Introduction and Brief History of the High Bridge

The Project Development, Vision and Goals

Design Elements

Construction Challenges

From Rendering to Reality … A Success Story
A BRIEF HISTORY
BRIEF HISTORY

1837 to 1842

The Old Croton Aqueduct

- NYC experienced epidemics of cholera, typhoid and plague, frequent fires and property loss.

- Constructed to bring reliable sources of potable water to NYC.

- One of the first modern aqueducts transporting water by gravity 41 miles.

- Superseded by the New Croton Aqueduct built in 1890, the OCA remained in service until 1955.
BRIEF HISTORY

The High Bridge

- Critical link enabling delivery of water from Croton Dam to Manhattan
- Monumental structure measuring 1450’ long and 122’ high and featuring fifteen (15) granite arches
- Designed by John B. Jervis (1795-1885) engineer of the Erie Canal
Demands of a Thirsty City

- By 1860, the twin 36-inch mains reach capacity
- A new 90 ½ inch iron main is installed atop cast iron standards above the existing pipes
- Spandrel walls raised 6’-feet and the deck built
BRIEF HISTORY

1837 to 1920
BRIEF HISTORY

1926 to 1928

- Greater demands on navigation
  - 1895 Harlem Ship Canal built
    - More frequent river traffic and larger ships
    - Pressure to remove the High Bridge river piers
    - Plan to replace the river piers with a single span steel arch
BRIEF HISTORY

1926 to 1928
1930-1958

A Changing City

- New Croton Aqueduct and Tunnel completed in 1895
- Operation of the Catskill Aqueduct in 1917
- December 2, 1958 water delivery across the High Bridge permanently discontinued
BRIEF HISTORY

1960-1970

A Neglected Community Connection

Walkway Closed 1970

- 1970 - The High Bridge awarded NYC Landmark Status
- 1972 - The High Bridge is listed on the National Register of Historic Places
- 1992 – The OCA and High Bridge designated a National Historic Landmark
BRIEF HISTORY

1960-1970
PROJECT VISION
plaNYC Goals

- A plan to keep NYC livable
- To prepare for one million more residents by 2030
- For all New Yorkers to live within a 10-minute walk of a park
Total Funding of $62 Million

- $49.6 Million through plaNYC
- $5 Million through US Rep. José E. Serrano
- $7.2 Million in other federal grants
Enhance NYC’s pedestrian environment
Respect the work of the nineteenth century visionaries
Create effective links
Restore the bridge's beauty, usefulness, and grandeur
DESIGN OBJECTIVES

- Provide a structurally sound, reliable facility
- Utilize historic preservation treatments
- Correct the cause of leakage and infiltration
- Provide safety and universal accessibility improvements
- Provide a visitor information system to educate the public
DESIGN ELEMENTS
MASONRY SPANS

- MASONRY CLEANING
- MASONRY / STONE REPAIR
- MASONRY REPOINTING
STEEL SPANS

- STEEL REPAIRS
- BEARING REPLACEMENT
- CLEANING & PAINTING
DECK RECONSTRUCTION

Steel Span

BRICK PAVERS – 1” VERTICAL DISPLACEMENT AT EDGES DUE TO FROST HEAVE

3” MORTAR SLAB WITH MESH REINFORCING

PROBE REVEALED SEVERAL HOLLOW AREAS

STEEL ARCH SPAN SCHEMATIC CROSS SECTION
DECK RECONSTRUCTION

Masonry Spans

* TIE RODS – 5% TO 90% MATERIAL SECTION LOSS
90 TIE RODS HAVE > 25% MATERIAL SECTION LOSS

1 3/4" DIA. WROUGHT IRON TIE RODS @ 5’ C/C
*175 TOTAL TIE RODS

BRICK PAVERS – GENERALLY GOOD CONDITION

12” BRICK ARCH - GOOD CONDITION

ASPHALT WATER-PROOFING - POOR CONDITION

BRICK UNDERLAYMENT VARIABLE DEPTH

MASONRY ARCH SPAN SCHEMATIC SECTION THROUGH ATTIC
TIED-BRICK ARCH

**Tie Rod**

- **CORE 4" DIA. HOLE THRU STONE, BRICK AND MORTAR**
- **COPE STONE AT NEW TIE ROD**
- **CHASE NEED TO BE ONLY TO THIS LINE AWAY FROM NUT AND WASHER (THRU MORTAR FILL)**
- **REPLACE BRICK UNDERLAYMENT**
- **CUT 10" CHASE TO INSTALL ANCHORAGE FOR TIE ROD (THRU BRICK UNDERLAYMENT)**
- **FILL CAVITY WITH NATURAL CEMENT GROUT TO THIS LINE AFTER STRESSING TIE ROD**
- **CORE THRU SKEWBACK AS SHOWN**
- **1" THICK STIFFENING RIB AT 1'-3" OC**
- **4" x 8" x ½" BEARING PLATE AND NUT**
- **1½" DIA. CORED HOLE FOR 1½" DIA. THREADBAR**

**BRICK PAVING UNDERLAYMENT AND WATERPROOFING REMOVED**
BRONX RAMP
MANHATTAN RAMP
VIEWING PLATFORMS

BOLT CAST IRON CURB TO EXISTING STEEL CORNING

8" HT. SAFETY FENCE

RAIL BRACE (19")
CAST IRON CURB

ATTACH BENCH TO CONCRETE SLAB BELOW
32” AT 2% SLOPE
32” AT 2% SLOPE

1” THICK X 2” X 4” ADA COMPLIANT CAST IRON GRATE, BOLT TO SUPPORTS

8” WIDE CUSTOM CAST IRON CURB AND CUSTOM GRATE TAPERING TO MELT GRADE

PROPOSED HOOF BENCH

STEEL FLANGE SUPPORT FOR GRATES, LEAVE 1/2"

1 1/4” X 2” X 1 1/4” THICK ANGLE FRAME
SETTING BED CONCRETE LEVELING PAD ON SUP SHEET

1/2” THICK X 8” WIDE STEEL LEVELING SUPPORT WITH GROOVED BOTTOM FOR DRAINAGE

CAST IRON GRATE

9’ HT. SAFETY FENCE

TRASH RECEPTACLE

SLOPED SECTION TO MELT BRIDGE DECK

LEVEL PLATFORM

HOOF BENCH - BOLTED TO CONCRETE SLAB BELOW

5’5” WALL
PROTECTIVE FENCING

Bridge Elevation

Bridge Section at Non-Pier Locations

DOT LED Post Top
CONSTRUCTION CHALLENGES
Aqueduct Infrastructure

- Below the Park Pathways
- Restrictions to Equipment
- Limiting work space around the 90-inch Pipe
- Confined space in Attic
- Limiting opening to Attic and Gallery via Manhole
ACCESS

Site Limitations

- Below MetroNorth RR
- Major Deegan Interstate
- Harlem River Drive
- 100-feet over the Harlem River
- No Parking
ACCESS
OPENING SUCCESS
RENDERING TO REALITY
OPENING SUCCESS
OPENING SUCCESS
OPENING SUCCESS
INTERPRETIVE HISTORY

**1837 - 1842**
FRESH WATER

The Croton Aqueduct carried fresh water by gravity from the Croton Aqueduct Reservoir to two reservoirs in Manhattan.

**1839 - 1848**
THE HIGH BRIDGE

High Bridge, the first major bridge across the Harlem River, was an engineering marvel designed to carry the Croton Aqueduct.

**1869 - 1872**
NEW RESERVOIR

A new reservoir was needed for the growing population of Upper Manhattan, as the original reservoirs were inadequate.

**1867 - 1874**
THIRSTY CITY

Water pressure could not meet the demand, necessitating the addition of a new reservoir.

**1927 - 1928**
STEEL ARCH

The old stone arch bridge was replaced with a steel arch bridge to accommodate the growing population and traffic.

**1970 - 1971**
A DESTINATION

High Bridge became a popular destination for picnics, concerts, and other events, attracting people from all over New York City.
RECONNECTING TIME & COMMUNITY

- Completes a major link in the 350-mile NYC Greenway
- Reconnects Manhattan and the Bronx with over 100-acres of parks and amenities
- Visitor information system of round bronze plaques serves to commemorate the High Bridge history for all who visit