APPENDIX G – STRUCTURAL ANALYSIS

The purpose of this Appendix is to provide information regarding the current status and the anticipated future conditions for all structures on the WIS 441 corridor.

Using WisDOT's Highway Structure Information (HSI) system, current condition ratings were obtained from recent inspection reports for each structure. The inspection reports present important structural information regarding the current condition of key bridge components. Three specific ratings given to the deck, superstructure, and the substructure are determined from the National Bridge Inventory (NBI) rating scale (**Table 1**). These descriptions are only valid for the NBI ratings and not for any other rating scale used later in this Appendix.

Table 1: National Bridge Inventory (NBI) Rating Scale

Scale	Rating	Description
9	EXCELLENT CONDITION	Excellent condition
8	VERY GOOD CONDITION	No problems noted
7	GOOD CONDITION	Some minor problems
6	SATISFACTORY CONDITION	Structural elements show minor deterioration
5	FAIR CONDITION	All primary structural elements are sound but may have minor corrosion, cracking or chipping May include minor erosion on bridge piers
4	POOR CONDITION	Advanced corrosion, deterioration, cracking or chipping Also significant erosion of concrete bridge piers
3	SERIOUS CONDITION	Corrosion, deterioration, cracking and chipping, or erosion of concrete bridge piers has seriously affected deck, superstructure, or substructure Local failures are possible
2	CRITICAL CONDITION	Advanced deterioration of deck, superstructure, or substructure. May have cracks in steel or concrete, or erosion may have removed substructure support It may be necessary to close the bridge until corrective action is taken
1	"IMMINENT" FAILURE CONDITION	Major deterioration or corrosion in deck, superstructure, or substructure, or obvious vertical or horizontal movement affecting structure stability Bridge is closed to traffic but corrective action may put back in light service
0	FAILED CONDITION	Out of service, beyond corrective action
N	NOT APPLICABLE	Not applicable

The other primary rating scale used, Highway Structure Information (HSI) Smart Flag, is primarily used to define the deck condition of the structure. This value ranges between 1 and 5 where five would be equivalent to a failed structure. More information about criteria for the rating system for each smart flag is located on the WisDOT Extranet in the Bridge Inspection Pocket Manual – Section 3 Smart Flags.

Exhibits G-1 and G-2 show the Final Bridge Recommendations and Current Conditions respectively. The Final Bridge Recommendations (**Exhibit G-1**) show possible suggested maintenance items as well as comments pertaining to structural issues, vertical clearance issues, and bridge width issues. The Current Conditions chart (**Exhibit G-2**) contains all data pertaining to bridge conditions as well as functional conditions of the bridge.

Using a numbered point scale developed specifically for this operational study, structural characteristics were modified to reflect age and wear/tear on the bridge (**Exhibits G-3 and G-4**). This point system allows for future recommendations based on the predicted ratings for each structure as it ages.

The analysis that was performed provided recommendations for the current conditions and at years 2020 and 2035. This study determined that there are no immediate concerns for any of the bridges within the WIS 441 corridor based on their structural characteristics. There are however, some recommendations for repairs, upgrades, and preventative maintenance to keep these structures in safe and fully operable condition.

The Little Lake Butte de Morts overpass (B-70-061) is geometrically deficient due to the narrow driving surface of the structure. Although the bridge does not meet roadway width standards, the bridge is an exception to the rule because it is considered a “major bridge.” The WisDOT FDM shoulder width standard (Chapter 11-44-1) for this particular bridge permits 3.5 foot shoulders (right and left) which is the current design.

On the WIS 441 corridor there are 15 bridges that do no meet the desired vertical clearance requirement as outlined by WisDOT FDM criteria (Chapter 11-35-1 Attachment 8). Of these 15 bridges four do not meet the minimum vertical clearance as outlined by FDM criteria. An overpass that is below vertical clearance standards is a danger due to the potential for traffic impacts to the superstructure. The bridges that do not meet the minimum vertical clearance standards include the following: the Telulah Avenue Bridge over WIS 441 (B-08-024), the Carpenter Street Pedestrian Bridge over WIS 441 (B-08-033), the CTH P (Racine Street) Bridge over WIS 441 (B-70-110), and the WIS 441 Bridge over Tayco Street (B-70-068). All of these bridges do however fall less than one foot short of the desired vertical clearance which means that the overpass can be reworked by either lowering the road profile by one foot or raising the bridge girders by one foot thus avoiding a total structure replacement.

At year 2020 it is recommended that one structure near the US 41 and US 10/WIS 441 interchange receive an overlay upgrade to improve the deck driving surface. At year 2035 it is anticipated that no bridges will need surface overlays, fourteen bridges need deck replacements, and two structures will potentially need replacement. Seventeen of the 36 analyzed structures are anticipated to remain above acceptable condition and are not expected to have any unforeseen structural problems between 2008 and 2035.

A. Recommendations Explained

1. Overview

The following recommendations are based on a system designed to estimate future structural conditions of the bridges along the WIS 441 corridor. These recommendations should not be used as sole justification for future repairs to bridges within the WIS 441 corridor.

2. Short Term Improvements

Cycle 1: Year 2020

The only bridge which failed tests at year 2020 was the US 10/WIS 441 Bridge over Little Lake Butte des Morts (B-70-061). This bridge, built in 1975, does not have coated reinforcement bars. This typically causes a bridge deck to deteriorate faster than similar bridges with coated reinforcing bars. Due to this fact, bridge B-70-061 is anticipated to have deck problems near the year 2020. This is justified by the prediction that the underside of the concrete deck will have a rating of 3 out of 5 at this time. It is, however, recommended to wait to replace the deck until the driving surface is in need of repair. This bridge also has a width less than the minimum standard. Redecking as well as widening should be considered as opposed to just redecking the bridge.

Cycle 2: Year 2035

Between the years 2020 and 2035 it is anticipated that four of the analyzed structures will be considered “structurally deficient”. This term can have a variety of implications, and does not necessarily mean that any of the bridges will be in imminent danger of failure. More specifically, a structure becomes structurally deficient when the deck, superstructure, or substructure decreases to a “poor” rating (0 – 4 on the NBI scale).

The WIS 441 Bridge over the Fox River south of WIS 96 (Wisconsin Avenue) (B-44-126) failed tests at 2035 that suggest a replacement for the bridge deck (driving surface and underside) should be considered. The under-surface of the bridge deck, rated as a 4, is expected to have severe rust staining, cracking, and a distressed area between 25% and 50% (Source: HSI Bridge Inspection Pocket Manual – Section 3 Smart Flags). When the bridge deck reaches this condition a deck replacement should be considered.

The southbound WIS 441 overpass over CTH KK (Calumet Street) (B-08-028) has an anticipated NBI substructure value of 4 in 2035; however, the bridge does not fail any of the tests. For this reason no major repairs can be justified. Repair work performed on the column supports could increase the NBI rating of the structure. It is recommended that the overpass receive extra attention such as weight restrictions and increased inspections during the years preceding and following 2035.

The Telulah Avenue Bridge over WIS 441 (B-08-024), the Carpenter Street Pedestrian Bridge (B-08-033), the WIS 441 Bridge over WIS 47 (Appleton Road)(B-70-114), and the WIS 441 Bridges over the two NW quadrant ramps at CTH P (Racine Street)(B-70-109 and B-70-108) all have a predicted underside deck rating of 3. All five bridges are expected to have cracking to the undersurface that is described as “moderate with a distressed area of 10% to 25%” (Source: HSI Bridge Inspection Pocket Manual). Due to the condition of the underside of the deck, as well as the age of these structures, it is recommended that the bridge deck be replaced on these five structures around 2035.

Between 2020 and 2035 it is anticipated that the bridge deck (driving surface and underneath) for the Little Lake Butte de Morts overpass (B-70-061) will reach a poor

rating resulting in justification for deck replacement. If the deck is replaced, it is recommended that it also be widened to meet the desired bridge width. The sufficiency rating should also be regularly monitored. Once the rating falls below 50, federal financial assistance can be requested. The 2035 recommendations are under the assumption that no work is done regarding the 2020 recommendations to structure B-70-061.

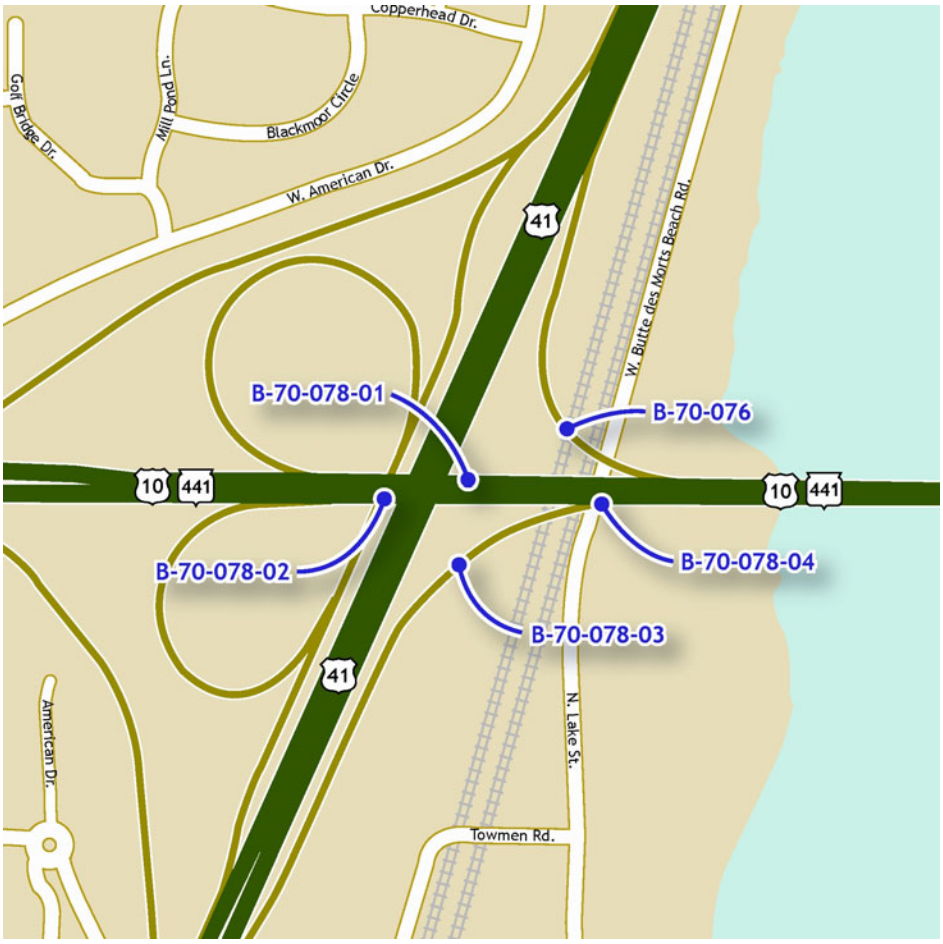
The southbound WIS 441 ramp to northbound US 41, that crosses over Butte des Morts Beach Road and CNW railroad (B-70-076), is anticipated in 2035 to have an underside deck rating of 3. Due to age of the structure, 60 years old, and the underside deck rating of 3, a deck replacement should be considered at this time. It is, however, recommended to wait to replace the deck until the driving surface is in need of repair.

The CTH P (Racine St.) Bridge over WIS 441 (B-70-110) is anticipated to have deficiencies in its bridge deck by 2035. The underside deck rating is estimated to be a 3 and this rating along with the age of the bridge could lead to the need for a deck replacement. In 2035 the NBI rating for the superstructure is also estimated to be at a 4 which is considered a “poor” rating. The recommendation for the bridge at year 2035 is to replace the deck and possibly do necessary work to the superstructure to raise its NBI rating.

The southbound WIS 441 Bridge over Butte des Morts Beach Road (B-70-078-01) is anticipated to have an NBI substructure rating of 4 near the year 2035. The pack rust value is anticipated to reach a 4 and the underside of the concrete deck is predicted to have a rating of 3. Since the bridge is predicted to have these three “poor” ratings and its age will reach 60 years old, it is recommended that this bridge be replaced.

Because B-70-078-01 is recommended for replacement, it is also recommended that B-70-078-02 and B-70-08-04 be considered for replacement. This is justified because B-70-078-02 is a twin structure to B-70-078-01 and when one structure is replaced it is recommended its twin receive similar treatment. B-70-078-04 is also of the same vintage and same structure system being the link from the northbound US 41 ramp to northbound US 10/WIS 441 mainline (For bridge numbering clarification see **Figure 1**). Since these structures are all part of one similar structure system and have similar faults, they are all recommended to be replaced at or near the same time.

Figure 1: US 41 and US 10/WIS 441 Bridge Numbering



The ramp from northbound US 41 to northbound US 10/WIS 441 (B-70-078-03) does not need immediate replacement when the other three bridges in the B-70-078 series are replaced (it is not considered a “twin”). B-70-078-03 does however have deficiencies that should be addressed at or near 2035. It is predicted to have an HSI deck rating of 3 as well as an underside concrete deck rating of 3. Due to both of these contributing ratings along with the structure’s age and use of uncoated bars, it is recommended that the deck be replaced.

The other bridge with potential for replacement around the year 2035 is the US 10/WIS 441 overpass above US 41 and the auxiliary lane for the two system interchange loops (B-70-079). It is anticipated that the NBI superstructure and substructure values for this bridge will fall to a 4 and the underside deck will have a rating of 3 near 2035. Due to these ratings it is predicted that this bridge will need replacement at this point.

3. Methodology

Estimating the future conditions of structures is difficult due to uncontrollable factors such as traffic impacts, weathering, and natural disasters. All bridges deteriorate over time; however, it is not possible to effectively predict the life of a bridge due to the many inconsistencies involved in the aging process. The remainder of this Appendix will detail and explain the process used to determine the recommendations for the structures in the WIS 441 corridor.

CYCLE 1: Years 2008 to 2020

1. BRIDGE REPLACEMENT TESTS

Structural Criteria / TESTS	Details See ***Predicted Condition Changes*** worksheet.
Predicted Change in Inspection Report Data from **2008** to **2020**. We know the maintenance condition of the bridge in 2008, but we do not know it with 100% certainty in the period 2008 to 2020; therefore we have to estimate the change. The adjacent values show the predicted change from now until the period we are evaluating. Note how the decks deteriorate at different rates depending on whether they have UNCOATED or COATED bars.	**PREDICTED CHANGE 2008 to 2020** **UNCOATED BARS** Pack Rust Smart Flag >= **+1** (steel structures only) Section Loss Smart Flag >= **+1** (steel structures only) Steel Cracking Smart Flag >= **+1** (steel structures only) NBI Deck <= **-1** HSI Deck >= **+1** Underside Deck Smart Flag >= **+1** NBI Superstructure <= **-1** NBI Substructure <= **-1** Sufficiency Rating <= **0** (No Change) Inventory Rating <= **0** (No Change) **COATED BARS** Pack Rust Smart Flag >= **+1** Section Loss Smart Flag >= **+1** Steel Cracking Smart Flag >= **+1** NBI Deck <= **0** (No Change) HSI Deck >= **0** (No Change) Underside Deck Smart Flag >= **0** (No Change) NBI Superstructure <= **-1** (No change to structures over water) NBI Substructure <= **-1** (No change to structures over water) Sufficiency Rating <= **0** (No Change) Inventory Rating <= **0** (No Change)
1. Superstructure Smart Flags This set of criteria assumes that deterioration is so widespread through-out the deck and superstructure that it is more economical to replace the bridge than rehabilitate it. Age criterion is added to make sure the minimum life of the bridge is used.	**YES** Age >= **50** and NBI Deck <= **4** or HSI Deck >= **4** and Underside Deck Smart Flag >= **3** and Pack Rust Smart Flag >= **4** or Section Loss Smart Flag >= **4** or Steel Cracking Smart Flag >= **4** **or No**
2. Voided Slab Voided Slabs are obsolete and should be replaced with a different type of structure if they are old and deteriorated. Also the same comments under Haunched Slabs also apply to Voided Slabs.	**YES** Age >= **50** and NBI Deck <= **4** or HSI Deck >= **4** and Underside Deck Smart Flag >= **3** **or No**

Structural Criteria / TESTS	Details See ***Predicted Condition Changes*** worksheet.
3. Haunched Slab The NBI rating for deck and superstructure are the same for haunched slabs which tends to overemphasize the deterioration in the superstructure. Haunched slabs need to be treated separately from other superstructure types so as not to overemphasize the superstructure rating.	**YES** Age >= **50** and NBI Deck <= **4** or HSI Deck >= **4** and Underside Deck Smart Flag >= **3** **or No**
4. NBI Deck, Superstructure, & Substructure This set of criteria assumes that deterioration is so widespread throughout the deck and superstructure that it is more economical to replace the bridge than rehabilitate it. Age criterion is added to make sure the minimum life of the bridge is used.	**YES** Age >= **50** and NBI Deck <= **4** or NBI Superstructure <= **4** or NBI Substructure <= **4** **or No**
5. Sufficiency Rating Federal bridge replacement funding is available if the sufficiency rating is below 50. It is assumed that the funding should be used when it is available.	**YES** Sufficiency Rating <= **50** **or No**
6. Inventory Rating There is an obscure federal rule that the inventory rating measured in tons must be greater than 10 otherwise the bridge is structurally deficient. This is such a low rating that it is assumed that bridge is so deteriorated or structurally undersized that it should be replaced.	**YES** Inventory Rating <= **10 Tons** **or No**
• **Test 1A: REPLACEMENT?**	**REPLACEMENT** If any of the answers to the above is **YES** then the bridge is replaced. or **Go to next test** If “No”, then “Go to next test.”
• **Test 1B:** Check **TWIN** structure for **REPLACEMENT**.	**REPLACEMENT** If the structure is to be replaced has a twin, then the twin is replaced even if it did not meet the criteria above. or **Go to next test**

2. DECK REPLACEMENT, REDECK & WIDEN, AND OVERLAY TESTS

Structural Criteria / TESTS	Details See ***Predicted Condition Changes*** worksheet.
Predicted Change in Inspection Report Data from **2008** to **2020**. We know the maintenance condition of the bridge in 2008, but we do not know it with 100% certainty in the period 2008 to 2020; therefore we have to estimate the change. The adjacent values show the predicted change from now until the period we are evaluating. The predicted change is the same as the change for the "bridge replacement" test. Note how the decks deteriorate at different rates depending on whether they have UNCOATED or COATED bars.	**PREDICTED CHANGE 2008 to 2020** **UNCOATED BARS** NBI Deck <= **-1** HSI Deck >= +**1** Underside Deck Smart Flag >= +**1** **COATED BARS** NBI Deck <= **0** (No Change) HSI Deck >= **0** (No Change) Underside Deck Smart Flag >= **0** (No Change)
• **Test 2A: Deck Replacement** for **UNCOATED** bars? The Deck Replacement criterion is straight forward. The Functional BRIDGE WIDTH Override for REDECK & WIDENING could be used at this point to determine if the existing bridge is to be widened by adding girders to existing for functional reasons like adding a lane for capacity, without consideration of the maintenance condition of the bridge. Later in the spreadsheet, at Tests 2B, 2C, 2D, & 2E, there is consideration for REPLACEMENT if significant rehabilitation is required for the bridge anyway.	**Deck Replacement** Age >= **25** and NBI Deck <= **4** or HSI Deck >= **4** or Underside Deck Smart Flag >= **3** or **Go to next test**
• **Test 2B: Deck Replacement** for **COATED** bars? The Deck Replacement criterion is straight forward. The Functional BRIDGE WIDTH Override for REDECK & WIDENING could be used at this point as explained above.	**Deck Replacement** Age >= **35** and NBI Deck <= **4** or HSI Deck >= **4** or Underside Deck Smart Flag >= **3** or **Go to next test**
• **Test 2C:** Flag changing **Deck Replacement** to **REPLACEMENT** due to inadequate **ROADWAY UNDER** width? This test flags Deck Replacements that may need to be changed to a REPLACEMENT. The test assumes that significant rehabilitation work needs to be done to the bridge based on its maintenance condition and that it has inadequate ROADWAY UNDER width. In order to obtain adequate ROADWAY UNDER width the bridge may also need to be lengthened. Since there is no practical way to lengthen an existing bridge, it may need to be upgraded to a REPLACEMENT. A flag is placed next to the Deck Replacement recommendation as an alert that the Deck Replacements that may need to be changed to a REPLACEMENT.	**1 ROADWAY UNDER WIDTH does not meet MINIMUM width standards. May require REPLACEMENT in order to achieve adequate ROADWAY UNDER width.** or **2 ROADWAY UNDER WIDTH does not meet DESIRABLE width standards. May require REPLACEMENT in order to achieve adequate ROADWAY UNDER width.** or **Go to next test**

Structural Criteria / TESTS	Details See ***Predicted Condition Changes*** worksheet.
• **Test 2D:** Flag changing **Deck Replacement** to **REPLACEMENT** due to inadequate **VERTICAL CLEARANCE**? This test flags Deck Replacements that may need to be changed to a REPLACEMENT. This test assumes that significant rehabilitation work needs to be done to the bridge based on its maintenance condition and that it has inadequate VERTICAL CLEARANCE. There are two flags – one for bridges that are within 1 foot of the desirable clearance and those that are more than 1 foot less than the desirable clearance. Adequate vertical clearance may be achieved at many bridges either by lowering the road up to 1 foot or raising the girders about 1 foot without replacing them. Bridges that must be raised more than 1 foot may need REPLACEMENT due to difficulties raising the roadway profile. A flag is placed next to the Deck Replacement recommendation as an alert that the Deck Replacements that may need to be changed to a REPLACEMENT. CRITERIA Refer to the WisDOT FDM manual for desired and minimum vertical clearance values.	**3 VERTICALCLEARANCE does not meet MINIMUM clearance standards. Deck Replacement may require lowering the road under or raising the girders to achieve adequate VERTICALCLEARANCE.** or **4 VERTICALCLEARANCE does not meet DESIRABLE clearance standards. May require REPLACEMENT to achieve adequate VERTICALCLEARANCE.** or **Go to next test**
• **Test 2E:** Flag changing **Deck Replacement** to **REDECK & WIDEN** due to inadequate **BRIDGE WIDTH**? This test assumes that significant rehabilitation work needs to be done to the bridge based on its maintenance condition and that it has inadequate BRIDGE WIDTH. Functional Bridge Width Priority with a "High" rating means that the BRIDGE WIDTH does not meet minimum width standards and that it should be REDECKED & WIDENED.	**5 BRIDGE WIDTH does not meet MINIMUM width standards. May require REDECK & WIDEN in order to achieve adequate BRIDGE WIDTH.** **6 BRIDGE WIDTH does not meet DESIRABLE width standards. May require REDECK & WIDEN in order to achieve adequate BRIDGE WIDTH.** **7 Bridge is a MAJOR bridge and subject to different width standards. Decreased bridge width may be justified.** **8 Bridge is a ramp or has a ramp on it. Ramp standards should be considered.** or **Go to next test**
• **Test 2F:** Check **TWIN** structure for **REPLACEMENT**.	**REPLACEMENT** If the structure to be replaced has a twin, then the twin is replaced even if it did not meet the criteria above. or **Go to next test**
• **Test 2G:** Check **TWIN** structure for **Deck Replacement** or **REDECK & WIDEN.**	**Deck Replacement** If the structure has to have its deck replaced and has a twin, then the twin deck must be replaced even if it did not meet the criteria above. or **REDECK & WIDEN** If the structure is to be re-decked & widened and has a twin, then the twin is re-decked & widened even if it did not meet the criteria above. or **Go to next test**

Structural Criteria / TESTS	Details See ***Predicted Condition Changes*** worksheet.
• **Test 2H: Deck Overlay** The overlay is to improve the deck surface and is completed with either bitimus asphalt or concrete.	**Overlay** UNCOATED BARS Age >= **20** and HSI Deck >= **3** or **Overlay** COATED BARS Age >= **30** and HSI Deck >= **3** or **Go to next test**
• **Test 2I: Deck Replacement (overlay exception)** If the bridge has two previous overlays and fails test 2H but NOT any other test, the deck should be replaced. The two previous overlays provided temporary improvement to the deck surface; however, continuing to lay overlays will not fix the deteriorating original deck.	**Replace Deck** If the deck has 2 previous overlays & Age >= **30** and HSI Deck>= **3** or **Go to next test**
• **Test 2J:** Check **TWIN** structure for **OVERLAY**.	**Overlay** If the structure is to be overlaid has a twin, then the twin is overlaid even if it did not meet the criteria above. or **Do Nothing**

CYCLE 2: Years 2020 to 2035

Structural Criteria	Details See ***Predicted Condition Changes*** worksheet.
Predicted Change in Inspection Report Data from **2008** to **2035**. We know the maintenance condition of the bridge in 2008, but we do not know it with 100% certainty in the period 2020 to 2035; therefore we have to estimate the change. The adjacent values show the predicted change from now until the period we are evaluating. Note how decks deteriorate at different rates depending on whether they have UNCOATED or COATED bars.	**PREDICTED CHANGE 2008 to 2035** **UNCOATED BARS** Pack Rust Smart Flag >= **+2** (steel structures only) Section Loss Smart Flag >= **+2** (steel structures only) Steel Cracking Smart Flag >= **+2** (steel structures only) NBI Deck <= **-2** HSI Deck >= **+2** Underside Deck Smart Flag >= **+2** NBI Superstructure <= **-2** NBI Substructure <= **-2** Sufficiency Rating <= no prediction Inventory Rating <= no prediction **COATED BARS** Pack Rust Smart Flag >= **+2** (steel structures only) Section Loss Smart Flag >= **+2** (steel structures only) Steel Cracking Smart Flag >= **+2** (steel structures only) NBI Deck <= **-1** HSI Deck >=**+1** Underside Deck Smart Flag >= **+1** NBI Superstructure <= **-2** (**-1** for all structures over water) NBI Substructure <= **-2** (**-1** for all structures over water) Sufficiency Rating <= no prediction Inventory Rating <= no prediction

Structural Criteria	Details See ***Predicted Condition Changes*** worksheet.
ALL OTHER DATA Same as CYCLE 1, except that for bridges that were REPLACED, Deck Replaced, RE-DECKED & WIDENED, or Overlaid in CYCLE 1, the HSI elements, Smart Flags, NBI ratings, Sufficiency Ratings, Inventory Ratings, and Construction Dates are upgraded to reflect the work done.	Same as CYCLE 1.

Definitions

Coated/uncoated bars: refers to the presence (or lack of) epoxy coating on the steel reinforcement within the deck, super, and/or substructure.

NBI ratings: Nationally used structural rating system to evaluate the deck surface, the superstructure (e.g., beams and girders), and the substructure (e.g., columns/supports).

HSI deck element: an indication of the deck condition similar to the NBI rating with a different numbering scale.

Underside deck smart flag: indicates the deck soffit (undersurface) condition. It is extremely valuable when the top surface of the deck is covered with an overlay.

Pack rust smart flag: indicates the presence and severity of rust packing between steel plates.

Section loss smart flag: indicates that some of the original member cannot carry its designed load. In a steel bridge this is normally due to rust.

Steel cracking smart flag: is used to report distress of steel elements due to cracking.

Sufficiency Rating: provides an overall measure of the bridge's condition and is used to determine eligibility for federal funds (based on NBI ratings, geometrics, and importance).

Haunched: the enlarged part of a beam or slab near its supported ends that result in increased strength.

Roadway under flag: if present, indicates the roadway under the bridge is not designed to geometric specifications.

Vertical clearance: refers to the distance between the bottom of the girder/beam and the roadway that runs underneath the overpass.

Functionally obsolete: the bridge has older design features and cannot safely accommodate current traffic volumes, and vehicle sizes and weights.

Structurally deficient: defines a bridge with an NBI rating of 4 or less within the deck, super, and/or substructure. The term does not imply that the bridge poses an immediate threat of failure, but should be considered for repair, weight/load restriction, and/or increased inspections.

Inventory rating: the highest load a bridge can take an infinite number of times. It is represented in number form 'XX' which represents an HS (XX) truck. To determine the load, use the formula,

$$tonnage = 32 * \frac{XX}{20}$$

The rating is based on a standard in which XX is 20 and the design allowable tonnage is 32.

Exhibit G-1

Final Recommendations

No.	Bridge Number	Feature 'On'	Feature 'Under'	Girder Type	FINAL RECOMMENDATION at Year = 2020	FINAL RECOMMENDATION at Year = 2035	Structural Comment	Vertical Clearance Comment	Bridge Width Comment
1	B-44-129	WIS 441/US 10 NB	US 41	Cont. Steel	No Action Needed	No Action Needed			
2	B-44-130	WIS 441/US 10 SB	US 41	Cont. Steel	No Action Needed	No Action Needed		Does not meet DESIRABLE CLEARANCE standards	
3	B-44-127	WIS 441NB	CTH OO (Northland Ave.)	Prestress Conc.	No Action Needed	No Action Needed			
4	B-44-128	WIS 441SB	CTH OO (Northland Ave.)	Prestress Conc.	No Action Needed	No Action Needed			
5	B-44-126	WIS 441	C. & NW. Trans. Co. RR	Steel Girder	No Action Needed	**Deck Replacement**	'Heavy' cracking to the under-surface of the bridge deck		
6	B-44-126	WIS 441	WIS 96 (Wisconsin Ave.)	Steel Girder	No Action Needed	**Deck Replacement**	'Heavy' cracking to the under-surface of the bridge deck		
7	B-44-126	WIS 441	Fox River	Steel Girder	No Action Needed	**Deck Replacement**	'Heavy' cracking to the under-surface of the bridge deck		
8	B-44-125	CTH Z (Kimberly Ave.)	WIS 441	Prestress Conc.	No Action Needed	No Action Needed		Does not meet DESIRABLE CLEARANCE standards	
9	B-44-124	Fox River Valley RR	WIS 441	Steel Girder	No Action Needed	No Action Needed		Does not meet DESIRABLE CLEARANCE standards	
10	B-44-123	WIS 441SB	CTH CE (College Ave.)	Prestress Conc.	No Action Needed	No Action Needed		Does not meet DESIRABLE CLEARANCE standards	
11	B-44-122	WIS 441NB	CTH CE (College Ave.)	Prestress Conc.	No Action Needed	No Action Needed		Does not meet DESIRABLE CLEARANCE standards	
12	B-08-028	WIS 441SB	CTH KK (Calumet St.)	Prestress Conc.	No Action Needed	**Increase Monitoring**	Potential problems with the substructure by 2035	Does not meet DESIRABLE CLEARANCE standards	
13	B-08-027	WIS 441NB	CTH KK (Calumet St.)	Prestress Conc.	No Action Needed	No Action Needed		Does not meet DESIRABLE CLEARANCE standards	
14	B-08-026	WIS 441SB	Lake Park Rd.	Prestress Conc.	No Action Needed	No Action Needed			
15	B-08-025	WIS 441NB	Lake Park Rd.	Prestress Conc.	No Action Needed	No Action Needed			
16	B-08-024	Telulah Ave.	WIS 441	Prestress Conc.	No Action Needed	**Deck Replacement**	Moderate' cracking to the under-surface of the bridge deck	Does not meet MINIMUM CLEARANCE standards	
17	B-08-033	Carpenter St. Ped. Bridge	WIS 441	Cont. Conc.	No Action Needed	**Deck Replacement**	Moderate' cracking to the under-surface of the bridge deck	Does not meet MINIMUM CLEARANCE standards	
18	B-70-116	WIS 441SB	Oneida St.	Prestress Conc.	No Action Needed	No Action Needed			
19	B-70-115	WIS 441NB	Oneida St.	Prestress Conc.	No Action Needed	No Action Needed		Does not meet DESIRABLE CLEARANCE standards	
20	B-70-114	WIS 441SB	WIS 47 (Appleton Rd.)	Prestress Conc.	No Action Needed	**Deck Replacement**	Moderate' cracking to the under-surface of the bridge deck	Does not meet DESIRABLE CLEARANCE standards	Does not meet DESIRABLE BRIDGE WIDTH standards
21	B-70-113	WIS 441NB	WIS 47 (Appleton Rd.)	Prestress Conc.	No Action Needed	No Action Needed		Does not meet DESIRABLE CLEARANCE standards	Does not meet DESIRABLE BRIDGE WIDTH standards
22	B-70-112	WIS 441SB	CTH AP (Midway Rd.)	Prestress Conc.	No Action Needed	No Action Needed			Does not meet DESIRABLE BRIDGE WIDTH standards
23	B-70-111	WIS 441NB	CTH AP (Midway Rd.)	Prestress Conc.	No Action Needed	No Action Needed		Does not meet DESIRABLE CLEARANCE standards	
24	B-70-110	CTH P (Racine St.)	WIS 441	Cont. Steel	No Action Needed	**Deck Replacement**	Moderate' cracking to the under-surface of the bridge deck	Does not meet MINIMUM CLEARANCE standards	
25	B-70-109	WIS 441SB	NW Ramp & NW Loop to CTH P	Prestress Conc.	No Action Needed	**Deck Replacement**	Moderate' cracking to the under-surface of the bridge deck		Does not meet DESIRABLE BRIDGE WIDTH standards
26	B-70-108	WIS 441NB	NW Ramp & NW Loop to CTH P	Prestress Conc.	No Action Needed	**Deck Replacement**	Moderate' cracking to the under-surface of the bridge deck		Does not meet DESIRABLE BRIDGE WIDTH standards
27	B-70-068	WIS 441	Tayco St.	Prestress Conc.	No Action Needed	No Action Needed		Does not meet MINIMUM CLEARANCE standards	
28	B-70-061	WIS 441	Little Lake Butte de Morts (Fox River)	Cont. Steel	**Deck Replacement**	**Deck Replace and Widen**	Moderate-Heavy cracking to deck surface and under-surface		Does not meet MINIMUM BRIDGE WIDTH standards
29	B-70-076	SB WIS 441Ramp To NB US	W. Butt des Morts Beach Rd. & RR	Cont. Steel	No Action Needed	**Deck Replacement**	Moderate' cracking to the under-surface of the bridge deck		
30	B-70-078-01	WIS 441SB	B.d.M. Beach Rd., SOO Line & RR	Cont. Steel	No Action Needed	**Possible Replacement**	Potential for full bridge replacement by 2035		
31	B-70-078-02	WIS 441NB	B.d.M. Beach Rd., SOO Line & RR	Cont. Steel	No Action Needed	**Deck Replacement**	Moderate cracking to deck surface and under-surface		
32	B-70-078-03	NB US 41Ramp to NB WIS 4	SOO Line & RR	Cont. Steel	No Action Needed	**Deck Replacement**	Deck surface at 'fair to moderate' condition		
33	B-70-078-04	WIS 441NB meets on-ramp	B.d.M. Beach Rd.	Steel Girder	No Action Needed	**Deck Replacement**	Moderate cracking to deck surface and under-surface		
34	B-70-079	WIS 441/ US 10	US 41and Loop Aux. (connector) lane	Cont. Steel	No Action Needed	**Possible Replacement**	Potential for full bridge replacement by 2035		
35	B-70-157	US 10 EB	Cold Spring Rd.	Cont. Conc.	No Action Needed	No Action Needed			
36	B-70-158	US 10 WB	Cold Spring Rd.	Cont. Conc.	No Action Needed	No Action Needed			

Exhibit G-2

Current Condition

BRIDGE CONDITION DETAILS														FUNCTIONAL CONDITIONS															NOTES †						
No.	Bridge No.	Year Built	Bridge Deck Year	Most Recent Overlay	Current Deck State	HSI‡ Deck Element	Coated / Uncoated Bars	Underside Deck Smart Flag	NBI * Deck	NBI Super	NBI Sub	SUFF. Rating	Inventory Rating (HS-##)	**Roadway Under Geometry "Flag"**	Actual Vertical Clearance (ft)	Desired Vertical Clearance (ft)	Distance Below Desired (ft)	Minimum Vertical Clearance (ft)	Distance Below Minimum (ft)	**Vertical Clearance "Flag"**	Actual Bridge Width (ft)	Desirable Bridge Width (ft)	Distance Less Than Desired (ft)	Minimum Bridge Width (ft)	Distance Less Than Minimum (ft)	**Bridge Width "Flag"**	Major Bridge Width Exception	Traffic Impact	Vertical Clearance	Bridge Width	Replace Due to Widening & VC?	Overlay an Overlay?	Inspections	Structural Notes
1	B-44-129	1993	1993	---	ORIGINAL	1	C	1	7	8	8	99	27		16.80	16.75		16.33			43	40		38				---	---	---	---	---	---	---
2	B-44-130	1993	1993	---	ORIGINAL	1	C	1	8	8	8	99	28		16.50	16.75	**0.25**	16.33		X	43	40		38				---	4	---	---	---	---	---
3	B-44-127	1993	1993	---	ORIGINAL	1	C	1	7	8	7	100	21		16.75	16.75		16.25			43	40		38				---	---	---	---	---	---	---
4	B-44-128	1993	1993	---	ORIGINAL	1	C	1	7	8	7	100	21		17.00	16.75		16.25			43	40		38				---	---	---	---	---	---	---
5	B-44-126	1989	1992	---	NEW DECK	2	C	3	7	7	7	85	29		23.45	23.30		23.00			87	82.5		78.5				---	---	---	---	---	---	---
6	B-44-126	1989	1992	---	NEW DECK	2	C	3	7	7	7	85	29		27.90	16.75		16.33			87	82.5		78.5				---	---	---	---	---	---	---
7	B-44-126	1989	1992	---	NEW DECK	2	C	3	7	7	7	85	29		N/A	N/A		N/A			87	82.5		78.5				---	---	---	---	---	---	11
8	B-44-125	1992	1992	---	ORIGINAL	1	C	1	7	8	8	83	22		16.74	16.75	**0.01**	16.33		X	58	44		44				---	4	---	---	---	---	---
9	B-44-124	1992	1992	---	THRU GRID (STEEL)	N/A	N/A	N/A	8	8	8	N/A	NA		16.57	16.75	**0.18**	16.33		X	20	N/A		N/A				---	---	---	---	---	---	---
10	B-44-123	1992	1992	---	ORIGINAL	1	C	1	7	8	8	100	22		16.73	16.75	**0.02**	16.25		X	43	40		38				---	---	---	---	---	---	---
11	B-44-122	1992	1992	---	ORIGINAL	1	C	1	7	8	8	100	22		16.50	16.75	**0.25**	16.25		X	43	40		38				---	4	---	---	---	---	---
12	B-08-028	1993	1993	---	ORIGINAL	1	C	1	7	7	6	99	21		16.70	16.75	**0.05**	16.25		X	43	40		38				---	4	---	---	---	---	---
13	B-08-027	1993	1993	---	ORIGINAL	1	C	1	7	7	7	99	21		16.70	16.75	**0.05**	16.25		X	43	40		38				---	4	---	---	---	---	---
14	B-08-026	1993	1993	---	ORIGINAL	1	C	1	7	7	7	100	23		15.40	15.25		14.75			43	40		38				---	---	---	---	---	---	---
15	B-08-025	1993	1993	---	ORIGINAL	1	C	1	7	7	7	100	23		15.90	15.25		14.75			43	40		38				---	---	---	---	---	---	---
16	B-08-024	1992	1992	---	ORIGINAL	1	C	2	7	8	7	94	23		16.09	16.75	**0.66**	16.33	**0.24**	X	46	36		36				---	3	---	---	---	---	---
17	B-08-033	1992	1992	---	ORIGINAL	1	C	2	7	8	8	N/A	NA		16.90	17.75	**0.85**	17.25	**0.35**	X	12	N/A		N/A				---	3	---	---	---	---	---
18	B-70-116	1993	1993	---	ORIGINAL	1	C	1	7	8	8	100	21		16.80	16.75		16.33			43	40		38				---	---	---	---	---	---	---
19	B-70-115	1993	1993	---	ORIGINAL	1	C	1	8	8	8	100	21		16.70	16.75	**0.05**	16.33		X	43	40		38				---	4	---	---	---	---	---
20	B-70-114	1990	1990	---	ORIGINAL	1	C	2	7	8	8	99	23		16.62	16.75	**0.13**	16.33		X	40	40		38				---	4	---	---	---	---	---
21	B-70-113	1990	1990	---	ORIGINAL	1	C	1	7	8	8	99	23		16.71	16.75	**0.04**	16.33		X	40	40		38				---	4	---	---	---	---	---
22	B-70-112	1990	1990	---	ORIGINAL	1	C	1	7	8	8	87.5	24	X	18.46	16.75		16.25			40	40		38				---	---	---	---	---	---	12
23	B-70-111	1990	1990	---	ORIGINAL	1	C	1	7	8	8	87.5	24	X	16.60	16.75	**0.15**	16.25		X	40	40		38				---	4	---	---	---	---	12
24	B-70-110	1990	1990	---	ORIGINAL	1	C	2	7	6	7	96.1	25		16.24	16.75	**0.51**	16.33	**0.09**	X	60	44		44				---	---	---	---	---	---	---
25	B-70-109	1990	1990	---	ORIGINAL	1	C	2	7	7	8	85.1	21		17.05	16.75		16.33			40	40		38				---	---	---	---	---	---	---
26	B-70-108	1990	1990	---	ORIGINAL	1	C	2	7	8	8	89.5	21		16.95	16.75		16.33			40	40		38				2	4	---	---	---	---	---
27	B-70-068	1975	1992	2005	BIT OVERLAY	1	C	1	7	7	7	88.6	17		14.50	15.25	**0.75**	14.75	**0.25**	X	87.3	82.5		78.5				---	3	---	8	---	---	---
28	B-70-061	1975	1988	2007	CONC OVERLAY	1	U	2	8	7	6	64.1	14		N/A	N/A		N/A			68.7	82.5	**13.80**	78.5	**9.80**	X	YES	---	---	5,6	7	---	10	11
29	B-70-076	1975	1975	2005	BIT OVERLAY	1	U	1	7	7	7	95	19		28.08	23.30		23.00			34.8	27		27				---	---	---	---	9	---	---
30	B-70-078-01	1975	1994	2005	BIT OVERLAY	1	U	1	7	7	6	83.9	17		29.08	23.30		23.00			41.5	40		38				---	---	---	---	---	---	---
31	B-70-078-02	1975	1975	2005	BIT OVERLAY	1	U	1	7	7	7	87.2	17		25.83	23.30		23.00			43.4	40		38				---	---	---	---	---	---	---
32	B-70-078-03	1975	1975	2005	BIT OVERLAY	1	U	1	7	7	7	92.6	17		23.75	23.30		23.00			34.8	27		27				---	---	---	---	9	---	---
33	B-70-078-04	1975	1994	2005	BIT OVERLAY	1	U	1	7	7	7	87.9	17		26.42	15.25		14.75			63	46		46				---	---	---	---	---	---	---
34	B-70-079	1975	1988	2005	BIT OVERLAY	1	U	1	6	6	6	86.4	22		17.43	16.75		16.33			92.8	82.5		78.5				---	---	---	---	9	---	---
35	B-70-157	1997	1997	---	ORIGINAL	1	C	1	8	8	8	99	22		16.21	15.25		14.75			55	54		54				---	---	---	---	---	---	---
36	B-70-158	1997	1997	---	ORIGINAL	1	C	1	8	8	8	81	22		15.81	15.25		14.75			44.5	40		38				---	---	---	---	---	---	---

~ Values in this spreadsheet were obtained using the Wisconsin DOT Highway Structure Information (HSI) System
~ Vertical clearance and width desired/minimum values obtained from the WisDOT FDM manual (chapter 11-35)

‡ HSI = Highway Structures Information (system)
* NBI = National Bridge Index

† Notes:

1. Traffic impact may be heavily influencing replacement recommendation
2. Bridge has experienced traffic impact incidences …possibly raise girders, lower roadway under, or replace structure
3. **Vertical clearance** does not meet minimum standards …consider raising girders, lowering roadway under, or replacing structure
4. **Vertical clearance** does not meet desirable standards …consider raising girders, lowering roadway under, or replacing structure
5. **Bridge width** does not meet minimum standards …consider re-decking and widening
6. **Bridge width** does not meet desirable standards …consider re-decking and widening
7. Consider replacing bridge due to inadequate bridge width
8. Consider replacing overpass or lower road under due to inadequate clearance
9. Consider a second overlay
10. Continue to monitor **sufficiency rating** …funding is available for a rating below 50
11. Bridge over water therefore no vertical clearance requirements
12. Roadway under rating of 2 out of 10 (high replacement priority) due to inadequate minimum median distance & lack of column protection

Exhibit G-3

2020 Predicted Condition

No.	Bridge No.	Age in Year 2020	Coated / Uncoated Bars	HSI Deck Element 2008 → 2020			Underside Deck Smart Flag 2008 → 2020			NBI Deck 2008 → 2020			NBI Super 2008 → 2020			NBI Sub 2008 → 2020			Pack Rust Smart Flag 2008 → 2020			Section Loss Smart Flag 2008 → 2020			Steel Cracking Smart Flag 2008 → 2020			Sufficiency Rating	Inventory Rating (HS_##)	Test(s) Failed
1	B-44-129	17	C	1	-	1	1	-	1	7	-	7	8	-1	7	8	-1	7	0	+1	1	0	+1	1	0	+1	1	99	27	-
2	B-44-130	17	C	1	-	1	1	-	1	8	-	8	8	-1	7	8	-1	7	0	+1	1	0	+1	1	0	+1	1	99	28	2-D4
3	B-44-127	27	C	1	-	1	1	-	1	7	-	7	8	-1	7	7	-1	6	0	-	0	0	-	0	0	-	0	100	21	-
4	B-44-128	27	C	1	-	1	1	-	1	7	-	7	8	-1	7	7	-1	6	0	-	0	0	-	0	0	-	0	100	21	-
5	B-44-126	31	C	2	-	2	3	-	3	7	-	7	7	-1	6	7	-1	6	0	+1	1	0	+1	1	0	+1	1	85	29	-
6	B-44-126	31	C	2	-	2	3	-	3	7	-	7	7	-1	6	7	-1	6	0	+1	1	0	+1	1	0	+1	1	85	29	-
7	B-44-126	31	C	2	-	2	3	-	3	7	-	7	7	-	7	7	-	7	0	+1	1	0	+1	1	0	+1	1	85	29	-
8	B-44-125	28	C	1	-	1	1	-	1	7	-	7	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	83	22	2D-4
9	B-44-124	28	N/A	N/A			N/A			8	-	8	8	-1	7	8	-1	7	0	+1	1	0	+1	1	0	+1	1	N/A	NA	2D-4
10	B-44-123	28	C	1	-	1	1	-	1	7	-	7	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	100	22	2D-4
11	B-44-122	28	C	1	-	1	1	-	1	7	-	7	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	100	22	2D-4
12	B-08-028	27	C	1	-	1	1	-	1	7	-	7	7	-1	6	6	-1	5	0	-	0	0	-	0	0	-	0	99	21	2D-4
13	B-08-027	27	C	1	-	1	1	-	1	7	-	7	7	-1	6	7	-1	6	0	-	0	0	-	0	0	-	0	99	21	2D-4
14	B-08-026	27	C	1	-	1	1	-	1	7	-	7	7	-1	6	7	-1	6	0	-	0	0	-	0	0	-	0	100	23	-
15	B-08-025	27	C	1	-	1	1	-	1	7	-	7	7	-1	6	7	-1	6	0	-	0	0	-	0	0	-	0	100	23	-
16	B-08-024	28	C	1	-	1	2	-	2	7	-	7	8	-1	7	7	-1	6	0	-	0	0	-	0	0	-	0	94	23	2D-3
17	B-08-033	28	C	1	-	1	2	-	2	7	-	7	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	N/A	NA	2D-3
18	B-70-116	27	C	1	-	1	1	-	1	7	-	7	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	100	21	-
19	B-70-115	27	C	1	-	1	1	-	1	8	-	8	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	100	21	2D-4
20	B-70-114	30	C	1	-	1	2	-	2	7	-	7	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	99	23	2D-4
21	B-70-113	30	C	1	-	1	1	-	1	7	-	7	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	99	23	2D-4
22	B-70-112	30	C	1	-	1	1	-	1	7	-	7	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	87.5	24	-
23	B-70-111	30	C	1	-	1	1	-	1	7	-	7	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	87.5	24	2D-4
24	B-70-110	30	C	1	-	1	2	-	2	7	-	7	6	-1	5	7	-1	6	0	+1	1	0	+1	1	0	+1	1	96.1	25	2D-3
25	B-70-109	30	C	1	-	1	2	-	2	7	-	7	7	-1	6	8	-1	7	0	-	0	0	-	0	0	-	0	85.1	21	-
26	B-70-108	30	C	1	-	1	2	-	2	7	-	7	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	89.5	21	-
27	B-70-068	45	C	1	-	1	1	-	1	7	-	7	7	-1	6	7	-1	6	0	-	0	0	-	0	0	-	0	88.6	17	2D-3
28	B-70-061	45	U	1	+1	2	2	+1	3	8	-1	7	7	-	7	6	-	6	0	+1	1	0	+1	1	0	+1	1	64.1	14	2A, 2E
29	B-70-076	45	U	1	+1	2	1	+1	2	7	-1	6	7	-1	6	7	-1	6	1	+1	2	0	+1	1	0	+1	1	95	19	-
30	B-70-078-01	45	U	1	+1	2	1	+1	2	7	-1	6	7	-1	6	6	-1	5	2	+1	3	0	+1	1	0	+1	1	83.9	17	-
31	B-70-078-02	45	U	1	+1	2	1	+1	2	7	-1	6	7	-1	6	7	-1	6	1	+1	2	0	+1	1	0	+1	1	87.2	17	-
32	B-70-078-03	45	U	1	+1	2	1	+1	2	7	-1	6	7	-1	6	7	-1	6	0	+1	1	0	+1	1	0	+1	1	92.6	17	-
33	B-70-078-04	45	U	1	+1	2	1	+1	2	7	-1	6	7	-1	6	7	-1	6	1	+1	2	0	+1	1	0	+1	1	87.9	17	-
34	B-70-079	45	U	1	+1	2	1	+1	2	6	-1	5	6	-1	5	6	-1	5	0	+1	1	0	+1	1	0	+1	1	86.4	22	-
35	B-70-157	23	C	1	-	1	1	-	1	8	-	8	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	99	22	-
36	B-70-158	23	C	1	-	1	1	-	1	8	-	8	8	-1	7	8	-1	7	0	-	0	0	-	0	0	-	0	81	22	-

** HSI deck element is a rating betw een 1 and 5 (1 = excellent condition)
** Underside deck smart flag is a rating betw een 1 and 5 (1 = excellent condition)
** NBI ratings range betw een 9 and 0 (9 = very good, 4 = poor, and 0 = failed)
** Pack rust, section loss, and steel cracking smart flags rate betw een 0 and 5 (0 = not present)
** Sufficiency rating ranges betw een 0 and 100; 100 indicating a new bridge w ith no defects

Exhibit G-4

2035 Predicted Condition

No.	Bridge No.	Age in Year 2035	Coated / Uncoated Bars	HSI Deck Element				Underside Deck Smart Flag				NBI Deck				NBI Super				NBI Sub				Pack Rust Smart Flag				Section Loss Smart Flag				Steel Cracking Smart Flag				Test(s) Failed	Possibly Structurally Deficient in 2035??
				2008	2020 Up-Grade	'08-'35 Predicted Change	2035	2008	2020 Up-Grade	'08-'35 Predicted Change	2035	2008	2020 Up-Grade	'08-'35 Predicted Change	2035	2008	2020 Up-Grade	'08-'35 Predicted Change	2035	2008	2020 Up-Grade	'08-'35 Predicted Change	2035	2008	2020 Up-Grade	'08-'35 Predicted Change	2035	2008	2020 Up-Grade	'08-'35 Predicted Change	2035	2008	2020 Up-Grade	'08-'35 Predicted Change	2035		
33	B-44-129	32	C	1		+1	2	1		+1	**2**	7		-1	6	8		-2	6	8		-2	6	0		+2	2	0		+2	2	0		+2	2		
34	B-44-130	32	C	1		+1	2	1		+1	**2**	8		-1	7	8		-2	6	8		-2	6	0		+2	2	0		+2	2	0		+2	2	2D-4	
1	B-44-127	42	C	1		+1	2	1		+1	2	7		-1	6	8		-2	6	7		-2	5	0		-	0	0		-	0	0		-	0		
2	B-44-128	42	C	1		+1	2	1		+1	2	7		-1	6	8		-2	6	7		-2	5	0		-	0	0		-	0	0		-	0		
3	B-44-126	**46**	C	2		+1	**3**	3		+1	**4**	7		-1	6	7		-2	5	7		-2	5	0		+2	2	0		+2	2	0		+2	2	2B, 2H	
4	B-44-126	**46**	C	2		+1	**3**	3		+1	**4**	7		-1	6	7		-2	5	7		-2	5	0		+2	2	0		+2	2	0		+2	2	2B, 2H	
5	B-44-126	**46**	C	2		+1	**3**	3		+1	**4**	7		-1	6	7		-1	6	7		-1	6	0		+2	2	0		+2	2	0		+2	2	2B, 2H	
6	B-44-125	43	C	1		+1	2	1		+1	2	7		-1	6	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0	2D-4	
7	B-44-124	43	N/A	N/A				N/A				8		-1	7	8		-2	6	8		-2	6	0		+2	2	0		+2	2	0		+2	2	2D-4	
8	B-44-123	43	C	1		+1	2	1		+1	2	7		-1	6	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0	2D-4	
9	B-44-122	43	C	1		+1	2	1		+1	2	7		-1	6	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0	2D-4	
10	B-08-028	42	C	1		+1	2	1		+1	2	7		-1	6	7		-2	5	6		-2	**4**	0		-	0	0		-	0	0		-	0	2D-4	YES
11	B-08-027	42	C	1		+1	2	1		+1	2	7		-1	6	7		-2	5	7		-2	5	0		-	0	0		-	0	0		-	0	2D-4	
12	B-08-026	42	C	1		+1	2	1		+1	2	7		-1	6	7		-2	5	7		-2	5	0		-	0	0		-	0	0		-	0		
13	B-08-025	42	C	1		+1	2	1		+1	2	7		-1	6	7		-2	5	7		-2	5	0		-	0	0		-	0	0		-	0		
14	B-08-024	43	C	1		+1	2	2		+1	**3**	7		-1	6	8		-2	6	7		-2	5	0		-	0	0		-	0	0		-	0	2B, 2D-3	
15	B-08-033	43	C	1		+1	2	2		+1	**3**	7		-1	6	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0	2B, 2D-3	
16	B-70-116	42	C	1		+1	2	1		+1	2	7		-1	6	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0		
17	B-70-115	42	C	1		+1	2	1		+1	2	8		-1	7	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0	2D-4	
18	B-70-114	45	C	1		+1	2	2		+1	**3**	7		-1	6	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0	2B, 2D-4	
19	B-70-113	45	C	1		+1	2	1		+1	2	7		-1	6	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0	2D-4	
20	B-70-112	45	C	1		+1	2	1		+1	2	7		-1	6	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0		
21	B-70-111	45	C	1		+1	2	1		+1	2	7		-1	6	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0	2D-4	
22	B-70-110	45	C	1		+1	2	2		+1	**3**	7		-1	6	6		-2	**4**	7		-2	5	0		+2	2	0		+2	2	0		+2	2	2B, 2D-3	YES
23	B-70-109	45	C	1		+1	2	2		+1	**3**	7		-1	6	7		-2	5	8		-2	6	0		-	0	0		-	0	0		-	0	2B	
24	B-70-108	45	C	1		+1	2	2		+1	**3**	7		-1	6	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0	2B	
25	B-70-068	60	C	1		+1	2	1		+1	2	7		-1	6	7		-2	5	7		-2	5	0		-	0	0		-	0	0		-	0	2D-3	
26	B-70-061	**60**	U	1		+2	**3**	2		+2	**4**	8		-2	6	7		-1	6	6		-1	5	0		+2	2	0		+2	2	0		+2	2	2A, 2E, 2H	
27	B-70-076	**60**	U	1	-1	+2	2	1	N/A	+2	**3**	7	+1	-2	6	7	N/A	-2	5	7	N/A	-2	5	1	N/A	+2	3	0	N/A	+2	2	0	N/A	+2	2	2A, 2I	
28	B-70-078-01	**60**	U	1		+2	**3**	1		+2	**3**	7		-2	5	7		-2	5	6		-2	**4**	2		+2	**4**	0		+2	2	0		+2	2	1A, 2A, 2H	YES
29	B-70-078-02	**60**	U	1		+2	**3**	1		+2	**3**	7		-2	5	7		-2	5	7		-2	5	1		+2	3	0		+2	2	0		+2	2	2A, 2H	
30	B-70-078-03	**60**	U	1	-1	+2	2	1	N/A	+2	**3**	7	+1	-2	6	7	N/A	-2	5	7	N/A	-2	5	0	N/A	+2	2	0	N/A	+2	2	0	N/A	+2	2	2A, 2I	
31	B-70-078-04	**60**	U	1		+2	**3**	1		+2	**3**	7		-2	5	7		-2	5	7		-2	5	1		+2	3	0		+2	2	0		+2	2	2A, 2H	
32	B-70-079	**60**	U	1	-1	+2	2	1	N/A	+2	**3**	6	+1	-2	5	6	N/A	-2	**4**	6	N/A	-2	**4**	0	N/A	+2	2	0	N/A	+2	2	0	N/A	+2	2	1A, 2A, 2I	YES
35	B-70-157	38	C	1		+1	2	1		+1	2	8		-1	7	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0		
36	B-70-158	38	C	1		+1	2	1		+1	2	8		-1	7	8		-2	6	8		-2	6	0		-	0	0		-	0	0		-	0		

** HSI deck element is a rating betw een 1 and 5 (1 = excellent condition)

** Underside deck smart flag is a rating betw een 1 and 5 (1 = excellent condition)

** NBI ratings range betw een 9 and 0 (9 = very good, 4 = poor, and 0 = failed)

** Pack rust, section loss, and steel cracking smart flags rate betw een 0 and 5 (0 = not present)