1. NAME OF PROPERTY

Historic Name: Union Canal Tunnel

Other Name/Site Number: Lebanon Tunnel

2. LOCATION

Street & Number: Tunnel Hill Road Not for publication: N/A

City/Town: Lebanon Vicinity: X County: Lebanon

Code: 42 State: Pennsylvania Zip Code: 17046

3. CLASSIFICATION

Ownership of Property
Private: X
Public-local: ___
Public-State: ___
Public-Federal: ___

Category of Property
Building(s): ___
District: ___
Site: ___
Structure: X
Object: ___

Number of Resources within Property

Contributing	Noncontributing	
___	___	buildings
___	___	sites
1	___	structures
___	___	objects
1	0	Total

Number of Contributing Resources Previously Listed in the National Register: 1

Name of related multiple property listing:

4. STATE/FEDERAL AGENCY CERTIFICATION

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this ____ nomination ____ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ____ meets ____ does not meet the National Register Criteria.

_____ _____
Signature of Certifying Official Date

_____
State or Federal Agency and Bureau

In my opinion, the property ____ meets ____ does not meet the National Register criteria.

_____ _____
Signature of Commenting or Other Official Date

_____
State or Federal Agency and Bureau

5. NATIONAL PARK SERVICE CERTIFICATION

I, hereby certify that this property is:

____ Entered in the National Register
____ Determined eligible for the National Register
____ Determined not eligible for the National Register
____ Removed from the National Register
____ Other (explain): _____

_____ _____
Signature of Keeper Date of Action

6. FUNCTION OR USE

Historic: TRANSPORTATION Sub: water-related

Current: RECREATION AND CULTURE Sub: museum

7. DESCRIPTION

ARCHITECTURAL CLASSIFICATION: Other: Tunnel

MATERIALS:
Foundation: N/A
Walls: Argillaceous Slate
Roof: Argillaceous Slate
Other: Limestone & Sandstone (portals)

Describe Present and Historic Physical Appearance.

Located northwest of the city of Lebanon, the Union Canal Tunnel passes beneath Tunnel Hill Road, through an 80′ tall hill which is comprised of argillaceous slate rock, with veins of hard flinty limestone.[1] The 18′ wide tunnel runs on a south to north axis. The original 1827 length of 729′ was reduced to 600′ when the tunnel's height was increased from 15′ to 18′ in 1857-58.[2] The reduced length was caused when the 3′ of rock removed from the top arch raised the top of the tunnel closer to the ground surface level.[3] The side walls and floor of the tunnel remain as originally constructed. The 1857-58 enlarged arch was completed to the same curve profile as the original tunnel arch.[4] The irregular surface of the exposed rock within the tunnel has a flat bottom, perpendicular side walls, and a semi-elliptical top arch.

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[1]The name of the Union Canal derives from the merging of two individual canal companies which had earlier been established to build canals along the same general route.

[2]This modification was done during the winter of 1857-58. William L. Lehman Data Book, (transcription) Lebanon County Historical Society.

[3]Most of the 130′ of uncovered tunnel occurred at the northern end.

[4]March 11, 1993 letter from Lois H. Meily, Lebanon County Historical Society, to Robie Lange. NHL File, History Division, National Park Service, Washington, D.C.

In addition to the interior of the tunnel, the nominated resource includes the northern and the southern portal faces which were built at the time of the 1850s tunnel shortening, as well as the retaining walls which project 53′ out from the northern portal and 71′ out from the southern portal.[5]

The sandstone face of the southern portal is approximately 18′ wide. [See Photograph #1 and Figure #1] The post 1850s 18′ clearance of the tunnel has been reduced due to the accumulation of silt in the canal. The overall portal height (including 5′8" of stonework above the portal opening) is currently 19′10". The crenelated stone ornamentation atop the portal face and the adjacent wing walls was added during the 1930s.[6] The current appearance of the retaining walls, which project perpendicularly from the southern portal, reflect changes made during the 1850s tunnel modification, as well as changes made during a 1930s restoration to the tunnel and retaining walls.[7]

The northern portal is also 18′ wide, but the tunnel's 19th century height of 18′ has been severely reduced by accumulated silt and other material. [See Photographs #2 & #3 and Figure #2] An additional 14′ of masonry comprises the remainder of the portal height above the portal opening.

Despite the impact of raising the tunnel's top arch by 3′ in the 1850s (resulting in the loss of 130′ of tunnel length and the construction of new portals) the great majority of the original fabric remains to sufficiently convey the historic integrity of this nationally significant tunnel.

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[5]Research has been unable to confirm whether these retaining walls are surviving portions of the original longer tunnel, or were constructed as part of the 1857-58 tunnel modification, or even continue to possess sufficient historic integrity following the 1930s' restoration.

[6]No written documentation was found to determine exactly when the crenelated stones were added, but early 20th century photographs in the Lebanon County Historical Society collections strongly suggest that they were added in the 1930s. One photograph entitled "Oldest Tunnel in the United States," and another entitled "Tunnel of the Abandoned Union Canal" show the southern portal without the decorative stones, while a photograph taken during the 1930s restoration, shows the stones partially in place.

[7]An entirely new feature added during the 1930s restoration was the walkway constructed at the western retaining wall to provide a canal-level view of the southern portal.

8. STATEMENT OF SIGNIFICANCE

Certifying official has considered the significance of this property in relation to other properties: Nationally:___ Statewide:___ Locally:___

Applicable National Register Criteria:	A_X_ B___ C___ D___
Criteria Considerations (Exceptions):	A___ B___ C___ D___ E___ F___ G___
NHL Criteria:	1
NHL Theme(s):	XIV-C TRANSPORTATION-CANALS XVIII-B TECHNOLOGY-TRANSPORTATION XVIII-H TECHNOLOGY-CONSTRUCTION
Areas of Significance:	ENGINEERING TRANSPORTATION
Period of Significance:	1825-1858
Significant Dates:	1827, 1857
Significant Person(s):	N/A
Cultural Affiliation:	N/A
Architect/Builder:	Simeon Guilford (Assistant Engineer)

State Significance of Property, and Justify Criteria, Criteria Considerations, and Areas and Periods of Significance Noted Above.

Summary Statement of Significance

Tunnel construction technology of the early 19th century was a relatively crude, tremendously arduous, and fairly dangerous undertaking. Constructed between 1825 and 1827 as part of an 80-mile canal, the Union Canal Tunnel is the oldest extant canal tunnel built in the United States.[1] The canal was planned to

[1]An earlier canal tunnel was built ca. 1820 as part of the Schuylkill Navigation Canal near Auburn, Pennsylvania. The tunnel was 20′ tall, 18′ wide, and about 450′ long. During the mid-1830s, the tunnel's length was reduced by half, and in the mid-1850s, the ground above the tunnel was removed, making it merely another open cut section of canal. Archibald Black, The

carry passengers and freight between Philadelphia and Harrisburg, facilitating commerce between Pennsylvania's major urban center and the resource-rich interior. Furthermore, the canal was regarded as a necessary first step in recapturing some of the commerce lost to New York State's more ambitious Erie Canal. The tunnel is located at the summit, or point of highest elevation, of the canal. Although the canal failed to equal the expectations of its supporters, its construction left behind the oldest extant transportation tunnel in the United States.

History

The idea of building a canal to link the Schuylkill and Susquehanna rivers was suggested at several early points in time by some of Pennsylvania's most prominent individuals, including William Penn in 1690, and David Rittenhouse in 1762. By building a canal across the large land mass of southeastern Pennsylvania, from the shore of the Schuylkill River at Reading to the Susquehanna River at Middletown (south of Harrisburg), passengers and freight could be transported swiftly, easily, and cheaply from the city and port of Philadelphia to the central portion of the state. Efforts to construct the canal, however, did not begin to make significant headway until about 1815, after Loammi Baldwin, Jr. (the son of the builder of the Middlesex Canal), and later, Canvass White (earlier an engineer on the Erie Canal), were enlisted to serve as the canal's engineer.

In laying out the route of canals, engineers tried to avoid the necessity of carrying their canal over rises in elevation. The importance of maintaining a level canal grade relates to a basic law of nature--since water seeks its own level, water could not be easily maintained at the higher elevations of a canal because it tended to flow down to the lower elevations. When traversing such variations in elevations was unavoidable, canal engineers usually installed a series of canal locks to gradually raise the barges in level pools to higher and higher elevations. Had this portion of canal not already occupied the highest elevation along the canal route, the engineers might have utilized canal locks to lift barges over the 80' hill. Instead, they decided to undertake the more ambitious approach of tunneling, which had the additional advantage of not introducing the time delays of traveling through canal locks. Despite the difficulty and expense of construction, canal tunnels proved very useful in maintaining a more level canal.[2]

Story of Tunnels (New York: Whittlesey House, 1937): 19.

[2]One of the most impressive American canal tunnels is the 3,118'-long Paw Paw Tunnel constructed between 1836 and 1848 in Western Maryland as part of the Chesapeake and Ohio Canal. This tunnel is currently open to the public as part of the National Park Service's Chesapeake and Ohio Canal.

The tunnel was a small, yet critical, component of the larger canal project. It was constructed under the direction of the canal's Assistant Engineer, Simeon Guilford.[3] The actual excavation was begun under three contracts in early 1826 by John B. Ives, Maloy & Slaman, and Thomas Moore Co.[4] The tunnel was constructed using the best available technology of the time. Workers laboriously hammered sharpened rods, or "drills", into the rock at the tunnel face. Black powder was inserted into each of the drill holes and ignited. Picks and shovels were then used to break off more of the fractured rock and to move it away from the tunnel heading. According to one contemporary account, working in day and night shifts, the tunnel excavation advanced through the rock at a rate of 2′ per day.[5] The tunnel was originally excavated with dimensions of 15′ high and 18′ wide.

A year and a half after it was begun, the tunnel was completed. The total project cost was $30,500.[6] The first canal boat passed through the tunnel on June 12, 1827.[7] Since the tunnel was too narrow for a towpath, barges were poled through by the crew, and the mules were walked over the top of the 80′ high hill.[8] The canal was officially opened in the beginning of 1828.[9]

During the mid-1850s, the canal and its locks were widened to provide clearance for larger barges. With this modification, the canal could handle barges which were nearly double its original 28-ton capacity. Apparently the original width of the tunnel was sufficient to accommodate the newer and larger barges, but as part of this upgrading, in 1857 and 1858, 3′ of rock was removed from the top arch of the tunnel to increase its overall height.

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[3]Daniel L. Schodek, Landmarks in American Civil Engineering (Cambridge, MA: MIT Press, 1987): 163.

[4]Dean M. Aungst, "The Two Canals of Lebanon County," Papers of the Lebanon County Historical Society (Lebanon, PA: Lebanon County Historical Society, 1966): 37.

[5]Niles Weekly Register (October 28, 1826): 132.

[6]This amount included the cost of the open cuts at either portal. Aungst, p. 37; "Union Canal Tunnel National Register of Historic Places Nomination Form," (Washington: National Park Service, 1971).

[7]Niles Weekly Register, Vol. 31, June 23, 1927.

[8]"Union Canal Tunnel in Pennsylvania is Designated as National Historic Civil Engineering Landmark," American Society of Civil Engineering News (May 13, 1970) [Press Release].

[9]Aungst, p.38.

The cost of the mid-century expansion of the tunnel was $8,280.[10] Nevertheless, the new 50-ton barges still could not compete with the much larger and more economically efficient barges being introduced on larger canals.[11]

With the completion of the Pennsylvania Main Line Canal in the mid-1830s, the Union Canal became a link in an even longer canal system leading all the way to Pittsburgh. Shortly thereafter, newer canals capable of carrying even larger barges began to take much of Pennsylvania's barge commerce away from the Union Canal. Even the widening of the Union Canal during the 1850s proved inadequate to compete with the wider canals and the expanding networks of railroads. After going bankrupt during the 1860s, the canal was picked up at auction by one of its most formidable competitors, the Philadelphia and Reading Railroad. The canal was finally abandoned by them in 1885.[12] Beginning in 1950, the Lebanon County Historical Society began acquiring parcels of land which include the tunnel and the adjacent canal. The Historical Society preserves and maintains the tunnel and a short section of watered canal for the education and enjoyment of the community.

In recognition of its engineering significance, the Union Canal Tunnel was designated a Civil Engineering Landmark by the American Society of Civil Engineers in 1970. The Tunnel was listed on the National Register of Historic Places in 1974.

The Union Canal was neither the earliest nor the most ambitious canal built in America. It did, however, include an engineering feature which only one earlier canal builder had dared to undertake--to carry a canal through a hard rock obstruction via a tunnel. As such, it remains the oldest extant transportation tunnel in the United States.

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[10]"Union Canal Tunnel National Register of Historic Places Nomination Form."

[11]"Union Canal Tunnel in Pennsylvania is Designated as National Historic Civil Engineering Landmark," ASCE News; "Union Canal Tunnel National Register of Historic Places Nomination Form."

[12]Schodek, pp. 164-5.

9. MAJOR BIBLIOGRAPHICAL REFERENCES

Aungst, Dean M. "The Two Canals of Lebanon County," Papers of the Lebanon County Historical Society, Vol. XIIV, No. 1, pp.37-38, Lebanon, Lebanon County Historical Society, 1966.

Black, Archibald. The Story of Tunnel. New York: Whittlesey House (McGraw-Hill Book Company, Inc.), 1937.

"Historical Files." Lebanon, PA: Lebanon County Historical Society.

Sandstrom, Gosta A. Tunnels. New York: Holt, Rinehart and Winston, 1963.

Schodek, Daniel L. Landmarks in American Civil Engineering Cambridge, MA: MIT Press, 1987.

Stauffer, David McNeely. Modern Tunnel Practice. New York: The Engineering News Publishing Company, 1911.

"Union Canal Tunnel Civil Engineering Landmark File." American Society of Civil Engineers, Washington, DC.

"Union Canal Tunnel in Pennsylvania is Designated as National Historic Civil Engineering Landmark." American Society of Civil Engineering News (May 13, 1970) [Press Release].

Vogel, Robert M. Tunnel Engineering: A Museum Treatment. Washington, DC: Smithsonian Institution, 1964.

West, Graham. Innovation and the Rise of the Tunneling Industry. Cambridge: Cambridge University Press, 1988.

Previous documentation on file (NPS):

___ Preliminary Determination of Individual Listing (36 CFR 67) has been requested.
_X_ Previously Listed in the National Register.
___ Previously Determined Eligible by the National Register.
___ Designated a National Historic Landmark.
___ Recorded by Historic American Buildings Survey: #_____
___ Recorded by Historic American Engineering Record: #_____

Primary Location of Additional Data:

___ State Historic Preservation Office
___ Other State Agency
___ Federal Agency
___ Local Government
___ University
_X_ Other (Specify Repository): Lebanon County Historical Society

10. GEOGRAPHICAL DATA

Acreage of Property: approx. 2 acres

UTM References: Zone Northing Easting

A 18 4467410 375840

Verbal Boundary Description:

The boundary of the nominated property is printed by a dotted line on the attached Lebanon Quadrangle USGS map, and its approximate center point is indicated by the above listed UTM reference point.

Boundary Justification:

The boundary of the nominated property includes the extant tunnel, from portal to portal, as well as the northern and southern retaining walls.

11. FORM PREPARED BY

Name/Title: Robie S. Lange / Historian Org.: History Division, NPS

Street: P.O. Box 37127 City/Town: Washington State: DC

ZIP: 20013-7127 Telephone: 202-343-0350 Date: October, 1993

Union Canal Tunnel
Lebanon vicinity
Lebanon County, PA

Lebanon Quad
UTM Reference Pt.
18 / 4467410 / 375840