Caversham Valley Safety Improvements

Challenges faced at the Lookout Point Bridge
Introduction

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Lookout Point Bridge
Geotechnical Considerations

1. Geological Setting
2. Geotechnical Features
3. Ground Improvements
4. Bridge Piles
GEOLOGICAL SETTING

1. Overlying colluvial soils and fill
2. Massive Sandstone basement
3. Sandstone surface deeply weathered
4. Very weak soil layer
GEOTECHNICAL FEATURES

• Very weak soil presence confirmed
• Susceptible to loading
• Especially under severe seismic loading
• SH1 is a lifeline route – high post seismic reliability
GROUND IMPROVEMENT

• Various GI options examined
• Susceptible to settlement and slope deformation
• Especially under severe seismic loading
• SH1 is a lifeline route – high post seismic reliability
GEOTECHNICAL FEATURES

• Significant additional features present
• Sandstone basement not massive
• Faulting not previously mapped
• Is it an active feature?
• Affected local rock mass weathering and strength?
Geotechnical features

- Section on pile line
- Socket in fault gouge
- Passing through void
- Crown collapse risk
GROUND IMPROVEMENT

- Various treatment options considered
- Decided to infill void
- Water and loose sand present
- Low strength pumped concrete
GROUND IMPROVEMENT

- Multiple ports through crown
- Pump out water and sand slurry
BRIDGE PILES

1. Low socket capacity
2. Residual risk of ground displacement.
3. Piles susceptible to excessive lateral strain.
4. Adopt eccentric sleeves above long sockets
<table>
<thead>
<tr>
<th></th>
<th>Southern Abutment P1 &amp; P2</th>
<th>Pier P3 &amp; P4</th>
<th>Northern Abutment P6 (P5 &amp; P7 less crit)</th>
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</thead>
<tbody>
<tr>
<td>ULS Factored Axial Demand</td>
<td>3790 kN</td>
<td>5220 kN</td>
<td>3995 kN</td>
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<td>Ideal ULS total axial capacity</td>
<td>8067 kN</td>
<td>8319 kN</td>
<td>10363 kN</td>
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<td>GSRF for no PDA testing</td>
<td>0.56</td>
<td>0.56</td>
<td>0.52</td>
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<td>Reliable ULS total axial capacity</td>
<td>4517 kN</td>
<td>4658 kN</td>
<td>5388 kN</td>
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<tr>
<td>Reliable Capacity / Factored Demand</td>
<td>119%</td>
<td>89%</td>
<td>134%</td>
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