Level 2 Inspection of 14 Timber Structures

Prepared for: Glen Innes Severn Council

Date: December 2013
Rev00
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Appendix A  Inspection Sketches
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Prepared by:  ____________________________   Date:  17 December 2013

Reviewed by:   ____________________________   Date:  17 December 2013

Authorised by:  ____________________________  Date:  17 December 2013

Report Revision History

<table>
<thead>
<tr>
<th>Rev No.</th>
<th>Description</th>
<th>Prepared by</th>
<th>Reviewed by</th>
<th>Authorised by</th>
<th>Date</th>
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<tr>
<td>A</td>
<td>Draft</td>
<td>J. Lawson</td>
<td>A. Sonnenberg</td>
<td>A. Sonnenberg</td>
<td>13/12/2013</td>
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<tr>
<td>00</td>
<td>Final Report</td>
<td>J. Lawson</td>
<td>A. Sonnenberg</td>
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1. **Introduction**

**pitt&sherry** was engaged by Glen Innes Severn Council to undertake Level 2 Inspections of 14 of their timber bridge structures. The purpose of the inspections was to assist Glen Innes Severn Council with identifying bridge components with defects that require repair or replacement, and then prioritising these works so that council can allocate their budget to undertake the rehabilitation works.

The structures to be inspected are as follows:

<table>
<thead>
<tr>
<th>Bridge ID</th>
<th>Road Name</th>
<th>Watercourse</th>
<th>No. Spans</th>
<th>Deck Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>5105</td>
<td>Bargens Road</td>
<td>Nobby Creek</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>5130</td>
<td>Cherry Tree Road</td>
<td>Furracabad Creek</td>
<td>2</td>
<td>91</td>
</tr>
<tr>
<td>5140</td>
<td>Clairville Road</td>
<td>Five Mile Creek</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>5150</td>
<td>Coxs Road</td>
<td>Deepwater Creek</td>
<td>2</td>
<td>58</td>
</tr>
<tr>
<td>5170</td>
<td>Furracabad Road</td>
<td>Furracabad Creek</td>
<td>4</td>
<td>145</td>
</tr>
<tr>
<td>5175</td>
<td>Gulf Road</td>
<td>Beardy Creek</td>
<td>5</td>
<td>180</td>
</tr>
<tr>
<td>5195</td>
<td>Polhill Road</td>
<td>Wellingrove Creek</td>
<td>3</td>
<td>97</td>
</tr>
<tr>
<td>5205</td>
<td>Glen Elgin Road</td>
<td>Glen Elgin Creek</td>
<td>2</td>
<td>80</td>
</tr>
<tr>
<td>5215</td>
<td>Mount Mitchell Road</td>
<td>Mann River</td>
<td>4</td>
<td>152</td>
</tr>
<tr>
<td>5220</td>
<td>Mount Mitchell Road</td>
<td>Yarrow River</td>
<td>2</td>
<td>60</td>
</tr>
<tr>
<td>5230</td>
<td>Mount Slow Road</td>
<td>Yarrow River</td>
<td>1</td>
<td>34</td>
</tr>
<tr>
<td>5235</td>
<td>Nine Mile Road</td>
<td>Severn River</td>
<td>10</td>
<td>232</td>
</tr>
<tr>
<td>5270</td>
<td>Shannon Vale Road</td>
<td>Mann River</td>
<td>4</td>
<td>213</td>
</tr>
<tr>
<td>5280</td>
<td>Shaws Road</td>
<td>Deepwater River</td>
<td>1</td>
<td>31</td>
</tr>
</tbody>
</table>

2. **Scope of Works**

The scope of works to be conducted by **pitt&sherry** is as follows:

- Conduct Level 2 Inspections using bridge engineers in accordance with VicRoads Road Structures Inspection Manual (April 2011)
- Record generic data for each structure such as road name, crossing details, GPS coordinates and geometry
- Identify defects and condition rate components in accordance with descriptions from Bridge Inspection Manual
- Recommend repair treatments for identified defects (based on the VicRoads Repair Manual) and estimate treatment costs
- Recommend structures for further assessment or testing as appropriate
- An inspection report for the structures containing an outline of the procedures used during the inspection, all data collected during the inspection including component condition ratings and defects, recommended repair treatments, a sketch of the structure, and recommendations for the ongoing management of the asset
- A prioritised maintenance schedule for the identified defects
3. Inspection Methodology

The Level 2 Inspections were conducted in accordance with the methodology outlined in the VicRoads Inspection Manual (2011) using the software BridgeAsyst® along with a tablet inspection app for capturing Level 2 inspection data (developed by pitt&sherry). Components were inspected from the ground up on foot, to determine their condition and give them a rating. Although VicRoads recommends rating of components in percentages, in this report the conditions has been supplied in quantities at the request of Council. Any defects identified were noted down and images of the defects and generic photos of the structure were catalogued.

For each defect, a recommendation for treatment was made, along with a cost estimate and an urgency at which the recommended action should be undertaken. The urgencies assigned to the defects are as follows:

- **Urgency 1**: Repairs are required immediately as the component has failed or there is a high risk of failure of the component or a high risk of danger to the public
- **Urgency 2**: Repairs are required within the next 6 to 12 months or there could be a moderate risk of failure of the component or a moderate risk of danger to the public
- **Urgency 3**: Repairs are required within the next 1 to 2 years or there could be a small risk of failure of the component or a small risk of danger to the public
- **Urgency 4**: Repairs are more of a cosmetic type with little effect on strength of the component but may have a reasonable effect on the durability of the member. Strengthening may be required in the next 3 to 5 years as further deterioration occurs
- **Urgency 5**: Repairs are solely cosmetic having no effect on strength of the component and little effect on its durability

After completing the component rating, and identifying all defects in the structure an overall condition of the structure was assigned from 1 through to 5, where:

- **Overall Condition of 1**: Good
- **Overall Condition of 2**: Fair
- **Overall Condition of 3**: Poor
- **Overall Condition of 4**: Very Poor
- **Overall Condition of 5**: Disaster
4. Structure Inspections

4.1 Structure 5105

4.1.1 General Details
Structure 5105 is a single span timber structure located on Bargens Rd, crossing over Nobby Creek.
The structure was inspected by Albert Molina pitt&sherry on 8 December, 2013.

4.1.2 Generic Details
Structure 5105 is constructed from timber girders with a timber deck and substructure.
The structure has the following geometric properties:

- Length: 8.4 metres
- Width: 4.0 metres
- Number of spans: 1
- Number of beams: 5
- Structure over: Water
- Structure usage: Road

The overall condition of the structure is 4 (Very poor)
Generic photos of the structure are shown in Figure 1 to Figure 3.

Figure 1 Structure 5105: Deck
4.1.3 Condition Rating

<table>
<thead>
<tr>
<th>Comp. no.</th>
<th>Description</th>
<th>Exp. class</th>
<th>Qty.</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2T</td>
<td>Open Girders/Stringers: Timber</td>
<td>1</td>
<td>4 each</td>
<td>2</td>
</tr>
<tr>
<td>10T</td>
<td>Longdecking/Crossdecking: Timber</td>
<td>1</td>
<td>34m²</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24T</td>
<td>Abutment: Timber</td>
<td>2</td>
<td>4m²</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50T</td>
<td>Kerbs/Footways: Timber</td>
<td>1</td>
<td>17m</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52O</td>
<td>Bridge Approaches: Other</td>
<td>1</td>
<td>2 each</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>54O</td>
<td>Crossing - Waterway: Other</td>
<td>1</td>
<td>1 each</td>
<td>1</td>
</tr>
<tr>
<td>55S</td>
<td>Guardfence: Steel</td>
<td>1</td>
<td>0m</td>
<td></td>
</tr>
</tbody>
</table>

The middle three timber stringers could not be fully inspected due to restricted access under the structure from the high water level and low clearance of the structure.

4.1.4 Defects

The following sections highlight the defects that were identified during the inspection, along with the methods that may be used to repair the structures and a cost estimate for those repairs.

**Open Girders/Stringers: Timber**

**Defect 1**
There is splitting and decay of the outer timber stringers (Figure 4). The inner stringers could not be inspected due to the low clearance of the structure and the high water level. It is expected that the members are in a similar condition to the outer stringers.

It is recommended that this be monitored at future inspections with the purpose of identifying the rate of deterioration of the members. Due to the condition of the bed logs (see below) replacement of the structure may need to be considered.

The estimated cost of the replacement is $120,000.

The treatment urgency for the repairs is Urgency 3.

**Longdecking/Crossdecking: Timber**

**Defect 2**
There are signs of deterioration of up to 4m² of the decking area. At one location a decking member has completely failed (Figure 5).

The recommended treatment is as follows:

- Replace damaged and failed areas of decking

The estimated cost of the repair works is $1,000.

The treatment urgency for the repairs is Urgency 3.

**Abutment: Timber**

**Defect 3**
There is severe splitting and pipe rot of the bed logs at both abutments (Figure 6).

The recommended treatment is as follows:

- Replace timber bed logs, however due to the condition of the rest of the structure it may be more cost effective for Council to consider replacing the structure with concrete box culverts or a short span bridge
The estimated cost of the repair works is $20,000. The estimated cost of the replacement is $120,000.

The treatment urgency for the repairs is Urgency 2.

**Guardfence: Steel**

**Defect 4**
There is no guardfence present at the structure.

The recommended treatment is as follows:

- Carry out risk assessment to determine if guardfence is required at the site

The estimated cost of the repair works is $500.

The treatment urgency for the repairs is Urgency 3.

![Figure 4 Structure 5105: Defect 1 - Splitting and decay of timber stringers](image-url)
Figure 5  Structure 5105: Defect 2 - Failure of timber decking member

Figure 6  Structure 5105: Defect 3 - Severe splitting and pipe rot of bed logs
4.2 Structure 5130

4.2.1 General Details
Structure 5130 is a two span timber structure located on Cherry Tree Rd, crossing over Furracabad Creek.
The structure was inspected by Albert Molina pitt&sherry on 4 December 2013.

4.2.2 Generic Details
Structure 5130 is constructed from timber girders with a timber deck and substructure (there is concrete jacketing around the timber piles).
The structure has the following geometric properties:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>18.3 metres</td>
</tr>
<tr>
<td>Width</td>
<td>5.2 metres</td>
</tr>
<tr>
<td>Number of spans</td>
<td>2</td>
</tr>
<tr>
<td>Number of beams</td>
<td>8</td>
</tr>
<tr>
<td>Structure over</td>
<td>Water</td>
</tr>
<tr>
<td>Structure usage</td>
<td>Road</td>
</tr>
</tbody>
</table>

The overall condition of the structure is 3 (Poor)
Generic photos of the structure are shown in Figure 7 to Figure 9.
Figure 8 Structure 5130: Elevation

Figure 9 Structure 5130: Soffit
4.2.3 Condition Rating

<table>
<thead>
<tr>
<th>Comp. no.</th>
<th>Description</th>
<th>Exp. class</th>
<th>Qty.</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2T</td>
<td>Open Girders/Stringers: Timber</td>
<td>1</td>
<td>8 each</td>
<td>3 1</td>
</tr>
<tr>
<td>7T</td>
<td>Corbels: Timber</td>
<td>1</td>
<td>4 each</td>
<td>8 6</td>
</tr>
<tr>
<td>10T</td>
<td>Longdecking/Crossdecking: Timber</td>
<td>1</td>
<td>95m²</td>
<td>91 4</td>
</tr>
<tr>
<td>22T</td>
<td>Column or Pile Extensions: Timber</td>
<td>2</td>
<td>12 each</td>
<td>8 4</td>
</tr>
<tr>
<td>24T</td>
<td>Abutment: Timber</td>
<td>2</td>
<td>14m²</td>
<td>14</td>
</tr>
<tr>
<td>50T</td>
<td>Kerbs/Footways: Timber</td>
<td>1</td>
<td>37m</td>
<td>37</td>
</tr>
<tr>
<td>52O</td>
<td>Bridge Approaches: Other</td>
<td>1</td>
<td>2 each</td>
<td>2</td>
</tr>
<tr>
<td>53O</td>
<td>Batter Protection: Other</td>
<td>1</td>
<td>2 each</td>
<td>2</td>
</tr>
<tr>
<td>54O</td>
<td>Crossing - Waterway: Other</td>
<td>1</td>
<td>1 each</td>
<td>1</td>
</tr>
<tr>
<td>55S</td>
<td>Guardfence: Steel</td>
<td>1</td>
<td>0m</td>
<td>0</td>
</tr>
</tbody>
</table>

The timber piles could not be inspected as all timber piles have concrete jacketing. The condition rating above is based on the observations of the jacketing.

4.2.4 Defects

The following sections highlight the defects that were identified during the inspection, along with the methods that may be used to repair the structures and a cost estimate for those repairs.

**Corbels: Timber**

**Defect 1**
There is heavy splitting to one corbel at the centre pier (Figure 10).

The recommended treatment is as follows:
- Install cross bolts into timber corbel and then monitor performance at future inspections

The estimated cost of the repair works is $1,000.
The treatment urgency for the repairs is Urgency 3.

**Longdecking/Crossdecking: Timber**

**Defect 2**
There are signs of deterioration of up to 4m² of the decking area (Figure 11).

The recommended treatment is as follows:
- Replace deteriorated members

The estimated cost of the repair works is $1,000.
The treatment urgency for the repairs is Urgency 3.

**Column or Pile Extensions: Timber**

**Defect 3**
There is severe cracking of the concrete jacketing of four of the timber piles at the pier location (Figure 12).

The recommended treatment is as follows:
- Determine if design drawings or records exist for the jacketing
- If not break back concrete to investigate condition of timber piles under the supervision of an engineer. Follow up with a reinstatement of jacketing with reinforcement or column pile splice (depending on the condition of the encased timber)

The estimated cost of the repair works is $20,000.
The treatment urgency for the repairs is **Urgency 2**.

**Guardfence: Steel**

**Defect 4**
There is no guardfence present at the structure.
The recommended treatment is as follows:
- Carry out risk assessment to determine if Guardfence is required at the site
The estimated cost of the repair works is $500.
The treatment urgency for the repairs is **Urgency 3**.

Figure 10  Structure 5130: Defect 1 - Heavy splitting of one corbel
Figure 11  Structure 5130: Defect 2 - Deterioration of decking members

Figure 12  Structure 5130: Defect 3 - Sever cracking in concrete jacketing of timber piles
4.3 Structure 5140

4.3.1 General Details
Structure 5140 is a single span timber structure located on Clairville Rd, crossing over Five Mile Creek.
The structure was inspected by Albert Molina pitt&sherry on 4 December 2013.

4.3.2 Generic Details
Structure 5140 is constructed from timber girders with a timber deck and substructure.
The structure has the following geometric properties:

- **Length:** 7.6 metres
- **Width:** 5.5 metres
- **Number of spans:** 1
- **Number of beams:** 4
- **Structure over:** Water
- **Structure usage:** Road

The overall condition of the structure is 2 (Fair)
Generic photos of the structure are shown in Figure 13 to Figure 15.

![Figure 13 Structure 5140: Deck](image-url)
Figure 14  Structure 5140: Elevation

Figure 15  Structure 5140: Soffit
4.3.3 Condition Rating

<table>
<thead>
<tr>
<th>Comp. no.</th>
<th>Description</th>
<th>Exp. class</th>
<th>Qty.</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2T</td>
<td>Open Girders/Stringers: Timber</td>
<td>1</td>
<td>4 each</td>
<td>2</td>
</tr>
<tr>
<td>10T</td>
<td>Longdecking/Crossdecking: Timber</td>
<td>1</td>
<td>42m²</td>
<td>12 25 5</td>
</tr>
<tr>
<td>24T</td>
<td>Abutment: Timber</td>
<td>2</td>
<td>5m²</td>
<td>5</td>
</tr>
<tr>
<td>50T</td>
<td>Kerbs/Footways: Timber</td>
<td>1</td>
<td>15m</td>
<td>15</td>
</tr>
<tr>
<td>52O</td>
<td>Bridge Approaches: Other</td>
<td>1</td>
<td>2 each</td>
<td>2</td>
</tr>
<tr>
<td>53O</td>
<td>Batter Protection: Other</td>
<td>1</td>
<td>2 each</td>
<td>2</td>
</tr>
<tr>
<td>54O</td>
<td>Crossing - Waterway: Other</td>
<td>1</td>
<td>1 each</td>
<td>1</td>
</tr>
<tr>
<td>55S</td>
<td>Guardfence: Steel</td>
<td></td>
<td>0m</td>
<td></td>
</tr>
</tbody>
</table>

The middle two timber stringers could not be fully inspected due to restricted access under the structure from the high water level and low clearance of the structure.

4.3.4 Defects

The following sections highlight the defects that were identified during the inspection, along with the methods that may be used to repair the structures and a cost estimate for those repairs.

**Open Girders/Stringers: Timber**

Defect 1

There is minor weathering and splitting of the timber stringers, but it is not of concern at this stage (Figure 16).

It is recommended that this be monitored at future inspections.

**Longdecking/Crossdecking: Timber**

Defect 2

There is deterioration to up to 5m² of the decking area with 5 members requiring replacement (Figure 17).

The recommended treatment is as follows:

- Replace heavily deteriorated members and monitor remainder at future inspections

The estimated cost of the repair works is $1,250.

The treatment urgency for the repairs is Urgency 3.

**Abutment: Timber**

Defect 3

There is minor splitting of the abutment bed logs (Figure 18).

It is recommended that this be monitored at future inspections.

**Guardfence: Steel**

Defect 5

There is no guardfence present at the structure.

The recommended treatment is as follows:

- Carry out risk assessment to determine if Guardfence is required at the site

The estimated cost of the repair works is $500.
The treatment urgency for the repairs is Urgency 3.

Figure 16  Structure 5140: Defect 1 - Minor weathering and splitting of timber stringers

Figure 17  Structure 5140: Defect 2 - Deterioration of decking members
Figure 18  Structure 5140: Defect 3 - Minor splitting of abutment bed logs
4.4 Structure 5150

4.4.1 General Details
Structure 5150 is a two span timber structure located on Coxs Rd, crossing over Deepwater River.
The structure was inspected by Albert Molina pitt&sherry on 3 December, 2013.

4.4.2 Generic Details
Structure 5150 is constructed from timber girders with a timber deck and a concrete substructure.
The structure has the following geometric properties:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>15.6 metres</td>
</tr>
<tr>
<td>Width</td>
<td>4.2 metres</td>
</tr>
<tr>
<td>Number of spans</td>
<td>2</td>
</tr>
<tr>
<td>Number of beams</td>
<td>8</td>
</tr>
<tr>
<td>Structure over</td>
<td>Water</td>
</tr>
<tr>
<td>Structure usage</td>
<td>Road</td>
</tr>
</tbody>
</table>

The overall condition of the structure is 2 (Fair)
Generic photos of the structure are shown in Figure 19 to Figure 21.
Figure 20  Structure 5150: Elevation

Figure 21  Structure 5150: Soffit
4.4.3 **Condition Rating**

<table>
<thead>
<tr>
<th>Comp. no.</th>
<th>Description</th>
<th>Exp. class</th>
<th>Qty.</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2T</td>
<td>Open Girders/Stringers: Timber</td>
<td>1</td>
<td>8 each</td>
<td>8</td>
</tr>
<tr>
<td>7T</td>
<td>Corbels: Timber</td>
<td>1</td>
<td>3 each</td>
<td>3</td>
</tr>
<tr>
<td>10T</td>
<td>Longdecking/Crossdecking: Timber</td>
<td>1</td>
<td>70m²</td>
<td>65 5</td>
</tr>
<tr>
<td>20T</td>
<td>Cross Heads (non integral): Timber</td>
<td>1</td>
<td>2 each</td>
<td>2</td>
</tr>
<tr>
<td>20S</td>
<td>Cross Heads (non integral): Steel</td>
<td>1</td>
<td>1 each</td>
<td>1</td>
</tr>
<tr>
<td>23C</td>
<td>Pier Wall: Cast-In-Situ Concrete</td>
<td>2</td>
<td>8m²</td>
<td>8</td>
</tr>
<tr>
<td>24T</td>
<td>Abutment: Cast-In-Situ Concrete</td>
<td>2</td>
<td>16m²</td>
<td>16</td>
</tr>
<tr>
<td>50T</td>
<td>Kerbs/Footways: Timber</td>
<td>1</td>
<td>32m</td>
<td>28 4</td>
</tr>
<tr>
<td>52O</td>
<td>Bridge Approaches: Other</td>
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<td>2</td>
</tr>
<tr>
<td>53O</td>
<td>Batter Protection: Other</td>
<td>1</td>
<td>2 each</td>
<td>2</td>
</tr>
<tr>
<td>54O</td>
<td>Crossing - Waterway: Other</td>
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<td>1 each</td>
<td>1</td>
</tr>
<tr>
<td>55S</td>
<td>Guardfence: Steel</td>
<td>1</td>
<td>0m</td>
<td></td>
</tr>
</tbody>
</table>

4.4.4 **Defects**

The following sections highlight the defects that were identified during the inspection, along with the methods that may be used to repair the structures and a cost estimate for those repairs.

**Longdecking/Crossdecking: Timber**

Defect 1
There is deterioration to up to 5m² of the decking area with 5 members requiring replacement (Figure 22).

The recommended treatment is as follows:
- Replace deteriorated decking members

The estimated cost of the repair works is $1,250.

The treatment urgency for the repairs is Urgency 3.

**Cross Heads: Steel**

Defect 2
There is surface rusting to the steel crosshead at the abutment (Figure 23).

It is recommended that this be monitored at future inspections.

**Abutment: Cast-In-Situ Concrete**

Defect 3
There is a minor vertical crack in one concrete abutment (Figure 24).

It is recommended that this be monitored at future inspections.

**Kerbs/Footways: Timber**

Defect 4
There is severe deterioration of approximately 4m of the timber kerb (Figure 25).
The recommended treatment is as follows:
- Replace damaged member

The estimated cost of the repair works is $500.
The treatment urgency for the repairs is Urgency 3.

**Bridge Approaches: Other**

**Defect 5**
There is loss of fill at both bridge approaches (Figure 26).
The recommended treatment is as follows:
- Replace lost fill material

The estimated cost of the repair works is $2000.
The treatment urgency for the repairs is Urgency 3.

**Guardfence: Steel**

**Defect 5**
There is no guardfence present at the structure.
The recommended treatment is as follows:
- Carry out risk assessment to determine if Guardfence is required at the site

The estimated cost of the repair works is $500.
The treatment urgency for the repairs is Urgency 3.

Figure 22  Structure 5150: Defect 1 - Deterioration of decking members
Figure 23  Structure 5150: Defect 2 - Surface rusting of steel cross head

Figure 24  Structure 5150: Defect 3 - Minor crack in concrete abutment
Figure 25  Structure 5150: Defect 4 - Damage to timber kerb

Figure 26  Structure 5150: Defect 5 - Loss of fill at edge of bridge approaches
4.5 **Structure 5170**

4.5.1 **General Details**  
Structure 5170 is a four span timber structure located on Furracabad Rd, crossing over Furracabad Creek.  
The structure was inspected by Albert Molina **pitt&sherry** on 4 December, 2013.

4.5.2 **Generic Details**  
Structure 5170 is constructed from timber girders with a timber deck and substructure.  
The structure has the following geometric properties:

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>30.3 metres</td>
</tr>
<tr>
<td>Width</td>
<td>5.0 metres</td>
</tr>
<tr>
<td>Number of spans</td>
<td>4</td>
</tr>
<tr>
<td>Number of beams</td>
<td>16</td>
</tr>
<tr>
<td>Structure over</td>
<td>Water</td>
</tr>
<tr>
<td>Structure usage</td>
<td>Road</td>
</tr>
</tbody>
</table>

The overall condition of the structure is 4 (Very Poor)  
Generic photos of the structure are shown in Figure 27 to Figure 29.
Figure 28 Structure 5170: Elevation

Figure 29 Structure 5170: Soffit
### 4.5.3 Condition Rating

<table>
<thead>
<tr>
<th>Comp. no.</th>
<th>Description</th>
<th>Exp. class</th>
<th>Qty.</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2T</td>
<td>Open Girders/Stringers: Timber</td>
<td>1</td>
<td>16 each</td>
<td>16</td>
</tr>
<tr>
<td>7T</td>
<td>Corbels: Timber</td>
<td>1</td>
<td>12 each</td>
<td>8</td>
</tr>
<tr>
<td>10T</td>
<td>Longdecking/Crossdecking: Timber</td>
<td>1</td>
<td>150m²</td>
<td>15</td>
</tr>
<tr>
<td>20T</td>
<td>Cross Heads (non integral): Timber</td>
<td>1</td>
<td>5 each</td>
<td>5</td>
</tr>
<tr>
<td>22T</td>
<td>Column or Pile Extensions: Timber</td>
<td>2</td>
<td>17 each</td>
<td>8</td>
</tr>
<tr>
<td>24T</td>
<td>Abutment: Timber</td>
<td>2</td>
<td>18m²</td>
<td>18</td>
</tr>
<tr>
<td>50T</td>
<td>Kerbs/Footways: Timber</td>
<td>1</td>
<td>60m</td>
<td>60</td>
</tr>
<tr>
<td>52O</td>
<td>Bridge Approaches: Other</td>
<td>1</td>
<td>2 each</td>
<td>2</td>
</tr>
<tr>
<td>53O</td>
<td>Batter Protection: Other</td>
<td>1</td>
<td>2 each</td>
<td>2</td>
</tr>
<tr>
<td>54O</td>
<td>Crossing - Waterway: Other</td>
<td>1</td>
<td>1 each</td>
<td>1</td>
</tr>
<tr>
<td>55S</td>
<td>Guardfence: Steel</td>
<td>1</td>
<td>60m</td>
<td>60</td>
</tr>
</tbody>
</table>

### 4.5.4 Defects

The following sections highlight the defects that were identified during the inspection, along with the methods that may be used to repair the structures and a cost estimate for those repairs.

**Open Girders/Stringers: Timber**

**Defect 1**

There is surface deterioration and weathering of all timber stringers (Figure 30).

It is recommended that this be monitored at future inspections with the purpose of identifying the rate of deterioration of the members. Due to the condition of the piles (see below) replacement of the structure may need to be considered.

**Corbels: Timber**

**Defect 2**

There is splitting and decay of the corbels (Figure 31). Four of the corbels are severely split and require replacement. Three others are showing signs of splitting and should be monitored in future inspections.

The recommended treatment is as follows:

- Install cross bolts into severely split timber corbels and then monitor performance at future inspections
- Monitor remaining corbels at future inspections

The estimated cost of the repair works is $4000.

The treatment urgency for the repairs is **Urgency 2**.

**Longdecking/Crossdecking: Timber**

**Defect 3**

There is deterioration to up to 8m² of the decking area with 8 members requiring replacement (Figure 32).
The recommended treatment is as follows:
- Replace heavily deteriorated members and monitor remainder at future inspections

The estimated cost of the repair works is $2,000.
The treatment urgency for the repairs is Urgency 3.

_Colom or Pile Extensions: Timber_

**Defect 4**
There is moderate to severe splitting and rot of 9 timber piles both at the abutments and the piers (Figure 33). The bracing of the timber columns is also heavily deteriorated at the pier locations.
The recommended treatment is as follows:
- Dewater around the structure and repair/replace heavily split timber piles
- The cost of this may be prohibitive and therefore Council may wish to consisted replacement of the structure

The estimated cost of the repair works is $80,000. The estimated cost of replacement is $550,000.
The treatment urgency for the repairs is Urgency 2.

_Bridge Approaches: Other_

**Defect 5**
There is potholing and cracking of the asphalt approaches (Figure 34).
The recommended treatment is as follows:
- Re-asphalt bridge approach

The estimated cost of the repair works is $3,000.
The treatment urgency for the repairs is Urgency 3.
Figure 30  Structure 5170: Defect 1 - Surface deterioration/weathering of timber stringers

Figure 31  Structure 5170: Defect 2 - Severe splitting to timber corbels
Figure 32 Structure 5170: Defect 3 - Deterioration of decking members

Figure 33 Structure 5170: Defect 4 - Severe splitting and rot to timber piles
Figure 34 Structure 5170: Defect 5 - Potholing and cracking of approach
4.6 Structure 5175

4.6.1 General Details
Structure 5175 is a five span timber structure located on Gulf Rd, crossing over Beardy River.
The structure was inspected by Albert Molina pitt&sherry on 3 December, 2013

4.6.2 Generic Details
Structure 5175 is constructed from timber girders with a timber deck and concrete substructure.
The structure has the following geometric properties:

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>42.4 metres</td>
</tr>
<tr>
<td>Width</td>
<td>4.2 metres</td>
</tr>
<tr>
<td>Number of spans</td>
<td>5</td>
</tr>
<tr>
<td>Number of beams</td>
<td>15</td>
</tr>
<tr>
<td>Structure over</td>
<td>Water</td>
</tr>
<tr>
<td>Structure usage</td>
<td>Road</td>
</tr>
</tbody>
</table>

The overall condition of the structure is 3 (Poor)
Generic photos of the structure are shown in Figure 35 to Figure 37.

Figure 35 Structure 5175: Deck
Figure 36  Structure 5175: Elevation

Figure 37  Structure 5175: Soffit
4.6.3 Condition Rating

<table>
<thead>
<tr>
<th>Comp. no.</th>
<th>Description</th>
<th>Exp. class</th>
<th>Qty.</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>2T</td>
<td>Open Girders/Stringers: Timber</td>
<td>1</td>
<td>15 each</td>
<td>14 1</td>
</tr>
<tr>
<td>7T</td>
<td>Corbels: Timber</td>
<td>1</td>
<td>12 each</td>
<td>11 1</td>
</tr>
<tr>
<td>10T</td>
<td>Longdecking/Crossdecking: Timber</td>
<td>1</td>
<td>180m²</td>
<td>176 4</td>
</tr>
<tr>
<td>20S</td>
<td>Cross Heads (non integral): Steel</td>
<td>1</td>
<td>6 each</td>
<td>6</td>
</tr>
<tr>
<td>23C</td>
<td>Pier Wall: Cast-In-Situ Concrete</td>
<td>2</td>
<td>20m²</td>
<td>20</td>
</tr>
<tr>
<td>24C</td>
<td>Abutment: Cast-In-Situ Concrete</td>
<td>2</td>
<td>14m²</td>
<td>14</td>
</tr>
<tr>
<td>50T</td>
<td>Kerbs/Footways: Timber</td>
<td>1</td>
<td>85m</td>
<td>65 20</td>
</tr>
<tr>
<td>52O</td>
<td>Bridge Approaches: Other</td>
<td>1</td>
<td>2 each</td>
<td>2</td>
</tr>
<tr>
<td>54O</td>
<td>Crossing - Waterway: Other</td>
<td>1</td>
<td>1 each</td>
<td>1</td>
</tr>
<tr>
<td>55S</td>
<td>Guardfence: Steel</td>
<td>1</td>
<td>0m</td>
<td></td>
</tr>
</tbody>
</table>

4.6.4 Defects

The following sections highlight the defects that were identified during the inspection, along with the methods that may be used to repair the structures and a cost estimate for those repairs.

**Open Girders/Stringers: Timber**

**Defect 1**
There is one severely split timber stringer (Figure 38), with minor deterioration and splitting of other timber members.

The recommended treatment is as follows:

- Replace member

The estimated cost of the repair works is $15,000.

The treatment urgency for the repairs is Urgency 2.

**Corbels: Timber**

**Defect 2**
There is splitting and deterioration of 1 timber corbel (Figure 39).

The recommended treatment is as follows:

- Replace member

The estimated cost of the repair works is $10,000.

The treatment urgency for the repairs is Urgency 2.

**Longdecking/Crossdecking: Timber**

**Defect 3**
There is deterioration to up to 4m² of the decking area with 4 members requiring replacement (Figure 40).

The recommended treatment is as follows:

- Replace heavily deteriorated members and monitor remainder at future inspections

The estimated cost of the repair works is $1,000.