Background & construction staging

Minor structures

New viaduct

Existing viaduct deconstruction

Management of key risks
Existing Newmarket Viaduct

- Constructed in 1966
- First bridge of its size & type in the southern hemisphere
- Constructed using insitu balanced cantilever methods
- First bridge designed in NZ using a computer
Existing Newmarket Viaduct

• Two separate parallel twin cell box girders
• Light construction with thin deck slab
• Major cracking from differential temperature effects before viaduct opening
• External P/T & white surfacing added
Existing Newmarket Viaduct
Existing Newmarket Viaduct
Deconstruction of existing southbound viaduct
Typical pier arrangement
Typical pier arrangement

Hinge at pier base

Post-tensioned diaphragm at piers
Typical pier arrangement
Temporary works for transverse stability
Deconstruction temporary works
Pier head brackets
Pier head brackets

Shear friction interfaces
Temporary Works – typical pier
Typical deconstruction cycle
Controlling energy release at midspan cuts

Horizontally mounted jack. Pressurised to a load equivalent to the bending moment in the section

Closure Segment
Deconstruction – first segments
Deconstruction – removal using Big Blue
Original viaduct construction
The original viaduct constructors
Investigating existing structure’s condition
Ground penetrating radar surveys
Controls & monitoring programme

- Check deflections of cantilever tip relative to pier
- Determine ‘safe’ crack widths (only possible at specific locations)
- Check relative deflections at first cut in span
- Check actual force against analysis prior to adjusting prop loads
- Check actual deflection of pier after deck cuts
Background & construction staging

Minor structures

New viaduct

Existing viaduct deconstruction

Management of key risks
## Summary of Key Risks

<table>
<thead>
<tr>
<th></th>
<th>Total Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risks</td>
<td>78</td>
</tr>
<tr>
<td>Extreme Threats</td>
<td>1</td>
</tr>
<tr>
<td>Very High Threats</td>
<td>11</td>
</tr>
<tr>
<td>High Threats</td>
<td>35</td>
</tr>
<tr>
<td>Moderate/ Minor Threats</td>
<td>31</td>
</tr>
<tr>
<td>Response Plans</td>
<td>300</td>
</tr>
</tbody>
</table>
### Summary of Key Risks

<table>
<thead>
<tr>
<th>Very High Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Materials falling from viaduct</td>
</tr>
<tr>
<td>3 Failure of temporary works</td>
</tr>
<tr>
<td>4 Existing structure condition leads to distress/failure</td>
</tr>
<tr>
<td>5 Working adjacent to live traffic (ramps &amp; local roads)</td>
</tr>
<tr>
<td>6 Awareness &amp; adherence to safety practices</td>
</tr>
<tr>
<td>7 Lack of knowledge of existing structure stops deconstruction</td>
</tr>
<tr>
<td>8 Restrictions imposed on working hours</td>
</tr>
<tr>
<td>9 Precast segment production rate is lower than assumed</td>
</tr>
<tr>
<td>10 Higher than assumed delay due to rain</td>
</tr>
<tr>
<td>11 Higher than assumed delay due to wind</td>
</tr>
</tbody>
</table>
### Summary of Key Risks

<table>
<thead>
<tr>
<th>Extreme Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Working adjacent to live traffic (SH1)</td>
</tr>
</tbody>
</table>


Working adjacent to live traffic
Risk ID 19432
Working adjacent to live traffic
Risk ID 19432

Risks

- Vehicle impact with barriers, workers or plant
- Loose objects falling from vehicles
- Traffic accidents
- Traffic congestion
Working adjacent to live traffic
Risk ID 19432

Risk Mitigation
Working adjacent to live traffic
Risk ID 19432

SH1 Southbound Newmarket Viaduct
Jan 2008 - Mar 2009 Median Southbound Flow

Low speed vehicle ‘shunt’ accidents & traffic congestion
Speeding & reckless driving. High speed vehicle accidents
Working adjacent to live traffic
Risk ID 19432

Risk Mitigation

• Speed limit - 70km/h S/B & 80km/h N/B
• Advance warning - VMS advance notices
• Signage & lining - warning signs & high spec lining
• Speed enforcement - increased Police presence
• Incidence response - additional CCTV
• Temp. lane closures - eg for gantry launching
• Road user education communications - local & regional
Working adjacent to live traffic
The ‘Switch’ weekend SH1 closure
Working adjacent to live traffic
The ‘Switch’ weekend SH1 closure

Northern Approach South Bound Handover Strategy

Prior to big weekend
- Pavement to northern approach
- Gantry launches to northern approach

Big Weekend
- Divert traffic
- Pavement tie-in
- Transverse slide Gantry
- Line marking

Open traffic to new Sth bnd viaduct
Working adjacent to live traffic

The ‘Switch’ weekend SH1 closure

SH1 CLOSURE CHANGE
4-5 SEPT

36 HOUR CLOSURE of the southbound Southern Motorway over Newmarket and opening of the NEW SOUTHBOUND Newmarket Viaduct

www.nzta.govt.nz/newmarketconnection
Freephone 0508 CONNECT (266 6328)

www.facebook.com/switchmyroute

SOUTHERNMOTORWAYCLOSEDSUNDAYSEPT 5
The Viaduct Walk
Over 12,000 people & $12,000 raised for charity
Working adjacent to live traffic

The ‘Switch’ weekend SH1 closure
Working adjacent to live traffic
The ‘Switch’ weekend SH1 closure
Working adjacent to live traffic
The ‘Switch’ weekend SH1 closure
# Summary of Key Risks

<table>
<thead>
<tr>
<th><strong>Extreme Threats</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Working adjacent to live traffic (SH1)</td>
</tr>
</tbody>
</table>

*Needs YOUR help!*
The most challenging phase is now!
Please help us to achieve Zero Harm
Background & construction staging

Minor structures

New viaduct

Existing viaduct deconstruction

Management of key risks