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### 3.9 ELEMENT LEVEL INSPECTION

#### 3.9.1 Introduction

Moveable bridges are complex structures and contain components that, for a significant portion of time, do not see structural loading. Examples of these components would be lifting legs, hydraulic cylinders, equalizer cables, etc. However, because these components do experience the structural dead load of the bridge, they need to be inspected and assessed thoroughly to ensure the proper operation and safety of the structure.

While most moveable bridges are individually unique, there are several shared structural components that can be identified and assessed under the NBE, BME and ADE's discussed in Part 2 of this manual.

This chapter will aid the inspector in identifying common moveable bridge components and assigning them under the most appropriate nationally or locally recognized element.

#### 3.9.2 Inspection Safety - Lock Out / Tag Out Procedure

Prior to the inspection of a moveable bridge inspection, it is imperative that the Bridge Operator is contacted and acknowledges that inspectors will be assessing the condition of all the structural and mechanical components. If the bridge controls for the structure are not located on site, it is recommended that the control box for that structure undergo the lock out/tag out procedure to ensure that a third party unaware of inspectors within the structure do not accidentally operate the machinery creating a potentially life threatening situation.

More information on this program can be viewed at:

<https://www.osha.gov/dts/osta/lototraining/>

The operation of the moveable components of the bridge during the inspection should only occur after confirming with the inspectors to do so. Similarly, the inspectors may require the bridge to be operated in order to see and hear any potential defects during the opening/closing procedure. Clear communication between the Bridge Operator and Inspectors is required.

#### 3.9.3 Element Level Inspection

Although moveable bridges possess mechanical and electrical components as well as unique structural components, the inspector should view the bridge as a fixed structure. This visualization should be done in both the open and closed settings of the bridge. Components may become loaded in one setting versus the other. It is these components that the bridge inspection should be aware of and use his/her engineering judgement to assign the most appropriate element if possible.

WisDOT is aware of the uniqueness each moveable bridge possesses. However, there is a limited inventory of moveable structures within the State of Wisconsin. Consequently it is problematic to the development of agency defined elements (ADE's). Due to the rarity of moveable bridge components within the management system, it is not practical to create individual elements within the data management system. Thus, Wisconsin has chosen to



assess the overall condition of the entire systems unique to Moveable bridges (Electrical, Mechanical, Hydraulic, and Structural)

3.9.3.1 Movable Bridge Member Assessments

WisDOT has two moveable bridge components located under the assessments portion of the inspection report to cover the most typical components of moveable bridges. Through HSI these assessments are found through a drop down menu. Assessments are similar to elements in the method they are assessed. Each assessment is quantified and the total quantity or portion thereof, depending on the unit of measurement for each assessment, is assigned a condition rating of Good, Fair, Poor or Severe.

The assessments allow the bridge owner to track the condition of the bridge components with the same practicality as an element. The following table describes the two assessments currently located within the assessments drop down box in HSI. Refer to Part 2 of this manual for more discussion on assessments and inspection methods.

Assessment	Unit	Description
Moveable Bridge Counterweight	EA	This assessment includes all forms of counterweights. The assessment is assessed in the same manner as an element.
Moveable Bridge Cables	EA	This assessment includes all counterweight and equalizer cables within the moveable bridge system. Elements 147 Steel Cable – Primary, 148 Steel Cable – Secondary and 149 Other Cable – Secondary should not be used to assess moveable bridge cables. These elements are specifically called out in the AASHTO manual for use in suspension, cable stay or suspender cables.

**Table 3.9.3- 1:** Movable Bridge Components Located in Miscellaneous Assessments

3.9.3.2 Moveable Bridge Elements

It is recommended the inspector assess the other unique components of the bridge under common NBE’s, when applicable. For instance, purlins, which are typically found supporting steel grid decking, run perpendicular to stringers. These members are not girders, floorbeams, nor stringers. Purlins could accurately be assessed under the deck element they support. However, purlins are typically repaired or replaced at a different rate than the steel decking, therefore purlins would be most suitably assessed under Element 8170 Other Structural Members.

It is acceptable for Other Structural Members to be used more than once on an inspection report for more than one type of member. For management purposes, it may be in the inspector’s best interest to document the number of members under each type in each condition state within the structural notes for the element. This will allow for more efficient



updating and inspection during future inspections. Refer to Figure 3.9.3-1 for an example of documenting several different members under Other Structural Members.

Check	Elem	Sub	Description	Unit	Total Qty.	Quantity in Condition State			
						1	2	3	4
X	8170		<b>Other Primary Structural Members</b>	EA	80	50	18	12	
			Purlins Total = 60: 12 purlins, 6 West Abutment/ 6 East Abutment, exhibited 25% section loss over the bottom flange surface area. Remaining in good condition with no Floor Beam Cantilever Total = 20: 18 floor beam cantilevers, 4 @ NW corner, 5 @ SW sidewalk, 4 @ NE sidewalk, 5 @ SE sidewalk, exhibited moderate corrosion along bottom flange and lower web with no loss of section. Remaining in good condition with no surface corrosion noted.						

**Figure 3.9.3- 1:** Sample Breakdown of Movable Bridge Components in the Element Notes under a Common Element.

It is important to note that whenever a moveable component is used under a more generic element that the inspector specifically quantify the component within the structural notes under the element on the inspection report. This is done to clearly separate the moveable component from the fixed portions. This allows for easier editing of notes in future inspections and allows the program manager look at moveable components as necessary.

Whenever possible, the inspector should attempt to evaluate moveable components under appropriate elements. This should be done to more accurately reflect the actual condition of all structural components, moveable or fixed, and to prioritize funding for repairs or maintenance.

There are numerous moveable bridge systems and components that will not be able to be categorized under a common element. The electrical motors, hydraulic lines, counterweight and cable sheaves are examples of components that need to be evaluated and comment upon in the Movable Bridge Inspection Report forms provided separately for these unique systems for moveable bridges.

The inspection report is a legal document and should not be edited inaccurately or embellished upon so as to unfairly allocate potential funding.



# Structure Inspection Manual

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