Auckland, New Zealand - population of 1.4Mio.

Project First mooted in 1956

Various routes considered, including full surface option or extended cut and cover

Combination of surface, bored tunnel and cut and cover tunnel announced May 2009

Western Ring route identified as 1 of 7 Roads of national significance (RONS)

Missing link between SH 20 and SH 16

Provides a 48km motorway linking Manukau, Auckland, Waitakere, North Shore and the Airport.

4.5km of new motorway, 2.5km of which comprises two three lane tunnels.
Waterview Connection

- 5km long 3-lane motorway comprising 35 lane-km
- Two 2.4 km long 13.1 m diameter bored tunnels
- Two vent buildings
- Six road bridges – 1,800 m total length
- One long span footbridge and several smaller structures
- Over 3 km of retention structures
- Extensive urban improvements and landscaping
- Operations and Maintenance responsibilities for 10 years
The Alliance Model and Participants

- Alliancing - well established contract form in NZ & Australia
- Collaborative approach with collective performance obligations
- Equitable share of gain/pain compared with target cost
- 100% open book
- Embedded NZTA personnel & technical expertise

Key Sub-Alliance partners: SICE and Wilson Tunnelling
Supporting Work sites:-
- Wiri Muck Disposal site
- East Tamaki precast factory
Construction Works

Overview Project Works

Great North Road Interchange
North Ventilation Building and Tunnel Portal
South Ventilation Building and Tunnel Portal
Tunnel Alignment
Carriageway and Bridges
Fun Facts and Figures

- $1.4B total target cost
- 66 months project duration
- 10th largest diameter TBM – worth $58-million
- 24,000 pre-cast concrete segments to line the tunnels – worth $110-million
- GNR interchange ramps larger than New Market Viaduct – worth $60-million
- M&E installations – worth $140-million
- Urban improvements – playing fields, skate parks, cycle paths, stream improvements, etc.
Southern Area Layout

- Completion of Maioro Interchange
- Oakley Creek Bridge
- Richardson Rd Bridge
- Valonia Sportsfields
- Oakley Creek Footbridges
- Existing Sewer
- New Sewer
- Carriageway
- Hendon Footbridge
- South Ventilation Building
- Tunnel Portal
Maioro Rd to Richardson Rd Earthworks
Southern Approach Trench (SAT)
Southern Approach Trench (SAT)
To construct manufacturing facilities and produce:

- 24,000 Tunnel Segments
- 2,400 Tunnel Invert Culverts
- 296 Super T Bridge Beams

The above scope requires:

- 120,000 m³ Concrete
- 8,300 t of Reinforcement
Pre cast Sub-Alliance

Segments

- Total # = 24,000
- 9 segments weighing 10 t
  plus a smaller key segment
  = 1 ring
- Approx. 4m x 2m x 0.450 m
- Delivery – 3 segments per
  Load
- Production programme:
  July 2013 to Jan 2015
- Facility currently being planned
- Total # = 2,400; 12.5 t in weight
- Approx 3.7m x 2m x 0.300 m
- Production Programme:
  - July 2013 to Dec 2014
Tunnel Construction

- Start at southern portal end 2013
- Excavation southbound tunnel
- Turnaround TBM at northern portal
- Excavation northbound tunnel
- Excavation & lining of CP’s
- M+E in tunnel
- Commissioning & testing
- Tunnel opening early 2017
Mainline Tunnel

- 13.1m internal dia.
- 14.41m excavation dia.
- Twin tunnels @ 2.4km
- Three lanes per tunnel
- Lining with concrete precast segments 450mm wall thickness
- Ring arrangement 9+1
- Ring length 2m
- Weight of one ring ≈100T
- Service tunnel under road
Cross-Section with Cross-Passage

- 16 No. emergency cross-passages
- 1 No. combined low point sump / cross-passage
- Length 11m
- Spacing 150m, 4.2m wide x 4.8m high
- Excavation support using shotcrete techniques
Cross-Section with Cross-Passage
Tunnel Works

Programme

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan</td>
<td>Jun</td>
<td>Dec</td>
<td>Jan</td>
<td>Jun</td>
</tr>
<tr>
<td>TBM Manufacture</td>
<td>FAT</td>
<td>Shipping</td>
<td>Site Establishment</td>
<td>Assembly &amp; Commissioning</td>
</tr>
</tbody>
</table>
EPB TBM
Supplier = Herrenknecht
Cut Diameter = 14.46m
Shield Diameter = 14.41m
Weight (TBM) = 2,400T
Length of TBM = 12.425m
Overall length including gantries ≈ 87m
Cutter Head design for 120 Mpa (cemented sandstone)
Fabrication / assembly – Nansha, China
Delivery July 2013
TBM layout

100-200m

90m

0-50m
Any questions?