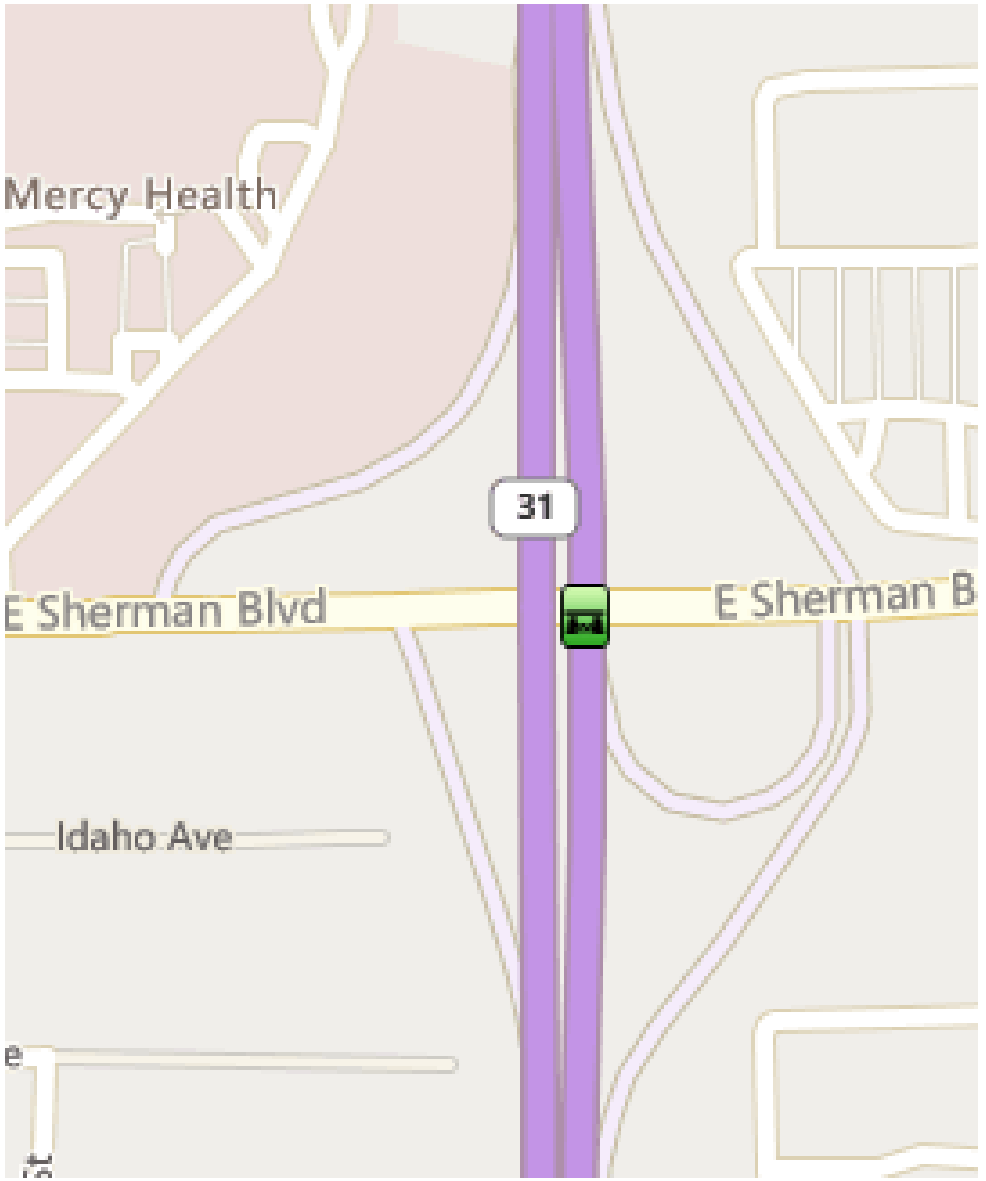
Sherman Ave Over US-31 Deck Deterioration

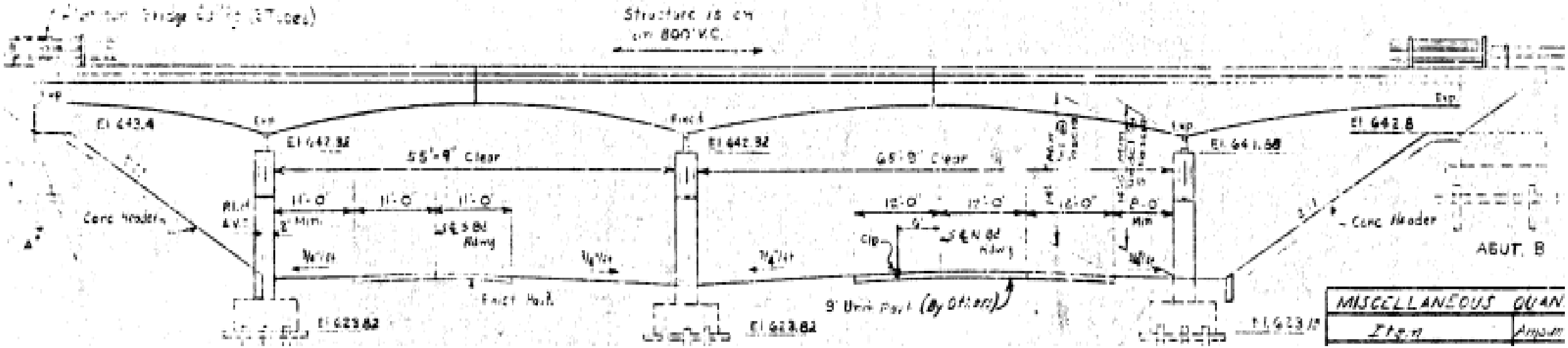
Statewide Region Support Bridge Preservation

Location

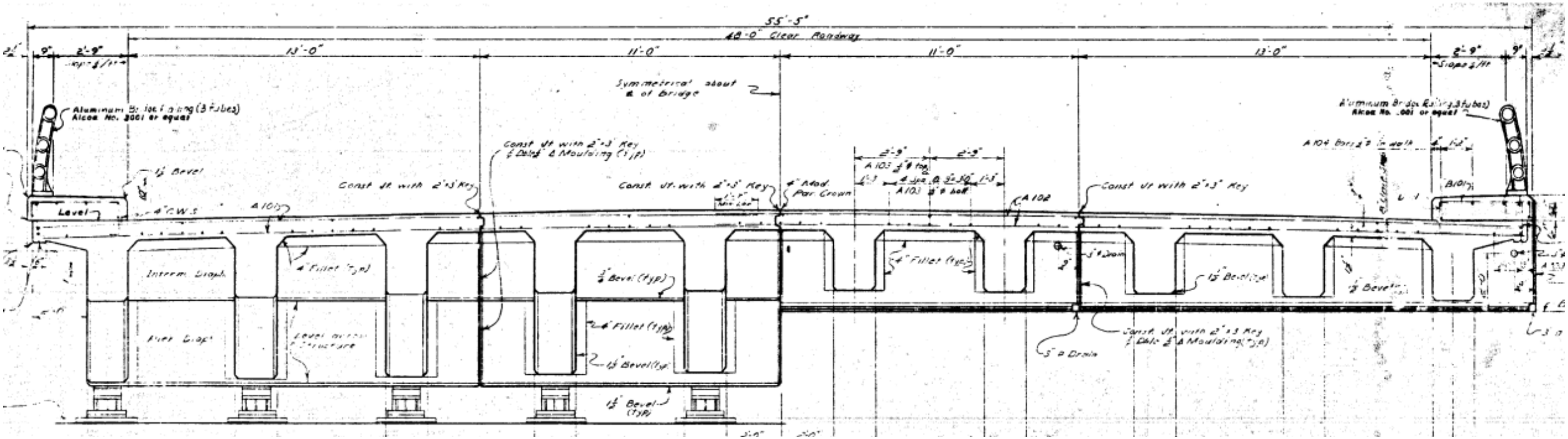
- Originally Built in 1960
- 4 span - Variable depth continuous concrete tee beams integral with the bridge deck.
- Rehabilitation in 1994
- Structure Length is 205 ft
- Structure Width is 55ft
- 4 Lanes with 3.5 ft of shoulders.



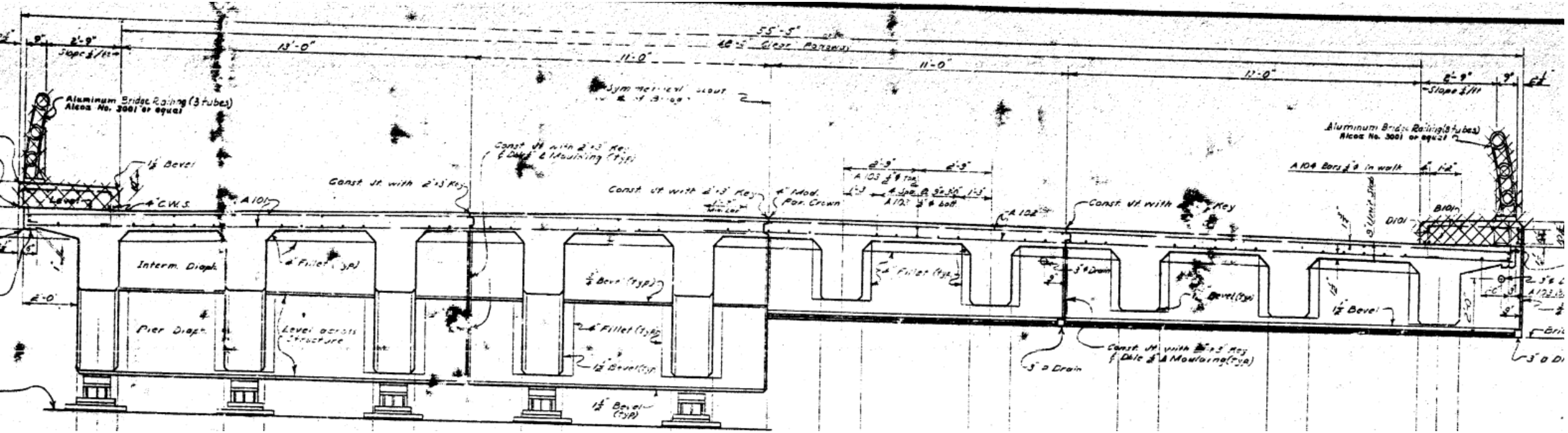
Original Plans in 1960



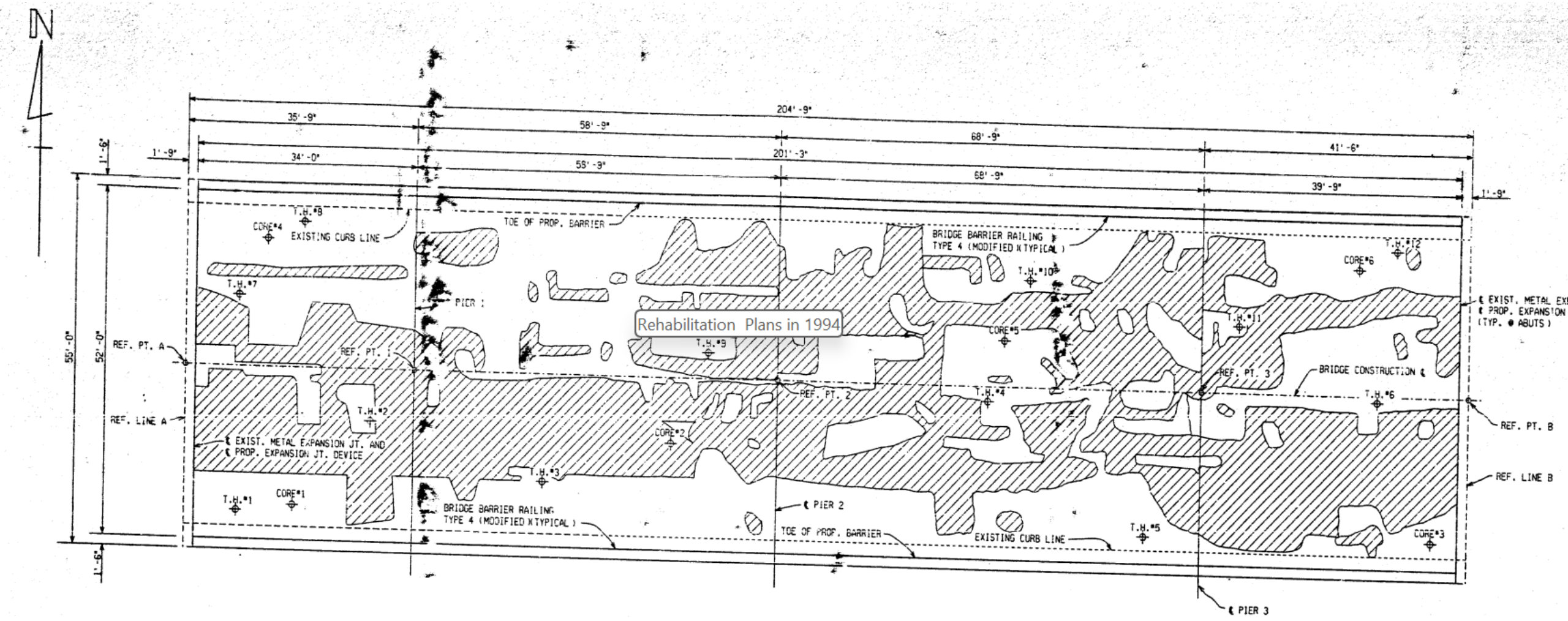
Original Plans in 1960



Rehabilitation Plans in 1994



Rehabilitation Plans in 1994



Structure Condition in 2015

Deck Surface	6 (Fair Condition)
Deck Bottom	6 (Fair Condition)
Railings	7 (Good Condition)
Stringers	5 (Fair Condition)
Abutments	6 (Fair Condition)
Piers	8 (Good Condition)
Approaches	8 (Good Condition)
Overall Rating	5

Structure Condition in 2015

Deck Surface was approx.
9% Delaminated

Deck Bottom was approx.
3% Delaminated

Structure Condition in 2015

Structure Condition in 2017

- Bit chip seal was placed on the deck surface – No Photo

Table 2: Deteriorated Concrete Areas on the Deck Surface for S03 of 61072

DECK SURFACE					
	Total Area (sft)	**Delaminated Area (sft)**	**Spalled Area (sft)**	**Existing Patches**	**Percent Deficient**
Span 1	1716.0	190.0	0.0	0.00	11.07%
Span 2	2820.0	236.0	0.0	0.00	8.37%
Span 3	3300.0	220.0	5.0	0.00	6.82%
Span 4	1992.0	198.0	10.0	8.00	10.84%
TOTAL =	***9,828.0***	***844.0***	***15.0***	***8.0***	***8.8%***

Structure Condition in 2018

Structure Condition in 2018

- On October 2018 Maintenance scope of work included:
  - Stage 1 - Milled off existing bit chip seal on the deck & 25ft butt joints (night 1)
  - Stage 2 - Deck Patched = 1060 Rapid Set concrete mix (night 2)
  - Stage 3 - Placed 1 ¼” HMA overlay on deck surface without a membrane. (night 3)

Approximate Cost of Project

NEW PROJECT SCOPE

- Stage 1 – Bit Chip Seal Removal – $17,000
- Stage 2 - Deck Patching – $15,000
- Stage 3 – HMA Overlay – $30,000
- Maintaining Traffic – 3 night closures – MDOT

Total cost was approximately = $62,000

Structure Condition in 2021

Structure Condition in 2021

- On October 2021 work included:
  - Stage 1 - Milled off existing HMA Overlay on the deck & 25ft butt joints
  - Stage 2 - Deck Patched = 1060 Rapid Set concrete mix
  - Stage 3 - Placed 1 ¼” HMA overlay on deck surface without a membrane.

Structure Condition in 2021

Approximate Cost of Project

NEW PROJECT SCOPE

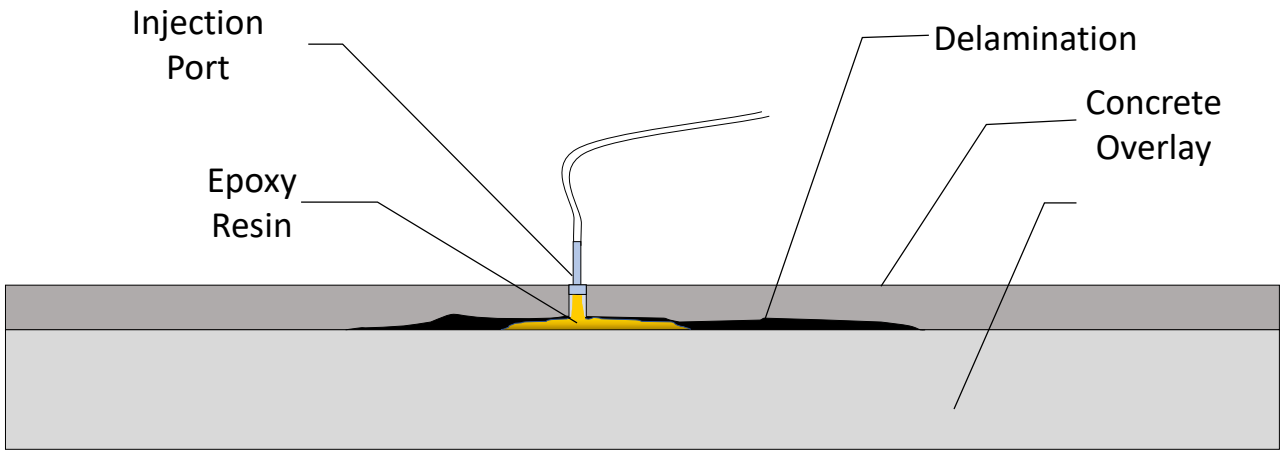
- Stage 1 – HMA Overlay Removal – $17,000
- Stage 2 - Deck Patching – $20,000
- Stage 3 – HMA Overlay – $30,000
- Maintaining Traffic – 3 night closures - MDOT

Total cost was approximately = $67,000

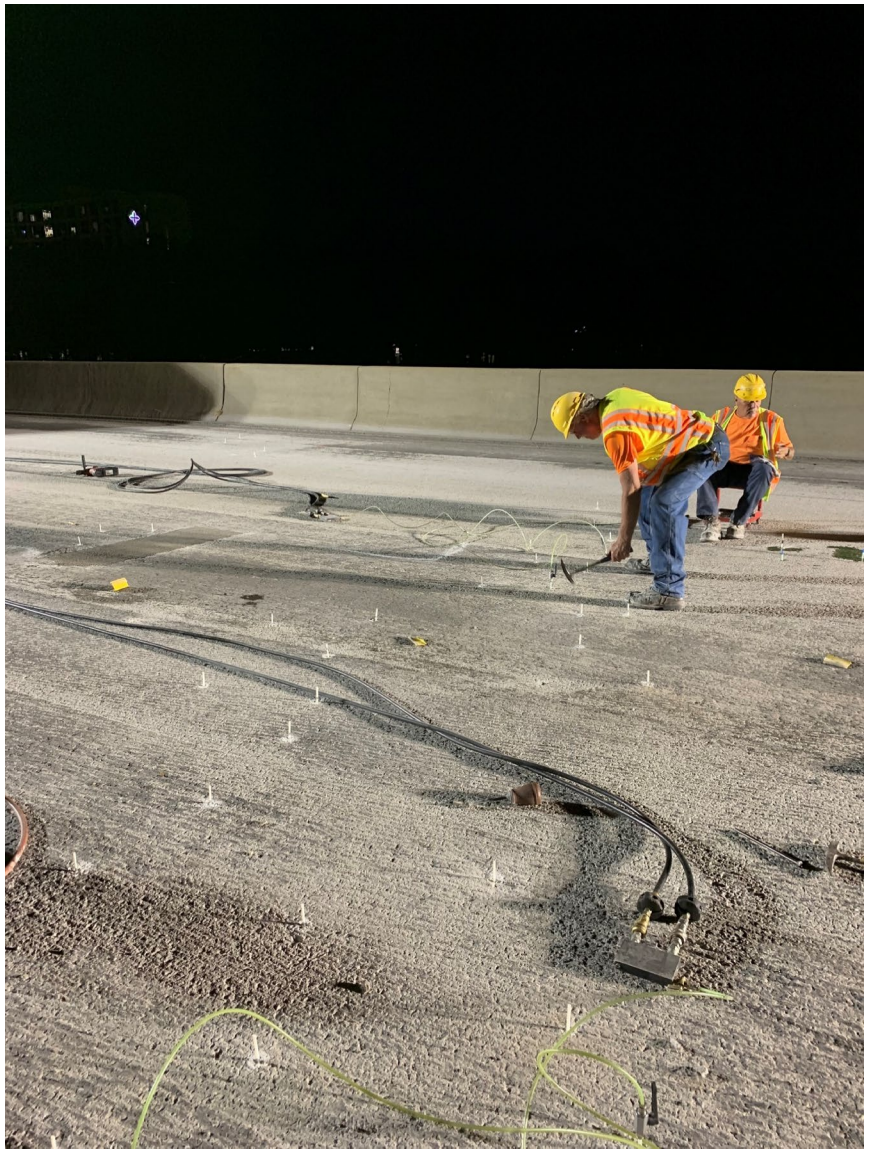
Structure Condition in 2023

- On July 2023 work included:
  - Stage 1 - Milled off existing HMA Overlay on the deck & 25ft butt joints
  - Stage 2 - Deck Patched = 1060 Rapid Set concrete mix
  - Stage 3 – Deck injection
  - Stage 4 - Placed 1 ¼” HMA overlay on deck surface without a membrane.

Deck Injection



Structure Condition in 2023



Deck Injection

Akabond 818

Technical Data Sheet

100% Solids Hi-Mod Injection Grout

Description

Akabond 818 is a 100%, solids, low viscosity epoxy adhesive. It can be used with pressure injection systems or by gravity feed.

Applications

Designed to restore cracked structural concrete by use of a pressure injection system. Akabond 818 can also be used to grout cracks in a horizontal plane by gravity grouting applications.

Advantages

- *Low viscosity*
- *Moisture insensitive*
- *Exceptional flow characteristics*
- *High modulus for superior strength*

Specifications

Certified ASTM C-881 Types I, II, IV, and V. Grade 1, Classes B and C

Physical Properties

		Akabond 818 Resin Part A	Akabond 818 Hardener Part B	Mixed
Composition		Epoxy	Amine	
Mix Ratio, by weight By volume		100 100	43 50	
Appearance		Liquid	Liquid	Liquid
Color		Yellow	Blue	Green
Viscosity @ 77°F (25°C) (cPs)	ASTM D-2393	700	35	200
Density @ 77°F (25°C) g/cc (lb/gal)	ASTM D-792	1.13 (9.4)	0.96 (8.05)	
Pot life @ 77°F (25°C) 229g (min)	ASTM D-2471			20

Akabond 818

Technical Data Sheet

100% Solids Hi-Mod Injection Grout

Cured Properties at 74°F (23°C) [1]			
Hardness	ASTM D-2240	Shore D	82
Tensile Strength	ASTM D-638	psi (MPa)	10,100 (70)
Tensile Modulus	ASTM D-638	psi (MPa)	472,000 (3,250)
Flexural Strength	ASTM D-790	psi (MPa)	14,500 (100)
Flexural Modulus	ASTM D-790	psi (MPa)	511,000 (3,520)
Compressive Strength	ASTM D-695	psi (MPa)	14,700 (101)
Compressive Modulus	ASTM D-695	psi (MPa)	353,000 (2,430)
Glass Transition Temperature (Tg)	DMA	°F (°C)	141 (61)
Application temperature		°F (°C)	>40 (4)
Final cure		days	7
Water absorbtion	24 hour immersion	%	0.27

Limitations:

- Do not thin product. Solvents may prevent proper curing
- Substrate temperature should be 40°F (4°C) minimum and rising.
- For best results, materials should be maintained between 65"-75°F during application.
- Do not apply through standing water.
- Material becomes a vapor barrier after cure.
- Concrete or masonry must be tested for water-vapor transmission prior to application.
- Do not use in expansion joints (moving joints).

Deck Injection - The Process

Approximate Cost of Project

NEW PROJECT SCOPE

- Stage 1 – HMA Overlay Removal – $17,000
- Stage 2 - Deck Patching – $12,000
- Stage 3 - Deck Injection – $32,500 (515 gallons)
- Stage 4 – HMA Overlay – $30,000
- Maintaining Traffic – 4 nights of closure & 1 full day

Total cost was approximately = $91,500

DID IT WORK?