

HERA Presentation

16 February 2012



**WELL-CONNECTED
ALLIANCE** PROUDLY
DELIVERING



Waterview Connection



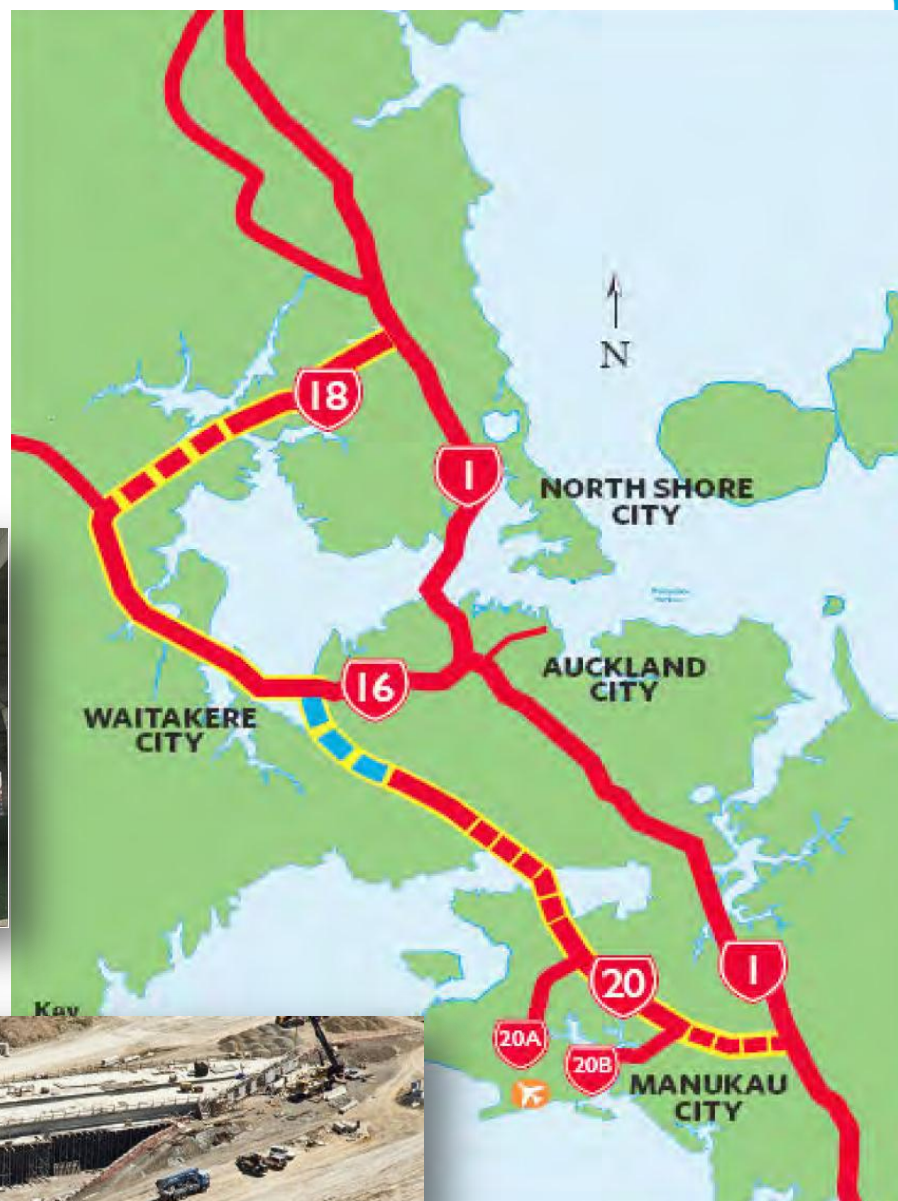
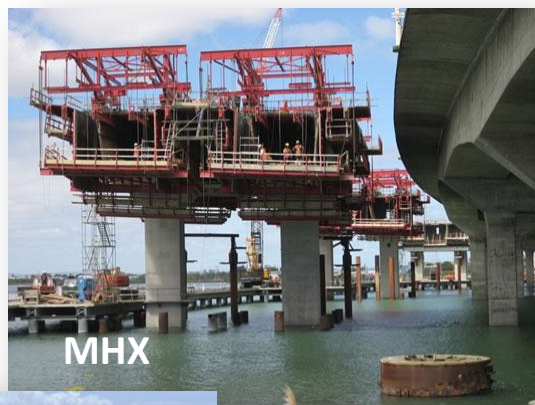
NZ TRANSPORT AGENCY
WAKA KOTAHĪ

Roads of national significance

Introduction

- John Burden – Alliance Project Manager
- Stefan Hanke – Construction Manager
- Malcolm MacDonald – Surface Works Construction Manager
- Phil Weston – Commercial Manager

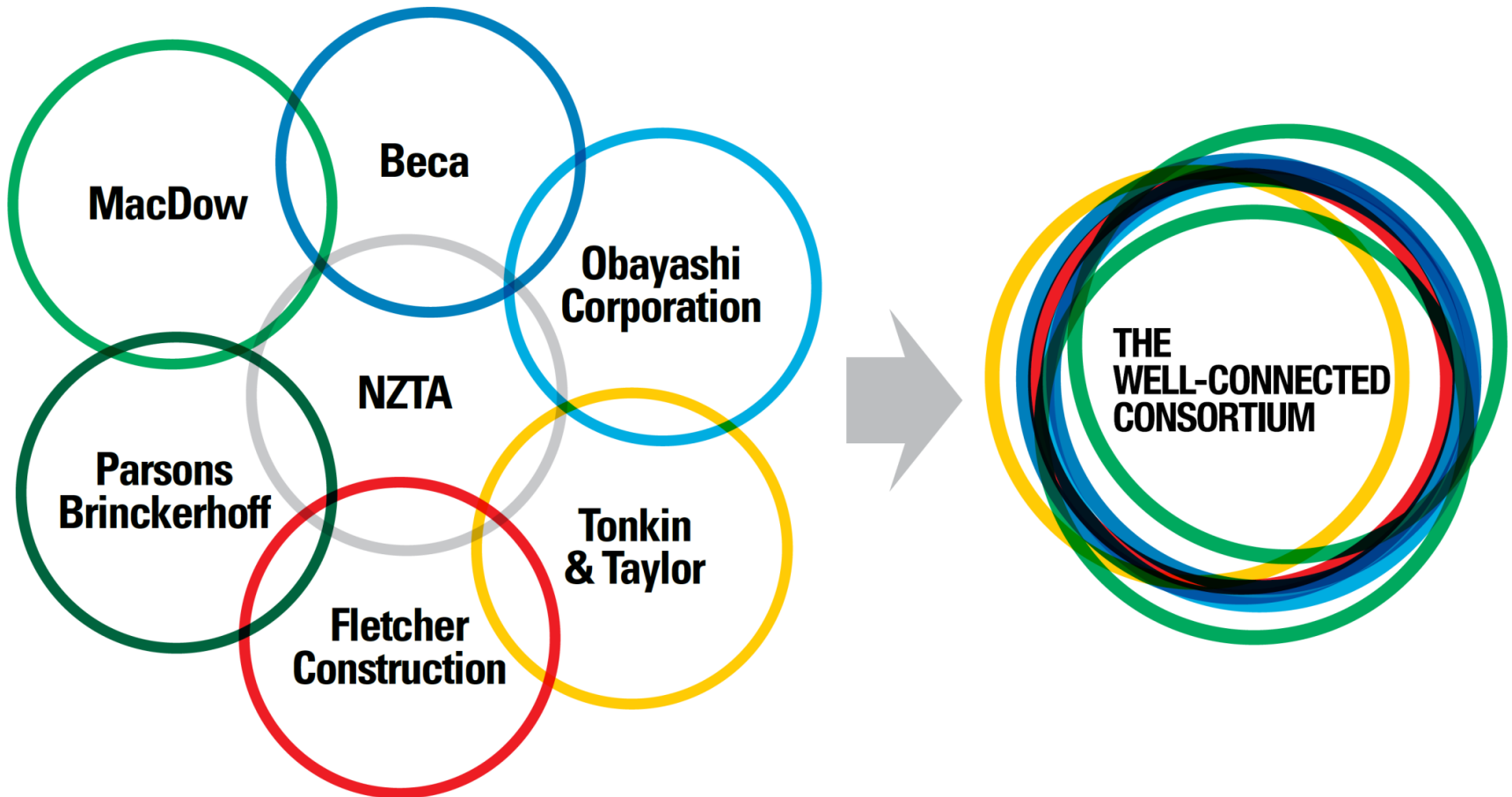
Auckland Western Ring Route



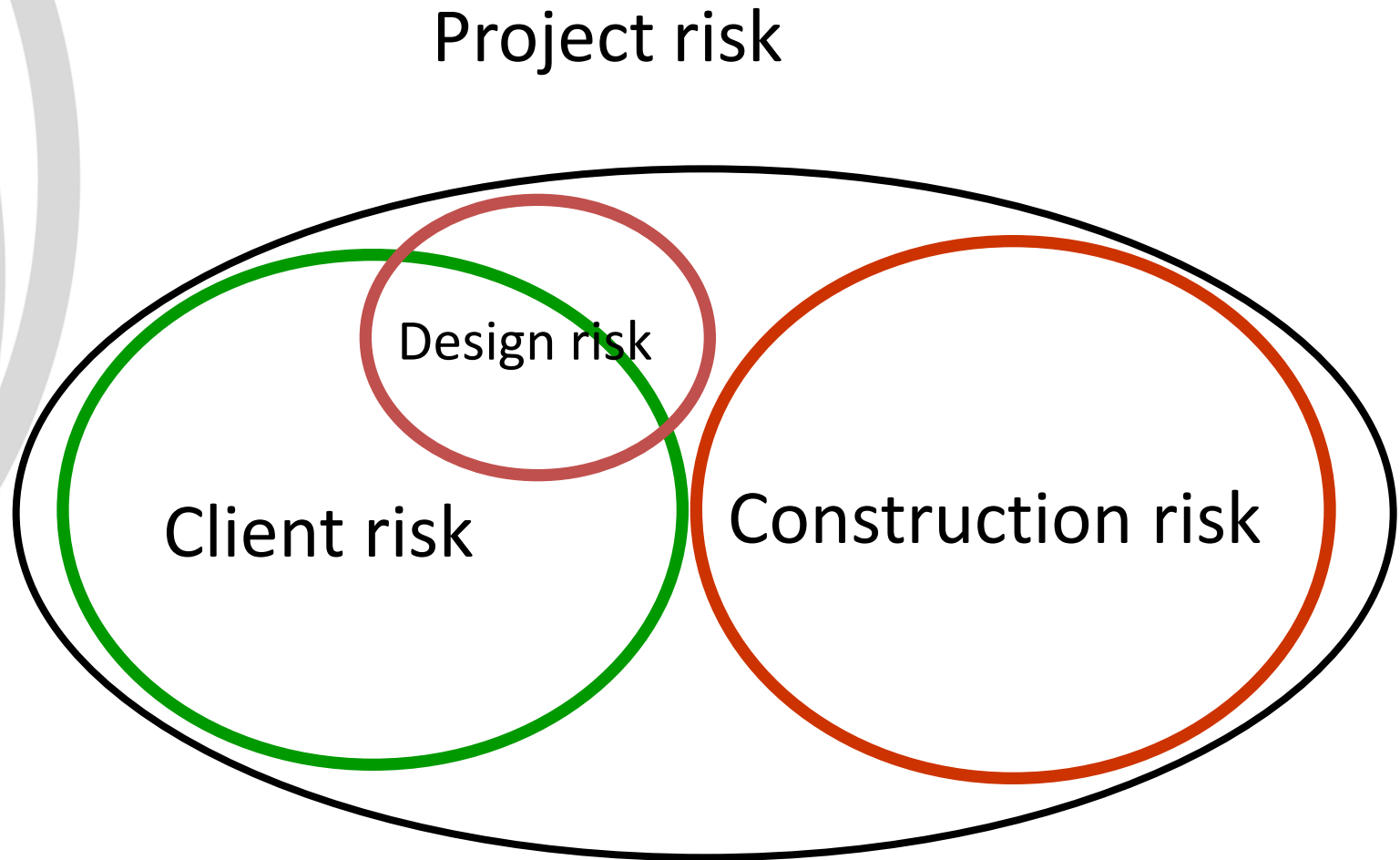
The Waterview Connection



The Organisation

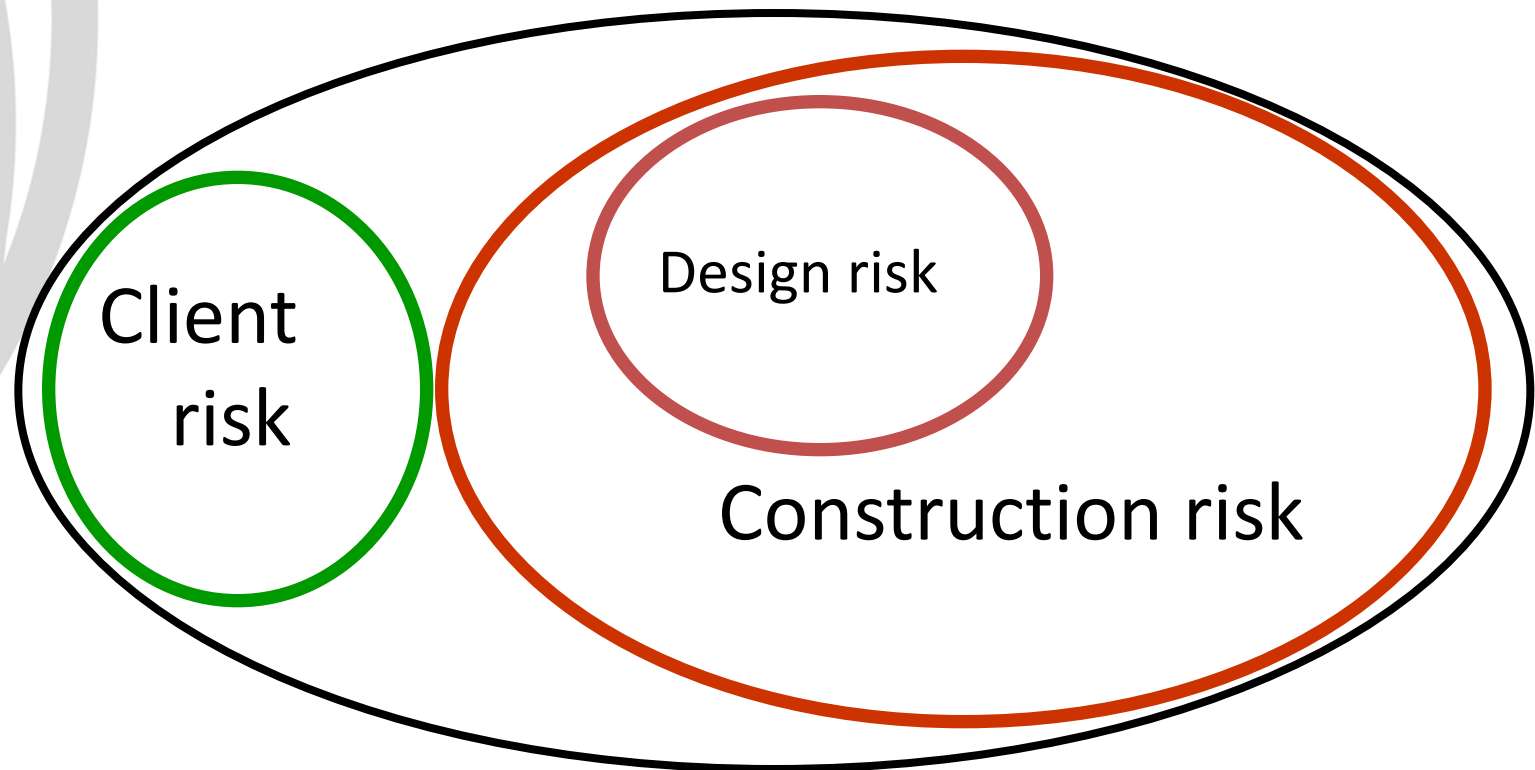


Traditional Model

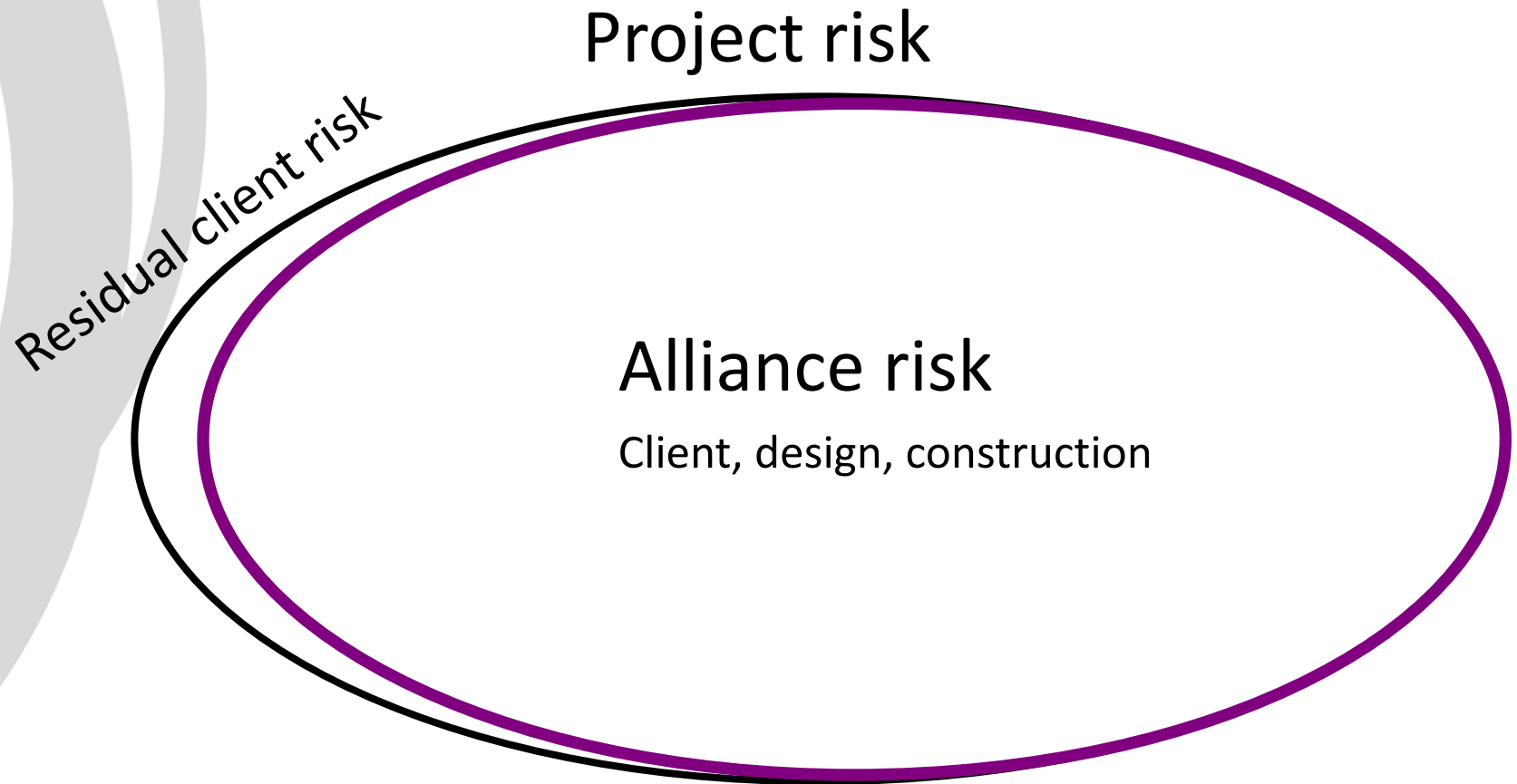


Design-Build Model

Project risk



Alliance Model



Core Alliance Principles

- Win-Win or Lose-Lose: Pain Gain share to target cost.
- Fair share of risk and reward.
- Equal say – PAB unanimous.
- “Best for Project” decisions.
- Full access to and support of organisations.
- Open Book.
- Clear responsibilities within a no-blame culture

Projects that suit Alliances

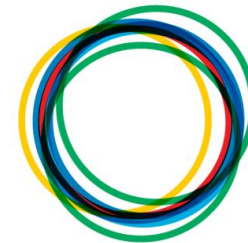
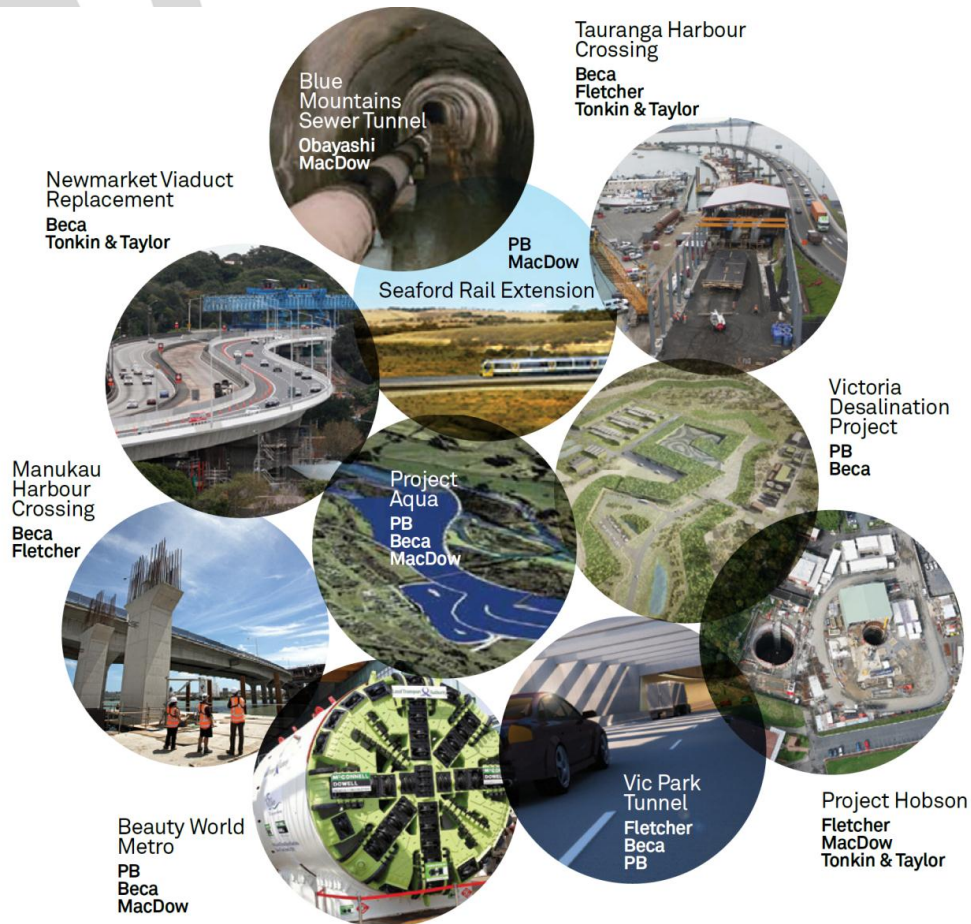
- Complex interfaces
- Difficult stakeholder issues
- Very tight time frames
- Difficult to define scope
- Significant value can be added by owner involvement
- Risk & opportunity better managed collectively

NZ Project Alliances

- Freeflow Alliance (Grafton Gully & CMJ Stage 1) - 2001
- Northern Gateway Alliance (ALPURT Motorway) - 2003
- Project AQUA (Waitaki Power Project) - 2003
- Southland Road Maintenance – 2006
- Project Motions (Wastewater Separation) - 2006
- 400kV Power Line Project - 2007 (Under tender)
- SH20 Manukau Harbour Crossing - 2007
- Auckland Motorway Alliance (Maintenance) – 2008
- Newmarket Viaduct Replacement – 2008
- ACC Western Road Maintenance Alliance - 2008
- Victoria Park Tunnel - 2009
- Te Rapa Bypass – 2009
- Mt Vic & Terrace Tunnel Refurbishment - 2009



Experience



**THE
WELL-CONNECTED
CONSORTIUM®
FOR THE
WATERVIEW
CONNECTION**

Project Scope



Project Metrics:

- PAA - \$1,200M – 5 years
- OMAA - \$170M – 10 years
- Project length 5.5km (2.4km tunnel)
- Tunnel length 4.8km 13.1m ID)
- Pavement 50 lane km (190,000m²)
- Bridges 1.9km (6 road, 1 pedestrian)

General Arrangement



Quantities

• People on Site	600
• Bulk excavation	550,000m ³
• Tunnel spoil	800,000m ³
• Bridges	25,000m ²
• Tunnel lining concrete	100,000m ³ (24,000 segments)
• Structural concrete	80,000m ³
• Cabling	600km
• Pipework	32km
• Jet fans	64No
• Reinforcing	9000T
• Tonnes Structural Steel	12,000T

Key Dates

- Start enabling works Jan 2012
- Start earthworks in south Jul 2012
- Start south portal Oct 2012
- Start north portal Feb 2013
- Start Great Nth Rd Interchange May 2013
- TBM arrives Jul 2013
- TBM Starts Oct 2013
- Complete first tunnel Oct 2014
- Complete second tunnel Oct 2015
- Complete project Mar 2017

The Tunnel

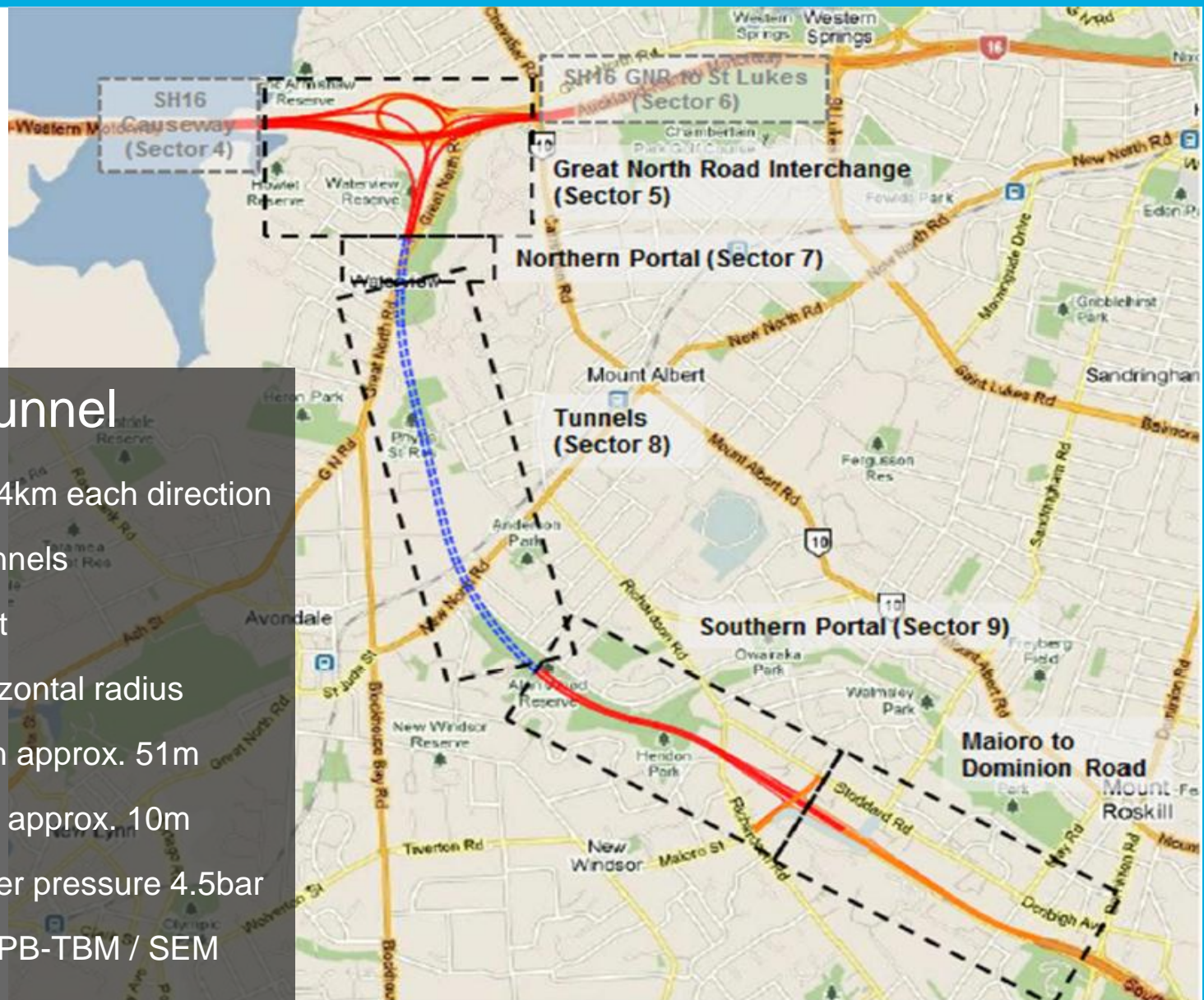
- Stefan Hanke – Construction Manager

Waterview Tunnel

- Tunnel Data and Alignment
- Tunnel Cross-Sections
- Geological Overview
- Excavation Methods
- TBM
- Cross-Passages
- Logistics

Waterview Tunnel

- Tunnel length 2.4km each direction
- Twin, parallel tunnels
- 5% max gradient
- 1500m min. horizontal radius
- Max. overburden approx. 51m
- Min. overburden approx. 10m
- Max. groundwater pressure 4.5bar
- Excavation by EPB-TBM / SEM

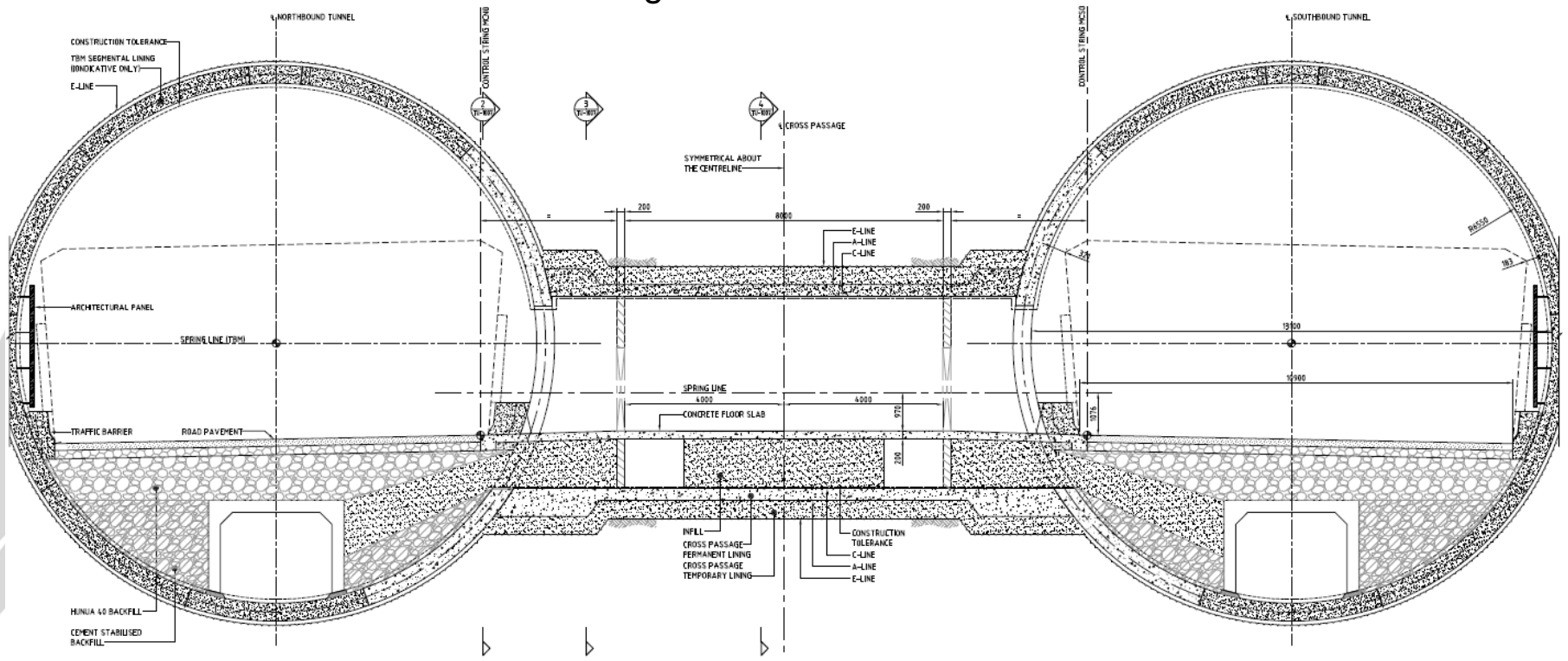


13.1m internal dia.
14.41m excavation dia.
Twin tunnels
Three lane each
Lining with concrete
precast segments
450mm wall thickness
Ring arrangement 9+1
Ring length 2m
Weight of one ring
100to
Service tunnel under
road

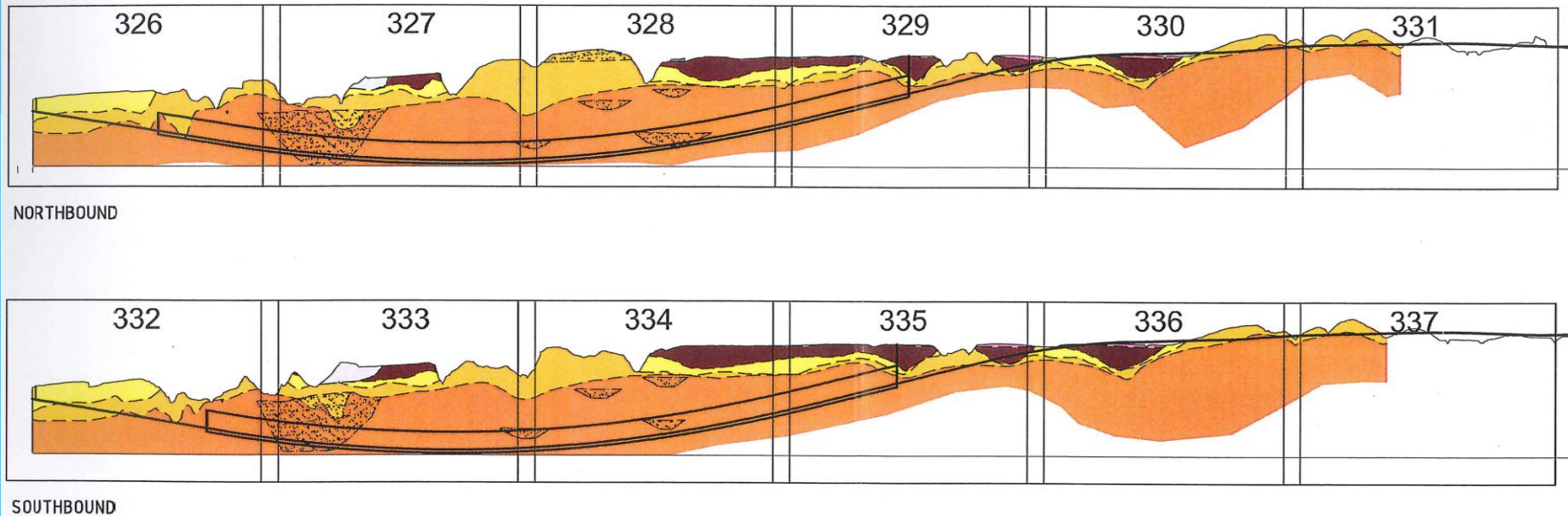


Cross-Section with Cross-Passage

- ca. 17 emergency cross-passages
- 1 combined low point sump / cross-passage
- Length approx. 11m each
- Spacing 150m-175m
- Excavation using shot crete method



Geological Long Sections



Three main rock material types along the alignment:

- Extremely weak locked sands (EUS1) with a UCS of <1MPa
- Unweathered siltstone (EUL), alternating siltstone/sandstone (EUSL) and weak to very
- Well cemented sandstone (EUS3) and volcaniclastic grit/sandstone (EUg) with a UCS>5MPa

Tunnel Excavation Methods



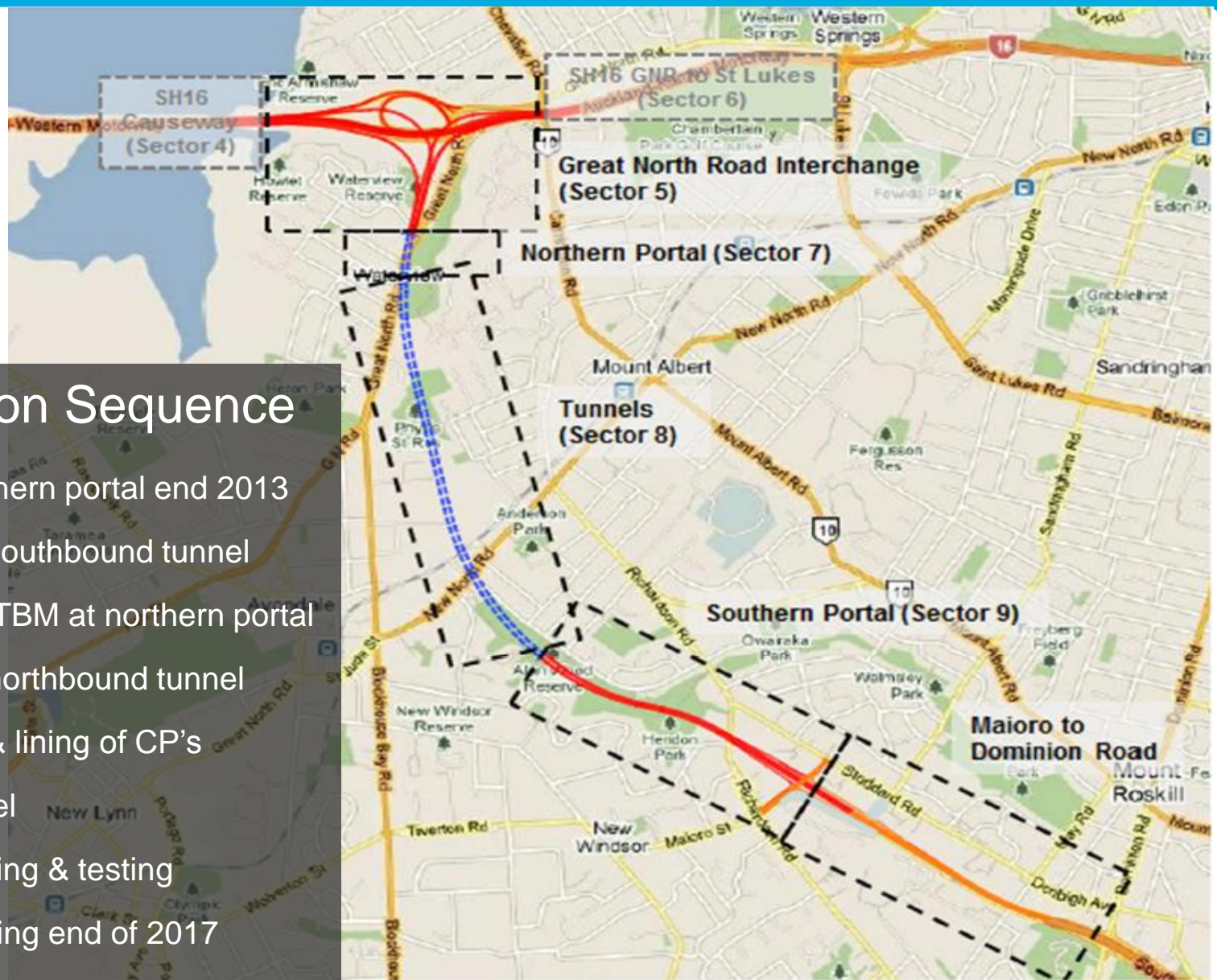
Mainline - Tunnel

Cross-Passages

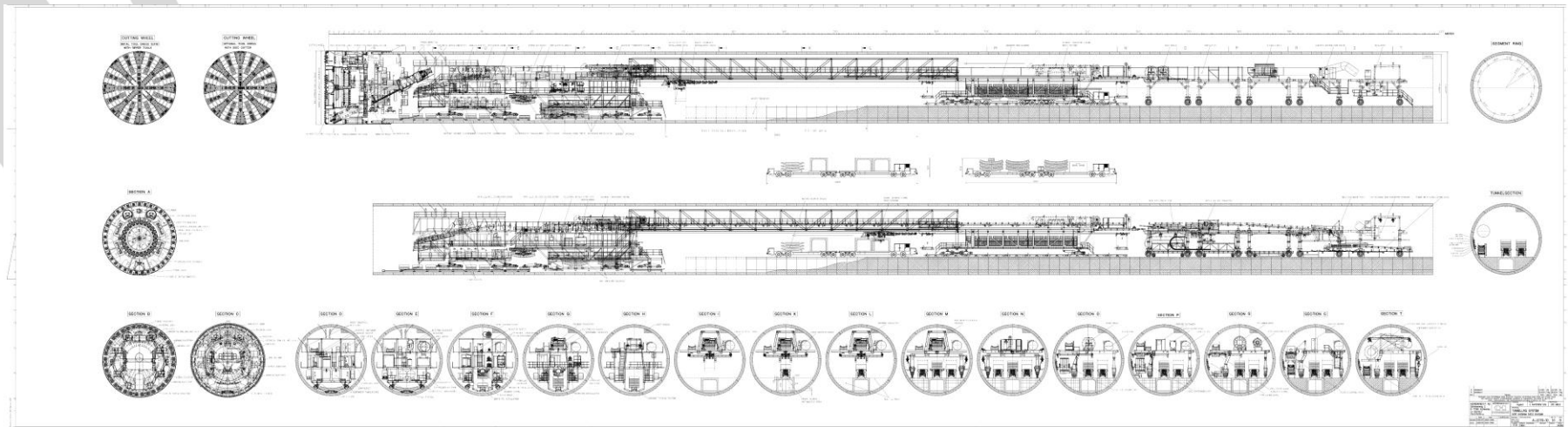


Construction Sequence

- 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 end of 2017



TBM System



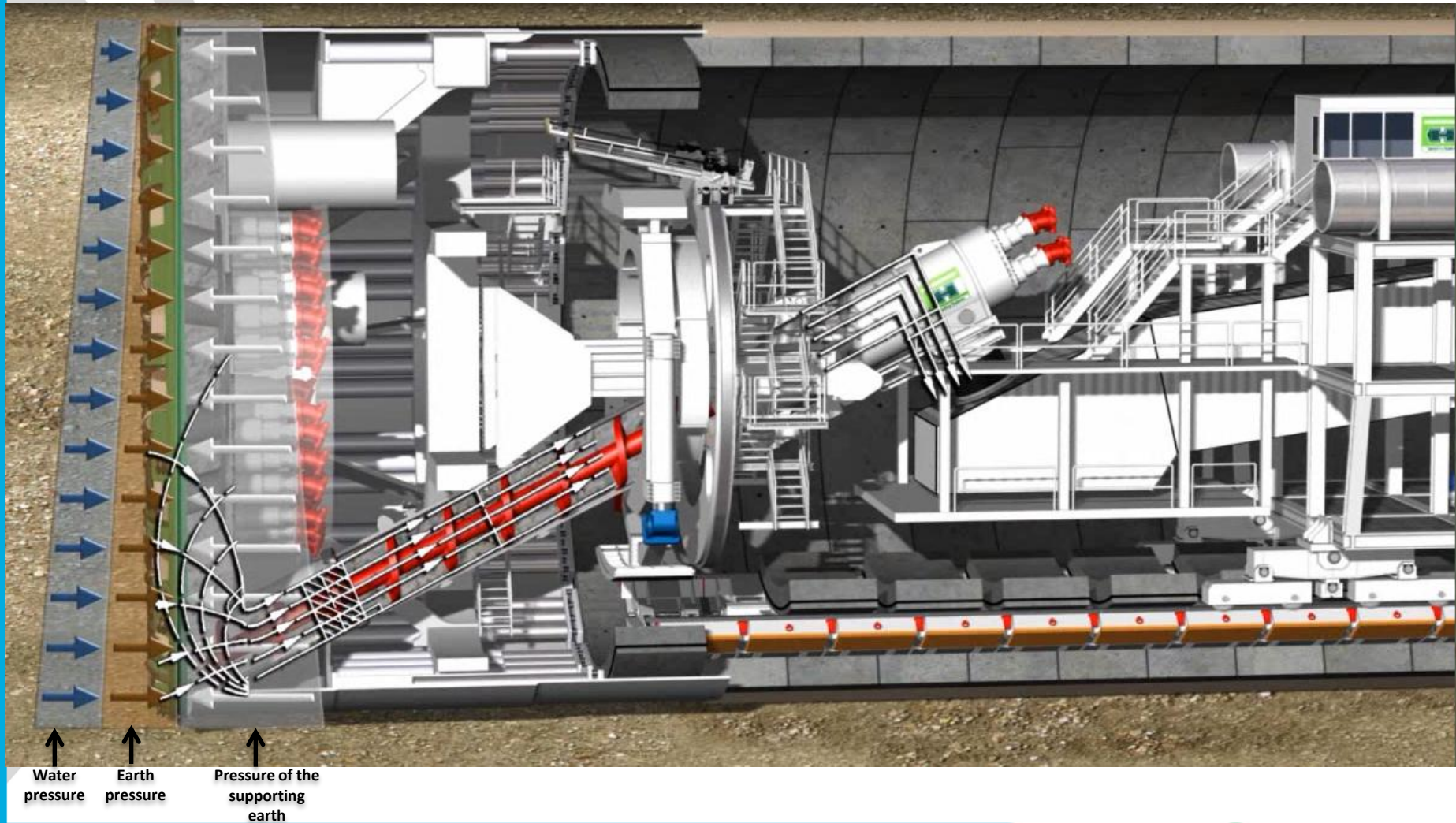
- Supplier = Herrenknecht AG
- Diameter = 14.41m, overall length 215m, TBM length 13.5m
- Weight (TBM&backup) = 4,200to, transport size of largest part approx. 8mx8mx3m – 300to
- Main bearing 7800 mm dia. one piece, shield tolerance 20mm circumferential @ 14.41m
- Operating pressure 6bar, max. face pressure 4.5bar, support force 99.215kN , man locks 3No.
- Cost = \$60M
- Fabrication / assembly – Schwanau, Germany & Nansha, China
- Delivery July 2013



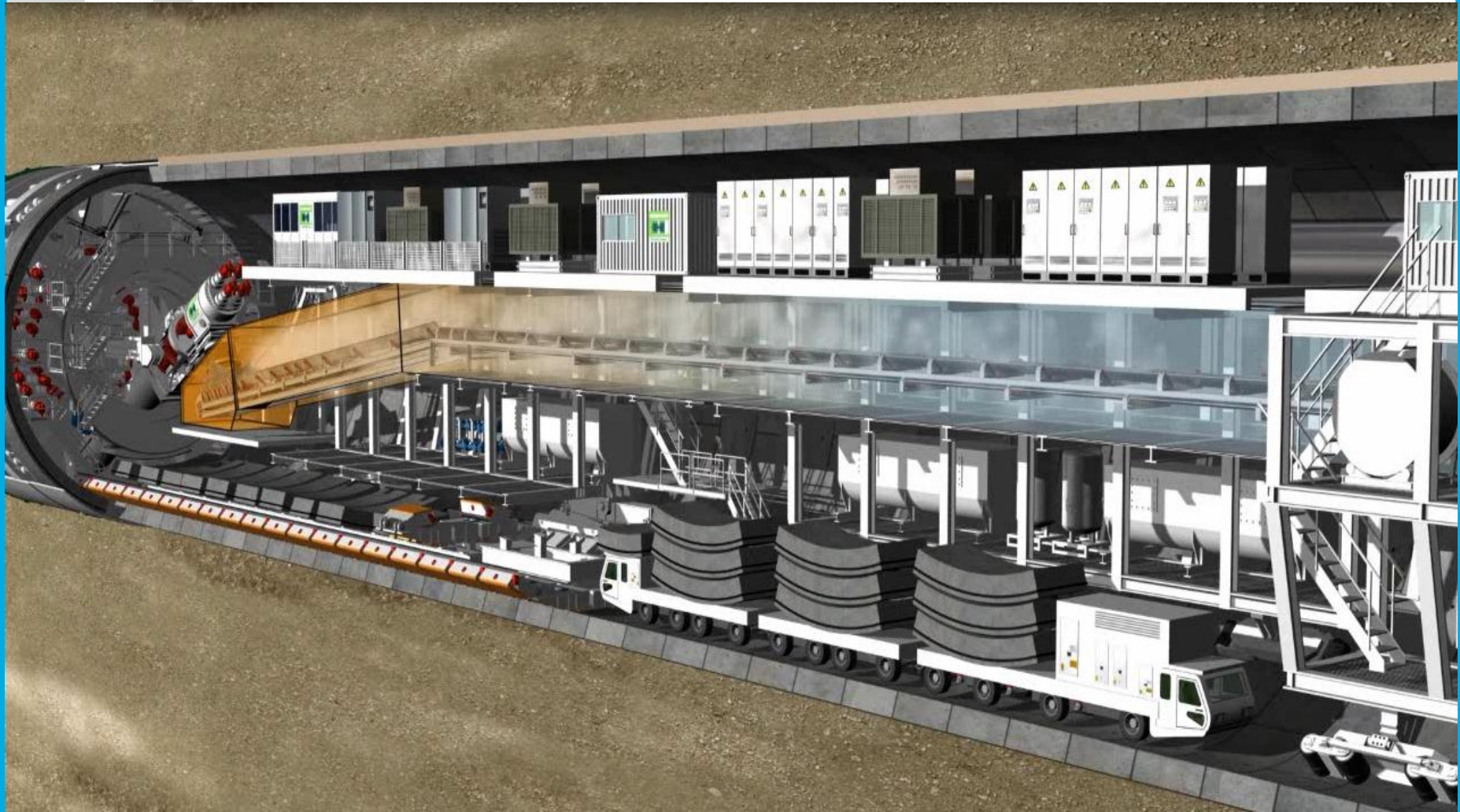


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TBM Flow



TBM Segments



TBM Segments

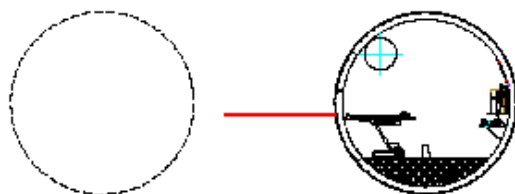


Cross-Passage Excavation

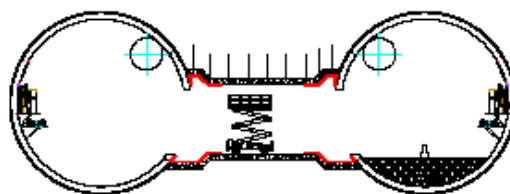


Cross Passage (Standard) : Construction Sequence

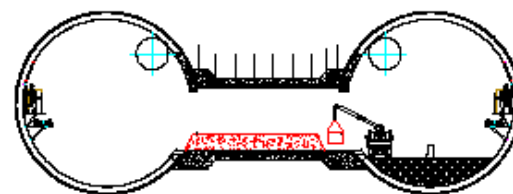
① Probe Drilling and extra measures if required.



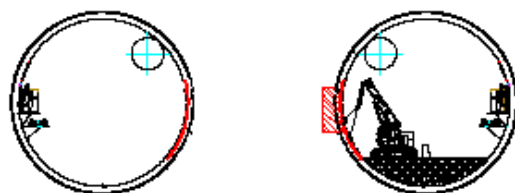
⑤ Waterproofing at Collar



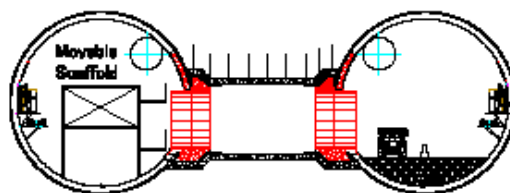
⑨ Cable trench(PG) & Backfilling(flowable cono.)



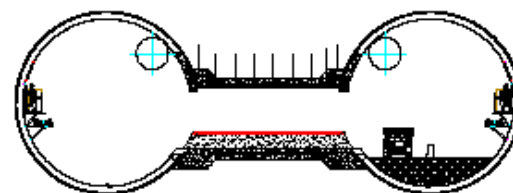
② Preparation for Opening & Breaking out



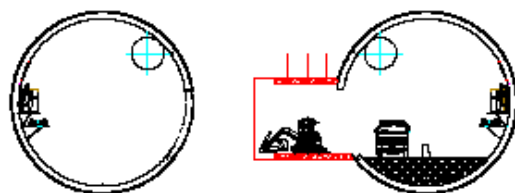
⑥ Rebar, Form setting & Concreting at Collar



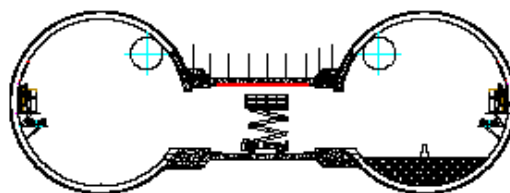
⑩ Floor concreting & Finishing work(final grouting, etc.)



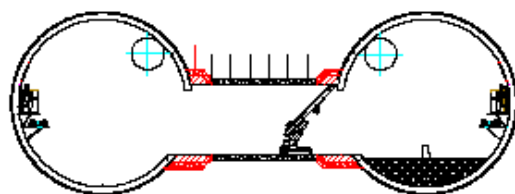
③ Excavation & Initial Support



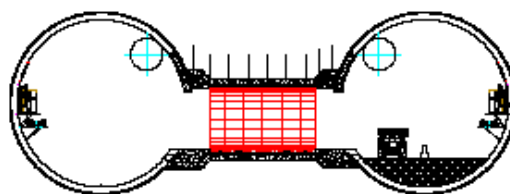
⑦ Waterproofing



④ Excavation & Initial support at Collar



⑧ Rebar, Form setting & Concreting



Tunnel Logistics

- All removal from Southern Sites – Alan Wood Reserve
- 24 hr Operation
- 6 Day working
- Access to Southern Portal via Maioro Street works
- Total Spoil expected from Tunnels = 800,000 m³
- Average $\approx 1511\text{m}^3$ (solid) per 24 hours based on a long average of 10 m / day
- 50,000 truck movements dependent on truck capacity, currently assuming 52T gross = 17m³

Surface Works

- Malcolm McDonald – Surface Works Construction Manager

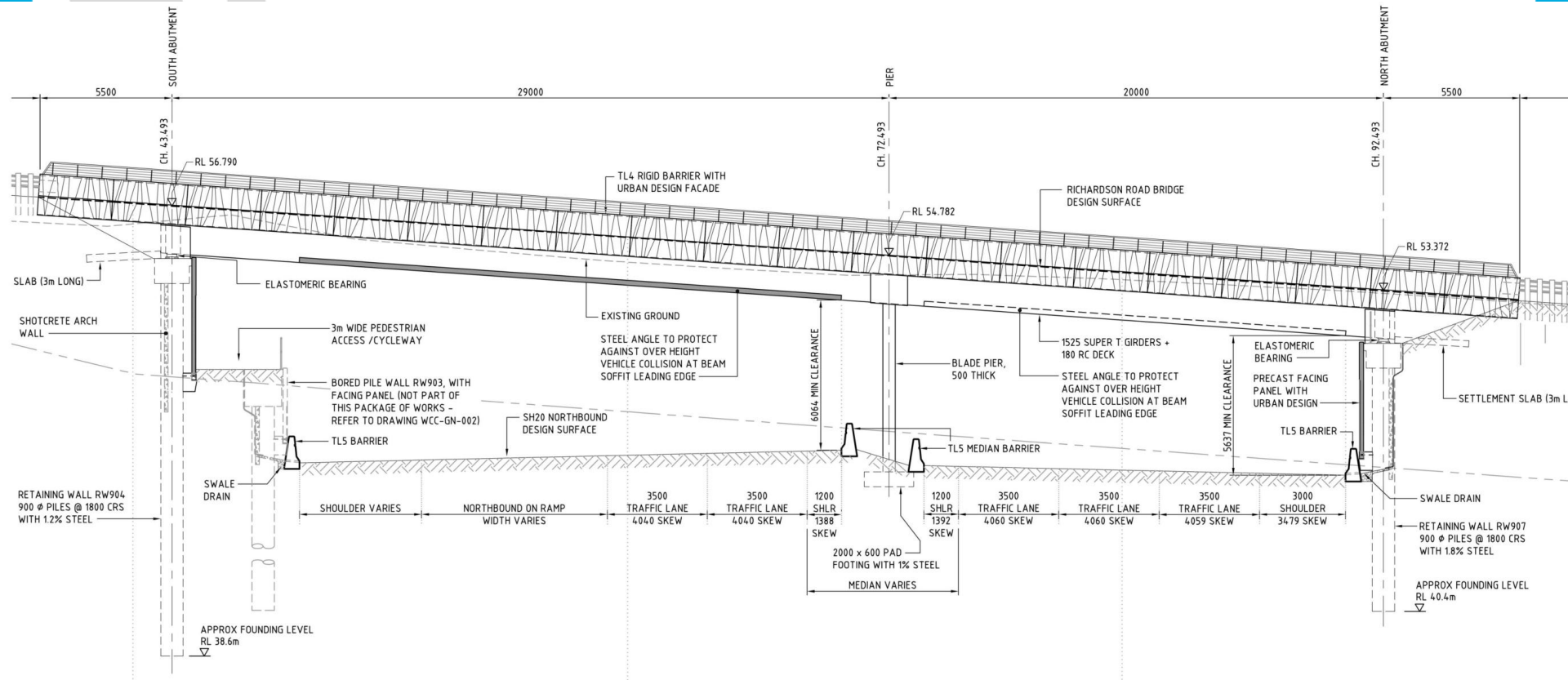
Project Scope - South



Maioro St to South Portal



Richardson Rd Bridge



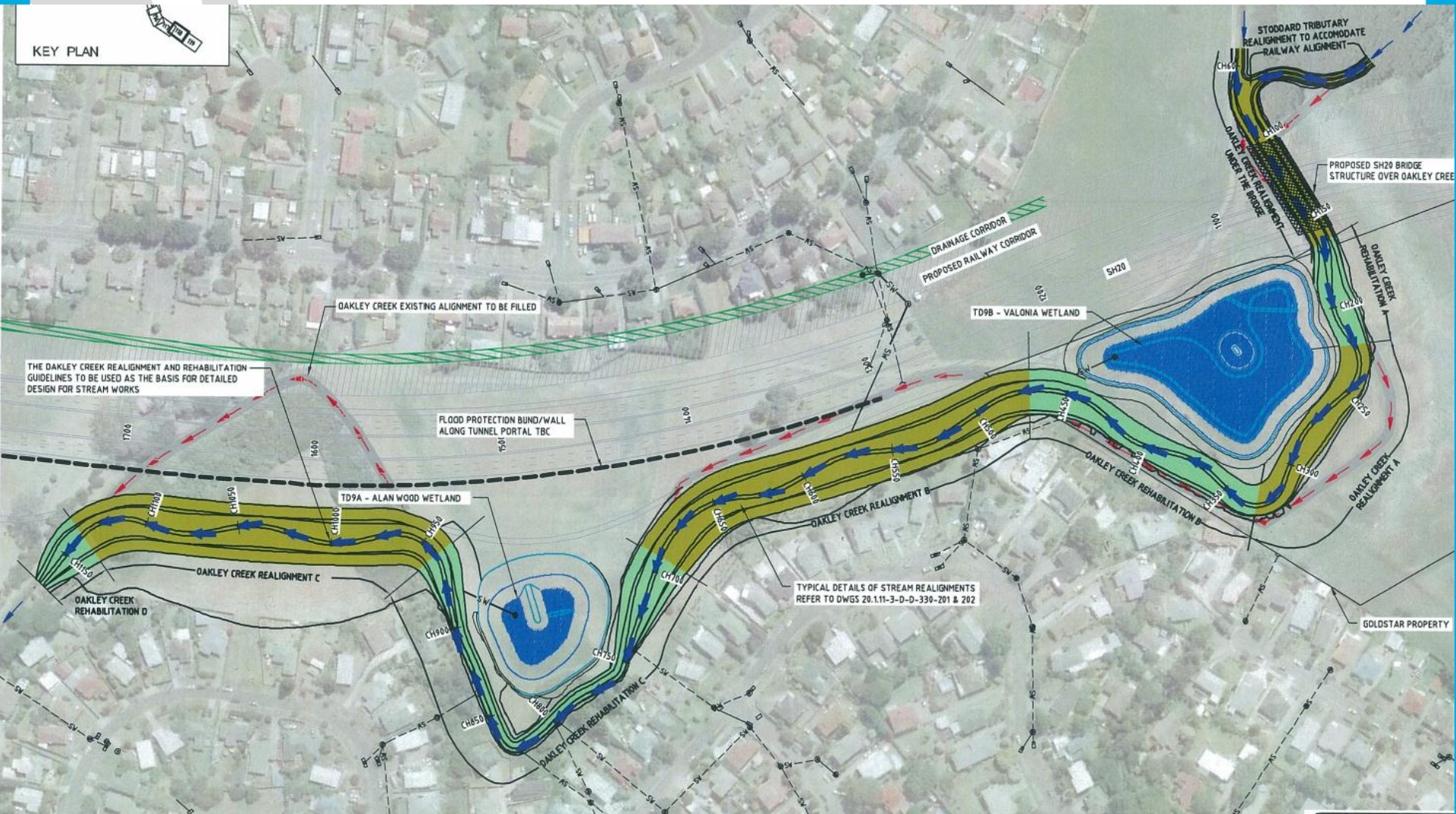
Hendon Footbridge



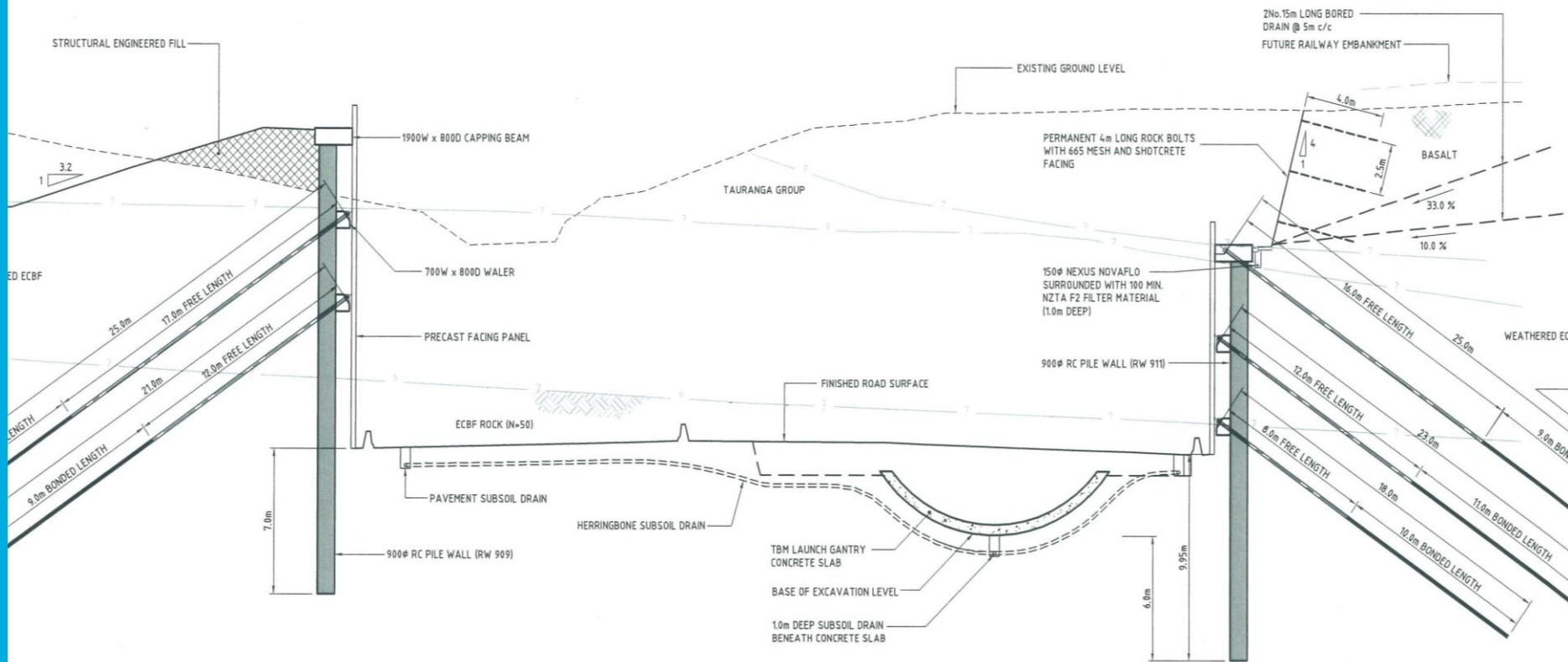
Oakley Creek Works



Oakley Creek Works



South Trench Typical Section

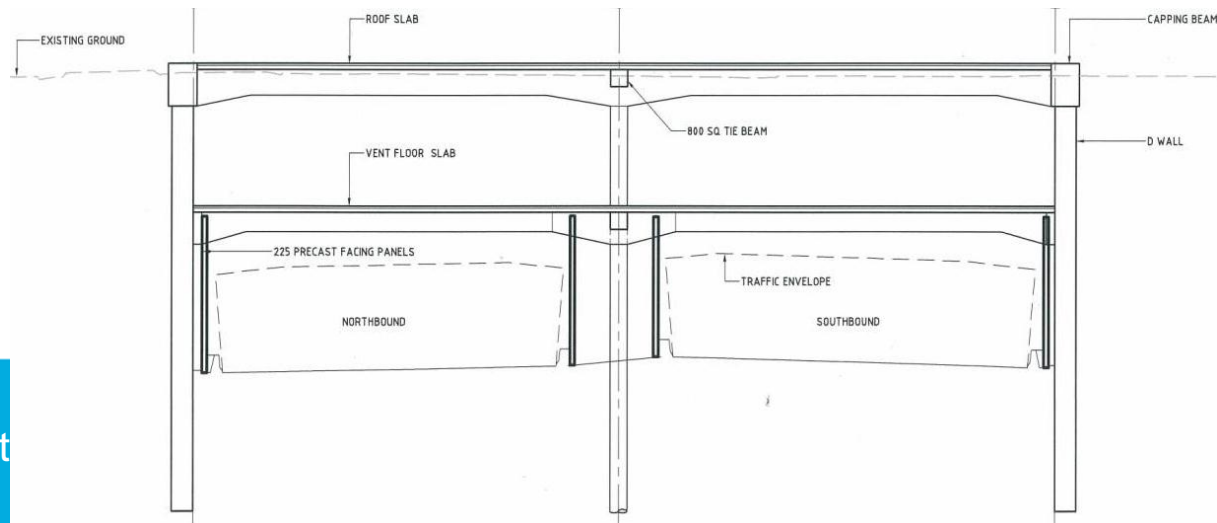
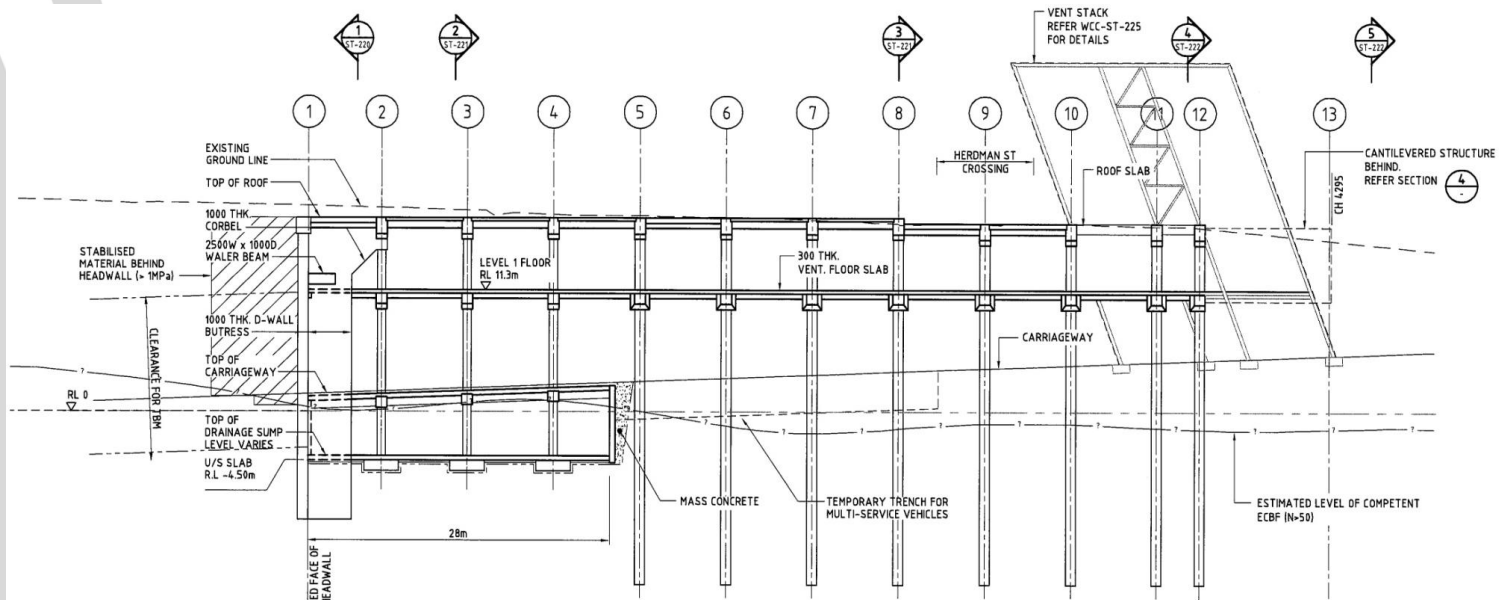




North Portal & Structures



North Portal



Great North Road Interchange



Beam Erection



Procurement

- Phil Weston - Commercial Manager

Overview

- Key metal work packages
- Values
- Procurement Process
- Who to contact

Key Metal Work Packages

- Reinforcing Steel - supply
- Signage Gantries
- Pile casings
- Structural Steel
- Temporary Structures



Values

- Temporary Works
 - Circa \$1.8M
- Permanent Works
 - Circa \$26.5M



And in more detail...

	\$K	Tn	M2
Rebar		13,800	
Mesh			41,000
Steel Fibres		2,900	
gantries		200	
Structural Steel Temp and Permenant		8,800	
Pile Cages		1,800	
Reidbar type	600		
Pile Casings	975		
Miscellaneous Metalwork	4,800		

Procurement process

- Competitively tender
- Sole source / nominated
- Self perform

Contacts

- Subcontractors and Suppliers
 - Louise Cooper
- Purchase Orders
 - Wally Parry



forename.surname@wellconnected.co.nz

QUESTIONS