Bearings
Elastomeric Bearing
Elastomeric Bearing

<table>
<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BELA</td>
<td>Elastomeric Bearing</td>
<td>Ea of bearing</td>
</tr>
<tr>
<td></td>
<td>This element defines only those bearings that provide for rotation and/or</td>
<td></td>
</tr>
<tr>
<td></td>
<td>longitudinal and/or transverse movement by means of elastomeric material.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>and includes rubber strip bearing pads.</td>
<td></td>
</tr>
</tbody>
</table>

For each of the condition states, report the estimated quantity in each.

**Condition state descriptions**

<table>
<thead>
<tr>
<th>Condition State</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>The element shows minimal deterioration. Shear deformations are correct for existing temperatures.</td>
</tr>
<tr>
<td>2</td>
<td>Minor cracking, splitting or other deterioration may be present. Shear deformation may be slightly excessive. Minor misalignment or lateral movement may be present. Strength and/or serviceability are not affected. Dowels may be slightly corroded.</td>
</tr>
<tr>
<td>3</td>
<td>Significant cracking, splitting or bulging may be present. Moderate misalignment or lateral movement may be present. Dowels may be severely corroded.</td>
</tr>
<tr>
<td>4</td>
<td>Advanced deterioration. Shear deformations may be excessive. Top and bottom surfaces may not be parallel. Significant misalignment or lateral movement may be present. Loss of bearing function may be imminent. Dowels may be missing, distorted or severely corroded.</td>
</tr>
</tbody>
</table>

**Key Areas to inspect** for any deterioration signs:

1. Bearing location in relation to support pads.
2. Condition of bearing and support pads.

**Rating Guidance Notes:**

The bearing rating includes the rating of the bearing pads and any supporting headstock as well as any associated dowels.

Minor movement defined as still on bearing pad.
Moderate movement defined as starting to come off mortar pad.
Significant movement defined as already off the mortar pad.
Elastomeric Bearing

Condition State 1
The element shows minimal deterioration. Shear deformations are correct for existing temperatures.

Elastomeric bearings in good condition

Elastomeric bearing in good condition. General cleaning required.
Elastomeric Bearing

Condition State 2
Minor cracking, splitting or other deterioration may be present. Shear deformation may be slightly excessive. Minor misalignment or lateral movement may be present. Strength and/or serviceability are not affected. Dowels may be slightly corroded.

Minor cracking and splitting.
Elastomeric Bearing

**Condition State 3**
Significant cracking, splitting or bulging may be present. Moderate misalignment or lateral movement may be present. Dowels may be severely corroded.

Significant splitting and bulging of bearing pads.

Significant splitting and bulging of bearing pads.
Elastomeric Bearing

**Condition State 3**
Significant cracking, splitting or bulging may be present. Moderate misalignment or lateral movement may be present. Dowels may be severely corroded.

Significant bulging of bearing pad.
Elastomeric Bearing

**Condition State 4**
Advanced deterioration. Shear deformations may be excessive. Top and bottom surfaces may not be parallel. Significant misalignment or lateral movement may be present. Loss of bearing function may be imminent. Dowels may be missing, distorted or severely corroded.

Elastomeric bearing showing excessive shear deformation.

Elastomeric strip bearing slipping out in a skewed PPLNK bridge.
Metal Bearings
Metal Bearings

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<thead>
<tr>
<th>Element</th>
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<tr>
<td>BEXP</td>
<td>Metal Expansion Bearing (Roller, sliding, etc)</td>
<td>Ea of bearing</td>
</tr>
<tr>
<td></td>
<td>This element defines only those metal bridge bearings that provide for rotation and longitudinal and/or transverse movement by means of metal roller, rocker or sliding mechanisms but not including pot bearings.</td>
<td></td>
</tr>
<tr>
<td>BFIX</td>
<td>Metal Fixed Bearing</td>
<td>Ea of bearing</td>
</tr>
<tr>
<td></td>
<td>This element defines only those metal bridge bearings that provide for rotation movement only but not including pot bearings.</td>
<td></td>
</tr>
</tbody>
</table>

For each of the condition states, report the estimated quantity in each.

Condition state descriptions

<table>
<thead>
<tr>
<th>Condition State</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The element shows minimal deterioration. If a protective coating system is present, it is sound and functioning as intended to protect the metal. Vertical and horizontal alignment is within limits. Bearing support member is sound. Any lubrication system is functioning properly.</td>
</tr>
<tr>
<td>2</td>
<td>There may be some surface corrosion with no pitting. Debris buildup is affecting bearing movement. Bearing alignment is still tolerable. The lubrication system, if any, may have failed.</td>
</tr>
<tr>
<td>3</td>
<td>There may be some corrosion with minor pitting. The assemblies may have moved enough to cause minor cracking or spalling in the supporting concrete. Debris buildup is affecting bearing movement. Bearing alignment is at or near limits.</td>
</tr>
<tr>
<td>4</td>
<td>Corrosion is advanced. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Bearing alignment may be beyond tolerable limits. Shear keys may have failed. The bearing assembly may have frozen</td>
</tr>
</tbody>
</table>

Key Areas to inspect for any deterioration signs:
1. Bearing location in relation to support pads
2. Condition of bearing and support pads

Rating Guidance Notes:
The bearing rating includes the rating of the bearing pads and any supporting headstock as well as any associated dowels
Minor movement defined as still on bearing pad
Moderate movement defined as starting to come off mortar pad
Significant movement defined as already off the mortar pad.
Metal Bearings  BEXP, BFIX

**Condition State 1**
The element shows minimal deterioration. If a protective coating system is present, it is sound and functioning as intended to protect the metal. Vertical and horizontal alignment is within limits. Bearing support member is sound. Any lubrication system is functioning properly.

Bearing in good condition.

Bearing in good condition.
**Metal Bearings**

**Condition State 2**
There may be some surface corrosion with no pitting. Debris buildup is affecting bearing movement. Bearing alignment is still tolerable. The lubrication system, if any, may have failed.

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Signs of corrosion at the edges of interface.

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Signs of surface corrosion.
Metal Bearings  

**Condition State 2**

There may be some surface corrosion with no pitting. Debris buildup is affecting bearing movement. Bearing alignment is still tolerable. The lubrication system, if any, may have failed.

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Surface corrosion of the bearing.

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Surface corrosion and some accumulation material at the interface.
Metal Bearings

**Condition State 3**
There may be some corrosion with minor pitting. The assemblies may have moved enough to cause minor cracking or spalling in the supporting concrete. Debris buildup is affecting bearing movement. Bearing alignment is at or near limits.

Looking at the condition of the bearings at the Khancoban end of the bridge.

Corrosion of the base plate with minor pitting.

Significant buildup of debris.
Metal Bearings

**Condition State 4**
Corrosion is advanced. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Bearing alignment may be beyond tolerable limits. Shear keys may have failed. The bearing assembly may have frozen.

![Image of Metal Bearing Condition State 4]

Significant loss of support under the bearing.

![Image of Metal Bearing Condition State 4]

Significant loss of support under the bearing.
Metal Bearings

**Condition State 4**
Corrosion is advanced. There may be loss of section of the supporting member sufficient to warrant supplemental supports or load restrictions. Bearing alignment may be beyond tolerable limits. Shear keys may have failed. The bearing assembly may have frozen.

Advanced corrosion of the base plate.

Significant corrosion with pitting.
Enclosed/Concealed Bearings
Enclosed/Concealed Bearings

BENC

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<thead>
<tr>
<th>Element</th>
<th>Description</th>
<th>Units</th>
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<tbody>
<tr>
<td>BENC</td>
<td>Enclosed/Concealed Bearings The element defines only those bridge bearings that are enclosed so they are not open for detailed inspection. This includes pot bearings but does not hidden elastomeric or other type of bearings</td>
<td>ea of bearing</td>
</tr>
</tbody>
</table>

For each of the condition states, report the estimated quantity in each.

**Condition state descriptions**

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<thead>
<tr>
<th>Condition State</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>The element shows no deterioration. There are no vertical or horizontal offsets. There is no cracking of support members. The support member is stable under traffic.</td>
</tr>
<tr>
<td>2</td>
<td>Both vertical and horizontal offsets are within the capability of the bearings and are not yet significant. The supported member may exhibit minimal vertical movement under traffic. There may be minor cracking or spalling of support members. There may be insignificant reduction of bearing due to superstructure shortening.</td>
</tr>
<tr>
<td>3</td>
<td>There may be minor leakage of rubber. There may be significant spalling or cracking of the support members. There may be significant reduction of bearing due to superstructure shortening.</td>
</tr>
<tr>
<td>4</td>
<td>There may be considerable leakage of rubber. Vertical and/or horizontal offsets are significant indicating bearing failures. There may be significant vertical movement under traffic. Support members may have failed.</td>
</tr>
</tbody>
</table>

**Key Areas to inspect** for any deterioration signs:

1. Bearing location in relation to support pads
2. Condition of bearing and support pads
3. Close inspection for extrusion of elastomer

**Rating Guidance Notes:**

The potential for catastrophic failure due to reduction of bearing capacity because of prestress shortening should be considered when rating this element.

The bearing rating includes the rating of the bearing pads and any supporting headstock as well as any associated dowels
Minor movement defined as still on bearing pad
Moderate movement defined as starting to come off mortar pad
Significant movement defined as already off the mortar pad.
Enclosed/Concealed Bearings  

**Condition State 1**  
The element shows no deterioration. There are no vertical or horizontal offsets. There is no cracking of support members. The support member is stable under traffic.

Enclosed bearing in good condition.

Enclosed bearing in good condition.
Enclosed/Concealed Bearings

Condition State 2
Both vertical and horizontal offsets are within the capability of the bearings and are not yet significant. The supported member may exhibit minimal vertical movement under traffic. There may be minor cracking or spalling of support members. There may be insignificant reduction of bearing due to superstructure shortening.

Loose studs on the top plate.

Enclosed bearing with surface corrosion.
Enclosed/Concealed Bearings

**Condition State 3**
There may be minor leakage of rubber. There may be significant spalling or cracking of the support members. There may be significant reduction of bearing due to superstructure shortening.

Minor leakage of rubber.

Moderate leakage of rubber.
Enclosed/Concealed Bearings

Condition State 3
There may be minor leakage of rubber. There may be significant spalling or cracking of the support members. There may be significant reduction of bearing due to superstructure shortening.

Bearings have reached their extension limit with possibility of further deck movement.

Broken seal.
Enclosed/Concealed Bearings

**Condition State 4**
There may be considerable leakage of rubber. Vertical and/or horizontal offsets are significant indicating bearing failures. There may be significant vertical movement under traffic. Support members may have failed.

Excessive damage to the guide/shear key and significant leakage of rubber.

Excessive gap at the concrete bearing interface indicating rotational limits of the bearings may have been reached.
Enclosed/Concealed Bearings

**Condition State 4**
There may be considerable leakage of rubber. Vertical and/or horizontal offsets are significant indicating bearing failures. There may be significant vertical movement under traffic. Support members may have failed.

Significant leakage of rubber.