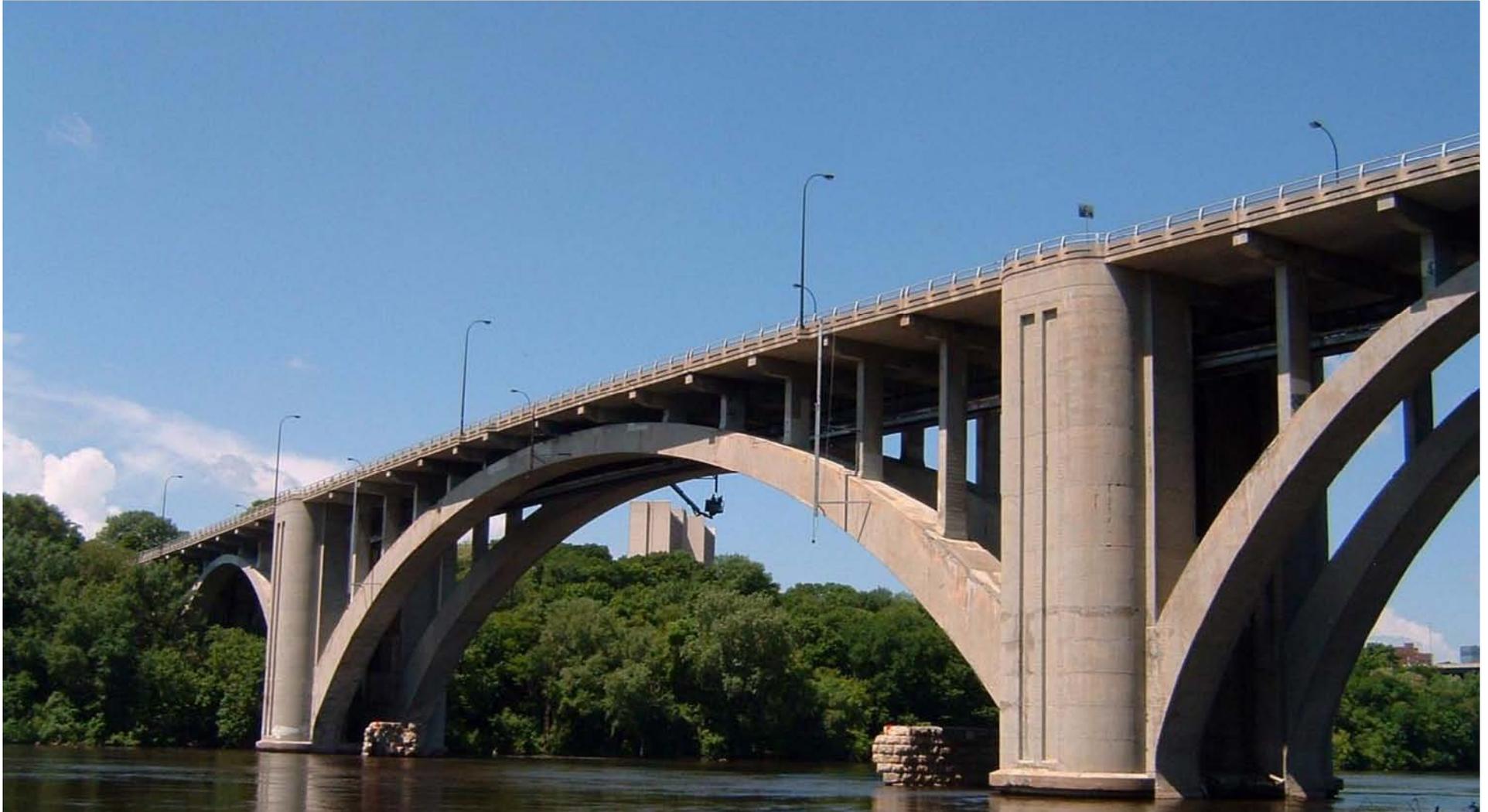


CAPPELEN MEMORIAL BRIDGE REHABILITATION



Owner: Hennepin County

Engineering: HNTB with Olson-Nesvold Engineering (ONE) and others

Section 106 Historical Committee: Hennepin County, MnDOT Cultural Resources Unit, Federal Highway Administration (FHWA), MnDOT State Aid, Mpls HPC, HNTB, ONE, Gemini Research

Mn/DOT, FHWA, and MnSHPO will review the plans

Formal Purpose and Need Statement

Primary Need: Preserve Structure by Addressing Deterioration and Load Capacity



Example of deterioration of concrete and steel reinforcing due in part to saturation with water laden with chlorides from road deicing salts

Secondary Needs:

**Address Non-motorized
Accommodations**

Improve Lane Geometry at East End

**Do not Preclude Future Improvement of
East Intersection**



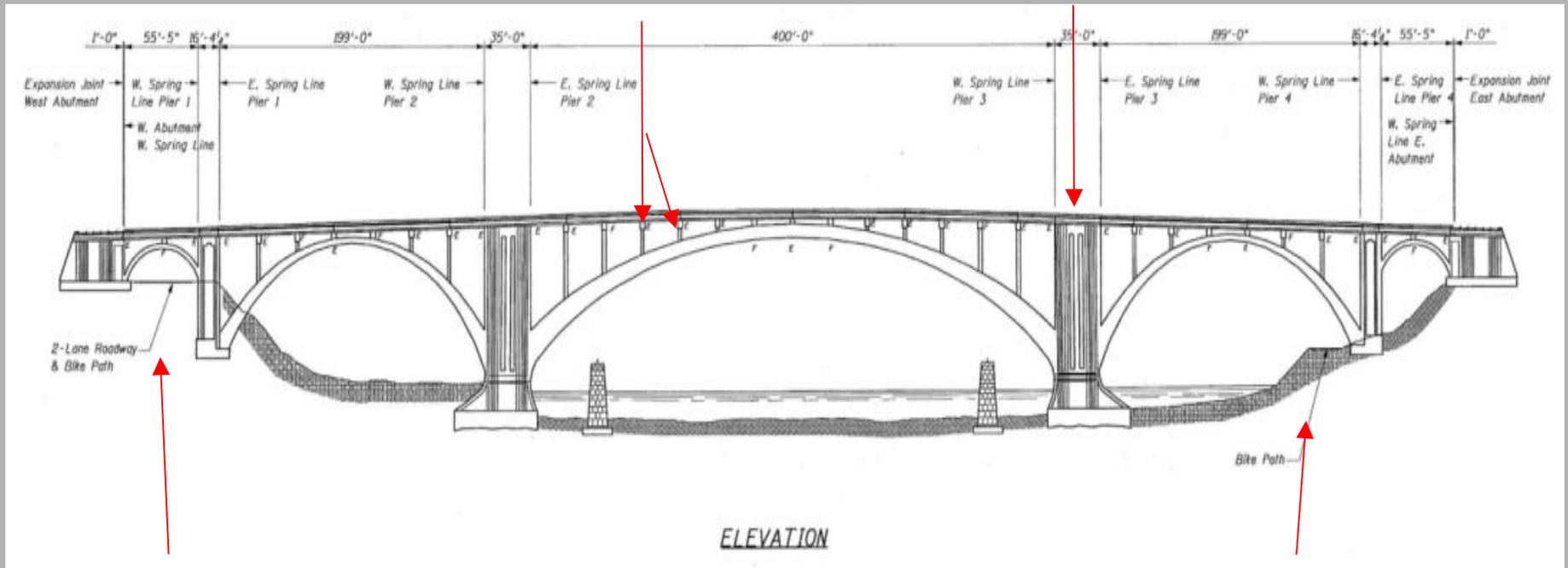
Additional Considerations:

Right-of-Way, Cost, Service Life

Elevation view

Spandrel columns topped by cap beams

Observation bay on river pier



Span 1 over West River Pkwy

Pier 2

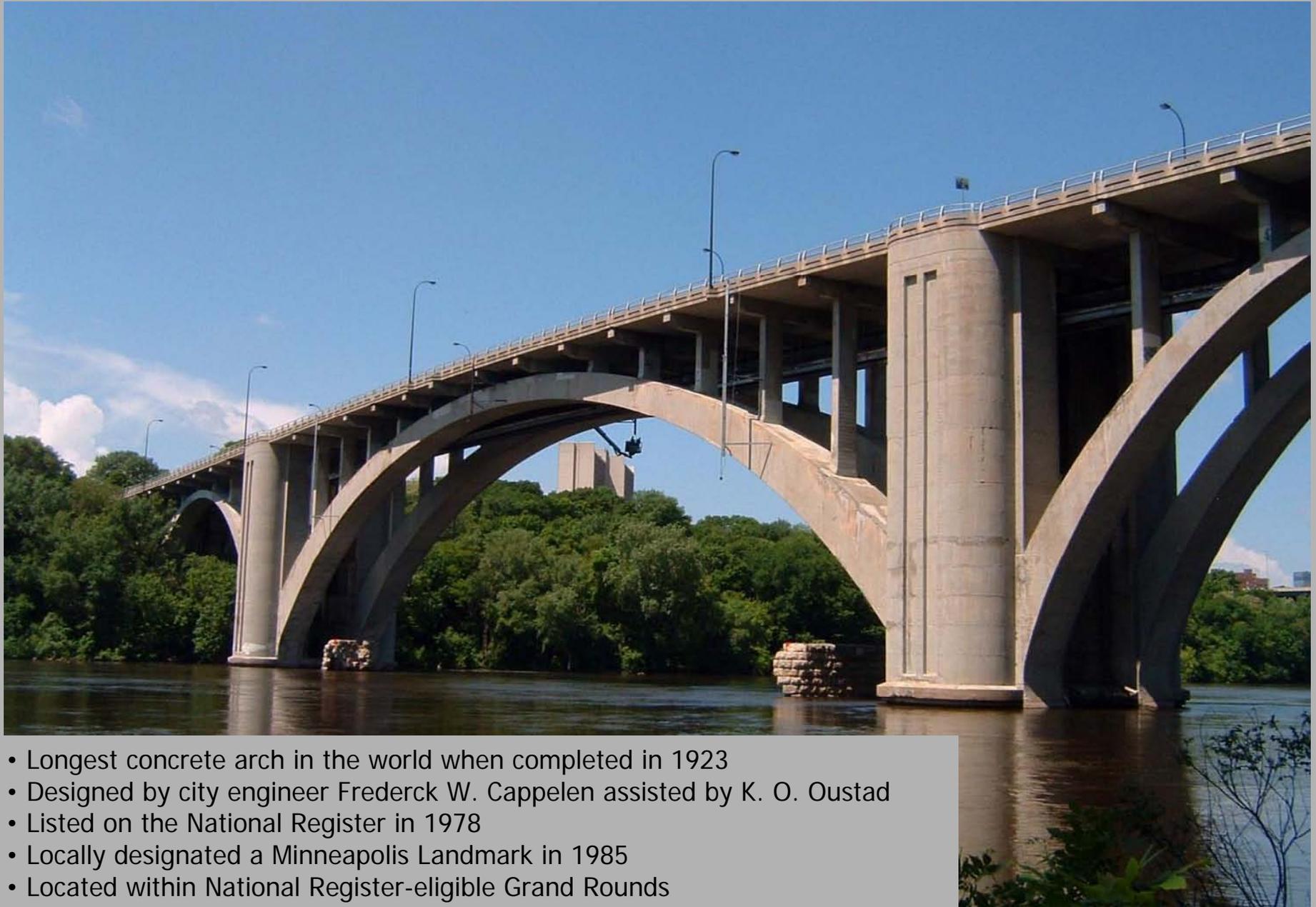
Span 3

Pier remnants from 1889 bridge

Bike path

East abutment

National Register eligibility and significance



- Longest concrete arch in the world when completed in 1923
- Designed by city engineer Frederck W. Cappelen assisted by K. O. Oustad
- Listed on the National Register in 1978
- Locally designated a Minneapolis Landmark in 1985
- Located within National Register-eligible Grand Rounds

Franklin Avenue Bridge Rehabilitation Study Historic Properties



 Boundaries of Historic Properties



prep by Gemini Research May 2013

Alterations



1940

- water main added
- streetcar tracks removed, 2 vehicle lanes added (for total of 4), inner piperail added at edge of sidewalk

1954

- West River Road built under span 1

1970

- everything above arches, piers, and abutments removed and replaced (including spandrel columns, cap beams, deck, rail, lights)

1984

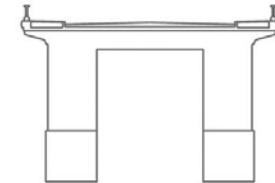
- concrete deck received 2" concrete overlay

Age of Bridge Fabric

Everything above arches, piers, and abutments was removed and replaced in 1970



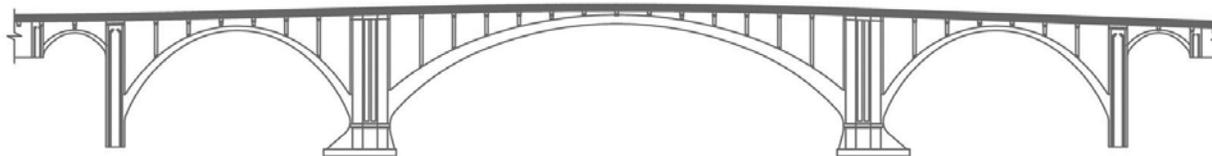
1923 ELEVATION



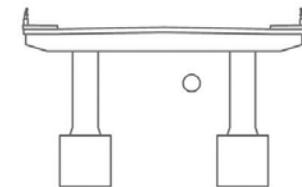
1923 TRANSVERSE SECTION



ELEVATION
ORIGINAL STRUCTURE REMAINING
AFTER REMOVALS FOR 1970 PROJECT



1970 ELEVATION



1970 TRANSVERSE SECTION

Plotted by: dan.streeter
Plotted on:
File path: \\SSS\Public\projects\1066-1-HNTB Franklin Ave Rehab\2 - production\c - work\Exhibit\Franklin 8-9-13.dgn

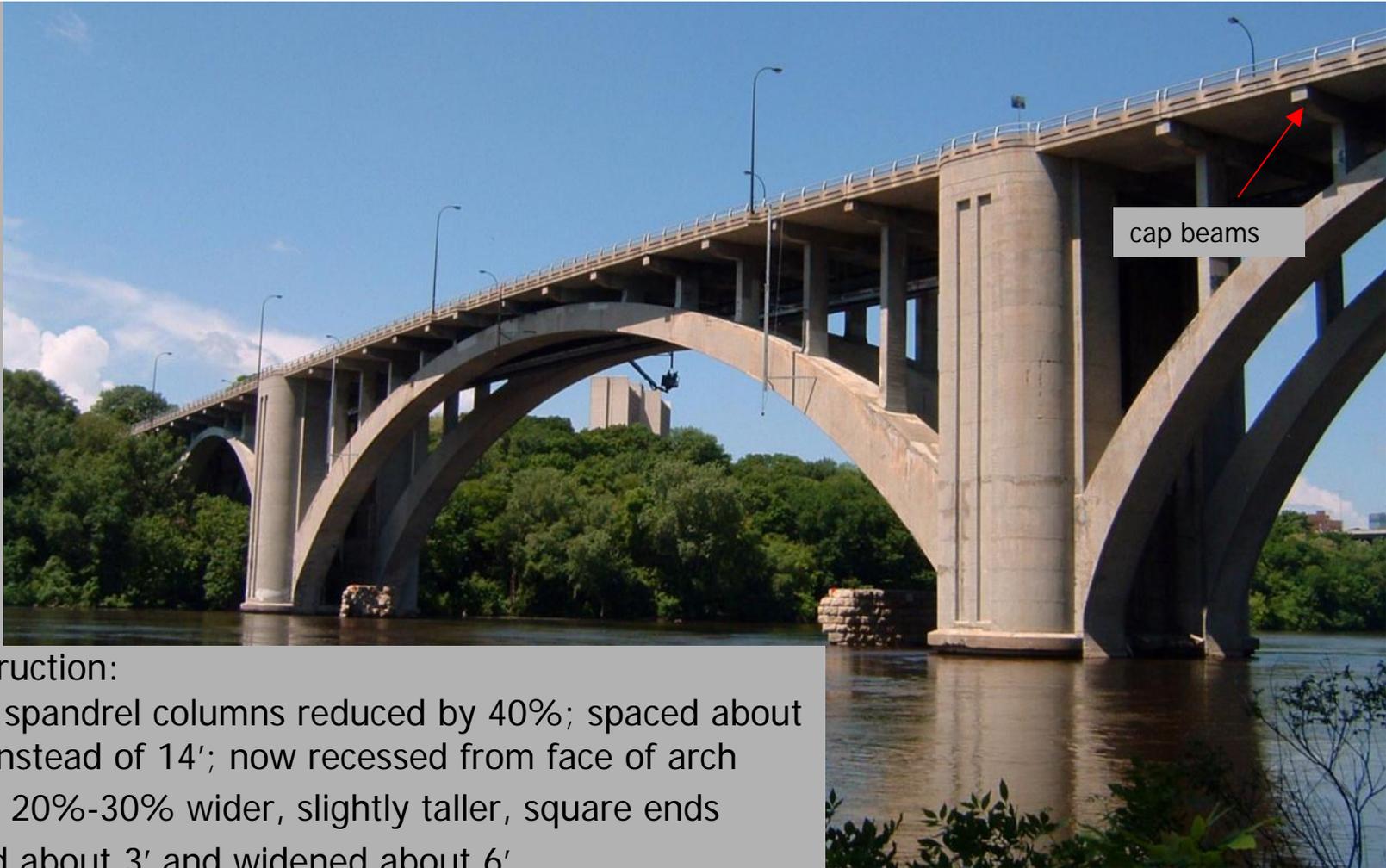
BRIDGE NO.
2441

Olsen & Murrell Engineers, P.C.
7125 Washington Ave. E., Suite 100
Minneapolis, MN 55439-3401



FRANKLIN AVENUE OVER
MISSISSIPPI RIVER

BRIDGE CHANGES



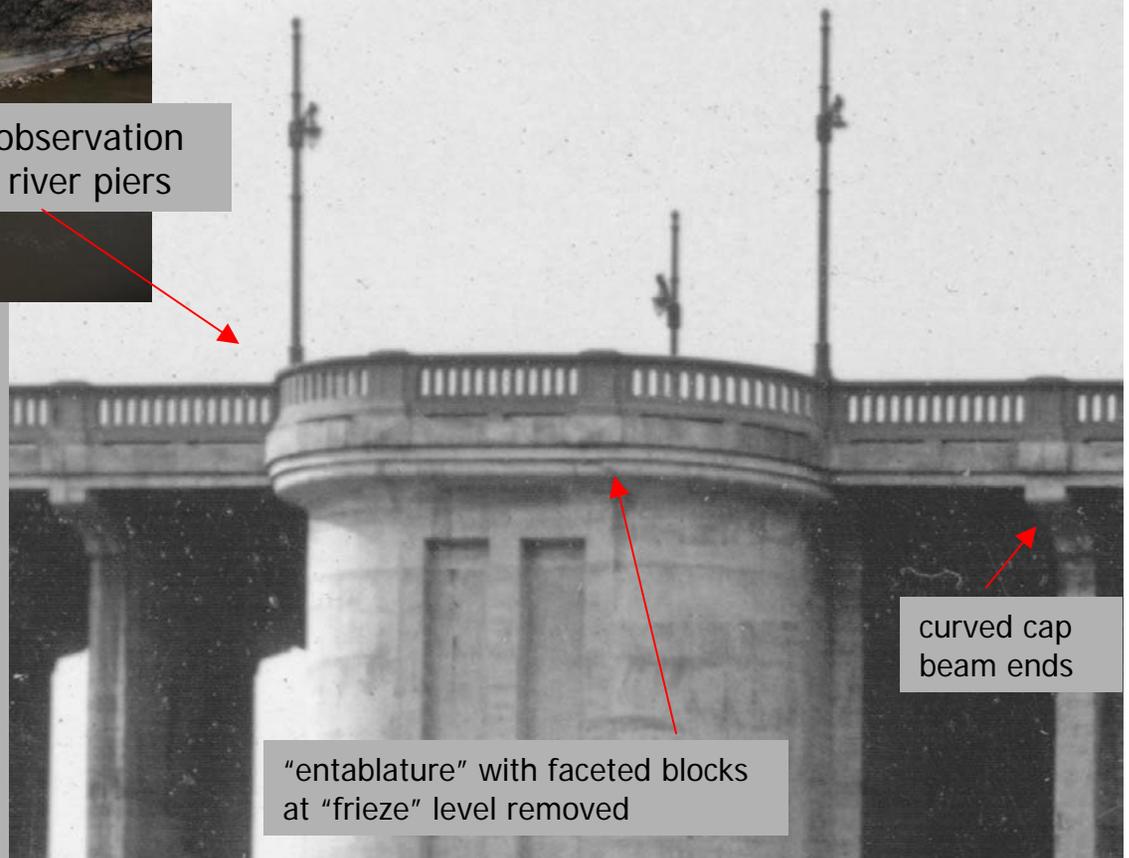
1970 reconstruction:

- number of spandrel columns reduced by 40%; spaced about 29' apart instead of 14'; now recessed from face of arch
- cap beams 20%-30% wider, slightly taller, square ends
- deck raised about 3' and widened about 6'
- projection of the river piers from deck edge reduced by widened deck
- overhang of observation bay removed
- widened deck now projects over riverbank piers by several feet
- new railing and lights
- concrete covered with protective film-forming coating

1970 alterations



altered observation
bays on river piers



curved cap
beam ends

"entablature" with faceted blocks
at "frieze" level removed

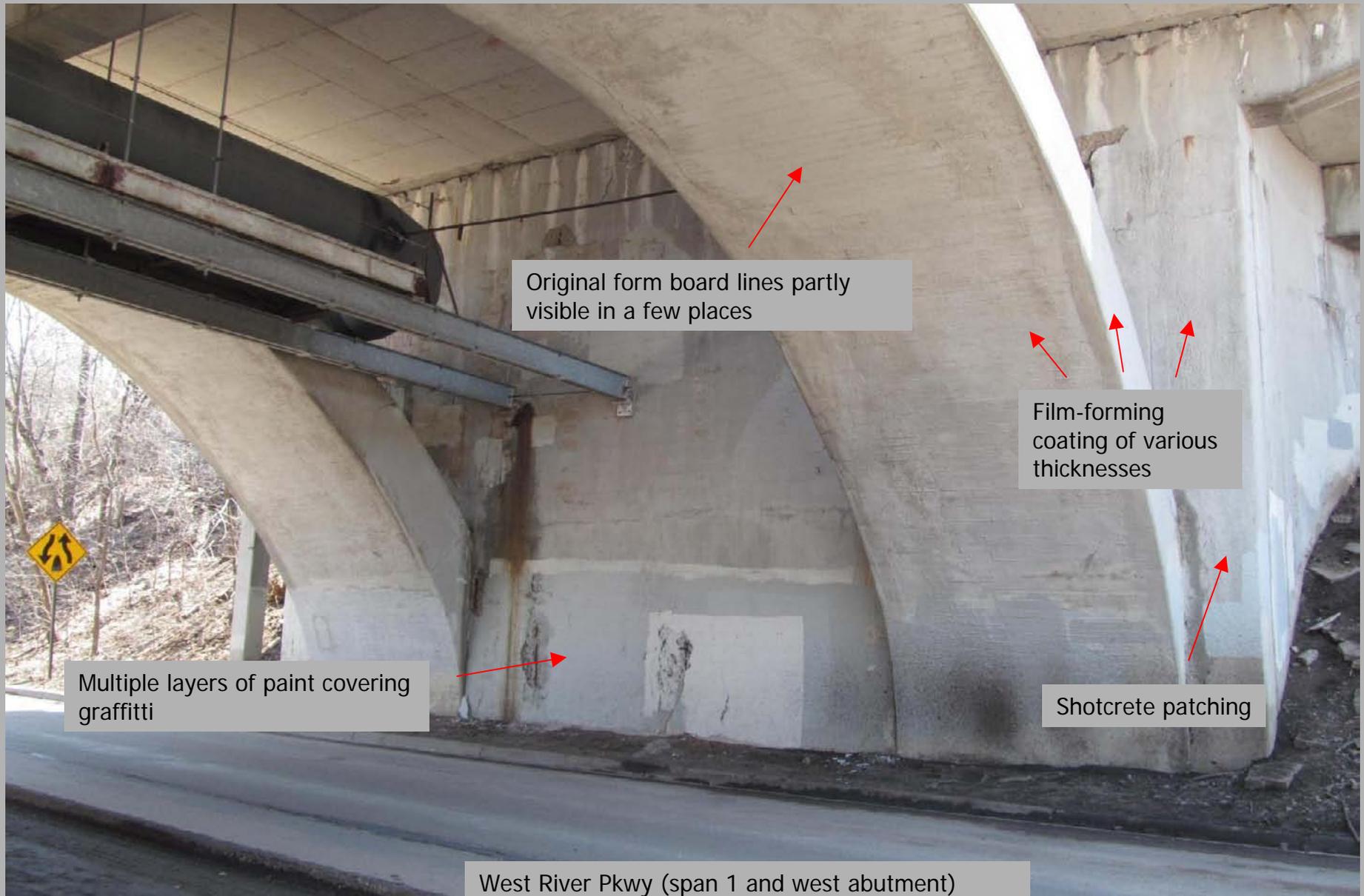


altered cap
beam ends

west bank pier (pier 1)

In 1970 concrete was covered with film-forming coating

There have been several generations of subsequent concrete repairs and paint layers



Original form board lines partly visible in a few places

Film-forming coating of various thicknesses

Multiple layers of paint covering graffiti

Shotcrete patching

West River Pkwy (span 1 and west abutment)

Character-Defining Features



- reinforced concrete construction with Melan-system arch reinforcement
- open spandrel design with symmetrical series of five arches
- stylistic transition between Classical Revival and Art Deco/Moderne
- four open concrete piers (river piers: project out from deck and arches, recessed fluting, detail at water level; piers 1 and 4: cruciform plan, recessed geometric design)
- urban setting over Mississippi River, location within and contributing to the Grand Rounds

Partly lost: spandrel column system (altered), observation bays (altered), exposed concrete surface (covered in 1970 with film-forming coating)

Lost: Classical treatment of cap beam ends, deck fascia (entablature), and railing (balustrade)

Recommended Rehabilitation Alternative



Deck

Replace existing 66'-wide deck with deck of same width except at east end (over spans 4 and 5) where deck will be widened by 10' beginning east of pier 3 to improve geometry entering 5-legged intersection



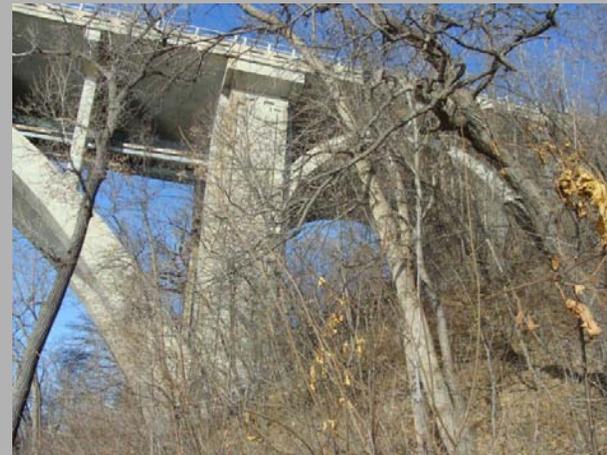
original 60'-wide deck (in 1954)



begin widening at first spandrel column east of pier 3



deck would gradually widen at 1:15



widened area in spans 4 and 5

Deck



East end of bridge where widening would occur



East end of bridge and
5-legged intersection

Proposed east end widening (looking west)

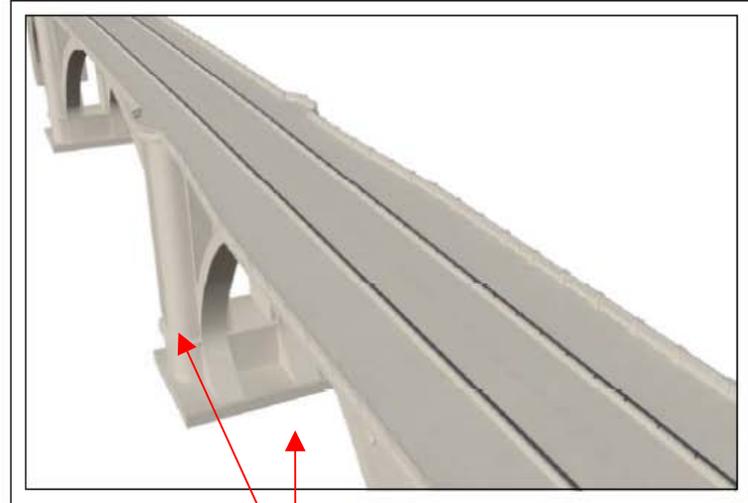
1923 CONFIGURATION



1970 CONFIGURATION



PROPOSED CONFIGURATION



Pier 3 and Span 4

Sidewalk and inner rail

Replace existing raised sidewalk with 17' bike/ped trail (would taper to 12' wide at east end of bridge)

Add crashworthy inner rail between trail and vehicular traffic



original 8'-wide sidewalk (in 1947)



1970 7'-wide sidewalk (current view)



proposed inner rail



inner rail at edge of walkway on Ford Bridge

Proposed new deck with bike/ped trail, lights, and inner and outer railings (looking east)



Outer railing

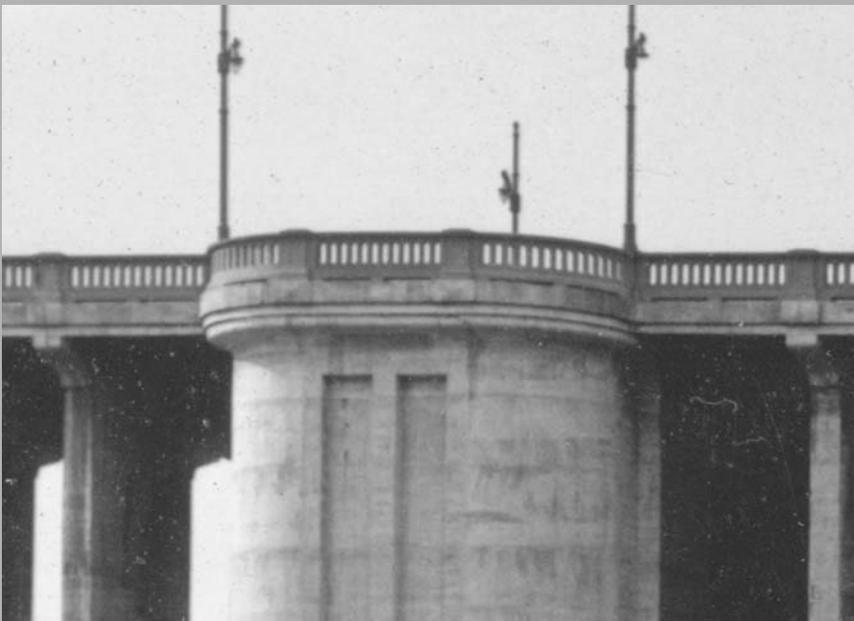
Replace 1970 rail with close reconstruction of historic rail



original 44" high concrete rail (in 1947)



1970 48" high rail (current view)

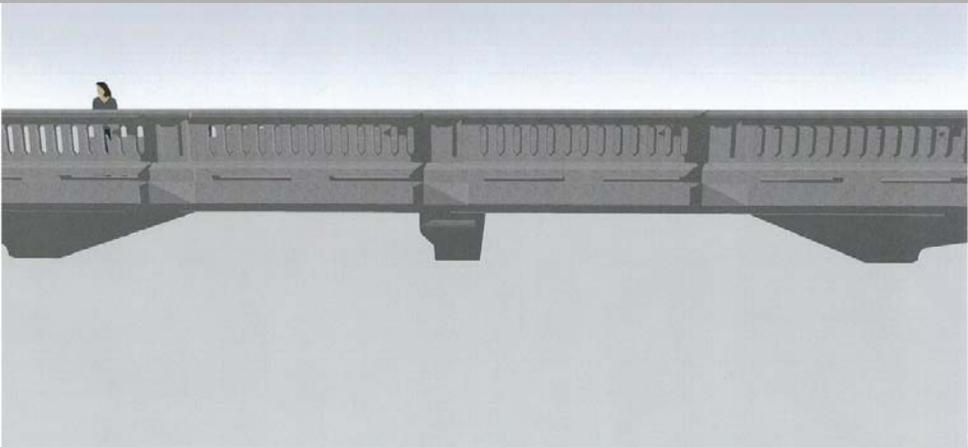


original 44" high concrete rail (in 1946)

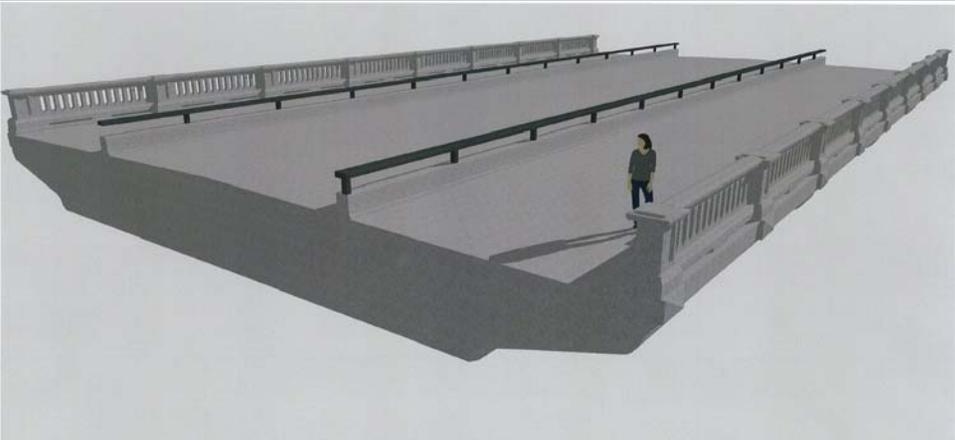


proposed 48" rail

Proposed rail



proposed 48" rail (with frieze, faceted blocks, and cap beam ends)



proposed 48" rail, 17'-wide trail, and inner rail



original rail in ca. 1969

Observation bays

On new deck, extend observation bays about 40" over river piers

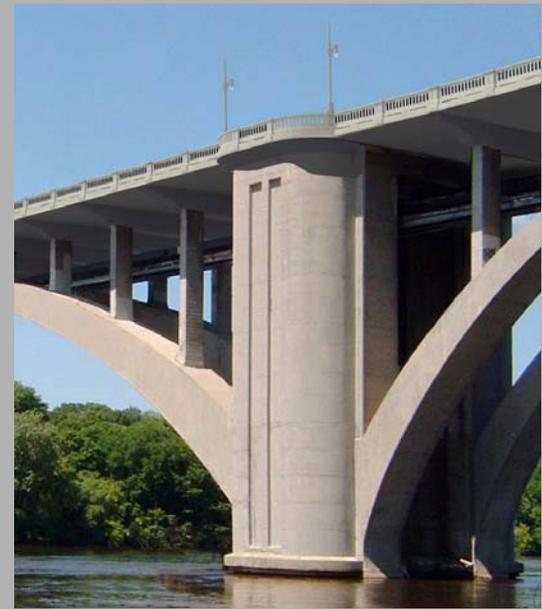
Will recover about 2/3 of original observation bay depth (from sidewalk perspective)



original overlook bays (1954 view)



1970 bay (current view)



proposed

Cap beams

Replace all cap beams (they date from 1970)

Give new beams curved ends similar to historic curve

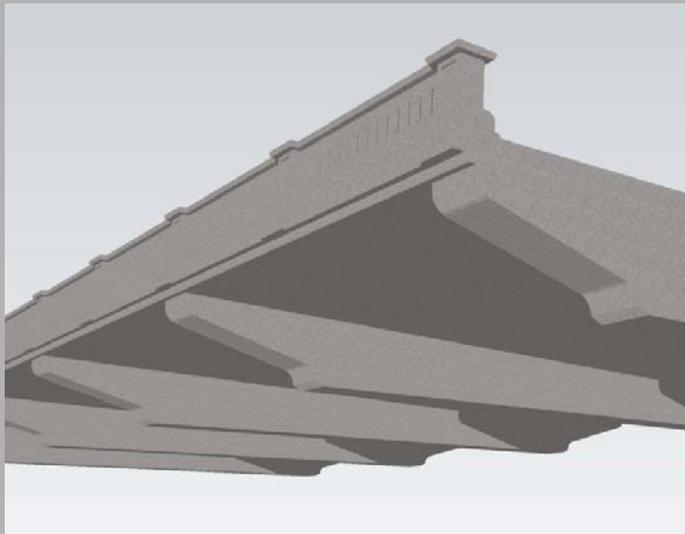
Cover beams (except those in span 1) with film-forming coating to protect concrete from salt-laden water



original cap beam ends (in 1946)



1970 cap beams (current view)



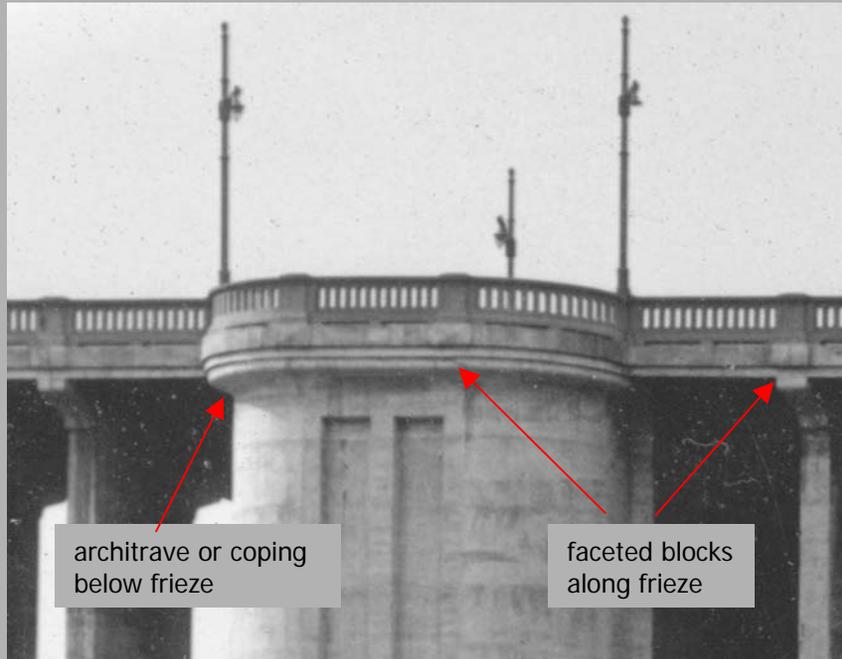
proposed shape of cap beam ends



Example of film-forming coating on Anoka-Champlain Bridge

Deck fascia

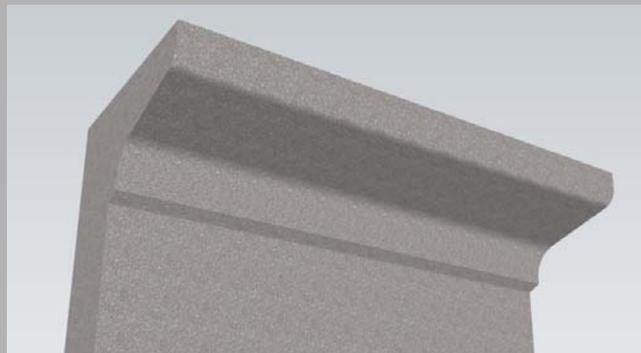
On side of new deck, create entablature with frieze, faceted blocks, and architrave (coping)



original deck (in 1946)



1970 treatment (current view)



concept for observation bay architrave



proposed

Treatment strategy for concrete repairs below deck

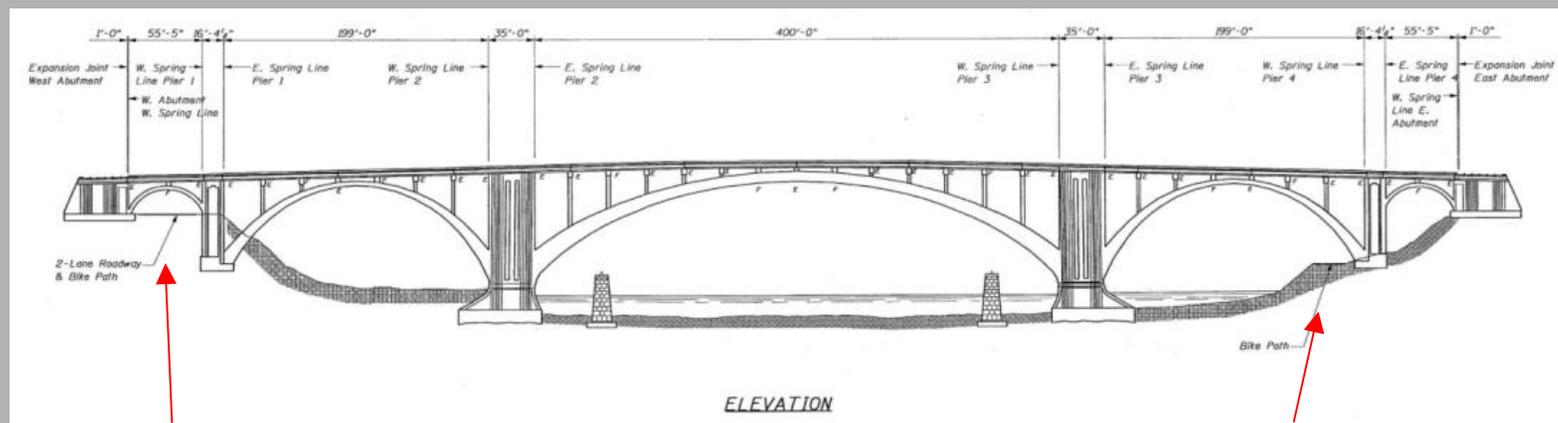
The massive scale of the bridge and its Mississippi River location preclude treatments that have a short service life or require additional or repeat work.

Concrete of various ages needs to be visually blended.

The concrete must be protected from water and deicing salts to prevent further loss of historic fabric and achieve a long service life.

The 1970 coating is adhering well in many places. Completely removing it may alter the surface of the historic concrete. The project budget precludes removing all existing coatings and “restoring” the original concrete finish.

The west abutment and span 1 are most accessible to the public because of West River Parkway. Other below-deck areas are generally viewed from a distance or are hidden.



Span 1 over
West River Pkwy

Pier 2

Span 3

Bike
path

East
end

Spandrel columns

Repair concrete (which dates from 1970)

Cover with film-forming coating to blend repairs and protect concrete



spandrel columns date from 1970

River piers (piers 2 and 3)

Remove 1970 coating that is not adhering

Repair concrete (which dates from 1923)

Cover with film-forming coating to blend repairs and protect concrete



1923 concrete with 1970 coating

Riverbank piers (piers 1 and 4)

Pier 1 (at West River Pkwy)

Remove 1970 coating that is not adhering

Repair concrete (which dates from 1923)

Create curve on beam structure at top of pier

Finish repairs with special board-form finish

Stain to blend patches

Protect with clear silane coating

Pier 4 (on east bank, less accessible to public)

Same as pier 1 except:

Finish repairs with standard concrete finish

Cover with film-forming coating to blend repairs and protect concrete



Example of board-form finish on bridge repair work on Dean River Pkwy



River arches (spans 2, 3, 4)

Remove 1970 coating that is not adhering

Repair concrete (which dates from 1923)

Embed cathodic protection anodes

Finish repairs with standard concrete finish

Cover with film-forming coating to blend repairs and protect concrete



cathodic protection: embed hidden sacrificial anodes (long zinc rods) to attract chloride ions (thereby protecting the steel reinforcing)



Outer arches (spans 1 and 5) & west and east abutment

Remove 1970 coating that is not adhering

Repair concrete (which dates from 1923)

Embed cathodic protection anodes in arches

Reconstruct 2 missing spandrel columns in spans 1 and 5 to add strength

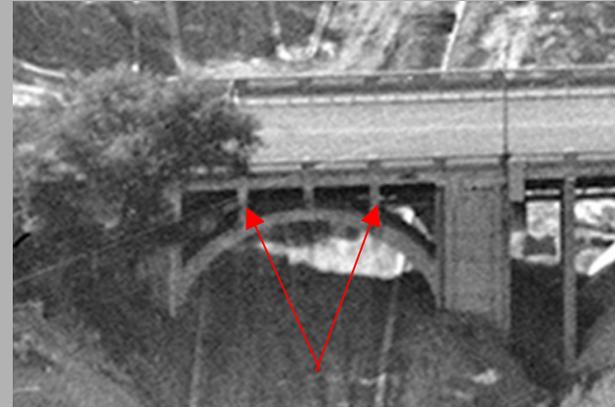


At span 1 and west abutment (at W. River Pkwy)

Finish repairs with special board-form finish

Stain to blend patches

Protect with clear silane coating



Reconstruct two spandrel columns removed in 1970



At span 5 and east abutment (less accessible to public)

Finish repairs with standard concrete finish

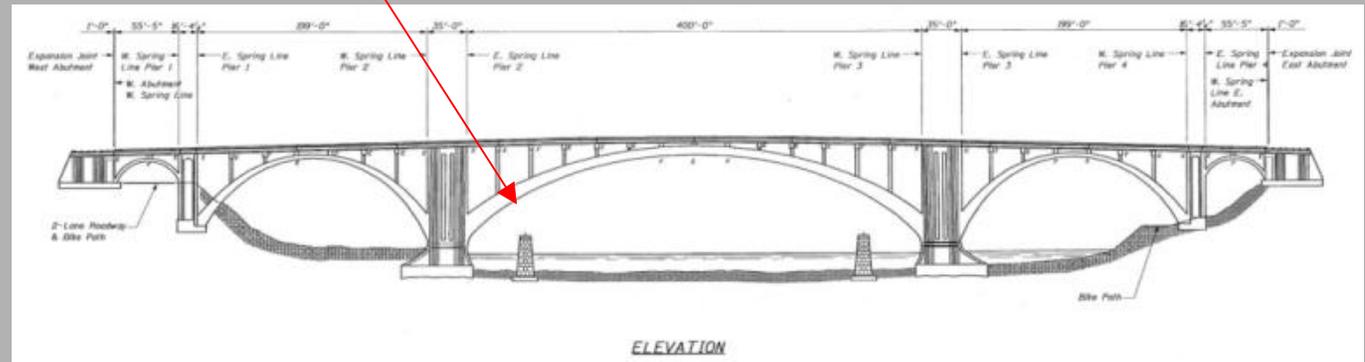
Cover with film-forming coating to blend repairs and protect concrete

Old bridge piers

Remove piers from previous (1889) bridge
(They are not eligible for the National Register)



piers from 1889 bridge

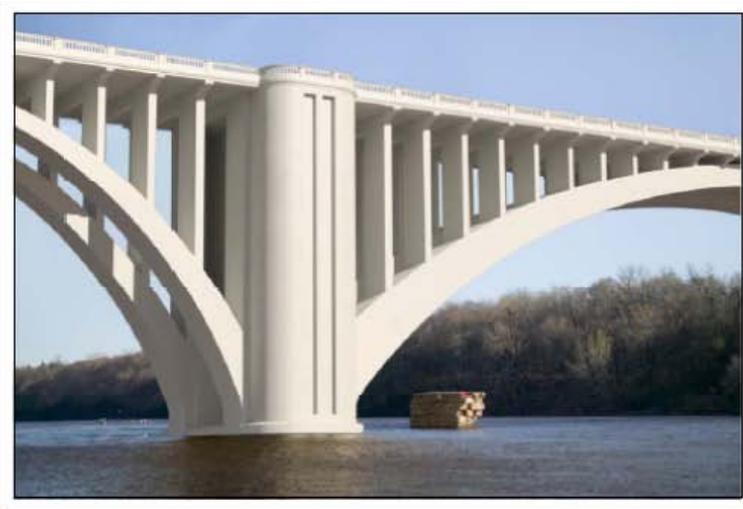


Visualization of proposed rehabilitation

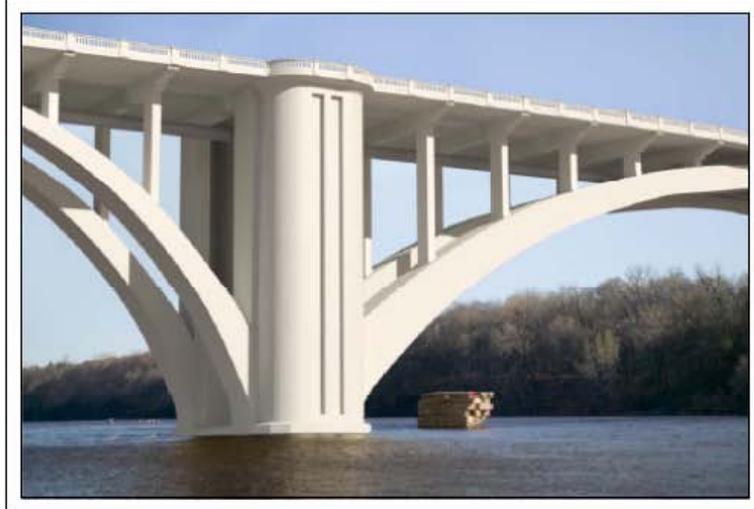


River pier view

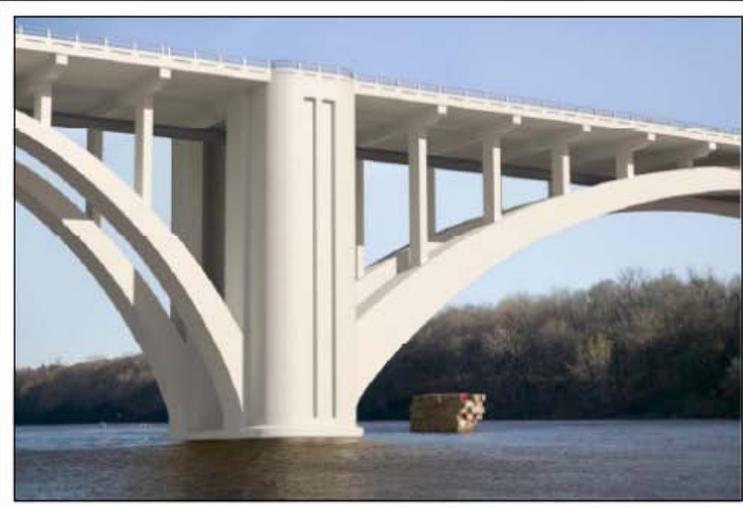
1923 CONFIGURATION



PROPOSED CONFIGURATION



1970 CONFIGURATION



NOTES:

1923 — 1970 CHANGES INCLUDE:

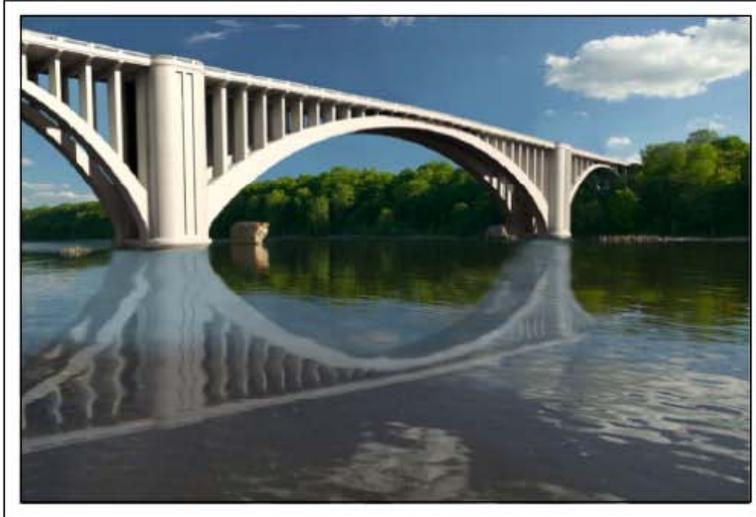
- A. NEW WIDER DECK
- B. NEW RAILING
- C. NEW SPANDREL COLUMNS
- D. NEW CAP BEAMS

1970 — PROPOSED CHANGES INCLUDE:

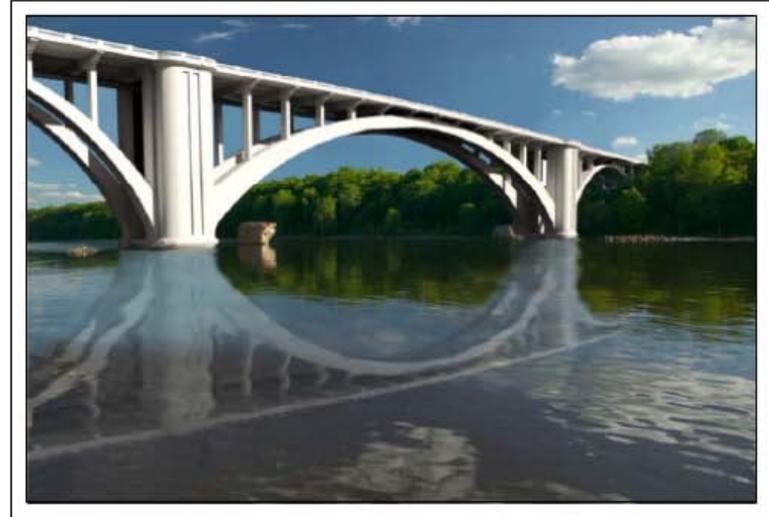
- E. NEW DECK WIDER AT EAST END
- F. NEW RAILING
- G. NEW CAP BEAMS
- H. ENTABLATURE DETAILING AT TOP OF RIVER PIERS

Main span view

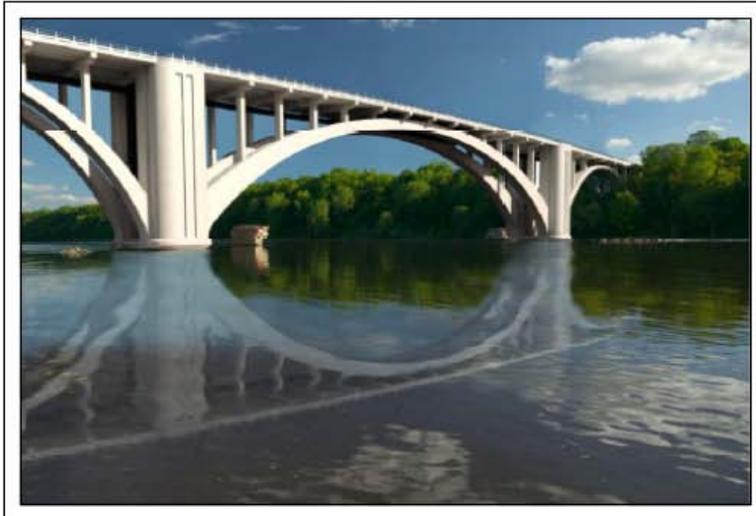
1923 CONFIGURATION



PROPOSED CONFIGURATION



1970 CONFIGURATION



NOTES:

1923 — 1970 CHANGES INCLUDE:

- A. NEW WIDER DECK
- B. NEW RAILING
- C. NEW SPANREL COLUMNS
- D. NEW CAP BEAMS

1970 — PROPOSED CHANGES INCLUDE:

- E. NEW DECK (WIDER AT EAST END)
- F. NEW RAILING
- G. NEW CAP BEAMS
- H. EXTABLATURE DETAILING AT TOP OF RIVER PIERS