



# Investigation and Repair Design of Impacted Damaged Bridge Steel Superstructure in Nevada

Brandon Henning, PE

Principal Structures Engineer –  
Inspection/Maintenance  
NDOT Structures Division



Michael Marshall, PE

Bridge Engineer  
Stantec Consulting

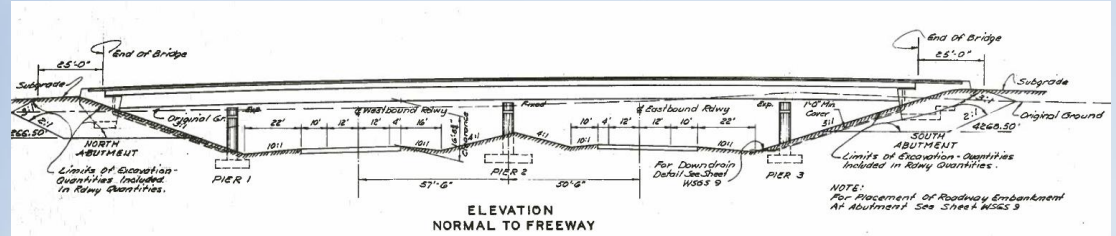


# I-1255

Winnemucca Blvd (SR 289)  
Over Interstate 80



# Design and Condition

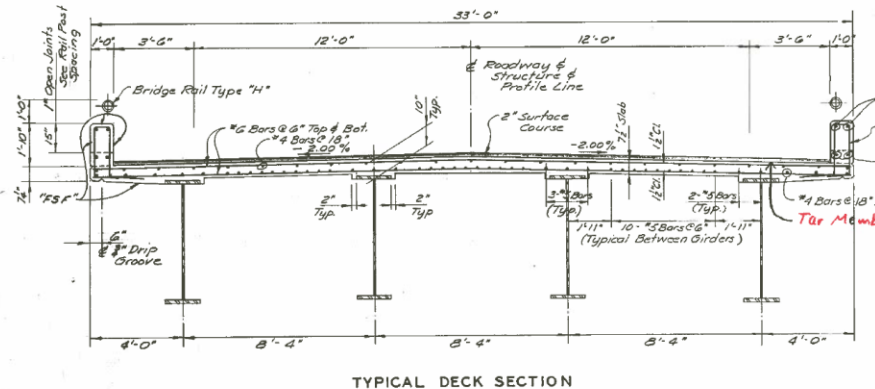


## Concrete Deck

- Integral top flange to deck interaction
- 7/2021 NBI Rating: 7 (Good Condition)

## Four Steel Girder Superstructure

- Continuous design, 4-span
- 7/2021 NBI Rating: 7 (Good Condition)



# Design and Condition

- Year Built: 1970
- Inventory Rating: 28.4 Tons
- Operating Rating: 47.1 Tons



# History

- No major defects or repairs
- Small impact of Girder 4, Span 3



# Impact Reported

- Impact Reported December 2021
- Previous Inspection: July 2021, next inspection due 2023
- Google Street View Updated October 2021



# September 2021





# October 2021

- Have photo?

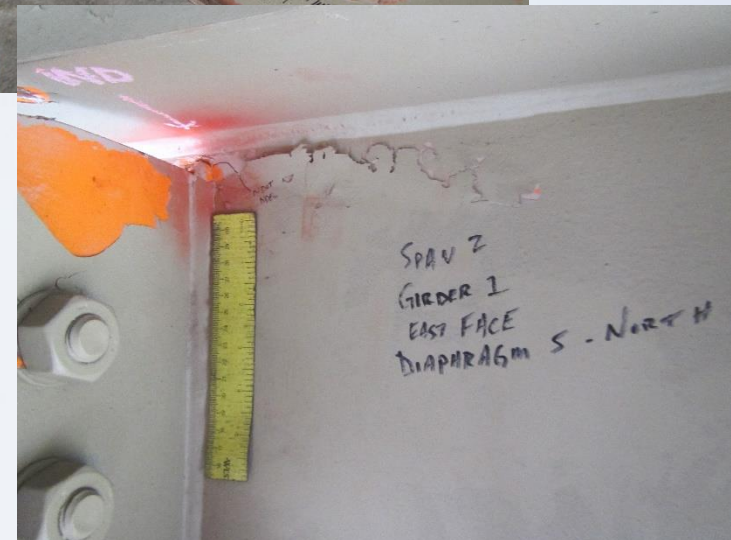


# Findings December 2021 Damage Inspection



# Findings December 2021 Damage Inspection

- Scrapes to Girders 1-4 bottom flange, Gouges in Girders 1 and 3 observed on top of bottom flange
- Girder 1
  - Deformation up to 14-13/16”
  - (14) buckled stiffeners
  - Crack at Diaphragm 5



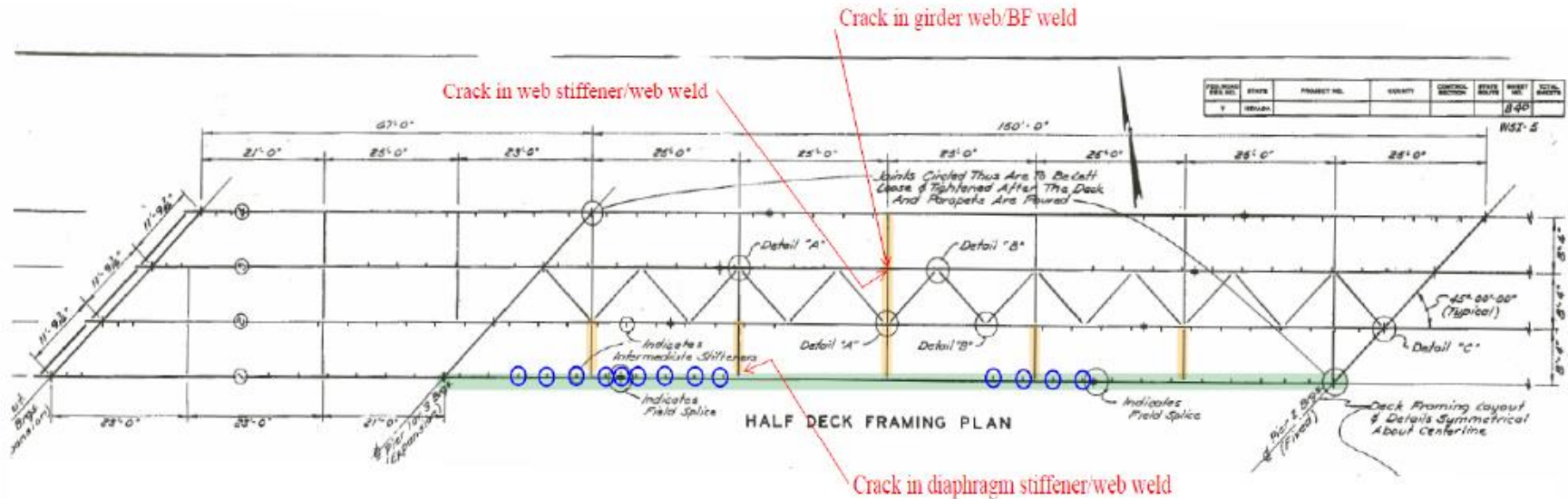
# Findings December 2021 Damage Inspection

- Girder 3
  - Crack at Diaphragm 4
  - Crack between Web and Floorbeam
- Diaphragms
  - Buckled in Bay 1 and along impact line in Bays 2 and 3



# Findings December 2021 Damage Inspection





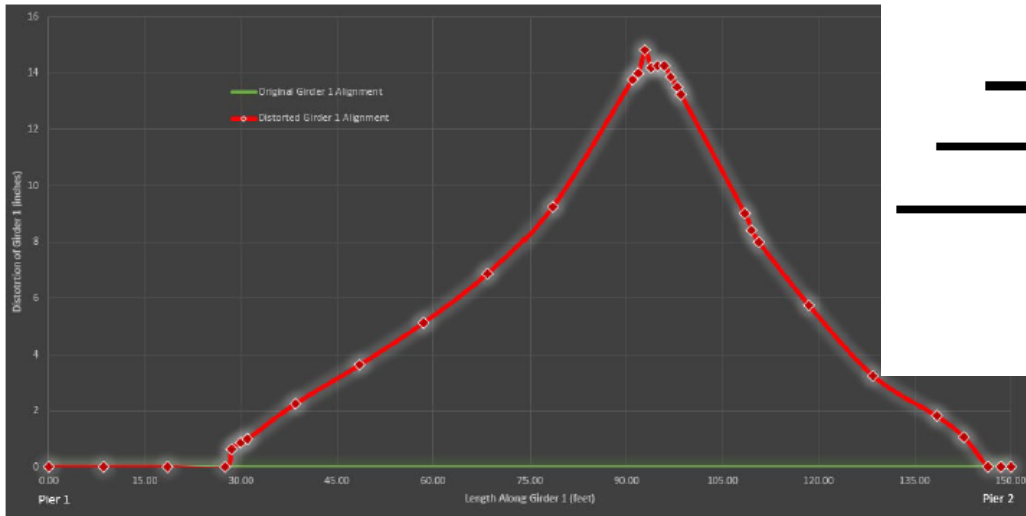
Findings/Legend:

- 1. Deflection/deformation of Girder 1
  - a. Shaking of Girder 1 under load
- 2. Diaphragm buckling
- 3. Vertical Web Stiffener buckling
- 4. Crack - Girder 1, Diaphragm 5, Bay 1, Web Stiffener, Top
- 5. Crack - Girder 3, Diaphragm 4, Bay 2, Web Stiffener, Bottom
- 6. Crack - Girder 3, Diaphragm 4, Bay 3, Web-Bottom Flange weld

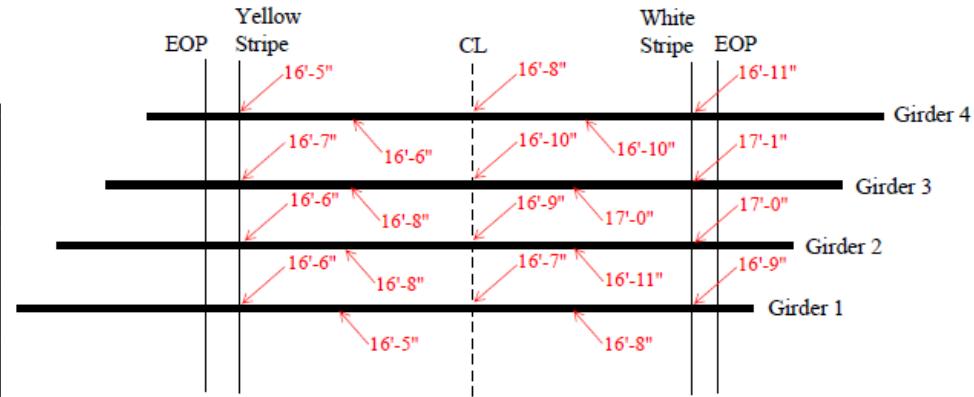
Figure 2: Affected Elements

**Table 1: Girder 1 Distortion Profile Data**

Location Along Girder 1 (ft)	Distortion of Web (in)	Location Along Girder 1 (ft)	Distortion of Web (in)	Location Along Girder 1 (ft)	Distortion of Web (in)
0.00	0.000	78.46	9.250	109.54	8.438
8.46	0.000	90.88	13.750	110.63	8.000
18.46	0.000	91.88	14.000	118.46	5.750
27.46	0.000	92.88	14.813	128.46	3.250
28.46	0.625	93.88	14.188	138.46	1.813
29.92	0.875	94.88	14.250	142.71	1.063
31.00	1.000	95.88	14.250	146.46	0.000
38.46	2.250	96.88	13.875	148.46	0.000
48.46	3.625	97.88	13.500	150.00	0.000
58.46	5.125	98.46	13.250	-	-
68.46	6.875	108.46	9.000	-	-



**Figure 3: Girder 1 Distortion Profile**



**Figure 4: Minimum Vertical Clearance**

## Closure plan



**Figure 5: Recommended lane closure strategy**



## Continued Inspections

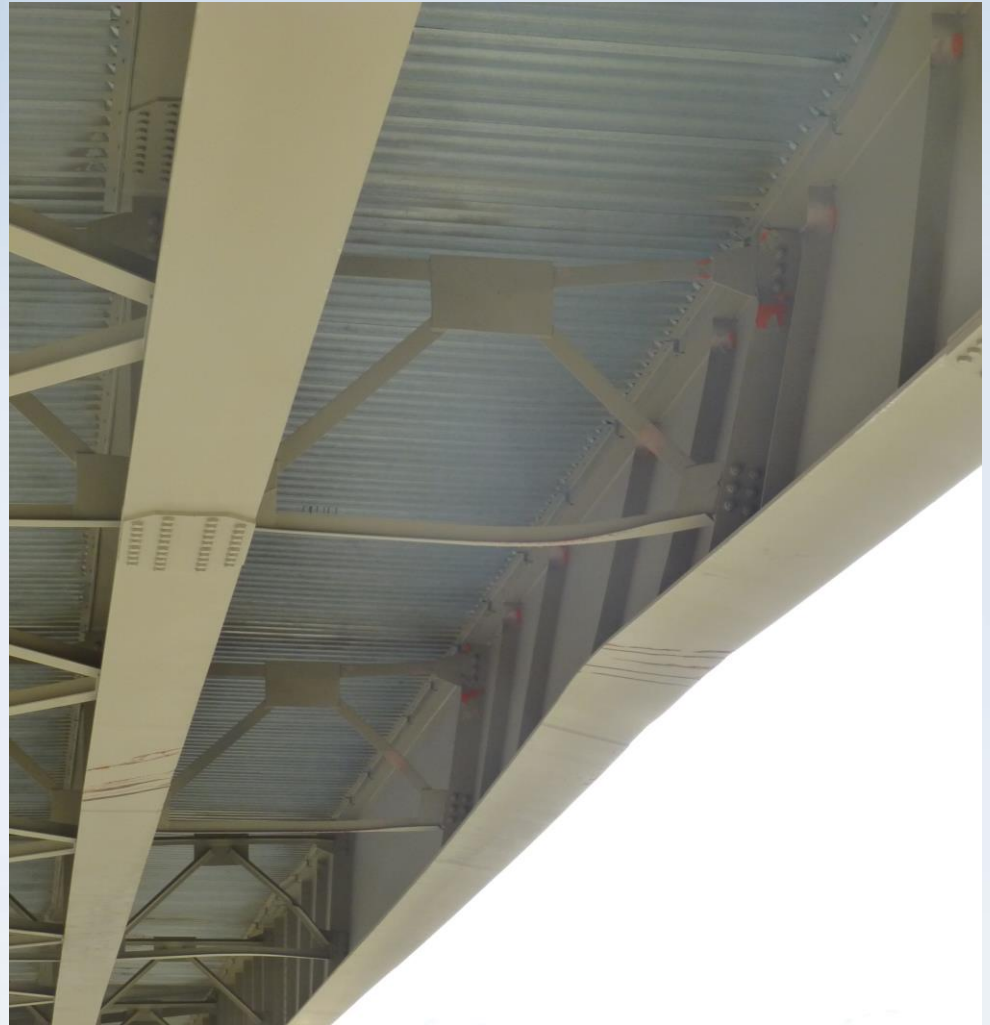
- No additional findings since 2021 initial prior to repairs



# Repair Project

Emergency Agreement Scope of Services:

- Girder Heat Straightening
- Crack Repairs
- Wb Stiffeners Repair
- Diaphragm Replacement
- Painting



# Scope of Work

## Girder 1:

- Heat straightening Girder 1, web and bottom flange.
- Heat straightening Girder 1 vertical stiffeners.

## Diaphragms:

- Remove and replace Diaphragms 2-6 in Bay 1 after Girder 1 heat straightening.
- Heat straighten Diaphragm 4 in Bays 2 and 3.



# Scope of Work

## Cracking Repairs

- Girder 1 Cracking.
  - Girder 1, Diaphragm 5, Bay 1, at the top
- Girder 3 Cracking.
  - Girder 3, Diaphragm 4, Bay 2 at the bottom
  - Girder 3, Diaphragm 4, Bay 3, near diaphragm stiffener

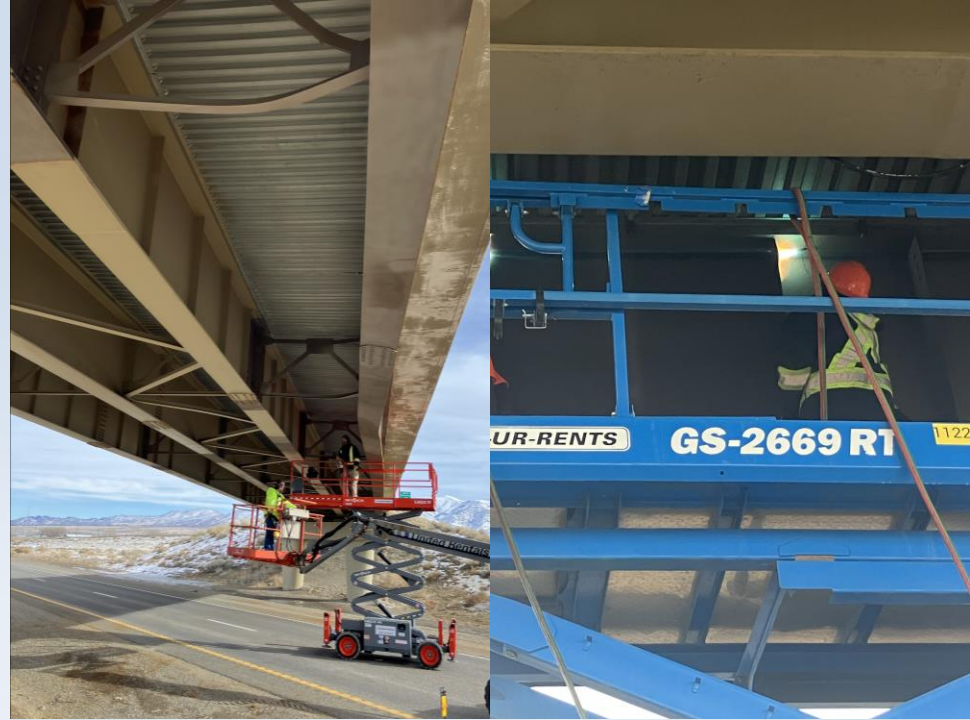


# Emergency Agreement

- Advertised April 2023
- Awarded November 8, 2023
  - Ames Construction, Inc. Prime
    - Dan R Dalton, Inc. - Heat Straightening
    - Olsen Beal – Diaphragms and crack repairs
- Why the delay from April to November?
- Work began January 2, 2024
- Bridge open to traffic January 23, 2024

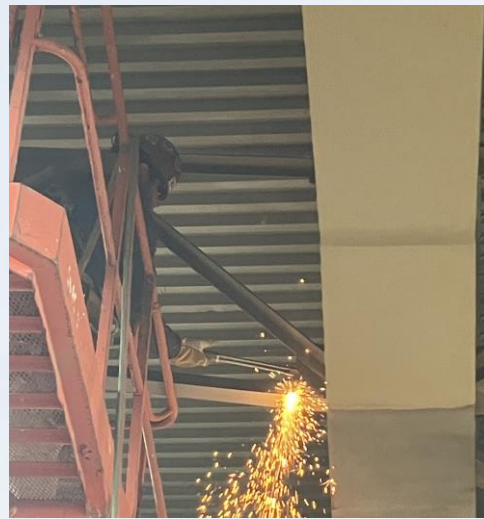
# Repair Process

- Abrasive Blasting
- Lead Paint Removal



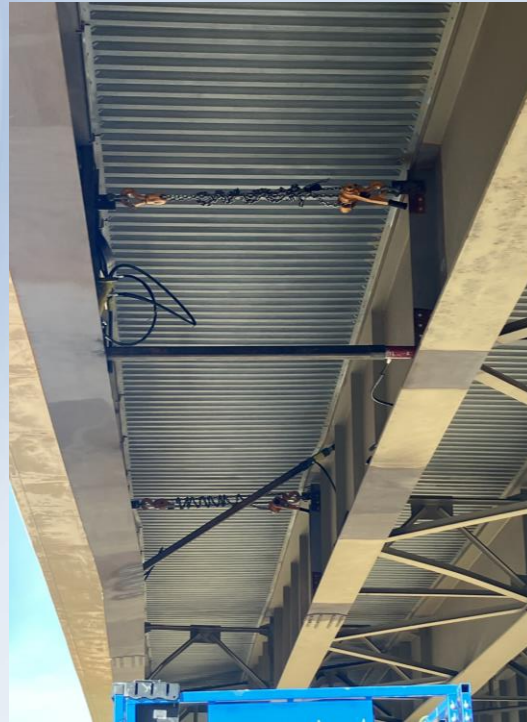
# Repair Process

- Heat Straightening
- Beam Repair









## Repair Process

- Crack Repairs
- Diaphragm Repairs





# Repair Process

- Repaint Girders



# Repair Complete Reopen Inspection

- Special Inspection performed during January Repairs
- August 2024 Special Inspection Verified Repairs have been completed and repainted.



## Lessons Learned

- Value of Street View with History
- Open discussion with local regions and districts (this would not have been found until July 2023)
- Open dialogue with community and public reports
- Contracting with Heat Straightener Contractor

# Questions

