

DISTRICT DEPARTMENT OF TRANSPORTATION

William Howard Taft Memorial Bridge Pedestrian Railing Improvement

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Presented to:



U.S. Commission of Fine Arts

September 21st, 2023



William Howard Taft Memorial Bridge Pedestrian Railing Improvement

Presentation **Outline**

1. Project Owner, Design Team, and Stakeholders
2. Need and Purpose of the Project
3. Project Location, Bridge Description and History, and Existing Conditions
4. Section 106 Process
5. Precedents and Design Criteria
6. Design Options
7. Preliminary Cost Estimate
8. Reference Items

Project Owner, Design Team and Stakeholders

- **Project owner:** District Department of Transportation (DDOT)
- **Design Team:** WSP
- **Stakeholders:**
 - Commission of Fine Arts (CFA)
 - National Capital Planning Commission (NCPC)
 - District of Columbia State Historic Preservation Office (DCSHPO)
 - The National Park Service (NPS)
 - The Federal Highway Administration (FHWA)
 - Several citizen groups
 - Advisory Neighborhood Commissions (ANC)
 - DC Councilmembers
 - DC Residents, Businesses and tourists
 - Smithsonian
 - Historic Preservation Group (Cleveland Park, Woodley Park, Kalorama Park, Dupont Circle)

Need and Purpose of the Project

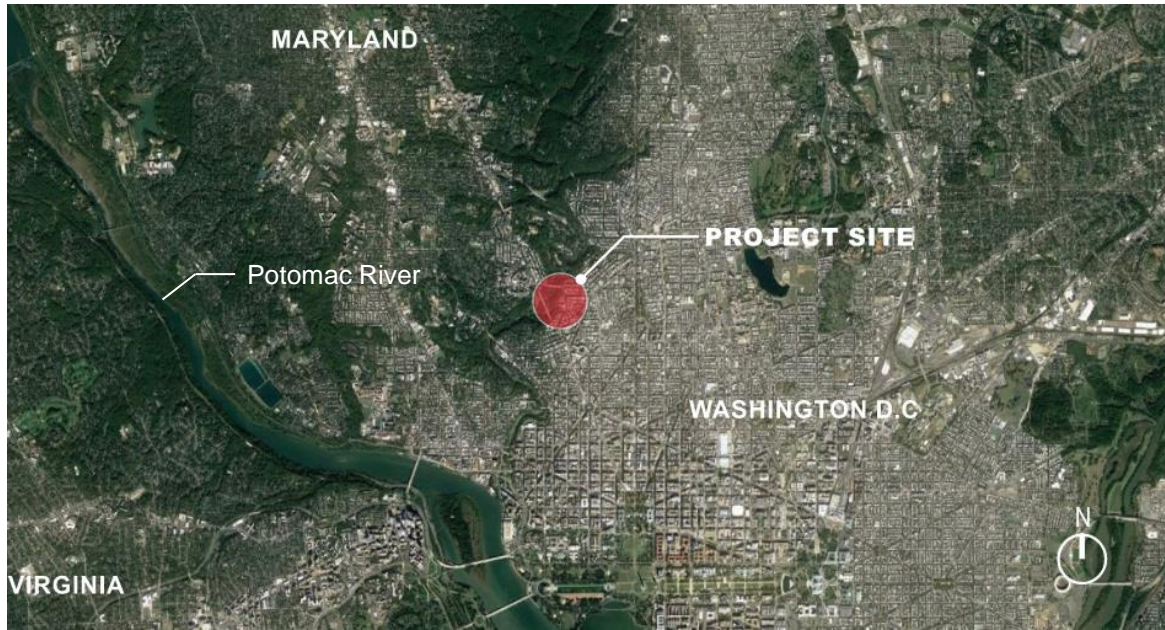
Need:

- DC Government Office of the Chief Medical Examiner data showed that 26 Bridge-related suicides occurred in DC between January 1, 2010, and June 1, 2022, of which 13 fatalities were from the Taft Bridge.

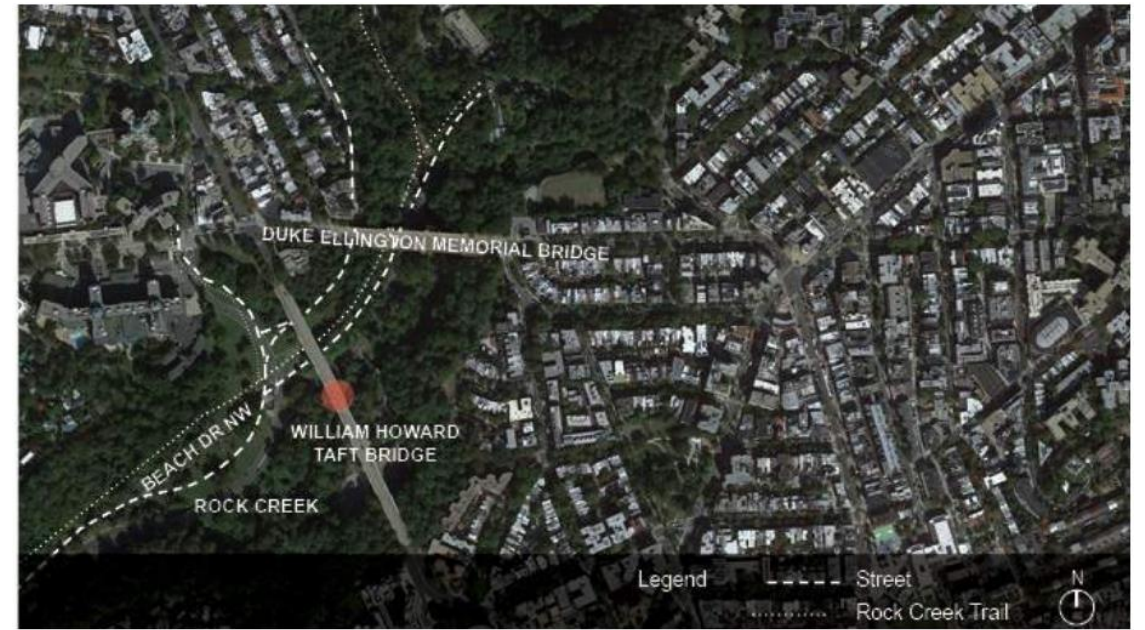
Purpose:

- Develop a suicide deterrent barrier system (SDB) that reduces the potential of suicide attempts.
- Minimize the impact to the existing historic bridge fabric and surrounding viewsheds.
- Provide a deterrent barrier or replacement design that is compatible with the bridge aesthetics.

Project Location



Vicinity Map



Location Map

General **View** of the Bridge



Under Bridge View - Rock Creek Park



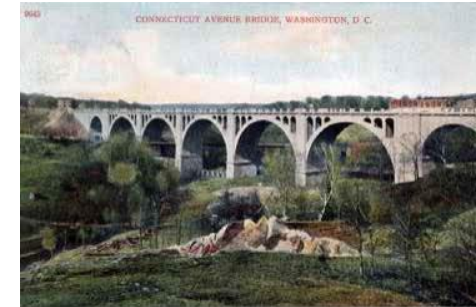
Under Bridge View – Rock Creek Park



Taft Bridge Birds Eye View Perspective

Bridge Description and History

- Constructed between 1897 and 1907.
- Designed by George S. Morison (Engineer) and Edward Pearce Casey (Architect).
- With total length of 1331 ft.
- The bridge crosses over Rock Creek Park and carries Connecticut Avenue.
- It is considered one of the largest unreinforced concrete arch bridges in the world.
- The bridge rises 136 feet from the floor of Rock Creek Park.
- The construction of the William Howard Taft Bridge made vast stretches of upper Northwest Washington D.C. more easily accessible and thus more desirable as residential areas.
- The bridge is supported by seven arches; the five large arches are 150 feet long each, and the two smaller arches measure 82 feet long each.
- Originally, the bridge had a curb-to-curb width of 39 feet and a 6'-0" pedestrian walkway on both the east and west sides of the bridge travel lanes.
- The bridge included a metal railing system, concrete pilasters, and architectural bridge lighting.
- Two Perry lions are installed at each end of the bridge.
- The Perry lions were restored in 1965 and then were replaced in 2000.
- Twelve Bairstow eagle lampposts are installed on each side of the bridge. The twelve lampposts are distributed along the length of the bridge as follows: two groups of two posts at the north end of the bridge, four single lampposts at equal spacing, and two groups of two lampposts near the south end of the bridge.



Streetsofwashington.com



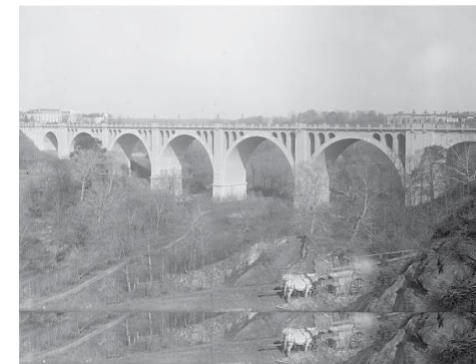
Streetsofwashington.com



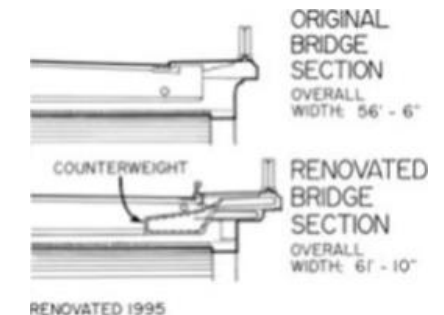
Streetsofwashington.com



Bridge before 1995 renovation
DDOT Historic Collections



Library of Congress Collection



Library of Congress Collection

Bridge Description and History (2)

- From 1993 to 1995 a comprehensive bridge rehabilitation occurred involving:
 - The replacement and widening of the bridge deck.
 - The curb-to-curb width was increased from 39 feet to 40 feet.
 - The pedestrian walkway width was increased from 6 feet to 7'-6".
 - A traffic barrier was added to separate traffic lanes from pedestrian walkways.
 - The total width of the deck increased from 59 feet to 64'-8".
 - Concrete piers were rehabilitated.
 - Existing lanterns and pilasters were removed and reinstalled
 - Existing railings were replaced.
 - A precast concrete element was added at the bottom of the railings to increase the railing height.

- 1897-1907 ▶ Original Bridge Construction
- 1965 ▶ Perry Lion Restoration Project
- 1993-1995 ▶ Major Bridge rehabilitation
 - Bridge deck replaced and widened
- 2000 ▶ New Concrete Lions cast for bridge ends

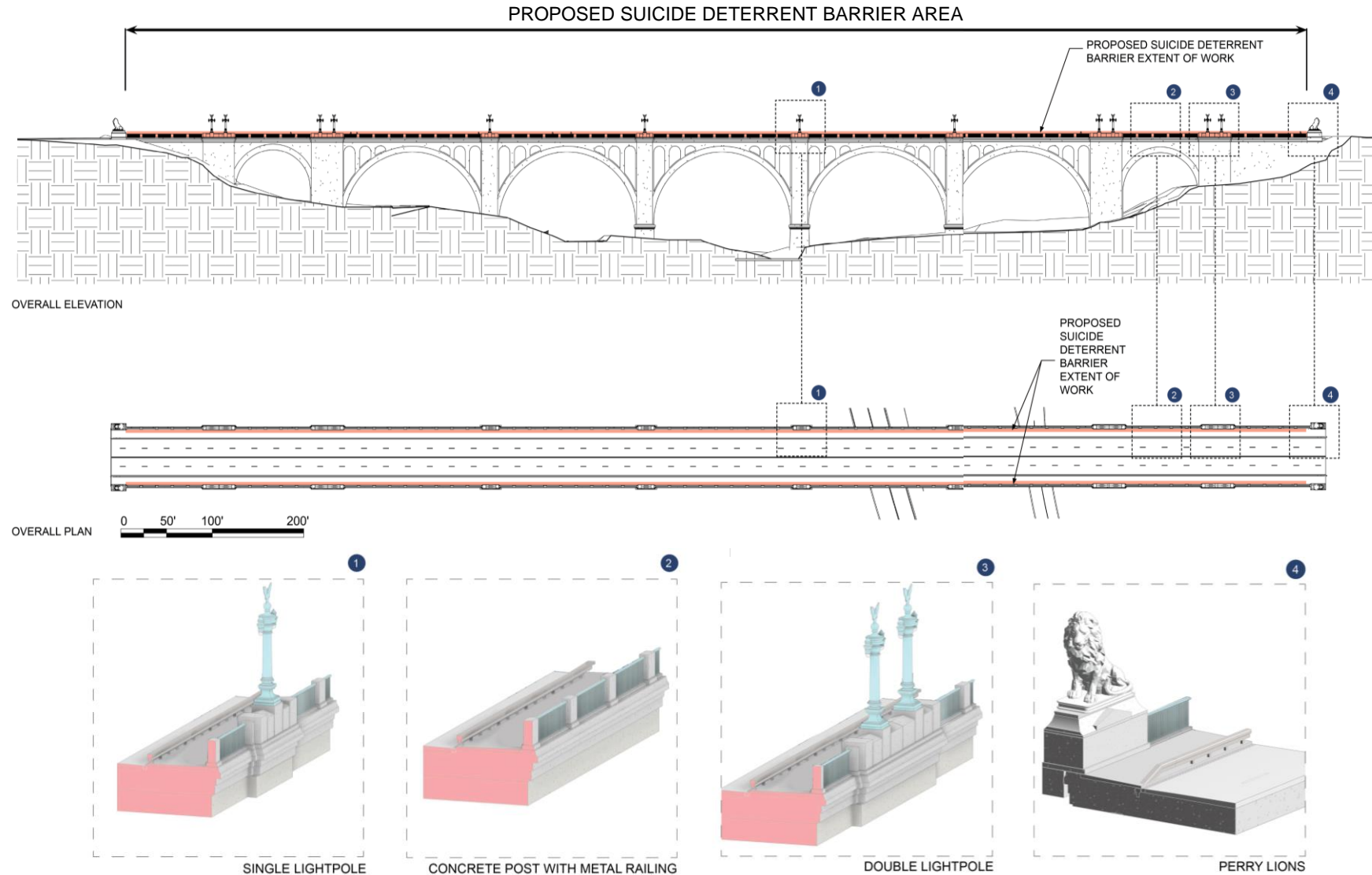


Bridge View from Rock Creek Park



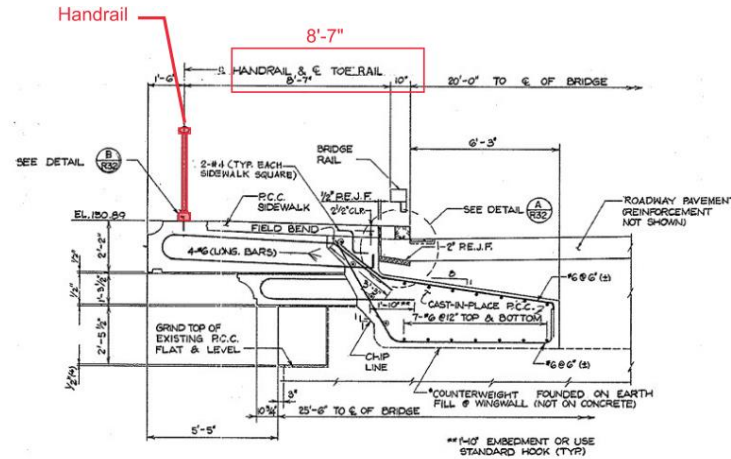
Under Bridge View from Rock Creek Park

Existing Plan and Elevation – Features Unique Design Element

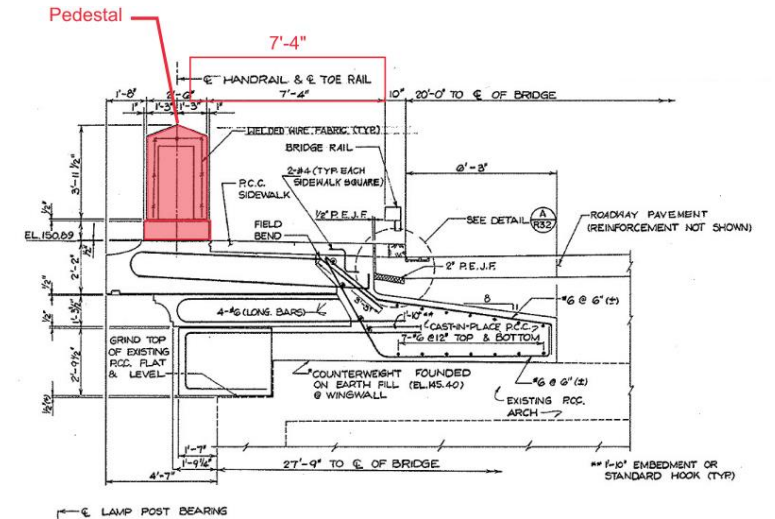


Existing Sidewalk Sections (2)

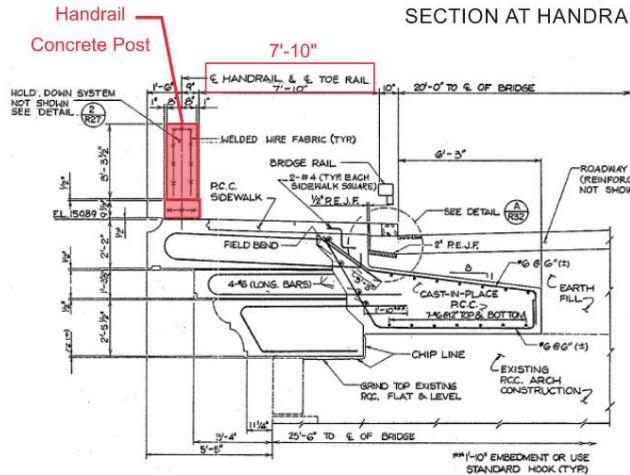
- Typical pilaster width perpendicular to bridge centerline: 1'-4" with inside face 8'-7" from the face of traffic railing
- Lamppost pilaster width directly under the lamppost in the direction perpendicular to bridge centerline: 3'-10" with inside face 7'-4" from the face of traffic railing



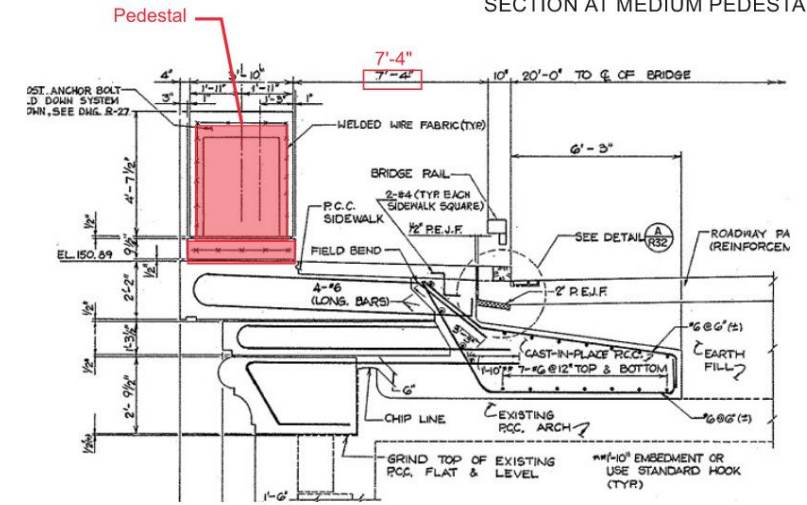
SECTION AT HANDRAIL



SECTION AT MEDIUM PEDESTAL

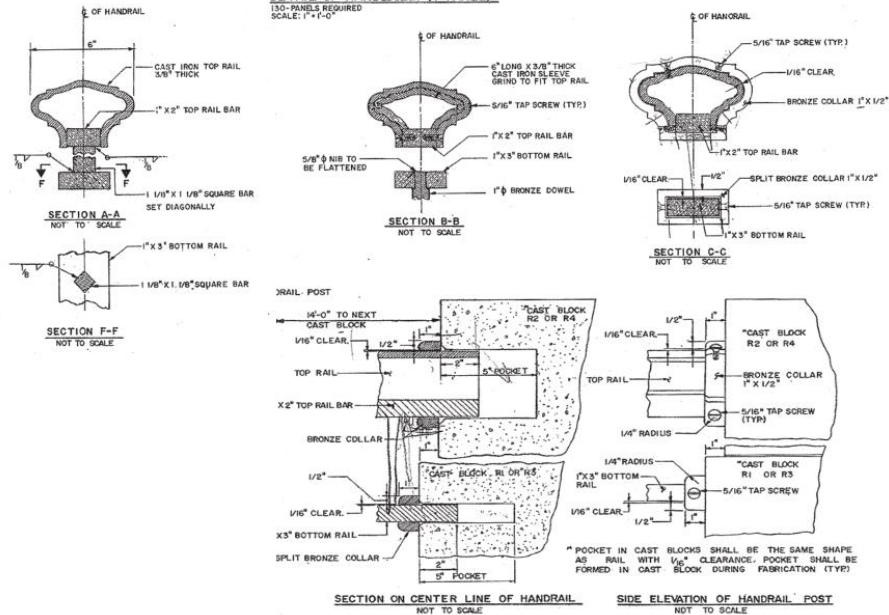
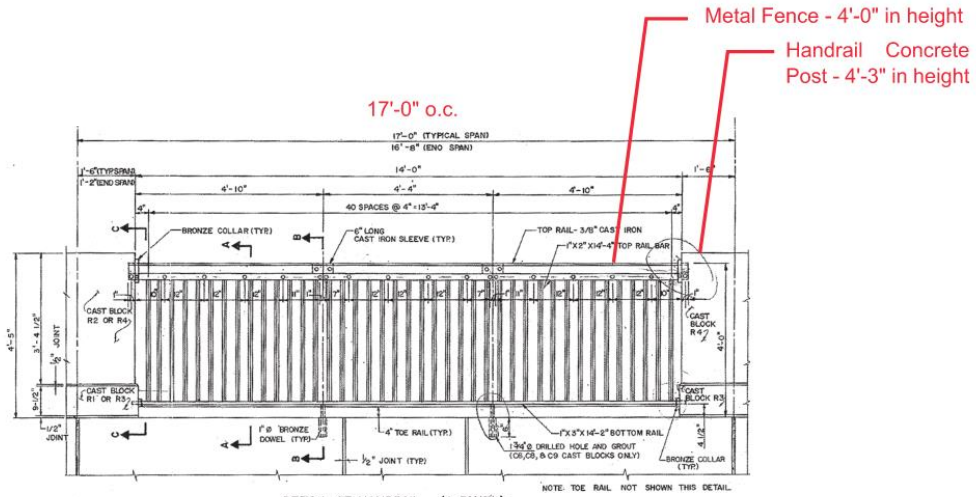


SECTION AT HANDRAIL CONCRETE POST



SECTION AT LARGE PEDESTAL

Existing Details



Taft Memorial drawing R-37 Handrail Detail



Bairstow eagle lamp post

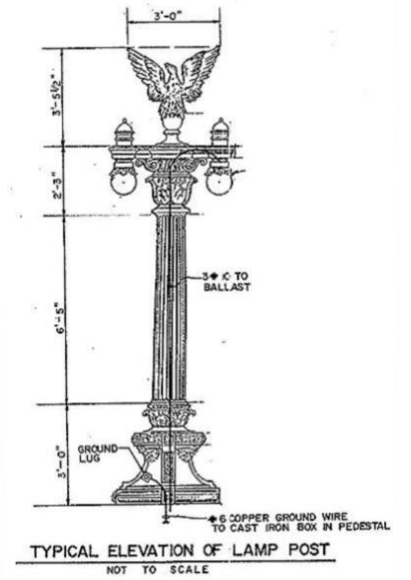


Image of Perry lion



1995 Rehab of Connecticut Ave

Section 106 Process

- Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires federal agencies to consider the effects on historic properties of projects they carry out, assist, fund, permit, license, or approve throughout the country. If a federal or federally assisted project has the potential to affect historic properties, a Section 106 review will take place.

(<https://www.achp.gov/protecting-historic-properties/section-106-process/introduction-section-106>)



View of Rock Creek Park from Bridge Deck

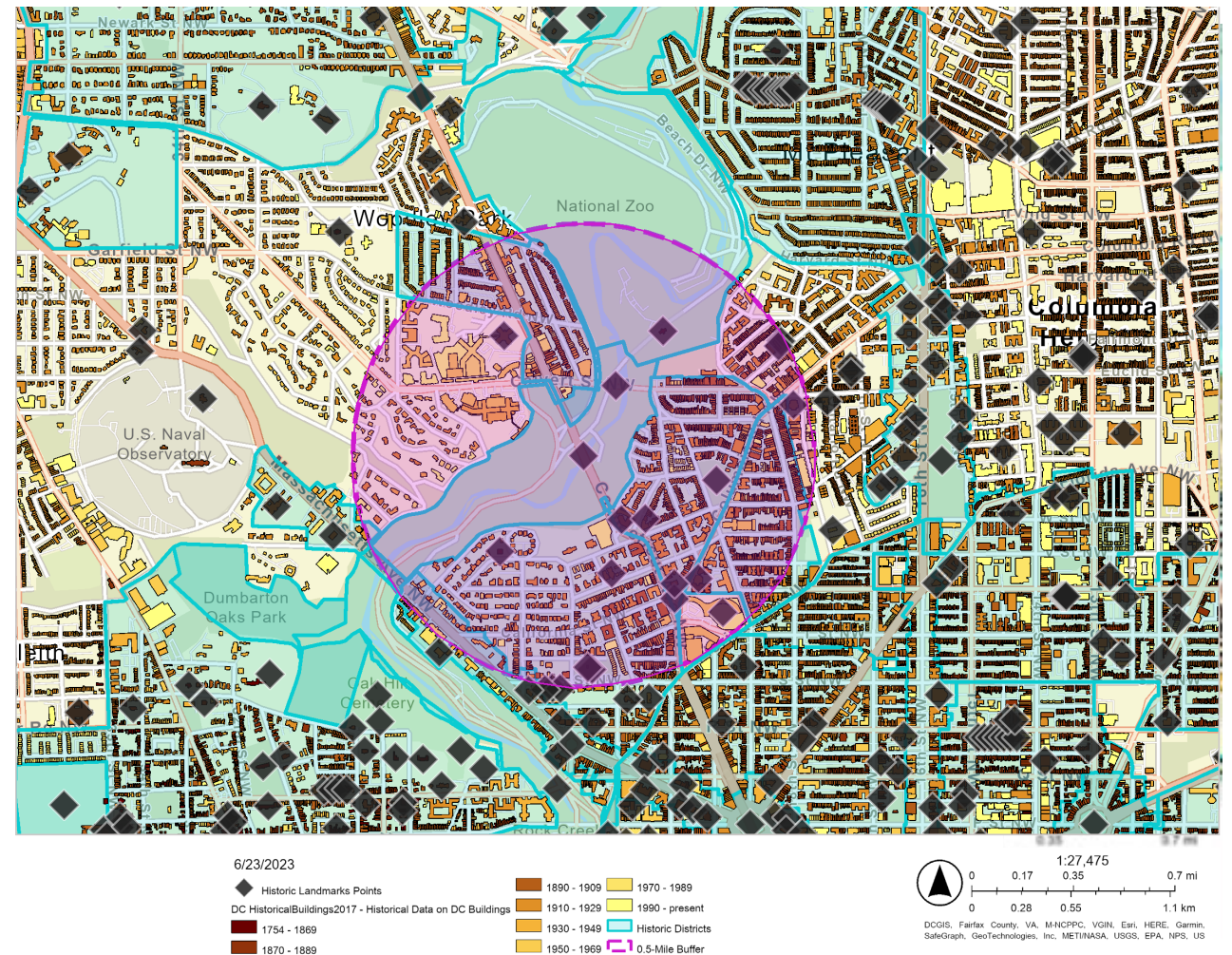


Image from DC GIS illustrating viewsheds from the bridge

Precedents



CAPTION LIST	SOURCE
1. Empire State Building, New York	Google image
2. Bridge in Madrid, Spain	DDOT
3. Bridge in Madrid, Spain	DDOT
4. Brooklyn Bridge, New York	Google image
5. Pedestrian bridge, Switzerland	Hammerglass image
6. Golden Gate Bridge, San Francisco	Golden Gate Physical Suicide Deterrent Study
7. Bridge netting	Google image
8. Pedestrian bridge, Switzerland	Google image
9. Duke Ellington Bridge, Washington DC	Google image
10. Key Bridge, Washington DC	Google image
11. 9th Street bridge, Washington DC	Google image



Golden Gate suicide net barrier
 The net, which consists of 385,000 square feet of marine-grade stainless steel at a cost of \$211 million, will be located 20 feet below the sidewalk and will extend 20 feet out on either side of the bridge.

A 250-pound person jumping into the center of the net will cause the net to sag approximately 2 feet and will suffer significant bruises, sprains and possible broken bones. The Golden Gate Bridge District and the Southern Marin Fire Department will be responsible for removing people from the net.

The support struts will be spaced every 50 feet and painted the same international orange as the bridge. The net itself will be gray.



Precedents (2)

- **Several study reports for the installation of suicide deterrent barriers were reviewed:**
 - Golden Gate Bridge
 - Sunshine Skyway Bridge
 - Cornell University
 - Governor Thomas Johnson Bridge
 - National survey (Switzerland)
- Precedents in the available literature were reviewed including local, national, and international precedents
- **Materials /systems used:**
 - Glass railings
 - Metal railings (vertical pickets and metal mesh systems)
 - Netting (both horizontal and vertical)



Precedents (3)

- **Implementation strategies or illustration to appeal and connect with people's emotions**

- **Mapo Bridge, South Korea**

The Bridge of Life Project is meant to connect with people's emotion through words, slogans and clips of pictures. Questions such as "Did you eat anything yet?" "How are you doing?" follows with series of clipped pictures. Telephone booth and lifeline hotline is also installed.

A brass statue on the bench shows a young man being comforted by an older father figure, echoing the overall message of the project. We should consider involving soft design elements to the physical prevention features. We should also acknowledge the drawback of the standalone emotional appeal strategy. Physical prevention features were eventually installed on the bridge.

- **Golden Gate Bridge, San Francisco**

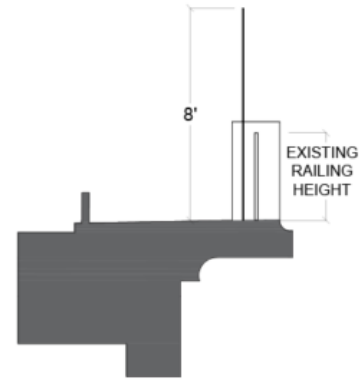
In the scope of national precedents, Golden Gate Bridge installed and involved both physical prevention features and a lifeline hotline.

- ① Clips of slogans and pictures, Mapo Bridge, South Korea
- ② Phone Booth, Mapo Bridge, South Korea
- ③ Brass Statue, Mapo Bridge, South Korea
- ④ Phone Booth, Golden Gate Bridge, San Francisco, USA

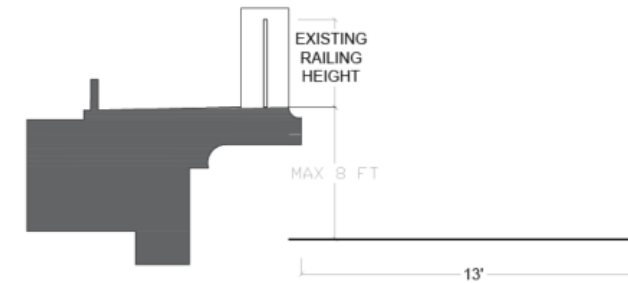


Design Criteria

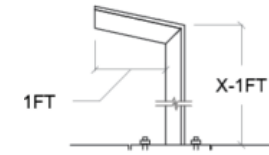
- **Barrier Height**
 - Ideal height (8'-0" above any foothold)
 - Height reduction (curved top/angled inward)
- **Handholds**
 - Maximize finger clearance to prevent handholds by reducing projections to less than 1"
- **Footholds**
 - Minimize horizontal element projection. For instance, in embassy design, anti-climb façade elements tend to slope any horizontal setback at 60 degrees or more.
- **Materials**
 - Metal picket fencing, metal mesh, glass



BARRIER HEIGHT



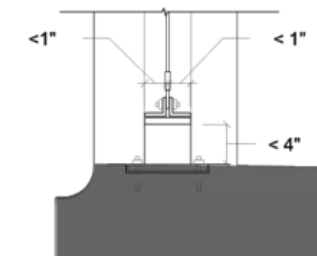
EXTERIOR HORIZONTAL NETTING



WINGLET AT TOP FOR OUTBOARD BARRIER



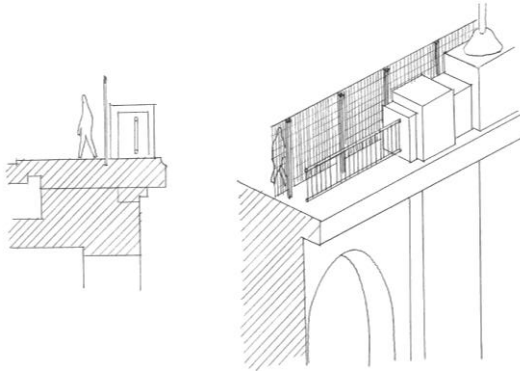
VERTICAL ELEMENTS DISTRIBUTION



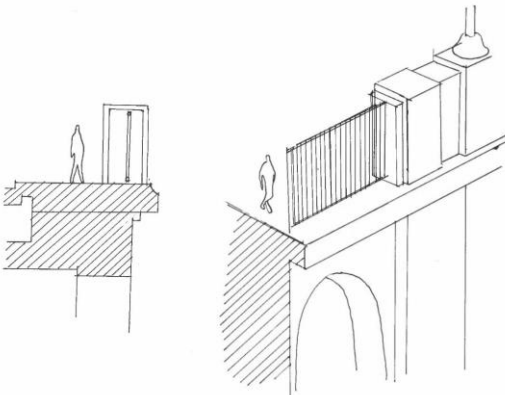
FOOTHOLD

Studied Options – Design Criteria Application

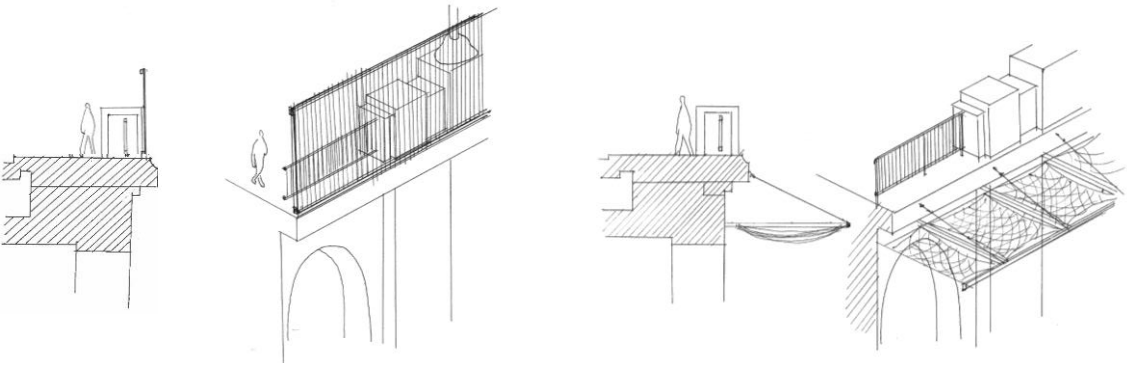
A: Addition at the sidewalk



B: Replacing the existing condition

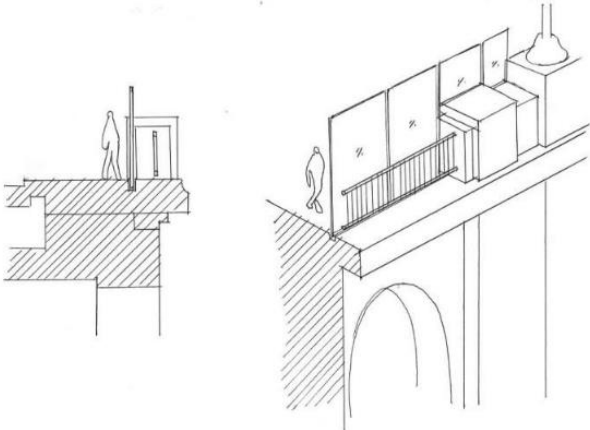


C: Addition outside of the existing condition

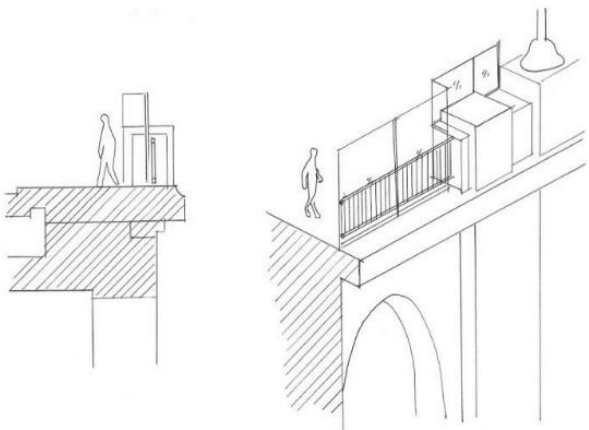


Studied Options – Design Criteria Application (2)

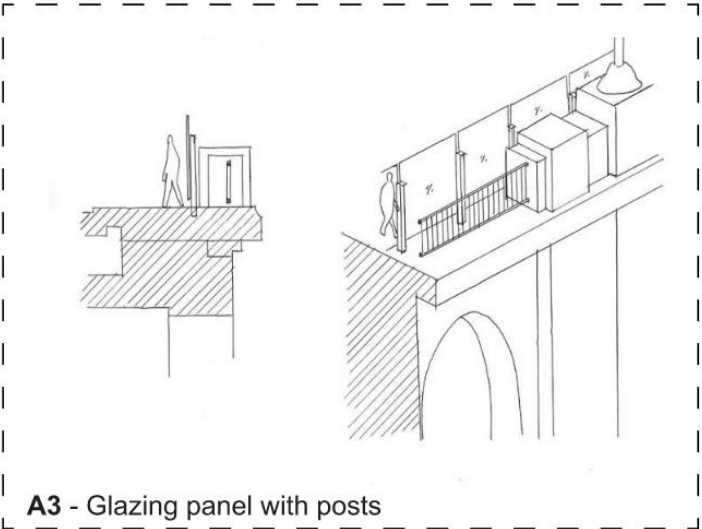
A: Addition at the sidewalk



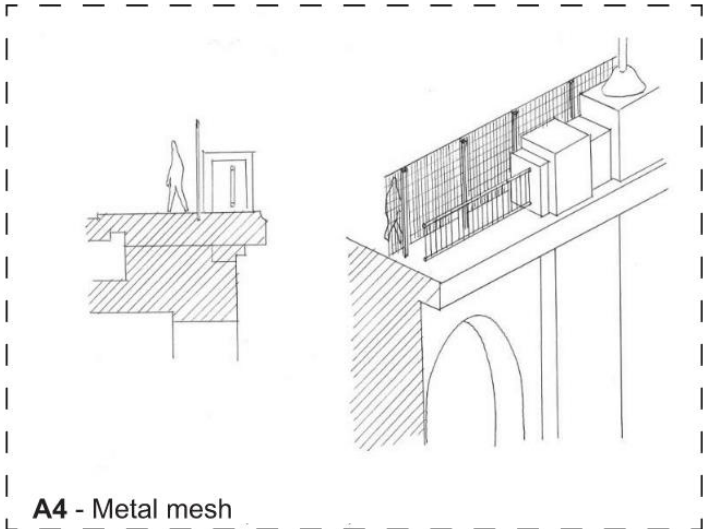
A1 - Glazing cantilevered panel



A2 - Jagged glazing panel



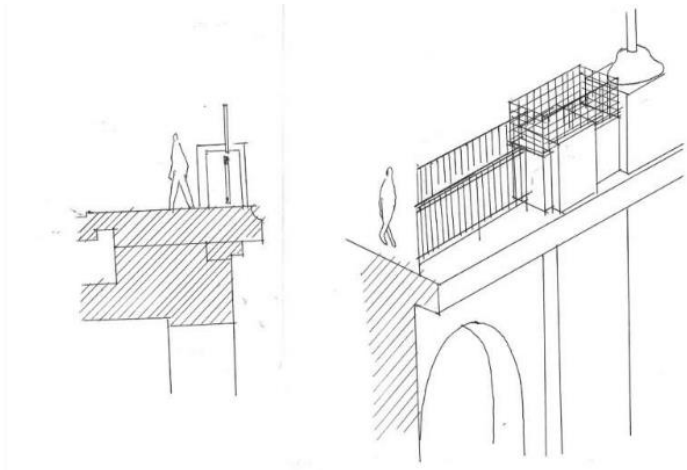
A3 - Glazing panel with posts



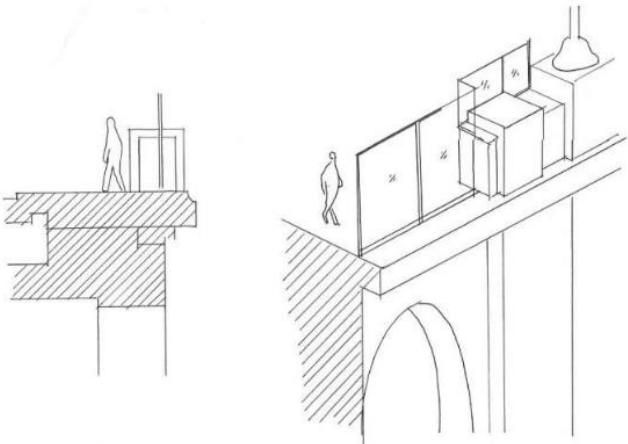
A4 - Metal mesh

Studied Options – Design Criteria Application (3)

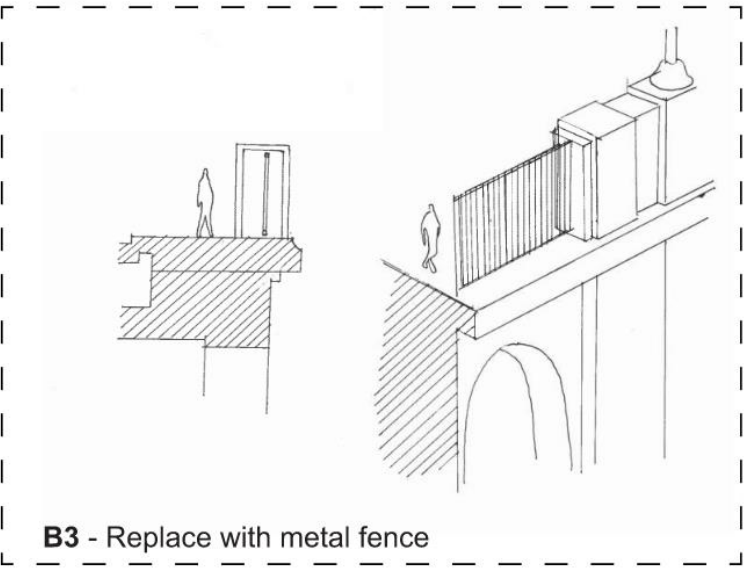
B: Replacing the existing condition



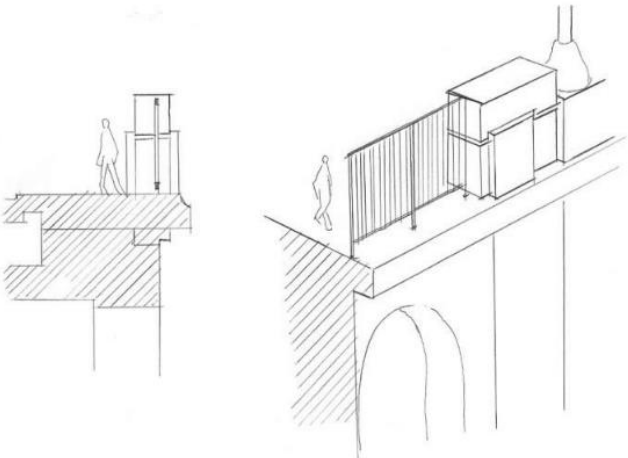
B1 - Metal fence extension



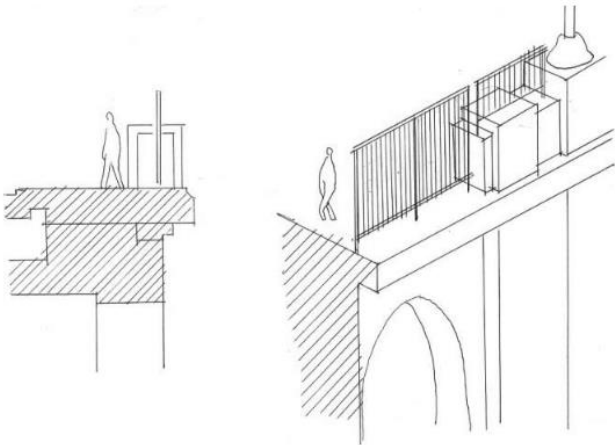
B2 - Replace with glazing panel



B3 - Replace with metal fence



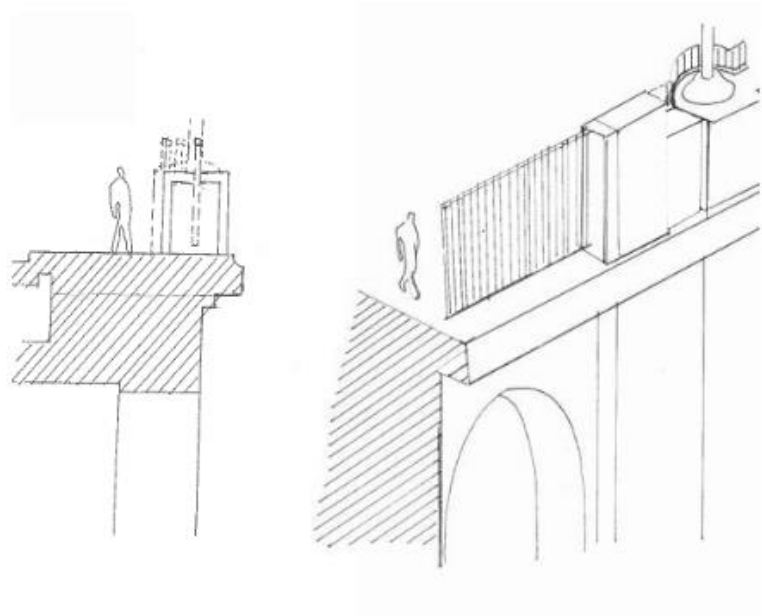
B4 - Replace railing & raise pilasters



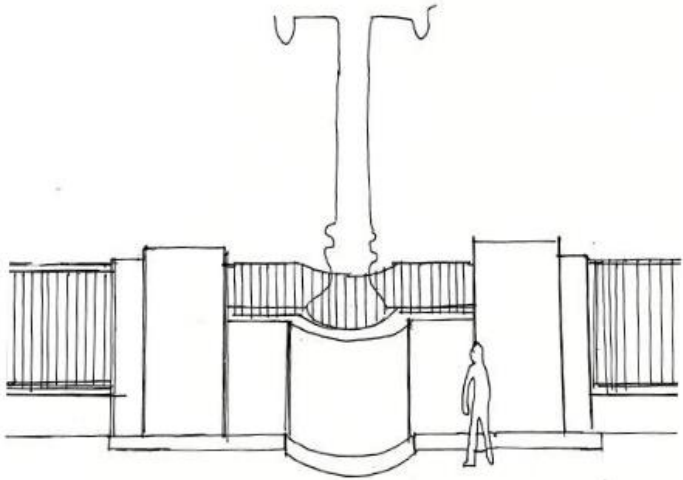
B5 - Replace with tall metal railing

Studied Options – Design Criteria Application (4)

B: Replacing the existing condition

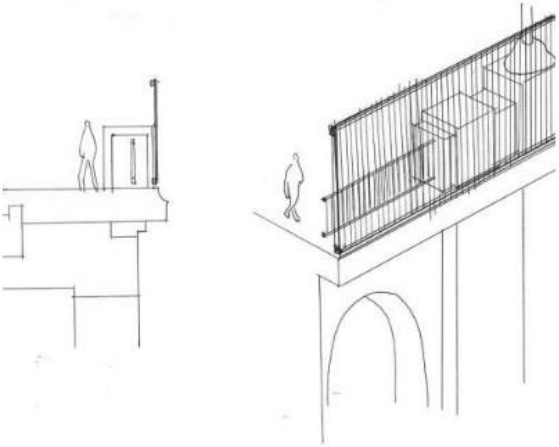


B6 – Cylinder pedestal

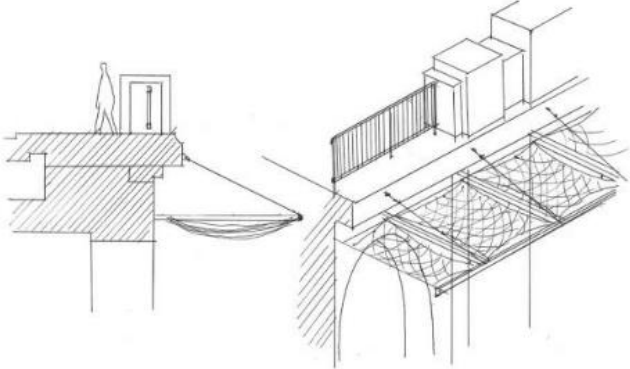


Elevation (sidewalk side)

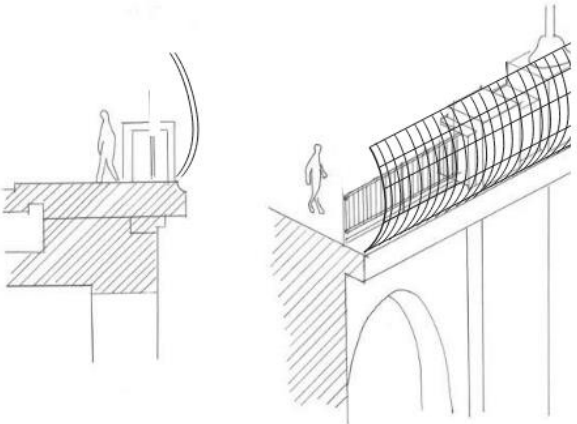
Studied Options – Design Criteria Application (5)



C1 - Extra tall metal fence



C2 - Horizontal netting



C3 - Vertical netting

C: Addition outside of the existing condition

Design Options

Option 1 **Glazed Panel** Addition



Option 2 **Wire Mesh** Addition



Option 3 (New) **Replace Concrete & Metal Fence**



Option 1: Glazed Panel Addition



Option 1: Glazed Panel Addition



Sidewalk View



Elevation at Single Light Pole



Elevation at Double Light Pole



Concrete Post with Metal Handrail - Elevation

Option 1: Ceramic Frit applied on Glazed Panel



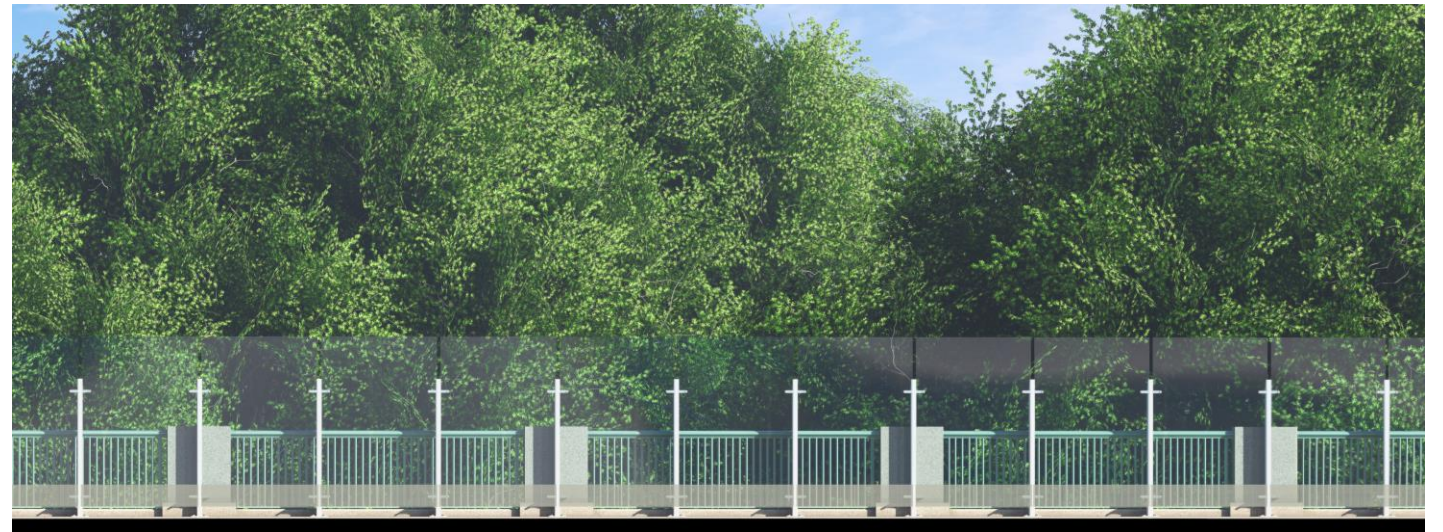
Sidewalk View



Elevation at Single Light Pole



Elevation at Double Light Pole

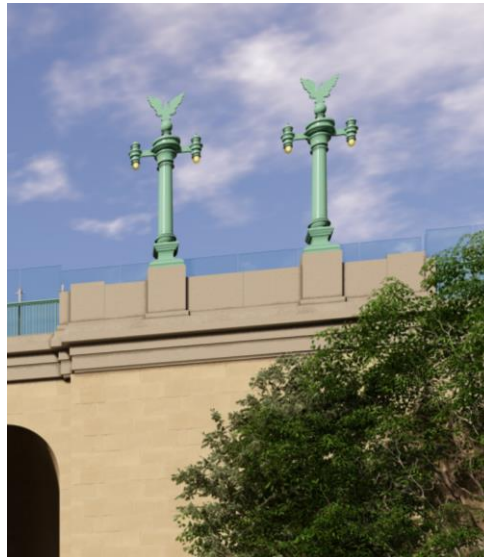


Concrete Post with Metal Handrail - Elevation

Existing



Option 1



View from Rock Creek Park with Single Light Pole Condition



View from Rock Creek Park with Double Light Pole Condition

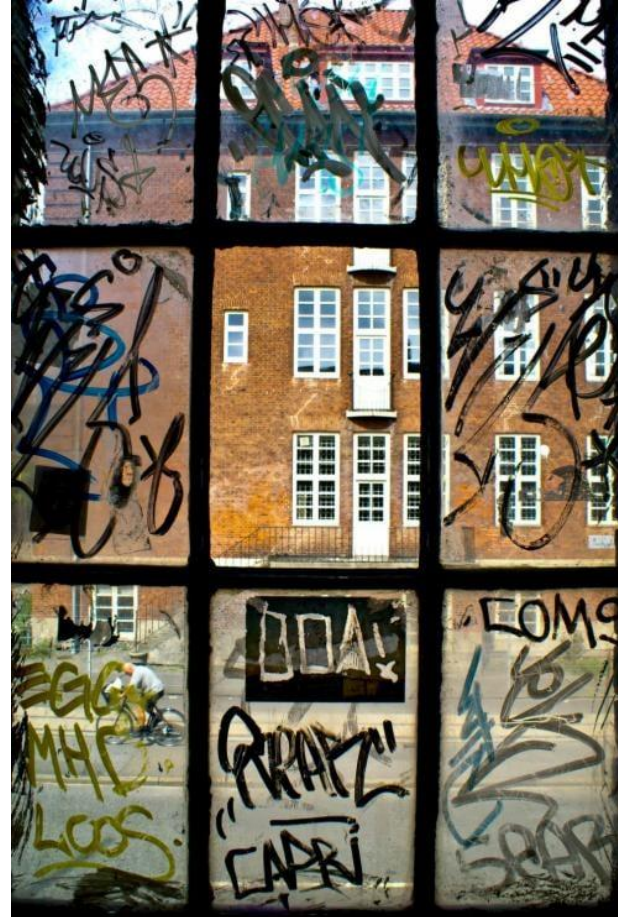
Option 1: Addition

Security & Safety, Anti-Graffiti Film

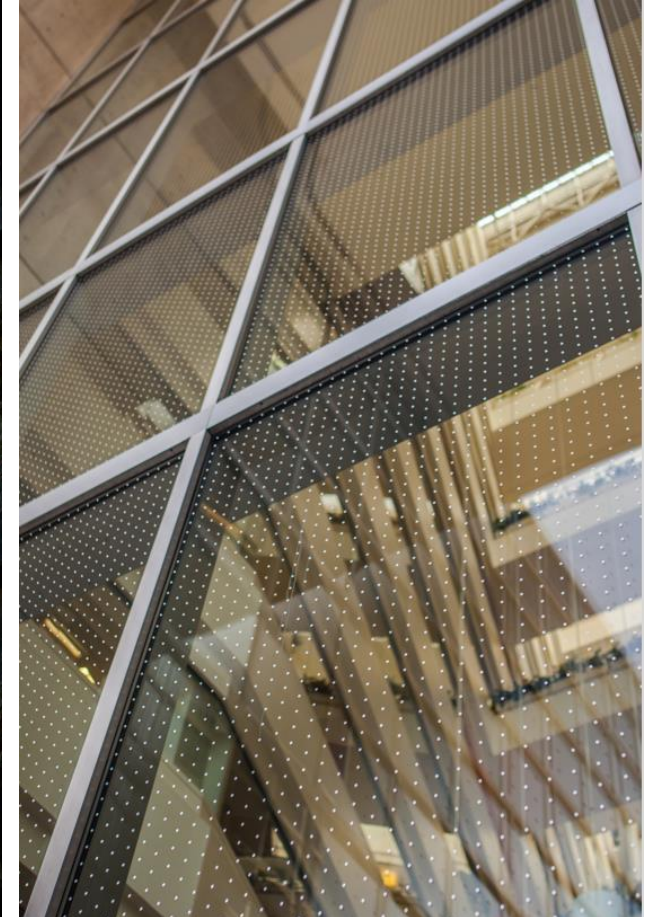
- A durable, optically clear, proven solution to quickly and cost-effectively eradicate vandalism repeatedly with a single application.
- Undetectable, optically clear polyester film providing maximum visibility.
- Protect the surface from the most common forms of vandalism including acid etching, scratching, and permanent markers.
- Multi-layer construction provides a more cost-effective alternative to single-application protection.
- An exclusive adhesive system that allows a qualified technician to easily peel away the film without transferring adhesive to the underlying film or glass

Bird Safety Film

Bird Safety film products are types of film with UV stripe coating that visually signal an impending barrier to birds and help prevent collisions. It generally has an acceptable avoidance index score from the American Bird Conservancy.



Security, Safety and Anti Graffiti Film



Bird Safety Film

Option 2: Wire Mesh Addition



Option 2: Wire Mesh Addition



Rendering of Wire Mesh



Elevation at Single Light Pole



Elevation at Double Light Pole

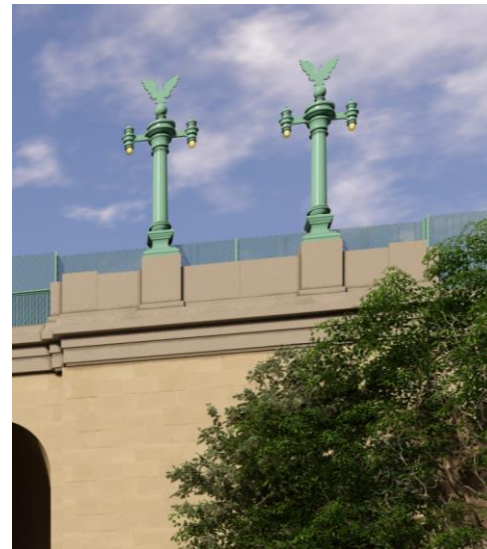


Concrete Post with Metal Handrail - Elevation

Existing



Option 2



View from Rock Creek Park with Single Light Pole Condition



View from Rock Creek Park with Double Light Pole Condition

Option 2: Addition

- **Welded Wire Mesh**

Welded Wire Mesh is a galvanized carbon steel plate barb size 1mm or 2mm with an outer coating. It is known to be extremely difficult to cut and difficult to climb. Many of the products come with a lifetime warranty (i.e. 25 years) in normal environmental conditions.

- **Architectural Mesh**

Architectural Mesh is generally finer than Welded Wire Mesh and can be manipulated easily. The density and transparency can be also adjusted based on the design.



Reference Photo of Welded Wire Mesh



Reference Photo of Welded Wire Mesh



Reference Photo of Bridge 341



Reference Photo of Wilson Blvd



Photo of a Physical Sample

Option 3 (New): Replace Concrete and Metal Fence



Option 3 : Replace



Sidewalk View



Elevation at Single Light Pole



Elevation at Double Light Pole

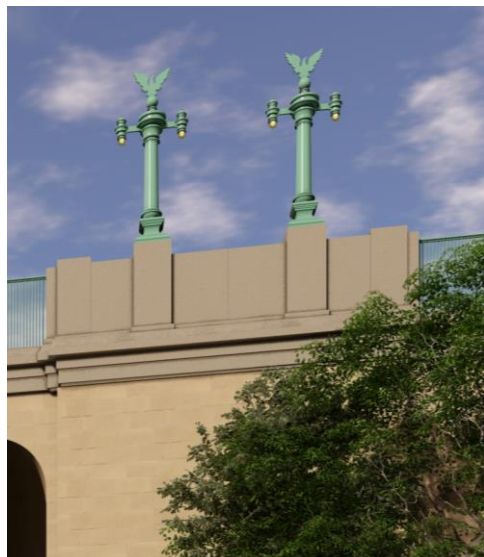


Concrete Post with Metal Handrail - Elevation

Existing



Option 3



View from Rock Creek Park with Single Light Pole Condition



View from Rock Creek Park with Double Light Pole Condition

Existing



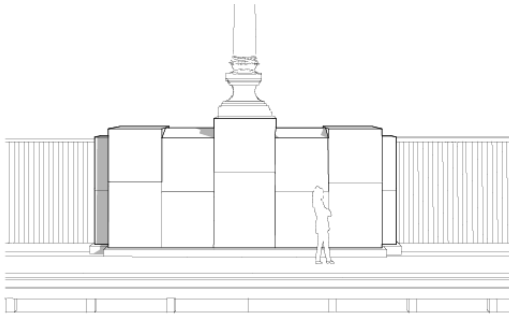
Option 3 : **Replace** Concrete and Metal Fence



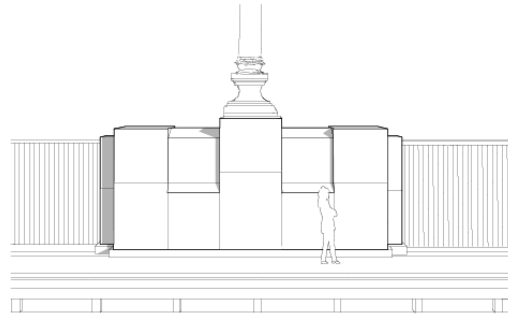
Perry Lion Statue – Perspective View

Option 3 and Its Major Variations Comparison

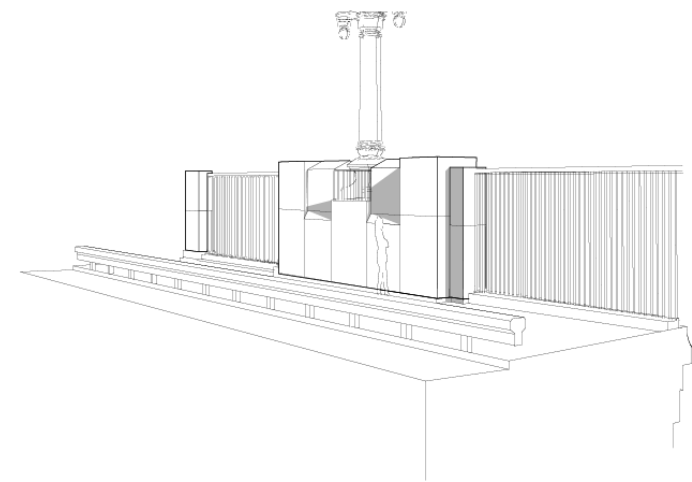
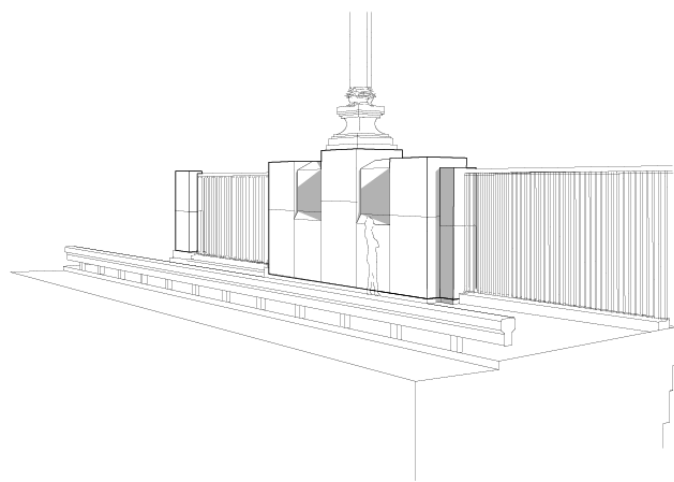
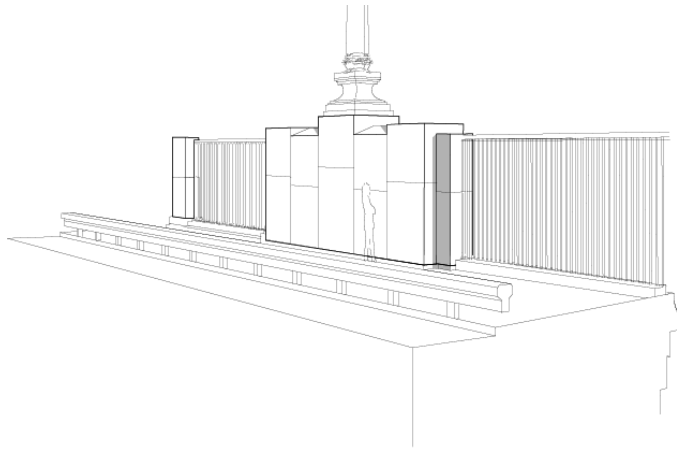
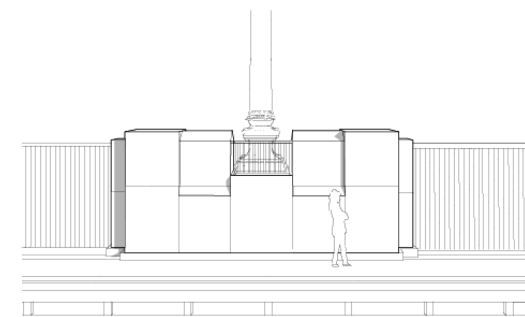
Option 3
Replace



Option 3B
Articulation



Option 3C
Articulation and Modulation



- Simple extruded concrete massing, elevated to min. 8ft
- $\frac{3}{4}$ " horizontal reveal at the original top profile of the concrete

- 4" setback for the added concrete for the upper portion
- 60 degrees steep slope transition at the bottom of the setback massing

- The light pole and its pedestal remain at the existing height
- Additional metal railing in front of the light pole

Option 3B: Articulation of Concrete Mass



Sidewalk View



Elevation at Single Light Pole



Elevation at Double Light Pole



Concrete Post with Metal Handrail - Elevation



Option 3C: Modulation and Articulation of Concrete Mass

Sidewalk View



Elevation at Single Light Pole



Elevation at Double Light Pole



Concrete Post with Metal Handrail - Elevation

Option 3D: **Concrete Cap as an Additive Material**



Sidewalk View



Elevation at Single Light Pole



Elevation at Double Light Pole



Concrete Post with Metal Handrail - Elevation

Option 3E: Painted Metal Cap as an Additive Material



Sidewalk View



Elevation at Single Light Pole



Elevation at Double Light Pole



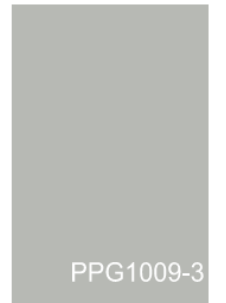
Concrete Post with Metal Handrail - Elevation



Existing Concrete



PPG1009-4



PPG1009-3

Potential Paint Color

Summary

Option 1



Option 2



Option 3 (New)



Glazed Panel Addition

5 Million +/-

Wire Mesh Addition

1.2 Million +/-

Replace Concrete and Metal Fence

4 Million +/-



District Department of Transportation

250 M St SE | Washington, DC 20003 | 202.673.6813