NHDOT Bridge Program
State Red List Ranking Process

Approved By: ______________________
L. Robert Landry, PE
Chair, NHDOT Bridge Management Committee

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NHDOT STATE RED LIST BRIDGE RANKING PROCESS

(I) INTRODUCTION

The NHDOT has developed a mathematical approach to establish the ranking of State Red List bridges from which bridge funds can then be allocated. This updated process relies primarily on current bridge condition data, roadway attributes, and physical bridge and site attributes. The weighting/scoring system creates a composite score (ranking) based on the following six (6) components:

1) Condition – The current physical condition of the major bridge elements of the specific bridge, in accordance with the National Bridge Inspection Standards (NBIS) of the Federal Highway Administration (FHWA);

2) Type & Size – The physical characteristics of the specific bridge regarding the type of bridge and overall bridge deck area (length & width);

3) Importance – The relative value/importance of the specific bridge to the overall state transportation system based on the roadway tier on which it is located, the detour length, and the traffic volume;

4) Capacity – The calculated structural capacity of the specific bridge, i.e., its ability to safely support vehicular loads with or without a load posting; and; the vertical clearance for vehicles passing on or under the bridge, i.e., the roadway height and width dimensions. These values indicate whether the bridge requires posting of restrictions for vehicular loads, e.g., "Weight Limit 10-Tons"; or; "12-Ft. vertical clearance".

5) Risk – The characteristics of the specific bridge site and/or bridge structural elements that indicate a susceptibility to scour undermining of the substructure and/or fatigue of the structural elements, thereby affecting the ability of the bridge to serve the needs of the transportation system.

And;

6) Manual Adjustments – Other characteristics of the specific bridge and specific bridge site not included in the components listed above that affect its ranking.

This mathematical process was implemented when determining the ranking for the 2017 State Red List. The application of specific factors, which are assigned and applied to the six (6) bridge characteristics noted above, is the primary driver used to determine the bridge ranking. This data-driven methodology ensures that the State Red List ranking process is consistent, reproducible, and transparent.

It is important to note that a "bridge", as defined in *RSA 234.2 Bridge Defined*, is any span 10 feet or greater, and that according to FHWA regulations, a "bridge" is defined as any span greater than 20 feet.

The State Red List represents the portion of the NHDOT Bridge inventory that meets the Red List Bridge definition set forth in RSA 234:25-a., as stated below:

234:25-a Red List Bridges –

I. The commissioner of transportation shall establish and maintain a list of highway bridges that are found, after inspection by the department, to be structurally deficient, which shall be known as red list bridges. This list shall also include structurally deficient state-owned railroad bridges over highways.

II. Separate red lists shall be established and maintained for state-owned bridges and for bridges owned by municipalities.

III. Both red lists under paragraph II shall specify whether a bridge is structurally deficient. The department of transportation shall number and prioritize all state-owned red list bridges relative to the need for repair or replacement.
IV. Any red list bridge that is closed as a result of a department of transportation recommendation shall remain on the red list along with the date of closure and the reason it was closed. Red list bridges shall be removed from the red list when the department certifies that the bridge has been satisfactorily repaired or replaced, or the department permanently closes any state-owned red list bridge, or when the governing body of the municipality permanently closes any municipally-owned red list bridge.
V. In this chapter, a structurally deficient bridge means a bridge with a primary element in poor or worse condition (National Bridge Inventory (NBI) rating of 4 or less).

The State Red List is developed and reported in accordance with the requirements set forth in RSA 234:25-b, as stated below:

234:25-b Inspection of Red List Bridges; Report. –
I. The department of transportation shall inspect every red list state-owned bridge on the red list biannually and every red list municipal bridge annually as a minimum.
II. The department of transportation shall annually provide a complete list of state-owned and municipally-owned red list bridges to the governor, the executive council, the speaker of the house of representatives, the president of the senate, and the house and senate standing committees with jurisdiction over highways and bridges. Additionally the department shall annually notify the governing bodies of municipalities of any red list bridges owned by such municipality and any state-owned red list bridge within such municipality. These reports and notifications shall be provided on or before April 1 of each year.

(II) <u>RANKING PROCESS</u>

As noted above, to be included on the State Red List or the Municipal Red List, a bridge must have one or more major structural elements in “Poor” or worse condition, in accordance with the National Bridge Inspection Standards (NBIS). Bridges included on the State Red List are ranked through a scoring process that assigns a total point value to each specific bridge, based on the components described below in further detail. The equation below presents the manner in which scores associated with each component are used to determine the ranking of each Red List Bridge:

<u>Ranking Score</u> = [Condition + Type & Size + Importance + Risk + Capacity + Manual]

Component	Max. Points Calculated	Max. % of Points	Considerations
Condition	10.0	37%	NBIS condition rating of each major bridge element (deck, superstructure, substructure, or culvert), which are collected during bridge inspections
Type & Size	8.0	30%	One of five (5) major bridge types (girder, truss, movable, timber or culvert) and the bridge deck area (length x width)
Importance	5.75	21%	Roadway tier, detour length, and traffic volume associated with the bridge
Risk	1.55	6%	Susceptibility to scour and whether any bridge members are fracture critical
Capacity	1.5	6%	Load/Weight restrictions and/or vertical/horizontal clearance restrictions
Manual Adjustments	N/A	N/A	Other known characteristics about the bridge not covered above that affect its ranking
Ranking Score	**26.8**	**100%**	**Maximum Total Ranking Score**

After a value has been calculated for each component of all Red List bridges, which determines a total ranking score for each Red List Bridge, the resulting list is sorted. <u>The bridge having the highest ranking score is placed at the top of the list, and the bridge having the lowest ranking score is placed at the bottom of the list</u>. The resulting list identifies the ranking of each State Red List Bridge for that calendar year.

(A) Condition Component:

When considering the overall structural condition of the bridge, the ranking of the bridge is based on the specific NBIS condition rating of the major bridge elements. In this evaluation, factors were developed based on the condition of the bridge's major structural elements, e.g., the deck, superstructure, substructure, or culvert. These assigned factors are used to calculate the "condition" component score, which is the largest portion of the bridge's ranking score and represents up to a maximum of 37% of the total ranking score for each bridge.

In accordance with the NBIS, the major structural elements (deck, superstructure, substructure, or culvert) of a bridge each receive a condition rating that ranges between "9", representing "excellent" condition, and "0", representing a "closed" bridge that has failed due to the extremely poor condition of the structural elements. As shown in the table below, condition "points" are assigned to correspond with the NBIS rating for each major bridge element – the worse the condition of the bridge element, the higher the assigned points. The points for each bridge element are then multiplied by the condition factors for each element, resulting in an overall "condition" score for the bridge. In this manner, bridges having major structural elements in poorer condition will have a higher condition score, and will thus have a higher ranking on the Red List than those bridges in comparatively better structural condition.

When calculating the score for the condition component of the bridge, 50% of the points are assigned based on the condition of the superstructure, 30% for the substructure, and 20% for the deck. Culverts receive 100% of the points assigned to represent the condition of the entire culvert.

Since the major bridge elements are weighted separately, higher points are assigned to deteriorated elements that represent larger safety concerns. For example, the bridge superstructure is assigned a higher portion (50% of the "condition" component) of the overall score for the "condition" component since a deficient superstructure may cause considerable mobility impacts to the transportation system should a weight limit reduction and posting, or even a complete bridge closure, be required. Further, significant safety concerns may be associated with a deficient superstructure, whereas there is less concern with a deficient deck since the consequences are very different should a failure occur with either of these major elements.

Also, addressing deficiencies in the superstructure (50% of the "condition" component), i.e., girders, truss members, etc., requires a major investment of resources and would have a major impact on the transportation system. Conversely, a deficient bridge deck (20% of the "condition" component) generally does not result in a weight limit posting or bridge closure. Also, addressing deficiencies in the bridge deck would not require the same level of investment of resources and would have less of an impact on the transportation system, when compared to the superstructure.

NBIS Rating	Factors for Condition of Major Bridge Elements			
	Deck Factor (weighted 20%)	**Superstructure Factor (weighted 50%)**	**Substructure Factor (weighted 30%)**	**Culvert Factor (weighted 100%)**
9	0	0	0	0
8	0	0	0	0
7	1	1	1	1
6	2	2	2	2
5	4	4	4	4
4	7	7	7	7
3	9	10	10	9
2	10	10	10	10
1	10	10	10	10
0	10	10	10	10

The condition component is determined as follows:

Condition Component = [(Deck Factor x 20%) + (Superstructure Factor x 50%) + (Substructure Factor x 30%)]

Culvert Condition Component = [(Culvert Factor x 100%)]

Example 1:

Bridge "A": US Route "X" over the "Some River" Bridge Type = High Truss
Deck = 4; Superstructure = 4; Substructure = 4
Condition Component = [(7 x 0.20) + (7 x 0.50) + (7 x 0.30)] = 7.0

Example 2:

Bridge "B": NH Route "Z" over "Unnamed Brook" Bridge Type = I-Beams w/Concrete Deck
Deck = 4; Superstructure = 7; Substructure = 7
Condition Component = [(7 x 0.20) + (1 x 0.50) + (1 x 0.30)] = 2.2

These calculations show that Bridge "A" has a higher Red List ranking than Bridge "B", based solely on the relative condition of their major structural elements.

(B) Type & Size Component:

When considering the type & size of each bridge, the ranking of the bridge is based on: (1) the specific type of bridge structure, e.g., girder, truss, movable, timber, or culvert; and; (2) the area of the bridge deck, i.e., bridge length x bridge width. These assigned factors are used to calculate the "type & size" component score, which is the second most significant component of the ranking score and represents up to a maximum of 30% of the total ranking score for each Red List bridge.

(1) Bridge type factors are assigned to each specific type of bridge to account for the differences in the ease of maintenance and repair of the various bridge types. The five major types of bridges (girder, truss, movable, timber, and culvert) are given varying points, with moveable and truss bridges receiving the most points due to their complex structural configuration. Generally, these factors recognize the additional care, along with the extreme costs and resources, required to rehabilitate or replace movable and/or truss bridges. These complex structures are the most visible and most expensive bridges in the state's bridge inventory, when compared to the other three major bridge types.

Type of Bridge	Bridge Type Factor	Number of State Red List Bridges for 2017
Girder	1.75	76
Moveable	2.00	3
Truss	2.00	7
Timber	0.75	8
Culvert	0.50	39
		Total = 133

(2) Bridge size factors are assigned to each specific bridge to account for the differences presented when addressing deficiencies in the total deck areas (length x width) of various bridges. Emphasis in the ranking process is placed on bridges having large deck areas as they typically have greater costs than bridges having comparatively small deck areas. Assigning these points recognizes the variations in the costs and resources required to maintain, rehabilitate, or replace the bridge deck.

Description of Bridge Deck Area (Size)	Min. (sq. ft.)	Max. (sq. ft.)	Bridge Size Factor	Number of State Red List Bridges for 2017
Very Large	30,000	101,000	4.00	6
Large	10,000	30,000	3.00	13
Medium	2,000	10,000	2.00	48
Small	500	2,000	1.00	45
Very Small	0	500	0.50	21
				Total = 133

The type & size component is determined as follows:

Type & Size Component = [(Bridge Type Factor) x (Bridge Size Factor)]

Example 1:

Bridge "A": US Route "X" over the "Some River" — Bridge Type = High Truss
Bridge Type = High Truss (steel); — Bridge Type Factor = 2.00;
Total (Gross) Deck Area = 14,059 sf; — Size Factor = 3.00;
Type & Size Component = [(2.00) x (3.00)] = 6.00

Example 2:

Bridge "B": NH Route "Z" over "Unnamed Brook" — Bridge Type = I-Beams w/Concrete Deck
Bridge Type = I-girder (multi-span); — Bridge Type Factor = 1.75;
Total (Gross) Deck Area = 21,330 sf; — Size Factor = 3.00;
Type & Size Component = [(1.75) x (3.00)] = 5.25

These calculations show that Bridge "A" has a higher Red List ranking than Bridge "B", based solely on the type of bridge and the comparative size of their total deck areas.

(C) Importance Component:

When considering the relative importance of the bridge, the ranking of the bridge is based on; (1) the roadway tier on which the bridge is located; (2) the detour length should the bridge be closed; and; (3) the traffic volume carried by the bridge. This component considers the consequences of a bridge being closed, generally due to its poor and/or unacceptable structural condition. If a bridge is located on a high tier (greater importance) roadway and has a long detour length, its closure will have a significantly greater impact on the operation of the overall transportation system, i.e., impact significantly more drivers, than a closed bridge on a lower tier roadway having a short detour. This methodology ensures that deficiencies in bridges located on major roadways (i.e., Interstates, Turnpikes, etc.) of the State's transportation system are recognized and addressed so the bridge can remain fully in service in a well-maintained condition. These factors are used to calculate the "importance" component score, which is the third most significant component of the ranking score and represents up to a maximum of 21% of the total ranking score for each Red List bridge.

As shown below, points indicating the "importance" are calculated for each Red List bridge. These points are determined utilizing assigned factors based on the importance of the roadway tier on which the bridge is located, the detour length should the bridge be closed, and the daily traffic volume carried by the bridge.

(1) Tier factors are assigned to each bridge based on the relative value of the carried roadway to the overall transportation system, as described above. These factors range from "3.00" for bridges located on roadway tiers of "high" importance, to "0.50" for bridges located on roadway tiers of "low" importance. High Investment Bridges (HIBs) and any bridge located on a Tier 1 roadway are assigned a higher tier factor (3.00), whereas bridges located on other roadway tiers are assigned a lower tier factor ("0.50" and above).

Roadway Tier Definitions - Bridges	Roadway Tier	Tier Factor	Number of State Red List Bridges for 2017
High Investment Bridges – Bridges in this group have a deck area of 30,000 sq. ft. or greater; or; a movable bridge, regardless of the type of roadway on which it is located.	HIB	3.00	7
Interstates, Turnpikes, Divided Highways – Multi-lane divided highways supporting the highest traffic volumes & speeds, and convey the majority of commuter, tourist, & freight traffic.	1	3.00	12
Statewide Corridors – State numbered routes with moderate to high traffic volumes and speeds, especially during commuter hours.	2	2.00	42
Regional Transportation Corridors – These roadways support travel within regions, access statewide corridors, and support moderate traffic volumes and speeds.	3	1.00	34
Local Connectors – These secondary roadways and unnumbered routes provide local connection between and within communities; usually support low volume and low speed traffic.	4	0.50	31
Local Roads – Locally owned roadways within town limits or city compact limits; provide local connections for travel between and within communities; support low volume and low speed traffic in most instances.	5	N/A (Locally owned)	
Off Network – These are non-highway assets of the transportation network, e.g., Park 'n' Rides, pedestrian or railroad bridges, patrol sheds, and Rest Stops.	6	0.25	7
			Total = 133

(2) Traffic volume factors are assigned to each bridge based on the volume of traffic carried by the bridge on a daily basis. Consequently, closure of a bridge carrying a comparatively high volume of traffic would have a greater impact on the operation of the overall transportation system, i.e., impact significantly more drivers, than a closed bridge carrying a low volume of traffic.

Traffic Level	Traffic Volumes (vpd)		Traffic Volume Factor	Number of State Red List Bridges for 2017
	Min.	Max.		
Very High	20,000	> 70,000	1.50	16
High	5,000	20,000	1.25	43
Medium	500	5,000	1.00	68
Low	100	500	0.50	13
Very Low	0	100	0.50	11
				Total = 133

(3) Detour factors are assigned to each bridge based on the detour length (in miles) required to bypass a closed bridge by continuing travel on roadways of similar classification (quality) and functionality (capacity). Clearly, closure of a bridge having a comparatively long detour would have a greater impact on the operation of the overall transportation system, i.e., impact significantly more drivers, than a closed bridge having a shorter detour.

Detour Level	Detour Length (Miles)		Detour Factor	Number of State Red List Bridges for 2017
	Min.	Max.		
Very Long	20	99*	1.50	13
Long	10	20	1.25	19
Medium	5	10	1.00	19
Short	2	5	0.75	42
Very Short	0	2	0.50	40
* Detour length of 99 represents a dead end roadway.				**Total = 133**

The importance component is determined as follows:

Importance Component = [[(Roadway Tier Factor) x (Traffic Volume Factor)] + (Detour Length Factor)]

Example 1:

Bridge “A”: US Route “X” over the “Some River” Bridge Type = High Truss
Roadway Tier 2; Traffic Volume = 3,500 vpd Detour Length = 9.00 mi;
Importance Component = [[(2.00) x (1.00)] + (1.00)] = 3.00

Example 2:

Bridge “B”: NH Route “Z” over “Unnamed Brook” Bridge Type = I-Beams w/Concrete Deck
Roadway Tier 3; Traffic Volume = 1,900 vpd Detour Length = 3.50 mi;
Importance Component = [[(1.00) x (1.00)] + (0.75)] = 1.75

These calculations show that Bridge “A” has a higher Red List ranking than Bridge “B”, based solely on the roadway tier on which the bridges are located, the length of detours of each bridge, and the traffic volumes carried by each bridge.

(D) Risk Component:

When considering the level of risk associated with each bridge, the ranking of the bridge is based on: (1) whether the bridge is susceptible to scour undermining of the substructure; and; (2) whether the bridge superstructure is a type that includes fracture critical structural members, which could be subject to fatigue failure. Additional points are assigned to these bridges and are used to calculate the “risk” component score, which is the fourth most significant component of the ranking score and represents up to a maximum of only 6% of the total ranking score for each Red List bridge.

While the overall component of risk is a comparatively minor (6%) contributor to the total ranking score, these additional points can serve as a “tie-breaker” for bridges having similar total ranking scores based on the other four components. By including this score component, it is recognized that bridges that are scour susceptible and/or fracture critical, present unique risks to the transportation system should they be closed due to scour failure or fatigue failure of structural members.

(1) Scour factors are assigned to each bridge based on its scour rating. Similar to the NBIS condition rating of major bridge elements, the scour rating ranges from “9”, representing a bridge not over a waterway and thus having no risk of scour, and “0”, representing a “closed” bridge that has failed due to scour.

Scour Description	Scour Rating	Scour Critical Factor	Number of State Red List Bridges for 2017
Bridge is scour critical and scour damage has occurred	2 or less	1.25	2
Bridge is scour critical; Calculations show the foundation is unstable for calculated scour conditions	3	1.25	17
Bridge is not scour critical	4 through 9	1.00	114
Bridge has not been rated for scour	U (Unknown) Or T (Tidal)	1.00	
Bridge is not over a waterway	N	1.00	
			Total = 133

(2) Fracture critical factors are assigned to each bridge based on whether the type of bridge includes structural members that are subject to fracture failure due to fatigue of the member.

Bridge is Fracture Critical	Fracture Critical Factor	Number of State Red List Bridges for 2017
Yes	1.25	15
No	1	118
		Total = 133

The risk component is determined as follows:

Risk Component = [(Scour Critical Factor) x (Fracture Critical Factor)]

Example 1:

Bridge "A": US Route "X" over the "Some River" — Bridge Type = High Truss
Scour Critical = "No"; — Fracture Critical Members = "Yes"
Scour Critical Factor = 1.00; — Fracture Critical Factor = 1.25
Risk Component = [(1.00) x (1.25)] = 1.25

Example 2:

Bridge "B": NH Route "Z" over "Unnamed Brook" — Bridge Type = I-Beams w/Concrete Deck
Scour Critical = "Yes"; — Fracture Critical Members = "Yes"
Scour Critical Factor = 1.25; — Fracture Critical Factor = 1.25
Risk Component = [(1.25) x (1.25)] = 1.56

These calculations show that Bridge "B" has a higher Red List ranking than Bridge "A", based solely on whether the bridge is susceptible to scour and whether the bridge has structural members that are fracture critical.

(E) Capacity Component:

When considering the specific restrictions associated with each bridge, the ranking of the bridge is based on: (1) whether the bridge has weight restrictions regarding its vehicular load capacity; and; (2) whether the configuration of the bridge creates restrictions regarding its horizontal and vertical clearances for vehicles crossing the bridge, and regarding the under-clearance for vehicles passing below the bridge. Additional points are assigned to these bridges and are used to calculate the "capacity" component score, which is the fifth (least) most significant component of the ranking score and represents up to a maximum of only 6% of the total ranking score for each Red List bridge.

While the component of capacity is a comparatively minor (6%) contributor to the total ranking score, these additional points can serve as a "tie-breaker" for bridges having similar total ranking scores based on the other four components. Further, the rehabilitation or replacement of bridges that have capacity and/or clearance restrictions presents an opportunity to address shortcomings in the bridge population and improve mobility on the overall transportation system.

(1) Load Capacity factors are assigned to each bridge based on any weight restriction (load posting) that is required, according to the calculated live load capacity of the bridge in its present condition. These weight limit postings generally indicate a maximum vehicular load capacity, e.g., "20-Tons", "6-Tons", "Passenger Cars Only", etc. Obviously, load posted bridges prevent the passage of heavily loaded vehicles, thereby restricting the travel of goods and services, often including emergency response vehicles, on the transportation system.

Description	Load Capacity Factor	Number of State Red List Bridges for 2017
Closed Bridge	1.20	4
Weight Limit Posting ≤ 10-Tons	1.50	8
Weight Limit Posting > 10-Tons	1.20	4
"E" & "C" Type Bridge Posting	1.10	35
NPR (No Posting Required)	1.00	82
		Total = 133

(2) Clearance factors are assigned to each bridge based on any dimensional restrictions that require postings for vertical, horizontal, or under-clearances. These clearance postings generally indicate a maximum vehicular dimension, e.g., "14-Feet", "10-Feet", "Narrow Bridge", etc. Obviously, bridges posted with restricted clearances prevent the passage of larger vehicles and loads, thereby restricting the travel of goods and services, often including emergency response vehicles, on the transportation system.

If the bridge clearance is included when assigning clearance factors, it recognizes the possibility of impact damage to various bridge elements from over-sized and/or errant vehicles. Since the effect of including a clearance factor when calculating the Red List ranking is still being evaluated, all clearance factors have been assigned a value of 1.00 and will be adjusted in the future as needed to appropriately apply this factor.

Clearance Description	Min. (Ft.)	Max. (Ft.)	Clearance Factor	Number of State Red List Bridges for 2017
Open (Unrestricted vertical clearance)	18.00	∞	1.00	103
Partially Restricted (Clearance postings)	16.51	17.99	1.00	8
"Light" Restrictions	14.51	16.50	1.00	11
"Moderate" Restrictions	13.51	14.50	1.00	5
"Heavy" Restrictions	0.00	13.50	1.00	6
				Total = 133

The capacity component is determined as follows:

Capacity Component = [(Load Capacity Factor) x (Clearance Factor)]

Example 1:

Bridge "A": US Route "X" over the "Some River" — Bridge Type = High Truss
Load Capacity = "E-1"; — Clearance = "Unrestricted"
Load Capacity Factor = 1.10; — Clearance Factor = 1.00
Capacity Component = [(1.10) x (1.00)] = 1.10

Example 2:

Bridge "B": NH Route "Z" over "Unnamed Brook" — Bridge Type = I-Beams w/Concrete Deck
Load Capacity = "NPR"; — Clearance = "Unrestricted"
Load Capacity Factor = 1.00; — Clearance Factor = 1.00
Capacity Component = [(1.00) x (1.00)] = 1.00

These calculations show that Bridge "A" has a higher Red List ranking than Bridge "B", based solely on whether the bridge has a load capacity restriction and whether the bridge has a clearance restriction.

(F) Manual Adjustment Component:

In addition to the five primary components (Condition, Type & Size, Importance, Capacity, and Risk) used to develop the ranking of State Red List bridges, as noted above, it is recognized that there may be other characteristics of the specific bridge and/or bridge site that should be considered when developing the final bridge ranking score. For this reason, a "manual" component was developed and included as part of the ranking process.

Some of this information, such as whether the bridge is currently under construction, may or may not be listed in the database of bridge inspection results, thus making it necessary to apply this information through a manual adjustment to the ranking score. This adjustment factor may decrease the ranking of each bridge, depending on the reason for and description of the specific manual adjustment. This component is necessary to ensure that Red List bridges are accurately ranked so that the limited funds available for bridge rehabilitation or replacement are applied appropriately for transportation improvement projects.

It is recognized that the five primary components are essential for the ranking of State Red List bridges. However, these cannot address every single factor of a bridge or group of bridges that should be considered when ranking Red List bridges. For this reason, additional numerical deductions to the overall component score, based on the five primary components, were developed and applied to specific types of bridges. These bridges were then individually reviewed to ensure that the deduction was appropriate for the specific bridge or group of bridges.

The factors considered for the manual adjustment component are as follows:

Manual Adjustment Description	**Manual Adjustment Factor**	**Number of State Red List Bridges for 2017**
Non-Essential Bridge (Redundant and/or short detour)	- 5.00	5
Railroad bridge over a Roadway	-3.00	3
Bridge under construction	Multiply the Final ranking score by "0" to eliminate the score and move the bridge to bottom of Red List	17
Other Considerations (Based on discussion of specific bridge)	Varies	9
No Manual Adjustment Needed	0.00	99
		Total = 133

(1) Non-Essential Bridge – Bridges in this category are considered to be redundant, generally meaning that there is a bridge of comparable functionality nearby. For this reason, it would generally have a lower ranking than other bridges on the state transportation system. Thus, this adjustment factor has a negative numerical value.

(2) Railroad Bridge over Roadway - Bridges in this category would carry an active railway over a roadway. Since a railroad bridge does not allow use by roadway vehicles, it would generally have a lower ranking than other bridges on the state transportation network. Thus, this adjustment factor has a negative numerical value.

(3) Bridges Under Construction – Ideally, bridges in this category would be undergoing active rehabilitation or replacement activities. Although the bridge database would still include characteristics identifying these structures as being on the State Red List, the construction efforts would address any identified deficiencies. For this reason, these bridges would generally have the lowest ranking, and would be moved to the bottom of the State Red List.

(4) Other Considerations – As the State Red List ranking is developed each year, the criteria and overall ranking process used the previous year is reviewed to determine whether any further adjustments are necessary. Should any discrepancies, irregularities, or unexpected results be identified, this adjustment factor provides a means of addressing this issue to develop the most accurate ranking of State Red List bridges. This might include bridges where interim activities have improved the condition of the bridge, but are known to only be short term improvements.

No manual adjustments were made for either Bridge "A" or Bridge "B".

(III) FINAL RANKING SCORE

Calculation to Determine Red List Bridge Ranking:

Final Ranking Score = [Condition + Type & Size + Importance + Risk + Capacity + Manual]

Example 1:

Bridge "A": US Route "X" over the "Some River"
Condition Component = 7.00
Type & Size Component = 6.00
Importance Component = 4.00
Risk Component = 1.25
Capacity Component = 1.10
Manual Adjustment Component = 0.00
Final Ranking Score = [7.00 + 6.00 + 3.00 + 1.25 + 1.10 + 0.00] = 18.35

Example 2:

Bridge "B": NH Route "Z" over "Unnamed Brook"
Condition Component = 2.20
Type & Size Component = 4.75
Importance Component = 2.50
Risk Component = 1.56
Capacity Component = 1.00
Manual Adjustment Component = 0.00
Final Ranking Score = [2.20 + 5.25 + 1.75 + 1.56 + 1.00 + 0.00] = 11.76

These calculations show that Bridge "A" has a higher R&R List ranking than Bridge "B" when all components are considered.

When all State Red List bridges are compared in this manner, the result is a ranking of these bridges, which is used as a primary reference when decisions are made regarding how and when transportation improvement projects are identified, selected, funded, developed, and constructed.

(IV) SUMMARY

Application of applicable adjustment factors for all components results in a ranking process for State Red List bridges, based on currently available data, that is consistent, reproducible, and transparent. This data-driven methodology ensures that the resulting State Red List ranking provides accurate information and recommendations with which to prioritize the selection, funding, development, and construction of bridge rehabilitation and construction projects.