

North Avenue Bridge

B-4521

West North Avenue over MDOT MTA Light Rail, CSX, Amtrak, Jones Falls, and Falls Road

Baltimore City, Maryland

1891-1896

Public

CAPSULE SUMMARY

The North Avenue Bridge (BC1208), built between 1891 and 1896, carries the six-lane West North Avenue over the Jones Falls Valley in a heavily developed urban area, and is part of the Baltimore & Ohio (B&O) Railroad Baltimore Belt Line (B-5287). The three-level, seven-span, stone-arch bridge is 888 feet long and 100 feet wide. The exterior is dark irregularly coursed stone blocks and regularly coursed, rock-faced limestone. The substructure spans the Maryland Department of Transportation Maryland Transit Administration light rail tracks, CSX railroad tracks, Amtrak railroad tracks, the Jones Falls, and Falls Road on the middle level, with the Baltimore & Potomac (B&P) Tunnel at the lowest level. The 27-foot wide western four arches are paired. The three eastern arches are 130 feet wide. The B&P Tunnel southeast portal is between the fourth and fifth arches, extending beyond the south face of the bridge at an angle. The superstructure accommodates wide, two-level, concrete sidewalks on both the north and south sides, five lanes of vehicular traffic, and a protected bicycle lane. An original cast-iron balustrade runs atop the circa-1976 and 1977 date-stamped concrete parapets.

The North Avenue Bridge was constructed by the City of Baltimore. As part of the construction, the bridge accommodated the B&O Railroad's Baltimore Belt Line, a railroad segment constructed between 1890 and 1895 in Baltimore, Maryland. The Belt Line was a major infrastructure improvement that was part of a larger effort by the B&O to provide through-service between Washington, DC, and New York City. The Belt Line allowed the B&O to connect its yards in Mount Clare on the west side of Baltimore to Bay View Junction on the east. Prior to its completion, the B&O used barges to ship its railcars over the Patapsco River. The B&O electrified four miles of the Belt Line between 1895 and 1896.

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1. Name of Property (indicate preferred name)

historic North Avenue Bridge

other

2. Location

street and number West North Avenue over MDOT MTA Light Rail, CSX, Amtrak, the Jones Falls, and Falls Road ___ not for publication

city, town Baltimore ___ vicinity

county Baltimore City

3. Owner of Property (give names and mailing addresses of all owners)

name Maryland Department of Transportation, State Highway Administration

street and number 707 North Calvert Street telephone

city, town Baltimore state MD zip code 21202

4. Location of Legal Description

courthouse, registry of deeds, etc. liber folio
city, town Baltimore, MD tax map tax parcel tax ID number

5. Primary Location of Additional Data

- Contributing Resource in National Register District
 Contributing Resource in Local Historic District
 Determined Eligible for the National Register/Maryland Register
 Determined Ineligible for the National Register/Maryland Register
 Recorded by HABS/HAER
 Historic Structure Report or Research Report at MHT
 Other: _____

6. Classification

Category	Ownership	Current Function		Resource Count	
___ district	<input checked="" type="checkbox"/> public	___ agriculture	___ landscape	Contributing	Noncontributing
___ building(s)	___ private	___ commerce/trade	___ recreation/culture	___	___ buildings
<input checked="" type="checkbox"/> structure	___ both	___ defense	___ religion	___	___ sites
___ site		___ domestic	___ social	1	___ structures
___ object		___ education	<input checked="" type="checkbox"/> transportation	___	___ objects
		___ funerary	___ work in progress	1	0 Total
		___ government	___ unknown		
		___ health care	___ vacant/not in use		
		___ industry	___ other:		
				Number of Contributing Resources previously listed in the Inventory	
				1	

7. Description

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Condition

excellent deteriorated
 good ruins
 fair altered

Prepare both a one paragraph summary and a comprehensive description of the resource and its various elements as it exists today.

This form provides an overall description and history of the North Avenue Bridge, but focuses on the relationship of the bridge to the B&O Railroad Baltimore Belt Line.

The North Avenue Bridge (BC1208), built between 1891 and 1896, is a complex structure that carries West North Avenue over the Jones Falls Valley, spanning, from west to east, the Maryland Department of Transportation Maryland Transit Administration (MDOT MTA) light rail tracks, the CSX railroad tracks, the Amtrak railroad tracks and associated Baltimore and Potomac (B&P) Railroad Tunnel (B-5164), the Jones Falls, and Falls Road. The bridge is in a heavily developed urban area and is bounded by the Jones Falls Expressway (I-83) to the southwest, various railroad junctions to the south, the Howard Street Bridge (BC1405, B-4529) to the southeast, a CSX metal girder railroad bridge to the northeast, and the North Avenue Light Rail Station to the northwest. The North Avenue Bridge is part of the Baltimore & Ohio (B&O) Railroad Baltimore Belt Line (B-5287), a 7.2-mile railroad segment constructed between 1890 and 1895 that cuts north and east through the city of Baltimore from Camden Station (B-148) on the south side of the city to Bay View Junction on the northeast.

The North Avenue Bridge is a three-level, seven-span, stone-arch bridge measuring 888 feet in length and 100 feet in width. The exterior contains two types of cut coursed stone: small, dark irregularly coursed stone blocks on the westernmost end and regularly coursed, rock-faced limestone for the remainder. The bridge superstructure contains the asphalt-paved West North Avenue roadway. The substructure spans over the MDOT MTA light rail tracks, CSX railroad tracks, Amtrak railroad tracks, the Jones Falls, and Falls Road on the middle level, with the B&P Tunnel at the lowest level (see **Figure 1**). The seven arched openings at the central level are unevenly sized and spaced. The western four portals are 27 feet wide and are clustered in pairs—the first two carrying the light rail tracks (formerly used by Northern Central Railway [NCR]) and the second two carrying CSX tracks (formerly used by the B&O Railroad). The twin portals are identical with paired segmental arches lined by unevenly sized voussoirs. The tunnel arches are constructed of brick covered with a thin concrete veneer (see **Figure 2a**). Seen at ground level inside the four western tunnels are arches that support the B&P Tunnel below (see **Figure 2b**). The three eastern arched openings are 130 feet wide and span, from west to east, Amtrak railroad tracks (formerly used by the Pennsylvania Railroad), the Jones Falls, and Falls Road. Each of these large arch barrels are skewed and constructed of coursed red brick ribs that fan out to form a stepped surface. The arches rest on large stone piers. At the lowest level of the bridge, between the fourth and fifth arched openings of the middle level, is the southeast portal of the B&P Tunnel. The portal extends at grade with the other Amtrak tracks beyond the south face of the bridge at an angle, jutting out from the bridge (see **Figure 3**). The arched portal is lined by irregularly spaced voussoirs. An original cast-iron balustrade runs atop the 1976 and 1977 date-stamped concrete parapets, with the exception of small sections on the north and south sides that contain solid metal panels. The deck accommodates wide, two-level, concrete sidewalks on both the north and south sides and five lanes of vehicular traffic separated by a Jersey barrier. The westbound lanes contain two through vehicle lanes and a protected bicycle lane. The eastbound lanes contain three through vehicle lanes (Culhane 1999, 1, IV-14).

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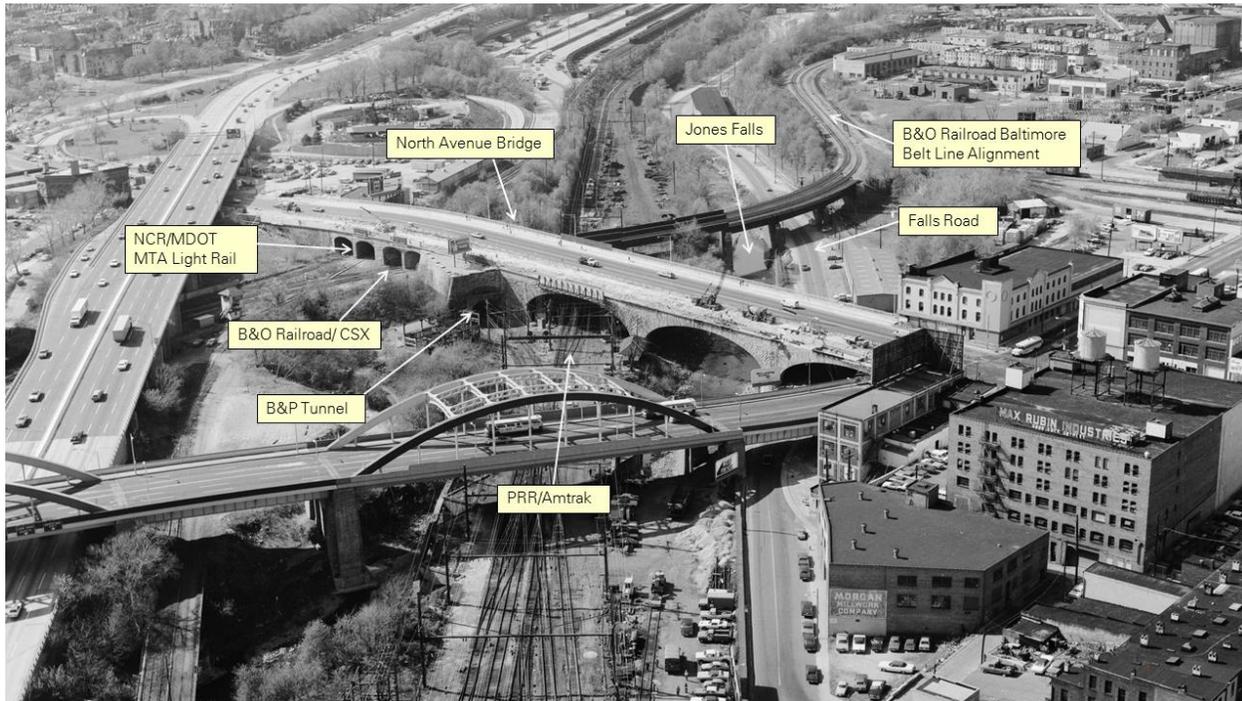


Figure 1: Annotated aerial view of the North Avenue Bridge, looking northwest, 1977.
Photo Credit: Historic American Engineering Record, HAER MD-45, Library of Congress

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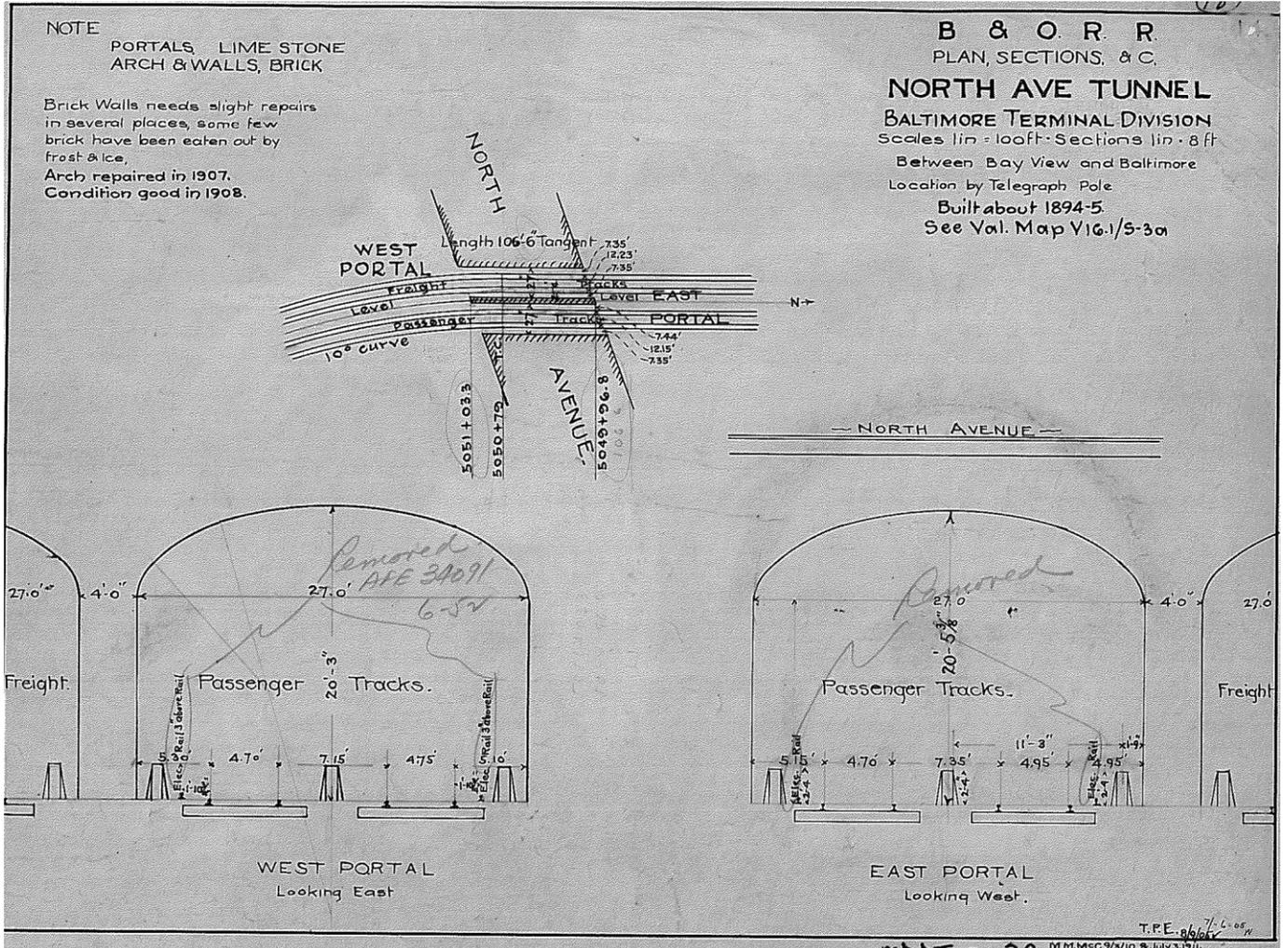


Figure 2a: Plan sheet showing the B&O Railroad south and north portal sections, indicated in the image as the “west” and “east” portals, from “B&O RR Plan, Sections, &c. North Ave. Tunnel,” 1905 (annotated in 1905, 1910, 1911, and 1952 [assumed]).

Image Credit: CSX Transportation

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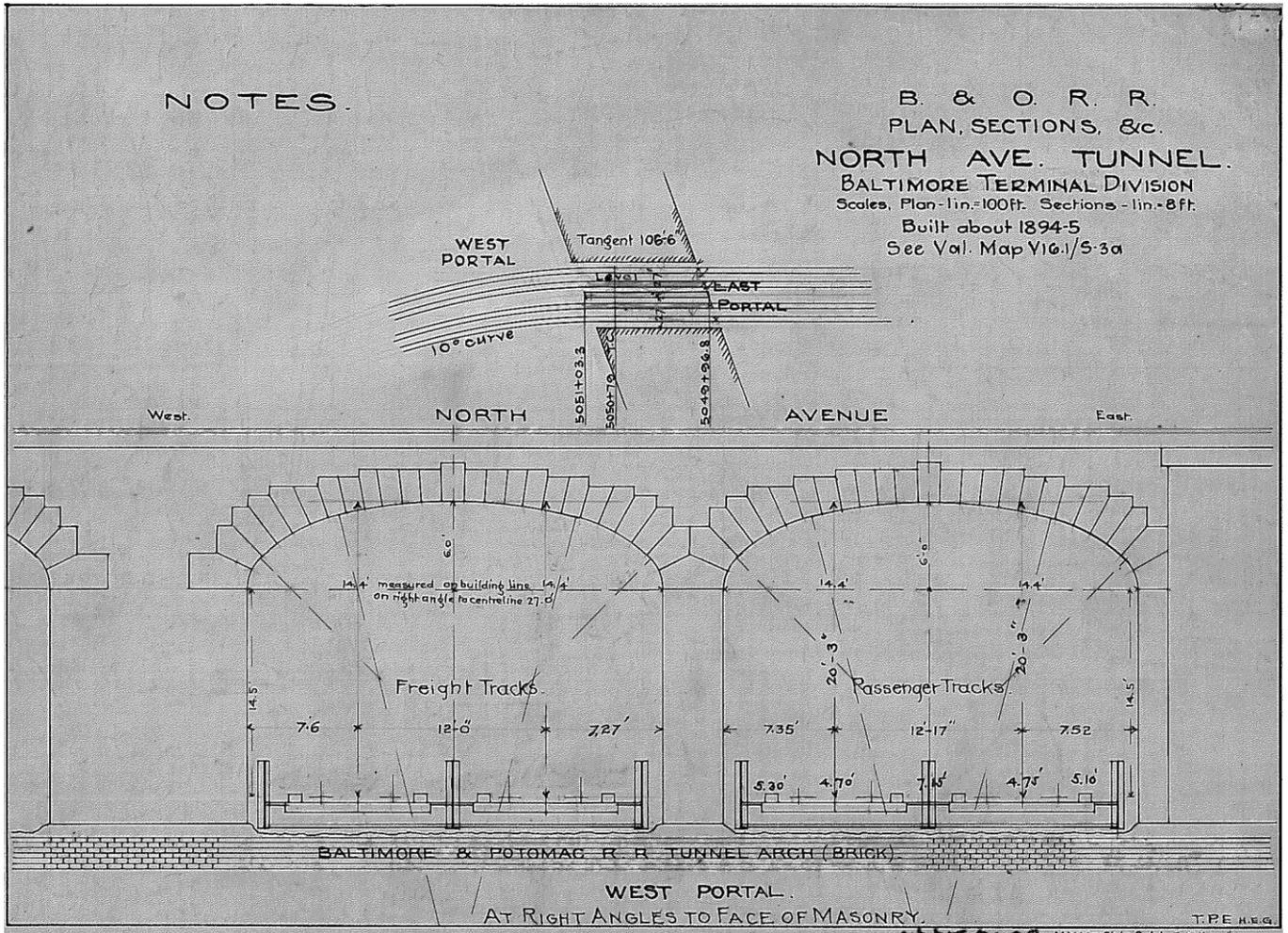


Figure 2b: Plan sheet showing the B&O Railroad south portals, indicated in the image as the “west portal,” above the B&P Tunnel arch, from “B&O RR Plan, Sections, &c. North Ave. Tunnel,” 1905 (annotated in 1905, 1910, and 1911).
 Image Credit: CSX Transportation

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Figure 3: North Avenue Bridge, B&P Tunnel southeast portal (left) and south elevation of the arch over Amtrak tracks (center), ca. 2014.
Photo Credit: Amtrak

8. Significance

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Period	Areas of Significance	Check and justify below		
<input type="checkbox"/> 1600-1699	<input type="checkbox"/> agriculture	<input type="checkbox"/> economics	<input type="checkbox"/> health/medicine	<input type="checkbox"/> performing arts
<input type="checkbox"/> 1700-1799	<input type="checkbox"/> archeology	<input type="checkbox"/> education	<input type="checkbox"/> industry	<input type="checkbox"/> philosophy
<input checked="" type="checkbox"/> 1800-1899	<input type="checkbox"/> architecture	<input checked="" type="checkbox"/> engineering	<input type="checkbox"/> invention	<input type="checkbox"/> politics/government
<input type="checkbox"/> 1900-1999	<input type="checkbox"/> art	<input type="checkbox"/> entertainment/ recreation	<input type="checkbox"/> landscape architecture	<input type="checkbox"/> religion
<input type="checkbox"/> 2000-	<input type="checkbox"/> commerce	<input type="checkbox"/> ethnic heritage	<input type="checkbox"/> law	<input type="checkbox"/> science
	<input type="checkbox"/> communications	<input type="checkbox"/> exploration/ settlement	<input type="checkbox"/> literature	<input type="checkbox"/> social history
	<input type="checkbox"/> community planning		<input type="checkbox"/> maritime history	<input checked="" type="checkbox"/> transportation
	<input type="checkbox"/> conservation		<input type="checkbox"/> military	<input type="checkbox"/> other: _____
Specific dates	1891-1896	Architect/Builder City of Baltimore and Samuel Rea, engineers, L.B. McCabe and Brother, builder		
Construction dates	1891-1896			
Evaluation for:				
<input type="checkbox"/> National Register		<input type="checkbox"/> Maryland Register		<input checked="" type="checkbox"/> not evaluated

Prepare a one-paragraph summary statement of significance addressing applicable criteria, followed by a narrative discussion of the history of the resource and its context. (For compliance projects, complete evaluation on a DOE Form – see manual.)

The North Avenue Bridge was constructed by the City of Baltimore. As part of the construction, the bridge accommodated the path of the Baltimore and Ohio (B&O) Railroad's Baltimore Belt Line, a railroad segment constructed between 1890 and 1895 in Baltimore, Maryland. The Belt Line was a major infrastructure improvement that was part of a larger effort by the B&O to provide through-service between Washington, DC, and New York City. The Belt Line allowed the B&O to connect its yards in Mount Clare on the west side of Baltimore to Bay View Junction on the east. Prior to its completion, the B&O used barges to ship its railcars over the Patapsco River.

Railroads in Baltimore

The B&O Railroad was chartered in 1827, and three years later became the first operational railroad in the United States. The railroad's goal was to connect Baltimore to the lucrative markets of the Ohio River Valley. Westward progress was slow, as the line to Wheeling, West Virginia, was not completed until 1852; however, other segments were completed more quickly. The B&O opened a southern branch to Washington, DC, in 1835 that departed from the B&O's eastern terminus at Mount Clare Station at Pratt and Poppleton Streets in southwest Baltimore. In 1857, the B&O moved its eastern terminus to its newly constructed, and much larger, Camden Station at West Camden and South Howard Streets, which was much closer to downtown (Manning 2015, 2).

The B&O soon faced stiff competition from other railroads. The Philadelphia, Wilmington, and Baltimore (PW&B) Railroad and the Baltimore and Susquehanna Railroad (later known as the Northern Central Railway) established lines to Baltimore by 1840. The Pennsylvania Railroad (PRR) expanded its Baltimore presence through acquisitions of the Northern Central Railway and the Baltimore and Potomac (B&P) Railroad. In 1873, the PRR constructed the 1.7-mile B&P Tunnel under the west side of Baltimore, providing a western connection to their newly constructed Union Station in the Jones Falls Valley. On the east side of the city, the PRR constructed a tunnel under Hoffman Street, which connected Union Station to the PW&B's line to Philadelphia (Manning 2015, 2).

With these improvements, the PRR gained a continuous north-south route through Baltimore connecting Washington, DC, to Philadelphia. Meanwhile, the B&O had no such connection through Baltimore, leaving the railroad at a distinct disadvantage. A partial solution to provide better access was the construction of a spur from Camden Station to Locust Point on the west side of the Baltimore Harbor. At Locust Point, a specially designed ferry transferred cars across the harbor to Canton on the east side. From

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Canton, a line continued two miles northeast to Bay View Junction, where it connected with the PW&B's line to Philadelphia (Manning 2015, 2).

North of Bay View Junction, both the PRR and B&O used tracks owned by the PW&B. Both railroads sought to acquire the PW&B, and, in 1881, the PRR, which was in a better financial position, secured ownership of the PW&B. Three years later, in 1884, the PRR prohibited all B&O service from the tracks, removing the B&O's access to Philadelphia. This action spurred the construction of the B&O's "Royal Blue Line," a new rail alignment between Bay View Junction and Philadelphia. North of Philadelphia, the B&O relied on tracks owned by the Reading Railroad and the Central Railroad of New Jersey to reach New York's harbor (Manion 1990, 7; Harwood 1990, x).

Establishment of the B&O Belt Line

While the Locust Point to Canton ferry continued to operate as a stopgap measure in Baltimore, the B&O explored other options for a rail connection through Baltimore, including a proposed elevated line that was unpopular with civic leaders. The proposed alternative was the construction of a 1.4-mile tunnel under Howard Street that would connect Camden Station to Bay View Junction through Baltimore's less populous north side. From Bay View Junction, the line would connect to the B&O's Royal Blue Line to Philadelphia (Manning 2015, 2-3). This route posed complicated construction challenges, including the need to cross the Jones Falls Valley and the tracks and rail yard of the PRR while avoiding major roadways, the North Avenue Bridge (under construction at the time), and the southeast portal of the B&P Tunnel. According to one historian, "the topography, tracks, and city streets presented a maze of obstacles at varying elevations, and [the chief engineer] had to find a way to thread the new line," all four tracks of it at this point, "through it all." The final design "literally wove the Belt Line through these existing structures" (Manning 2015, 3).

In 1888, the B&O incorporated the Baltimore Belt Railroad Company, which allowed the railroad to gain right-of-way through Baltimore. They were joined in this venture by the Maryland Central Railroad (MCRR), a small, narrow-gauge line that had initiated the idea for the tunnel; however, the MCRR soon failed, and the B&O took full control of the project. The plan proved controversial, however, as the Baltimore City Council voiced concerns about possible surface disruptions during construction of the tunnel. Baltimore residents were also concerned about dangerous track crossings and smoke and gas ventilation causing serious health hazards, a problem that plagued the now 15-year-old B&P Tunnel. A group of Baltimoreans calling themselves the "Citizens' Committee" published their concerns in a news article in 1890, expressing frustration at several factors that would disturb the lives of nearby residents, including the size of proposed open cuts, lack of limits on train speed, and location. The committee, however, was supportive of the proposed tunnel beneath Howard Street (Manion 1990, 12-13; *The Sun* 1890a, 1).

The B&O made a few concessions to ensure completion of the project. As part of the ordinance for the Belt Line, the B&O agreed to construct granite coping with iron rails, as well as walls with iron railings and curbs to protect pedestrians from the open cuts during the tunnel's construction. To limit bottlenecks inside the tunnel and to protect passengers from fumes and gases from steam locomotives, the city approved the railroad's request for double tracks and side tracks to keep traffic moving. The railroad was prohibited from adding ventilation openings along Howard Street. Instead, it was instructed to build tall chimneys on its property to lift smoke above the city; however, a later decision to use electric power along the line negated the need for such ventilation structures. Howard Street, a busy thoroughfare, had to remain open during construction and the city's northside streets along the Belt Line route could not be obstructed by construction. Additionally, the city allocated land for two passenger stations along Howard Street, though only Mount Royal Station was constructed. After two years of negotiations and land surveys, in the fall of 1889 the B&O and Baltimore City officials announced final plans to construct a tunnel beneath Howard Street. In May of 1890, all necessary

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approvals were secured from Baltimore's mayor, City Council, and the Maryland Legislature to allow the Baltimore Belt Railroad Company's work to commence (Harwood 2002, 87; Lee 2004, 167; Manion 1990, 14-15; Manning 2015, 2-3).

The "Records of Construction of Section No. 4 of the Baltimore Belt Railroad" list Samuel Rea, Chief Engineer, September 1889 to April 15, 1891; Richard Randolph, Chief Engineer, April 15, 1891, to August 22, 1892; and W. T. Manning, Chief Engineer, August 22, 1892, to completion. Rea joined the Baltimore Belt Railroad Company as chief engineer in 1889 and was instrumental in making the Howard Street Tunnel and Belt Line a reality. His ingenuity provided workable solutions for the route the Belt Line would thread through Baltimore, including the tangle of tracks at Jones Falls Valley by the existing North Avenue Bridge and the B&P Tunnel (Lee 2004, 168). Rea had spent most of his career working for various railroads. He began working at the PRR in 1871 at age sixteen as a chainman on the Morrison's Cove Branch in Pennsylvania. The Panic of 1873 halted most engineering work, and Rea joined the Hollidaysburg Iron and Nail Company for about one year before rejoining the PRR's engineering corps. As an assistant engineer, he helped with the construction of the 1877 Point Bridge, a chain suspension bridge over the Monongahela River in Pittsburgh and the construction of the Pittsburgh and Lake Erie Railroad. In 1879, he served as assistant engineer of the construction of the Pittsburgh, Virginia, and Charleston Railroad, and in 1888, he was made assistant to the PRR's second vice president. In 1889, he resigned and joined the Belt Line project as vice president of the MCRR and chief engineer of the Baltimore Belt Railroad Company. Ill health forced his resignation from work beginning in 1891, but he returned to the PRR as assistant to the president in 1892, later serving in various vice president roles until he was elected president of the company in 1912 (*Altoona Tribune* 1925, 2). Manning became chief engineer of the Baltimore Belt Railroad Company and assistant chief engineer of the B&O Railroad in 1892 and chief engineer of the B&O Railroad in 1894. He oversaw construction of the Belt Line before retiring from the B&O in 1899. J.B. Bolt, P.A. may also have had a role in the design of the Belt Line.

The construction contracts were awarded to two local firms, Ryan and McDonald and L. B. McCabe and Brother, the latter of which would go on to help build New York City's first subway in 1904. These two firms were incorporated as The Maryland Construction Company for the construction of the Baltimore Belt Line. The Belt Line construction was divided into four discrete sections: a 2-mile section from Hamburg Street to Mount Royal Avenue, which included the Howard Street Tunnel; a 1.2-mile section from Mount Royal Avenue to Guilford Avenue; a 2-mile section from Guilford Avenue to Belair Road; and a 2-mile section from Belair Road to Bay View Junction (Manion 1990, 15; Lee 2004, 173; *Railway Review* 1922, 142).

The anticipated cost of the Belt Line was \$6 million—\$5 million for the construction and \$1 million for contingencies and improvements (Harwood 2002, 85). The Howard Street Tunnel alone was estimated to cost more than \$2 million of the budget (Manion 1990, 15). The timing of this expensive project was unfortunate, as the Panic of 1893 exacerbated a period of financial instability across the country and led to the failure of one of the B&O's principal financial supporters, the Baring Brothers' baking firm in London. Between 1892 and 1896, the B&O's total revenue dropped sharply. The B&O was forced to cut back proposed expansion plans, allowing for the completion of the Belt Line but no other costly projects. Everyday infrastructure maintenance also suffered (Jacobs 1989, 68). The Belt Line's construction went over budget, totaling approximately \$7 million, which was the B&O's most expensive rail project to date. The B&O, already suffering financial mismanagement, sunk into receivership in early 1896 (Harwood 2002, 97). John K. Cowen, who replaced Charles Mayer as president a few weeks prior in January of 1896, steered the B&O through receivership over the next two years. When the company emerged, it had added over 200 new locomotives, 28,000 new freight cars, and more than 120,000 tons of steel rails, and was in better financial shape overall (Reynolds and Oroszi 2000, 39).

When completed in 1895, the double-tracked Baltimore Belt Line ran north from Camden Station via the Howard Street Tunnel (B-79), past Mount Royal Station (B-26), through the shorter Mount Royal Tunnel, through the North Avenue Bridge (B-4521), over the

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B&P Tunnel, across the Jones Falls, and finally winding north up the east side of the Jones Falls Valley (see **Figure 4**). After reaching a high point near Huntingdon Avenue and West 26th Street, the line turned sharply east, passing through a long, open cut interspersed with several stone-arch tunnels of varying lengths, including the Guilford Avenue Tunnel, and over several smaller plate girder bridges, ultimately connecting with the B&O's Royal Blue Line to Philadelphia at Bay View Junction. In total, the Belt Line included 7.2 miles of track and 10 tunnels totaling 9,605 feet in length. All original tunnel portals and retaining walls along the open cuts are rusticated, regularly coursed limestone, although in most cases the tunnel themselves are constructed of brick. Original bridges generally consist of steel through-plate girders supported by stepped limestone abutments (Manning 2015, 3-4).

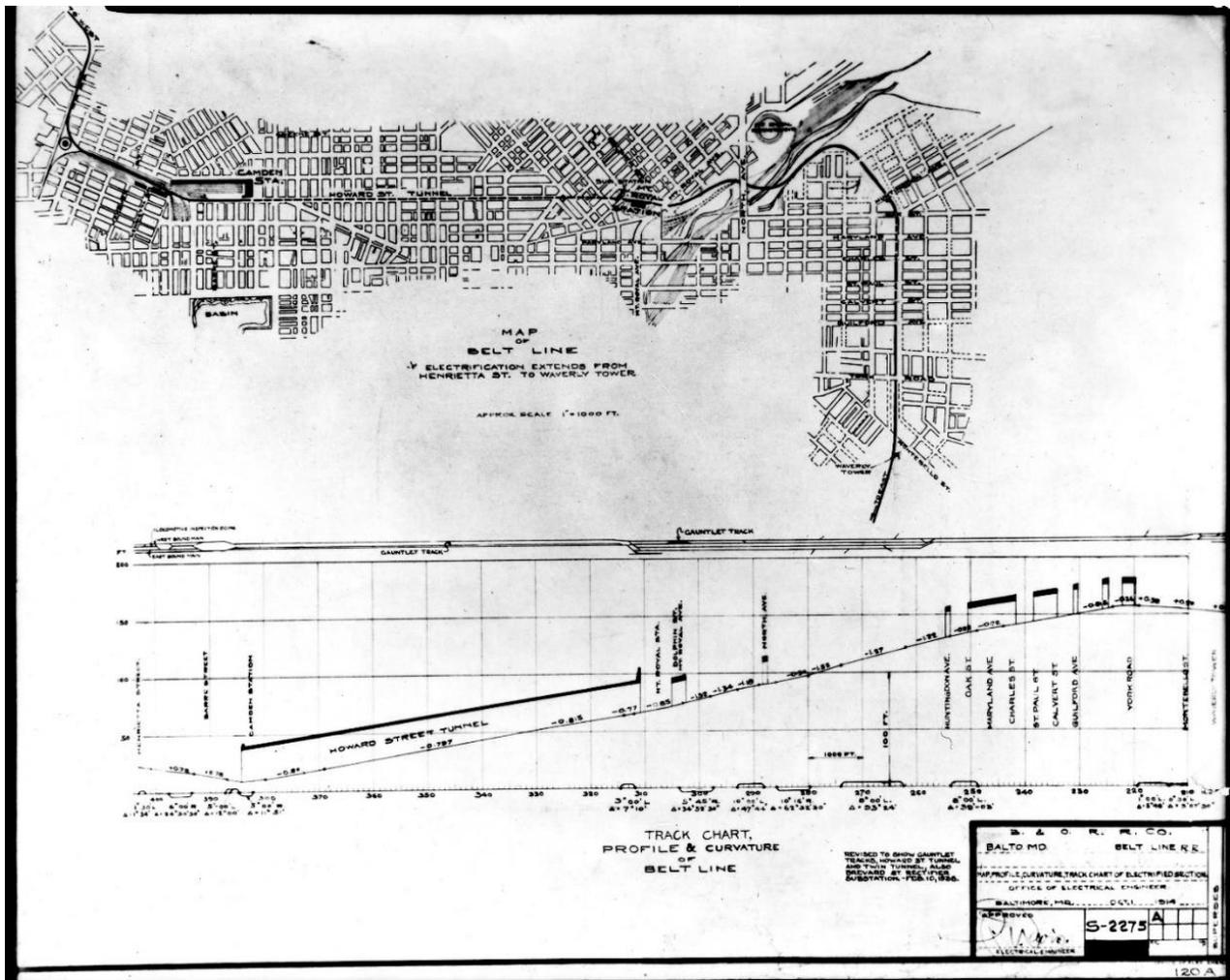


Figure 4: Map and track chart, profile and curvature of the Baltimore Belt Line, 1914.
Image Credit: B&O Railroad Museum

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History and Construction of the North Avenue Bridge

The North Avenue Bridge crosses the Jones Falls near what was the northern extent of the city between 1816 and 1888. During the eighteenth and early nineteenth centuries, the bridge area consisted of undeveloped woodland owned by the Rutter family. The vicinity had been improved with rail lines for the Baltimore and Susquehanna Railway (later the Northern Central Railway [NCR]) by the mid-nineteenth century. A 400-foot, five-span, iron and wood truss bridge with stone abutments and piers, completed in 1870, carried North Avenue over the Jones Falls and rail lines associated with the Baltimore & Potomac (B&P) Railroad and NCR's Bolton Yard, a circa-1832 freight yard at Bolton Station, located near the intersection of Mount Royal Avenue and Dolphin Street. The B&O constructed Mount Royal Station in 1896 on the Bolton lot, south of Bolton Station, after acquiring the lot from the NCR. An additional single-span portal, which was the eastern end of the B&P Tunnel was constructed in 1873 to the west of the NCR tracks. By 1876, the city annexed land as far north as North Avenue. By the 1880s, the original bridge was deteriorating, and, in 1889, one 57-foot truss collapsed. During the following year, the city began planning for the replacement of the bridge with a stone viaduct, but the design was complicated by the pending construction of the B&O Railroad's Baltimore Belt Line. The new bridge would have to cross not only the Jones Falls and Falls Road, but also tracks for the B&O and NCR, as well as the B&P Tunnel. The bridge was designed so that each set of tracks could be accommodated without causing serious bottlenecks or compromising the structural integrity of the bridge or the B&P Tunnel. The successful construction of this bridge facilitated the continued use of a number of railroad lines, which were instrumental in connecting Baltimore with Washington, Philadelphia, and New York (Bray et al. 2021, 31; Culhane 1999, IV-15; Harwood 1990, 88, 90).

In 1890, the *Sun* published an article by George C. Wilkins, general agent for the NCR, a subsidiary of the Pennsylvania Railroad (PRR), the B&O's primary competitor, calling for the realignment of the proposed Belt Line tracks over the NCR's Bolton Yard. The original plans called for the tracks of the Belt Line to cross seven Bolton Yard tracks at grade, then over the NCR passenger tracks and under North Avenue near the existing North Avenue bridge. At the eastern end of the bridge, the proposal called for raising the grade from Maryland Avenue to a total of 16 feet. The NCR proposed instead a plan where the Belt Line tracks crossed just two tracks in Bolton Yard by shifting the location where the tracks would intersect in the yard. This would also minimize the impacts of increasing the grading of North Avenue in residential areas (*The Sun* 1890b, 1).

In 1891, the *Sun* announced revisions to the new North Avenue Bridge design to avoid the seven NCR tracks at Bolton Yard. The newspaper noted that the B&O tracks would run under the west side of the bridge instead of the east side, which was originally proposed in the Belt Line ordinance. The NCR tracks were to be lowered, while the grade on North Avenue was to be raised west of the bridge (*The Sun* 1891, 4).

The North Avenue crossing has been described as a "complicated arrangement" (Lee 2005, 173). To weave through the existing landscape features and infrastructure, the new bridge was constructed on a 10-degree curve (see **Figure 5**). The NCR and B&O tracks at the west end of the bridge had to pass under North Avenue through twin stone-arch tunnels and cross over the east portal of the B&P Tunnel; however, the B&P Tunnel roof was not strong enough to support the weight of the passing overhead trains. Rea devised a creative solution where two additional plate girder bridge sections were constructed inside the bridge tunnels, creating "a unique, three-level street and rail crossing" (see **Figures 6 and 7**) (Lee 2005, 168; Manning 2015, 3).

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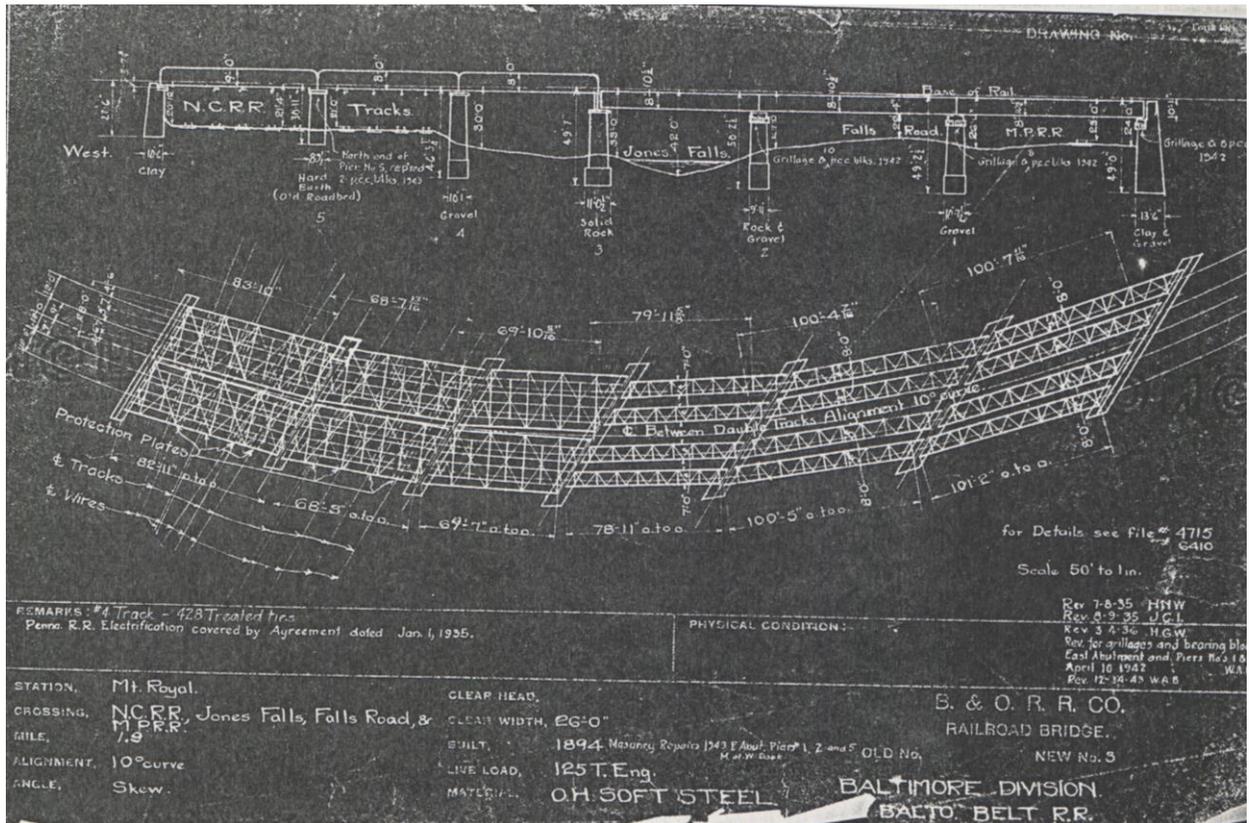


Figure 5: Section and plan of the North Avenue Bridge, n.d. (annotated in 1935, 1936, 1942, and 1943).
Image Credit: B&O Railroad Historical Society

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Figure 6: North Avenue Bridge, B&O Railroad portals, looking north, circa 1930. Photo Credit: B&O Railroad Historical Society



Figure 7: North Avenue Bridge, B&O Railroad portals, looking north, 1966. Photo Credit: B&O Railroad Historical Society

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The city hired L.B. McCabe and Brother as contractors for the North Avenue Bridge. The various alterations in design culminated in the contractors having to temporarily halt work on the new bridge in October 1894 while the City of Baltimore and the B&O Belt Railroad Company worked out payment for the bridge. The B&O owed the city \$9,000 for building the bridge piers and western approach abutment tall enough to carry North Avenue over the B&O tracks, and to provide space for the protection of the B&P tunnel below. In addition, the city's water department owed the city's bridge account \$9,000 because it had to construct 30-inch water mains above the arches of the bridge, causing the bridge's height to increase three feet and the project cost to increase. Overall, L.B. McCabe and Brother's contract totaled \$320,000. The original estimated cost of the bridge was \$394,000, but by 1894, the estimate had grown to almost \$500,000 (*The Sun* 1894, 10; *The Sun* 1895a, 10). Troubles over payments continued into the spring of 1895, when the city inquired into the construction delay of the bridge's western approach. Charles Mayer, president of the B&O, authorized no more than \$104,000 for the construction, but the city's bridge engineer, Frederick H. Smith, argued that because the design plans had changed, the Belt Railroad Company should pay the expected increased cost (*The Sun* 1895a, 10). Assistant City Commissioner Charles A. Hook was brought in as an arbitrator. He decided in July 1895 that the remainder the B&O owed the city was \$101,824.61. He also decided that the city and the railroad company were both equally responsible for the cost of the arches over the B&P Tunnel because the work was not in the original agreement for the construction (*The Sun* 1895b, 8).

Construction continued while the city and the railroad argued over the cost. The electrified overhead rail that was to power the B&O trains was installed in September of 1894. Two years later, in the spring of 1896, the tracks of the existing railroad lines were removed on the western approach to fix the grading. In June, a marble block measuring six feet long, eighteen inches wide, and three feet high was placed at the corner of North Avenue and Oak Street (now Howard Street) and fitted with a bronze plaque commemorating the completion of the bridge, but it does not appear to be extant (*The Sun* 1895c, 8; *The Sun* 1896a, 10; *The Sun* 1896b, 10).

Electric Railways and the Conversion to Diesel Locomotives

Although the B&O included stipulations against tunnel pollution from the steam locomotives in the incorporation document for the Baltimore Belt Railroad Company, company officials settled on using electric locomotives by the beginning of the line's construction in 1891 (Harwood 2002, 87). The lack of smoke and dangerous fumes, which would negate the need for expensive ventilation chimneys, appealed to railroad management (Manion 1990, 19). However, the steep grade (a 0.8 percent incline of approximately 150 feet) of Howard Street Tunnel's eastbound tracks (heading north to Philadelphia) required a powerful locomotive, and an electric one powerful enough had yet to be built (Sagle 1964, 310).

Electrified transportation was a relatively new concept at the time. Some horse car lines and a citywide streetcar system in Richmond, Virginia, had been electrified by 1890. The pace picked up in the last decade of the nineteenth century, with more horse car lines being converted to electricity. The electrified lines were not meant to haul heavy freight and were limited primarily to light passenger traffic. The Belt Line, however, would be carrying both freight and passengers. Without having built an electric locomotive strong enough for the task, General Electric (GE) convinced the B&O that their electric locomotives would be able to haul heavy freight and passenger trains better than steam (Harwood 2002, 87). GE agreed to build not only the locomotives, but also the lighting, electric signaling, power distribution, and two power plants (although only one was constructed) (Manion 1990, 19). The original concept called for electric motors pushing the trains through the Howard Street Tunnel, but concern over buckling of wooden cars led engineers to decide to have the motors pull the trains. The role of the electric locomotives, or motors, was primarily to pull the steam locomotives through the tunnel from Camden Station to Mount Royal Station at the north end of the tunnel. For passenger trains, the electric motor would uncouple at Mount Royal Station, and be replaced with a steam locomotive. Freight trains, having no need to stop at the passenger station, were to be hauled to Huntingdon Avenue (Harwood 2002, 92-93).

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GE's form of electrification included an overhead third rail supported by direct hangers within the tunnels, and a steel and iron catenary system consisting of two Z-bars arranged in a box with a slot in the bottom outside of the tunnels (Harwood 2002, 92; Sagle 1964, 310, 311). A metal "shoe" from the electric motor's roof fit into a slotted, inverted "trough," which delivered the direct current (Harwood 2002, 92).

The original electrified section of the Belt Line began south of Camden Station and ended three miles north at Huntingdon Avenue, though in 1901 it was extended one mile east to the Waverly neighborhood in north Baltimore, including through the Guilford Avenue Bridge. The three original electric locomotives built for the Belt Line weighed nine tons. Each had four electric motors that produced a total of 1,440 horsepower, which were 27 percent more powerful than the B&O's steam locomotives. The motors could pull passenger trains eastbound through the Howard Street Tunnel at 35 miles per hour and freight trains at 15 miles per hour. In June of 1895, one month after the Belt Line formally opened, the first electric motor arrived in Baltimore from GE's plant in Schenectady, New York. A second arrived in November, and a third in May of 1896. By then, the four-mile section of the Belt Line was considered fully electrified (Harwood 2002, 92-93, 109).

To power the electric locomotives on the Belt Line, the B&O had to create its own electricity, since no electric utilities existed in Baltimore at the time. E. Francis Baldwin, designer of many buildings and structures for the B&O, designed the Baltimore Belt Line Power House (B-79), which was along Howard Street south of Camden Street. The Power House operated until 1914, when the B&O began receiving power from a local utility company. Later, the building was used as a repair shop for B&O train cars. It was demolished in the late 1970s for the construction of I-395 (Manning 2015, 7).

The B&O Belt Line operated on the overhead electric rail system for several years. In 1902, it was replaced with a third electrified rail at ground level, which remained in use for several decades. In 1903, four new 40-ton motors were added for slow-speed freight service; they worked in sets of two to haul up to a 1,600-ton train. In 1906, one more was added to form a three-unit job when necessary. Four years later, two 60-ton electric locomotives joined the Belt Line. A total of six more, all built by GE, were added in 1912, 1923, and 1927 (Manning 2015, 3; Sagle 1964, 310).

In the mid-1930s, the B&O began to convert from steam and electric to diesel engines. Diesel locomotives were easier to maintain, so the B&O did not need as many crew members as it did for steam or electric motors. Diesel motors could also handle a variety of track situations better than steam or electric and were more reliable and cheaper overall. For the Belt Line, switching to diesel eliminated the stopping of freight trains at Camden Station to pick up an electric locomotive to haul it through the Howard Street Tunnel, which caused long trains to temporarily halt at at-grade street crossings. Sections of electrified rail remained in place for several more years, but in 1952 all remaining electrified engines were replaced with diesel and the third electrified rail was removed from the track shortly after (Manning 2015, 3-4; World Wide Rails n.d.; Sagle 1964, 310).

Decline of the Railroad

In 1944, over \$112 million in debt and interest had come due for the B&O. Over a two-year period, the Interstate Commerce Commission (ICC), a federal agency established in 1887 to regulate railroads, considered and eventually approved the B&O's deferment plan, which set maturity dates between 1965 and 2010. Though this lightened the company's financial burden, the decline of passenger service on the B&O after World War II exacerbated matters. The railroad had seen a steady decline in passenger traffic following the end of the war as faster and more efficient means of transportation via automobiles and airplanes became more commonplace and affordable. In 1946, passenger service revenue fell by 25 percent as inflation rose. In the postwar period railroads

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spent billions in private funding for railroad maintenance, while federal and state governments subsidized highway construction, further eroding railroad passenger and freight traffic (Jacobs 1989, 115).

The situation worsened for the B&O in the 1950s. Automation in the railroad industry led to an 81 percent decrease in the number of B&O employees (Jacobs 1989, 120). In 1957, passenger traffic decreased by 120,693 passengers from the year prior. Despite a five percent fare increase, passenger revenue declined by more than \$231,586. In 1957, the B&O discontinued eight passenger trains between Baltimore and New York, which included the Belt Line route, resulting in a net annual saving of approximately \$1.6 million. In November of 1957, the B&O filed petitions to completely discontinue service between Baltimore and New York, which included the Belt Line route, to alleviate deficit issues (B&O 1957, 5).

In April of 1958, the B&O eliminated passenger service between New York City and Baltimore. Anticipating a reduction in train traffic, the B&O chose to single-track much of its railroad from Baltimore to Philadelphia. By 1960, the Howard Street Tunnel and most of the Belt Line had been reduced to a single track. However, planners failed to account for the fact that passenger service occurred mostly during the day, with freight service occurring overnight. Reducing to a single track meant that freight traffic continued to suffer congestion despite a decrease in overall train traffic (Manning 2015, 7; *The Sun* 1959, 10; Harwood 2002, 171).

Absorption of the B&O Railroad into CSX Transportation

In the 1960s, revenue continued to sink as operating expenses remained largely the same (Jacobs 1989, 120). Across the country, railroads were suffering. In 1960, the Chesapeake and Ohio (C&O) Railroad sought to purchase a majority share in B&O common stock, which was achieved the following year and approved by the ICC on December 31, 1962 (Jacobs 1989, 122). The new combined C&O/B&O totaled 11,000 miles of tracks. The C&O embarked on a number of improvements to the B&O's infrastructure. In 1971, Hay Watkins, an employee of the C&O since 1949, became president of the C&O/B&O and renamed the railroad company, mostly for marketing purposes, the "Chessie System." The logo—a cat with a blanket tucked beneath its chin—dated to the 1930s, in which a C&O advertisement in *Fortune* magazine ran with the tag line "Sleep Like a Kitten," referring to the C&O's smooth ride (Jacobs 1989, 124-125).

The 1970s proved fruitful for the Chessie System, with total operating revenues rising over \$800 million and net earnings of more than \$85 million (Jacobs 1989, 125). In 1980, the ICC approved a merger of the Chessie System with the Seaboard Coast Line, which had formed in 1967 from a merger between the Atlantic Coast Line and the Seaboard Air Line. The 1980 merger produced a holding company known as CSX Transportation; rumor had it that the "C" stood for Chessie, the "S" for Seaboard, and the "X" was due to the fact that the result of the merger was greater than simply adding the two systems together. In 1986, the B&O, C&O, and CSX Transportation consolidated into CSX Transportation Incorporated (Jacobs 1989, 127). As of 2022, CSX continues to operate a freight line along the former alignments of the B&O Baltimore Belt Line and Royal Blue Line (Manning 2015, 4).

Post-Construction Alterations to the North Avenue Bridge

In 1907, one of the B&O's arches was repaired (B&O 1905).

In 1919, the brick sidewalks over North Avenue were replaced with concrete and the road was paved with asphalt. The city's water department also installed a 36-inch suction main beneath the south sidewalk (*The Sun* 1919, 11).

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Between 1976 and 1977, the original cast iron railings of the superstructure were removed, refinished, and put back into place. Concrete parapets were added. Minor alterations include application at an unknown time of shotcrete or gunite and repointing to the interior of the tunnels carrying the B&O tracks through the North Avenue Bridge arches (Culhane 1999, 1, IV-14).

The second tracks were removed at the North Avenue Bridge when the B&O single-tracked much of the Belt Line circa 1960.

In 1984, CSX sought to raise height restrictions on the Belt Line to accommodate multi-level automobile carriers following the expansion of the General Motors plant in southeast Baltimore. The tracks under the CSX portals of the North Avenue Bridge were moved to the center of the arch to allow for the height clearance (*The Sentinel* 1984, 7).

Circa 2020, the innermost westbound vehicular traffic lane atop the North Avenue Bridge was converted into a protected bicycle lane.

As of 2022, alterations to the two CSX portals are proposed as part of a project to allow double stacking of freight trains along CSX's route between Baltimore and Philadelphia.

Research did not identify alterations to the substructure of the bridge not related to the B&O portals.

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9. Major Bibliographical References

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See Section 8.

10. Geographical Data

Acreage of surveyed property	<u>2.45</u>	
Acreage of historical setting	<u>2.45</u>	
Quadrangle name	<u>Baltimore East</u>	Quadrangle scale: <u>1:24,000</u>

Verbal boundary description and justification

The boundary for North Avenue Bridge encompasses approximately 2.45 acres in Ward 12 found on Baltimore City tax maps. The boundary encompasses the bridge deck and the north and south elevations, including the rail portals.

11. Form Prepared by

name/title	Meghan P. White and Nicole A. Diehlmann		
organization	RK&K, LLP	date	4/25/2022
street & number	12600 Fair Lakes Circle, Suite 300	telephone	703-259-3739
city or town	Fairfax	state	VA

The Maryland Inventory of Historic Properties was officially created by an Act of the Maryland Legislature to be found in the Annotated Code of Maryland, Article 41, Section 181 KA, 1974 supplement.

The survey and inventory are being prepared for information and record purposes only and do not constitute any infringement of individual property rights.

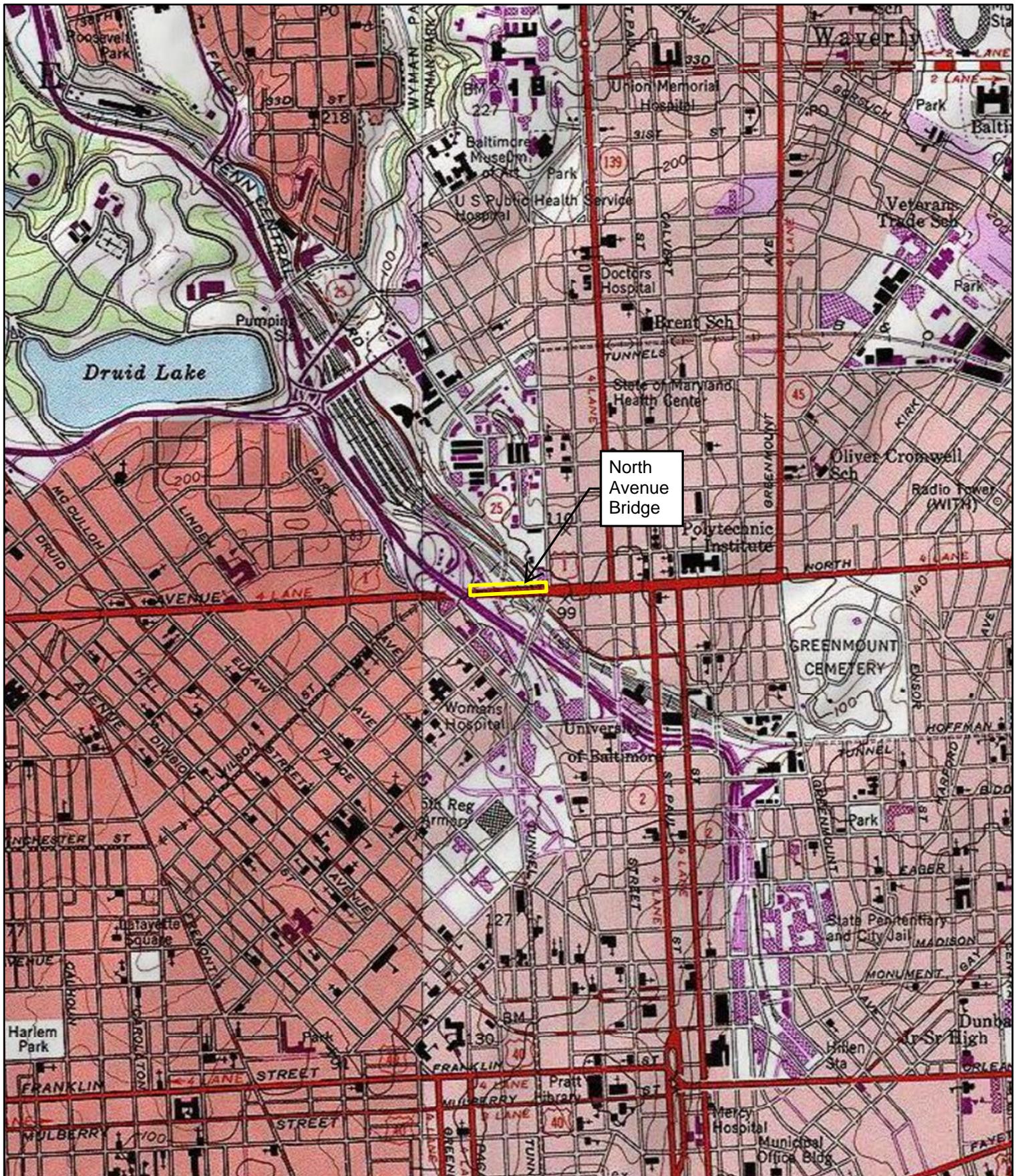
return to: Maryland Historical Trust
Maryland Department of Planning
100 Community Place
Crownsville, MD 21032-2023
410-697-959

North Avenue Bridge (BC1208)

B-4521

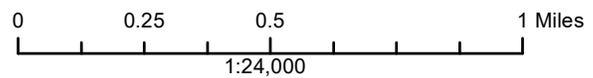
Location: North Avenue over Light Rail, CSX, Amtrak, the Jones Falls, and Falls Road

Baltimore City



 North Avenue Bridge

USGS 7.5' Quadrangle
Baltimore East



1:24,000

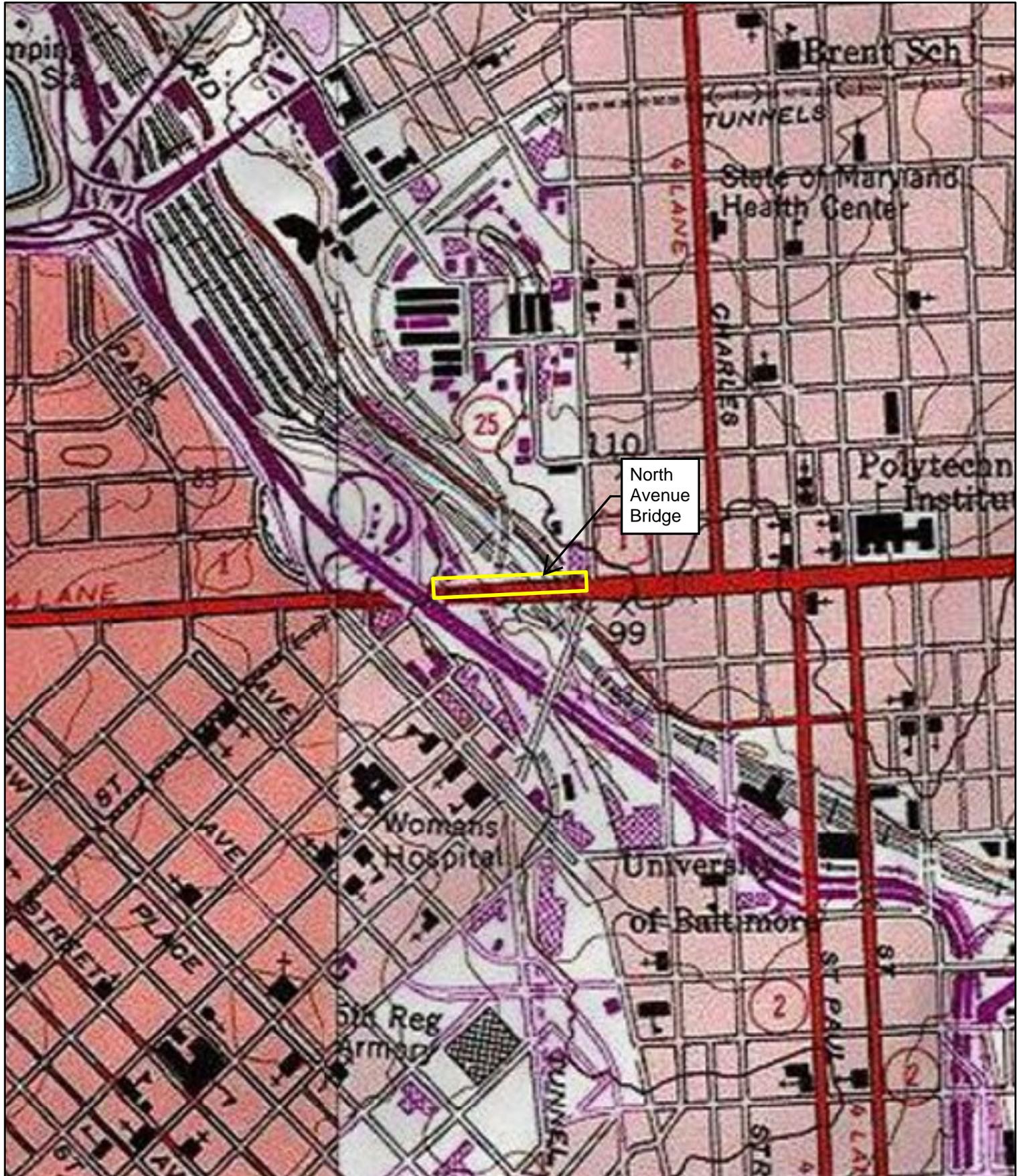


North Avenue Bridge (BC1208)

B-4521

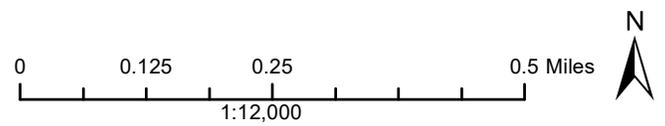
Location: North Avenue over Light Rail, CSX, Amtrak, the Jones Falls, and Falls Road

Baltimore City



 North Avenue Bridge

USGS 7.5' Quadrangle
Baltimore East

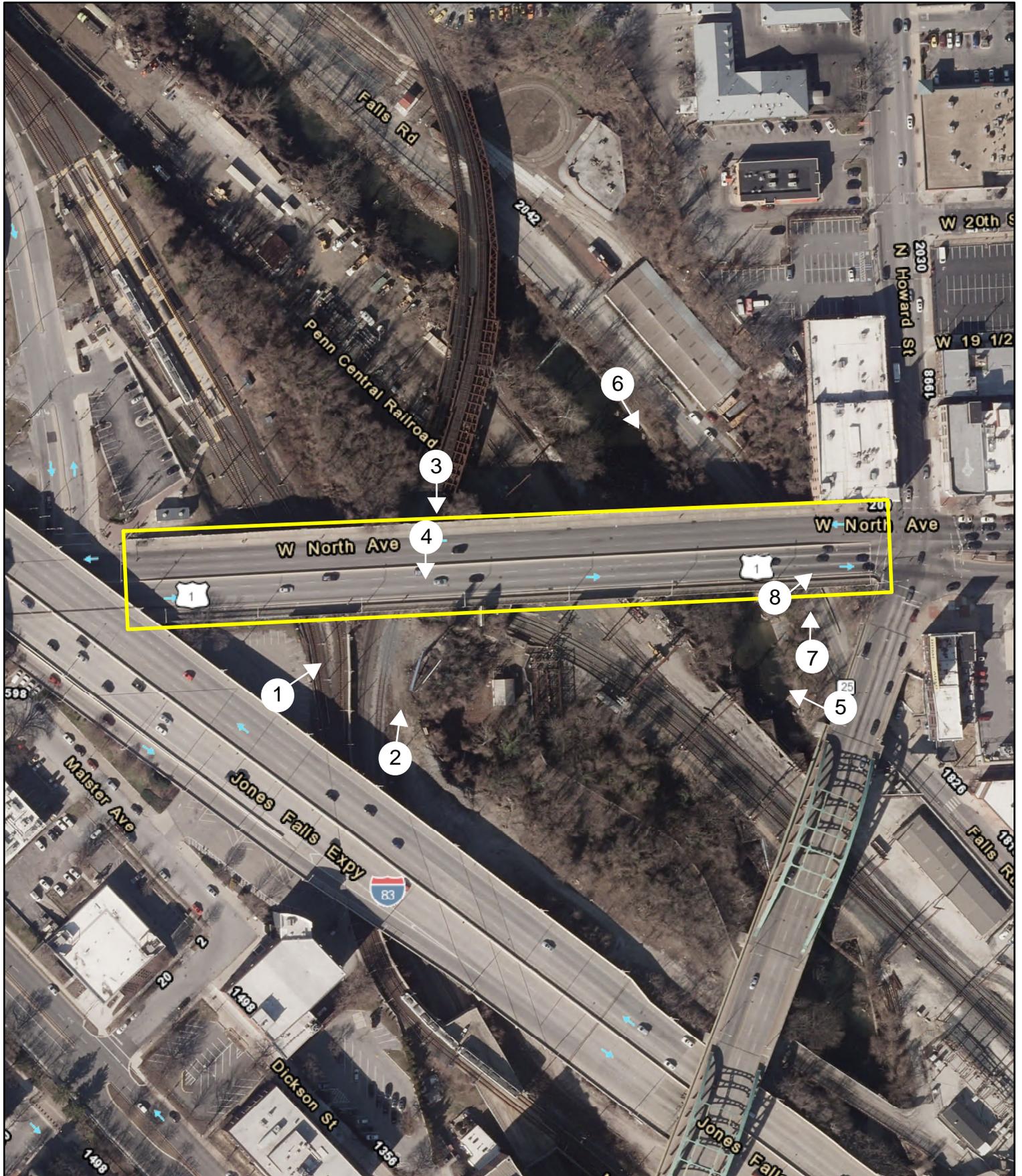


North Avenue Bridge (BC1208)

B-4521

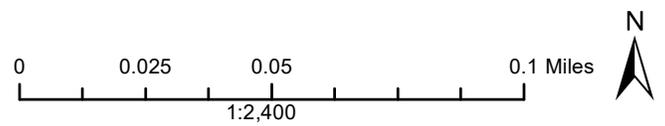
Location: North Avenue over Light Rail, CSX, Amtrak, the Jones Falls, and Falls Road

Baltimore City



 North Avenue Bridge

 Photo Location



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Name of Property: North Avenue Bridge

Location: North Avenue over MDOT MTA Light Rail, CSX, Amtrak, the Jones Falls, and Falls Road, Baltimore, MD



Photo 1: CSX south portals (right) and MDOT MTA light rail portals (left), looking northeast



Photo 2: CSX south portals (right) and MDOT MTA light rail portals (left), looking north

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Name of Property: North Avenue Bridge

Location: North Avenue over MDOT MTA Light Rail, CSX, Amtrak, the Jones Falls, and Falls Road, Baltimore, MD



Photo 3: CSX north portals, with the tops of the B&P Tunnel arches visible in the background of the tunnel interior, looking southwest



Photo 4: Looking south toward the top of the B&P Tunnel arch, from inside the easternmost CSX portal

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Name of Property: North Avenue Bridge

Location: North Avenue over MDOT MTA Light Rail, CSX, Amtrak, the Jones Falls, and Falls Road, Baltimore, MD



Photo 5: B&P Tunnel southeast portal and south portal over Amtrak tracks, looking northwest



Photo 6: North elevation over Jones Falls, looking southwest

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Name of Property: North Avenue Bridge

Location: North Avenue over MDOT MTA Light Rail, CSX, Amtrak, the Jones Falls, and Falls Road, Baltimore, MD



Photo 7: South elevation over Falls Road, looking north



Photo 8: Brick interior of Falls Road arch, looking northeast

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Name of Property: North Avenue Bridge

Location: North Avenue over MDOT MTA Light Rail, CSX, Amtrak, the Jones Falls, and Falls Road, Baltimore, MD

PHOTO LOG

Name of Property: North Avenue Bridge

Name of Photographer: Nicole A. Diehlmann

Date of Photograph: July 2020 and September 2021

Location of Original Digital File: MD SHPO

Photographs inserted on continuation sheets.

Photo 1 of 8:

CSX north portals, with the tops of the B&P Tunnel arches visible in the background, looking southwest
B-4521_2020-07-02_001.tif

Photo 2 of 8:

CSX south portals (right) and MDOT MTA light rail portals (left), looking northwest
B-4521_2021-09-27_002.tif

Photo 3 of 8:

CSX north portals, with the tops of the B&P Tunnel arches visible in the background, looking southwest
B-4521_2021-09-27_003.tif

Photo 4 of 8:

Looking south at the top of the B&P Tunnel arch at the rear of the easternmost CSX portal
B-4521_2021-09-27_004.tif

Photo 5 of 8:

B&P tunnel southeast portal and south portal over Amtrak tracks, looking northwest
B-4521_2020-07-02_005.tif

Photo 6 of 8:

North elevation over the Jones Falls, looking southwest
B-4521_2020-07-02_006.tif

Photo 7 of 8:

South elevation over Falls Road, looking north
B-4521_2020-07-02_007.tif

Photo 8 of 8:

Brick interior of Falls Road arch, looking northeast
B-4521_2020-07-02_008.tif