

# Virtual Inspection – Start to Finish

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**HWC**  
ENGINEERING

# Agenda

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PREPARATION



INSPECTION  
PROCEDURES/HABITS



CONDITION  
EVALUATION

# Preparation

- Review bridge history and past reports
  - Note
    - Noteworthy deficiencies
    - Special details
    - Labeling convention
- Safety Considerations
  - INDOT inspects in pairs
  - Safety briefing
  - Site parking
- Inspection Equipment



# Inspection Procedures/Habits

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- Develop consistency
  - Have an order of inspection
- A picture of every subcomponent
- Enough pictures to document location, severity, and extent of deficiencies
  - As the rating goes down, the number of pictures goes up

# Condition Evaluation

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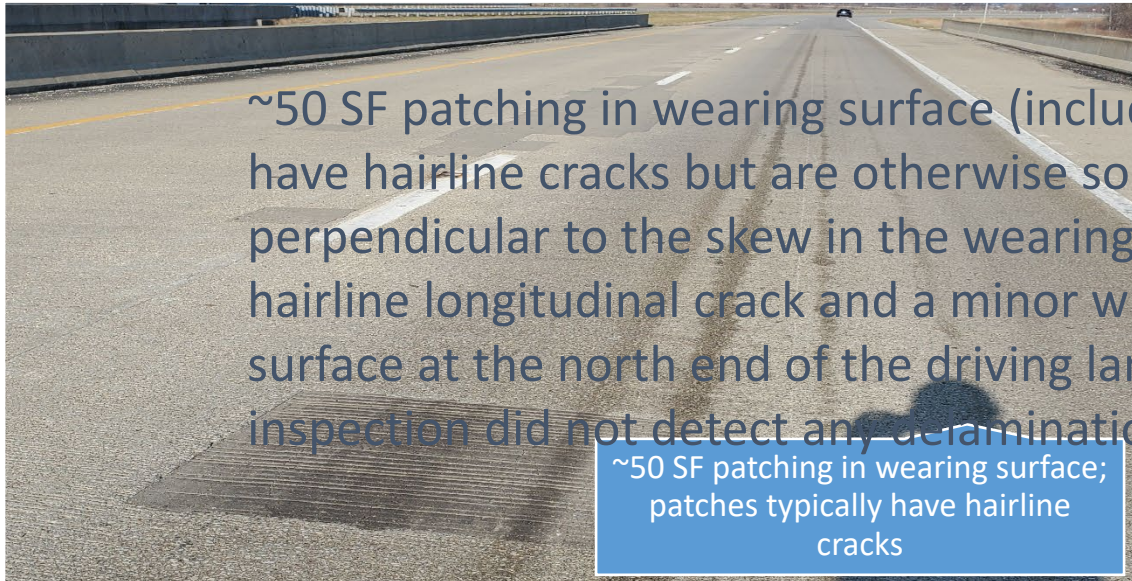
# Condition Evaluation

- Structure overview



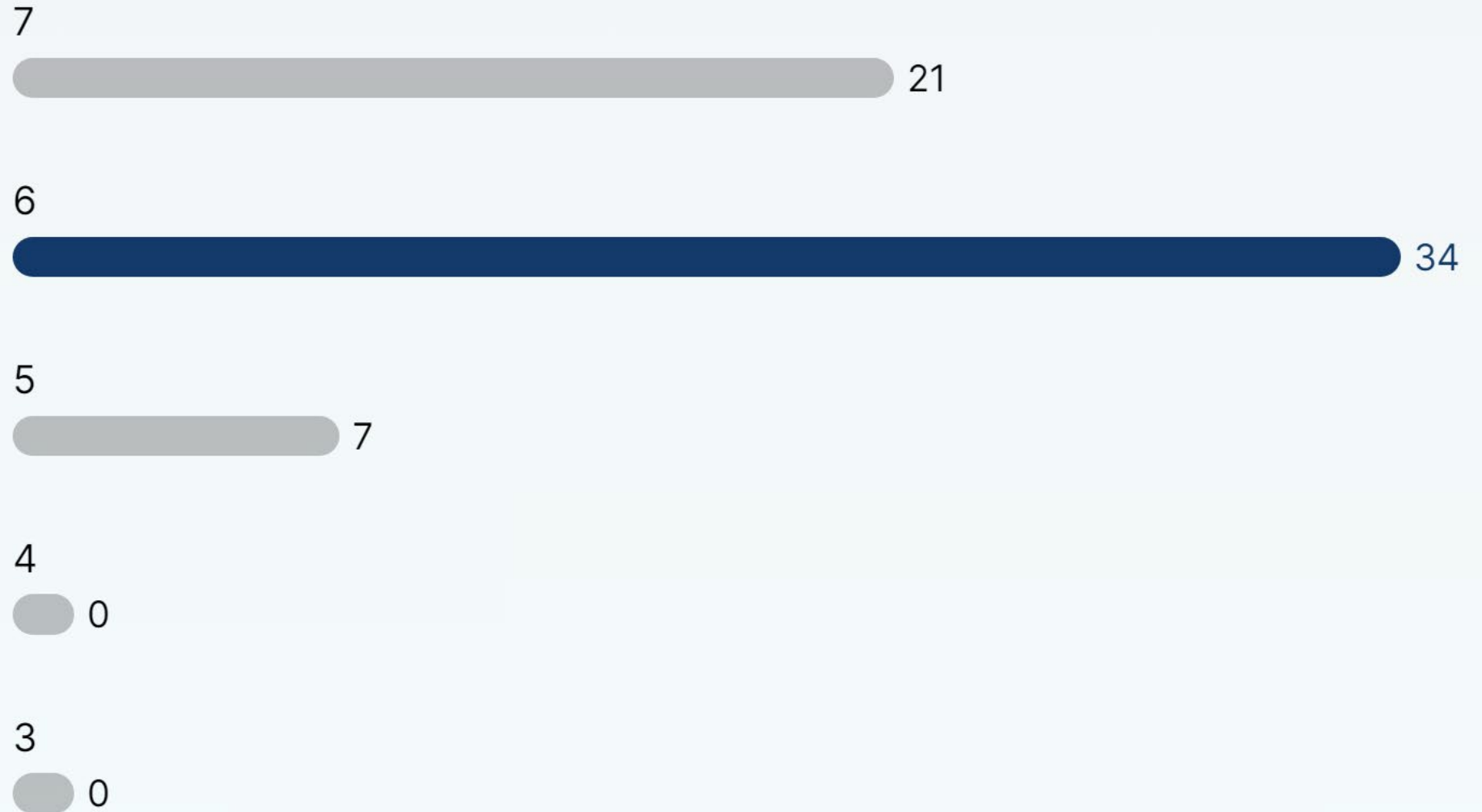
# Condition Evaluation

- Wearing Surface (Agency) – Agency





### Given the deficiency description, what would you rate the wearing surface?

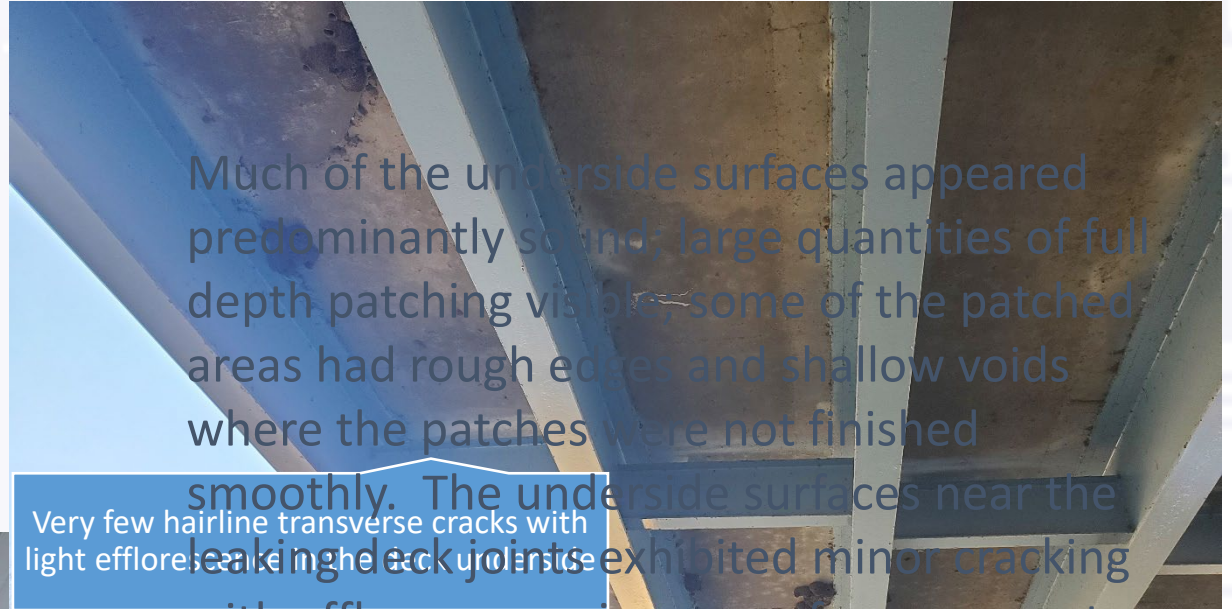


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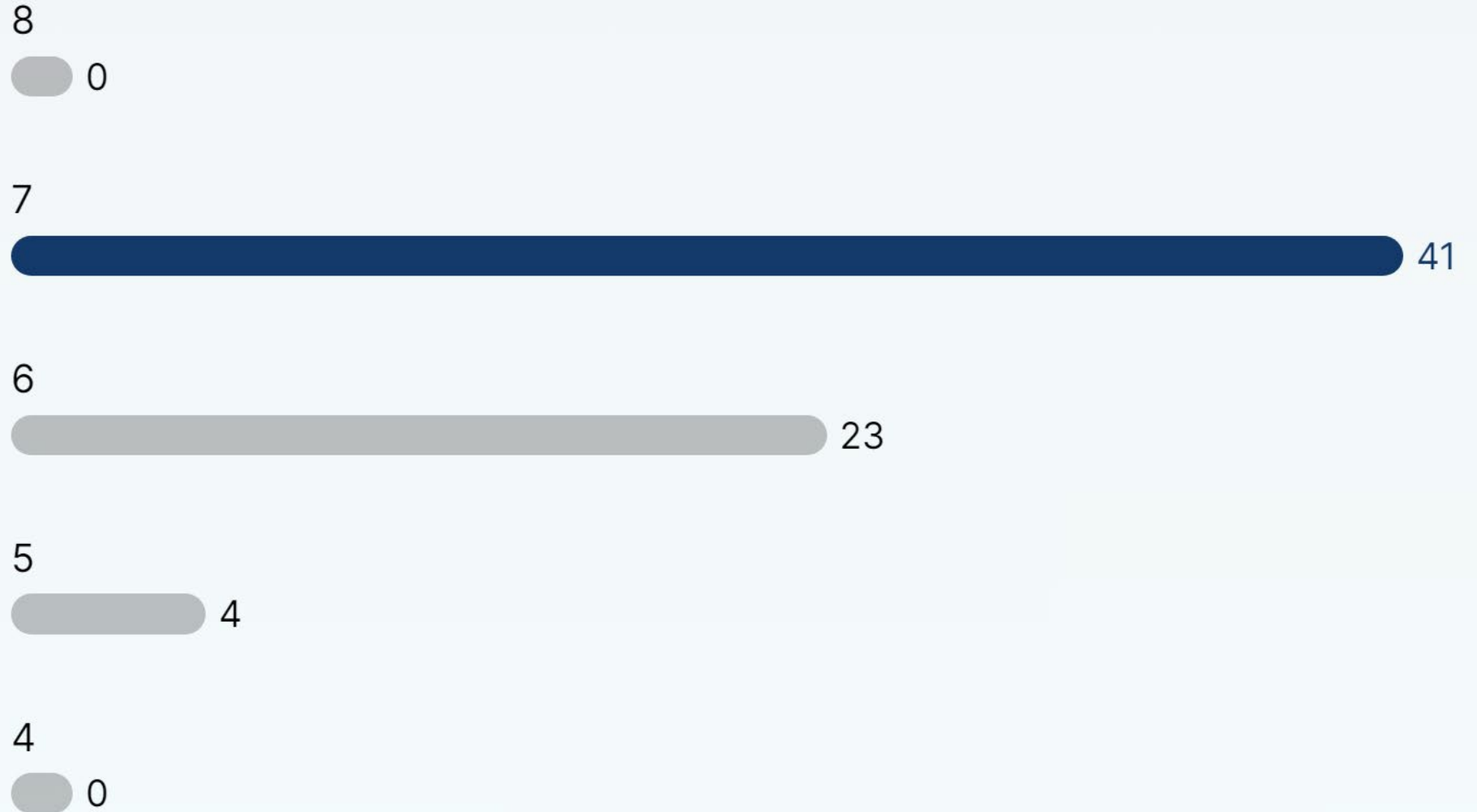
# Condition Evaluation

- Deck (58) – B.C.01





### Given the deficiency description, what would you rate the deck?

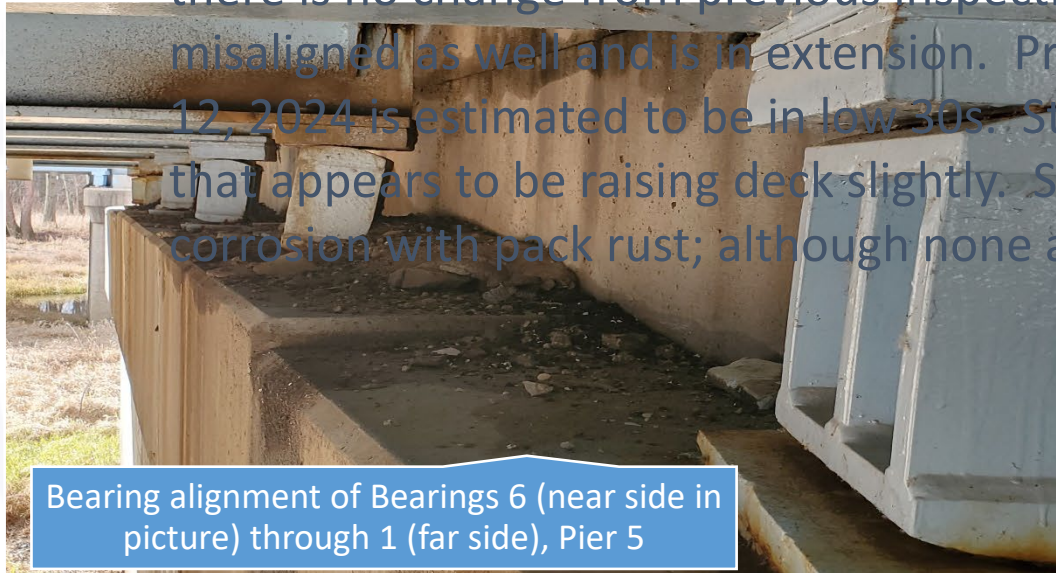


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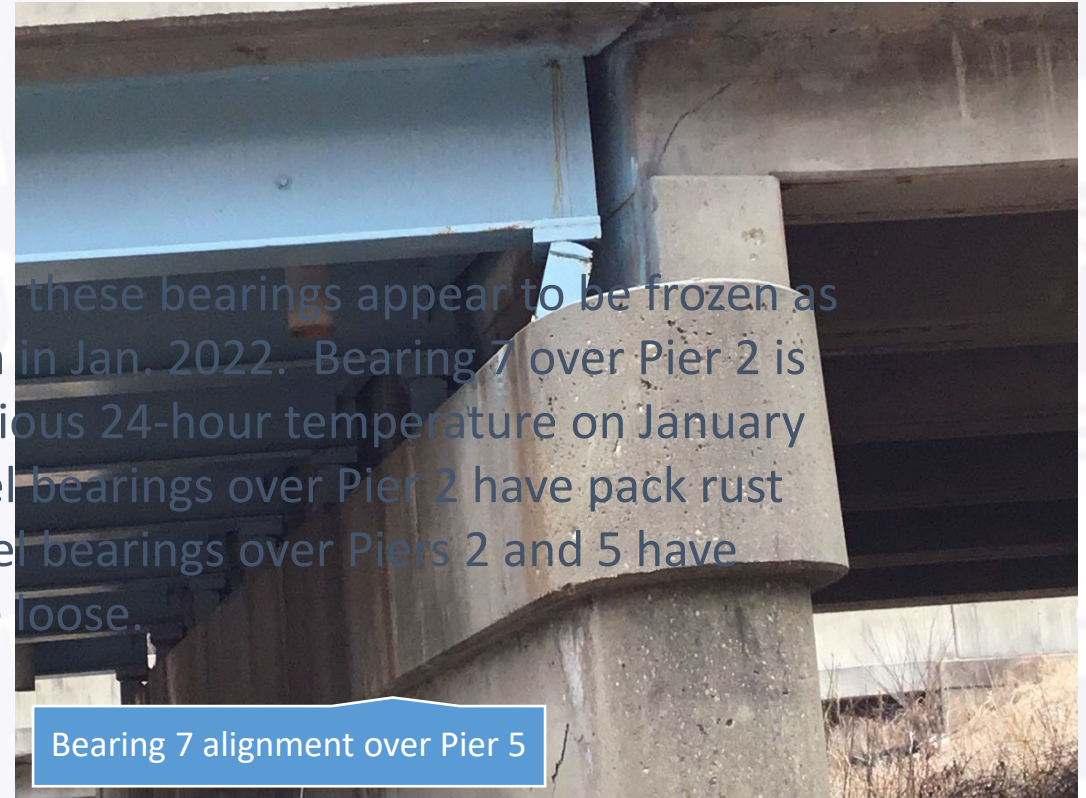
# Condition Evaluation

- Bearings (Agency) – B.C.07

Bearings 5 and 7 over Pier 5 are misaligned; these bearings appear to be frozen as there is no change from previous inspection in Jan. 2022. Bearing 7 over Pier 2 is misaligned as well and is in extension. Previous 24-hour temperature on January 12, 2024 is estimated to be in low 30s. Steel bearings over Pier 2 have pack rust that appears to be raising deck slightly. Steel bearings over Piers 2 and 5 have corrosion with pack rust; although none are loose.



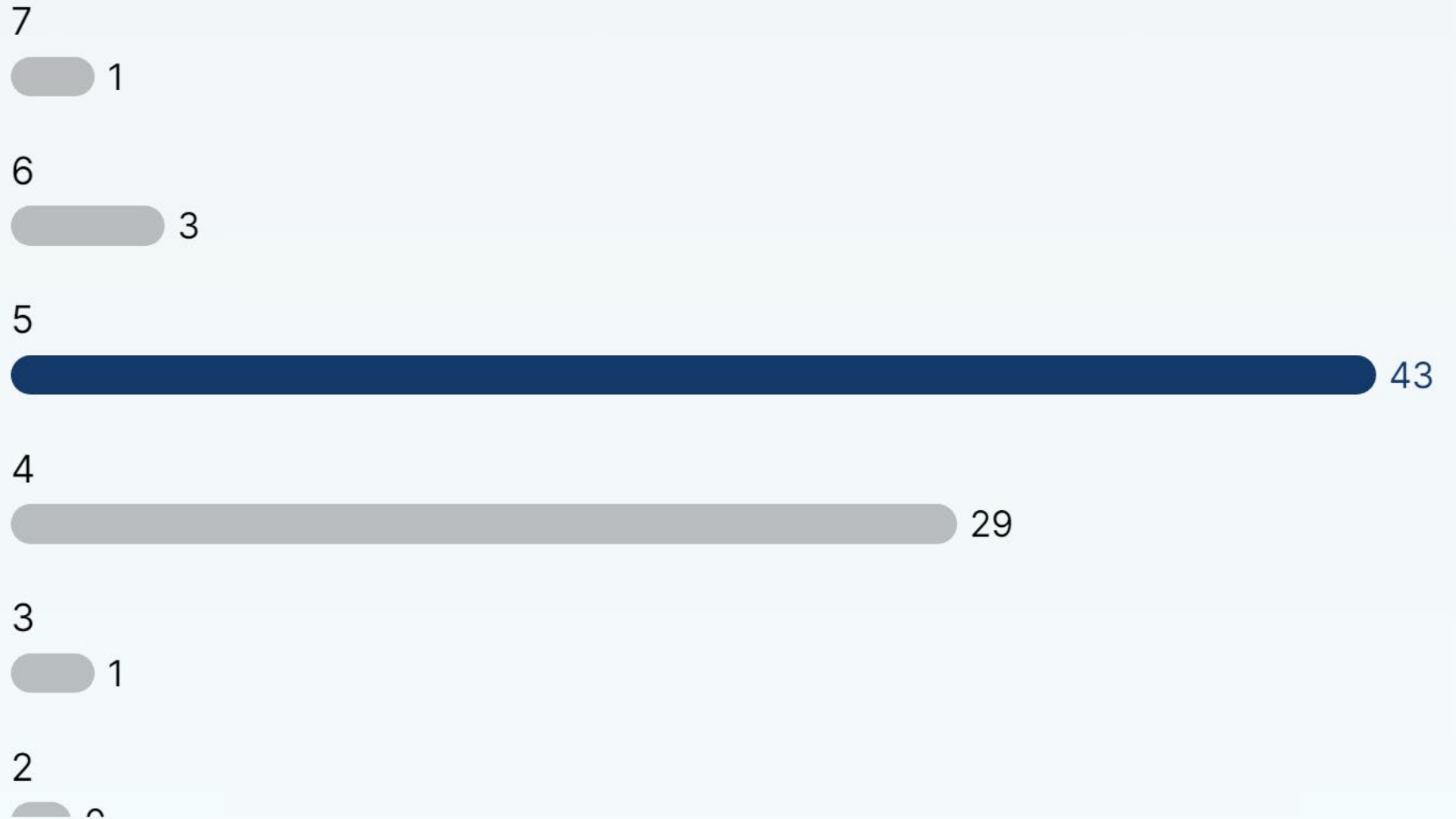
Bearing alignment of Bearings 6 (near side in picture) through 1 (far side), Pier 5



Bearing 7 alignment over Pier 5



### Given the deficiency description, what would you rate the bearings?



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# Condition Evaluation

- Superstructure (59) – B.C.02



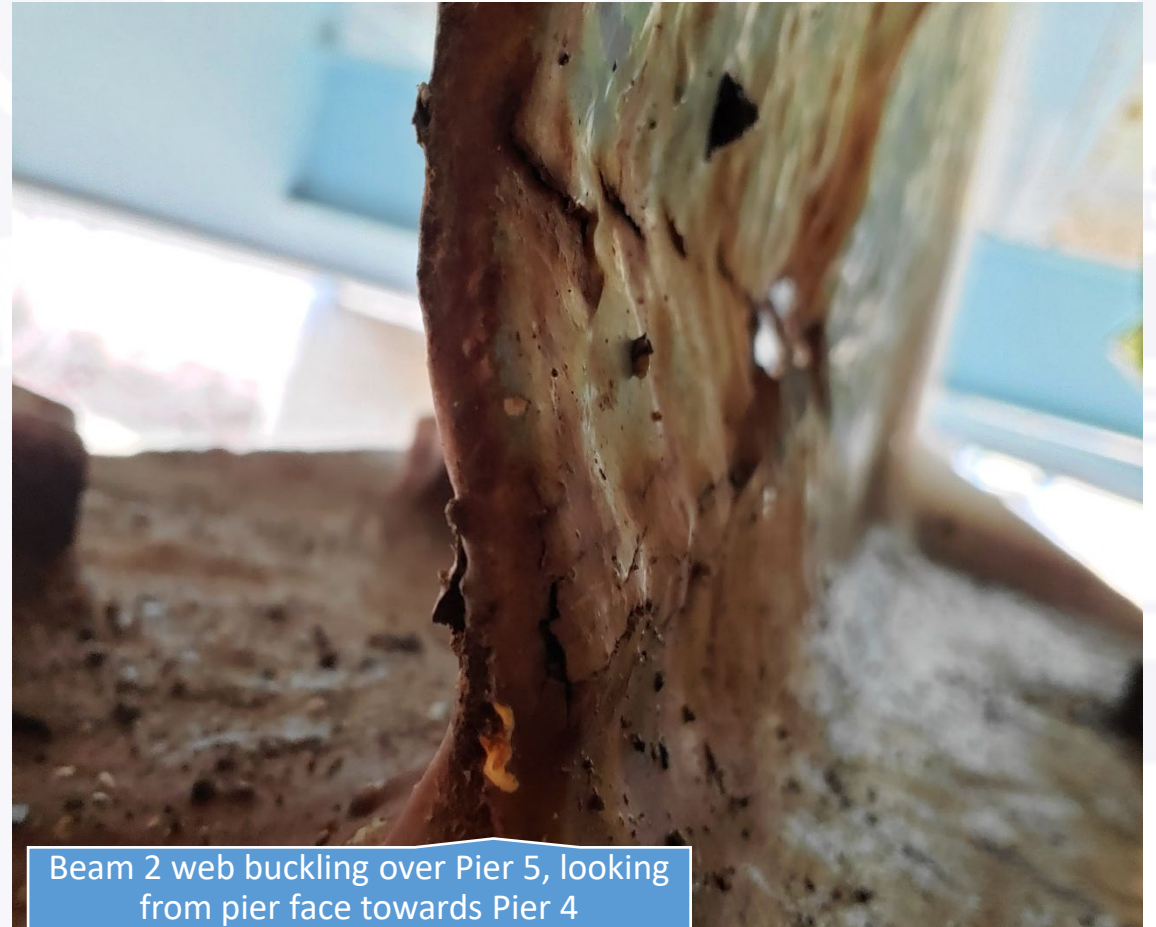
Span D overall condition

# Condition Evaluation

- Superstructure (59) – B.C.02



Beam 2 web, east face deterioration over Pier 5



Beam 2 web buckling over Pier 5, looking from pier face towards Pier 4



**Would you submit this as a critical find?**

Yes



No



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# Condition Evaluation

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- Superstructure (59) – B.C.02

Beam 2, Pier 5 was found to have web buckling (critical find issued and updated load rating requested; see sketch in attached documents). Steel beam ends and bearings below the Pier 2 and 5 joints exhibited minor section loss from the previous corrosion that generally appears arrested with the newer paint coating (exception is Beam 2, Pier 5 where a 1" hole was found; sketch of this location attached to report. RCGs in approach spans exhibited rust stains from the reinforcing chairs and fine flexural cracks near midspan. Within Span E, RCG 1 exhibited isolated spalling with exposed stirrup reinforcing (~ 3SF; see picture), and RCG 6 exhibited an isolated minor width horizontal crack that has not worsened since the previous routine inspection; this crack appears to be a pending spall similar to the west fascia girder spalling. Very small spalls on the underside of RCG 1, Span A over the south abutment. *Controlling Legal Load Rating Factor decreased from **1.61 to 1.06**.*





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### Given the deficiency description, what would you rate the superstructure?



# Condition Evaluation

- Substructure (60) – B.C.03



~6 LF horizontal cracking with rust staining and efflorescence in the south abutment cap under Beam 6. ~2 SF pending spall in the west nose of Pier 2, Span A side. The Pier 3 stem exhibits minor spalling exposing reinforcement (due to shallow cover). Pier 5, Span D side has ~2 SF spall on stem exposing reinforcement and minor cracking from leaking joint.

South abutment overall condition; ~6 LF horizontal cracking with rust staining and efflorescence in the south abutment cap under Beam 6.

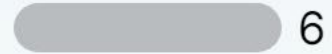


Given the deficiency description, what would you rate the substructure?

8



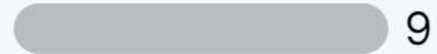
7



6



5



4

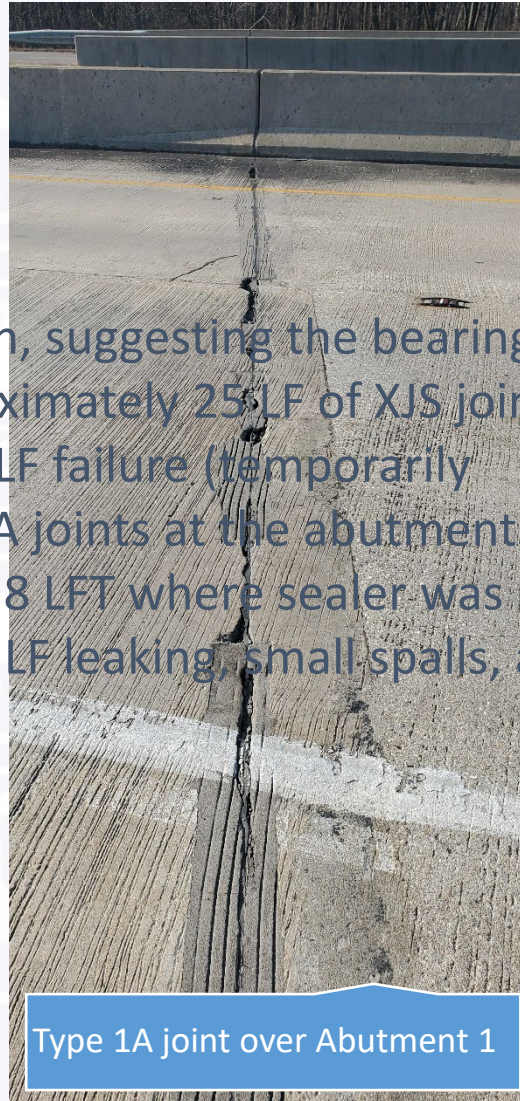


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# Condition Evaluation

- Joints (Agency) – B.C.08

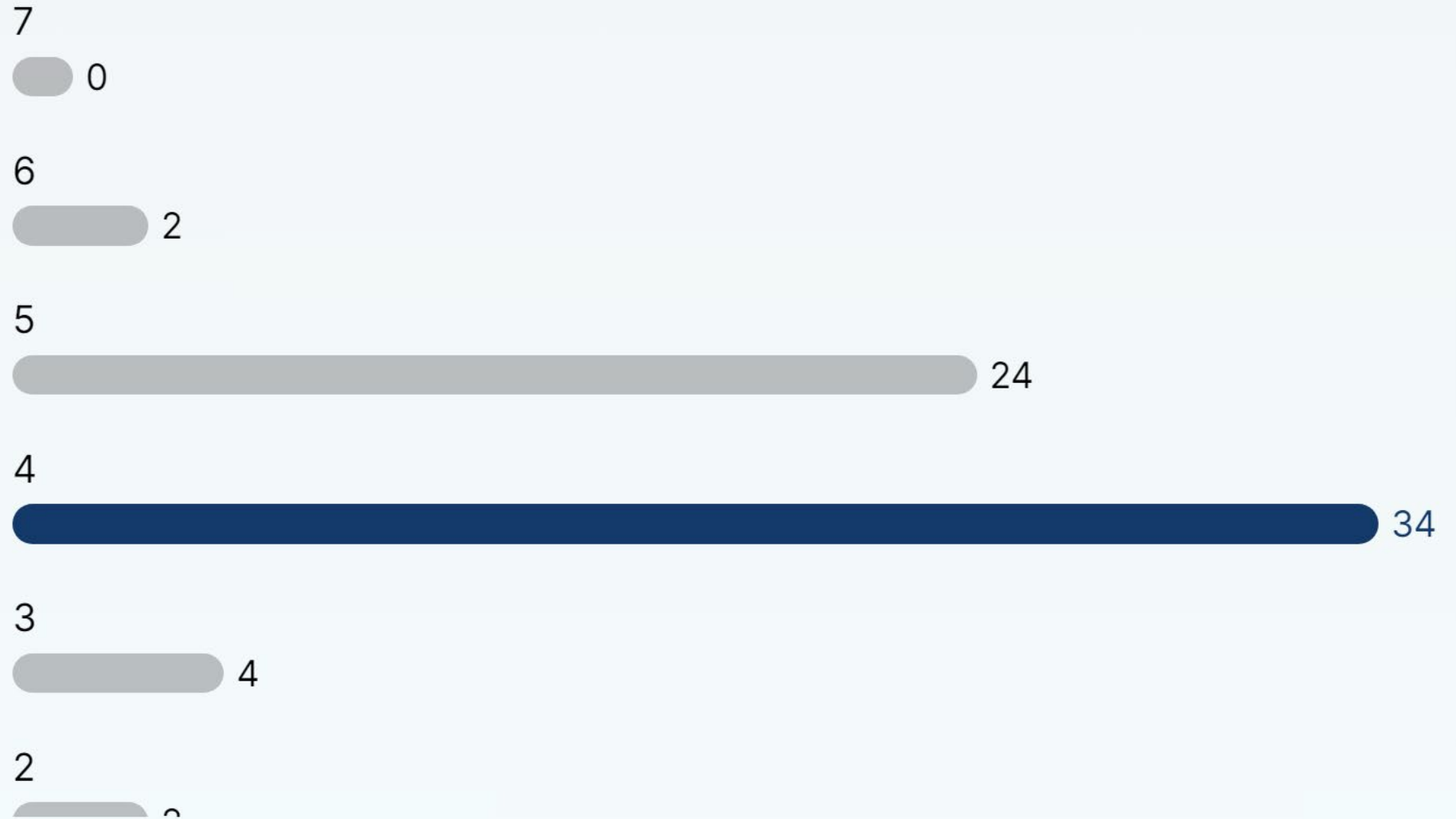
The SS joint over Pier 2 is slightly uneven, suggesting the bearings over Pier 2 have some pack rust. Approximately 25 LF of XJS joint over Pier 5 has been patched with ~ 10 LF failure (temporarily patched on Jan. 12, 2024). Both Type 1A joints at the abutments generally intact; north joint had around 8 LFT where sealer was not fully intact while the south joint has ~ 5 LF leaking, small spalls, and has been largely patched previously.





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### Given the deficiency description, what would you rate the deck joints?



# Condition Evaluation

- Channel (61) – B.C.09
  - The channel appears stable. Some minor debris downstream outside ROW.
- Channel Protection – B.C.10





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### Rate the channel.

9

0

8

0

7

0

6

0

5

0

# Condition Evaluation

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- Scour (113) – B.C.11
  - Not scour critical by analysis. No apparent scour issues.
    - Code: 9
- Scour Vulnerability - B.AP.03
  - Scour appraisal completed. Bridge determined to be stable for scour.
    - Code: A



# Condition Evaluation

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- NSTM Inspection Required - B.IR.01
  - N
- Inspection Type - B.IE.01
  - 2
- Inspection Begin Date - B.IE.02
  - 20240103
- Inspection End Date - B.IE.03
  - 2024012
- Inspection Interval - B.IE.05
  - 24
- Inspection Due Date - B.IE.06
  - Do **NOT** report this item as it is calculated by the FHWA
  - Calculated from the B.IE.03 – Inspection End Date

# Condition Evaluation

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## Notes:

Spans and piers labeled in plans (and this report) opposite of typical direction and (as if traveling from west to east on US 50).

## History:

- Rehab C (2017): Bridge deck replacement, was completed under DES No. 0400089, Contract No. B-34834. This bridge deck replacement contract included the following items: Deck replacement with new approach slabs and parapet barrier walls; Replacement of rocker bearings over piers with elastomeric pads; Conversion of abutments to Semi-Integral Abutments; eliminating rockers and deck joints; Superstructure painting; Slopewall repairs.
- Rehab B (1988): Deck overlay 2 completed under Des. No. 8569130, Contract No. 17436.
- Rehab A (1974): Deck overlay 1 completed under Contract No. 10077.

## Condition Summary:

Broken drains in Span A and C under west/south coping (submitted for maintenance). Due to traffic condition, the full deck was not walked by inspectors but observed from both approaches.

## Recommendations:

No major rehabilitation project is currently programmed in SPMS, nor is any recommended at this time.

# Agenda

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PREPARATION



INSPECTION  
PROCEDURES/HABITS



CONDITION  
EVALUATION

# Preparation

- Review bridge history and past reports (\*If Available)
  - Notes
    - Noteworthy deficiencies
    - Special details
    - Labeling convention
- Safety Considerations
  - Inspection Team (1 or 2?)
  - Safety
    - Contacts (Local and Emergency)
    - Facilities (Emergency and Medical)
- Inspection Equipment
  - Consider for the full county
  - Equipment for different types of inspections or access
    - Additional inspection clothing
    - Equipment for cleaning



# County Bridge

- Review site for parking and access to the bridge



# Inspection Procedures/Habits

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- Develop inspection plan for consistency
  - Team Leader
  - Team Member
- Identify access areas for inspection and photos
  - Equipment for Inspection Access
    - Clearing equipment
    - Climbing equipment
- Equipment needed for the specific bridge
  - Routine inspection equipment
  - NSTM inspection equipment (Fracture Critical)

# Condition Evaluation – Bridge No. 1

- Structure Overview



# Condition Evaluation

- Substructure (60) – B.C.03



rotting exposed. Minor  
treatment. Open  
baseline not full depth



# Condition Evaluation

- Tables in Appendix C of SNBI describe defect severity for Minor, Moderate, and Major criteria based on material and bridge components.
- Cracks defect described by width

**Table 47. Concrete - defect severity guidance for component condition ratings.**

<b>Defect</b>	<b>Minor</b>	<b>Moderate</b>
<b>Delamination, Spalling, Patched Area</b>	<b>Delamination, small spall, or patched area that is sound.</b>	<b>Large spall or patched area that is unsound or showing distress.</b>
<b>Exposed Rebar</b>	<b>Present without measurable section loss.</b>	<b>Present with measurable section loss.</b>
<b>Exposed Prestressing</b>	<b>Present without section loss.</b>	<b>Present with section loss.</b>
<b>Cracking</b>	<b>Unsealed medium width cracks or unsealed medium pattern (map) cracking.</b>	<b>Wide cracks or heavy pattern (map) cracking.</b>
<b>Abrasion, Wear, Scaling</b>	<b>Exposed coarse aggregate, but the aggregate remains secure in the concrete.</b>	<b>Coarse aggregate is loose or has popped out of the concrete matrix.</b>
<b>Efflorescence, Rust Staining</b>	<b>Surface white or leaching with little or no build-up. No rust staining present.</b>	<b>Rust staining or heavy build-up of efflorescence.</b>



# Condition Evaluation

- Substructure (60) – B.C.03
- Condition Rating Criteria - Appendix C of SNBI

Code	Condition	Description
N	NOT APPLICABLE	Component does not exist.
9	EXCELLENT	Isolated inherent defects.
8	VERY GOOD	Some inherent defects.
7	GOOD	Some minor defects.
6	SATISFACTORY	Widespread minor or isolated moderate defects.
5	FAIR	Some moderate defects; strength and performance of the component are not affected.
4	POOR	Widespread moderate or isolated major defects; strength and/or performance of the component is affected.
3	SERIOUS	Major defects; strength and/or performance of the component is seriously affected. Condition typically necessitates more frequent monitoring, load restrictions, and/or corrective actions.
2	CRITICAL	Major defects; component is severely compromised. Condition typically necessitates frequent monitoring, significant load restrictions, and/or corrective actions in order to keep the bridge open.
1	IMMINENT FAILURE	Bridge is closed to traffic due to component condition. Repair or rehabilitation may return the bridge to service.
0	FAILED	Bridge is closed due to component condition, and is beyond corrective action. Replacement is required to restore service.



Considering the photos and comments, what condition rating would you give the substructure?

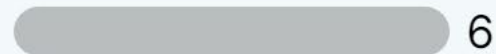
7



6



5



4



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# Condition Evaluation

- Superstructure (59) – B.C.02





### Accurate Condition Description?

A. Surface rusting throughout.



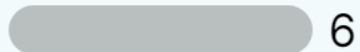
B. Surface rusting throughout with moderate pitting.



C. Surface rusting throughout with moderate pitting on bottom beam flanges. Heavier pitting on beam webs at abutments with approximately 10% section loss on beam webs.



D. Surface rusting throughout with moderate pitting on bottom beam flanges. Heavier pitting on beam webs at abutments. 10% section loss.



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# Condition Evaluation

- Deck (58) – B.C.01



4" Steel Grid Deck with surface rust throughout and damage at the east end of the deck



# Condition Evaluation

- Table in Appendix C for Steel Defects
- Deficiency notes “Surface rust throughout and damage at the east end of the deck”

**Table 48. Steel - defect severity guidance for component condition ratings.**

<b>Defect</b>	<b>Minor</b>	<b>Moderate</b>
<b>Corrosion</b>	Freckled rust. Corrosion has initiated.	Section loss is evident.
<b>Cracking</b>	Crack that has been effectively arrested.	Crack that has not been arrested.
<b>Connection</b>	Loose fasteners, or pack rust without distortion. Connection is in place and functioning as intended.	Missing bolts, rivets, or fasteners; broken welds; or pack rust with distortion.

# Condition Evaluation

- Deck (58) – B.C.01
- Condition Rating Criteria

Code	Condition	Description
N	NOT APPLICABLE	Component does not exist.
9	EXCELLENT	Isolated inherent defects.
8	VERY GOOD	Some inherent defects.
7	GOOD	Some minor defects.
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1	IMMINENT FAILURE	Bridge is closed to traffic due to component condition. Repair or rehabilitation may return the bridge to service.
0	FAILED	Bridge is closed due to component condition, and is beyond corrective action. Replacement is required to restore service.





Considering the photos and comments, what condition rating would you give the deck?

9



8



7



6



5



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# Load Posting Signage Review

- Reminder that load posting signs are required in advance of the bridge
- Per Memo 24-01, Missing advance signage is a critical finding



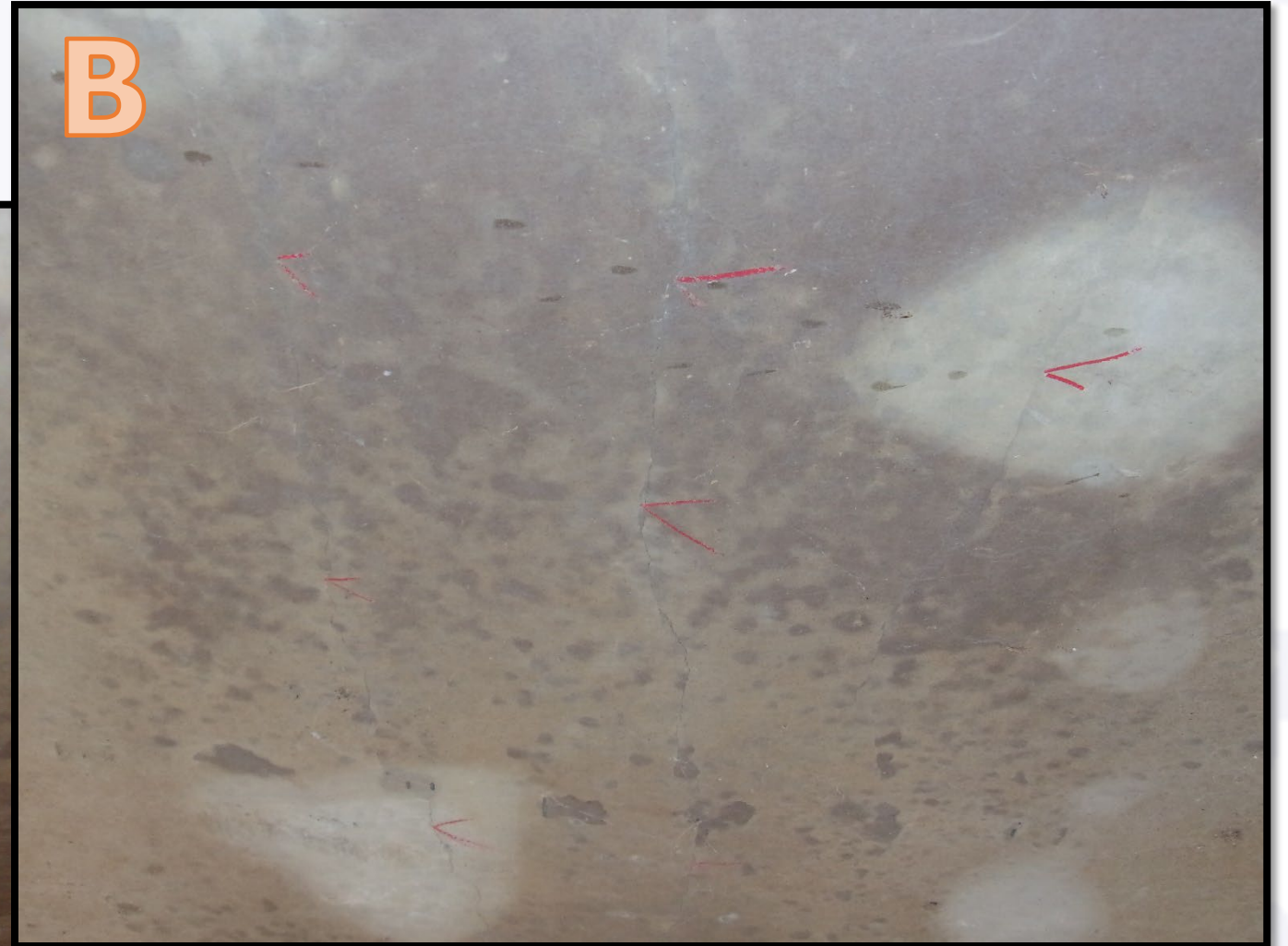
# Condition Evaluation – Bridge No. 2

- Structure Overview



# Condition Evaluation

- Superstructure (59) – B.C.02
- Cracks noted on bottom beams





### Accurate Deficiency Description (Location, Severity, & Extent)

Cracking on bottom of beams.

0

Beam 3 with 4 hairline longitudinal cracks along north 1/2 length of bottom of beam. Two cracks run along full length of beam. Seepage between beams.

55

Beam 3 with 4 hairline longitudinal cracks on bottom of beam.

3

Hairline cracks on bottom of beam 3.

0

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# Condition Evaluation – Bridge No. 3

- Structure Overview



# Condition Evaluation

- Channel (61) – B.C.09



# Condition Evaluation

- Condition Description:
- Channel alignment not in line with pipes. 4 ft to 6 ft bank and shoulder erosion on west side of north pipe at inlet. Riprap bank on southwest and southeast corners.

Table 54. Channel - defect severity guidance for component condition ratings.

Defect	Minor	Moderate	Major
<b>Alignment</b>	Flow angle of attack 15-30 degrees with respect to the bridge substructure, or 5-15 degrees with respect to wall piers.	Flow angle of attack 30-45 degrees with respect to the bridge substructure, or 15-30 degrees with respect to wall piers.	Flow angle of attack more than 45 degrees with respect to the bridge substructure, or more than 30 degrees with respect to wall piers.
<b>Migration</b>	Thalweg has moved from its baseline location, but movement has arrested or does not threaten the bridge or approach roadway.	Thalweg movement has not arrested and impacts embankment stability.	Thalweg movement has begun to undermine approach roadway.
<b>Degradation</b>	Exists within tolerable limits or has arrested.	Sloughing of banks, resulting in vertical embankments on both sides of the channel. Bridge is not yet impacted.	Sloughing of banks, resulting in vertical embankments on both sides of the channel. Bridge is impacted.
<b>Aggradation</b>	Exists within tolerable limits or has arrested.	Exceeds tolerable limits. Hydraulic opening is significantly blocked, increasing potential for overtopping or channel restriction.	Hydraulic opening is mostly blocked. May cause frequent overtopping or channel restriction.
<b>Debris</b>	Restricts channel slightly, or is prone to build-up.	Large deposits exist and restrict the channel, causing increased water velocities, redirecting stream flow, or eroding banks.	Hydraulic opening mostly blocked, significantly redirecting stream flow or impacting waterway capacity.
<b>Bank Erosion/ Instability</b>	Erosion/instability that does not impact the bridge or approach roadway.	Significant erosion/instability that is progressing toward the bridge or approach roadway.	Stability of the approach roadway embankment is impacted.



# Condition Evaluation

- Channel (61) – B.C.09
- Condition Rating Criteria

Code	Condition	Description
N	NOT APPLICABLE	Component does not exist.
9	EXCELLENT	Isolated inherent defects.
8	VERY GOOD	Some inherent defects.
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Considering the photos and comments, what condition rating would you give the Channel?



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