NPS Form 10-900
(Rev. 10-90)

OMB No. 1024-0018

United States Department of the Interior
National Park Service

1558

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name **BLACKSTONE VIADUCT**

other names/site number New York & New England Railroad Viaduct

2. Location

street & number Canal, Farnum & Mill Streets (see district data sheet) ☐ not for publication

city or town Blackstone ☐ vicinity

state Massachusetts code MA county Worcester code 027 zip code 01504

3. 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. I recommend that this property be considered significant ☐ nationally ☐ statewide ☑ locally. (☐ See continuation sheet for additional comments.)

Brona Simon DSHPO Dec. 26, 2001

Signature of certifying official/Title Brona Simon, Deputy State Historic Preservation Officer — Date
Massachusetts Historical Commission

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional Comments.)

Signature of certifying official/Title — Date

State or Federal agency and bureau

4. National Park Service Certification

I, hereby certify that this property is:
- ☑ entered in the National Register
  - ☐ See continuation sheet.
- ☐ determined eligible for the National Register
  - ☐ See continuation sheet.
- ☐ determined not eligible for the National Register
- ☐ removed from the National Register
- ☐ other (explain): _____

for

Signature of the Keeper — Date of Action

Edson H. Beall 2/5/02

Blackstone Viaduct
Name of Property

Worcester, MA
County and State

5. Classification

Ownership of Property
(Check as many boxes as apply)

_ private
_ public-local
x public-State
_ public-Federal

(Check only one box)

_ building(s)
_ district
_ site
x structure
_ object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
		building
		sites
11		structures
		objects
11		Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

n/a

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
(Enter categories from instructions)

TRANSPORTATION: rail-related

Current Functions
(Enter categories from instructions)

VACANT: not in use

7. Description

Architectural Classification
(Enter categories from instructions)

OTHER: masonry arch, earth embankment

Materials
(Enter categories from instructions)

foundation earth
walls stone/granite
roof n/a
other concrete

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

Blackstone Viaduct
Name of Property

Worcester, MA
County and State

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

X **A** Property is associated with events that have made a significant contribution to the broad patterns of our history.

_ **B** Property is associated with the lives of persons significant in our past.

x **C** Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.

_ **D** Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

Property is:

_ **A** owned by religious institution or used for religious purposes.

_ **B** removed from its original location.

_ **C** a birthplace or grave.

_ **D** a cemetery.

_ **E** a reconstructed building, object, or structure.

_ **F** a commemorative property.

_ **G** less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

COMMERCE
ENGINEERING
TRANSPORTATION

Period of Significance

1872-1951

Significant Dates

1872: Construction of viaduct completed
1918: Concrete sheathing added

Significant Person
(Complete if Criterion B is marked above)

n/a

Cultural Affiliation

N/a

Architect/Builder

Boston, Hartford & Erie RR, Boston Bridge Works
American Bridge Company

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

_ preliminary determination of individual listing (36 CFR 67) has been requested
_ 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:

x State Historic Preservation Office
_ Other State agency
_ Federal agency
_ Local government
_ University
_ Other

Name of repository:

10. Geographical Data

Acreage of Property 2.91

UTM References See continuation sheet.
(Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing
1.	19	290230	4654380
2.			
3.			
4.			

_ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Matthew Kierstead, industrial historian, PAL, Inc. Jonathan N.P. Mekinda, Betsy Friedberg, NR Director, MHC

organization Massachusetts Historical Commission date November 2001

street & number 220 Morrissey Boulevard telephone 617-727-8470

city or town Boston state MA zip code 02125

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items (Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of the SHPO or FPO.)

name Commonwealth of Massachusetts / Department of Environmental Management

street & number 151 Causeway Street telephone 617-626-1350

city or town Boston state MA zip code 02110

Description

The Blackstone Viaduct is located in the village of Waterford, a former textile mill village located immediately southeast of the civic center of the town of Blackstone, Worcester County, Massachusetts, and that straddles the Blackstone–North Smithfield, Rhode Island, border. It is an approximately 1,600 ft long, 50 to 100 ft wide, 25 ft. high, curved, earth embankment and masonry arch structure oriented east-west across an area bounded by town athletic fields and residential properties to the north, an eastward-facing bend in the Blackstone River to the east, a short watered segment of the Blackstone Canal (NRDIS 1995) to the west, and the Blackstone, Massachusetts–North Smithfield, Rhode Island boundary line to the south. The east section of the structure is bordered by open land consisting of town athletic fields to the north and vacant land to the south. The west section of the structure is located in a residential neighborhood consisting of mixed single and multiple-unit mid-19th-century textile mill workers' housing, and small, modern apartment buildings. The east end of the structure is bounded by the west bank of the Blackstone River, and the west end is bounded by the Canal Street Bridge Abutment, which supports the Canal Street Bridge (Blackstone Canal NRDIS 1995). The right-of-way of this rail line, including additional embankments and bridges, some within the Blackstone Canal and/or Blackstone Manufacturing Company National Register Historic districts, lie to the east and west of the Blackstone Viaduct (see *Significance* section below).

The structure consists of eleven components attached end-to-end. From east to west, these include the Blackstone River Bridge Abutment, the East Embankment, the Multiple-Arch Bridge East Abutment, the Multiple-Arch Bridge, the Multiple-Arch Bridge West Abutment, the Middle Embankment, the Single-Arch Bridge East Abutment, the Single-Arch Bridge, the Single-Arch Bridge West Abutment, the West Embankment, and the Canal Street Bridge Abutment.

The Blackstone River Bridge Abutment (1872, Map No. 1, photo #3) extends into and rises from the water on the west bank of the Blackstone River. It is a partially-ruined, approximately 12 ft. high wall of large, coursed, rough-cut, rectangular granite blocks. Its long east elevation faces east toward the river, and it has narrow north and south elevations, with stepped wing walls extending to the sides. It is divided into two stepped tiers, with an approximately 6 ft. high base with a row of large capstones, surmounted by an approximately 6 ft. high upper tier consisting of three courses of granite blocks set back about 2 feet from the south, east, and north edges of the base. The upper tier served as a base for the steel bridgework that supported the tracks over the river, no longer extant. A loose revetment of irregularly-shaped granite blocks is scattered around the structure at the waterline.

To the west lies the East Embankment (1872, Map No. 2), an approximately 800 ft. long, 25 ft. high, earth-and-cinder-fill embankment with an approximately 35 ft. wide, flat trackbed crest. This structure extends west-

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southwest from the Blackstone River Bridge Abutment, and gradually bends toward the west. Near the center of this embankment the earth has been excavated on the south side, interrupting the flat crest of the structure for approximately 100 ft. This embankment is bounded on its west end by the Multiple-Arch Bridge East Abutment.

The Multiple-Arch Bridge East Abutment (1872, Map No. 3, photo #1) consists of two flanking masonry wing walls extending back toward the east at approximately a 45 degree angle from the east end of the Multiple Arch Bridge. These retaining walls are stepped in profile, and constructed of two varieties of stone. The lower, inner areas of the walls are constructed of irregularly-coursed, rough-split and fieldstone pieces of a dark, blue-green rock. Laid on top of these walls are several regularly coursed rows of long, rectangular blocks of buff pink granite.

The Multiple-Arch Bridge (1872, Map no. 4, photos #1,2) is an approximately 375 ft. long, 25 ft. high structure consisting of seven Roman arches constructed of regularly-coursed, quarry-faced, rectangular granite blocks sheathed in an approximately 1 ft thick. layer of poured concrete reinforced with a lattice of steel reinforcing rods. The structure is 34 ft.-3 in. wide across the top, and battered out at the bottom to a width of 40ft.-8 in. at the ground intersection. The six west arches are each 38 ft.-8 in. wide, with 9 ft.-6 in. wide intervening piers. The face of each pier includes a shallow, battered buttress. The third arch from the west end spans Mill Street, a paved public road. The east arch is 41 ft. wide, and spans a short section of the Mammoth Mill raceway, now filled in with earth, and a dirt ballfield access road. The spandrel walls and arch barrel are smooth-faced and show some relict horizontal patterning from their plank casting forms. A slightly overhanging, 2 ft. high, smooth, cast parapet runs along the top of the spandrel wall. The deck area is filled with earth flush with the top of the parapets.

The Multiple-Arch Bridge West Abutment (1872, Map No. 5) consists of two flanking masonry wing walls extending back toward the west at approximately a 45 degree angle from the west end of the Multiple-Arch Bridge. These retaining walls are constructed of regularly coursed rows of long, rectangular blocks of gray, quarry-faced granite. The tops of the walls are stepped, and fall to meet granite block retaining walls that continue along the north and south sides of the Middle Embankment.

The Middle Embankment (1872, Map No. 6, photo #4) is an approximately 200 ft. long, 25 ft. high, earth-and-cinder-fill embankment with an approximately 35 ft. wide, flat trackbed crest. This embankment is bounded on its west end by the Single-Arch Bridge East Abutment. Five ft. high retaining walls consisting of regularly-

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coursed, quarry-faced, gray granite blocks with a slightly overhanging top course, run along the foot of the embankment on the north and south sides.

The Single-Arch Bridge East Abutment (1872, Map No. 7, photo #4) consists of two curved flanking masonry wing walls extending back toward the east from the east end of the Middle Embankment in a concave curve. These retaining walls are constructed of regularly-coursed rows of long, rectangular blocks of gray, quarry-faced granite. The tops of the walls are stepped, and fall to meet granite block retaining walls that continue along the north and south sides of the Middle Embankment.

The Single-Arch Bridge (1872, Map No. 8, photo #4) is an approximately 50 ft. long, 25 ft. high structure consisting of a single 36½ ft. wide Roman arch constructed of regularly-coursed, quarry-faced, rectangular granite blocks sheathed in an approximately 1 ft. thick layer of poured concrete reinforced with a lattice of steel reinforcing rods. The structure is 32 ft.-3 in. wide across the top, and battered out at the bottom to a width of 40 ft.-8 in. at the ground intersection. The spandrel walls and arch barrel are smooth faced and show some relict horizontal patterning from their plank casting forms. A slightly overhanging, 2 ft. high, smooth, cast parapet runs along the top of the spandrel wall. The deck area is filled with earth flush with the top of the parapets.

The Single-Arch Bridge West Abutment (1872, Map No. 9, photo #4) consists of two curved flanking masonry wing walls extending back toward the west from the west end of the West Embankment in a concave curve. These retaining walls are constructed of regularly coursed rows of long, rectangular blocks of gray, quarry-faced granite. The tops of the walls are stepped, and fall to meet granite block retaining walls that continue along the north and south sides of the West Embankment.

The West Embankment (1872, Map No. 10, photos #4,5) is an approximately 150 ft. long, 25 ft. high, earth-and-cinder-fill embankment with an approximately 35 ft. wide, flat trackbed crest. This embankment is bounded on its west end by the Canal Street Bridge Abutment. Five ft high retaining walls consisting of regularly-coursed, quarry-faced, gray granite blocks with a slightly overhanging top course run along the foot of the embankment on the north and south sides.

The Canal Street Bridge Abutment (1872, Map No. 11, photo #5) is a 25 ft. high masonry retaining wall structure constructed of regularly-coursed, quarry-faced, gray granite blocks. It is V-shaped in plan, with one wall parallel to Canal Street forming the west boundary of the Blackstone Viaduct, and the other extending east from the north end of the Canal Street wall and forming an embankment retaining wall. The Canal Street wall rises from the east edge of a concrete sidewalk, and the other wall rises from the south edge of a narrow alley

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next to a former mill workers' house. The Canal Street Abutment wall has a long stepped pocket lined with cast concrete along its top edge, which serves as a base for the east end of the Canal Street Bridge, a 1917 single-track deck girder structure, and a contributing element in the Blackstone Canal Historic District (NRDIS 1995).

The earth in and around the structure consists of fill of unknown origin, and railroad-related cinder and slag. The areas immediately adjacent to the entire length of the embankment and all of its arches and abutments were likely highly disturbed during construction. The area under the third arch from the east end, immediately east of the Mill Street arch, contains an upright cut granite post similar to and in line with a row of granite posts running along the east side of Mill Street to the south. This suggests that the earth under the arches may have the potential to reveal archeological information associated with the life of textile mill workers after 1872, the year the bridge was constructed, although the earth may have been disturbed again in 1918 when the concrete facing was installed on the arches.

Archaeological Description

While no ancient Native American sites have been recorded at the location of the Blackstone Viaduct, sites may be present. One site is recorded in the general area (within one mile). Prior to construction of the viaduct, environmental characteristics represented locational criteria (slope, soil drainage, distance to wetlands) that were favorable for many types of prehistoric sites. The viaduct is located in a level floodplain area that was probably well drained prior to railroad construction. The nominated area lies within 1,000 feet of the Blackstone River, its branch channels and streams. Fall lines in the river, indicating rapids and potentially important Native American fishery sites, are also located slightly over 1,000 feet from the viaduct. In spite of the above information, however, the potential for locating ancient Native American resources in the area of the viaduct is low. Railroad construction in the vicinity of the viaduct, including an earlier rail line and timber trestle and an earth-filled structure located on the same alignment, would have had an impact on cultural resources present prior to 1872. Construction of the viaduct also likely produced massive impacts to natural soil strata and any cultural resources present in the area.

There is a moderate potential for recovering historic archaeological resources in the area of the Blackstone Viaduct. Structural and stratigraphic evidence of a timber trestle and earth-filled railroad structure that preceded the viaduct may survive beneath or as part of the present structure. Evidence also exists indicating archaeological information associated with the lives of textile workers after 1872 may survive under the arches

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of the viaduct. The area under the third arch from the east end, immediately east of the Mill Street arch, contains an upright cut-granite post similar to and in line with a row of granite posts running along the east side of Mill Street to the south. These posts may indicate the presence of intact cultural and natural stratigraphy in the area associated with worker's housing constructed along Mill Street after 1872, the year the viaduct was constructed. Archaeological evidence in the area may include occupational-related features (trash pits, privies, wells) and structural remains from outbuildings. Structural evidence of the power canal for the Mammoth Mill may also survive beneath the easternmost arch of the viaduct. Later repairs to the viaduct in 1918 may have adversely affected the integrity of any post-1872 cultural resources located under the arches.

(end)

Significance

The Blackstone Viaduct, constructed by the Boston, Hartford & Erie Railroad in 1872, stands as powerful testimony to the history of railroad construction in town of Blackstone, Massachusetts, and the surrounding area. The Blackstone Viaduct is eligible for listing in the National Register of Historic Places under Criterion A at the local and state level for its association with the struggle to construct and control competing rail lines between Boston and New York City that took place during the second half of the 19th century. The viaduct is located in the village of Waterford, laid out by the Farnum family, who developed Blackstone's early textile industry and influenced the location of transportation infrastructure in the town. The Blackstone Viaduct is also eligible for listing in the National Register of Historic Paces under Criterion C at the local and state level as it is a highly visible component of a landscape dominated by surviving railroad structures, and is also significant as one of several large 19th -century masonry arch bridges constructed in Massachusetts.

Early Blackstone History

The area including present-day Blackstone, Massachusetts, was first settled by European colonists in 1636, when William Blackstone settled in what is now the town of Cumberland, Rhode Island. The land including Blackstone was incorporated as Mendon in 1667, and remained largely agricultural until the start of the nineteenth century (Blackstone Historical Commission 1996:9-10; Schuler and Friedberg 1995b:19). Blackstone was not incorporated as a separate town until 1845.

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The first industrial activity in the area occurred in 1716, when Jonathan Richardson operated an iron forge on Forge Pond. By the mid-18th century the Blackstone River's water power was tapped for a grist mill (Blackstone Historical Commission 1996: 13; Hurd 1889:610). Two cotton mills opened in 1809, one operated by the Blackstone Manufacturing Company. In 1804, this company purchased 260 acres of land on the Blackstone River in Mendon's South Parish, an area including the present-day towns of Blackstone and Millville. The Blackstone Manufacturing Company constructed a large mill complex in the area located between present-day Main Street and the Blackstone River (Hurd 1889:610). This event was a critical step in the area's development as it prompted the construction of additional mills in the immediate area. The next important industrial development occurred in 1825 when Welcome (1795-1874) and Darius D. (1798-1840) Farnum constructed a satinet mill in the South Parish, located in the vicinity of the meadow bounded by the present-day St. Paul and Canal streets (Blackstone Historical Commission 1996:21). This mill, known as the "Red Mill," led to an immediate increase in the population of the area, and spawned the development of the village of Waterford, which surrounds the Blackstone Viaduct (Hurd 1889:611). Subsequently, the Farnums built the nearby "Green Mill," and in 1836 the Farnum brothers completed their most ambitious mill project, the 400 ft long, 5-story "Mammoth Mill" in Waterford (Blackstone Historical Commission 1996:31). The power canal trench for the Mammoth Mill ran beneath the easternmost arch of the Blackstone Viaduct, which was built wider than the other arches to accommodate the watercourse. Remains of the Mammoth Mill are visible south of the viaduct. After the death of his brother Darius, Welcome Farnum purchased the "Stone Mill" in Millville, a village just east of Waterford, marking the last of Welcome Farnum's activities in the manufacturing industry.

Canals and Railroads

The growth of industry in the Blackstone area was further encouraged by the establishment of the north–south Blackstone Canal between Providence and Worcester (1828–1848), which provided an easy means of transporting commercial and industrial goods between these two large manufacturing centers (Schuler and Friedberg 1995a:11). Welcome Farnum influenced the routing of the canal through Waterford (Blackstone Historical Commission 1996:22–23). The canal bed is visible immediately west of the Blackstone Viaduct and Canal Street. This parcel of land and the Canal Street Railroad Bridge (1917) at the west end of the Blackstone Viaduct are contributing elements in the Blackstone Canal National Register Historic District (Adams 1995). Although the Blackstone Canal provided transportation for raw materials and finished goods, it also competed with mills along the Blackstone River for available water, and was often rendered impassable by frozen water in winter and low water in summer. It established a strong north-south transportation axis between its namesake cities, and fostered growth in trade between them and the cities along the canal route.

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In the mid-1840s discussion began concerning the construction of a railroad connecting Blackstone with either Boston or Providence. Welcome Farnum immediately took an active role in the discussion and supported the planned construction of a railroad linking Blackstone with Boston, via Walpole, Dedham, and the Boston & Providence Railroad. However, an alternative railroad, connecting the cities of Worcester and Providence, was also proposed and immediately garnered private and public support. In fact, support for this railroad was strong enough that in 1844 the Providence & Worcester Railroad (P&W) was chartered and construction completed by 1847. On October 25 of that year, the first train ran between its namesake cities (Blackstone Historical Commission 1996:46). The P&W maintained a depot in Blackstone, near the Blackstone Manufacturing Company mills in the area of present-day Canal Street, just north of the Blackstone River. The P&W provided rapid, inexpensive, year-round transportation compared to the sluggish, seasonal Blackstone Canal, which was rendered obsolete almost immediately after the completion of the parallel railroad. The P&W further reinforced the north-south trade axis in the Blackstone Valley.

Regardless of the immediate support for the Providence & Worcester, Welcome Farnum and several other area industrialists were determined to construct a railroad connecting Blackstone to the port of Boston, and in 1847 their proposal was accepted by the Massachusetts General Court and the Norfolk County Railroad was chartered (Blackstone Historical Commission 1996:42). The Norfolk County Railroad opened on May 15, 1849 when the first train traveled on the line from Blackstone to Walpole, and the company maintained a depot in Waterford to serve the demands of Welcome Farnum's mills. The completed railroad eventually ran from Blackstone to Dedham (Readville), where trains were able to transfer to the track of the Boston & Providence Railroad in order to travel directly into Boston (Karr 1995:293). The Norfolk County operated as a local, independent railroad until 1853, at which time the board of directors decided to lease their track to the Boston & New York Central Railroad, a small company that was attempting to establish an inland pathway from Boston to New York in order to compete with the established line along the shore of Long Island Sound to the south. The beginning of this lease marks the Blackstone area's growing importance as a railroad nexus, for the struggle to complete an inland railroad from Boston to the Hudson River and New York City via the Blackstone area lasted until the end of the 19th century.

The Boston & New York Central Railroad continued to lease the track of the Norfolk County until 1855, at which time the directors of the Norfolk County chose to lease the line to the Boston & Providence Railroad (Karr 1995:293). In 1857, after leasing the track for two years to the Boston & Providence, the Norfolk's directors decide to switch their tenant to the East Thompson Railroad for one year, after which they returned to independent operation. The East Thompson Railroad had originally been chartered as part of the Boston & New York Central Railroad to provide a link between Boston, Blackstone, East Thompson, Connecticut, and points further southwest (Karr 1995:111). However, the Boston & New York Central collapsed in 1855 and

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the line was operated independently for several years thereafter. In 1858 the Norfolk County Railroad resumed independent operation and continued to provide service between Blackstone and Boston via Dedham and the Boston & Providence. This second period of independent operation for the Norfolk County Railroad ended in early 1867 when the Boston, Hartford & Erie Railroad gained control of the line.

In the early 1860s, the Boston, Hartford & Erie Railroad had begun purchasing small New England railroads in order to complete an inland route between Boston and New York, similar to the one that the Boston & New York Central had attempted to construct almost a decade before (Karr 1995:111). In 1863, the Boston, Hartford & Erie purchased the Southbridge & Blackstone Railroad, intending to extend that line from East Thompson to Willimantic, Connecticut, where it would connect to the Air Line Railroad extending east from New Haven. In order to complete the connection between Blackstone and Boston, the Boston, Hartford & Erie began to lease the Norfolk County Railroad in late 1866 and began operating trains on the track in February, 1867 (Karr 1995:293). Though it was not until 1872 that the connection between Mechanicsville, Connecticut, southeast of East Thompson, and Willimantic finally opened, the track of the Norfolk Country Railroad served from 1867 as the Boston, Hartford & Erie's main route to Boston, connecting with that city via Islington, Massachusetts, and the Midland Railroad, which the Boston, Hartford & Erie also controlled. With the opening of the track between Willimantic and Mechanicsville in August of 1872, and the subsequent connection to the Air Line Railroad to New Haven which was completed in 1873, the Boston, Hartford & Erie successfully established an inland rail route from New York to Boston, a feat that many companies had unsuccessfully attempted (Karr 1995:91). The completion of the Blackstone Viaduct was part of the successful completion of this project.

With the opening of the connection between New Haven and Willimantic, the Norfolk County Railroad became part of a larger network of small railroads linked together in order to connect Boston and New York. However, the process of connecting all of these railroads was enough to bankrupt the very railroad that had masterminded the project: the Boston, Hartford & Erie Railroad. The New York & New England Railroad was formed in 1875 to replace the Boston, Hartford & Erie and it assumed control of the inland route that the Boston, Hartford & Erie had just completed (Karr 1995:111). Under the New York & New England, the Norfolk County Railroad remained the main line into Boston and was heavily traveled by both passenger and freight trains.

The New York & New England, which also became known as the "Air Line," operated profitably until 1889 when a major railroad bridge across the Thames River in New London, Connecticut, was completed. With the opening of the Thames River Bridge the all-rail "Shore Line" between Boston and New York City was

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completed and passenger business on the inland route began to decline (Karr 1995:96). In 1891 the New York & New England attempted to compete with the Shore Line route through publicity. It painted the passenger cars for its crack *New England Limited* passenger express train white with gilt lettering, and renamed it the *White Train*. This train became part of local legend for the inhabitants of the towns it passed through, who nicknamed it the "Ghost Train." Despite the numerous curves and hills on the line, the *White Train* and its even faster successor, the *Air Line Limited*, provided some of the fastest rail travel times between Boston and New York City. The *White Train* and its successors did not stop in Blackstone, and only paused in Willimantic, Connecticut, to take on coal and water (Harlow 1946:209–214). In 1898, the New York, New Haven & Hartford Railroad, which was the primary controller of the "Shore Line," absorbed the competing New York & New England and took control of the Norfolk County Railroad, and under its control business on the inland route between Boston and New York began to decline even further. Despite the short-lived prosperity of this line and the excitement created by the *White Train*, the "Air Line" was never a major east–west New England rail competitor. Ultimately the line failed due to competition from more powerful east–west Massachusetts railroads that had been established earlier on superior routes, including the Boston & Maine Railroad's "Fitchburg" division to Troy and Albany, New York; The Boston & Albany Railroad, and the New York, New Haven & Hartford Railroad's "Shore Line."

The New Haven Railroad continued to use the "Air Line" as an alternate long-distance freight and passenger line until the 1955 hurricane severed the line in Connecticut. Passenger service between Blackstone and Boston ceased in 1963 (Stott *Blackstone Viaduct* 1988). Portions of the line were operated by the New York, New Haven & Hartford until 1969 when it was absorbed by the Penn Central Railroad, which abandoned the section including the Blackstone Viaduct in that year (Interstate Commerce Commission 1969). The only part of the original Boston-Blackstone section of the Norfolk County Railroad line that still operates today is the Boston-Franklin/Forge Park section, which is operated as a commuter rail line by the Massachusetts Bay Transportation Authority (Karr 1995:294).

The Blackstone Viaduct

The Blackstone Viaduct was completed in April 1872, when the line was controlled by the Boston, Hartford & Erie Railroad and the inland route was just being finished (NY&NE 1876:27). It is unclear when work on the structure actually began, although it may have been started by the Boston, Hartford & Erie in 1867, when the line was given a $3 million loan from the State of Massachusetts. When that line passed into bankruptcy in 1870, its trustees expended large sums to completely renew the line (Stott *Blackstone Viaduct* 1988). A report published at the time of its completion stated that work on the structure had "commenced years ago" (Massachusetts Board of Railroad Commissioners 1872:59). The viaduct replaced a timber trestle and earth-

(continued)

fill structure located on the same alignment. The arches and abutments were constructed of quarry-faced, random ashlar, grey granite blocks, possibly obtained at nearby quarries in Uxbridge or Milford. Under the New York & New England, the entire Boston, Hartford & Erie line was double-tracked in 1883–1884 (Stott *Blackstone Viaduct* 1988). It is highly likely that the Blackstone Viaduct was constructed as a double-track structure in 1872, even though the original main line initially consisted of only one track. The construction of double-track-width bridges on single-track rail lines in anticipation of future traffic was commonly practiced in 19th century New England railroad construction. An 1870 atlas clearly shows that the previous structure carried two tracks, which would have been typical for trackage so close to a station and freight customers (Beers 1870).

By 1912, several of the Blackstone Viaduct's arches had begun to fail. Photographs of the structure from that year show that the spandrel walls had been shored up with timber supports (Interstate Commerce Commission n.d.). In 1918, the arches were heavily strengthened when the structure was encased by an approximately 1 ft thick layer of steel-reinforced, form-cast concrete. (Massachusetts Department of Public Works n.d.). New York, New Haven & Hartford Railroad records from 1918 list the Blackstone Viaduct as Bridge 35.88 on its South Bay (Boston) to Willimantic, Connecticut, line, Line No. 90. These records describe the structure as a "concrete-lined stone arch," "reinforced with conc." in 1918 (New York, New Haven & Hartford n.d.). This modification was likely chosen as an interim measure to stabilize the structure rather than replacing it, as the line had been downgraded by that time. Indeed, the bridge over Canal Street at the west end of the viaduct was replaced in 1917 with a single-track structure, which is consistent with the downgrading of the line (Stott *Canal Street* 1988). The steel bridge over the Blackstone River at the east end of the Blackstone Viaduct was damaged in a flood in the late 1960s, shifting the river pier. The bridge was subsequently removed. The two parcels of land included in this nomination, Map 7/Lot 5 and Map 8/ Lot 123, were transferred from the Penn Central Real Estate Corporation to the Commonwealth of Massachusetts on December 1, 1984 (Blackstone Assessors Office, Book 8502, Page 23).

The concrete sheathing completely obscures the original masonry construction of the arch barrels, piers and and spandrel walls, however, the structure still retains its original essential multiple arch bridge form. The material and texture of the original stonework is visible in the abutments and retaining walls elsewhere on the viaduct. The concrete cladding is itself notable as a form of repair to this structure. This repair was made in the World War I era, a time when the mechanical function and creative possibilities of the new plastic medium of reinforced concrete were being explored by the structural engineering community worldwide.

(continued)

Blackstone's Railroad Landscape

The Blackstone Viaduct is a significant landscape element in the Blackstone area, and the area's history as an important junction between several regional railroads has left a landscape legacy of transportation-related industrial structural and archaeological remains that shaped later residential and transportation development patterns. In addition to the Blackstone Viaduct, Blackstone is host to at least 13 other late-19th and early-20th -century steel railroad bridges, some of which are components of the same Norfolk County/New York & New England Railroad line that includes the Blackstone Viaduct, and some part of the adjacent Providence & Worcester Railroad. The specifics of these bridges are too numerous to include here. However, several of the bridges on the Norfolk County (New York & New England) line are contributing elements to the Blackstone Canal and/or Blackstone Manufacturing Company National Register districts. Contributing to the Blackstone Canal District (Adams 1995) are the Canal Street Bridge (south) (1917), and the east and west Factory Pond bridges (1918). Contributing to the Blackstone Manufacturing Company District (Schuler and Friedberg 1995b) are the Cains Court Bridge (1908) and the abutments of the Main Street Bridge (1917). Contributing to both districts is the Canal (River) Street Bridge (1918). Contributing to the Blackstone Canal District, but associated with the P & W Railroad are the two Blackstone Canal bridges (1903). None of these steel structures are as old, long, or as significant from an engineering standpoint as the Blackstone Viaduct. Also contributing to the Blackstone Canal District is the St. Paul Street Bridge, an 1851 two-span granite arch bridge over the bed of the Blackstone Canal. The P & W's Blackstone River Bridge (1889), a rare surviving, active example of a pin-connected truss, a type of construction superseded by all-riveted construction shortly after 1900, remains unlisted.

In addition to the bridges, the New York & New England and Providence & Worcester railroad rights-of-way include cuts, fills, and embankments that have influenced land use patterns in Waterford and Blackstone. These rights-of-way host historical archaeological sites including the New Haven/Providence & Worcester Union Station site northwest of the viaduct on Canal Street, and the P & W turntable and engine house site due west of the viaduct and Blackstone Canal Bed. Vestiges of the Midland Railroad can be seen in the track causeways crossing Harris Pond in eastern Blackstone, just north of Woonsocket, Rhode Island.

The impact of the "Air Line" on Blackstone's industrial development does not appear to have been great. The Blackstone Valley's dense textile mill infrastructure and economy was oriented along the north–south-running Blackstone River and that relationship was reinforced by the parallel Blackstone Canal and later Providence & Worcester Railroad. The early impetus for an additional rail line from Blackstone was a natural desire for a link to the port and population center of Boston. Once the New York & New England Railroad established its through route to the west, Blackstone became simply another small town on a line with more lofty ambitions of

(continued)

competing for Boston–New York City traffic. The New York & New England line through the Waterford section of Blackstone passed high above the village and mills, connecting the high river banks either side of the Blackstone River and avoiding the industrial bottomland beneath it. The Blackstone Viaduct can be considered an early example of a railroad "cutoff," a type of engineering project associated with early 20th century railroad improvements designed to eliminate curvature and gradient, and which often bypassed communities previously served by rail. The Delaware, Lackawanna & Western Railroad's famous "Lackawanna Cutoff" project resulted in the construction of numerous high fills and bridges, including the Tunkhanock Creek Viaduct in Nicholson, Pennsylvania, the world's largest reinforced concrete structure. Like the Tunkhanock Creek Viaduct, the Blackstone Viaduct is more significant in the context of structural engineering than to the community in which it is located.

The railroad landscape that includes the Blackstone Viaduct also includes remains of another railroad saga that left its mark on the area. The Southern New England Railroad, chartered in 1911, was proposed to run between the Canadian-backed Central Vermont Railroad at Palmer, Massachusetts, to Providence, Rhode Island, providing an alternative to the New Haven Railroad's monopoly on rail transportation in Southern New England. The right-of-way, including dramatic cuts, fills, embankments and concrete bridge abutments and piers was constructed, but the line was never completed due to financial difficulties and political intrigues involving the New Haven Railroad (Lowenthal 1998). The right-of-way traversed Blackstone between Millville and Woonsocket, crossing the New York & New England east of the Blackstone River, where remains of a Southern New England bridge abutment are still visible on Federal Street. The earthworks of the right-of-way are still visible snaking through Blackstone north of Route 122. In Millville, the Southern New England Railroad earth embankments and tall concrete bridge piers are part of a remarkable feature, the Millville Triple Crossing (or "Triad Bridge"), where a high Southern New England Railroad steel trestle (never constructed) would have crossed the New York & New England's riveted deck truss bridge (still extant, but abandoned), which in turn crosses the P & W's rare pin-connected through truss bridge over the Blackstone River (extant, still in use). Even in its unfinished state this engineering feat complements the nearby Blackstone Viaduct, and both represent the most dramatic evidence of the extensive railroad construction in this section of the Blackstone Valley. The Blackstone Viaduct is the largest single structure on the right-of-way of the former New York & New England Railroad in Massachusetts.

Masonry Arch Bridges in Massachusetts

The Blackstone Viaduct is a significant historic engineering resource in Massachusetts, and is one of several large multiple-arch, masonry bridges in the state. Nineteenth-century civil engineers were confronted with the

(continued)

challenge of carrying railroads and aqueducts across numerous river valleys in Massachusetts. The type of structure employed was the multiple-arch masonry bridge, or viaduct, an engineering solution dating from the time of the Roman Empire and used extensively for early 19th century European bridges. Granite, an appropriate building material, was available throughout eastern Massachusetts. The term "viaduct" refers to any multiple-span bridge, more commonly to masonry structures, that carries a transportation feature such as a road or railroad. The term "aqueduct" most commonly refers to a conduit for carrying water, but also less commonly refers to a bridge that carries such a conduit.

The largest and earliest major multiple-arch masonry bridge in Massachusetts is the Canton Viaduct, constructed for the Boston & Providence Railroad in 1835. The 615 ft. long, 70 ft. high, 21-arch granite structure was designed by William Gibbs McNeill and George Washington Whistler, two of the nation's preeminent railroad engineers. It was "widely conceded the most elegant and massive structure of masonry in the United States" when completed (Stott 1984:2). It is a National Civil Engineering Landmark, and is listed in the National Register of Historic Places. Later in the 1830s G.W. Whistler was engineer for the Western Railroad, constructed between Worcester, Massachusetts, and Albany, New York. This line included a series of massive stone arch bridges over the west branch of the Westfield River, which are listed in the National Register of Historic Places (Durfee and Lennon 1980). Smaller examples of multiple-arch granite railroad viaducts in Massachusetts include the 100 ft. long, four-span, 1846 Boston & Maine Railroad Fall River Bridge in Bernardston (Weigand 1977), and the 200 ft. long, eight-span, 1847 Boston & Worcester Railroad Bogastow Brook Bridge in Holliston (Carnes 1979).

Massachusetts also hosts an impressive group of multiple-arch masonry bridges built to carry the series of aqueducts that supply drinking water for the city of Boston. The earliest of these is the 1848 three-span, granite Charles River Bridge in Wellesley, Massachusetts, part of the Cochituate Aqueduct system linking the Cochituate Reservoir in Natick, Massachusetts with Boston. The later Sudbury Aqueduct system includes two brick and granite multiple-arch bridges spanning the Charles River built about 1875. The Waban Bridge, also in Wellesley, is a nine-span structure, and the Charles River (Echo) Bridge on the Newton-Wellesley line is a seven-span structure. Both are approximately 530 ft long and 40 ft tall. The newest bridge in this group is the seven-arch, 359 ft Assabet River Bridge, built in Northborough, Massachusetts in1897 as part of the Wachusett Aqueduct system. All of these structures have been listed in the National Register of Historic Places in a thematic nomination of Boston's historic water supply resources (Jenkins, et al. 1989).

The viaducts constructed during the first half of the 19th century were constructed prior to the development of long-span iron and steel bridge materials and technology and relied on the only available engineering solution,

(continued)

the multiple-arch masonry bridge. By the 1870s suspension bridges were in use for long single-span bridges, and by the last decade of the nineteenth century steel trusses were the most efficient solutions for multiple-span bridges. Although these solutions were popular for highway and railroad crossings, the masonry arch continued to be the solution of choice for bridges carrying aqueducts. This choice was not solely because of the availability of Granite in eastern Massachusetts. This structural form was undoubtedly chosen for its pleasing appearance and Classical associations, which were appropriate for highly-visible works of civil engineering carrying pure drinking water through populated areas. The choice of a multiple-arch masonry viaduct for the Blackstone Viaduct may have been a conscious one made for a similar combination of reasons. Granite was quarried in abundance in nearby communities including Milford and Uxbridge, which both had convenient rail connections to Blackstone. A masonry structure had the strength required to carry the increasing weight of post-Civil War railroad locomotives and trains. The structure also cut boldly through Waterford, an established village associated with the textile mills developed by the Norfolk Railroad's primary early supporter, Welcome Farnum, suggesting that the choice of an aesthetically-pleasing structure was motivated by its location and setting as much as by available materials and technology. Indeed, the dressed stone retaining walls, with their prominent capstone course and curved abutments, were an added embellishment to the structure where it ran through the Waterford mill village.

Archaeological Significance

Historic archaeological resources described above have the potential to provide detailed information relating to railroad bridge technologies, 19th century industrial water-power systems, and the lives of late 19th century industrial workers. Potential structural and stratigraphic evidence from the timber trestle and earth-filled structure that preceded the viaduct may contribute important architectural design and construction details from that structure. Archaeological evidence may also survive indicating to what extent, if any, elements of that structure were incorporated into the existing viaduct. Structural and stratigraphic evidence from the Mammoth Mill power canal may contribute similar information about that structure. Archaeological survey and testing can also help document the integrity and presence of post-1872 cultural resources beneath the third arch from the east end of the viaduct immediately east of the Mill Street arch. Archaeological evidence associated with late 19th century worker's housing in this area may contribute important information on the lives of mill workers and landuse activity beneath the viaduct arches.

(end)

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(end)

Geographical Data

Universal Transverse Mercator Coordinate Reference Number: 19.290232.4654380

Boundary Description:

The boundary follows the legal property boundaries of two irregularly-shaped linear parcels, Plat 7/Lot 5 to the east, and Plat 8/Lot 123 to the west, which are joined end-to-end by parallel lines-of-convenience that cross Mill Street between the two parcels.

Boundary Justification:

The boundaries encompass all Massachusetts Department of Environmental Management land that includes the Blackstone Viaduct abutments, embankments, and masonry arch structures.

(end)

Photographic Information

Photographer: Matthew A. Kierstead

Date of Photographs: November 18, 1999

Negatives on file at: PAL
210 Lonsdale Avenue
Pawtucket, RI 02860

Index to Photographs:

1. View looking northwest showing south face of Multiple-Arch Bridge with Multiple-Arch Bridge East Abutment at right

2. View looking west showing north face of Multiple-Arch Bridge with Waterford mill housing at right

3. View looking south showing east and north faces of Blackstone River Bridge Abutment

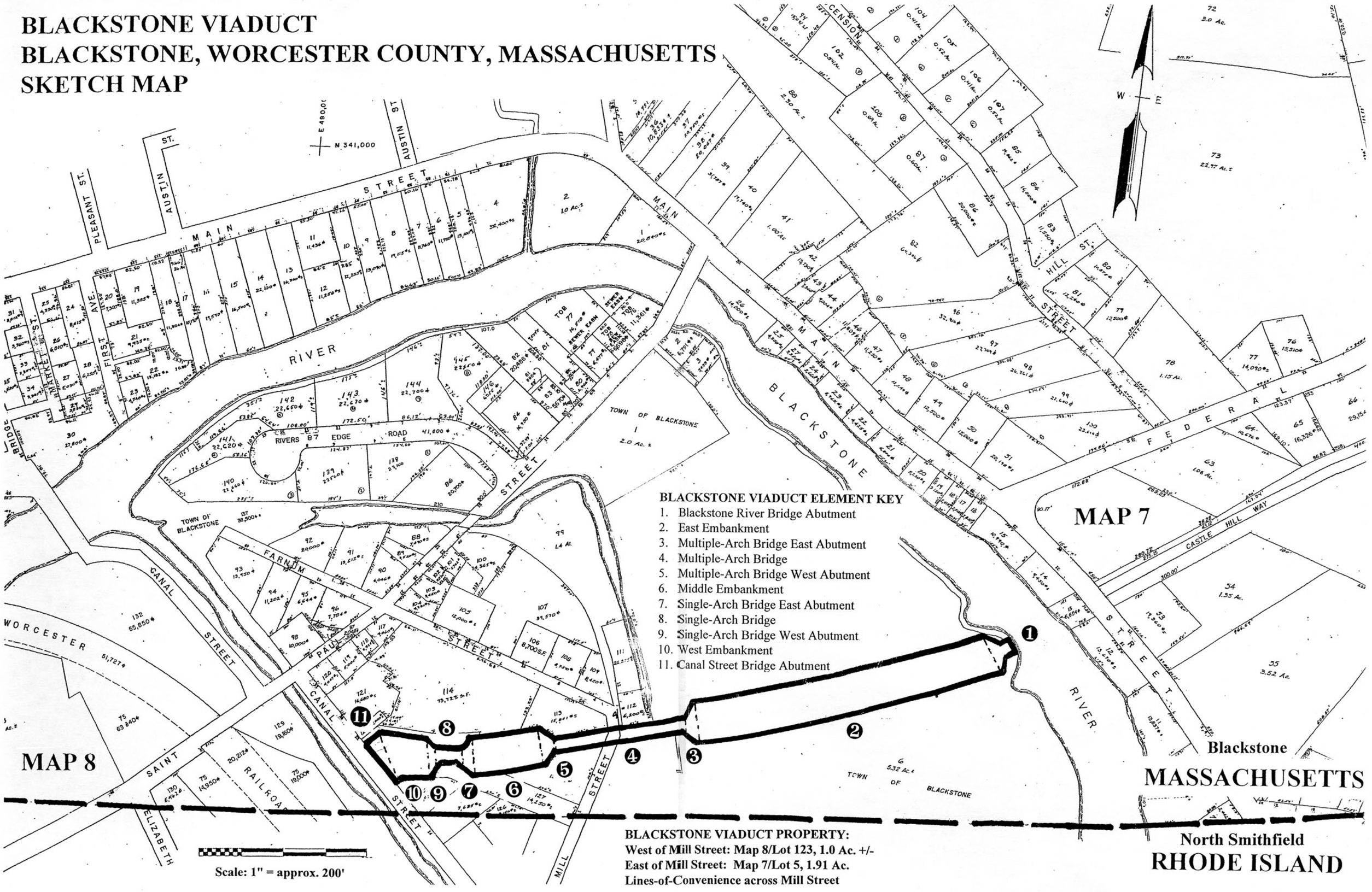
4. View looking north showing, from left to right, West Embankment, Single-Arch Bridge West Abutment, Single-Arch Bridge, Single-Arch Bridge East Abutment, and Middle Embankment

5. View looking northwest showing, from left to right, Canal Street Bridge Abutment, and West Embankment and granite retaining wall, with Waterford mill housing at right

BLACKSTONE VIADUCT
BLACKSTONE, MASSACHUSETTS
DATA SHEET

NR MAP NO.	MAP/ LOT	MHC NO.	NAME/ FUNCTION	STREET ADDRESS	DATE	STYLE/ TYPE	RESOURCE TYPE	PHOTO NO.
1	7/5	911	Blackstone River Bridge Abutment	Mill Street	1872	Masonry	C/ST	3
2	7/5	911	East Embankment	Mill Street	1872	Earth Fill	C/ST	
3	7/5	911	Multiple-Arch Bridge East Abutment	Mill Street	1872	Masonry	C/ST	1
4	7/5, Mill Street, 8/123	911	Multiple-Arch Bridge	Mill Street	1872	Masonry, Roman Arch, Reinforced Concrete	C/ST	1,2
5	8/123	911	Multiple-Arch Bridge West Abutment	Canal Street	1872	Masonry	C/ST	
6	8/123	911	Middle Embankment	Canal Street	1872	Earth Fill	C/ST	4
7	8/123	911	Single-Arch Bridge East Abutment	Canal Street	1872	Masonry	C/ST	4
8	8/123	911	Single-Arch Bridge	Canal Street	1872	Masonry, Roman Arch, Reinforced Concrete	C/ST	4
9	8/123	911	Single-Arch Bridge West Abutment	Canal Street	1872	Masonry	C/ST	4
10	8/123	911	West Embankment	Canal Street	1872	Earth Fill	C/ST	4,5
11	8/123	911	Canal Street Bridge Abutment	Canal Street	1872	Masonry	C/ST	5

BLACKSTONE VIADUCT
BLACKSTONE, WORCESTER COUNTY, MASSACHUSETTS
SKETCH MAP

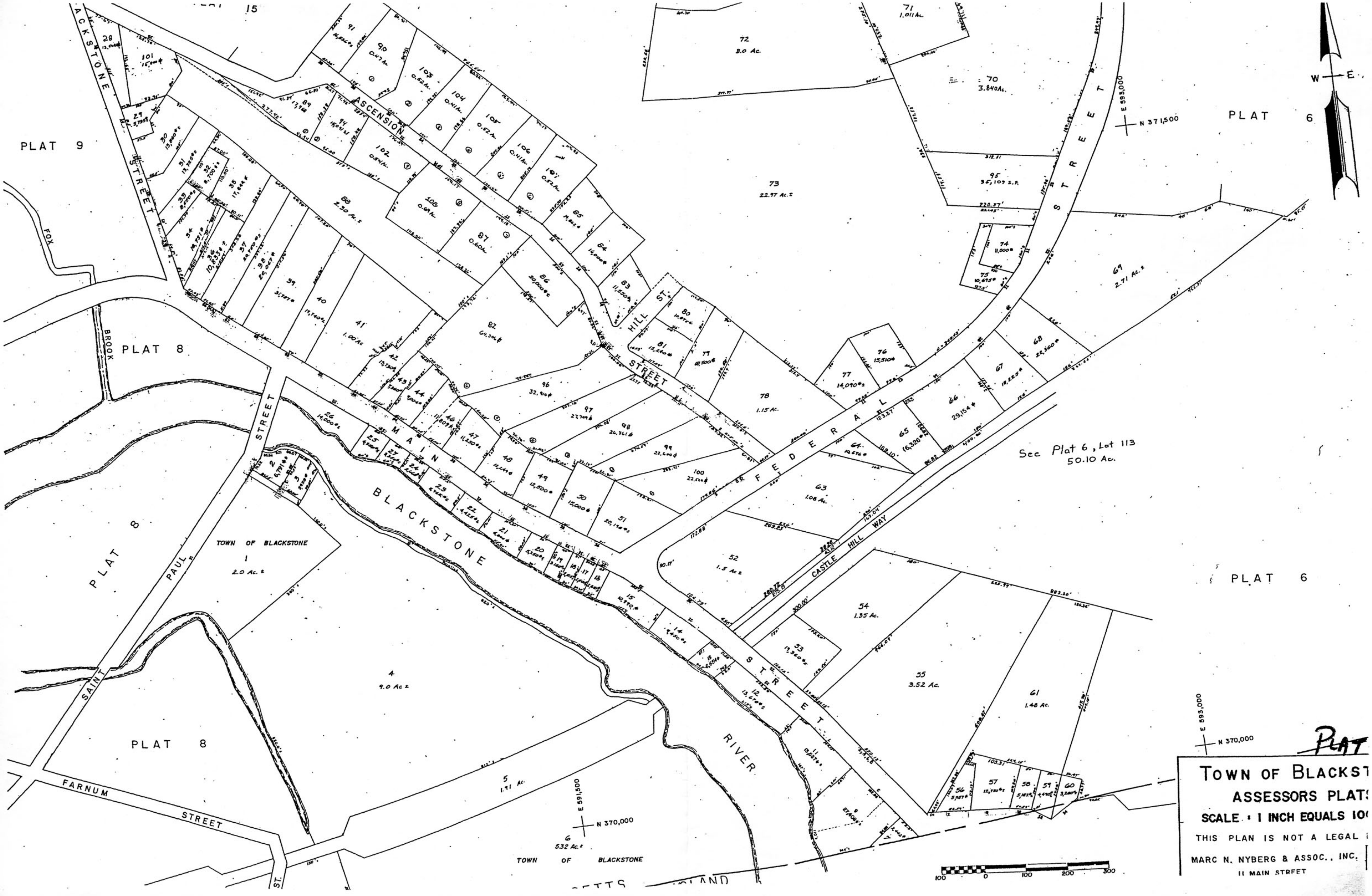


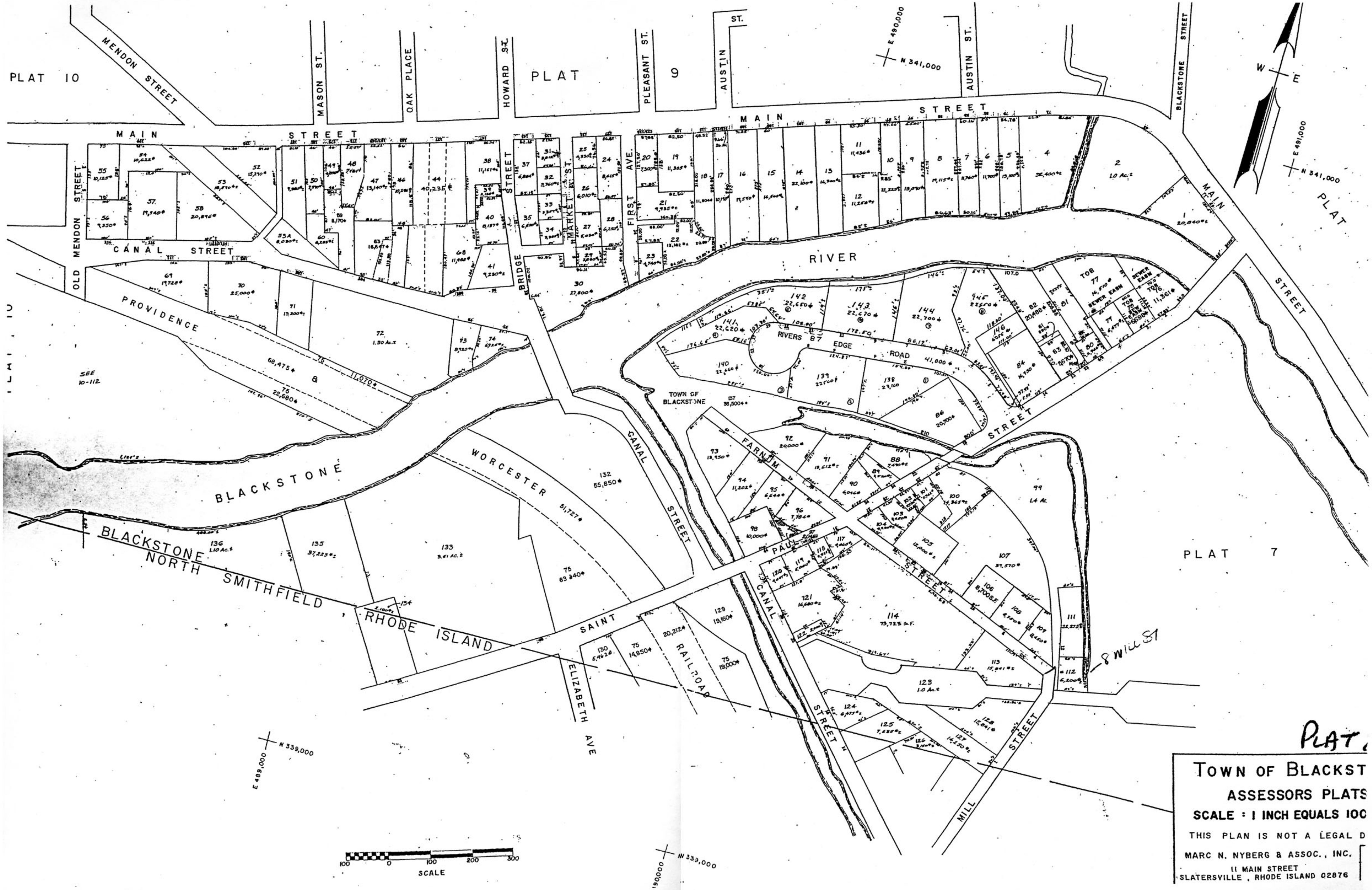
BLACKSTONE VIADUCT ELEMENT KEY

1. Blackstone River Bridge Abutment
2. East Embankment
3. Multiple-Arch Bridge East Abutment
4. Multiple-Arch Bridge
5. Multiple-Arch Bridge West Abutment
6. Middle Embankment
7. Single-Arch Bridge East Abutment
8. Single-Arch Bridge
9. Single-Arch Bridge West Abutment
10. West Embankment
11. Canal Street Bridge Abutment

BLACKSTONE VIADUCT PROPERTY:
West of Mill Street: Map 8/Lot 123, 1.0 Ac. +/-
East of Mill Street: Map 7/Lot 5, 1.91 Ac.
Lines-of-Convenience across Mill Street

Blackstone
MASSACHUSETTS
North Smithfield
RHODE ISLAND


PLAT 9
PLAT 8
PLAT 6
See Plat 6, Lot 113
50.10 Ac.
MAIN STREET
FEDERAL STREET
ASCENSION
HILL ST.
SAINT PAUL STREET
FARNUM STREET
CASTLE HILL WAY
BLACKSTONE RIVER
FOX BROOK
TOWN OF BLACKSTONE
N 371,500
E 593,000
N 370,000
E 591,500
TOWN OF BLACKST
ASSESSORS PLATS
SCALE : 1 INCH EQUALS 10
THIS PLAN IS NOT A LEGAL
MARC N. NYBERG & ASSOC., INC.
11 MAIN STREET


PLAT 10
MENDON STREET
MASON ST.
OAK PLACE
HOWARD ST.
PLAT 9
PLEASANT ST.
AUSTIN ST.
ST.
E 490,000
N 341,000
AUSTIN ST.
BLACKSTONE STREET
W
E
MAIN STREET
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N 341,000
PLAT
MAIN STREET
OLD MENDON STREET
CANAL STREET
BRIDGE STREET
MARKET ST.
FIRST AVE.
RIVER
PROVIDENCE
RIVERS EDGE ROAD
TOWN OF BLACKSTONE
SEE 10-112
BLACKSTONE
WORCESTER
CANAL STREET
FARNUM
PAUL STREET
STREET
PLAT 7
BLACKSTONE
NORTH SMITHFIELD, RHODE ISLAND
SAINT
ELIZABETH AVE
RAILROAD
CANAL STREET
MILL STREET
8 MILL ST
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SCALE
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TOWN OF BLACKST
ASSESSORS PLATS
SCALE : 1 INCH EQUALS 10C
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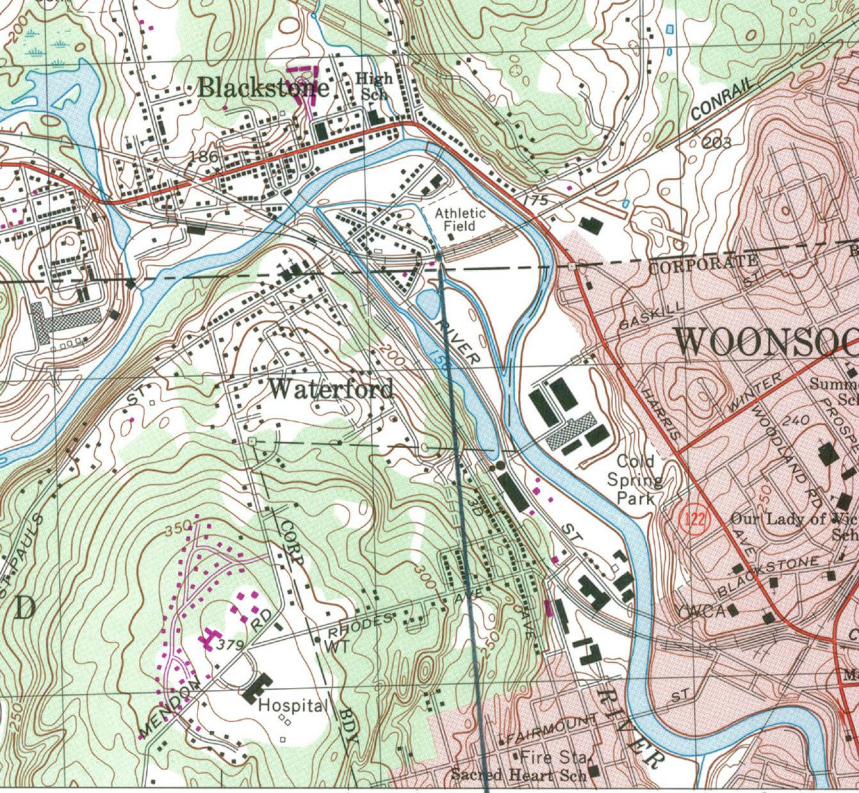
MARC N. NYBERG & ASSOC., INC.
11 MAIN STREET
SLATERSVILLE, RHODE ISLAND 02876

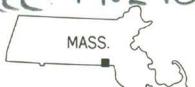


Blackstone Viaduct
Blackstone, Worcester Co., MA

1 MILE
7000 FEET
KILOMETER

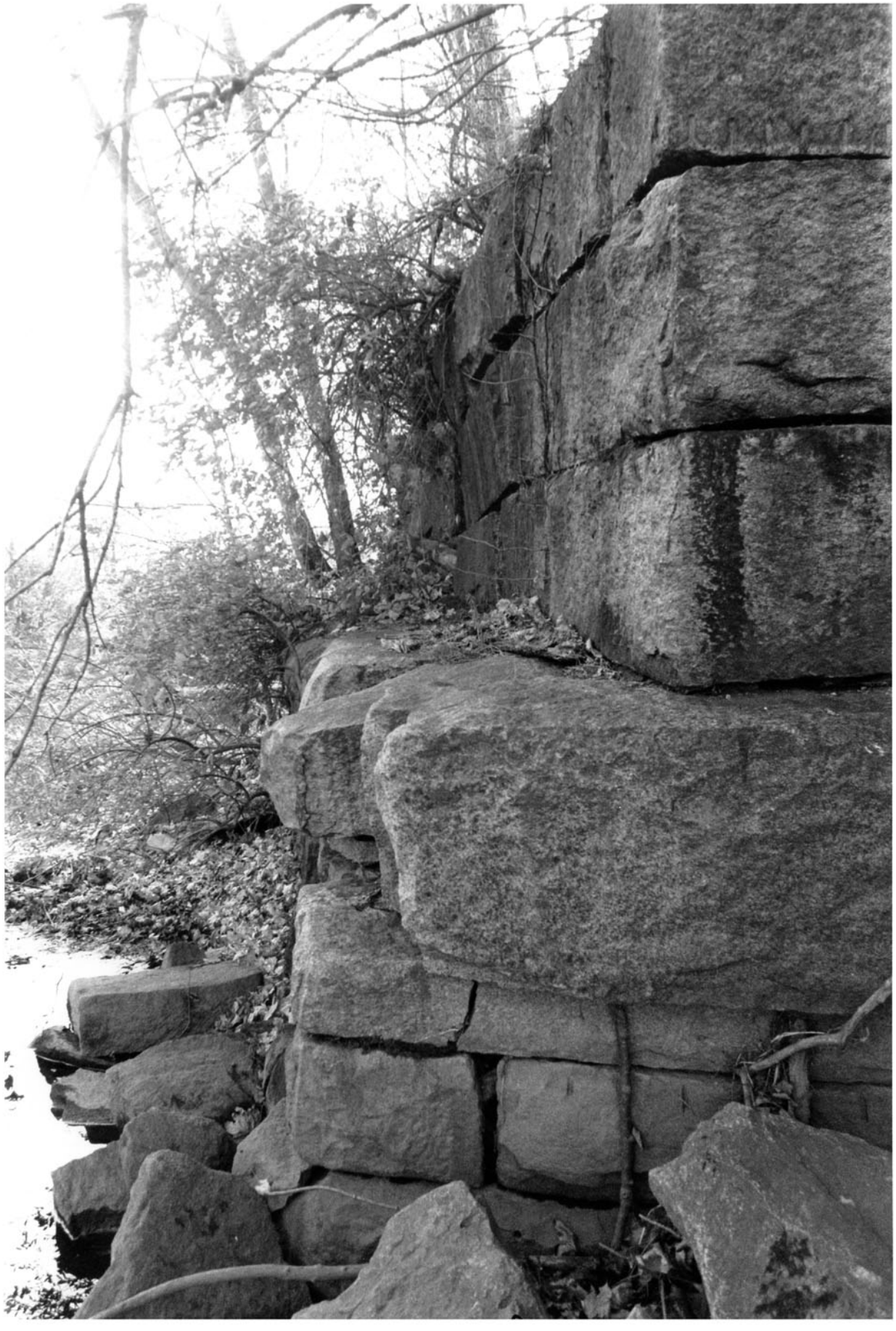
Primary highway hard surface

UTM Reference: 19.290232.4654380



1. View looking northwest showing south face of Multiple-Arch Bridge with Multiple-Arch Bridge East Abutment at right (Photographer: Matthew A. Kierstead, 18 November 1999)

2. View looking west showing north face of Multiple-Arch Bridge with Waterford mill housing at right (Photographer: Matthew A. Kierstead, 18 November 1999)



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4. View looking north showing, from left to right, West Embankment, Single-Arch Bridge West Abutment, Single-Arch Bridge, Single-Arch Bridge East Abutment, and Middle Embankment (Photographer: Matthew A. Kierstead, 18 November 1999)

5. View looking northwest showing, from left to right, Canal Street Bridge Abutment, and West Embankment and granite retaining wall, with Waterford mill housing at right (Photographer: Matthew A. Kierstead, 18 November 1999)