic span remains unknown.



Figure 108. Wasteweir and Spillway, view south, from towpath alignment at Mile 154.17. (UO-CLRG, 2023)



Figure 109. Wasteweir and Spillway, view southwest. (UO-CLRG, 2023)

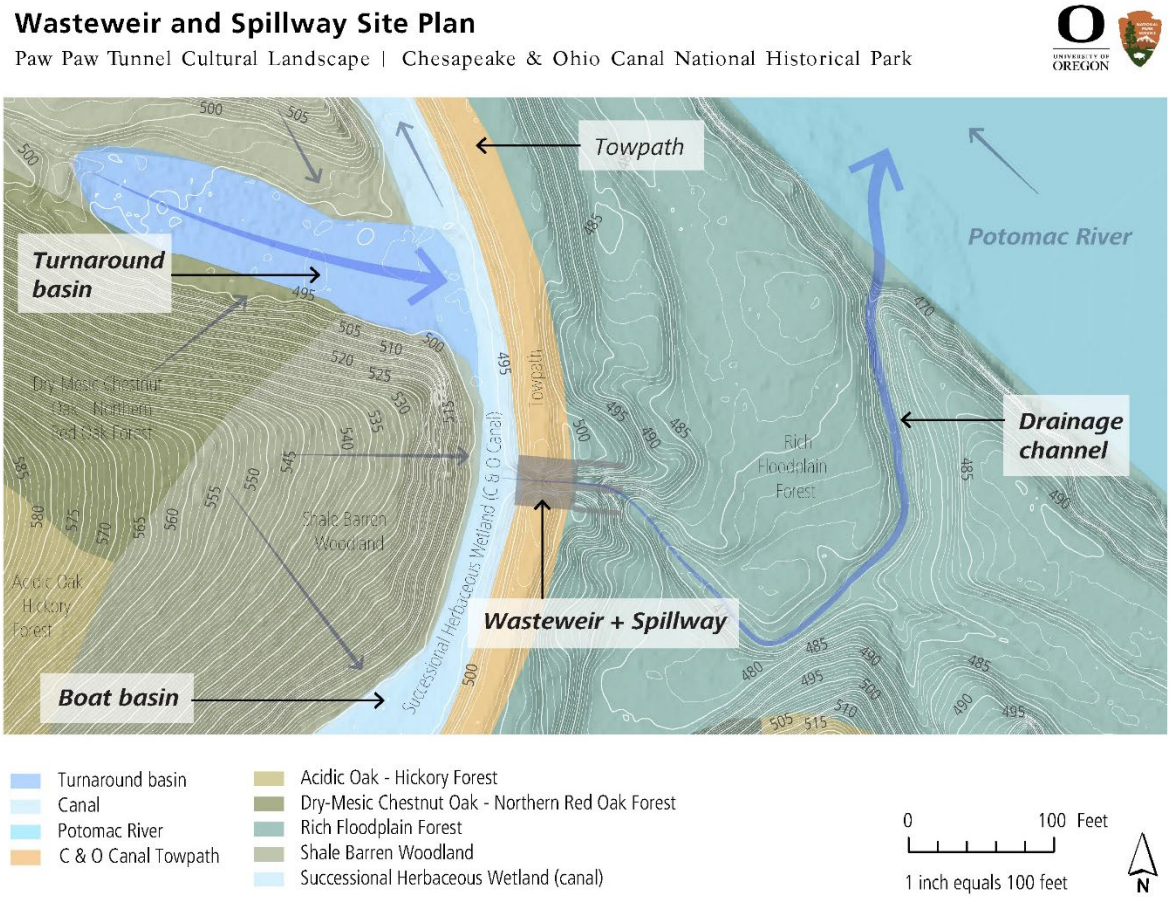


Figure 110. Wasteweir and Spillway Site Plan (UO-CLRG, 2024).



Figure 111. Wasteweir and Spillway, view southwest. (UO-CLRG, 2023).

Lock 62, and Bypass Flume, Contributing

Lock 62 is a composite lift lock sited at MM 154. The lock was constructed at the same time and in a similar manner to the locks in the Tunnel Hollow and provides 10 feet of lift (figs. 111-112). The lock chamber was constructed of gray and red sandstone from the Twigg Hollow quarry and was once faced with wood sheathing. The wood has rotted away, leaving only the iron pins which once held the wood in place. The gate recesses were faced with concrete in 1910 and the facing below the lower recess is concrete. A wooden footbridge has been constructed over the downstream end of the lock. The downstream (river-side) wing-wall of the lock is joined with a 4-foot-high, 100-foot-long (1.2 x 30.5 meters) retaining wall, also constructed with grey sandstone, which supports the towpath embankment.

In the case of each of the lock complexes, a wooden footbridge has been constructed using milled dimensional lumber over the downstream end of the lock, enabling pedestrian access to both berm and towpath sides of the complex. None appear to contribute to the historic character of the lock, although their above-grade construction and material scale remains compatible with the setting. These, or their predecessors, were documented in measured drawings of the HAER MD-30A, -B, and -C—corresponding with each of the Tunnel Hollow lock structures.

The lockhouse site for Lock 62 is sited across the towpath alignment (fig. 108), opposite the lock (river-side), as opposed to within the berm-side area adjoining the lock. This structure is integral to understanding the spatial configuration of the lock site, as well as the evolving construction and repair of lock structures later in the period (see ***Lockhouse foundation***, below).



Figure 112. Lock 62, view east. A later, concrete iteration of the lockhouse foundation is visible (left rear), located on the towpath (river) side of the canal prism. (Note vehicle for scale.) (UO-CLRG, 2023)



Figure 115. Lock 62 context, view southeast. Lockhouse foundation (left), towpath alignment (center), and lock structure (right) are each legible, as is the pump associated with Sorrel Ridge Campground (far left). (UO-CLRG, 2023)

Lockhouse foundation (Lock 62), Contributing

The concrete foundation attributed to the Lock 62 lockhouse (keeper's house) is located at MM 154 on the river side of the towpath, opposite Lock 62. Lockhouses were built by the C&O Canal Company to house lock tenders who were employed to manage individual lock operations, none of which are extant in the Paw Paw landscape. This structural remnant measures 26 by 16 feet (7.9 by 4.8 meters) in plan, has 8-inch thick, poured concrete walls, with its long axis is sited and aligned parallel to the towpath (fig. 113). This foundation supported a wood-frame building during the period of significance, but any physical remnants of this building no longer exist *in situ* above the foundation (sill) level. Four concrete posts remain along the towpath side of the structure, which once supported a porch, oriented toward the lock along the canal axis, perpendicular to the towpath alignment.

A photograph of the lockhouse recorded during the period of significance confirms an earlier use of log-frame construction, without concrete, for this building location; the building was then oriented southeast along the towpath (i.e. perpendicular to its existing

orientation, with front entrance facing upstream, and gable end facing the lock).[101] In the context of the C&O Canal Company's later use of Portland cement-based concrete for repairs or replacement of canal facilities by the early 20th century, the surviving foundation articulates a second, yet still contributing, iteration of construction.



Figure 116. Lockhouse foundation at Lock 62, view north. (UO-CLRG, 2023)

Culvert 210, Contributing

Culvert 210, sited at MM 153.4, was constructed in 1849 to allow the passage of Gross Run and storm runoff from the adjacent hollows east into the Potomac, beneath the canal prism and towpath embankment. The barrel arch is constructed of low-fired brick with dimensions comprising a 12-foot (3.6-meter) span, 5-6-foot (1.5-1.8-meter) rise, and 1-foot (0.3-meter) headwall, vaulted five courses deep. The headwall and retaining walls were constructed from red and grey sandstone, consistent with and probably quarried from the

[101] Hahn, 1980, 89.

stone at Twigg Hollow. Although the inlet (berm-side) headwall is faced with (non-historic) concrete and remains stable, the outlet (river-side) headwall has collapsed and is missing; bricks are eroding out of the vault arch.[102] Examination of the berm-side facing



Figure 117. Culvert 210, view west, as seen from outfall below towpath on river side. (UO-CLRG, 2023)

indicates that the concrete is similar in composition to that used in several of the Tunnel Hollow locks.

[102] Declining conditions in this parapet element were noted in 1971, although it is unclear whether any treatment measures were implemented at this time or since. In June 2023, this feature was observed to provide apparent habitat for at least one American badger (*Taxidea taxus*).



Figure 118. Culvert 210 outfall and drainage, view east, above Potomac River (background). Camera perspective located over the culvert structure (not visible), along towpath shoulder. (UO-CLRG, 2023)

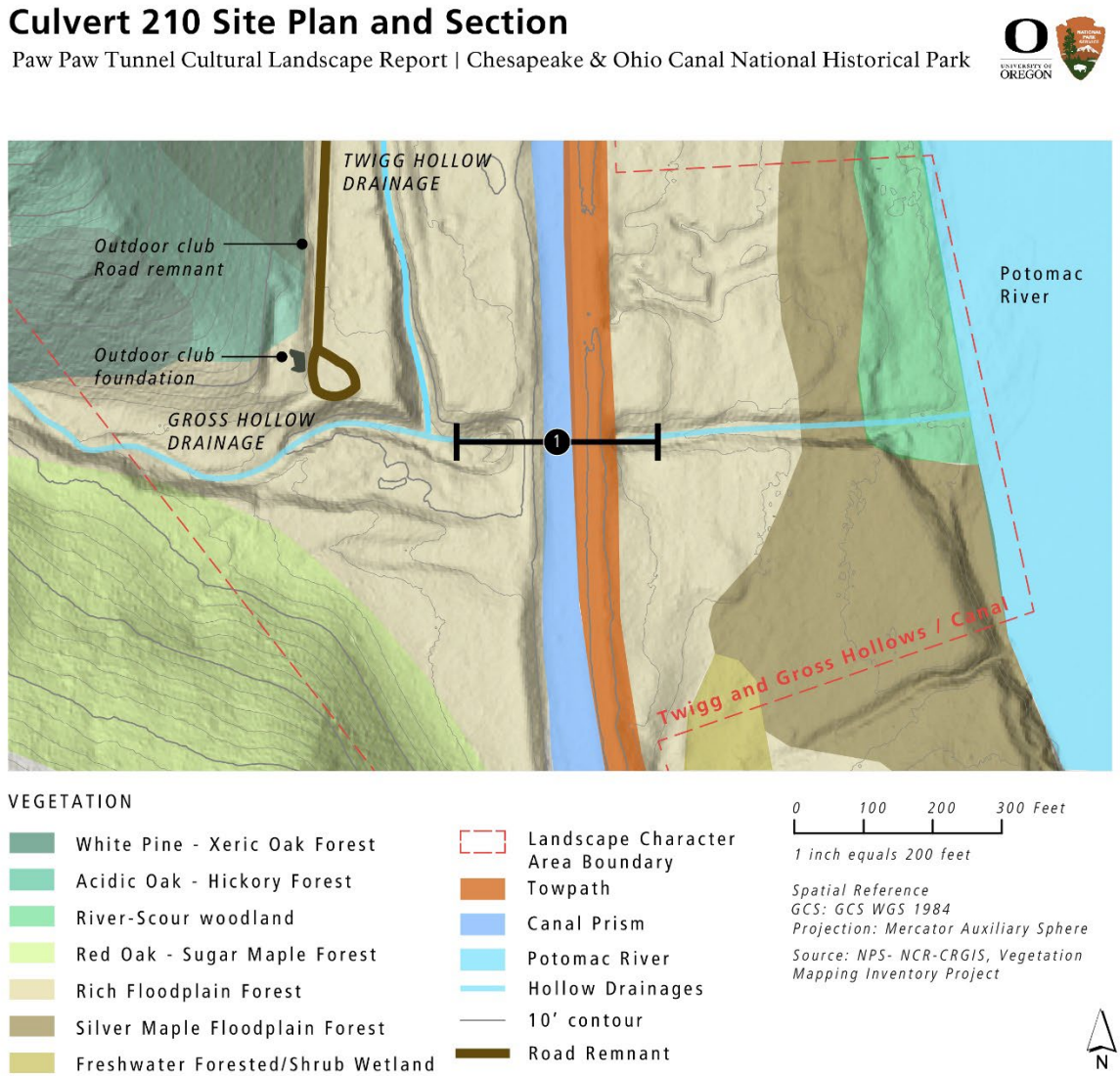


Figure 119. Culvert 210 Site Plan and Section. (UO-CLRG, 2024)

Lock 61 and Bypass Flume, Contributing

Lock 61 is located at Mile 153.10 and typifies the historic use of concrete during period reconstruction or repair of a composite-construction lift lock at Paw Paw. The deterioration of the timber liner led to the lock being partially replaced, c. 1900, with the poured concrete facings extant today. Rough-faced stonework on the lower wingwalls remains in place from original construction. The associated culvert-type bypass flume, similarly dates to the later, c. 1900 repair format, and also features formed concrete construction. Similar to those in Locks 66-62, a wayfinding marker (designating the lock name), is a non-contributing element, but remains compatible in scale and color with the historic setting.



Figure 120. Lock 61 chamber interior, axial view (northwest), as seen from the deck of the NPS footbridge spanning the lock. Flume culvert is visible to the west of the lock alignment (left). (UO-CLRG, 2023)

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Boat Basin, Sandy Flat Hollow	Contributing		Boat Basin, Sandy Flat Hollow	045638	
Culvert 210	Contributing			011737	226807
Lock 61 and Bypass Flume	Contributing				
Lock 62, and Bypass Flume	Contributing		Lock 62 - 5th of 13 Composite Locks.	011738 (Lock 62 - 5th of 13 Composite Locks) 012885 (Bypass Flume - Lock 62) 011739 (Lockhouse - Lock 62 – Foundation)	9369 (Lock 62) 23356 (Bypass Flume)
Lock 63-1/3 and Bypass Flume	Contributing		Lock 63 1/3 - 6th of 13 Composite Locks	011741 (Lock 63 1/3 - 6th of 13 Composite Locks) 012886 (Bypass Flume - Lock 63 1/3)	9374 (Lock 63-1/3) 23359 (Bypass Flume)
Lock 64-2/3 and Bypass Flume	Contributing		Lock 64 2/3 - 7th of 13 Composite Locks	011742	58868 (Lock 64-2/3) 23629 (Bypass Flume)
Lock 66, Bypass Flume, and Carpenter's Shop Foundation	Contributing			045642 (Lock 66 - 8th of 13 Composite Locks)	536758 (Lock 66)

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
				017223 (Bypass Flume - Lock 66) 011744 (Carpenter's Shop –Lock 66 – Foundation)	23631 (Bypass Flume)
Lockhouse foundation (Lock 62)	Contributing		Lockhouse - Lock 62 - Foundation	011739	23749
Spillway and Wasteweir Combination	Contributing		Spillway and Wasteweir Combination	011740	23358
Stone Spring House Ruins	Contributing				
Superintendent's House well	Contributing				
Boat Basin, Sandy Flat Hollow	Contributing			045638	
Towpath Culverts	Non contributing				
Towpath drainage channels at upstream (south) portal	Non contributing				

Small-Scale Features

Small-scale features comprise elements which provide detail and diversity for both functional needs and aesthetic concerns in the landscape. Small-scale features within the cultural landscape at Paw Paw are numerous. Contributing instances at Paw Paw include each of the five cut-stone survey markers sited along the Tunnel Hill survey transect; creosote vat at the former carpenter's shop site within the Lock 66 complex; one or more snubbing post holes adjacent to multiple lock chambers; and the surviving 'rope burn' marks within Tunnel Hollow, where changing canal and towpath alignment along the excavated cut caused tow ropes to rub and abrade the rock surface prior to 1924.

Non-contributing small scale features include water pumps; comfort stations; NPS lock numbering (sequence) signs at lock complexes, NPS wayfinding and interpretive waysides adjacent to towpath and Paw Paw Campground parking lot, and canoe launch remnant; poured concrete pad adjacent to towpath (associated with previous location of temporary portable toilet service, along riverside); the NPS towpath access gate and signs; picnic tables, fire ring, and pump at the Sorrel Ridge [hiker-biker] Campground; and NPS vehicular access gates, bollards, trail markers, and interpretive waysides on Tunnel Hill. All known instances of mile markers and posts are considered compatible, but do not contribute to the cultural landscape as small-scale features. All contemporary signs, markers, and barriers associated with tunnel or trail access detour or closure are likewise non-contributing.

Paw Paw Campground site features, Non-contributing

Paw Paw Campground comprises ten single campsites, managed by NPS for public, recreational use by reservation. The campground was initially developed and operated as a private enterprise after the period of significance by Allegany County resident Gary Arbaugh, likely in response to visitation associated with the nearby tunnel's National Monument status (prior to NPS fee simple acquisition from Arbaugh in 1973), benefitting

from NPS Mission 66 rehabilitation work.[103] Campground resources included Arbaugh's cabin (not extant) and canoe launch, both located in the southeast area of the site.[104] Campsite areas articulating this non-historic use are organized into two rows, arranged and demarcated in a numbered sequence, with markers oriented toward a central, open corridor of turf and mixed herbaceous cover, south of the Superintendent's house. Small-scale features associated with each campsite include a grill/fire ring, prefabricated picnic table, and fire pit; none contribute to the historic significance of the Paw Paw Tunnel cultural landscape. The spaces associated with several of the site elements show surface erosion or compaction, in particular where pedestrian traffic is localized and concentrated around picnic tables seating and fire rings.



Figure 121. Paw Paw Campground single campsites, view south. Temporary contractor staging equipment, associated with 2023 tunnel rockfall mitigation, is visible behind. (UO-CLRG, 2023)

[103] *Along the Towpath*, February 1972, Chesapeake and Ohio Canal Association.
[104] *Along the Towpath*, April 1985, Chesapeake and Ohio Canal Association.

Concrete parking barrier/bollards, Non-contributing

Prefabricated concrete fence posts and bollards surround the visitor parking area, separating Paw Paw Campground sites and lawn area to the south along the vehicular access road and Maryland State Highway 51. These features delineate vehicular access within zones of crushed-rock surfacing, and feature timber rails to designate vehicular boundaries. The material in these beams appears to be a replacement for at least one previous iteration, which is visible in 1979 photographs of the campground parking area from an elevated vantage south of Highway 51. Wood rails (or cross-ties) are missing near the northeast corner of the area, while the curved and dado-jointed concrete posts are extant. Concrete posts of this configuration are a later NPS-era form type; these features do not contribute to the period of significance.

Additional instances of the same post type flank the NPS vehicle access gate along Tunnel Hill Road, which no longer retain rails or mounting hardware. These may have been constructed as a security measure as early as 1956, during Mission 66 programming, or more likely after the establishment of the National Monument in 1961.



Figure 122. Concrete posts/bollards, view south, between parking and campground areas. (UO-CLRG, 2023)

Paw Paw Tunnel Survey/Alignment Stones (transit markers), Contributing

Five stone survey markers, designated in a numbered sequence by NPS, are aligned *in situ* above the Tunnel.[105] Survey markers consist of a single survey stone, placed at systematic intervals, atop each of the five ridges between the tunnel prisms (fig. 120). Extant stones are located approximately 180-260 feet apart, a distance commensurate with survey transit points according to early 19th century field surveying techniques. Markers appear to have been quarried and dressed across at least one surface, although exposure to the elements has reduced the original surface texture in all cases. A hole was drilled vertically into the center, with a linear channel chiseled across this; the hole received and stabilized a

[105] Survey stone numbering / nomenclature documented in NPS GPS survey "Paw Paw Tunnel Markers," July 2019, NPS-CHOH Resources Division, Hagerstown, Maryland. This documentation reflects a numbering designation for markers ranging 2-6, as a sequence recognizing the South Portal arch keystone location as the primary survey transit reference point.

mounting rod and hardware for surveying equipment, such as a magnetic (compass) transit or stadia rod, oriented toward the next stone marker (perpendicular to the channel orientation).

Marker 5, the northernmost survey stone, has lost legibility on top surface alignment channel and mounting hole has no legibility. Marker 4 is in fair condition with lichen and needle litter present; this stone is situated somewhat lower in elevation, suggesting that this stone may have shifted (or was pushed) downhill from its historic location atop the ridge. The northern portion of Marker 3 alignment stone is missing: a significant fracture is present on the northeastern corner of the survey stone. Marker 1 and 2 are both in good condition. Marker 1 is the southernmost survey stone, located south of Tunnel Hill Road. Trees have been previously cut at 2 feet above grade surrounding this stone, increasing its visibility.



Survey Stone 1 (*southernmost*)



Survey Stone 2



Survey Stone 3



Survey Stone 4



Survey Stone 5 (*northernmost*)

Figure 123. Survey stones 1-5, detail view, within their respective, positions above Paw Paw Tunnel alignment. (UO-CLRG, 2023)

Rope Burns at Bend below Downstream (north) Portal, Contributing

Numerous rope burns are located approximately 150 - 200 feet (45.7 - 60.9 meters) north of the Downstream (north) Portal. Two prominent clusters of rope burns are present on the towpath (east) side of the tunnel cut. The canal prism and towpath curve approximately 25 degrees to the northeast, this along with the steep sloping rockface adjacent to the towpath caused canal boat tow ropes to commonly rub and abrade the rock face imprinting grooves into the rock. These detailed features date to canal operations, prior to 1924. Rope burns are highlighted in Historic American Building Survey (HABS) MD-810 documentation, including photography by Jack Boucher (1966, noting these features as "tow rope chafing") and measured drawings delineated by Dana Lockett (2017). Following impacts associated with rockfall events, towpath repair and replacement, and wind and water erosion, the rope burns are in fair condition and remain clearly visible from the towpath and canal prism.



Figure 124. Rope burns, detail view, adjacent to towpath in the tunnel cut at North Portal. (detail excerpt from LoC HABS-MD-810, 1966).

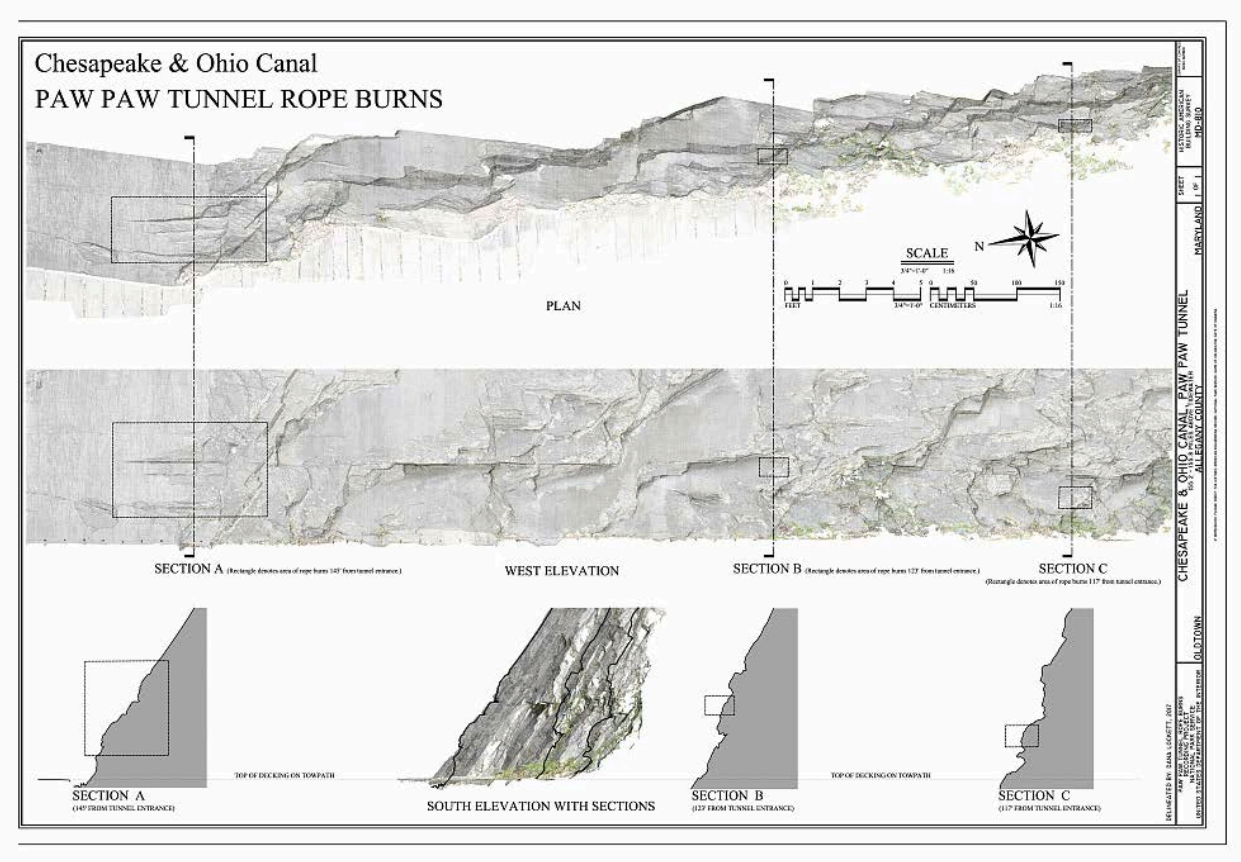


Figure 125. Delineated documentation of "rope burns" (rope grooves). HABS MD-810 addendum, 2017)



Figure 126. Rope Burns, view south. Part of the most recent iteration of the timber boardwalk structure is visible in this upstream perspective (right); construction was completed in Summer 2023. (NPS-CHOH, October 2023)

Wells/water pumps, Non contributing

Two wells/water pumps located along the towpath (river-side) and a third well at Paw Paw Campground provide water source for recreational users. Both pumps are 20th century-era, hand-powered format, with hinged cast-iron construction set into a poured concrete pad, set at grade. Well water is non-potable and is not treated for drinking or cooking. As a function of managing these contemporary resources with respect to visitor services, NPS posts and disseminates public guidance to recommend that all user filter, chemically treat, or boil water from these two point sources prior to consumption.



Figure 127. Well and water pump, view east, located along towpath south of Paw Paw Hollow. (UO-CLRG, 2023)

Mile and property markers, Non-contributing (compatible)

There are three formed-concrete mile marker locations across the cultural landscape at MM 154, 155, and 156. Stone markers, approximately two feet and six inches tall, were used prior to 1850 along the towpath to mark miles to a particular destination, no known evidence of historic mile markers are present in the Paw Paw Tunnel project area. Contemporary 8 x 8-inch prefabricated concrete posts finished with white paint mark the towpath and canal alignment at MMs 154 and 156. For much of the past decade, MM 155 did not retain a post in place. NPS staff note that this was a result of vandals, who pushed the marker into the canal prism. A new, replacement marker was installed with volunteer labor in 2023, following CLR documentation.



Figure 128. MM 156, view southeast, adjacent to the towpath between Paw Paw Campground and Paw Paw Tunnel. (UO-CLRG, 2023)



Figure 129. MM 154, view north, adjacent to towpath. Potomac River is also visible (right). (UO-CLRG, 2023)

Snubbing Post Holes on towpath side of Canal at Locks, contributing

Snubbing post hole locations are located between gate head walls and the towpath at several lock complexes. While voids associated with several remain visible at grade among herbaceous and grass cover, no material evidence of extant posts or fragments is visible at any lock site within the boundary.



Figure 130. Example of snubbing post holes on towpath side of Canal at Lock 62. (UO-CLRG, 2023)

NPS Signage at Paw Paw Campground, Non contributing

A cluster of non-contributing signage is located between Paw Paw Campsite 1 and the parking lot.



Figure 131. NPS signage at Paw Paw Campground, view north. (UO-CLRG, 2023)

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Paw Paw Tunnel Survey/Alignment Stones (transit markers)	Contributing		Paw Paw Tunnel Survey/Alignment Stones	047582	
Rope Burns at Bend below Downstream (north) Portal	Contributing		Rope Grooves at Bend below Downstream Portal	045634	
Concrete parking barrier/bollards	Non contributing				
Mile and property markers	Non contributing - compatible				
NPS Signage at Paw Paw Campground	Non contributing				
Paw Paw Campground site features	Non contributing				
Wells/water pumps	Non contributing				

Archeological Sites

Archeological sites are the locations of ruins, traces, or deposited artifacts in the landscape and are evidenced by the presence of either surface or subsurface features. Many of the features previously discussed in this section have been analyzed and documented through twin lenses of historical and industrial archeology (i.e., systems and functions of engineering processes).

For purposes of resource protection, various archeological resources are not delineated or discussed in detail, as appropriate to the scope of this study. Cultural Resources Inventory System – Archeological Resource (CRIS-AR) database entries provide further detail for

NPS internal use. Historic and cultural resources associated with Paw Paw Tunnel remain a fragile network spread over many acres, with limited security provisions, requiring sensitivity and discretion on the part of documentation stewardship.[106]

Nonetheless, it remains essential to acknowledge the Paw Paw cultural landscape as a complex archeological resource, both in light of overlapping, sometimes ephemeral land uses known to have shaped the site during the period of significance, such as laborer housing and construction operations, and the spatial scale of earthmoving and excavation. Such associated sites merit additional and more in-depth investigation, to better clarify canal development and change prior to 1924.

Brick Pile, Paw Paw Campground, Contributing

Brick piles believed to be associated with Lee Montgomery, contractor for the Paw Paw Tunnel, surround the Superintendent (Section) House. These bricks are the remains of Montgomery's effort to employ a patented brick machine to utilize local clay to supply material to the tunnel project. This effort was met with much trial and error, as evident in the number of bricks that remain. The local clay produced bricks that were soft and unfit for use.[107]

[106] CRIS-AS designations supersede the previous Archeological Sites Management Information System (ASMIS). This agency transition accompanies that of NPS CLI and LCS frameworks to CRIS, as resource managers advance stewardship of cultural landscape features previously documented through legacy database formats.
[107] 1979 NRHP.



Figure 132. Example of brick piles along Potomac cut bank at Paw Paw Campground. Note synthetic drainage tile, east of access trail protruding through pile interior. Note: visible brick fragments along bank with riparian tree roots exposed. (UO-CLRG, 2023)

Road Trace, Contributing

A spur road trace is located east of Lock 64-2/3, diverging northeast from the towpath. This road trace is associated with Lock complex operations. This road trace leads to the ruins of a double bay cellar. Young trees and vegetative understory have established within the road trace, limiting its legibility from the perspective of the towpath (fig. 130). The road cuts into the hillside east of the towpath and remains visible.



Figure 133. Historic road trace, view north, including encroaching understory vegetation (center-right). Road trace forks northeast from the towpath (left) aligned along the slope to the east. (UO-CLRG, 2023)

Double Bay Cellar Ruins at Lock 64-2/3, Undetermined

A double bay cellar stone foundation was documented in an architectural survey by the Maryland State Historical Trust in 1976 and again in a NPS Conditions Assessment in 2020. The double bay cellar ruins are located southeast of Lock 64-2/3 above the towpath along a spur road trace. The ruins are located within the hillside, east of Lock 64-2/3 and towpath. The Double Bay Cellar foundation consists of four stone walls forming two interior openings, each approximately 9 feet by 16 feet (2.7 by 4.8 meters), separated by an earthen and stone partition wall. In the 1976 architectural survey, this feature is designated "Feature G."



Figure 134. Possible cellar ruins, view south, near Lock 64-2/3. Feature includes ruins of a stone foundation for a structure built into the hillside. (NPS, 2020)

Furnace Foundation ruins, Gross Hollow, Undetermined

A possible furnace foundation was attributed in the 1965 canal survey delineated by J.B. Ferguson & Co., considered in the 2020 NPS-NCR 2020 field assessment:

> *…the [possible] foundation for a local furnace used to supply the canal engineering work with iron elements during construction. The approximately three-foot-high foundation ruin is composed of what appears to be concrete masonry with iron bars protruding about a foot high from the tops of the remaining walls... Large aggregate is exposed in many areas. Overall, the foundations are in poor condition as the concrete is spalling, iron elements corroding, and is covered in vegetation and debris.*

This ruin is located west of the canal prism facing northwest in Twigg Hollow. Densely encroaching vegetation obscures the visibility of the ruins from the towpath. It is also possible that this structure was associated with quarry operations, where reinforced or secured storage spaces would have been appropriate for tools and materiel amid ongoing operations.



Figure 135. Suspected furnace foundation ruins in Gross Hollow, view northwest, located west of canal prism. Construction features large-aggregate concrete with ferrous reinforcements projecting from the structure. (NPS, 2020)

Outdoor Club Foundation, Non-contributing

A foundation, potentially associated with Outdoor Club use, is located in Gross Hollow, northwest of Culvert 210. Remnant building materials and a foundation were identified by NPS staff in 2020. Vegetation has encroached upon the remnant, including both understory and established canopy species, consequently limiting the site's legibility, although digital elevation models of the terrain provide a general sense of its extent. Scattered brick fragments were apparent in 2023 along the adjacent slope (fig. 133), although visibility of surfaces here continue to decline among accumulated leaf litter and mixed-canopy vegetation growth colonizing the slope within the drainage. NPS cultural resource staff have also noted concrete masonry units (CMU) at this location.



Figure 136. Various foundation building materials, view northwest, including low-fired brick fragments, adjacent to the former Clubhouse site in Gross Hollow. (NPS-CHOH. 2020)

Lockhouse Foundation at Lock 61, Contributing

A foundation depression is located east of Lock 61 on the towpath side (fig. 134). The depression remains visible at grade, measuring roughly 20 x 18 feet (6 x 5.4 meters) with three distinct corner stones present. This feature comprises the remains of a lockhouse foundation associated with the lock complex.



Figure 137. Lockhouse foundation, view south, opposite Lock 61 across towpath alignment. (UO-CLRG, 2023)

Coping stone piles at locks, Contributing

Piles of coping stones are located at several locks including Lock 64-2/3 and Lock 63-1/3. A cluster of stones is located east of towpath just southeast of Lock 64-2/3 (fig. 135). Similarly, a pile of coping stones are located approximately thirty feet southeast of Lock 63-1/3. All stones are similar in size to rough faced stonework on the locks' lower wingwalls. These stones are likely the remnants of quarried block and other masonry materials discarded when these locks were repaired with concrete, prior to 1924.

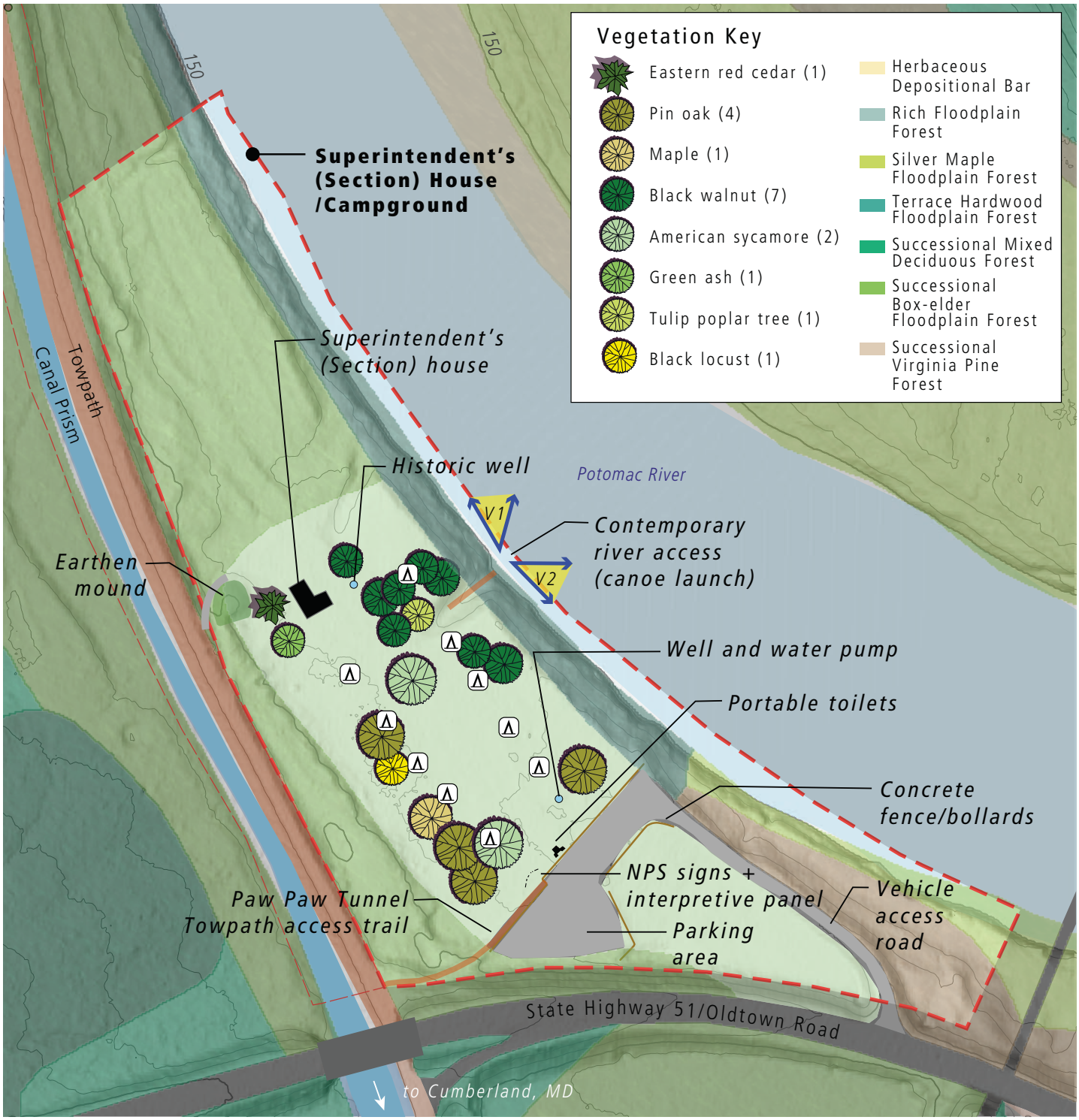


Figure 138. Pile of coping stones, view northeast, adjacent to towpath near Lock 64-2/3. (UO-CLRG, 2023)

Feature Name	Feature Contribution	CRIS CL Feature ID	CRIS-HS Resource Name	CRIS-HS Resource ID	FMSS Record Number
Brick Pile, campground	Contributing				
Coping Stone Piles at locks	Contributing		Ruins at Lock 64 2/3	045641	
Lockhouse Foundation at Lock 61	Contributing				
Road Trace	Contributing				
Outdoor Club Foundation	Non Contributing				
Double Bay Cellar Ruins at Lock 64-2/3	Undetermined				
Furnace Foundation Ruins, Gross Hollow	Undetermined				

Superintendent's House / Campground Character Area Site Map (1)

Paw Paw Tunnel Cultural Landscape Report | Chesapeake & Ohio Canal National Historical Park



Landscape Character Area Boundaries

Towpath

Canal Prism

Trail

Foot Bridge

Roads

Bollards

Buildings and Structures

Parking area

Potomac River

Lawn

Camp Sites 1-10

V# Views and Vistas

V1- View north toward Paw Paw Bends river meander and Tunnel Hill

V2- View south toward railroad trestle from Potomac riverbank

0 50 100 200 300 Feet

N

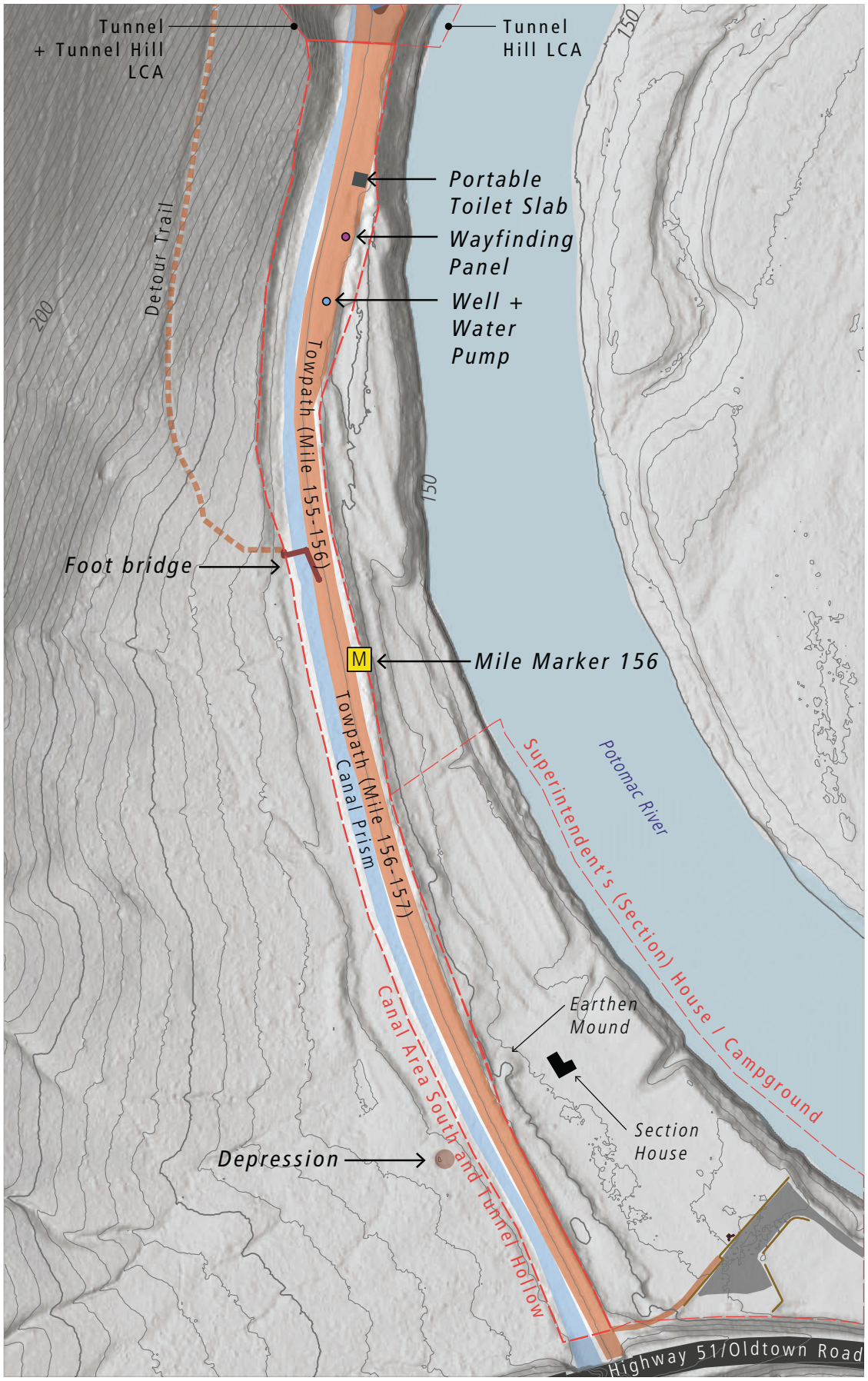
1 inch equals 200 feet

Spatial Reference: GCS WGS 1984

Source: NPS-CHOH Park geodata, NPS-NCR geodata, NPS open source geodata

Canal Area South and Paw Paw Hollow Site Map (2)

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- Landscape Character Area Boundaries
- Towpath
- Trail Detour
- Foot Bridge
- State Highway
- Bollards
- Buildings and Structures
- Parking area
- Canal Prism
- Potomac River
- Wayfinding Panel
- Well + Water Pump
- 10′ contours
- 2′ contours
- M Mile Marker (MM)
- Topographic Depression

0 100 200 300 Feet

1 inch equals 300 feet

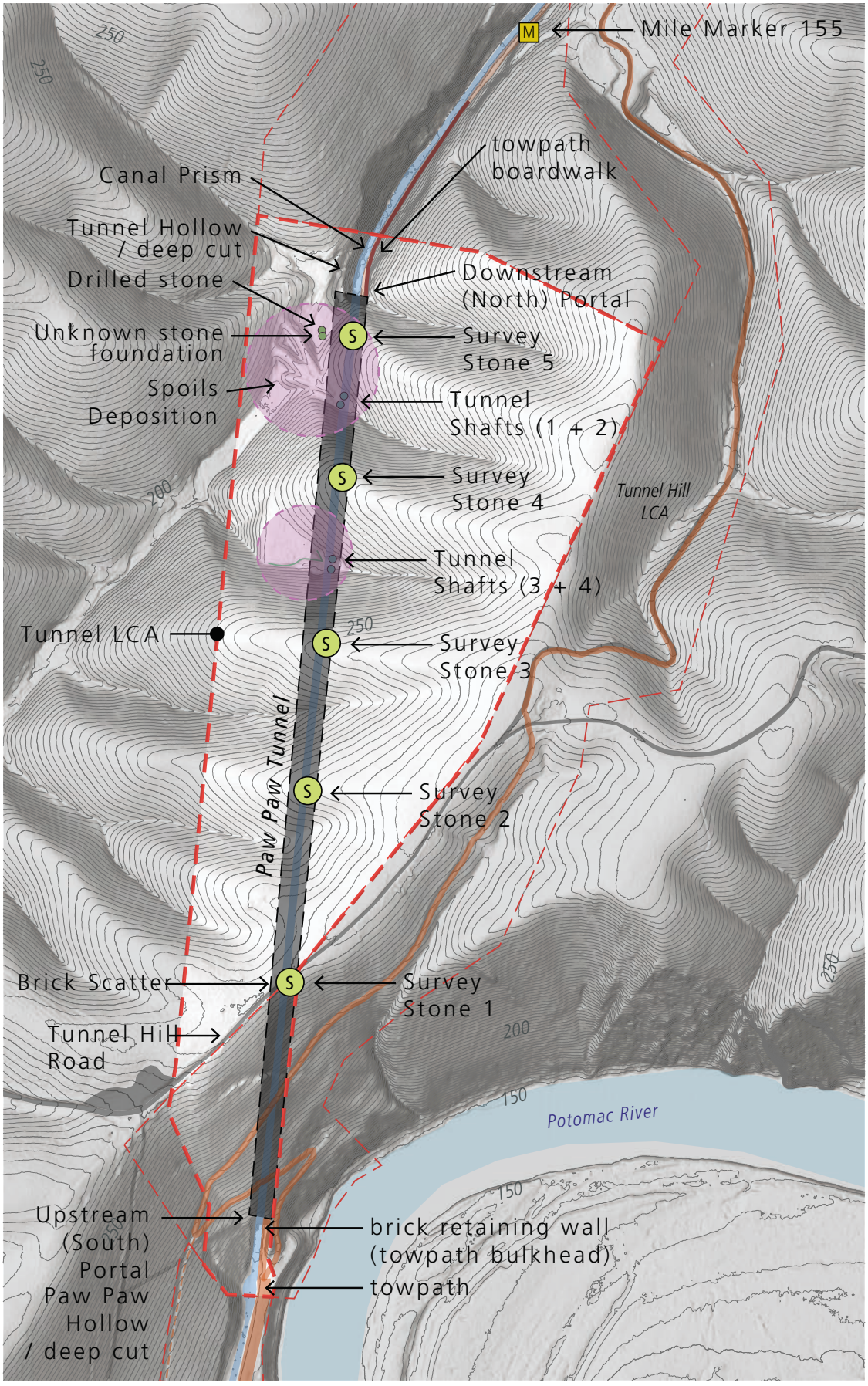
Scale: 1:3,600

Source: NPS-CHOH Park geodata, NPS-NCR geodata, NPS open source geodata

Spatial Reference: Datum- WGS 1984, Projection- Mercator Auxiliary Sphere

Tunnel Site Map (3)

Paw Paw Tunnel Cultural Landscape Report | Chesapeake & Ohio Canal National Historical Park



- Landscape Character Area Boundaries
- Towpath
- Trail Detour
- Boardwalk
- Roads
- Bollards
- Tunnel
- Historic Spoils Piles
- Canal Prism
- Potomac River
- Tunnel Shafts
- Survey Stones
- Drainage adaptation
- 10′ contours
- 2′ contours
- Mile Marker (MM)

0 100 300 600 Feet

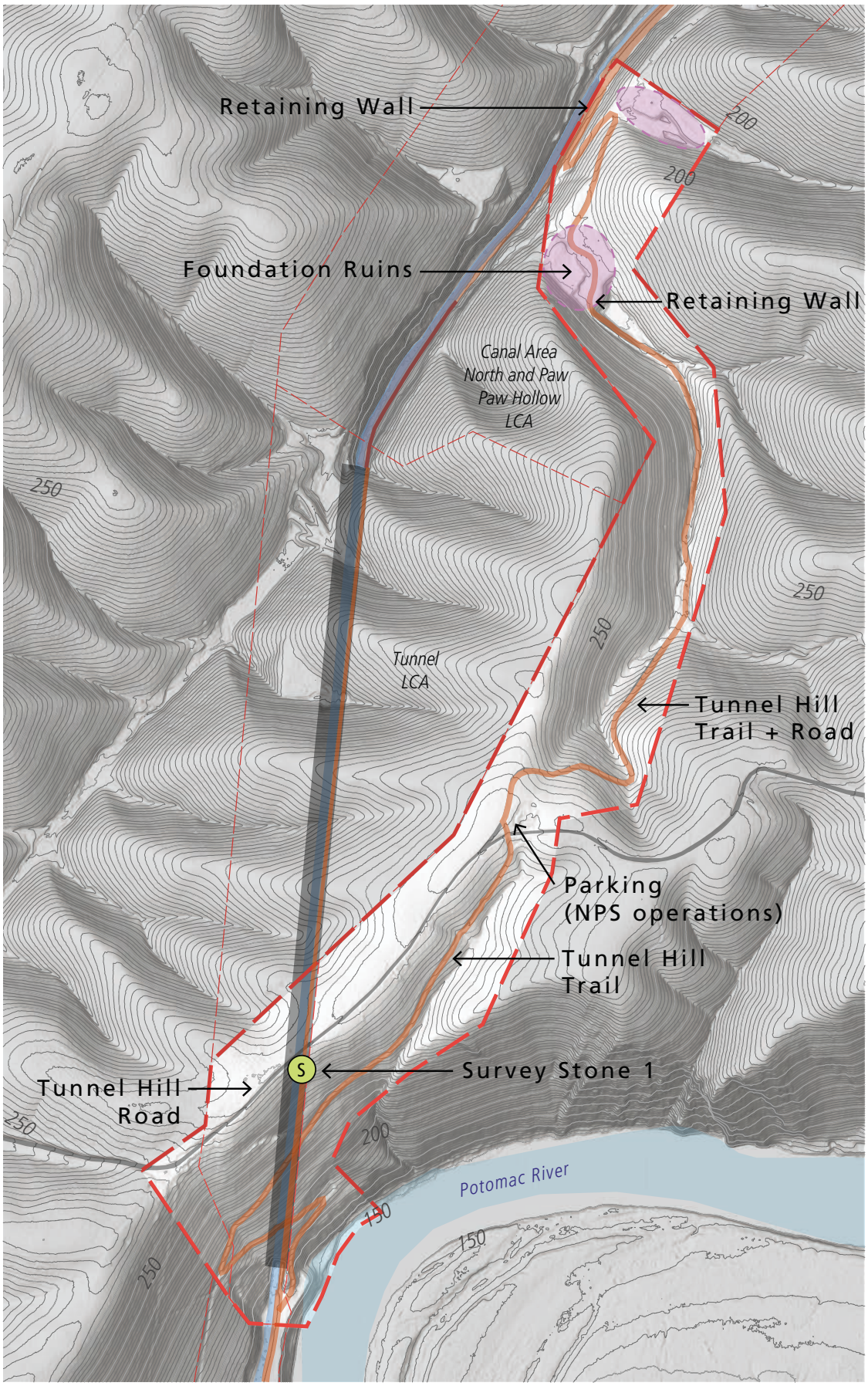
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Scale: 1:7,200

Source:
NPS-CHOH Park geodata, NPS-NCR geodata, NPS open source geodata

Spatial Reference
Datum: WGS 1984
Projection: Mercator Auxiliary Sphere

Tunnel Hill Site Map (4)

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Landscape Character Area Boundaries

Towpath

Trail

Paw Paw Tunnel

Boardwalk

Roads

Canal Prism

Potomac River

Survey Stones

10′ contours

2′ contours

Historic Spoils Piles

0 175 350 700 Feet

1 inch equals 700 feet

Scale: 1:8,400

Source:
NPS-CHOH Park geodata, NPS-NCR geodata, NPS open source geodata

Spatial Reference

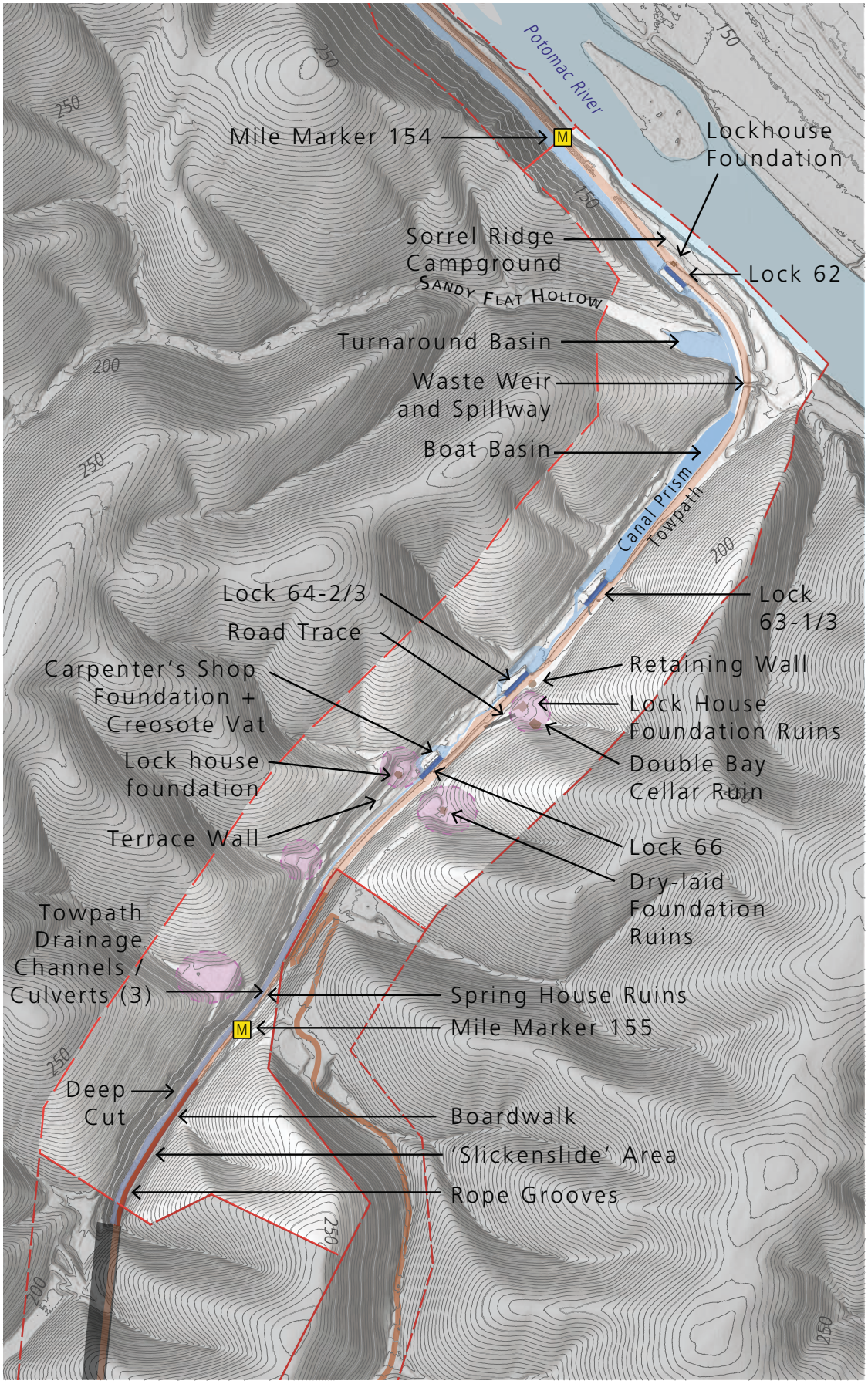
Datum: WGS 1984

Projection: Mercator Auxiliary Sphere

N

Canal Area North + Tunnel Hollow Site Map (5)

Paw Paw Tunnel Cultural Landscape Report | Chesapeake & Ohio Canal National Historical Park



- Landscape Character Area Boundaries
- Towpath
- Trail Detour
- Boardwalk
- Trail
- Roads
- Locks
- Buildings and Structures
- Canal Prism
- Potomac River
- 10' contours
- 2' contours
- M Mile Marker (MM)
- Foundation Ruins
- Historic Spoils Piles

0 350 700 Feet

1 inch equals 800 feet

Scale: 1:9,600

Source:
NPS-CHOH Park geodata, NPS-NCR geodata, NPS open source geodata

Spatial Reference

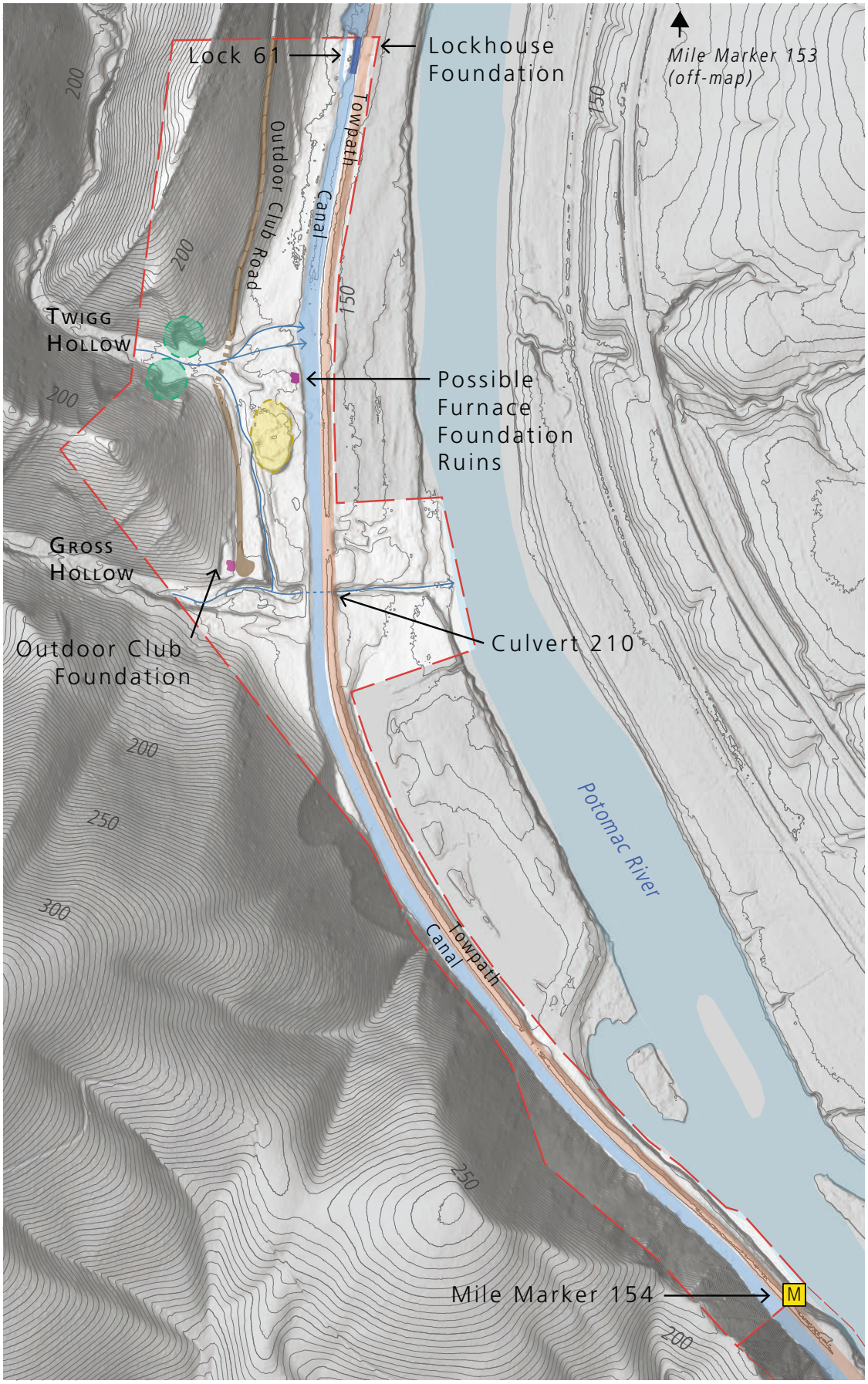
GCS: GCS WGS 1984

Projection: Mercator Auxiliary Sphere

N

Twigg and Gross Hollow Site Map (6)

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- Landscape Character Area Boundaries
- Towpath
- Roads
- Road washout
- Buildings and Structures
- Canal Prism
- Potomac River
- Drainages
- NPS Spoils Piles
- Borrow Pits
- 10′ contours
- 2′ contours
- Mile Marker (MM)
- Locks
- Ruins

0 175 350 700 Feet

1 inch equals 600 feet

Scale: 1:7,200

Source:
NPS-CHOH Park geodata, NPS-NCR geodata, NPS open source geodata

Spatial Reference

GCS: GCS WGS 1984

Projection: Mercator Auxiliary Sphere

N

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Appendix

Appendix A: Superintendent's (Section) House Supplemental Photo Documentation

Appendix A includes several detail views of foundation, structural, and cladding elements of the Superintendent's (Section) House, located at Paw Paw Campground within the Paw Paw Tunnel Cultural Landscape. Each page documents photographic details of existing conditions, as assessed onsite in June 2023. Images include examples of the material conditions and pathology visible in this significant built resource within the Tunnel landscape. Existing issues include (but are not limited to) brick masonry failure and loss in foundation structure, incompatible and failed masonry repairs, biological deterioration (rot) and loss of milled timber sill and wall elements, deferred maintenance, and continued exposure to weather and moisture.

Appendix A: Superintendent's (Section) House
Existing Conditions - photographic detail

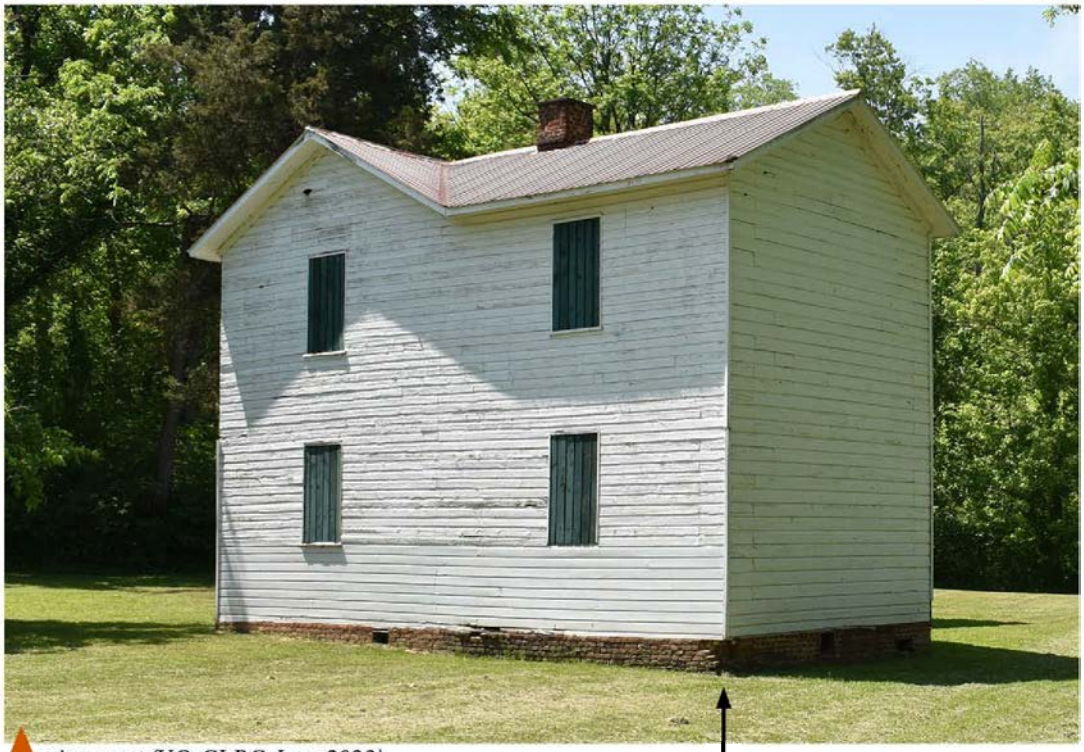
Paw Paw Tunnel Cultural Landscape Report



view south (UO-CLRG, June 2023)



Inset detail: Note missing/degraded elements among sills, studs, door casings, siding, trim/cladding; mortar loss in (incompatible) Mission 66-era brick header bond; and exposure of foundation void.



view west (UO-CLRG, June 2023)



Inset detail: Note failure of historic (i.e., low-fired) common-bond brick at southeast foundation corner, exposure of sill, and accumulated grass/leaf litter.



view southeast (UO-CLRG, June 2023)



Inset detail (above): Note mortar joint failure, missing foundation brick, and incompatible mixture of historic (i.e., low-fired) and Mission 66-era brick and bond types.



Inset detail (right): Note dessication and rot in window casing and sill. Existing (non-historic) ventilated security shutters appear to function well.



view east-northeast (UO-CLRG, June 2023)



Inset detail: Note failure of historic brick foundation and Mission 66-era repairs; loss of milled timber sill; dessication and rot in stud and siding/cladding elements; and encroaching cover.

National Park Service
U.S. Department of the Interior



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