



SiD Practice Forum – May 2017

Waterview Tunnel through the eyes of SiD

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T+T Tonkin+Taylor

NZ TRANSPORT
AGENCY
WAKA KOTAHI

Waterview Connection

COMPLETING THE WESTERN RING ROUTE

WELL-CONNECTED
ALLIANCE PROUDLY
DELIVERING

16 20 **Waterview Connection**

Roads of national significance

NZ TRANSPORT
AGENCY
WAKA KOTAHI



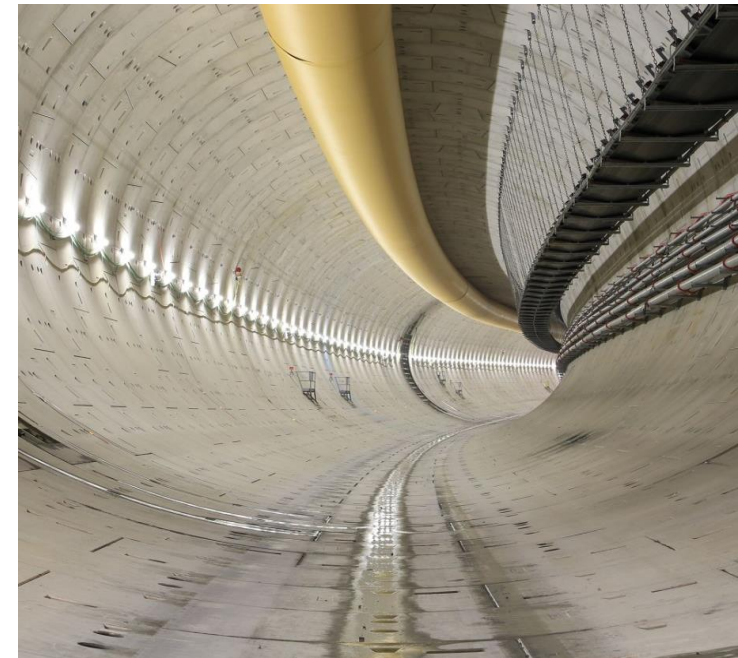
Safety In Design

Key Principles

- 1** Use a Risk Management Approach
- 2** Consider the Lifecycle
- 3** Knowledge and Capability
- 4** Consultation, Cooperation and Coordination
- 5** Information Transfer

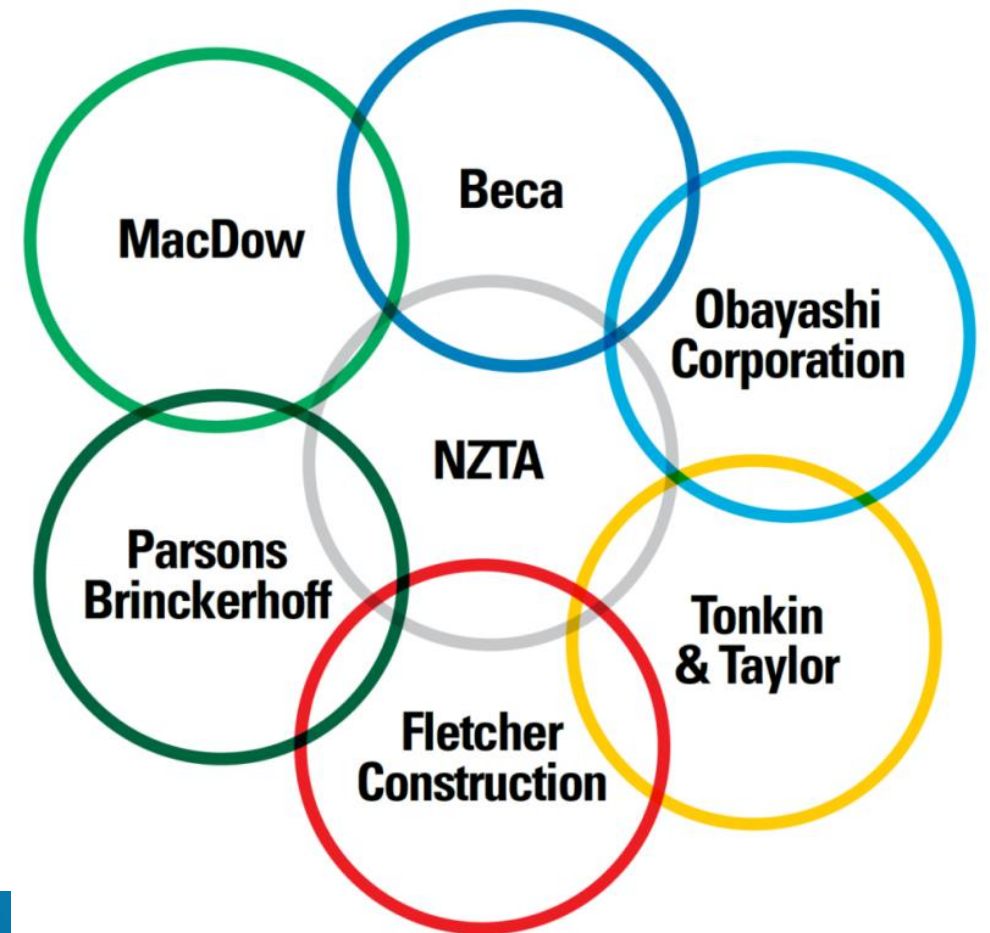
Project Overview

- 5km long 3-lane motorway comprising 35 lane-km
- Two 2.4 km long 13.1 m (ID) diameter bored tunnels
- Two vent buildings
- Six road bridges – 1,700 m total length
- Two long span footbridges and several smaller structures
- Over 3 km of retention structures
- Extensive urban improvements and landscaping
- 5+ years construction period
- Operations and Maintenance responsibilities for 10 years
- \$1.4 billion capital cost



Alliance

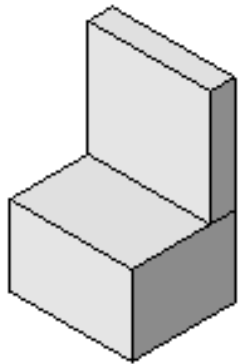
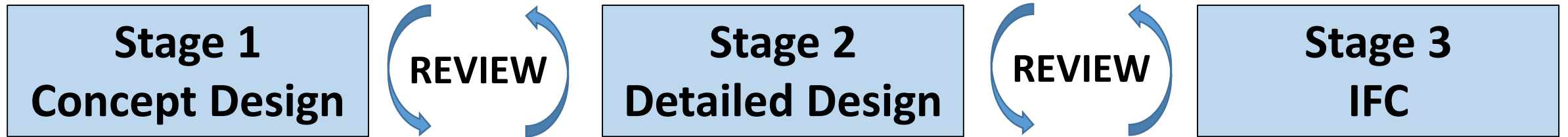
- Co-located, collaborative working arrangement – actively encouraged and built into project culture
 - Designers
 - Constructors
 - O&M
 - Client



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3-stage design process



SiD on Waterview

Documented Process –
part of the
Design Management Plan

Table 1 Safety in Design Rating Matrix

		IMPACT		
		High (Death, Major injury)	Medium (MTI, First Aid on site)	Low (Irritant, complaint)
PROBABILITY	High (>60%)	Major	Moderate	Minor
	Medium (15% - 60%)	Major	Moderate	Minor
	Low (<15%)	Moderate	Minor	Minor

review?

Table 2: Hierarchy of Control – Hazard Management (Health & Safety)

1	Elimination	<ul style="list-style-type: none"> Elimination – Remove the <i>cause</i> or <i>source</i> of hazard Redesign or Substitute the cause or source with less hazardous one
2	Isolation	<ul style="list-style-type: none"> Isolation - isolating the hazard from a person by safe guarding or by space or time separation Engineering Controls – allow for hazard to be designed out and control measures designed in (Drawings and Specifications, Construction Method Statements)
3	Minimisation	<ul style="list-style-type: none"> Administrative Controls (JSEA, ITP, Legislative Controls, Supervision and Operations and Management) Training and Induction PPE (Personal Protective Equipment)

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Workshop / Mini-Group Reviews

- Designers
- Constructors
- O&M Personnel
- Risk Manager

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Register & Reports

Safety in Design Register

Design Package Name:

Design Package ID (6 digits): Package Manager:

Design Review Stg: Package Verifier:

Due Date:

Verification at completion of Stage 2: (name/signature/date)

Design Manager:

Construction Manager:

Owner Verifier:



Confirmation of Transfer by

Package Manager:

Date:

Row Ref	SID ID	Identification of SID Risk (Stage 1)									Recommendation (Stage 1)			Resolution: What was done? (Stage 1 & 2)					Full/Partial Transfer	
		Category Guide	Title <i>Brief description</i>	Cause/Hazard <i>Trigger</i>	Phase <i>when it occurs</i>	Consequence <i>the impact when it occurs</i>	Existing Control(s)	%	Impact	Rating	Recommended Action	Control Category	Action Owner	Stage 1: Incl, Pending or None Stage 2: Completed action	Mitigation Measure	%	Impact	Residual	Phase	New Risk Owner

Verification at completion of Stage 2: (name/signature/date)

Design Manager:

Construction Manager:

Owner Verifier:



Confirmation of Transfer by

Package Manager:

Date:

Recommendation (Stage 1)			Resolution: What was done? (Stage 1 & 2)					Full/Partial Transfer	
Recommended Action	Control Category	Action Owner	Stage 1: Incl, Pending or None Stage 2: Completed action	Mitigation Measure	%	Impact	Residual	Phase	New Risk Owner

5 Information Transfer 

Briefings

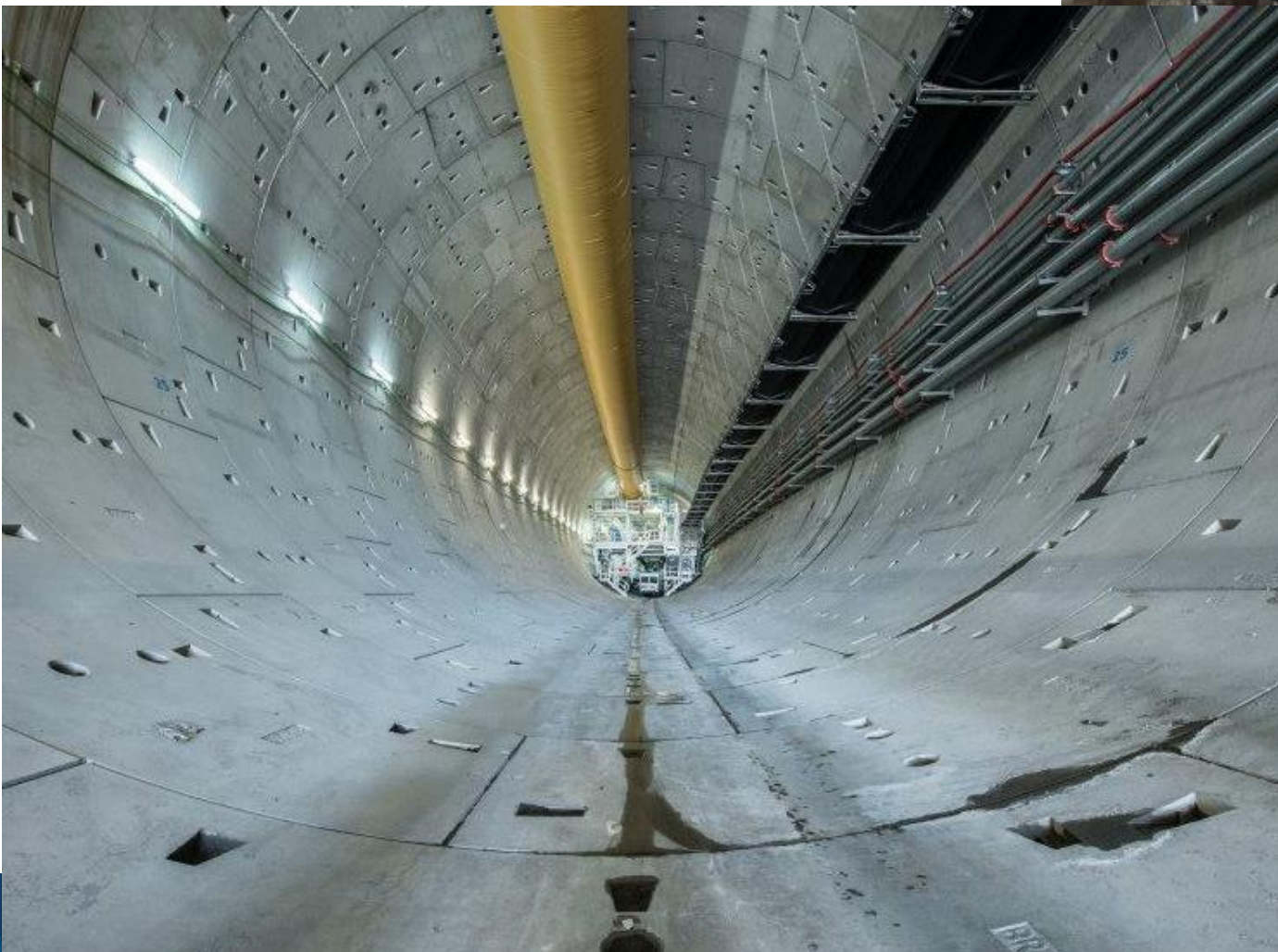
- Design handover briefings – design team to construction team at completion of design
- Construction Execution Plan briefings – design team, Construction team, QA team

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Examples of SiD Implementation

Tunnelling construction & method

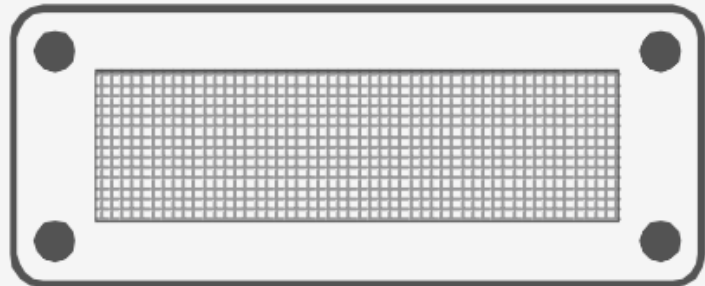


SiD Examples

- Lane Control for the tunnels
 - Northern approach
 - Inside



TUNNEL  **1.5 km AHEAD**



**NO LANE
CHANGING
IN TUNNEL**



SiD Examples

- Motorway Drainage



SiD Examples

Fire management





Questions?