



NZ TRANSPORT AGENCY
WAKA KOTAHI

Peka Peka to Ōtaki (Northern Section) Noise Mitigation Plan

**Waka Kotahi NZ Transport Agency
Peka Peka to Ōtaki (Northern Section)
Noise Mitigation Plan**

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Quality Assurance Statement	
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Revision Schedule					
Rev. No	Date	Description	Prepared by	Reviewed by	Approved by
00	02/08/17	Draft	B Shanks	S Wilkening	
01	08/11/17	Final	B Shanks	S Wilkening	
02	10/09/19	Updated	B Shanks	S Wilkening	
03	30/07/20	Waka Kotahi NZ Transport Agency comments	B Shanks	S Wilkening	
04	03/08/20	Minor amendments	B Shanks	S Wilkening	
05	20/08/20	WSP review comments	B Shanks	S Wilkening	
06	11/09/20	Waka Kotahi NZ Transport Agency comments	B Shanks	S Wilkening	
07	29/09/20	Peer review comments	B Shanks	S Wilkening	
08	28/10/20	Formatting amendments	B Shanks	S Wilkening	

(Transport Agency template v1.0)

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Publishing Note

Background to the development and release of these noise plans.

On award of the design and build contract for the PP2O expressway in 2016, Fletcher Construction Limited (Fletchers) undertook noise modelling and developed a draft noise plan based on their expressway designs, which included the following changes to that presented to the Board of Inquiry (BOI) in 2013:

- alignment changes to the far north end of the alignment, and (Northern Section)
- low flood bunds to the expressway edges along the southern section between the Ōtaki River and Mary Crest and (Southern Section)
- the use of finer grade 3/5 two coat chip seals than the specimen design (Full design)

Fletchers modelled noise levels were based on a 100 kph design speed and the traffic volumes used were those presented to the BOI in 2013. Normally this would be reviewed by Waka Kotahi, submitted to Kāpiti Coast District Council (KCDC) for statutory compliance purposes and then published.

However, as a result of changed traffic conditions after the M2PP expressway opening in 2017, Waka Kotahi reassessed the level of likely traffic on the PP2O expressway. This assessment confirmed that the traffic volumes would be greater than that presented to the BOI back in 2013. In addition, a law change allowing a higher speed limit on expressways were being contemplated by Waka Kotahi, and so modelling the effects of an increase to 110 Km/hr was desirable.

Consequently in 2018, Waka Kotahi instructed Fletchers to address the new understanding of traffic conditions by undertaking additional modelling. Throughout 2018 and into 2019, Fletchers undertook additional noise modelling to consider the effects of increased traffic volumes and an increased operational speed limit of 110 km/hr. Additional noise modelling tasks were run on the Fletcher design including and all Open Graded Porous Asphalt (OGPA) surface option and three alternatives options with chip seal and noise barriers in selected locations where noise impacts to were known to be greatest.

Noise levels were assessed with the new traffic volumes as well as with an additional 15 % and 30% of traffic over and above the new increased volumes. No modifications to buildings were identified as being required from this additional modelling work as either noise barriers and/or quiet road surfaces would deliver the required benefits in accordance with NZS6806.

Further work by Fletchers followed in 2019 to undertake an assessment of the acoustic benefits and costs of various noise barrier options for selected properties in the northern section of the expressway (where a quiet road surface was already required as part of the BOI consent conditions). The constraints of the existing urban environment in this northern section made noise barriers on property boundaries the only practical option in these locations.

Waka Kotahi wrote to and met with affected landowners in the northern section in late in 2019 to canvas their views on possible noise barriers on their property boundaries. At about the same time Waka Kotahi concluded a review of expressway pavements and decided to upgrade the entire expressway pavement using deep lift asphalt and an all OGPA surface for engineering reasons.

After obtaining affected northern landowner feedback, Waka Kotahi assessed noise barriers as very likely to represent the best practical option (BPO) for acoustic mitigation purposes at these selected locations and Fletchers were instructed to complete the detailed designs in consultation with landowners.

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As at September 2020, these details have progressed sufficiently to enable a public release of this report. This is still a “living document”, meaning that further updates and releases will be made as the detailed work is completed, submissions are made to KCDC for statutory compliance purposes and post project reviews are completed. In some locations in this report, place holding text has been used to indicate where details will be added in future.

Waka Kotahi

September 2020

1 Introduction

The Peka Peka to Ōtaki (northern section) is a 3.5 km length of state highway which is being constructed by Fletcher Construction Company Ltd under Transport Agency contract 730N.

The Peka Peka to Ōtaki Expressway extends from the Mackays to Peka Peka Expressway in the south to the existing SH1 at Taylors Road in the north. The project is split into two zones – north and south, with the boundary being the northern bank of the Ōtaki river.

A Noise Assessment for the full Peka Peka to Ōtaki section (Northern and Southern) was performed using the processes documented in NZS 6806 by URS prior to the lodgement of Notices of Requirement (NoR) and is detailed in report '*Peka Peka to Ōtaki Expressway – Operational noise and vibration assessment*' ref. 42176987/002/H, dated 12 February 2013. Designation conditions for road-traffic noise were set on the basis of that assessment.

1.1 Purpose of this document

This Noise Mitigation Plan (NMP) documents the detailed noise mitigation design for the Peka Peka to Ōtaki (northern section) necessary to satisfy the designation conditions, as well as the Principal's / Minimum requirements for the project.

This is intended to be a "living document", meaning that revisions will be made as additional information is available. In some locations, place holding text has been used to indicate where details will be added.

This document also demonstrates compliance with the Transport Agency's specification for noise mitigation (P40)¹.

This NMP has been prepared to document:

- a) Criteria;
- b) Noise modelling;
- c) Noise barriers;
- d) Low-noise road surfaces;
- e) Building-modification mitigation; and
- f) Post-construction review.

1.2 Revised assessment

Revised assessments were conducted in areas where there were changes to the design that had a material effect on noise levels.

Southbound Ōtaki offramp

The southbound offramp at Ōtaki was moved South from the NoR location to the new location near Bridge 2. This required an alteration to the designation,

As a result of this change, the predicted noise levels dropped at a significant number of PPFs. Predicted noise levels increased by 3 dB at two PPFs. An assessment of the change in noise levels and BPO for

¹ NZ Transport Agency (2014), SP/SP40: 2014 1409016, Specification for noise mitigation.

mitigation was conducted for these PPFs. This concluded that noise barriers would not be a practical option to reduce noise.

Full expressway changes

Some changes that have an effect on noise have been made to the project since the NoR assessment. The three most significant changes are:

1. The projected traffic flow data has significantly increased, based on the number of vehicles using the now operational Mackays to Peka Peka section of the expressway.
2. The modelled speed limit was increased from 100 km/h to 110 km/h, as instructed by the Waka Kotahi NZ Transport Agency. This increased speed limit has not yet been confirmed as the proposed speed limit for PP20.
3. The full expressway is to use a low noise road surface (EMOGPA) for engineering reasons.

As a result of these changes an updated NZS 6806 assessment was conducted by Marshall Day Acoustics (MDA). This has resulted in additional proposed mitigation measures. Where additional noise barriers are recommended, the design has been provided to residents for consultation, and amended where possible.

The changes and subsequent mitigation measures detailed above occurred after construction began on this section of the expressway. Therefore, it was not possible to provide design details or construct the barriers prior to construction commencing.

In some instances, PPFs have changed Categories. These have been assessed in accordance with Designation Condition 64 and the BPO mitigation options have been determined.

1.3 Personnel

The P40 specification requires that noise mitigation design is conducted by a suitably qualified professional. Mitigation design and preparation of this NMP has been prepared by Brendon Shanks and reviewed by Siiri Wilkening.

Brendon Shanks holds the degrees of Bachelor of Science (physics) and Bachelor of Music, and has ten years' experience as an acoustic consultant in New Zealand and the United Kingdom. He is a member of the Acoustical Society of New Zealand and the Institute of Acoustics (UK). He meets all the requirements set out in the P40 specification.

Siiri Wilkening holds a Master's degree in Engineering (Landscaping and Environmental Protection). She has more than 20 years' experience as an acoustic consultant. She is a member of the Acoustical Society of New Zealand. She meets all the requirements set out in the P40 specification.

2 Criteria

2.1 Designation conditions

The following designation conditions have been imposed on this project.

Table 2–1 Designation conditions – Operational noise

Condition	Subject	Addressed in this NMP
DC60	Operational rail noise	Yes
DC61	Definition of terms	Yes
DC62	Specification of mitigation measures	Yes
DC63	Detailed design requirements	Yes
DC64	BPO Process	Yes
DC65	Timing of mitigation options	Yes
DC66	Identification of Category C PPFs	Yes
DC67–71	Processing of Category C PPFs	N/A
DC72	Maintenance of Structural Mitigation	Yes
DC73	Noise Mitigation Plan	Yes

2.2 Selected options

Due to the changes in the noise emissions detailed in Section 1.2, additional mitigation measures are required to achieve the noise categories from the NoR assessment. A revised assessment for mitigation measures was conducted to determine BPO for noise barrier locations. The revised Noise Assessment identified the following mitigation as the selected options in the Northern Section.

Noise barriers

The NoR assessment did not recommend any noise barriers in the design. For the current design with the revised traffic volumes and speed, a series of noise barriers were considered in the Northern Section in an attempt to reduce the noise level at PPFs below the Categories defined in the NoR assessment. This additional mitigation was not a requirement of the designation conditions.

Based on this assessment, Waka Kotahi NZ Transport Agency instructed that BPO mitigation measures should be assessed for four locations where PPFs had negatively changed Categories from the Bol assessment. A matrix detailing the design considerations for these barrier options is included in Appendix J.

In three of these locations, lack of space between the road and the receivers means that the only option for a barrier location was the PPF property boundary.

In these locations, there was no scope for assessing different barrier lengths and heights, so only one option was assessed. This was acknowledged by Waka Kotahi NZ Transport Agency who instructed that these options be adopted as the basis for community liaison. Affected landowners have been consulted on the proposed barrier options.

Comments relating to the specific barrier locations are included in Table 2-2.

The barriers must be designed in accordance with NZTA P40: 2014 (P40) where practicable. This includes design requirements for noise barriers relating to:

- Statutory compliance
- Acoustics
- Durability
- Graffiti
- Urban design
- Landscaping
- Road safety
- Electrical power line clearance

Further discussion on the barrier design with respect to P40 is in Section 4, including instances where meeting some design requirements is not practicable.

Table provides a summary of where the revised assessment recommends that noise barriers are added. Some of these options are still being discussed with the affected landowners.

Table 2-2 Selected options – noise barriers

Location	Length (m)	Height (m)	Options assessed	Status
273 Main Highway	37m	2m	Existing property boundary fence upgraded. Option instructed by Waka Kotahi NZ Transport Agency	Subject to consultation with landowners
Milk Station	103	2.5m	Multiple options assessed, including option to achieve Category A. The selected option was BPO including landowner consultation.	Accepted by landowner
270A & 268 Main Highway	71m	2m	Due to lack of space a barrier at boundary of PPFs was the only option. Option instructed by Waka Kotahi NZ Transport Agency	Accepted by landowner
288-296 Mill Road	87m	2m	Due to lack of space a barrier at boundary of PPFs was the only option. Option instructed by Waka Kotahi NZ Transport Agency	Subject to consultation with landowners

Road surfaces

Low-noise road surfaces have been selected for the Expressway, as summarised in Table 2-3. Waka Kotahi NZ Transport Agency has instructed that this option is to be used for engineering reasons, rather than specifically as a noise mitigation measure. Therefore, it is no longer considered to be a “noise mitigation measure” for the expressway and a BPO assessment relating to noise is not necessary in this location.

Low noise surfacing is used as a noise mitigation measure on part of the Southbound off ramp at Ōtaki.

Table 2-3 Selected options – road surfaces

Location	Surface
Expressway - PP20 Northern section (excluding bridges)	PA-10
Expressway bridge decks (Bridge 1 - Waitohu Stream, Bridge 5 - Ōtaki River)	SMA 10-14
Ōtaki on-ramp NB	SMA 10-14
Ōtaki off-ramp SB	PA-10 SMA 10-14 for the final 100m
South of Te Manuao Road	SMA 10-14
Between Ōtaki on-ramp NB and off-ramp SB	SMA 10-14
North of Mill Rd	SMA 10-14

Building modification

Building modification is required at three PPFs (R055, R057, and R062) to satisfy DC60A which relates to rail noise.

Table 2-4 Selected options – building-modification mitigation

PPF
R055-057 260 Main Highway - Ōtaki Motel
R062 230 Main Highway

PPF Categories

With the structural mitigation detailed in Table 2-2 and 2-3, the total number of PPFs in the Northern Section in each of the NZS 6806 categories are shown in Table 2-5.

Table 2-5 Number of PPFs in NZS 6806 categories

Category A	Category B	Category C
50 PPFs	6 PPFs	0 PPFs

2.3 Transport Agency P40 specification

The relevant sections of the P40 specification are listed in Table 2- along with the section of this NMP where they are addressed.

Table 2–5 P40 Specification

P40 Section	Subject	Addressed in this NMP
2.1	Suitably qualified professionals	Section 1.3
3.3	Construction design	This NMP
4	Noise barriers	Section 4
5	Low-noise road surfacing	Section 5
6	Building modification	Section 6
7	Noise mitigation plan	This NMP
8	Post-construction review	Section 7

2.4 Principal’s Requirements

The Principal’s Requirements relating to operational noise are summarised in Table 2-6. The full text is attached in Appendix B

Table 2–6 Principal’s Requirements

Condition	Subject	Addressed in this NMP
A15.1.1	General – Prepare noise mitigation plan and satisfy designation conditions	Yes
A15.1.2	Quiet road surfacing	Yes
A15.1.3	Building modification	Yes
A15.1.4	Rail noise and vibration	Yes
A15.1.5	Post construction review	Yes

3 Modelling

Noise modelling has been performed to demonstrate that development of the road alignment and noise mitigation since the Noise Assessment undertaken for the Notice of Requirement is consistent with the designation conditions. The model includes the structural noise mitigation detailed in Sections 5 and 5 of this report.

3.1 Procedures

Table 3-1 lists the key model settings.

Table 3-1 Model settings

Parameter	Setting/source
Software	SoundPLAN 8.1
Algorithm	CRTN ²
Reflection model	CRTN ³
Parameter	$L_{Aeq(24h)}$
Earthworks topographic vertical resolution	0.5m
Ground absorption	1.0
Receiver height	1.5 m (4.5 m upper floors) – most exposed façade
Noise contour grid	1.5 m height, 5 m resolution
Receiver positions	Free-field

The CRTN algorithm gives results in terms of the $L_{A10(18h)}$. To convert this to $L_{Aeq(24h)}$ a -3 dB adjustment has been made. This adjustment has been implemented in the software in conjunction with the road surface adjustment detailed below.

Most data used in the noise model has been obtained directly from the project GIS system. However, in some instances additional data such as traffic flow and barriers have required manual entry direct into the noise model.

Contours

Earthwork contours have been imported from 'Corridors All North With Master Strings.dxf' dataset dated 15/06/2017 of the earthworks model as 3D polylines. Natural terrain contours outside of the earthworks boundary have been sourced from a combination of LiDAR and terrestrial mapping sources which have been combined to form the 3D Tri Ground Contours.dxf dataset (21/07/2017).

Road gradients and terrain screening have been determined from the contours.

² Calculation of Road Traffic Noise (CRTN). UK Department of Transport and the Welsh Office. ISBN 0115508473. 1988.

³ Calculation of Road Traffic Noise (CRTN). UK Department of Transport and the Welsh Office. ISBN 0115508473. 1988.

Buildings

The footprints for all buildings and all other structures within 200 metres of the roads have been imported into the noise model from the project GIS. All buildings have been modelled as 5 metres uniform height for single storey buildings and 7.5 metres uniform height for known two storey buildings. Predictions were made at all façades of individual buildings, with the noise levels stated being the highest of any facade.

Road alignments

Road alignments have been imported from 'Corridors All North With Master Strings.dxf' dataset dated 15/06/2017 of the geometrics model, as centrelines and road widths. Each two-lane carriageway has been modelled as a separate road. The gradients automatically calculated by the noise software have been manually disabled for downhill sections. Where there is a third lane (e.g. crawler lane, or exit lane) this has been modelled as a separate road. Local roads with one lane in each direction have each been modelled as a single road.

Road surfaces

The procedure used to incorporate different road surfaces in the model is as follows:

- In accordance with Transit Research Report 28⁴, a -2 dB adjustment has been made for a reference asphaltic concrete road surface, compared to CRTN,
- Surface corrections relative to asphaltic concrete have been in accordance with LTNZ Research Report 326⁵. The combination of surface corrections for cars and heavy vehicles have been made using the equation in the road surfaces noise guide⁶, and
- The combined correction has been entered in the modelling software as a road surface correction. This has also included the adjustment from $L_{A10(18h)}$ to $L_{Aeq(24h)}$.

Safety barriers

Solid (e.g. concrete) safety barriers have been manually entered in the noise model as 0.81 m high barriers.

Bridges

All bridges have been configured to be 'self-screening' roads, which blocks the noise of that road passing through them. Where there are not solid safety barriers on bridges, a 150 millimetre high vertical barrier has been modelled along the edges of the bridges to represent the kerb and channel.

Traffic data

Traffic data has been provided for all roads as the Annual Average Daily Traffic (AADT), percentage of heavy vehicles and speed. This has been provided separately for each carriageway and separately for crawler lanes. All traffic data has been provided for the design year of 2031, which is 11 years after the assumed opening year of 2020.

⁴ Research Report 28. Traffic noise from uninterrupted traffic flows, Transit, 1994.

⁵ Research Report 326: Road surface effects on traffic noise: Stage 3 – Selected bituminous mixes. Land Transport New Zealand, 2007.

⁶ Guide to state highway road surface noise, NZ Transport Agency, 2014.

The CRTN model has been developed based on 18-hour traffic. However, this has been entered as the 24-hour daily traffic (AADT), which results in modelling in the order of +0.2 dB conservative.

Table 3–2 Road details

Road section	Detailed design for construction (2031)			
	Surface	Speed (km/h)	AADT (vpd)	HV (%)
Expressway				
North of Taylors Road (two way)	Chipseal	110	19,105	18
North of Ōtaki on-ramp NB	PA-10 (Bridge 1 SMA 10-14)	110	9,883	18
North of Ōtaki off-ramp SB	PA-10 (Bridge 1 SMA 10-14)	110	9,221	14
Ōtaki Township NB	PA-10	110	6,341	16
Ōtaki Township SB	PA-10	110	5,709	14
North of Ōtaki River NB	PA-10	110	6,341	16
North of Ōtaki River SB	PA-10	110	5,709	14
Bridge 5 (Ōtaki River) NB	SMA 10-14	110	6,341	16
Bridge 5 (Ōtaki River) SB	SMA 10-14	110	5,709	14
Ramps				
Ōtaki on-ramp NB	SMA 10-14	110	3,541	22
Ōtaki off-ramp SB	PA-10 / SMA 10-14	110	3,513	22
Existing SH1 / new local arterial (two way)				
South of Te Manuao Road	SMA 10-14	50	4,948	16
Between Ōtaki on-ramp NB and off-ramp SB	SMA 10-14	50	7,758	16
North of Mill Rd	SMA 10-14	50	10,899	19

Calculation safety margin

A safety margin of 1.5 dB is included in the predicted noise levels to account for calculation uncertainty and reduce the risk of exceedance post-installation. It should be noted that this was not included in the NoR design. The introduction of the safety margin has not materially affected the predicted noise categories.

To allow direct comparison, the change in noise level presented in Table 3-3 assumes the 1.5 dB safety margin is applied to the NoR values and the Predicted Detailed Design values.

3.2 Results

Predicted road-traffic noise levels for the construction design of the Northern Section are shown in Table 3-3, compared with the noise criteria category predictions from the Noise Assessment for the NoR design/Selected options. The cells are colour coded according to the NZS 6806 category: category A – green, category B – orange, and category C - red.

Noise contour plots of the model are attached in Appendix C. These plots will be updated using the P40 Style Guide and to include the final noise barrier locations once these are confirmed.

A table including the existing noise levels as modelled for 2010 is included in Appendix D.

Table 3–3 Predicted noise category

PPF	Address	Criteria	NoR design	Detailed design for construction		
			6806 Category	Predicted change from NoR ³	Predicted noise level L _{Aeq(24h)}	6806 Category
R006	85 State Highway 1	Altered	Cat A	-1 dB	62 dB	Cat A
R007	82 State Highway 1	Altered	Cat A	1 dB	60 dB	Cat A
R008	299 Main Highway	Altered	Cat A	2 dB	49 dB	Cat A
R009	291A Main Highway	Altered	Cat A	3 dB	57 dB	Cat A
R010	291 Main Highway	Altered	Cat A	4 dB	61 dB	Cat A
R011	287 Main Highway	Altered	Cat A	5 dB	55 dB	Cat A
R012	285 Main Highway	Altered	Cat A	-3 dB	54 dB	Cat A
R013	283 Main Highway	Altered	Cat A	-3 dB	55 dB	Cat A
R014	277A Main Highway	Altered	Cat A	4 dB	66 dB	Cat B
R015	286 Main Highway	Altered	Cat A	-2 dB	55 dB	Cat A
R016	281 Main Highway	Altered	Cat A	-2 dB	59 dB	Cat A
R017	275A Main Highway	Altered	Cat A	5 dB	67 dB	Cat B
R018	277 Main Highway	Altered	Cat A	-2 dB	59 dB	Cat A
R019	271 Main Highway	Altered	Cat A	N/A ¹	N/A ¹	N/A ¹
R020	275 Main Highway	Altered	Cat A	-2 dB	61 dB	Cat A
R021	273 Main Highway	Altered	Cat A	-1 dB	61 dB	Cat A
R022	3A Te Manuao Rd	Altered	Cat A	-1 dB	49 dB	Cat A
R023	276 Main Highway	Altered	Cat A	-3 dB	62 dB	Cat A
R024	5 Te Manuao Road	Altered	Cat A	1 dB	47 dB	Cat A
R025	3B Te Manuao Rd	Altered	Cat A	1 dB	48 dB	Cat A
R026	3C Te Manuao Rd	Altered	Cat A	-1 dB	51 dB	Cat A
R027	269 Main Highway	Altered	Cat A	N/A ¹	N/A ¹	N/A ¹
R028	270A Main Highway, Building 1	Altered	Cat B	-5 dB	62 dB	Cat A
R029	270A Main Highway, Building 2	Altered	Cat A	-7 dB	59 dB	Cat A
R030	270A Main Highway, Building 3	Altered	Cat A	-4 dB	53 dB	Cat A
R031	270A Main Highway, Building 5	Altered	Cat A	-5 dB	60 dB	Cat A
R032	270A Main Highway, Building 4	Altered	Cat A	1 dB	51 dB	Cat A
R033	272 Main Highway	Altered	Cat A	1 dB	52 dB	Cat A
R034	270A Main Highway, Building 6	Altered	Cat A	-3 dB	53 dB	Cat A

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PPF	Address	Criteria	NoR design	Detailed design for construction		
			6806 Category	Predicted change from NoR ³	Predicted noise level L _{Aeq(24h)}	6806 Category
R035	270A Main Highway, Building 7	Altered	Cat A	-1 dB	51 dB	Cat A
R036	270A Main Highway, Building 8	Altered	Cat A	-2 dB	49 dB	Cat A
R037	268 Main Highway	Altered	Cat B	-2 dB	65 dB	Cat B
R038	270A Main Highway, Building 9	Altered	Cat A	-2 dB	48 dB	Cat A
R039	266 Main Highway	Altered	Cat A	-1 dB	57 dB	Cat A
R040	270B Main Highway	Altered	Cat A	1 dB	52 dB	Cat A
R041	270 Main Highway	Altered	Cat A	-1 dB	52 dB	Cat A
R042	17 Hariata St	Altered	Cat A	3 dB	53 dB	Cat A
R043	50 County Rd	Altered	Cat A	1 dB	57 dB	Cat A
R044	52 County Rd	Altered	Cat A	-1 dB	52 dB	Cat A
R045	15 Hariata St	Altered	Cat A	2 dB	56 dB	Cat A
R046	9 Hariata St	Altered	Cat A	2 dB	57 dB	Cat A
R047	294-296 Mill Rd	Altered	Cat A	-3 dB	61 dB	Cat A
R048	5 Hariata St	Altered	Cat A	1 dB	52 dB	Cat A
R049	46 County Rd	New	Cat B	3 dB	62 dB	Cat B
R050	1 Hariata St	Altered	Cat A	1 dB	48 dB	Cat A
R051	290-292 Mill Rd	Altered	Cat A	-5 dB	60 dB	Cat A
R052	280 Mill Rd	Altered	Cat A	1 dB	50 dB	Cat A
R053	288 Mill Rd	Altered	Cat A	-1 dB	63 dB	Cat A
R054	282 Mill Rd	Altered	Cat A	1 dB	54 dB	Cat A
R055	260 Main Highway (Ōtaki Motel)	Altered	Cat A	3 dB	63 dB	Cat A
R056	286 Mill Rd	Altered	Cat A	N/A ²	N/A ²	N/A ²
R057	260 Main Highway (Ōtaki Motel - Building 2)	Altered	Cat A	3 dB	61 dB	Cat A
R058	12 Dunstan St	Altered	Cat A	2 dB	48 dB	Cat A
R059	22 County Rd	New	Cat A	2 dB	55 dB	Cat A
R060	12 County Rd	New	Cat A	2 dB	57 dB	Cat A
R062	230 Main Highway	New	Cat A	-1 dB	56 dB	Cat A
R066	Former Rahui Milk Factory	New	Cat B	-1 dB	62 dB	Cat B
R068	Former Rahui Milk Factory - Social Hall	New	Cat B	-5 dB	60 dB	Cat B
R073	151-153 Main Highway	Altered	Cat A	-4 dB	56 dB	Cat A

¹ Buildings removed

² Identified as non-residential

³ With a 1.5 dB safety margin applied to both sets of values

Two PPFs have changed from Category A to B

Two of the PPFs have changed up a category from Category A to B as a result of design development (R014 and R017). An assessment of BPO mitigation measures was conducted to determine what would be required to achieve Category A at these properties. This included assessing the option of noise barriers and low noise road surfacing.

Due to the steep terrain between the road and the boundaries of the PPFs, and safety issues with barriers too close to the road edge, the noise barriers would need to be in excess of 3m achieve Category A at the PPFs.

Safety factors and durability relating to the road surface approaching an intersection limited the extent of low noise road surfacing that could be used.

The outcome of this assessment was that low noise road surfacing would be used where safe to do so and noise barriers were not considered BPO. The process for certification from Kāpiti Coast District Council is being progressed..

One PPF has changed from Category B to Category A, because of alterations to the Approved alignment. Three PPFs have been removed and are not included in the detailed design assessment.

4 Noise barriers

4.1 Location

Noise barriers will be installed as described in Table 4-1. Where a noise wall will be built on top of a noise bund, each component is listed. The barrier extents are shown graphically in Appendix E. All heights for noise walls are above the local ground level.

Table 4-1 Barriers

Location	Side	Type	Length (m)	Height (m)	Status
273 Main Highway	Southern property boundary	Timber	37m	1.8m	Subject to consultation with landowners
Milk Station	East of Expressway	Concrete	103m	2.5m	Accepted by landowner
270A & 268 Main Highway	East side of Main Highway	Timber	71m	2m	Accepted by landowner
288-296 Mill Road	West side of Main Highway	Timber	87m	2m	Subject to consultation with landowners

4.2 Design details

Options for a noise barrier at 288-296 Mill Road has been provided. This has been presented to the affected landowners and discussions over the final design are ongoing.

The height and length of the barrier alongside the Milk Station has been confirmed as 2.5m high and 103m long. The noise contours shown in Appendix C include the previous noise barrier option (3m high, 94m long). The contours will be updated when the location of the barrier is confirmed.

The detailed design of the noise barriers (including construction drawings) will be included in Appendix E at a later date. Where possible, the noise barriers shall be designed to meet the requirements of NZTA P40.

A GIS data set of as-built noise barriers will be supplied in accordance with the requirements of Section 7 of NZTA P40:2014.

Statutory compliance

TBC – after completion of detailed design

Acoustics

The current design options for noise barriers include timber fences where barriers are required on property boundaries. These barriers are not greater than 2m in height and would be constructed of timber or plywood with a surface mass greater than 10 kg/m². Draft designs for these fences are included in Appendix F.

The proposed barrier adjacent to the Milk Station will be 2.5m high and use overlapping concrete panels. This design has been used successfully by Waka Kotahi NZ Transport Agency on previous projects. Further details of the proposed design are included in Appendix F.

Durability

TBC - after completion of detailed design

The current proposed barriers for 273 Main Highway, 270A and 268 Main Highway, and 288-296 Mill Road are timber construction to keep the character of boundary fences. This does not meet the P40 durability requirements, so a consultation process shall confirm who will be responsible for future maintenance of the barriers.

Graffiti

TBC - after completion of detailed design

Urban design

TBC - after completion of detailed design

Landscaping

TBC - after completion of detailed design

Road safety

TBC - after completion of detailed design

Electrical power line clearance

TBC - after completion of detailed design

4.3 Timeframes for installation

Where possible, noise barriers would typically be installed at the beginning of construction, so that residents benefit from a reduction in noise from construction activity. In this instance, the need for noise barriers as a mitigation measure for road traffic noise only came about through changes to the project parameters (traffic volumes and design speed) that occurred after construction began.

Timeframes for installation of noise barriers will be included when known, after completion of detailed design.

4.4 Changes to selected options

The barriers indicated in Table 4-1 are all changes to the selected options. These have been added as a result of the revised assessment.

5 Road surfaces

5.1 Location

Low-noise road surfaces will be used along the alignment as detailed in Table 5-1.

The extents of low-noise road surfaces are also shown graphically in Appendix G.

Table 5-1 Road surfaces

Location	Start chainage	End chainage	Surface	Chip size, thickness and design void content (where applicable)
Expressway - PP20 Northern section	0300 0910	0730 3420	EMOGPA (PA-10)	Minimum depth of 25mm, 10mm nominal size aggregate, design air voids 20% min
Expressway Bridge decks	0730 3420	0910 3600	SMA 10-14	45mm SMA on tack coat on dense graded asphalt levelling course
Expressway - Northern tie-in	0000	0300	Chipseal	G3/5
Ōtaki on-ramp NB	000	100	EMOGPA (PA-10)	Minimum depth of 25mm, 10mm nominal size aggregate, design air voids 20% min
	100	363	SMA 10-14	45mm SMA11, 12.5mm nominal size aggregate, design air voids 4%
Ōtaki off-ramp SB (excluding final 100m)	000	184	EMOGPA (PA-10)	Minimum depth of 25mm, 10mm nominal size aggregate, design air voids 20% min
Ōtaki off-ramp SB - final 100m	184	284	SMA 10-14	45mm SMA11, 12.5mm nominal size aggregate, design air voids 4%
Existing SH1 - Te Manuao Road to Mill Road	000	560	SMA 10-14	45mm SMA11, 12.5mm nominal size aggregate, design air voids 4%

5.2 NAASRA counts

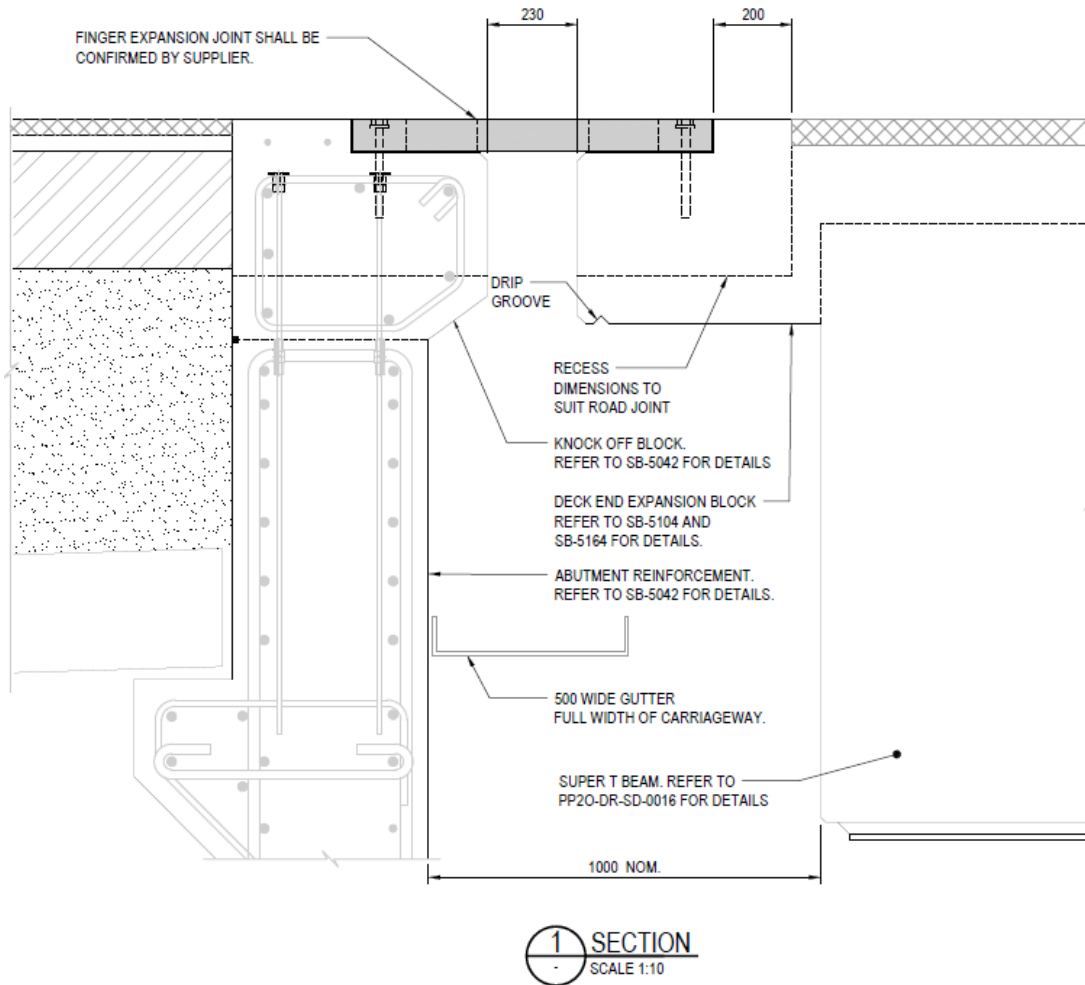
Principal's Requirement A15.1.2.1 requires the NAASRA count for the OPGA road surfaces to be an average value of less than 30 and a maximum value less than 50. This will be assessed during the post construction review.

5.3 Bridge joints

Bridge joints are required on the Ōtaki River bridge. There are no PPFs within 200m of the bridge.

Nevertheless, finger type joints are proposed for the Ōtaki River bridge, as shown in Figure 5-1Figure. These must be installed within standard tolerances. There the step between road surface and joint is larger than designed, the resultant impact of vehicle tyres can cause clearly definable sounds, as well as generating body rattle in trucks and trailers.

Figure 5-1: Proposed bridge joint cross section



5.4 Timeframes for installation

The Selected Options, including low noise surfacing, will be in place at the time of opening the expressway.

5.5 Changes to selected options

The change to the selected options is the use of a low-noise road surface throughout expressway and in critical areas of the on/off ramps. A low-noise surface was previously only included in the Ōtaki township section of the expressway.

6 Building-modification

Building modification is likely required at the PPFs in Table 6-1 to meet the internal noise criteria relating to rail noise given in designation condition DC60A. The proposed mitigation measures include upgraded glazing, additional layers of plasterboard to ceilings and walls, cavity insulation, and mechanical ventilation.

The specific building modifications will be confirmed through consultation with the relevant land owners.

6.1 Location

Building modification will be offered to PPFs as detailed in Table 6-1.

Table 6-1 Building-modification mitigation

PPF	Mitigation type
R055-057 260 Main Highway - Ōtaki Motel	Additional plasterboard, Cavity insulation, Glazing upgrade, mechanical ventilation, door system upgrades
R062 230 Main Highway	Additional plasterboard, Cavity insulation, Glazing upgrade, mechanical ventilation

6.2 Design details

Building-modification mitigation will be investigated and designed in accordance with the designation conditions and the *State highway guide to acoustics treatment of buildings*⁷.

6.3 Mitigation assessment process

Table 6-2 provides a summary of the assessment process, including a timeline of key assessment tasks.

Table 6-2 Building-modification mitigation

Date	Action	Comment
July 2018	MDA conducts initial noise measurements	Measurement of train noise levels and building façade performance. This validated the train noise level to be used for predictions
August 2018	MDA provides recommended building modification options	Options were provided to achieve the internal noise levels. However, agreement could not be reached.
2019	Railway alignment is altered prior to confirmation of building modification design	
November 2019	MDA conduct measurements of trains with altered rail alignment at Ōtaki Motel	Measurements of internal noise levels and building façade performances were conducted. This confirmed the initial recommended building modifications were still valid for Ōtaki Motel.
February 2020	MDA conduct measurements of trains with altered rail alignment at 230 Main Highway	Revised treatment options were provided to achieve the internal noise levels. However, agreement could not be reached.
June 2020	Full details of 230 Main Highway existing building construction are provided to MDA	Based on the existing building construction MDA revise treatment options. Agreement reached with Fletcher Construction Company Ltd.

6.4 Mitigation agreements

Legal agreements will be entered into with all property owners as detailed in the *State highway guide to acoustics treatment of buildings*, and using the templates from www.acoustics.nzta.govt.nz.

6.5 Timeframes for installation

TBC - After design confirmation

6.6 Changes to selected options

There have been no changes to the buildings identified as requiring building modification in the Northern Section. Specific details of the treatment required to these buildings has been revised throughout the assessment process (see Table 6-2 above) based on additional information about the existing building constructions.

7 Rail noise mitigation

Principal's Requirement A15.1.4 requires that "tracks shall be continuously welded and on ballast, or of a form that generates and transmits less noise and vibration".

Details of the track welding and ballast are included in Appendix H.

8 Post-construction review

A post-construction review of the modelling assumptions will be made to confirm the basis of this mitigation design, and to specifically confirm that the barriers and road surfaces have been constructed as specified. The review will be completed and reported within 12 months of the expressway opening to traffic.

The post-construction review report shall be submitted to the Transport Agency, and where necessary the Kāpiti Coast District Council.

8.1 Noise barrier site inspection

A site inspection will be performed by Marshall Day Acoustics within three months after completion of all noise barriers to confirm that the noise mitigation has been installed as documented in the final NMP. The reviewer shall conduct a visual inspection in accordance with Section 8.2 of NZTA P40:2014.

8.2 Road surface inspection

The road surface shall be visually inspected by a road surfacing specialist within three months of completion of all surfacing to confirm it is of the type detailed in in Table 5-1 of the final NMP. If twin layer or high void porous asphalt has been used, the specialist shall confirm the final surface has been laid as documented in the final NMP.

8.3 Noise modelling

Noise modelling of the as built alignment, surfaces, barriers and traffic data shall be conducted within 12 months of the expressway opening to traffic to confirm if there are significant changes from those detailed in the NMP.

Traffic monitoring shall be conducted to establish traffic volumes, including mix and speed. A traffic modelling specialist shall confirm whether these data measured shortly after opening correspond to the future design year conditions used in the noise model.

8.4 Verification measurements

PR A15.1.7-8 requires that noise measurements are conducted at three locations to verify predicted noise levels. Noise measurements would be conducted at locations on:

- Sutton Road
- Old Hautere Road, and
- County Road

Measurements would be conducted by Marshall Day Acoustics a period of 7 days at each location, during the period between 6 and 9 months after the expressway opens, as required by A15.1.7.

9 Ongoing maintenance

Management and maintenance of Structural Mitigation, including road surfacing and noise barriers (unless otherwise stated) shall be the responsibility of the Requiring Authority, as detailed in DC72.

9.1 Noise barriers

Responsibility of maintenance of noise barriers that are timber property boundary fences shall be defined when agreement is reached with affected property owners.

9.2 Road surfaces

Road surface degradation – review timeframe and responsibility - TBC

Glossary

Abbreviations

Abbreviation	Meaning	Abbreviation	Meaning
AADT	Annual average daily traffic	NZS	New Zealand Standard
AC	Asphaltic concrete	NZTA	Waka Kotahi NZ Transport Agency
AEE	Assessment of effects on the environment	OGPA	Open graded porous asphalt
BPO	Best practicable option	PPF	Protected premises and facilities
CRTN	Calculation of road traffic noise	RoNS	Road of national significance
dB	Decibels	RP	Route position
GIS	Geographic information system	RMA	Resource Management Act 1991
HV	Heavy vehicle	SAR	Scheme assessment report
Hz	Hertz	SH1	State Highway 1
km	Kilometre	SMA	Stone mastic asphalt
km/h	Kilometres per hour	vpd	Vehicles per day
NoR	Notice of requirement		

Terminology

Term	Definition
Alignment	The horizontal or vertical geometric form of the centre line of the carriageway.
Annual average daily traffic	The total volume of traffic passing a roadside observation point over the period of a calendar year, divided by the number of days in that year (365 or 366 days). Measured in vehicles per day.
Bridge	A structure designed to carry a road or path over an obstacle by spanning it. This includes culverts with a cross-sectional area greater than or equal to 3.4 square metres.
Carriageway	That portion of the road devoted particularly to the use of travelling vehicles, including shoulders.
Centreline	The basic line, at or near the centre or axis of a road or other work, from which measurements for setting out or constructing the work can conveniently be made.
Chip seal	A wearing course consisting of a layer or layers of chips originally spread onto the pavement over a film of freshly sprayed binder and subsequently rolled into place.
Clear zone	An area adjacent to a road carriageway that is clear of fixed objects and other hazards, providing a recovery zone for vehicles that have left the carriageway.
Conditions	Conditions placed on a resource consent (pursuant to section 108 of the RMA) or conditions of a designation (pursuant to subsection 171(2)(c) of the RMA).
Cross-section	A vertical section, generally at right-angles to the centreline showing the ground. On drawings it commonly shows the road to be constructed, or as constructed.

Term	Definition
Deceleration lane	A speed-change lane provided to allow vehicles to decrease speed.
Designation	Defined in section 166 of the RMA as: “a provision made in a district plan to give effect to a requirement made by a requiring authority under section 168 or section 168A or clause 4 of schedule 1.”
Design life	The period during which the performance of a pavement is expected to remain acceptable.
Design speed	A speed fixed for the design of minimum geometric features of a road.
Design year	The predicted year in which the design traffic volume would be reached.
Detailed design for construction	The final design that forms the basis for noise mitigation built on site.
Embankment	A construction work (usually of earth or stone) that raises the ground (or formation) level above the natural surface.
Expressway	A road mainly for through traffic, usually dual carriageway, with full or partial control of access. Intersections are generally grade separated.
Footpath	That portion of the road reserve set aside for the use of pedestrians only.
Free-field (Noise)	Description of a location which is at least 3.5 metres from any significant sound reflecting surface other than the ground.
Guard rail	A rail erected to restrain vehicles from physically leaving the road, including wire-rope barriers.
Interchange ramp	A carriageway within an interchange providing for travel between two arms (legs) of the intersecting roads.
Interchange	A grade separation of two or more roads with one or more interconnecting carriageways.
Intersection	A place at which two or more roads cross at grade or with grade separation.
$L_{Aeq(24h)}$	Time-average sound level over a twenty-four hour period, measured in dB.
Local road	A road (other than a State highway) in the district, and under the control, of a territorial authority, as defined in Section 5 of the Land Transport Management Act 2003.
Median barrier	A device used on multi-lane roads to keep opposing traffic within their prescribed carriageways.
Minimum requirements	Specifications in the contract documentation detailing the minimum requirements for the project construction, including noise mitigation measures/outcomes.
Noise	Noise may be considered as sound that serves little or no purpose for the exposed persons and is commonly described as ‘unwanted sound’.
Notice of requirement	A notice given to a territorial authority (under section 168 of the RMA) or by a territorial authority (under section 168A of the RMA) of a requirement for land, water, subsoil or airspace to be designated.
Outline plan	A plan of the public work, project, or work to be constructed on designated land provided to a territorial authority, pursuant to section 176A of the RMA, prior to the work being undertaken.

Term	Definition
Principal's requirements	The Transport Agency's requirements for the contractor's design and construction.
Ramp	Carriageway within an interchange providing for travel between two arms (legs) of the intersecting roads.
Retaining wall	A wall constructed to resist lateral pressure from the adjoining ground or to maintain in position a mass of earth.
Road	An area formed for vehicular traffic to travel on. The term 'road' describes the area between kerbs or surface water channels and includes medians, shoulders and parking areas.
Road reserve	A legally described area within which facilities such as roads, footpaths and associated features may be constructed and maintained for public travel.
Roundabout	An intersection where all traffic travels in one direction around a central island.
Sound	Sound (pressure) levels are an objective measure of changes in pressure levels that may be heard by humans. Unwanted sound can be considered as noise.
Traffic flow	The number of vehicles passing a given point during a specified period of time.
Traffic lane	A portion of the carriageway allotted for the use of a single line of vehicles.
Traffic volume	The number of vehicles flowing in both directions past a particular point in a given time (e.g. vehicles per hour, vehicles per day).
Vehicles per day	The number of vehicles observed passing a point on a road in both directions for 24 hours.

Road surface types

Term	Definition
SMA 10-14	Stone Mastic Asphalt with 10 to 14mm nominal size aggregate
EMOGPA (PA-10)	Epoxy Modified Porous Asphalt (Low noise surfacing) using 10-12.5mm nominal size aggregate

Appendix A Designation conditions

DC60A	The Requiring Authority shall enter into negotiations with the relevant property owner and / or occupier prior to construction of the realigned North Island Main Trunk Railway and implement any agreed noise mitigation measures in relation to the Ōtaki Motel and 230 Main Highway, in order to, where practicable, achieve indoor noise levels from rail operations not exceeding 35dB LAeq(1h) in bedrooms and 40 dB LAeq(1h) in other habitable spaces assuming outdoor rail noise levels as per Table 3.5 of TR 14, while maintaining adequate ventilation within these spaces, (subject to the landowner allowing reasonable access to implement the measures).
DC61	For the purposes of Conditions 61 to 73, the following terms mean: <ul style="list-style-type: none"> a) BPO – means Best Practicable Option; b) Building-Modification Mitigation – has the same meaning as in NZS6806:2010; c) Habitable Space – has the same meaning as in NZS6806:2010; d) Noise Assessment – means the Operational Noise and Vibration Assessment submitted with the NoR; e) Noise Criteria Categories – means groups of preference for time-averaged sound levels established in accordance with NZS6806:2010 when determining the selected mitigation option considered to be the BPO; i.e. Category A – primary noise criterion, Category B – secondary noise criterion, Category C – internal noise criterion; f) NZS6806:2010 – means NZS 6806:2010 Acoustics – Road-traffic noise – New and altered roads; g) PPFs – has the same meaning as in NZS6806:2010, and are generally identified in green, yellow or red on drawings NS-01 to NS-08; and h) Structural Mitigation – has the same meaning as in NZS6806:2010.
DC62	The Requiring Authority shall implement noise mitigation measures with reference to the “Selected Options” as set out within Section 7 Tables 7-1 and 7-2 of TR14, including the surfacing of 1050m of the Expressway with OGPA (PA10) through Ōtaki township from chainage 1300 to 2350 and Building-Modification Mitigation of the dwelling at 14 Old Hautere Road. The mitigation noted in this condition shall achieve the Noise Criteria categories indicated in drawings NS-01 to NS-08, where practicable and shall be subject to Conditions 63 to 73.
DC63	The detailed design of the selected mitigation options (the “Selected Options”) required to be implemented by Condition 62 shall be undertaken by a suitably qualified acoustics specialist prior to the Commencement of Construction of the Project.
DC64	Where the design of the Selected Options identifies that it is not practicable to implement a particular Structural Mitigation measure in the location or of the length included in the Selected Options required by Condition 62 either: <ul style="list-style-type: none"> a) If the design of the Structural Mitigation measure could be changed and would still achieve the same Identified Category or Category B at all relevant PPFs, and an independent and suitably qualified person certifies to KCDC that the changed Structural Mitigation would be consistent with adopting the BPO in accordance with NZS6806:2010, the Selected Options may include the changed mitigation measure, or b) If the changed design of the Structural Mitigation would change the Noise Criteria Category at any PPF from Category A or B to Category C, and the Manager confirms that the changed Structural Mitigation would be consistent with adopting the BPO in accordance with NZS6806:2010, the Selected Options may include the changed mitigation measure. c) The Requiring Authority shall consult with affected property owners prior to amending the Selected Options.

DC65	The Selected Options shall be implemented prior to completion of the Works, with the exception of any low-noise road surfaces, which shall be implemented within 12 months of the laying of the initial pavement surface.
DC66	Prior to construction of the Project, a suitably qualified acoustic specialist shall identify those PPFs which, following implementation of all the Structural Mitigation measures included in the Selected Options, are not in Noise Criteria Categories A or B and where Building Modification Mitigation in accordance with NZS 6806:2010 may be required to achieve 40 dB LAeq(24h) inside Habitable Spaces (“Category C Buildings”).
DC67	<p>a) Prior to Commencement of Construction of the Project in the vicinity of a Category C Building, the Requiring Authority shall write to the owner and occupier of each Category C Building seeking access to such building for the purpose of measuring internal noise levels and assessing the existing building envelope in relation to noise reduction performance.</p> <p>b) If the owner(s) and occupier(s) of the Category C Building approve the Requiring Authority’s access to the property within 12 months of the date of the Requiring Authority’s letter (sent pursuant to a), then no more than 12 months prior to Commencement of Construction of the Project Stage, the Requiring Authority shall instruct a suitably qualified acoustic specialist to visit the building to measure internal noise levels and assess the existing building envelope in relation to noise reduction performance.</p>
DC68	<p>Where a Category C Building is identified, the Requiring Authority shall be deemed to have complied with Condition 67 above where:</p> <p>a) The Requiring Authority (through its acoustics specialist) has visited and assessed the building; or</p> <p>b) The owner of the Category C Building approved the Requiring Authority’s request for access, but the Requiring Authority could not gain entry for some reason (such as entry being denied by a tenant); or</p> <p>c) The owner of the Category C Building did not approve the Requiring Authority’s access to the property within the time period set out in Condition 67b) (including where the owner(s) did not respond to the Requiring Authority’s letter within that period); or</p> <p>d) The owner of the Category C Building cannot, after reasonable enquiry, be contacted prior to completion of construction of the Project. If any of (a) to (d) above apply to a particular Category C Building, the Requiring Authority shall not be required to implement any Building-Modification Mitigation at that Category C Building.</p>
DC69	<p>Subject to Condition 70, within 6 months of the assessment required under Condition 67b), the Requiring Authority shall give notice to the owner of each Category C Building:</p> <p>a) Advising of the options available for Building-Modification Mitigation to the building; and</p> <p>b) Advising that the owner has three months within which to decide and advise the Requiring Authority whether to accept one or any option for Building-Modification Mitigation for the building</p>
DC70	Once an agreement on Building-Modification Mitigation is reached between the Requiring Authority and the owner of an affected building, the mitigation shall be implemented in a reasonable and practical timeframe agreed between the Requiring Authority and the owner.
DC71	<p>Subject to Condition 68, where Building-Modification Mitigation is required, the Requiring Authority shall be deemed to have complied with Condition 70 above where:</p> <p>a) The Requiring Authority has completed Building-Modification Mitigation to the Category C Building; or</p> <p>b) The owner(s) of the Category C Building did not accept the Requiring Authority’s offer to implement Building-Modification Mitigation prior to the expiry of the timeframe stated in Condition 69b) above (including where the owner(s) did not respond to the Requiring Authority within that period); or</p>

	c) The owner of the Category C Building cannot, after reasonable enquiry, be contacted prior to completion of construction of the Project.
DC72	The Requiring Authority shall manage, and maintain the Structural Mitigation to ensure that, to the extent practicable, those mitigation measures retain their noise reduction performance.
DC73	<p>A Noise Mitigation Plan shall be prepared by an independent and suitably qualified acoustics specialist 15 Working Days prior to the Commencement of Construction, and shall include details of:</p> <ul style="list-style-type: none"> a) The Selected Options; b) Predicted noise levels, including identification of any PPFs which have changed NZS 6806:2010 noise categories; and c) Methods for post-construction validation of the Noise Assessment and to ensure the Selected Options retain their noise reduction performance.

Appendix B Principal's Requirements

As contained in page 216 of the 'Appendices to Principal's Requirements' SM031 App B3B Issue 9: September 2014.

A15.1 Road and Rail Traffic (Operational) Noise

A15.1.1 General

A.15.1.1.1 The Contractor shall assess, implement, verify and document noise mitigation in accordance with the NZ Transport Agency specification NZTA P40:2014. This shall include mitigation for both road-traffic and railway noise.

A.15.1.1.2 The Contractor shall satisfy the requirements of all designation conditions relating to operational noise:

- a) Condition 60A – rail noise, and
- b) Conditions 61-73 – road-traffic noise

A15.1.2 Quiet Road Surface

A.15.1.2.1 The quiet road surfacing (see Appendix A8) in Ōtaki shall be an epoxy modified open graded porous asphalt. The NAASRA count for this surface shall be an average value less than 30 and a maximum value less than 50.

A15.1.3 Building Modification

A.15.1.3.1 The design and construction of building acoustic treatment shall adhere to the guidance in the 2015 version of the NZ Transport Agency State highway guide to acoustics treatment of buildings.

A15.1.4 Rail noise and vibration

A.15.1.4.1 All new rail track shall be continuously welded and on ballast, or of a form that generates and transmits less noise and vibration.

A15.1.5 Post-construction review

A15.1.6 A post-construction review shall be conducted meeting the requirements of both the specification NZTA P40:2014 and the designation conditions.

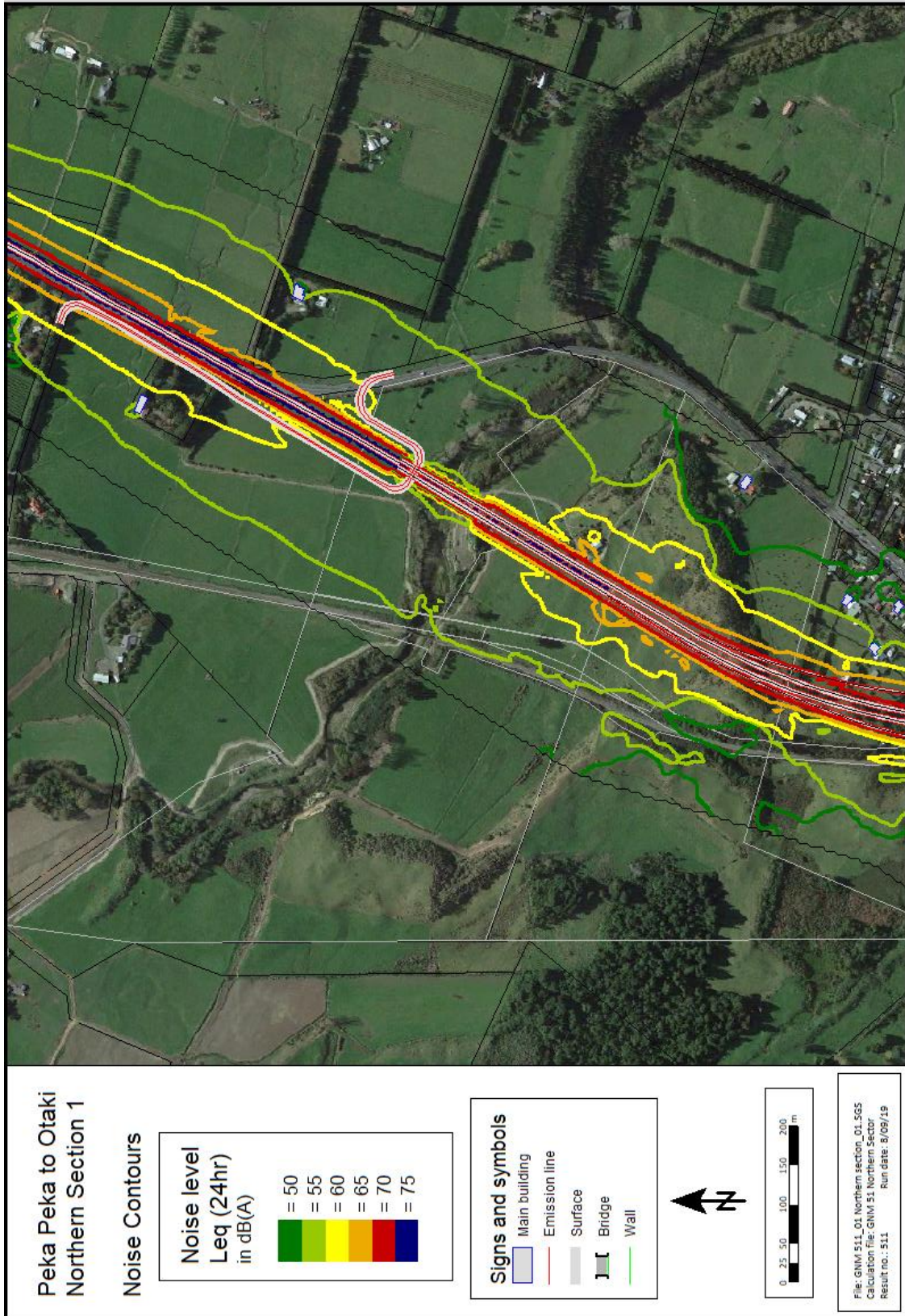
A15.1.7 The post-construction review shall include noise measurements for a period of at least seven days at each of three locations, for the purpose of verifying the noise model. The noise measurements shall be made between six and nine months after the expressway has opened to traffic. The measurements and analysis shall be in accordance with the NZ Transport Agency Noise monitoring requirements.

The results of the measurements shall be compared to the predicted road-traffic noise levels. If discrepancies are found, these shall be investigated and findings reported in the post-construction review report.

A15.1.8 The three locations for noise measurements shall be determined by the Principal following agreement with property owners. It is intended that the measurements will be at houses on Suttons Road, Old Hautere Road and County Road.

A15.1.9 The Contractor shall be responsible for any additional noise mitigation measures required as a result of the noise assessments not meeting the designation conditions.

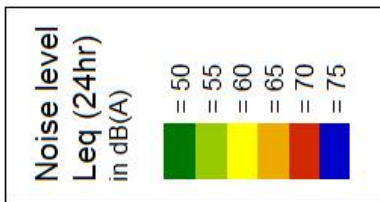
Appendix C Noise Contours










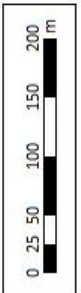
Peka Peka to Otaki
 Northern Section 2

Noise Contours

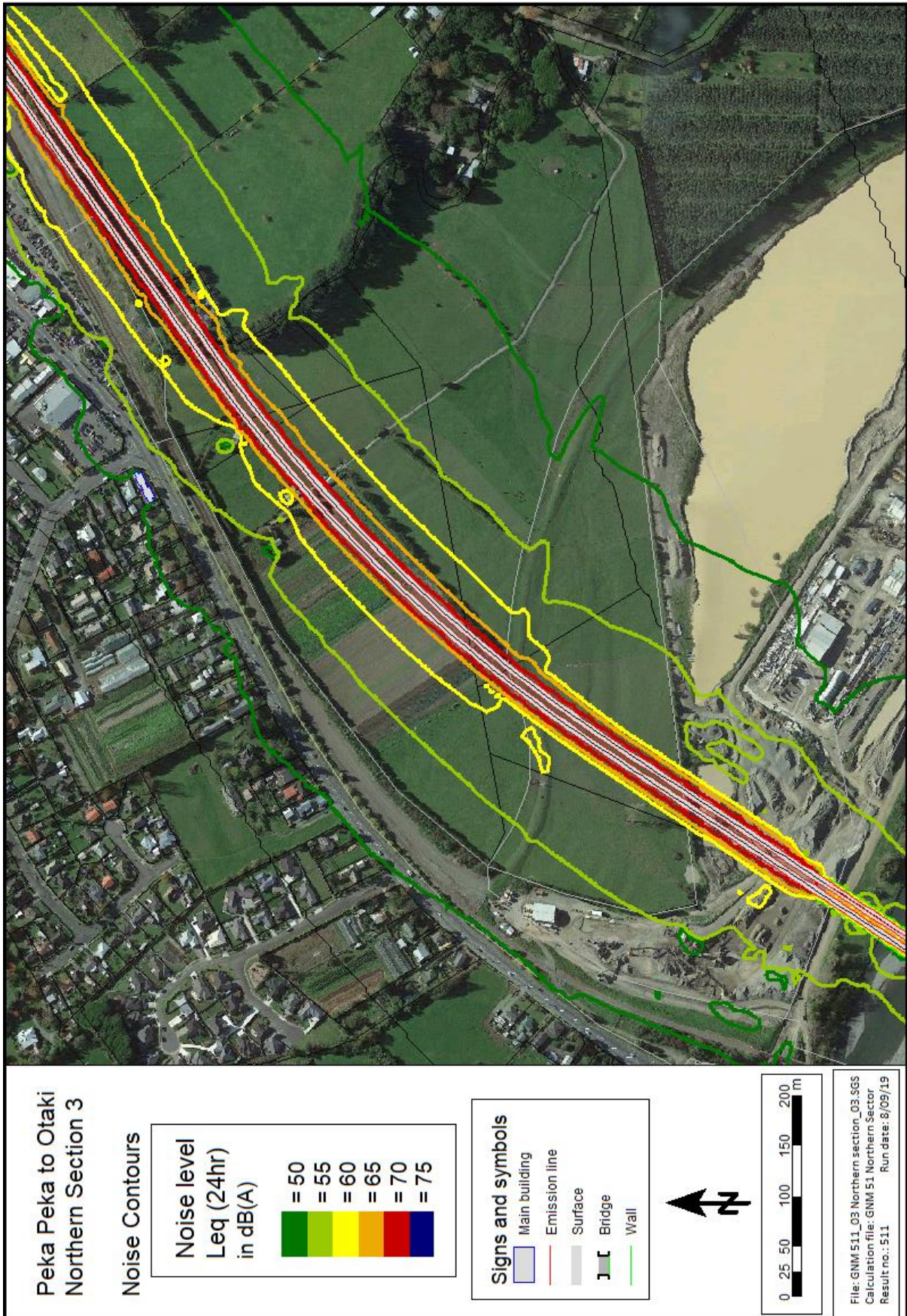


Signs and symbols

-  Main building
-  Emission line
-  Surface
-  Bridge
-  Wall



File: GMM 511_02_Northern section_02_565
 Calculation file: GMM 51 Northern Sector
 Result no.: 511
 Run date: 9/09/19



Appendix D Predicted noise levels

PPF	Address	Existing 2010	Detailed design for construction ¹
R006	85 State Highway	60 dB	62 dB
R007	82 State Highway	58 dB	60 dB
R008	299 State Highway	62 dB	49 dB
R009	291A Main Highway	53 dB	57 dB
R010	291 Main Highway	50 dB	61 dB
R011	287 Main Highway	61 dB	55 dB
R012	285 Main Highway	64 dB	54 dB
R013	283 Main Highway	62 dB	55 dB
R014	277A Ōtaki Main Rd	50 dB	66 dB
R015	286 Main Highway	66 dB	55 dB
R016	281 Main Highway	63 dB	59 dB
R017	275A Ōtaki Main Rd	52 dB	67 dB
R018	277 Main Highway	63 dB	59 dB
R019	271 Main Highway	55 dB	N/A ¹
R020	275 Main Highway	65 dB	61 dB
R021	273 Main Highway	64 dB	61 dB
R022	3A Te Manuao Rd	58 dB	49 dB
R023	276 Main Highway	67 dB	62 dB
R024	5 Te Manuao Road	62 dB	47 dB
R025	3B Te Manuao Rd	60 dB	48 dB
R026	3C Te Manuao Rd	53 dB	51 dB
R027	269 Main Highway	63 dB	N/A ¹
R028	270A Main Highway, Building 1	68 dB	62 dB
R029	270A Main Highway, Building 2	67 dB	59 dB
R030	270A Main Highway, Building 3	57 dB	53 dB
R031	270A Main Highway, Building 5	67 dB	60 dB
R032	270A Main Highway, Building 4	51 dB	51 dB
R033	272 Main Highway	51 dB	52 dB
R034	270A Main Highway, Building 6	57 dB	53 dB
R035	270A Main Highway, Building 7	53 dB	51 dB
R036	270A Main Highway, Building 8	52 dB	49 dB
R037	268 Main Highway	68 dB	65 dB
R038	270A Main Highway, Building 9	50 dB	48 dB
R039	266 Main Highway	58 dB	57 dB
R040	270B Main Highway	52 dB	52 dB
R041	270 Main Highway	53 dB	52 dB
R042	17 Hariata St	52 dB	53 dB
R043	50 County Rd	58 dB	57 dB

**Waka Kotahi NZ Transport Agency
Peka Peka to Ōtaki (Northern Section)
Noise Mitigation Plan**

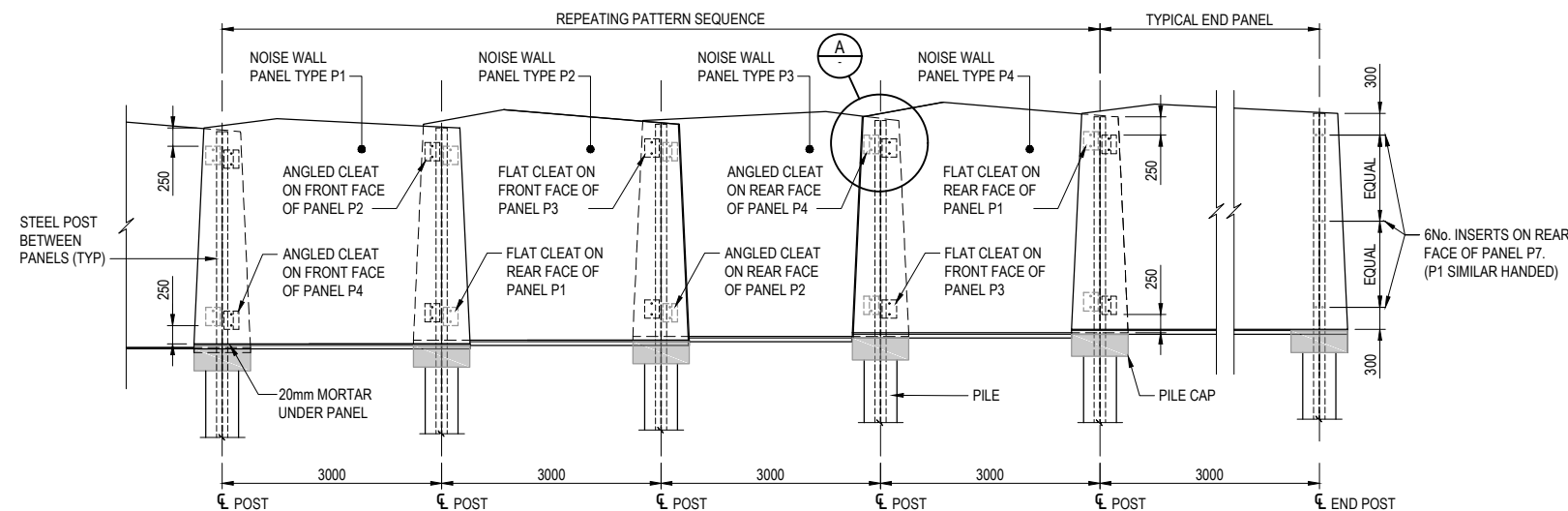
PPF	Address	Existing 2010	Detailed design for construction ¹
R044	52 County Rd	51 dB	52 dB
R045	15 Hariata St	57 dB	56 dB
R046	9 Hariata St	57 dB	57 dB
R047	294-296 Mill Rd	66 dB	61 dB
R048	5 Hariata St	52 dB	52 dB
R049	46 County Rd	56 dB	62 dB
R050	1 Hariata St	59 dB	48 dB
R051	290-292 Mill Rd	68 dB	60 dB
R052	280 Mill Rd	61 dB	50 dB
R053	288 Mill Rd	67 dB	63 dB
R054	282 Mill Rd	60 dB	54 dB
R055	260 Main Highway (Ōtaki Motel)	63 dB	63 dB
R056	286 Mill Rd	69 dB	N/A ²
R057	260 Main Highway (Ōtaki Motel - Building 2)	61 dB	61 dB
R058	12 Dunstan St	52 dB	48 dB
R059	22 County Rd	49 dB	55 dB
R060	12 County Rd	50 dB	57 dB
R062	230 Main Highway	54 dB	56 dB
R066	Former Rahui Milk Factory	51 dB	62 dB
R068	Former Rahui Milk Factory - Social Hall	49 dB	60 dB
R073	151-153 Main Highway	67 dB	56 dB

¹ Includes a 1.5 dB safety factor

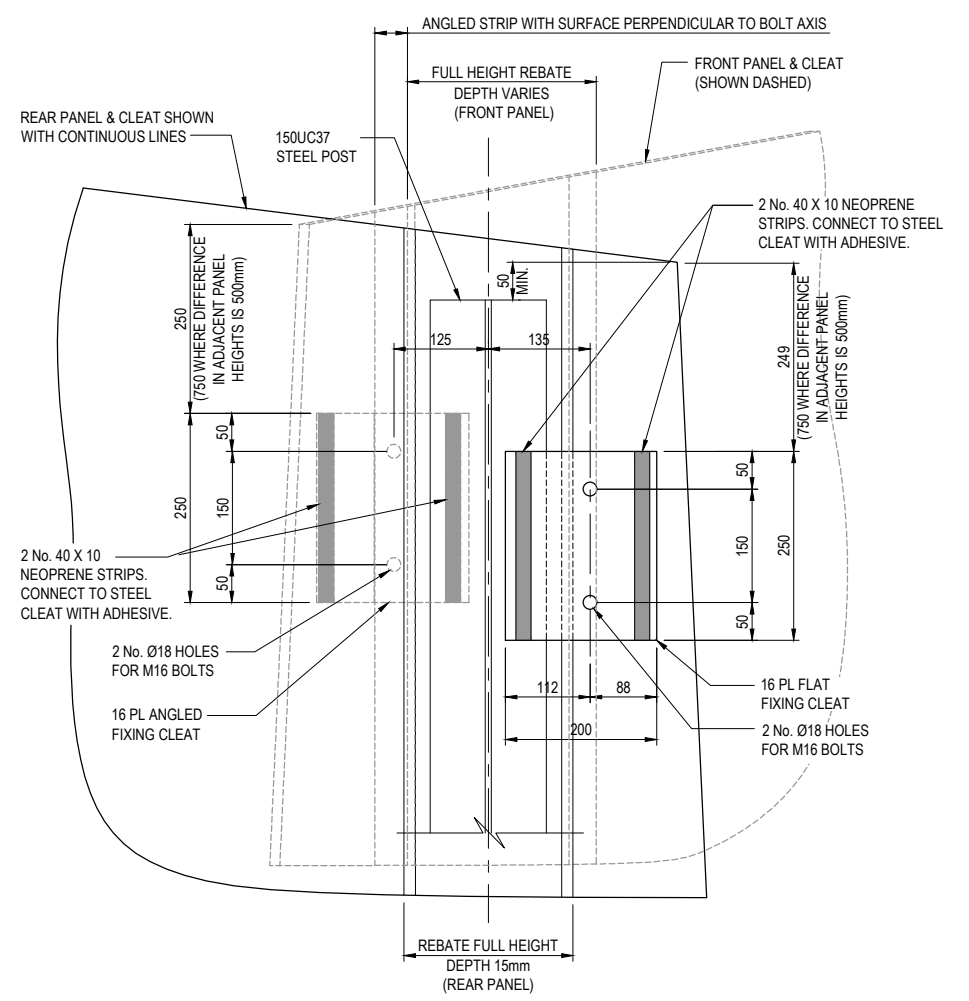
Appendix E Noise barriers

Detailed figures to be provided once locations are confirmed

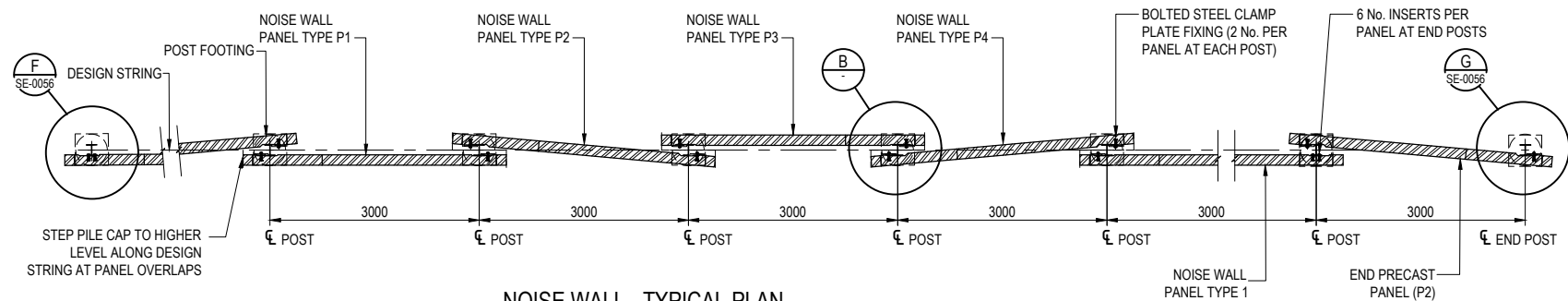
Appendix F Noise barrier design



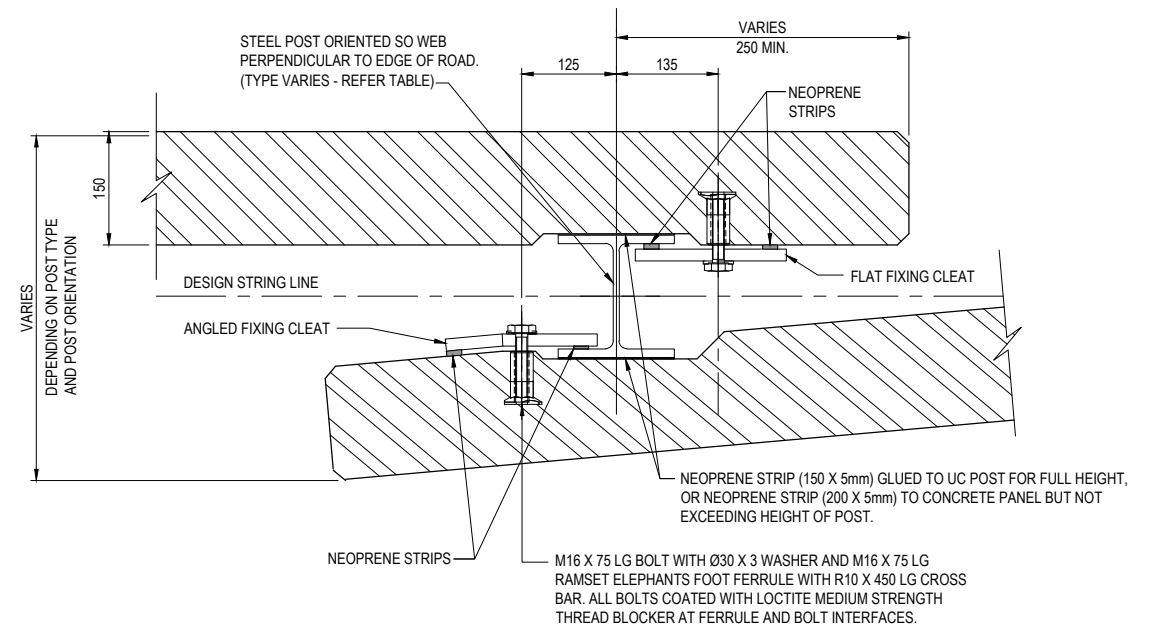
NOISE WALL - TYPICAL ELEVATION
SCALE 1:50 AT A1 (1:100 AT A3)



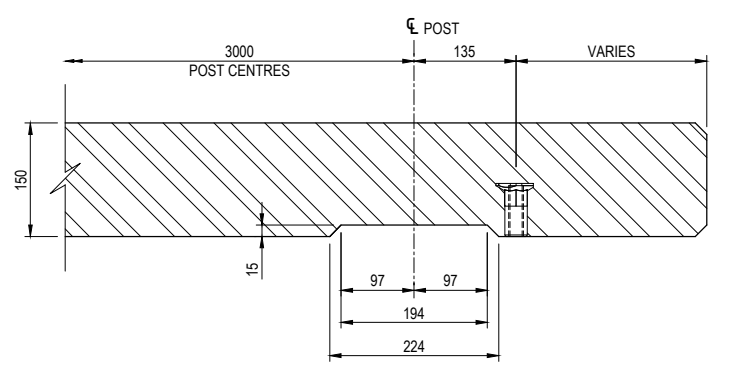
A **DETAIL - PANEL FIXING ELEVATION**
SCALE 1:5 AT A1 (1:10 AT A3)



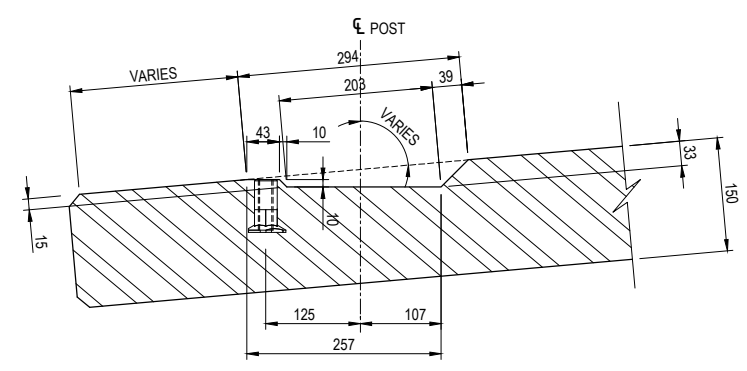
NOISE WALL - TYPICAL PLAN
SCALE 1:50 AT A1 (1:100 AT A3)



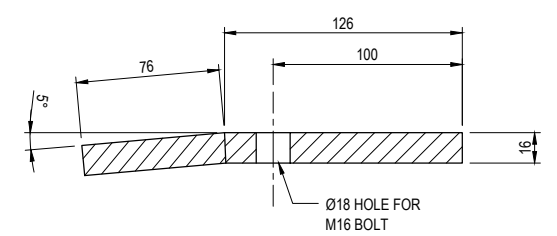
B **DETAIL - PANEL FIXING**
SCALE 1:5 AT A1 (1:10 AT A3)



C **DETAIL - PANEL TYPES 1 & 3 - REBATE**
SCALE 1:5 AT A1 (1:10 AT A3)



D **DETAIL - PANEL TYPES 2 & 4 - REBATE**
SCALE 1:5 AT A1 (1:10 AT A3)



E **DETAIL - ANGLED FIXING CLEAT**
SCALE 1:2 AT A1 (1:4 AT A3)

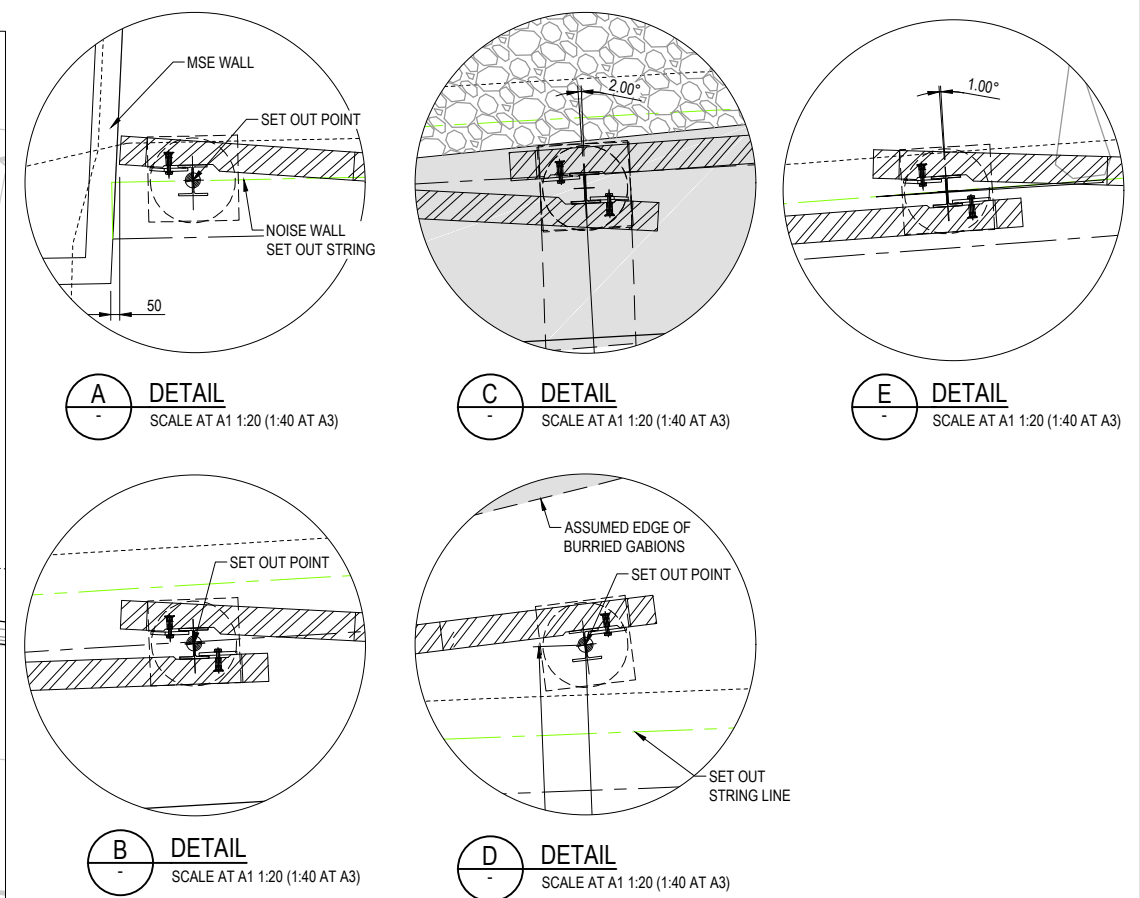
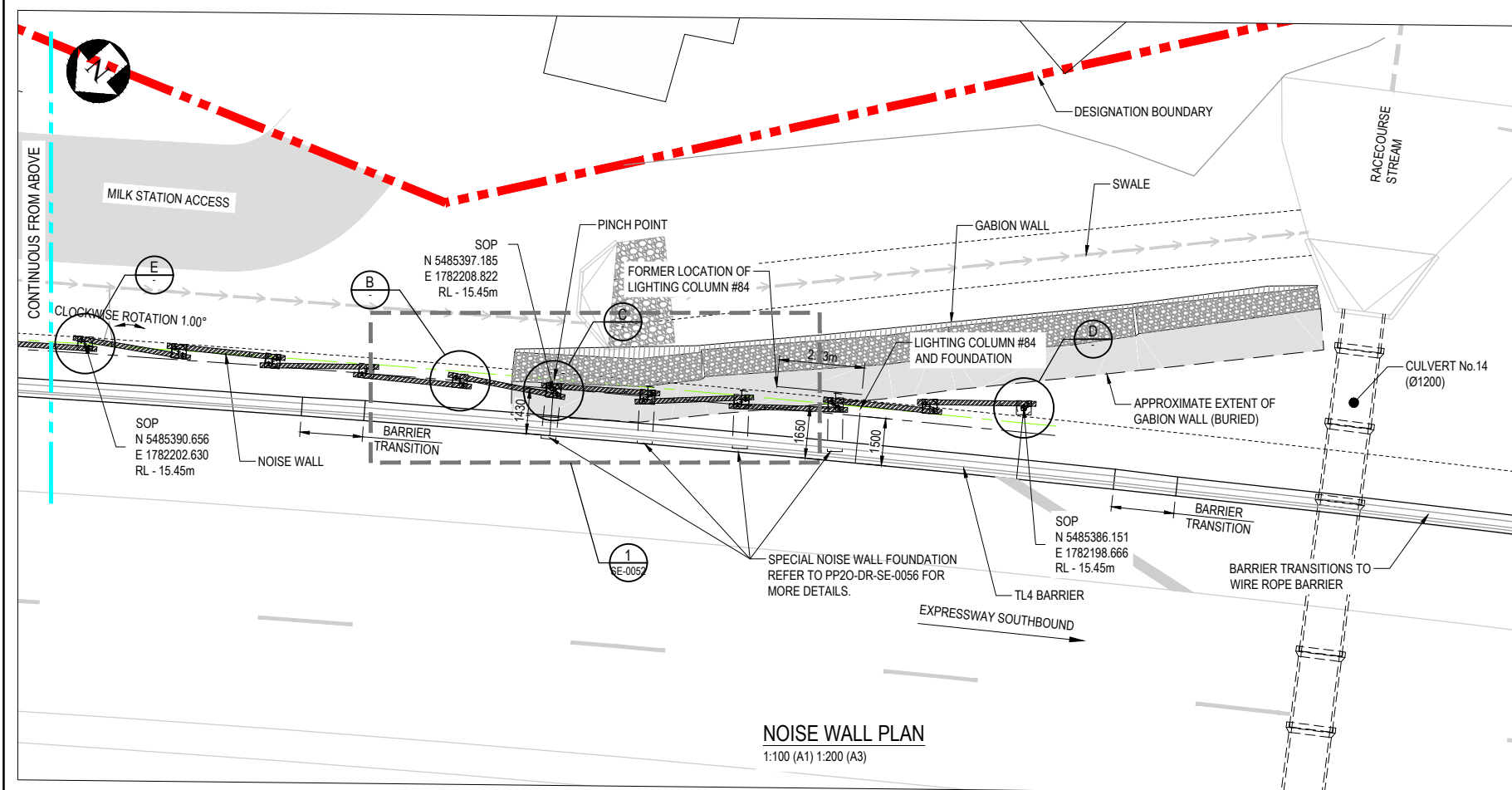
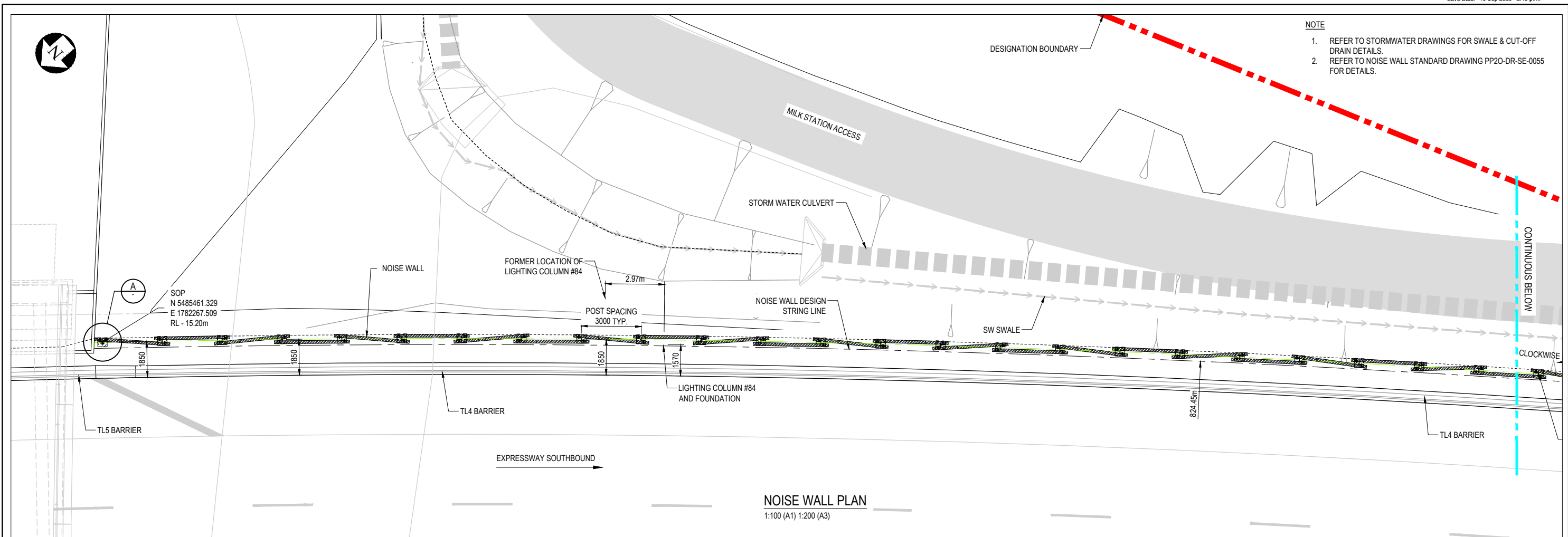
NOTES:
1. REFER DRAWING PP20-DR-SE-0058 FOR NOTES.

ORIGINAL DRAWING IN COLOUR **FOR INFORMATION NOT FOR CONSTRUCTION**

Scale (A1) AS SHOWN	Design Drawn	A.Kivell	20.07.20	Approved For Construction
Scale (A3) AS SHOWN	Drawn	A.Kochar	20.08.20	
	Design Verifier			
	Dwg Check			
	* Refer to Original Handcopy for Signature			

NZ TRANSPORT AGENCY **Peka Peka to Ōtaki Expressway** **Fletcher HIGGINS** **BECA** **Tonkin+Taylor**

Subject:	GENERAL STRUCTURES	Discipline:	STRUCTURAL
Title:	NOISE WALLS PANEL DETAILS	Drawing:	PP20-DR-SE-0055
		Rev:	A



ORIGINAL IN COLOUR
FOR INFORMATION NOT FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
B	WALL ALIGNMENT MODIFIED	GD			15.09.20
A	FOR INFORMATION	AK	GD	AL	07.08.20











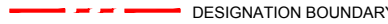



Design	S. Keerthivasan	07.08.20	Approved For Construction
Drawn	A. Kochar	07.08.20	
Dwg Verifier	A. Henderson	24.08.20	
Dwg Check			

* Refer to Original Hardcopy for Signature

Subject:	GENERAL STRUCTURES NOISE WALL LAYOUT PLAN	Discipline:	STRUCTURAL
Title:		Drawn by:	PP20-DR-SE-0051
		Rev:	B

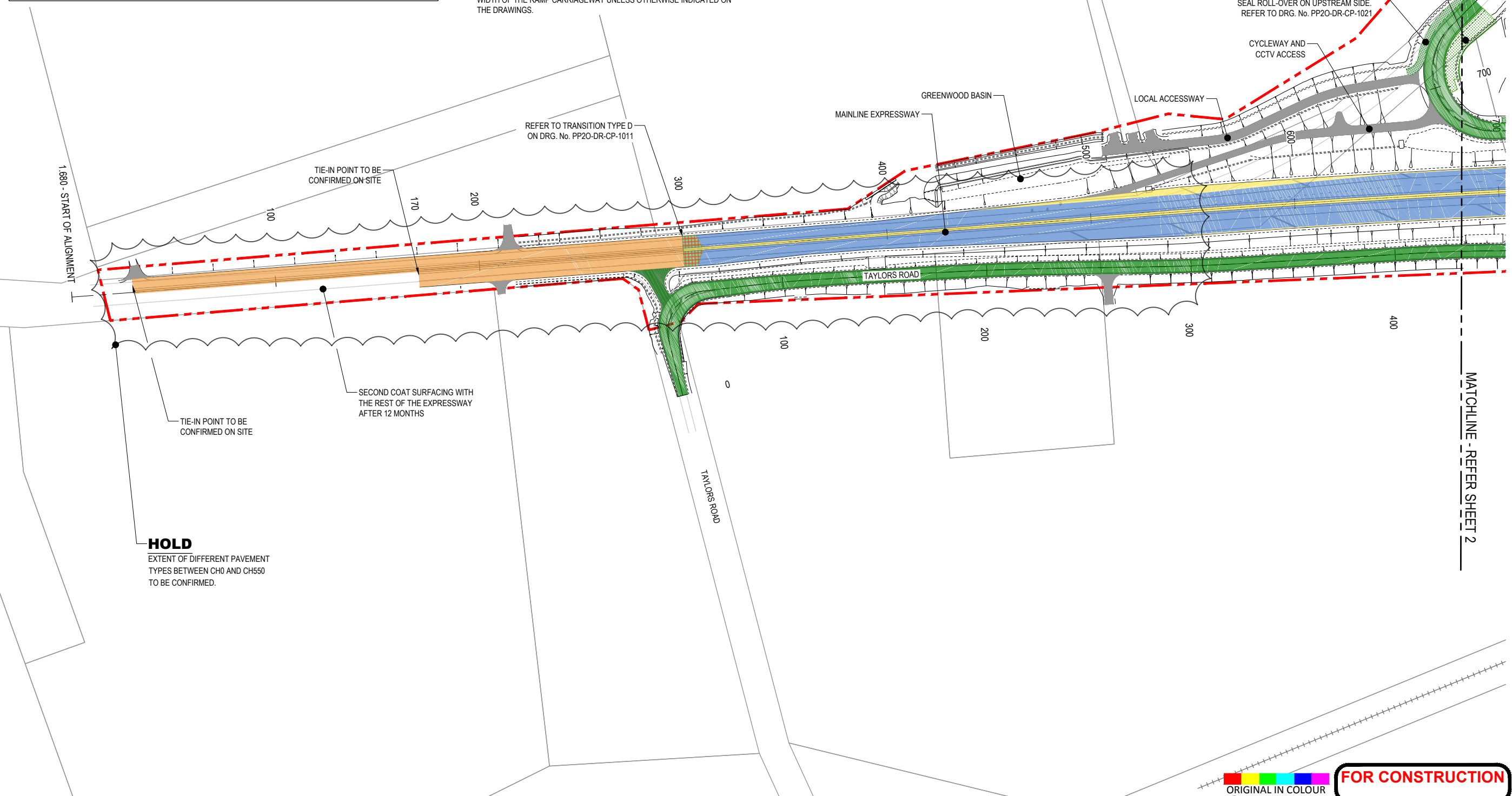
Appendix G Road surface layouts

SURFACING LEGEND:

	EXPRESSWAY CHIPSEAL SURFACING		LOCAL ROAD HIGH PSV CHIPSEAL SURFACING
	EXPRESSWAY NON-STRUCTURAL PAVEMENT CHIPSEAL SURFACING		LOCAL ARTERIAL AND LOCAL ROAD CHIPSEAL SURFACING
	EXPRESSWAY EMOGPA		LOCAL ROAD 45mm SMA ON WATERPROOFING SEAL
	EXPRESSWAY EMOGPA CAT 3 HIGH PSV CHIP		LOCAL ROAD 45mm SMA TACK COAT ON STRUCTURAL ASPHALT
	EXPRESSWAY RAMPS 45mm SMA		BRIDGE DECK 45mm SMA ON TACK COAT ON DENSE GRADED ASPHALT LEVELLING COURSE
	DESIGNATION BOUNDARY		TYPE 5 - REFER TO NOTE 4
	RAIL DESIGNATION		LOCAL ROAD 45mm SMA - CAT. 1 OR 3 HIGH PSV

NOTES:

- REFER TO DRAWINGS PP20-DR-CP-1001 TO 1003 FOR SURFACING NOTES AND PSV REQUIREMENTS.
- REFER TO DRAWINGS PP20-DR-CP-1011 TO 1023 FOR STANDARD PAVEMENT DETAILS.
- REFER TO DRAWINGS PP20-DR-CP-1061 TO 1078 FOR PAVEMENT LAYOUTS.
- FOR TYPE 5 SURFACING DETAILS REFER TO DRAWINGS PP20-DR-CP-1261 TO 1278.
- THE SURFACING AREAS SHOWN ON THESE DRAWINGS ARE INDICATIVE ONLY. NOTES ARE ADDED TO SUPPLEMENT THE INFORMATION PROVIDED. ANY UNCERTAINTIES ABOUT SURFACING TYPES, SURFACING EXTENT OR LOCATION SHALL BE CLARIFIED WITH THE DESIGNER PRIOR TO CONSTRUCTION.
- EMOGPA ON THE EXPRESSWAY SHALL COVER ALL TRAFFIC LANES AND:
 - UP TO 2.50m BEYOND THE EDGE LINE ON THE OUTSIDE SHOULDERS, AND
 - UP TO THE BARRIER ON THE HIGH SIDE OF THE OUTSIDE SHOULDER IN SUPERELEVATED CORNERS (AS INDICATED ON THE DRAWINGS); AND
 - UP TO 1.0m BEYOND THE MEDIAN EDGE LINE AT DEPRESSED MEDIANS; AND
 - UP TO 0.2m IN FRONT OF THE BARRIER IN THE RAISED MEDIAN, UNLESS OTHERWISE INDICATED ON THESE DRAWINGS. THE AREAS OF THE CARRIAGEWAY OUTSIDE OF THE EMOGPA SHALL HAVE CHIPSEAL.
- EMOGPA AND SMA ON THE EXPRESSWAY RAMPS SHALL COVER THE FULL WIDTH OF THE RAMP CARRIAGEWAY UNLESS OTHERWISE INDICATED ON THE DRAWINGS.



HOLD
EXTENT OF DIFFERENT PAVEMENT TYPES BETWEEN CH0 AND CH550 TO BE CONFIRMED.

ORIGINAL IN COLOUR **FOR CONSTRUCTION**

No.	Revision	By	Chk	Appd	Date
4	EXPRESSWAY PAVEMENT DESIGN UPDATED	AK	RT	SW	30.04.20
3	FLOOD PROTECTION TREATMENTS ADDED WHERE SHOWN	GD	RT	SW	20.02.19
2	MINOR UPDATES - HOLDS REMOVED	RMT	RT	BS	25.06.18
1	ISSUED FOR CONSTRUCTION - LOCAL ROAD ELEMENTS ONLY	LW	RT	BS	13.03.18

Scale	Design	Drawn	Dwg Verifier	Dwg Check	Date	Approved For Construction
Scale (A1) 1:1000	R.Theron	G.Down	J.Hallett	G.Down	23.06.17	S.Waters
Scale (A3) 1:2000					19.04.18	
					20.04.18	20.04.18

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY | **Peka Peka to Ōtaki Expressway** | **Fletcher HIGGINS** | **BECA** | **Tonkin+Taylor**

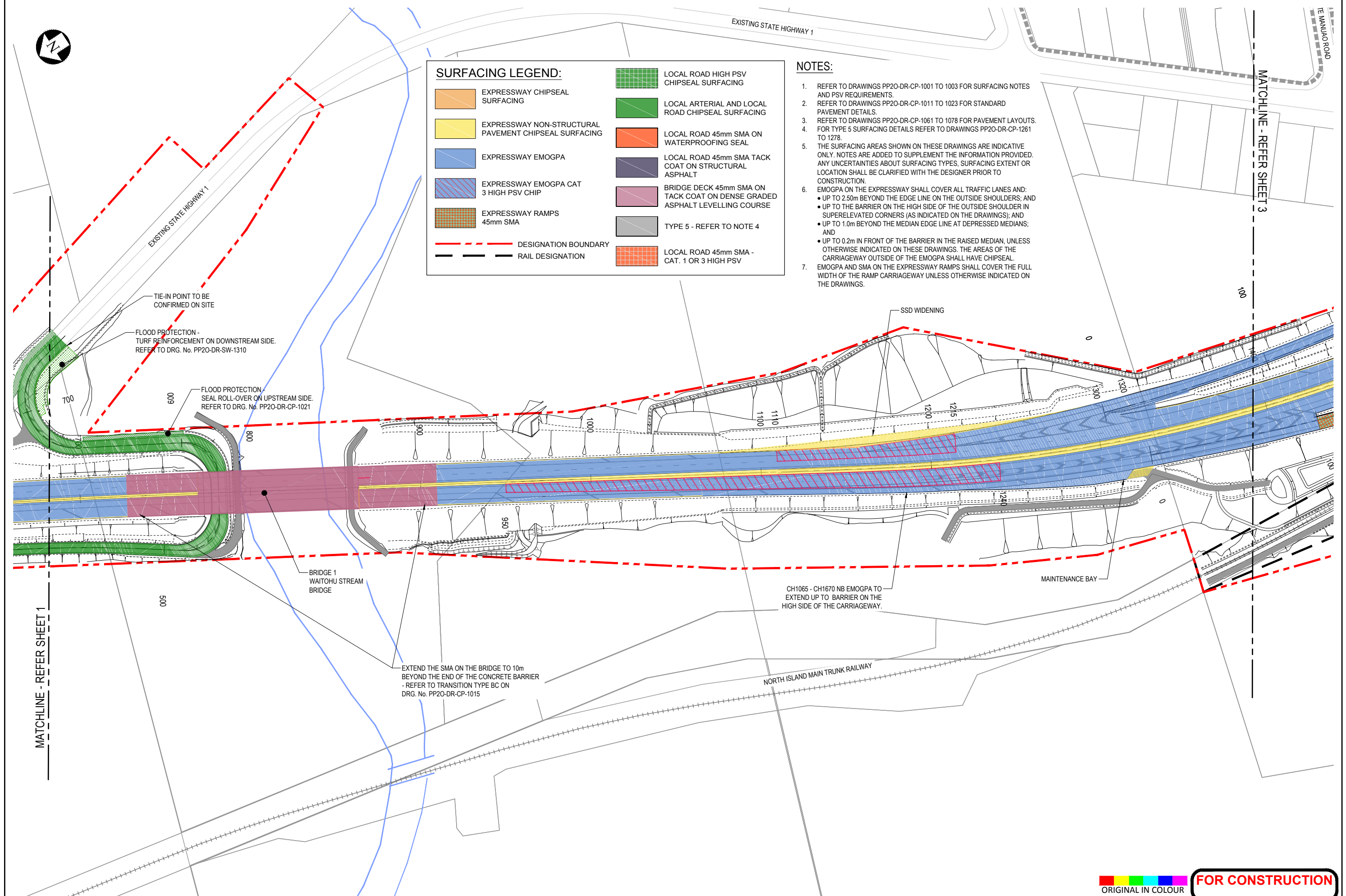
Subject:	PAVEMENTS AND SURFACING	Discipline:	CIVIL
Title:	SURFACING LAYOUT PLAN	Drawing No.:	PP20-DR-CP-1161
	SHEET 1 OF 18	Rev.:	4



SURFACING LEGEND:

	EXPRESSWAY CHIPSEAL SURFACING		LOCAL ROAD HIGH PSV CHIPSEAL SURFACING
	EXPRESSWAY NON-STRUCTURAL PAVEMENT CHIPSEAL SURFACING		LOCAL ARTERIAL AND LOCAL ROAD CHIPSEAL SURFACING
	EXPRESSWAY EMOGPA		LOCAL ROAD 45mm SMA ON WATERPROOFING SEAL
	EXPRESSWAY EMOGPA CAT 3 HIGH PSV CHIP		LOCAL ROAD 45mm SMA TACK COAT ON STRUCTURAL ASPHALT
	EXPRESSWAY RAMPS 45mm SMA		BRIDGE DECK 45mm SMA ON TACK COAT ON DENSE GRADED ASPHALT LEVELLING COURSE
	DESIGNATION BOUNDARY		TYPE 5 - REFER TO NOTE 4
	RAIL DESIGNATION		LOCAL ROAD 45mm SMA - CAT. 1 OR 3 HIGH PSV

- ### NOTES:
- REFER TO DRAWINGS PP20-DR-CP-1001 TO 1003 FOR SURFACING NOTES AND PSV REQUIREMENTS.
 - REFER TO DRAWINGS PP20-DR-CP-1011 TO 1023 FOR STANDARD PAVEMENT DETAILS.
 - REFER TO DRAWINGS PP20-DR-CP-1061 TO 1078 FOR PAVEMENT LAYOUTS.
 - FOR TYPE 5 SURFACING DETAILS REFER TO DRAWINGS PP20-DR-CP-1261 TO 1278.
 - THE SURFACING AREAS SHOWN ON THESE DRAWINGS ARE INDICATIVE ONLY. NOTES ARE ADDED TO SUPPLEMENT THE INFORMATION PROVIDED. ANY UNCERTAINTIES ABOUT SURFACING TYPES, SURFACING EXTENT OR LOCATION SHALL BE CLARIFIED WITH THE DESIGNER PRIOR TO CONSTRUCTION.
 - EMOGPA ON THE EXPRESSWAY SHALL COVER ALL TRAFFIC LANES AND:
 - UP TO 2.50m BEYOND THE EDGE LINE ON THE OUTSIDE SHOULDERS; AND
 - UP TO THE BARRIER ON THE HIGH SIDE OF THE OUTSIDE SHOULDER IN SUPERELEVATED CORNERS (AS INDICATED ON THE DRAWINGS); AND
 - UP TO 1.0m BEYOND THE MEDIAN EDGE LINE AT DEPRESSED MEDIANS; AND
 - UP TO 0.2m IN FRONT OF THE BARRIER IN THE RAISED MEDIAN, UNLESS OTHERWISE INDICATED ON THESE DRAWINGS. THE AREAS OF THE CARRIAGEWAY OUTSIDE OF THE EMOGPA SHALL HAVE CHIPSEAL.
 - EMOGPA AND SMA ON THE EXPRESSWAY RAMPS SHALL COVER THE FULL WIDTH OF THE RAMP CARRIAGEWAY UNLESS OTHERWISE INDICATED ON THE DRAWINGS.



No.	Revision	By	Chk	Appd	Date
4	EXPRESSWAY PAVEMENT DESIGN UPDATED	AK	RT	SW	30.04.20
3	FLOOD PROTECTION TREATMENTS ADDED WHERE SHOWN	GD	RT	SW	20.02.19
2	MINOR UPDATES - HOLDS REMOVED	RMT	RT	BS	25.06.18
1	ISSUED FOR CONSTRUCTION - LOCAL ROAD ELEMENTS ONLY	LW	RT	BS	13.03.18

Scale (A1)	Design	Date	Approved For Construction
1:1000	R.Theron	23.06.17	S.Waters
1:2000	G.Down	23.06.17	
	J.Hallett	19.04.18	
	G.Down	20.04.18	

* Refer to Original Hardcopy for Signature

Peka Peka to Ōtaki Expressway

Subject:	PAVEMENTS AND SURFACING	Discipline:	CIVIL
Title:	SURFACING LAYOUT PLAN	Drawing No.:	PP20-DR-CP-1162
	SHEET 2 OF 18	Rev.:	4

FOR CONSTRUCTION

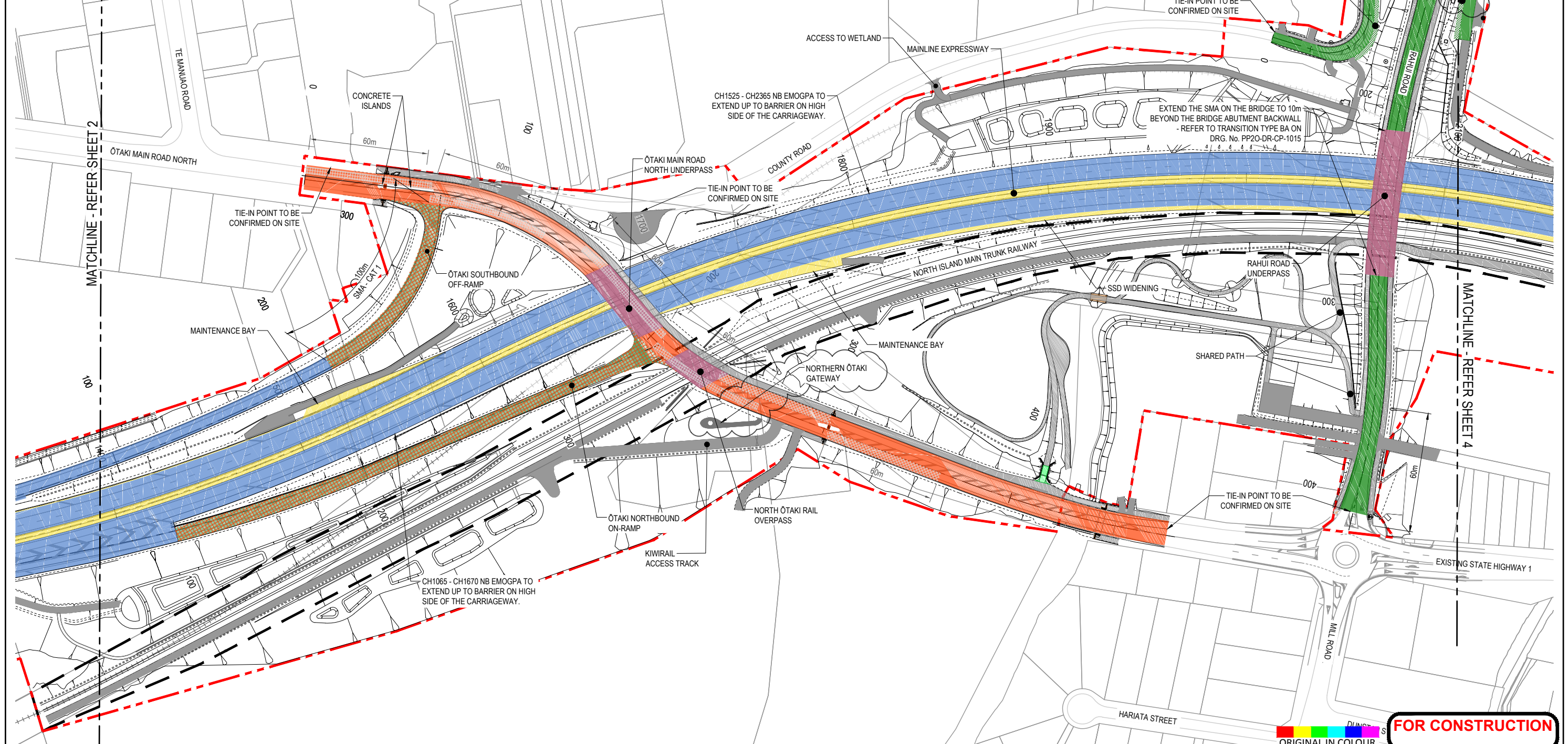


SURFACING LEGEND:

	EXPRESSWAY CHIPSEAL SURFACING		LOCAL ROAD HIGH PSV CHIPSEAL SURFACING
	EXPRESSWAY NON-STRUCTURAL PAVEMENT CHIPSEAL SURFACING		LOCAL ARTERIAL AND LOCAL ROAD CHIPSEAL SURFACING
	EXPRESSWAY EMOGPA		LOCAL ROAD 45mm SMA ON WATERPROOFING SEAL
	EXPRESSWAY EMOGPA CAT 3 HIGH PSV CHIP		LOCAL ROAD 45mm SMA TACK COAT ON STRUCTURAL ASPHALT
	EXPRESSWAY RAMP 45mm SMA		BRIDGE DECK 45mm SMA ON TACK COAT ON DENSE GRADED ASPHALT LEVELLING COURSE
	DESIGNATION BOUNDARY		TYPE 5 - REFER TO NOTE 4
	RAIL DESIGNATION		LOCAL ROAD 45mm SMA - CAT. 1 OR 3 HIGH PSV

NOTES:

1. REFER TO DRAWINGS PP20-DR-CP-1001 TO 1003 FOR SURFACING NOTES AND PSV REQUIREMENTS.
2. REFER TO DRAWINGS PP20-DR-CP-1011 TO 1023 FOR STANDARD PAVEMENT DETAILS.
3. REFER TO DRAWINGS PP20-DR-CP-1061 TO 1078 FOR PAVEMENT LAYOUTS.
4. FOR TYPE 5 SURFACING DETAILS REFER TO DRAWINGS PP20-DR-CP-1261 TO 1278.
5. THE SURFACING AREAS SHOWN ON THESE DRAWINGS ARE INDICATIVE ONLY. NOTES ARE ADDED TO SUPPLEMENT THE INFORMATION PROVIDED. ANY UNCERTAINTIES ABOUT SURFACING TYPES, SURFACING EXTENT OR LOCATION SHALL BE CLARIFIED WITH THE DESIGNER PRIOR TO CONSTRUCTION.
6. EMOGPA ON THE EXPRESSWAY SHALL COVER ALL TRAFFIC LANES AND:
 - UP TO 2.50m BEYOND THE EDGE LINE ON THE OUTSIDE SHOULDERS; AND
 - UP TO THE BARRIER ON THE HIGH SIDE OF THE OUTSIDE SHOULDER IN SUPERELEVATED CORNERS (AS INDICATED ON THE DRAWINGS); AND
 - UP TO 1.0m BEYOND THE MEDIAN EDGE LINE AT DEPRESSED MEDIANS; AND
 - UP TO 0.2m IN FRONT OF THE BARRIER IN THE RAISED MEDIAN, UNLESS OTHERWISE INDICATED ON THESE DRAWINGS. THE AREAS OF THE CARRIAGEWAY OUTSIDE OF THE EMOGPA SHALL HAVE CHIPSEAL.
7. EMOGPA AND SMA ON THE EXPRESSWAY RAMP SHALL COVER THE FULL WIDTH OF THE RAMP CARRIAGEWAY UNLESS OTHERWISE INDICATED ON THE DRAWINGS.



No.	Revision	By	Chk	Appd	Date
4	EXPRESSWAY PAVEMENT DESIGN UPDATED. REDLINE INCORPORATED	AK	RT	SW	30.04.20
3	FLOOD PROTECTION TREATMENTS ADDED WHERE SHOWN AND HIGH PSV CHIP SURFACE ADDED ON OTAKI MAIN ROAD NORTH	GD	RT	SW	20.02.19
2	MINOR UPDATES. HOLDS REMOVED	RMT	RT	BS	25.06.18
1	ISSUED FOR CONSTRUCTION - LOCAL ROAD ELEMENTS ONLY	LW	RT	BS	13.03.18

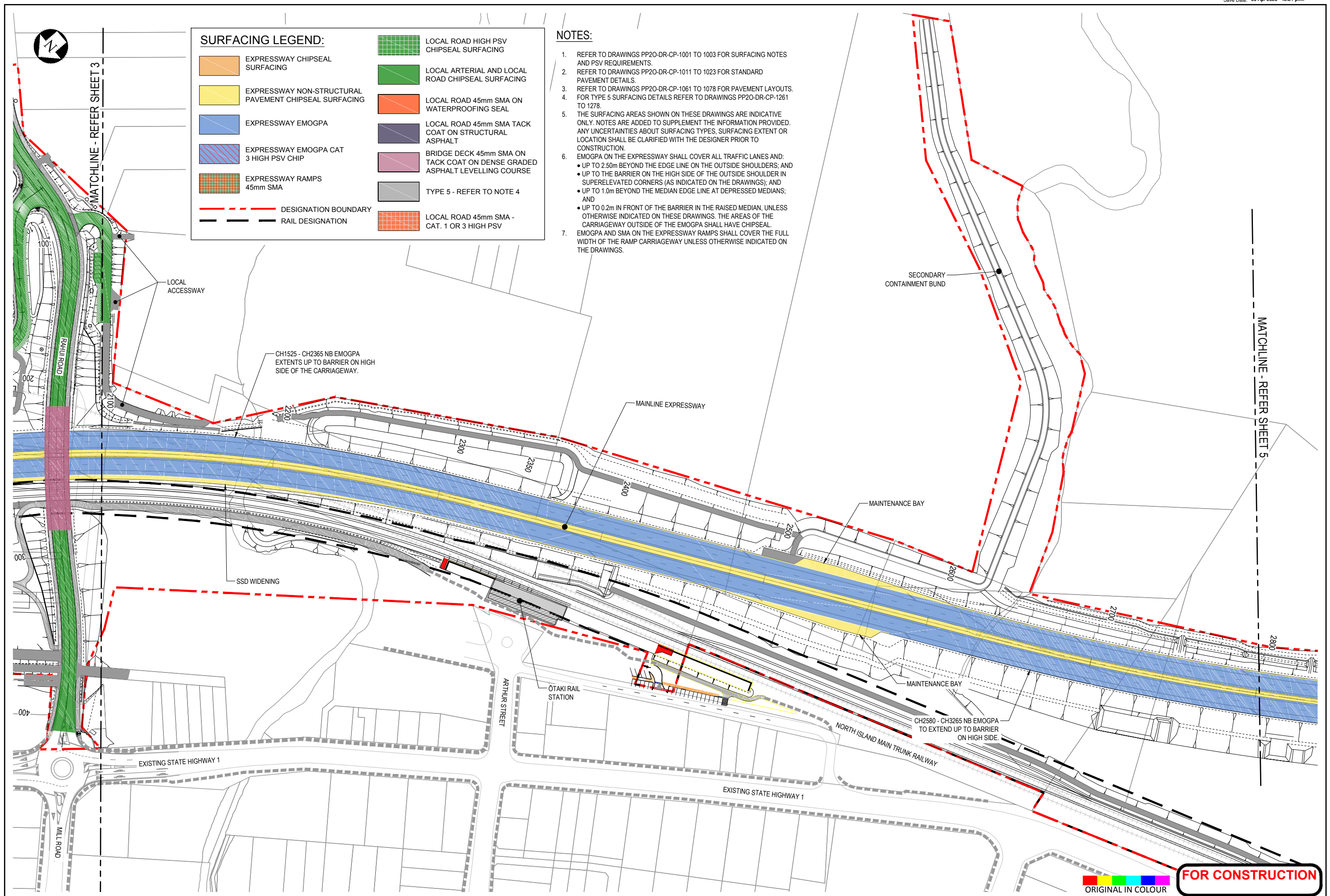
Scale	Design	Drawn	Drawn Date	Approved For Construction	Approved For Construction Date
Scale (A1) 1:1000	R.Theron	G.Down	23.06.17	S.Waters	23.06.17
Scale (A3) 1:2000	J.Hallett	G.Down	19.04.18		20.04.18

* Refer to Original Hardcopy for Signature

Subject:	PAVEMENTS AND SURFACING	Discipline:	CIVIL
Title:	SURFACING LAYOUT PLAN	Drawing No.:	PP20-DR-CP-1163
	SHEET 3 OF 18	Rev.:	4

FOR CONSTRUCTION
ORIGINAL IN COLOUR

Document No. R13000 - DESIGN DEVELOPMENT GENERAL/09 CAD/DRAWINGS/PP20-DR-CP-1163-1175.DWG



SURFACING LEGEND:

	EXPRESSWAY CHIPSEAL SURFACING		LOCAL ROAD HIGH PSV CHIPSEAL SURFACING
	EXPRESSWAY NON-STRUCTURAL PAVEMENT CHIPSEAL SURFACING		LOCAL ARTERIAL AND LOCAL ROAD CHIPSEAL SURFACING
	EXPRESSWAY EMOGPA		LOCAL ROAD 45mm SMA ON WATERPROOFING SEAL
	EXPRESSWAY EMOGPA CAT 3 HIGH PSV CHIP		LOCAL ROAD 45mm SMA TACK COAT ON STRUCTURAL ASPHALT
	EXPRESSWAY RAMPS 45mm SMA		BRIDGE DECK 45mm SMA ON TACK COAT ON DENSE GRADED ASPHALT LEVELLING COURSE
	DESIGNATION BOUNDARY		TYPE 5 - REFER TO NOTE 4
	RAIL DESIGNATION		LOCAL ROAD 45mm SMA - CAT. 1 OR 3 HIGH PSV

- NOTES:**
- REFER TO DRAWINGS PP20-DR-CP-1001 TO 1003 FOR SURFACING NOTES AND PSV REQUIREMENTS.
 - REFER TO DRAWINGS PP20-DR-CP-1011 TO 1023 FOR STANDARD PAVEMENT DETAILS.
 - REFER TO DRAWINGS PP20-DR-CP-1061 TO 1078 FOR PAVEMENT LAYOUTS.
 - FOR TYPE 5 SURFACING DETAILS REFER TO DRAWINGS PP20-DR-CP-1261 TO 1278.
 - THE SURFACING AREAS SHOWN ON THESE DRAWINGS ARE INDICATIVE ONLY. NOTES ARE ADDED TO SUPPLEMENT THE INFORMATION PROVIDED. ANY UNCERTAINTIES ABOUT SURFACING TYPES, SURFACING EXTENT OR LOCATION SHALL BE CLARIFIED WITH THE DESIGNER PRIOR TO CONSTRUCTION.
 - EMOGPA ON THE EXPRESSWAY SHALL COVER ALL TRAFFIC LANES AND:
 - UP TO 2.50m BEYOND THE EDGE LINE ON THE OUTSIDE SHOULDERS; AND
 - UP TO THE BARRIER ON THE HIGH SIDE OF THE OUTSIDE SHOULDER IN SUPERELEVATED CORNERS (AS INDICATED ON THE DRAWINGS); AND
 - UP TO 1.0m BEYOND THE MEDIAN EDGE LINE AT DEPRESSED MEDIANS; AND
 - UP TO 0.2m IN FRONT OF THE BARRIER IN THE RAISED MEDIAN, UNLESS OTHERWISE INDICATED ON THESE DRAWINGS. THE AREAS OF THE CARRIAGEWAY OUTSIDE OF THE EMOGPA SHALL HAVE CHIPSEAL.
 - EMOGPA AND SMA ON THE EXPRESSWAY RAMPS SHALL COVER THE FULL WIDTH OF THE RAMP CARRIAGEWAY UNLESS OTHERWISE INDICATED ON THE DRAWINGS.

No.	Revision	By	Chk	Appd	Date
3	EXPRESSWAY PAVEMENT DESIGN UPDATED	AK	RT	SW	30.04.20
2	MINOR UPDATES, HOLDS REMOVED	RMT	RT	BS	25.06.18
1	ISSUED FOR CONSTRUCTION - LOCAL ROAD ELEMENTS ONLY	LW	RT	BS	13.03.18

Scale	Design	Drawn	Drawn Date	Approved For Construction	Approved For Construction Date
Scale (A1) 1:1000	R.Theron	G.Down	23.06.17	S.Waters	23.06.17
Scale (A3) 1:2000	J.Hallett	J.Hallett	19.04.18		19.04.18
		G.Down	20.04.18		20.04.18

* Refer to Original Hardcopy for Signature

NZ TRANSPORT AGENCY WAIKA TĪKĪHĪ

Peka Peka to Otaki Expressway

Fletcher HIGGINS

BECA **TFT** **Tonkin+Taylor**

Subject:	PAVEMENTS AND SURFACING	Discipline:	CIVIL
Title:	SURFACING LAYOUT PLAN	Drawing No.:	PP20-DR-CP-1164
	SHEET 4 OF 18	Rev.:	3

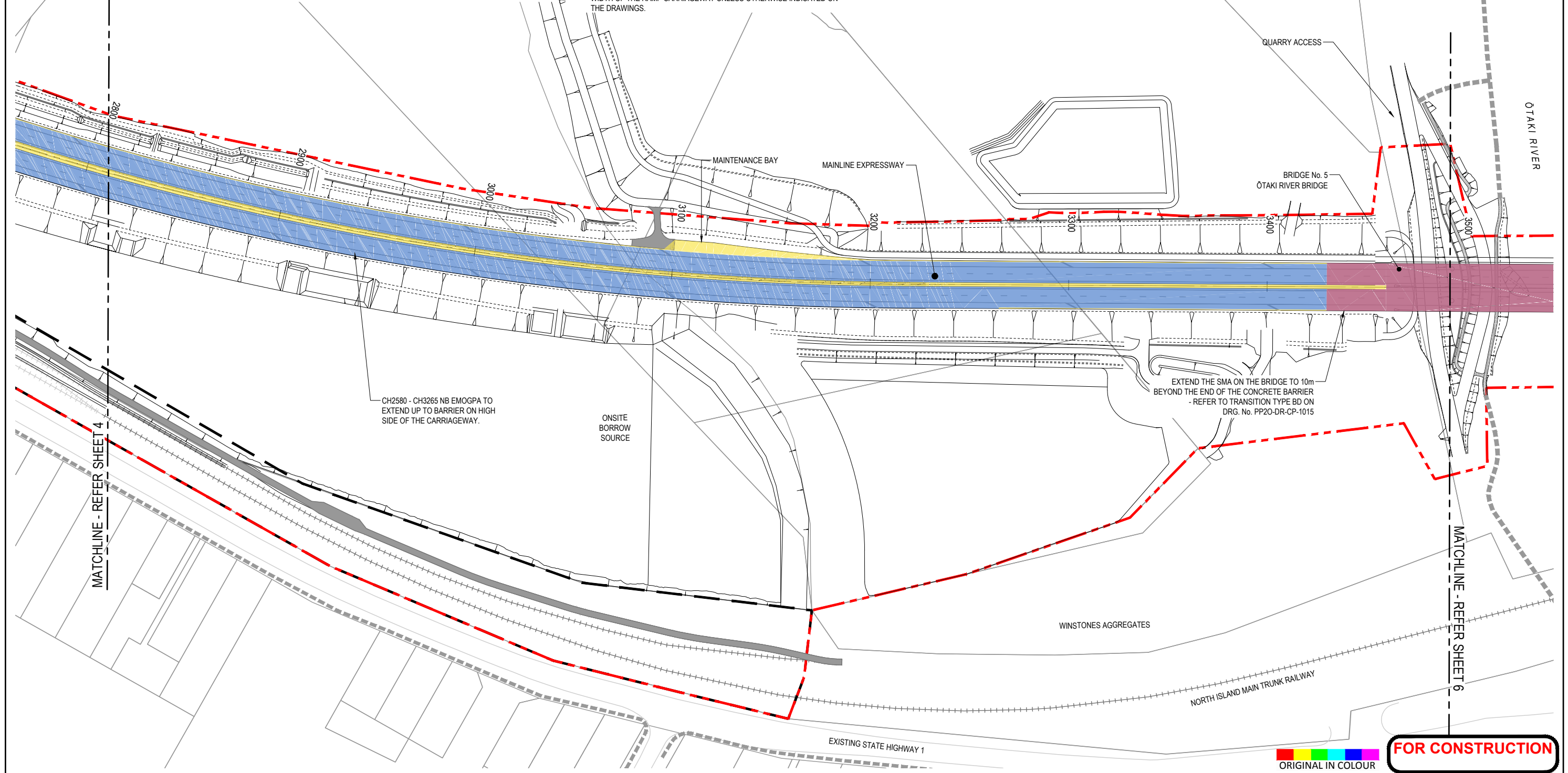
FOR CONSTRUCTION

ORIGINAL IN COLOUR



SURFACING LEGEND:	
	EXPRESSWAY CHIPSEAL SURFACING
	EXPRESSWAY NON-STRUCTURAL PAVEMENT CHIPSEAL SURFACING
	EXPRESSWAY EMOGPA
	EXPRESSWAY EMOGPA CAT 3 HIGH PSV CHIP
	EXPRESSWAY RAMPS 45mm SMA
	DESIGNATION BOUNDARY
	RAIL DESIGNATION
	LOCAL ROAD HIGH PSV CHIPSEAL SURFACING
	LOCAL ARTERIAL AND LOCAL ROAD CHIPSEAL SURFACING
	LOCAL ROAD 45mm SMA ON WATERPROOFING SEAL
	LOCAL ROAD 45mm SMA TACK COAT ON STRUCTURAL ASPHALT
	BRIDGE DECK 45mm SMA ON TACK COAT ON DENSE GRADED ASPHALT LEVELLING COURSE
	TYPE 5 - REFER TO NOTE 4
	LOCAL ROAD 45mm SMA - CAT. 1 OR 3 HIGH PSV

- NOTES:**
- REFER TO DRAWINGS PP20-DR-CP-1001 TO 1003 FOR SURFACING NOTES AND PSV REQUIREMENTS.
 - REFER TO DRAWINGS PP20-DR-CP-1011 TO 1023 FOR STANDARD PAVEMENT DETAILS.
 - REFER TO DRAWINGS PP20-DR-CP-1061 TO 1078 FOR PAVEMENT LAYOUTS. FOR TYPE 5 SURFACING DETAILS REFER TO DRAWINGS PP20-DR-CP-1261 TO 1278.
 - THE SURFACING AREAS SHOWN ON THESE DRAWINGS ARE INDICATIVE ONLY. NOTES ARE ADDED TO SUPPLEMENT THE INFORMATION PROVIDED. ANY UNCERTAINTIES ABOUT SURFACING TYPES, SURFACING EXTENT OR LOCATION SHALL BE CLARIFIED WITH THE DESIGNER PRIOR TO CONSTRUCTION.
 - EMOGPA ON THE EXPRESSWAY SHALL COVER ALL TRAFFIC LANES AND:
 - UP TO 2.50m BEYOND THE EDGE LINE ON THE OUTSIDE SHOULDERS; AND
 - UP TO THE BARRIER ON THE HIGH SIDE OF THE OUTSIDE SHOULDER IN SUPERELEVATED CORNERS (AS INDICATED ON THE DRAWINGS); AND
 - UP TO 1.0m BEYOND THE MEDIAN EDGE LINE AT DEPRESSED MEDIANS; AND
 - UP TO 0.2m IN FRONT OF THE BARRIER IN THE RAISED MEDIAN, UNLESS OTHERWISE INDICATED ON THESE DRAWINGS. THE AREAS OF THE CARRIAGEWAY OUTSIDE OF THE EMOGPA SHALL HAVE CHIPSEAL.
 - EMOGPA AND SMA ON THE EXPRESSWAY RAMPS SHALL COVER THE FULL WIDTH OF THE RAMP CARRIAGEWAY UNLESS OTHERWISE INDICATED ON THE DRAWINGS.



STRESSCRETE PLANT

QUARRY ACCESS

OTAKI RIVER

MAINTENANCE BAY

MAINLINE EXPRESSWAY

BRIDGE No. 5
OTAKI RIVER BRIDGE

CH2580 - CH3265 NB EMOGPA TO EXTEND UP TO BARRIER ON HIGH SIDE OF THE CARRIAGEWAY.

ONSITE BORROW SOURCE

EXTEND THE SMA ON THE BRIDGE TO 10m BEYOND THE END OF THE CONCRETE BARRIER - REFER TO TRANSITION TYPE BD ON DRG. No. PP20-DR-CP-1015

WINSTONES AGGREGATES

NORTH ISLAND MAIN TRUNK RAILWAY

EXISTING STATE HIGHWAY 1

ORIGINAL IN COLOUR

FOR CONSTRUCTION

No.	Revision	By	Chk	Appd	Date
3	EXPRESSWAY PAVEMENT DESIGN UPDATED	AK	RT	SW	30.04.20
2	MINOR UPDATES - HOLDS REMOVED	RMT	RT	BS	25.06.18
1	ISSUED FOR CONSTRUCTION - LOCAL ROAD ELEMENTS ONLY	LW	RT	BS	13.03.18

Scale	Design	Drawn	Checked	Approved For Construction
Scale (A1) 1:1000	R.Theron 23.06.17	G.Down 23.06.17	J.Hallett 19.04.18	S.Waters 20.04.18
Scale (A3) 1:2000				

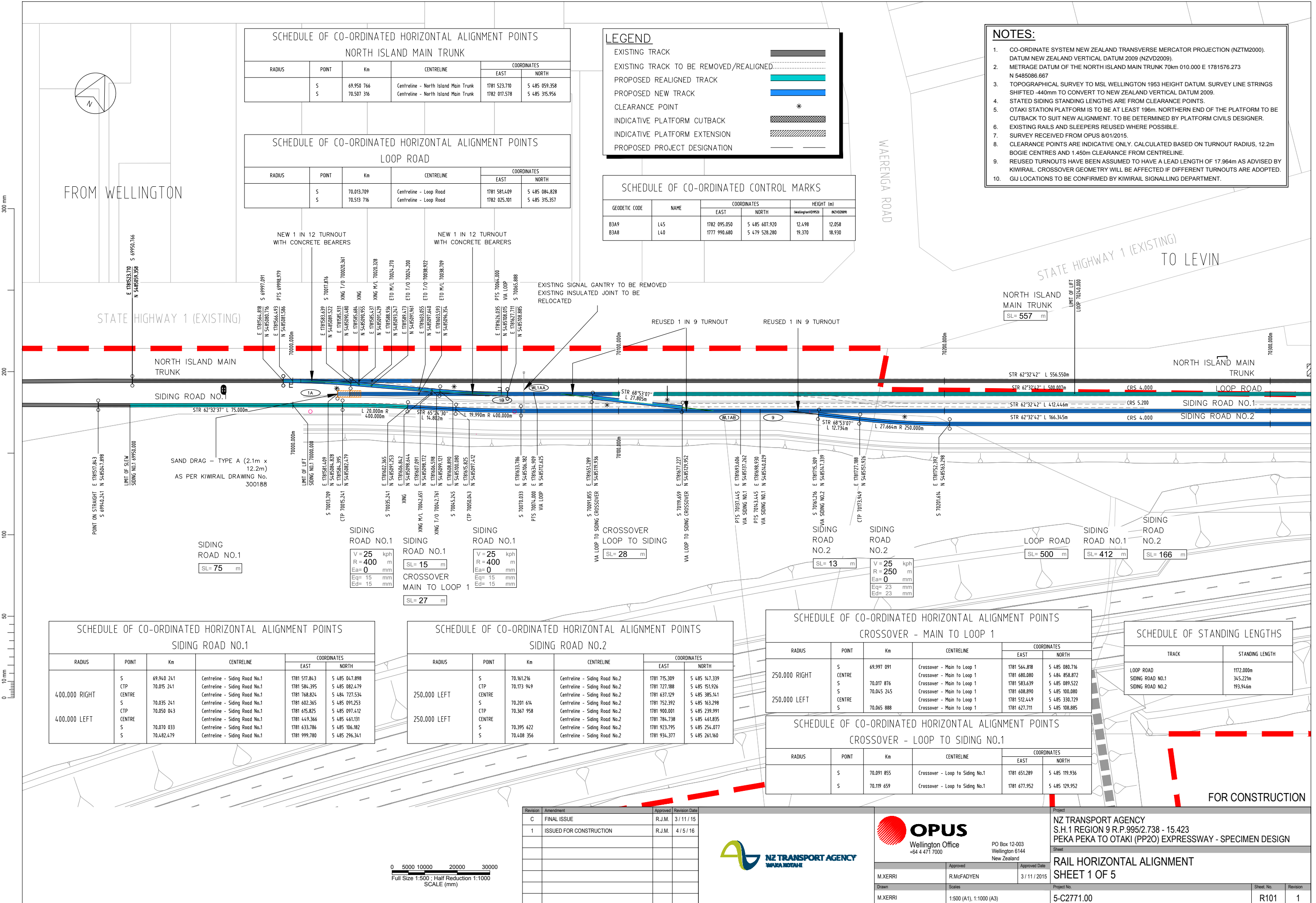
*Refer to Original Hardcopy for Signature

Peka Peka to Otaki Expressway

Subject:	PAVEMENTS AND SURFACING
Title:	SURFACING LAYOUT PLAN SHEET 5 OF 18

Discipline:	CIVIL
Drawing No.:	PP20-DR-CP-1165
Rev.:	3

Appendix H Rail Construction Drawings



**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
NORTH ISLAND MAIN TRUNK**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
S	69.950 766		Centreline - North Island Main Trunk	1781 523.710	5 485 059.358
S	70.507 316		Centreline - North Island Main Trunk	1782 017.578	5 485 315.956

**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
LOOP ROAD**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
S	70.013.709		Centreline - Loop Road	1781 581.409	5 485 084.828
S	70.513 716		Centreline - Loop Road	1782 025.101	5 485 315.357

LEGEND

- EXISTING TRACK
- EXISTING TRACK TO BE REMOVED/REALIGNED
- PROPOSED REALIGNED TRACK
- PROPOSED NEW TRACK
- CLEARANCE POINT
- INDICATIVE PLATFORM CUTBACK
- INDICATIVE PLATFORM EXTENSION
- PROPOSED PROJECT DESIGNATION

SCHEDULE OF CO-ORDINATED CONTROL MARKS

GEODETIC CODE	NAME	COORDINATES		HEIGHT (m)	
		EAST	NORTH	WellingtonVD95H	NCVD2009
B3A9	L45	1782 095.050	5 485 607.920	12.498	12.058
B3A8	L40	1777 990.680	5 479 528.280	19.370	18.930

- NOTES:**
- CO-ORDINATE SYSTEM NEW ZEALAND TRANSVERSE MERCATOR PROJECTION (NZTM2000). DATUM NEW ZEALAND VERTICAL DATUM 2009 (NZVD2009).
 - METRAGE DATUM OF THE NORTH ISLAND MAIN TRUNK 70km 010.000 E 1781576.273 N 5485086.667
 - TOPOGRAPHICAL SURVEY TO MSL WELLINGTON 1953 HEIGHT DATUM. SURVEY LINE STRINGS SHIFTED -440mm TO CONVERT TO NEW ZEALAND VERTICAL DATUM 2009.
 - STATED SIDING STANDING LENGTHS ARE FROM CLEARANCE POINTS.
 - OTAKI STATION PLATFORM IS TO BE AT LEAST 196m. NORTHERN END OF THE PLATFORM TO BE CUTBACK TO SUIT NEW ALIGNMENT. TO BE DETERMINED BY PLATFORM CIVILS DESIGNER.
 - EXISTING RAILS AND SLEEPERS REUSED WHERE POSSIBLE.
 - SURVEY RECEIVED FROM OPUS 8/01/2015.
 - CLEARANCE POINTS ARE INDICATIVE ONLY. CALCULATED BASED ON TURNOUT RADIUS, 12.2m BOGIE CENTRES AND 1.450m CLEARANCE FROM CENTRELINE.
 - REUSED TURNOUTS HAVE BEEN ASSUMED TO HAVE A LEAD LENGTH OF 17.964m AS ADVISED BY KIWI RAIL. CROSSOVER GEOMETRY WILL BE AFFECTED IF DIFFERENT TURNOUTS ARE ADOPTED.
 - GIJ LOCATIONS TO BE CONFIRMED BY KIWI RAIL SIGNALLING DEPARTMENT.

**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
SIDING ROAD NO.1**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
400.000 RIGHT	S	69.940 241	Centreline - Siding Road No.1	1781 517.843	5 485 047.898
	CTP	70.015 241	Centreline - Siding Road No.1	1781 584.395	5 485 082.479
400.000 LEFT	S	70.035 241	Centreline - Siding Road No.1	1781 768.824	5 484 727.534
	CTP	70.050 043	Centreline - Siding Road No.1	1781 602.365	5 485 091.253
	S	70.070 033	Centreline - Siding Road No.1	1781 615.825	5 485 097.412
	S	70.482.479	Centreline - Siding Road No.1	1781 449.366	5 485 461.131
	S		Centreline - Siding Road No.1	1781 633.786	5 485 106.182
	S		Centreline - Siding Road No.1	1781 999.780	5 485 296.341

**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
SIDING ROAD NO.2**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
250.000 LEFT	S	70.161.216	Centreline - Siding Road No.2	1781 715.309	5 485 147.339
	CTP	70.173 949	Centreline - Siding Road No.2	1781 727.188	5 485 151.926
250.000 LEFT	S	70.201 614	Centreline - Siding Road No.2	1781 637.129	5 485 385.141
	CTP	70.267 958	Centreline - Siding Road No.2	1781 752.392	5 485 163.298
	S	70.395 622	Centreline - Siding Road No.2	1781 900.001	5 485 239.991
	S	70.408 356	Centreline - Siding Road No.2	1781 784.738	5 485 461.835
	S		Centreline - Siding Road No.2	1781 923.795	5 485 254.077
	S		Centreline - Siding Road No.2	1781 934.377	5 485 261.160

**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
CROSSOVER - MAIN TO LOOP 1**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
250.000 RIGHT	S	69.997 091	Crossover - Main to Loop 1	1781 564.818	5 485 080.716
	CENTRE	70.017 876	Crossover - Main to Loop 1	1781 680.080	5 484 858.872
250.000 LEFT	S	70.045 245	Crossover - Main to Loop 1	1781 583.639	5 485 089.522
	CENTRE	70.065 888	Crossover - Main to Loop 1	1781 608.890	5 485 100.080
	S		Crossover - Main to Loop 1	1781 512.449	5 485 330.729
	S		Crossover - Main to Loop 1	1781 627.711	5 485 108.885

**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
CROSSOVER - LOOP TO SIDING NO.1**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
S	70.091 855		Crossover - Loop to Siding No.1	1781 651.289	5 485 119.936
S	70.119 659		Crossover - Loop to Siding No.1	1781 677.952	5 485 129.952

SCHEDULE OF STANDING LENGTHS

TRACK	STANDING LENGTH
LOOP ROAD	1172.000m
SIDING ROAD NO.1	345.221m
SIDING ROAD NO.2	193.946m

Revision	Amendment	Approved	Revision Date
C	FINAL ISSUE	R.J.M.	3 / 11 / 15
1	ISSUED FOR CONSTRUCTION	R.J.M.	4 / 5 / 16



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Approved
R.McFADYEN
3 / 11 / 2015

Approved Date
3 / 11 / 2015

Drawn
M.XERRI

Scales
1:500 (A1), 1:1000 (A3)

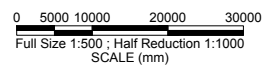
Project
NZ TRANSPORT AGENCY
S.H.1 REGION 9 R.P.995/2.738 - 15.423
PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN

Sheet
RAIL HORIZONTAL ALIGNMENT
SHEET 1 OF 5

Project No.
5-C2771.00

Sheet No.
R101

Revision
1



**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
NORTH ISLAND MAIN TRUNK**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
612.000 LEFT	S	69.950 766	Centreline - North Island Main Trunk	1781 523.710	5 485 059.358
	S	70.507 316	Centreline - North Island Main Trunk	1782 017.578	5 485 315.956
	CTP	70.570 316	Centreline - North Island Main Trunk	1782 072.968	5 485 345.957
	CENTRE		Centreline - North Island Main Trunk	1781 763.161	5 485 873.748
	CTP	71.117 549	Centreline - North Island Main Trunk	1782 368.665	5 485 784.817

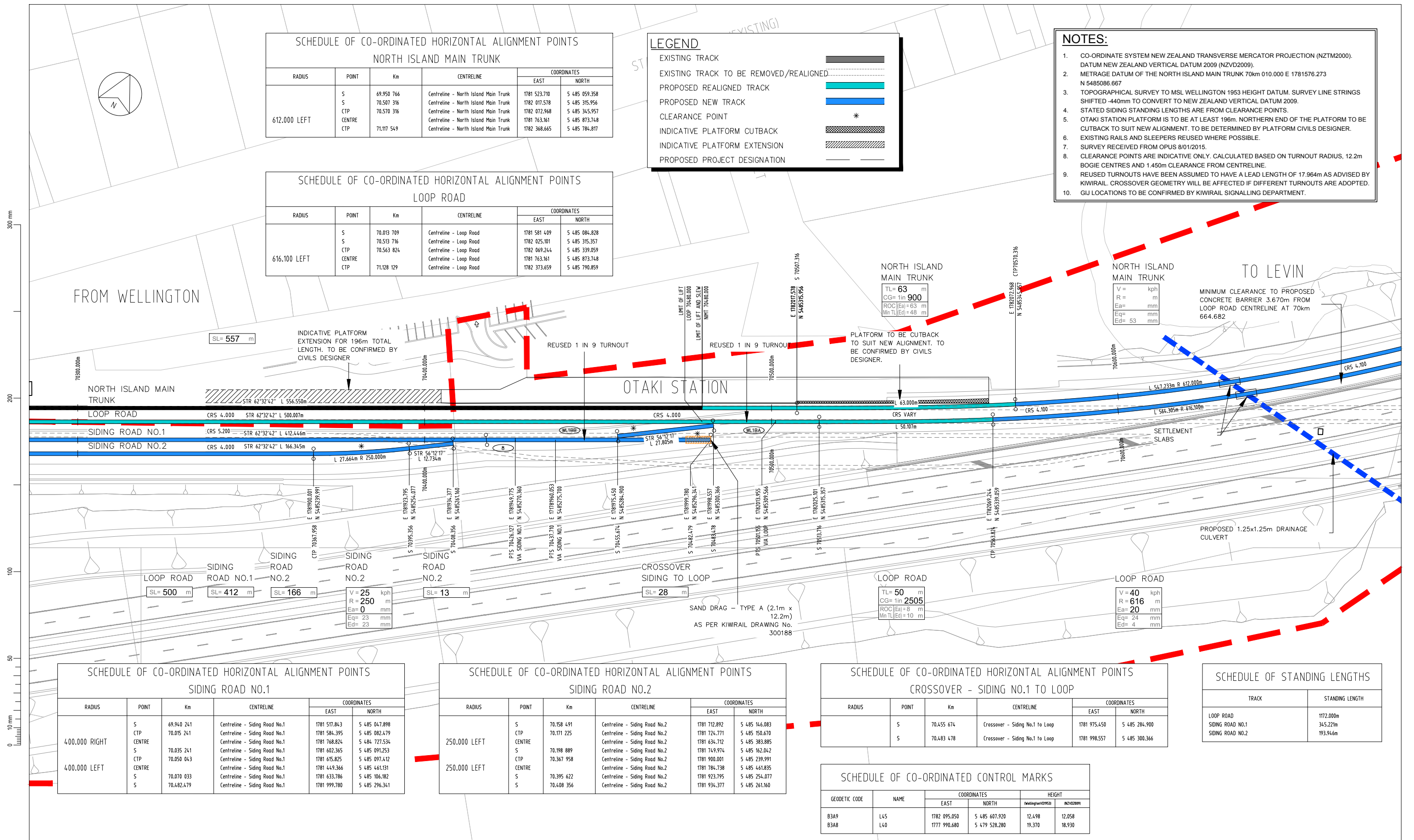
**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
LOOP ROAD**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
616.100 LEFT	S	70.013 709	Centreline - Loop Road	1781 581 409	5 485 084.828
	S	70.513 716	Centreline - Loop Road	1782 025.101	5 485 315.357
	CTP	70.563 824	Centreline - Loop Road	1782 069.244	5 485 339.059
	CENTRE		Centreline - Loop Road	1781 763.161	5 485 873.748
	CTP	71.128 129	Centreline - Loop Road	1782 373.659	5 485 790.859

LEGEND

- EXISTING TRACK
- EXISTING TRACK TO BE REMOVED/REALIGNED
- PROPOSED REALIGNED TRACK
- PROPOSED NEW TRACK
- CLEARANCE POINT
- INDICATIVE PLATFORM CUTBACK
- INDICATIVE PLATFORM EXTENSION
- PROPOSED PROJECT DESIGNATION

- NOTES:**
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**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
SIDING ROAD NO.1**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
400.000 RIGHT	S	69.940 241	Centreline - Siding Road No.1	1781 517.843	5 485 047.898
	CTP	70.015 241	Centreline - Siding Road No.1	1781 584.395	5 485 082.479
	CENTRE		Centreline - Siding Road No.1	1781 768.824	5 484 727.534
400.000 LEFT	S	70.035 241	Centreline - Siding Road No.1	1781 602.365	5 485 091.253
	CTP	70.050 043	Centreline - Siding Road No.1	1781 615.825	5 485 097.412
	S	70.070 033	Centreline - Siding Road No.1	1781 449.366	5 485 461.131
	S	70.482.479	Centreline - Siding Road No.1	1781 633.786	5 485 106.182
	S	70.482.479	Centreline - Siding Road No.1	1781 999.780	5 485 296.341

**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
SIDING ROAD NO.2**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
250.000 LEFT	S	70.158 491	Centreline - Siding Road No.2	1781 712.892	5 485 146.083
	CTP	70.171 225	Centreline - Siding Road No.2	1781 724.771	5 485 150.670
	CENTRE		Centreline - Siding Road No.2	1781 634.712	5 485 383.885
250.000 LEFT	S	70.198 889	Centreline - Siding Road No.2	1781 749.974	5 485 162.042
	CTP	70.367 958	Centreline - Siding Road No.2	1781 900.001	5 485 239.991
	S	70.395 622	Centreline - Siding Road No.2	1781 784.738	5 485 461.835
	S	70.408 356	Centreline - Siding Road No.2	1781 923.795	5 485 254.077
	S	70.408 356	Centreline - Siding Road No.2	1781 934.377	5 485 261.160

**SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS
CROSSOVER - SIDING NO.1 TO LOOP**

RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
S		70.455 674	Crossover - Siding No.1 to Loop	1781 975.450	5 485 284.900
		70.483 478	Crossover - Siding No.1 to Loop	1781 998.557	5 485 300.366

SCHEDULE OF STANDING LENGTHS

TRACK	STANDING LENGTH
LOOP ROAD	1172.000m
SIDING ROAD NO.1	345.221m
SIDING ROAD NO.2	193.946m

SCHEDULE OF CO-ORDINATED CONTROL MARKS

GEODETIC CODE	NAME	COORDINATES		HEIGHT	
		EAST	NORTH	(Wellington 1953)	(NZVD2009)
B3A9	L45	1782 095.050	5 485 607.920	12.498	12.058
B3A8	L40	1777 990.680	5 479 528.280	19.370	18.930

Revision	Amendment	Approved	Revision Date
C	FINAL ISSUE	R.J.M.	3 / 11 / 15
1	ISSUED FOR CONSTRUCTION	R.J.M.	4 / 5 / 16

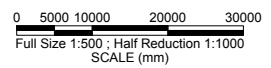


Project
 NZ TRANSPORT AGENCY
 S.H.1 REGION 9 R.P.995/2.738 - 15.423
 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN

Drawn	Scales	Approved	Approved Date
M.XERRI	1:500 (A1), 1:1000 (A3)	R.McFADYEN	3 / 11 / 2015

Sheet
RAIL HORIZONTAL ALIGNMENT
SHEET 2 OF 5

Project No.	Sheet No.	Revision
5-C2771.00	R102	1



FOR CONSTRUCTION

FROM WELLINGTON

TO LEVIN

SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS NORTH ISLAND MAIN TRUNK					
RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
612.000 LEFT	CTP	70.570 316	Centreline - North Island Main Trunk	1782 072.968	5 485 345.957
	CENTRE		Centreline - North Island Main Trunk	1781 763.161	5 485 873.748
	CTP	71.117 549	Centreline - North Island Main Trunk	1782 368.665	5 485 784.817

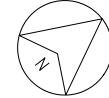
SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS LOOP ROAD					
RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
616.100 LEFT	CTP	70.563 824	Centreline - Loop Road	1782 069.244	5 485 339.059
	CENTRE		Centreline - Loop Road	1781 763.161	5 485 873.748
	CTP	71.128 129	Centreline - Loop Road	1782 373.659	5 485 790.859

SCHEDULE OF CO-ORDINATED CONTROL MARKS					
GEODETIC CODE	NAME	COORDINATES		HEIGHT	
		EAST	NORTH	Wellington 1953	NZVD2009
B3A9	L45	1782 095.050	5 485 607.920	12.498	12.058
B3A8	L40	1777 990.680	5 479 528.280	19.370	18.930

NORTH ISLAND
MAIN TRUNK
V = 90 kph
R = 612 m
Ea = 70 mm
Eq = 123 mm
Ed = 63 mm

LOOP ROAD
V = 40 kph
R = 616 m
Ea = 20 mm
Eq = 24 mm
Ed = 4 mm

300 mm
200
100
50
0



MINIMUM CLEARANCE TO PROPOSED CONCRETE BARRIER 3.670m FROM LOOP ROAD CENTRELINE AT 70km 664.682

PROPOSED 3x3m DRAINAGE CULVERT

SETTLEMENT SLABS

BRIDGE NO.4
RAHUI ROAD UNDERPASS

LEGEND

- EXISTING TRACK
- EXISTING TRACK TO BE REMOVED/REALIGNED
- PROPOSED REALIGNED TRACK
- PROPOSED NEW TRACK
- CLEARANCE POINT
- INDICATIVE PLATFORM CUTBACK
- INDICATIVE PLATFORM EXTENSION
- PROPOSED PROJECT DESIGNATION

NOTES:

1. CO-ORDINATE SYSTEM NEW ZEALAND TRANSVERSE MERCATOR PROJECTION (NZTM2000). DATUM NEW ZEALAND VERTICAL DATUM 2009 (NZVD2009).
2. METRAGE DATUM OF THE NORTH ISLAND MAIN TRUNK 70km 010.000 E 1781576.273 N 5485086.667
3. TOPOGRAPHICAL SURVEY TO MSL WELLINGTON 1953 HEIGHT DATUM. SURVEY LINE STRINGS SHIFTED -440mm TO CONVERT TO NEW ZEALAND VERTICAL DATUM 2009.
4. STATED SIDING STANDING LENGTHS ARE FROM CLEARANCE POINTS.
5. OTAKI STATION PLATFORM IS TO BE AT LEAST 196m. NORTHERN END OF THE PLATFORM TO BE CUTBACK TO SUIT NEW ALIGNMENT. TO BE DETERMINED BY PLATFORM CIVILS DESIGNER.
6. EXISTING RAILS AND SLEEPERS REUSED WHERE POSSIBLE.
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8. CLEARANCE POINTS ARE INDICATIVE ONLY. CALCULATED BASED ON TURNOUT RADIUS, 12.2m BOGIE CENTRES AND 1.450m CLEARANCE FROM CENTRELINE.
9. REUSED TURNOUTS HAVE BEEN ASSUMED TO HAVE A LEAD LENGTH OF 17.964m AS ADVISED BY KIWIRAIL. CROSSOVER GEOMETRY WILL BE AFFECTED IF DIFFERENT TURNOUTS ARE ADOPTED.
10. GIJ LOCATIONS TO BE CONFIRMED BY KIWIRAIL SIGNALLING DEPARTMENT.

FOR CONSTRUCTION

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C	FINAL ISSUE	R.J.M.	3 / 11 / 15
1	ISSUED FOR CONSTRUCTION	R.J.M.	4 / 5 / 16



Project		NZ TRANSPORT AGENCY S.H.1 REGION 9 R.P.995/2.738 - 15.423 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN	
Sheet		RAIL HORIZONTAL ALIGNMENT SHEET 3 OF 5	
Drawn	Scales	Project No.	Sheet No. / Revision
M.XERRI	1:500 (A1), 1:1000 (A3)	5-C2771.00	R103 / 1

0 5000 10000 20000 30000
Full Size 1:500 - Half Reduction 1:1000
SCALE (mm)

FROM WELLINGTON

TO LEVIN

SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS NORTH ISLAND MAIN TRUNK					
RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
612.000 LEFT	CTP	70.570 316	Centreline - North Island Main Trunk	1782 072.968	5 485 345.957
	CENTRE		Centreline - North Island Main Trunk	1781 763.161	5 485 873.748
	CTP	71.117 549	Centreline - North Island Main Trunk	1782 368.665	5 485 784.817
	S	71.180 549	Centreline - North Island Main Trunk	1782 375.670	5 485 847.419
	S	71.450 912	Centreline - North Island Main Trunk	1782 401.103	5 486 116.583

SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS LOOP ROAD					
RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
616.100 LEFT	CTP	70.563 824	Centreline - Loop Road	1782 069.244	5 485 339.059
	CENTRE		Centreline - Loop Road	1781 763.161	5 485 873.748
	CTP	71.128 129	Centreline - Loop Road	1782 373.659	5 485 790.859
	S	71.178 236	Centreline - Loop Road	1782 379.050	5 485 840.672
	S	71.257 361	Centreline - Loop Road	1782 386.493	5 485 919.445

TANGENTIAL TURNOUT DETAILS									
No.	Base Type	Total Length (Roads TP to Eto)	T/O Length (PIS to Thee P1)	T/O Rate	T/O Angle	M/L Geometry	T/O Geometry	Description	Drawing No.
7A	250-12	27.179	21.349	1 in 12	4.763642°	STR	R 250.000	STD L.H.	SCW0605-03
7B	250-12	27.179	21.349	1 in 12	4.763642°	STR	R 250.000	STD L.H.	SCW0605-03

NORTH ISLAND MAIN TRUNK
 V = 90 kph
 R = 612 m
 Ea = 70 mm
 Eq = 123 mm
 Ed = 53 mm

NORTH ISLAND MAIN TRUNK
 TL = 63 m
 CG = 1 in 900
 ROC(Ea) = 63 m
 Min TL(Ed) = 48 m

LOOP ROAD
 TL = 50 m
 CG = 1 in 2505
 ROC(Ea) = 8 m
 Min TL(Ed) = 10 m

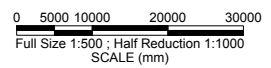
SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS CROSSOVER - MAIN TO LOOP 2					
RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
250.000 LEFT	CTP	71.295 085	Crossover - Main to Loop 2	1782 381.585	5 485 867.498
	CENTRE		Crossover - Main to Loop 2	1782 132.693	5 485 891.016
	S	71.225 870	Crossover - Main to Loop 2	1782 382.678	5 485 888.248
	CTP	71.253 239	Crossover - Main to Loop 2	1782 382.981	5 485 915.616
	S	71.274 025	Crossover - Main to Loop 2	1782 632.966	5 485 912.848
250.000 RIGHT	CTP	71.253 239	Crossover - Main to Loop 2	1782 382.981	5 485 915.616
	CENTRE		Crossover - Main to Loop 2	1782 632.966	5 485 912.848
	S	71.274 025	Crossover - Main to Loop 2	1782 384.074	5 485 936.366
	CTP	71.253 239	Crossover - Main to Loop 2	1782 382.981	5 485 915.616
	S	71.225 870	Crossover - Main to Loop 2	1782 382.678	5 485 888.248

SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS CROSSOVER - MAIN TO LOOP 2					
GEODETIC CODE	NAME	COORDINATES		HEIGHT	
		EAST	NORTH	(Wellington 1953)	(NZVD2009)
B3A9	L45	1782 095.050	5 485 607.920	12.498	12.058
B3A8	L40	1777 990.680	5 479 528.280	19.370	18.930

LEGEND

- EXISTING TRACK
- EXISTING TRACK TO BE REMOVED/REALIGNED
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- INDICATIVE PLATFORM CUTBACK
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 Wellington 6144
 New Zealand

Approved: R.McFADYEN
 Approved Date: 3 / 11 / 2015

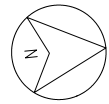
Drawn: M.XERRI
 Scales: 1:500 (A1), 1:1000 (A3)

Project: NZ TRANSPORT AGENCY
 S.H.1 REGION 9 R.P.995/2.738 - 15.423
 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN

Sheet: RAIL HORIZONTAL ALIGNMENT
 SHEET 4 OF 5

Project No: 5-C2771.00
 Sheet No: R104
 Revision: 1

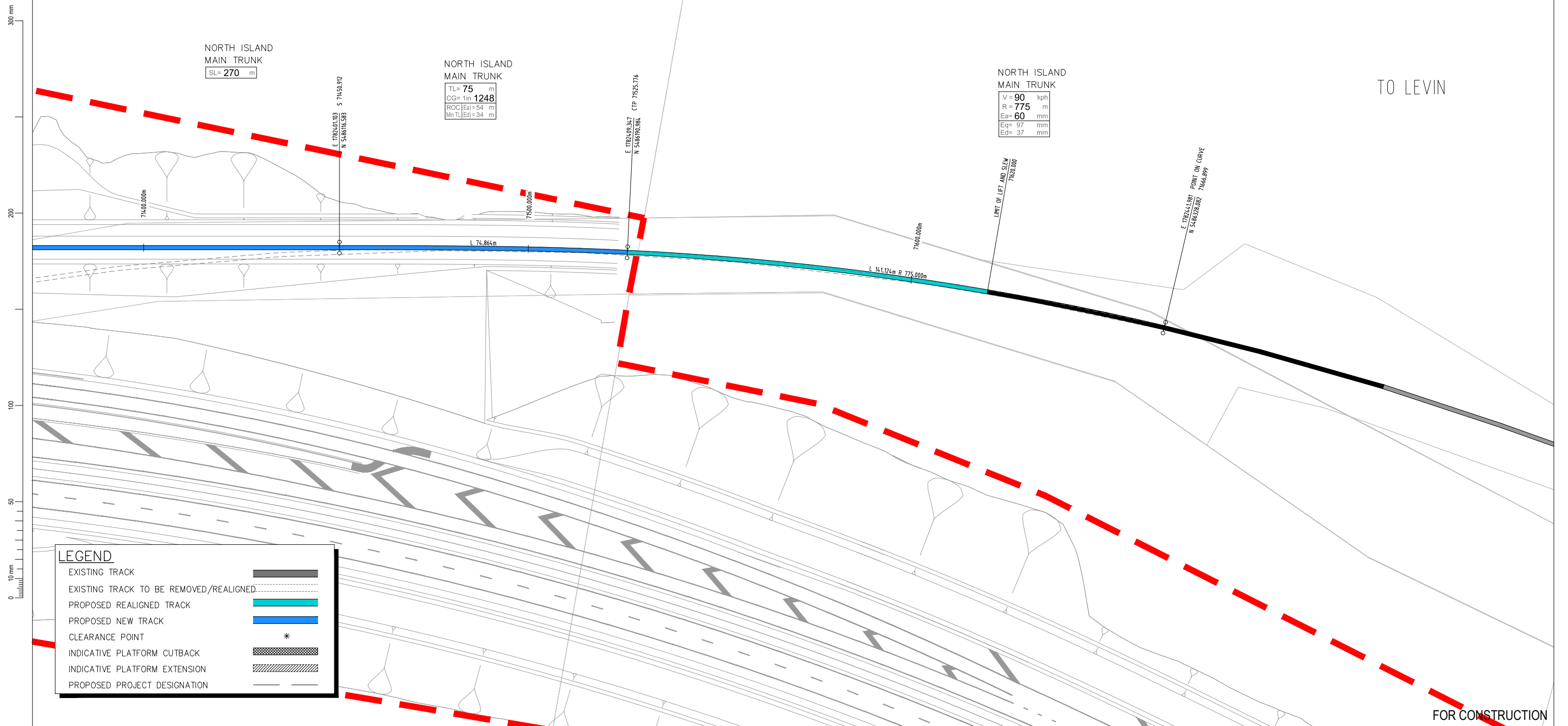
FROM WELLINGTON



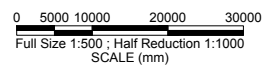
SCHEDULE OF CO-ORDINATED HORIZONTAL ALIGNMENT POINTS NORTH ISLAND MAIN TRUNK					
RADIUS	POINT	Km	CENTRELINE	COORDINATES	
				EAST	NORTH
775.000 RIGHT	S	71.180 549	Centreline - North Island Main Trunk	1782 375.670	5 485 847.419
	S	71.450 912	Centreline - North Island Main Trunk	1782 401.103	5 486 116.583
	CTP	71.525 776	Centreline - North Island Main Trunk	1782 409.347	5 486 190.984
	CENTRE		Centreline - North Island Main Trunk	1783 176.478	5 486 080.819
	S	71.666 899	Centreline - North Island Main Trunk	1782 441.981	5 486 328.082

SCHEDULE OF CO-ORDINATED CONTROL MARKS					
GEODETIC CODE	NAME	COORDINATES		HEIGHT	
		EAST	NORTH	Wellington 1953	NZVD2009
B3A9	L45	1782 095.050	5 485 607.920	12.498	12.058
B3A8	L40	1777 990.680	5 479 528.280	19.370	18.930

- NOTES:**
- CO-ORDINATE SYSTEM NEW ZEALAND TRANSVERSE MERCATOR PROJECTION (NZTM2000). DATUM NEW ZEALAND VERTICAL DATUM 2009 (NZVD2009).
 - METRAGE DATUM OF THE NORTH ISLAND MAIN TRUNK 70km 010.000 E 1781576.273 N 5485086.667
 - TOPOGRAPHICAL SURVEY TO MSL WELLINGTON 1953 HEIGHT DATUM. SURVEY LINE STRINGS SHIFTED -440mm TO CONVERT TO NEW ZEALAND VERTICAL DATUM 2009.
 - STATED SIDING STANDING LENGTHS ARE FROM CLEARANCE POINTS.
 - OTAKI STATION PLATFORM IS TO BE AT LEAST 196m. NORTHERN END OF THE PLATFORM TO BE CUTBACK TO SUIT NEW ALIGNMENT. TO BE DETERMINED BY PLATFORM CIVILS DESIGNER.
 - EXISTING RAILS AND SLEEPERS REUSED WHERE POSSIBLE.
 - SURVEY RECEIVED FROM OPUS 8/01/2015.
 - CLEARANCE POINTS ARE INDICATIVE ONLY. CALCULATED BASED ON TURNOUT RADIUS, 12.2m BOGIE CENTRES AND 1.450m CLEARANCE FROM CENTRELINE.
 - REUSED TURNOUTS HAVE BEEN ASSUMED TO HAVE A LEAD LENGTH OF 17.964m AS ADVISED BY KIWIRAIL. CROSSOVER GEOMETRY WILL BE AFFECTED IF DIFFERENT TURNOUTS ARE ADOPTED.
 - GIJ LOCATIONS TO BE CONFIRMED BY KIWIRAIL SIGNALLING DEPARTMENT.



LEGEND	
EXISTING TRACK	
EXISTING TRACK TO BE REMOVED/REALIGNED	
PROPOSED REALIGNED TRACK	
PROPOSED NEW TRACK	
CLEARANCE POINT	
INDICATIVE PLATFORM CUTBACK	
INDICATIVE PLATFORM EXTENSION	
PROPOSED PROJECT DESIGNATION	



Revision	Amendment	Approved	Revision Date
C	FINAL ISSUE	R.J.M.	3 / 11 / 15
1	ISSUED FOR CONSTRUCTION	R.J.M.	4 / 5 / 16



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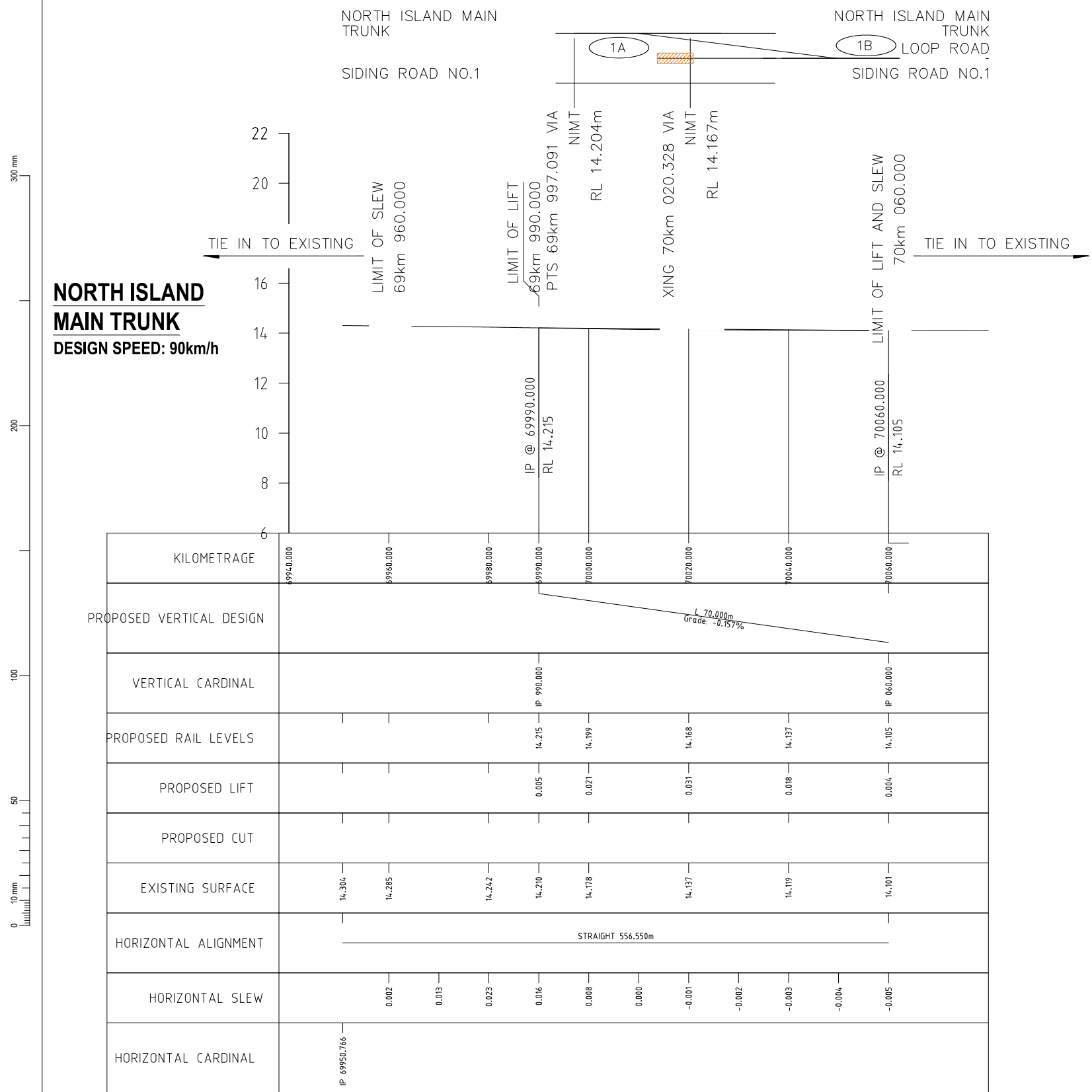
Approved
R.McFADYEN
3 / 11 / 2015

Drawn
M.XERRI
1:500 (A1), 1:1000 (A3)

Project		Sheet	
NZ TRANSPORT AGENCY S.H.1 REGION 9 R.P.995/2.738 - 15.423 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN		RAIL HORIZONTAL ALIGNMENT SHEET 5 OF 5	
Project No.	5-C2771.00	Sheet No.	R101
Revision	1	Revision	1

NOTES:

1. METRAGE DATUM OF THE NORTH ISLAND MAIN TRUNK 70km 010.000 E 1781576.273, N 5485086.667
2. HEIGHT DATUM: NEW ZEALAND VERTICAL DATUM 2009 (NZVD2009).
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5. SURVEY RECEIVED FROM OPUS 8/01/2015.

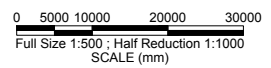


**NORTH ISLAND
MAIN TRUNK**
DESIGN SPEED: 90km/h

KILOMETRAGE	69940.000	69960.000	69980.000	69990.000	70000.000	70020.000	70040.000	70060.000				
PROPOSED VERTICAL DESIGN				L 70.000m Grade: -0.157%								
VERTICAL CARDINAL				IP 990.000				IP 060.000				
PROPOSED RAIL LEVELS				14.215	14.199	14.168	14.137	14.105				
PROPOSED LIFT				0.005	0.021	0.031	0.018	0.004				
PROPOSED CUT												
EXISTING SURFACE	14.304	14.285	14.242	14.210	14.178	14.137	14.119	14.101				
HORIZONTAL ALIGNMENT	STRAIGHT 556.550m											
HORIZONTAL SLEW		0.002	0.013	0.023	0.016	0.008	0.000	-0.001	-0.002	-0.003	-0.004	-0.005
HORIZONTAL CARDINAL	IP 69950.766											

LEGEND

PROPOSED RAIL LEVEL	—————
EXISTING RAIL / SURFACE LEVEL	—————



FOR CONSTRUCTION

Revision	Amendment	Approved	Revision Date
C	FINAL ISSUE	R.J.M.	3 / 11 / 15
1	ISSUED FOR CONSTRUCTION	R.J.M.	4 / 5 / 16



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Approved	Approved Date
R.McFADYEN	3 / 11 / 2015
Drawn	Scales
M.XERRI	1:500 (A1), 1:1000 (A3)

Project
NZ TRANSPORT AGENCY
S.H.1 REGION 9 R.P.995/2.738 - 15.423
PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN

Sheet
RAIL VERTICAL ALIGNMENT - MAIN LINE
SHEET 1 OF 5

Project No.	Sheet No.	Revision
5-C2771.00	R121	1

NOTES:

1. METRAGE DATUM OF THE NORTH ISLAND MAIN TRUNK 70km 010.000 E 1781576.273, N 5485086.667
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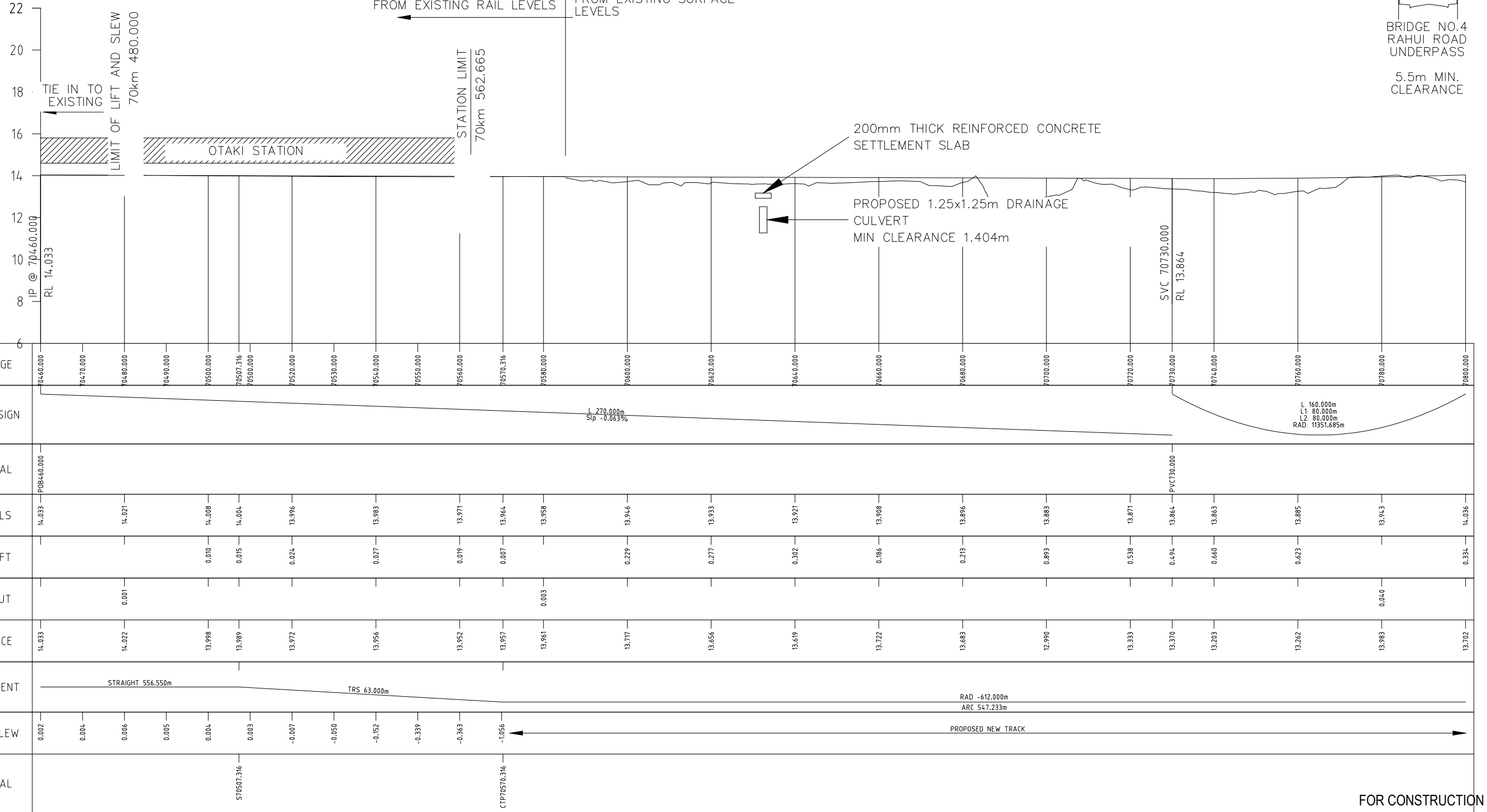
NORTH ISLAND MAIN TRUNK LOOP ROAD

NORTH ISLAND MAIN TRUNK LOOP ROAD

SIDING ROAD NO.1
WL1BA

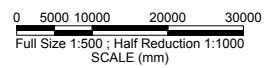
BRIDGE NO.4 RAHUI ROAD UNDERPASS
5.5m MIN. CLEARANCE

PROPOSED LIFTS/CUTS FROM EXISTING RAIL LEVELS
PROPOSED LIFTS/CUTS FROM EXISTING SURFACE LEVELS



LEGEND

PROPOSED RAIL LEVEL	_____
EXISTING RAIL / SURFACE LEVEL	_____



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Drawn
M.XERRI
1:500 (A1), 1:1000 (A3)

Project
NZ TRANSPORT AGENCY
S.H.1 REGION 9 R.P.995/2.738 - 15.423
PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN

Sheet
RAIL VERTICAL ALIGNMENT - MAIN LINE
SHEET 2 OF 5

Project No.
5-C2771.00

Sheet No.
R122

Revision
1

FOR CONSTRUCTION

NOTES:

1. METRAGE DATUM OF THE NORTH ISLAND MAIN TRUNK 70km 010.000 E 1781576.273, N 5485086.667
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5. SURVEY RECEIVED FROM OPUS 8/01/2015.

NORTH ISLAND MAIN TRUNK LOOP ROAD

NORTH ISLAND MAIN TRUNK LOOP ROAD

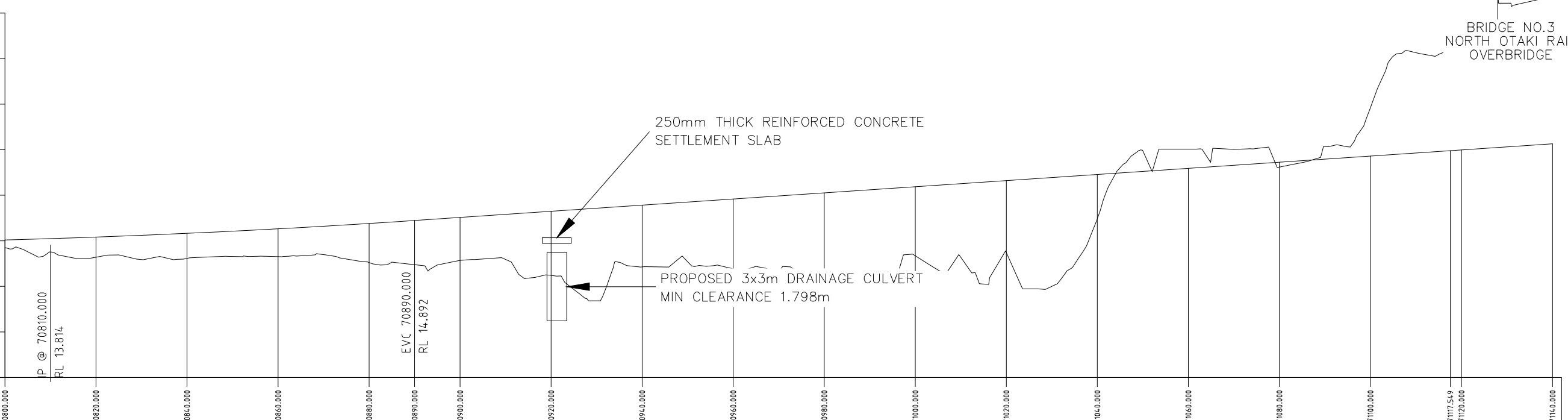
NORTH ISLAND MAIN TRUNK
DESIGN SPEED: 90km/h

300 mm
200
100
50
10 mm
0

BRIDGE NO.3 NORTH OTAKI RAIL OVERBRIDGE

250mm THICK REINFORCED CONCRETE SETTLEMENT SLAB

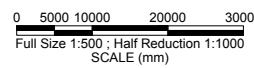
PROPOSED 3x3m DRAINAGE CULVERT
MIN CLEARANCE 1.798m



KILOMETRAGE	70800.000	70820.000	70840.000	70860.000	70880.000	70890.000	70900.000	70920.000	70940.000	70960.000	70980.000	71000.000	71020.000	71040.000	71060.000	71080.000	71100.000	71117.549	71120.000	71140.000
PROPOSED VERTICAL DESIGN	L 160.000m L1: 80.000m L2: 80.000m RAD: 11351.685m					L 450.000m Sip 1.347%														
VERTICAL CARDINAL						PVT 890.000														
PROPOSED RAIL LEVELS	14.036	14.165	14.329	14.528	14.762	14.892	15.027	15.296	15.565	15.835	16.104	16.374	16.643	16.912	17.182	17.451	17.721	17.957	17.990	18.259
PROPOSED LIFT	0.334	0.886	1.100	1.222	1.717	1.941	1.885	2.812	2.710	3.066	4.244	3.033	3.357	1.936		0.212		4.451	4.459	4.747
PROPOSED CUT															0.844		2.128			
EXISTING SURFACE	13.702	13.279	13.229	13.306	13.045	12.951	13.142	12.484	12.855	12.769	11.860	13.341	13.486	14.576	18.026	17.239	19.849	22.608	22.649	23.006
HORIZONTAL ALIGNMENT	RAD -612.000m ARC 547.233m																		TRS 63.000m	
HORIZONTAL SLEW	← PROPOSED NEW TRACK →																			
HORIZONTAL CARDINAL																			1117.549	

LEGEND

PROPOSED RAIL LEVEL	_____
EXISTING RAIL / SURFACE LEVEL	_____



Revision	Amendment	Approved	Revision Date
C	FINAL ISSUE	R.J.M.	3 / 11 / 15
1	ISSUED FOR CONSTRUCTION	R.J.M.	4 / 5 / 16



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Approved
R.McFADYEN
3 / 11 / 2015

Drawn
M.XERRI
1:500 (A1), 1:1000 (A3)

Project
NZ TRANSPORT AGENCY
S.H.1 REGION 9 R.P.995/2.738 - 15.423
PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN

Sheet
RAIL VERTICAL ALIGNMENT - MAIN LINE
SHEET 3 OF 5

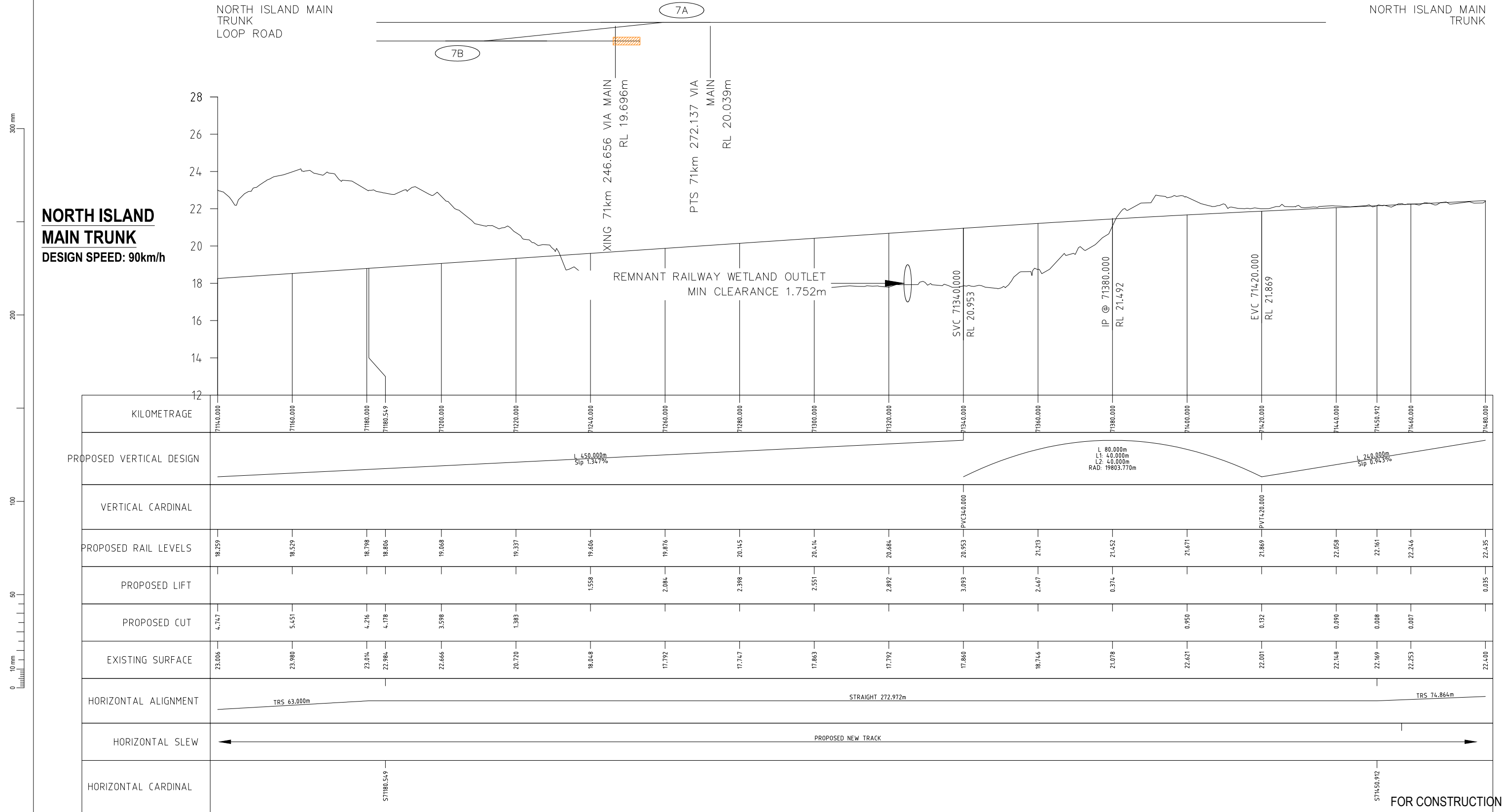
Project No.
5-C2771.00

Sheet No.
R123

Revision
1

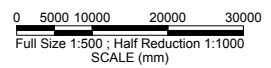
NOTES:

1. METRAGE DATUM OF THE NORTH ISLAND MAIN TRUNK 70km 010.000 E 1781576.273, N 5485086.667
2. HEIGHT DATUM: NEW ZEALAND VERTICAL DATUM 2009 (NZVD2009).
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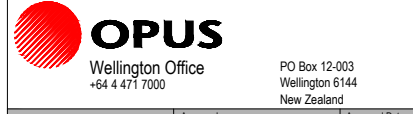


LEGEND

PROPOSED RAIL LEVEL	_____
EXISTING RAIL / SURFACE LEVEL	_____



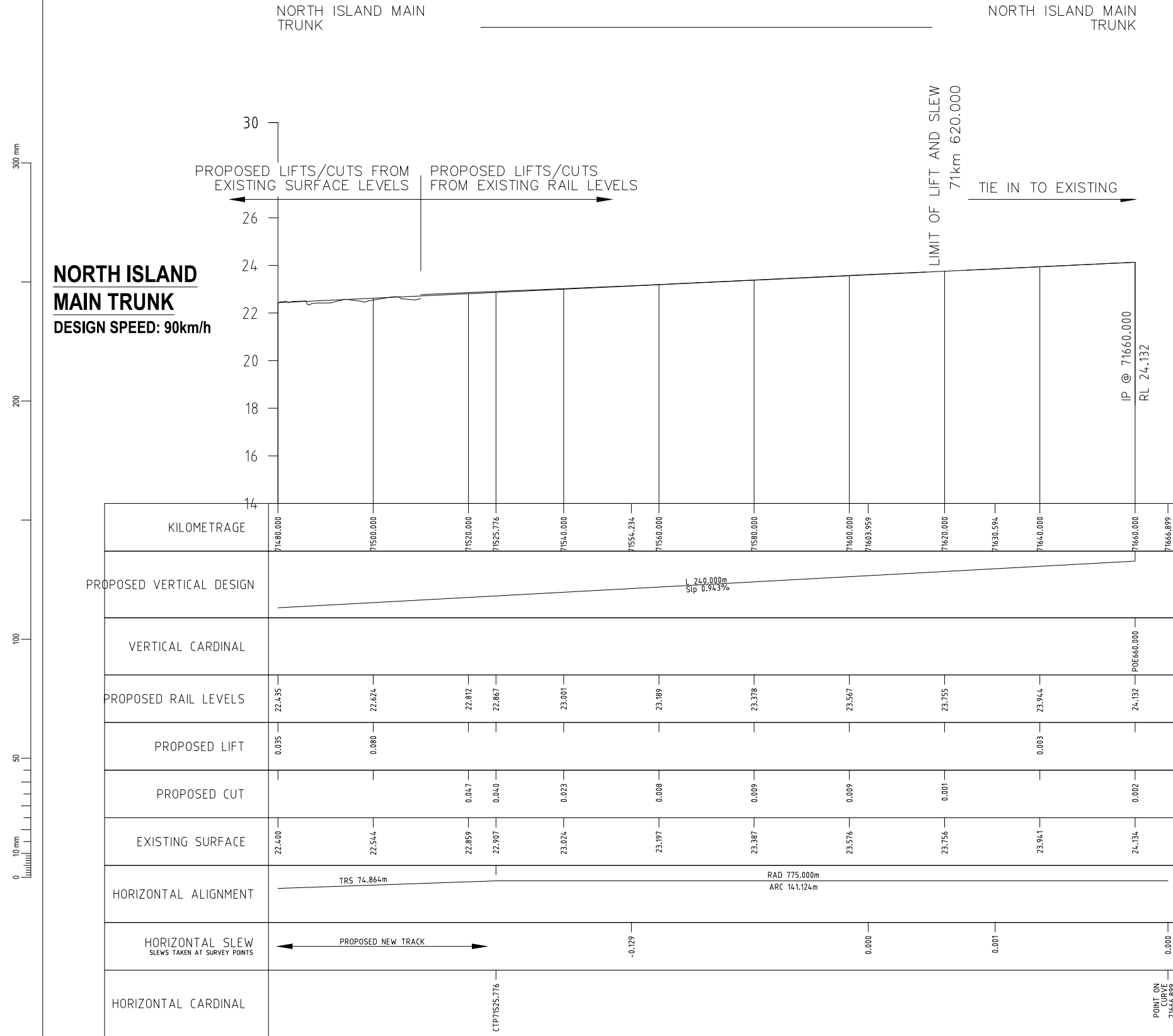
Revision	Amendment	Approved	Revision Date
C	FINAL ISSUE	R.J.M.	3 / 11 / 15
1	ISSUED FOR CONSTRUCTION	R.J.M.	4 / 5 / 16



Project		NZ Transport Agency S.H.1 REGION 9 R.P.995/2.738 - 15.423 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN	
Sheet		RAIL VERTICAL ALIGNMENT - MAIN LINE SHEET 4 OF 5	
Drawn	Scales	Project No.	Sheet No. / Revision
M.XERRI	1:500 (A1), 1:1000 (A3)	5-C2771.00	R124 / 1

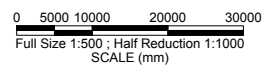
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LEGEND

PROPOSED RAIL LEVEL	_____
EXISTING RAIL / SURFACE LEVEL	_____



Revision	Amendment	Approved	Revision Date
C	FINAL ISSUE	R.J.M.	3 / 11 / 15
1	ISSUED FOR CONSTRUCTION	R.J.M.	4 / 5 / 16



Project		Approved		Approved Date	
NZ TRANSPORT AGENCY S.H.1 REGION 9 R.P.995/2.738 - 15.423 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN		R.McFADYEN		3 / 11 / 2015	
RAIL VERTICAL ALIGNMENT - MAIN LINE					
SHEET 5 OF 5					
Drawn	Scales	Project No.	Sheet No.	Revision	
M.XERRI	1:500 (A1), 1:1000 (A3)	5-C2771.00	R125	1	

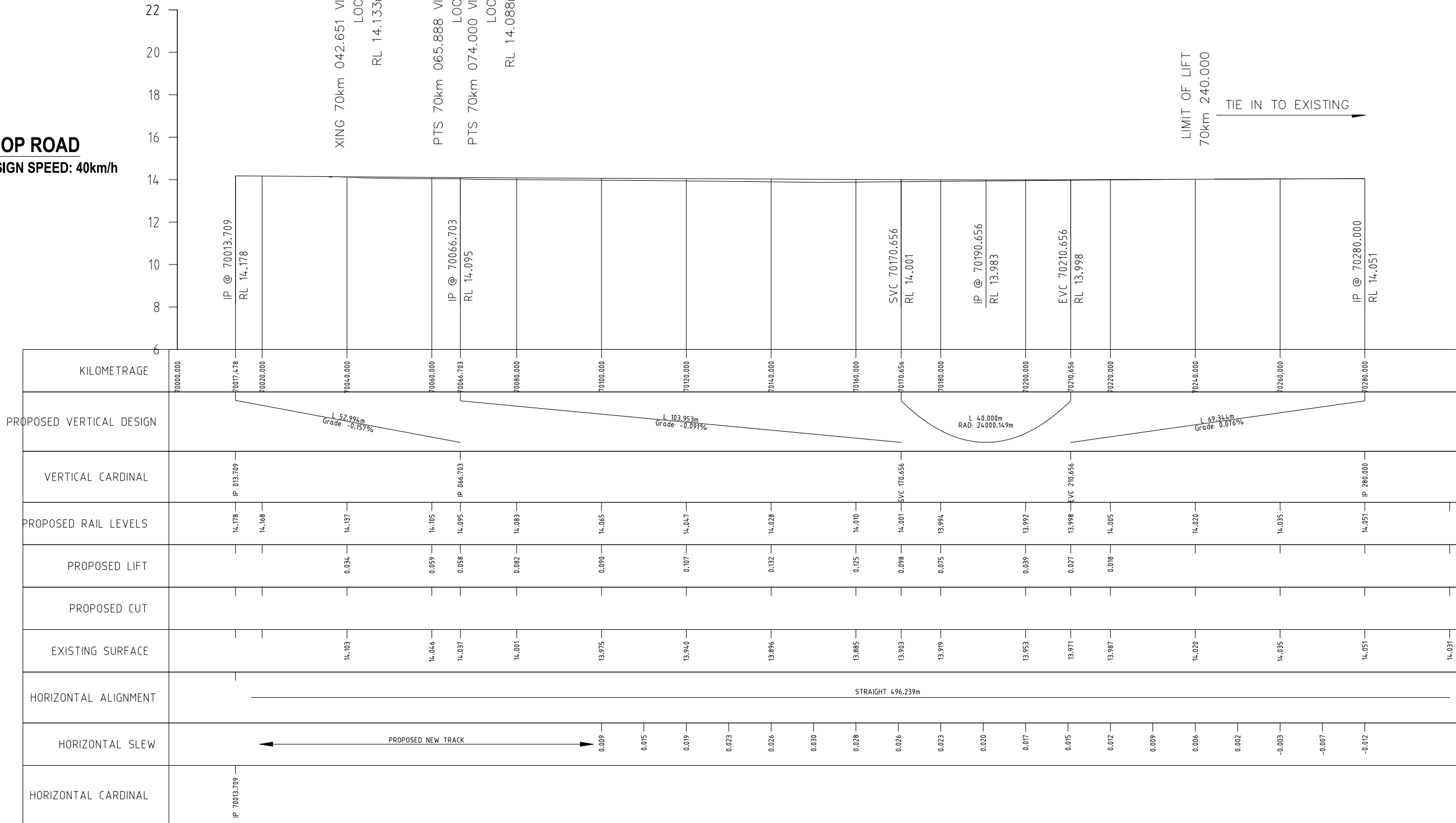
FOR CONSTRUCTION

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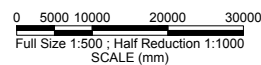
LOOP ROAD
DESIGN SPEED: 40km/h



FOR CONSTRUCTION

LEGEND

PROPOSED RAIL LEVEL	_____
EXISTING RAIL / SURFACE LEVEL	_____



Revision	Amendment	Approved	Revision Date
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Project
 NZ TRANSPORT AGENCY
 S.H.1 REGION 9 R.P.995/2.738 - 15.423
 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN

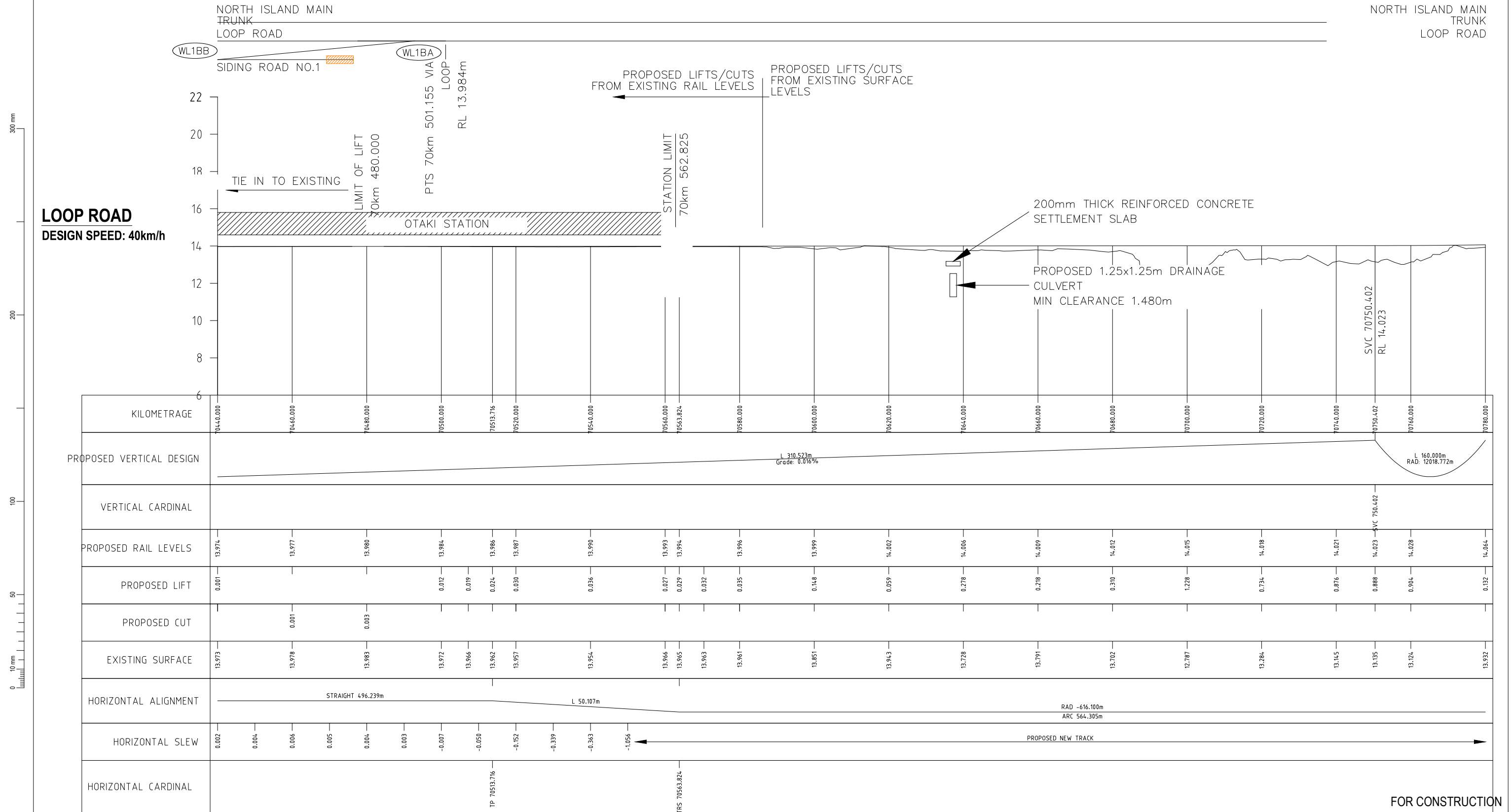
Sheet
RAIL VERTICAL ALIGNMENT - LOOP
SHEET 1 OF 4

Drawn	M.XERRI	Approved	R.McFADYEN	Approved Date	3 / 11 / 2015
Drawn	M.XERRI	Scales	1:500 (A1), 1:1000 (A3)	Project No.	5-C2771.00

Sheet No.	R126	Revision	1
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NOTES:

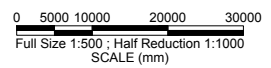
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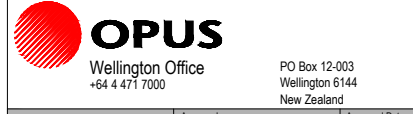
KILOMETRAGE	70440.000	70460.000	70480.000	70500.000	70513.716	70520.000	70540.000	70560.000	70563.824	70580.000	70600.000	70620.000	70640.000	70660.000	70680.000	70700.000	70720.000	70740.000	70750.402	70760.000	70780.000		
PROPOSED VERTICAL DESIGN	L 310.523m Grade: 0.016%																						
VERTICAL CARDINAL	L 160.000m RAD: 12018.772m																						
PROPOSED RAIL LEVELS	13.974	13.977	13.980	13.984	13.986	13.987	13.990	13.993	13.994	13.996	13.999	14.002	14.006	14.009	14.012	14.015	14.018	14.021	14.023	14.028	14.064		
PROPOSED LIFT	0.001			0.012	0.019	0.024	0.030	0.036	0.027	0.029	0.032	0.035	0.148	0.059	0.278	0.218	0.310	1.228	0.734	0.876	0.888	0.904	0.132
PROPOSED CUT		0.001	0.003																				
EXISTING SURFACE	13.973	13.978	13.983	13.972	13.966	13.962	13.957	13.954	13.966	13.965	13.963	13.961	13.951	13.943	13.728	13.791	13.702	12.787	13.284	13.145	13.195	13.124	13.932
HORIZONTAL ALIGNMENT	STRAIGHT 496.239m L 50.107m RAD -616.100m ARC 564.305m																						
HORIZONTAL SLEW	0.002	0.004	0.006	0.005	0.004	0.003	-0.007	-0.050	-0.152	-0.339	-0.363	-1.056	PROPOSED NEW TRACK										
HORIZONTAL CARDINAL	TP 7053.716 PMS 70563.824																						

LEGEND

PROPOSED RAIL LEVEL	_____
EXISTING RAIL / SURFACE LEVEL	_____



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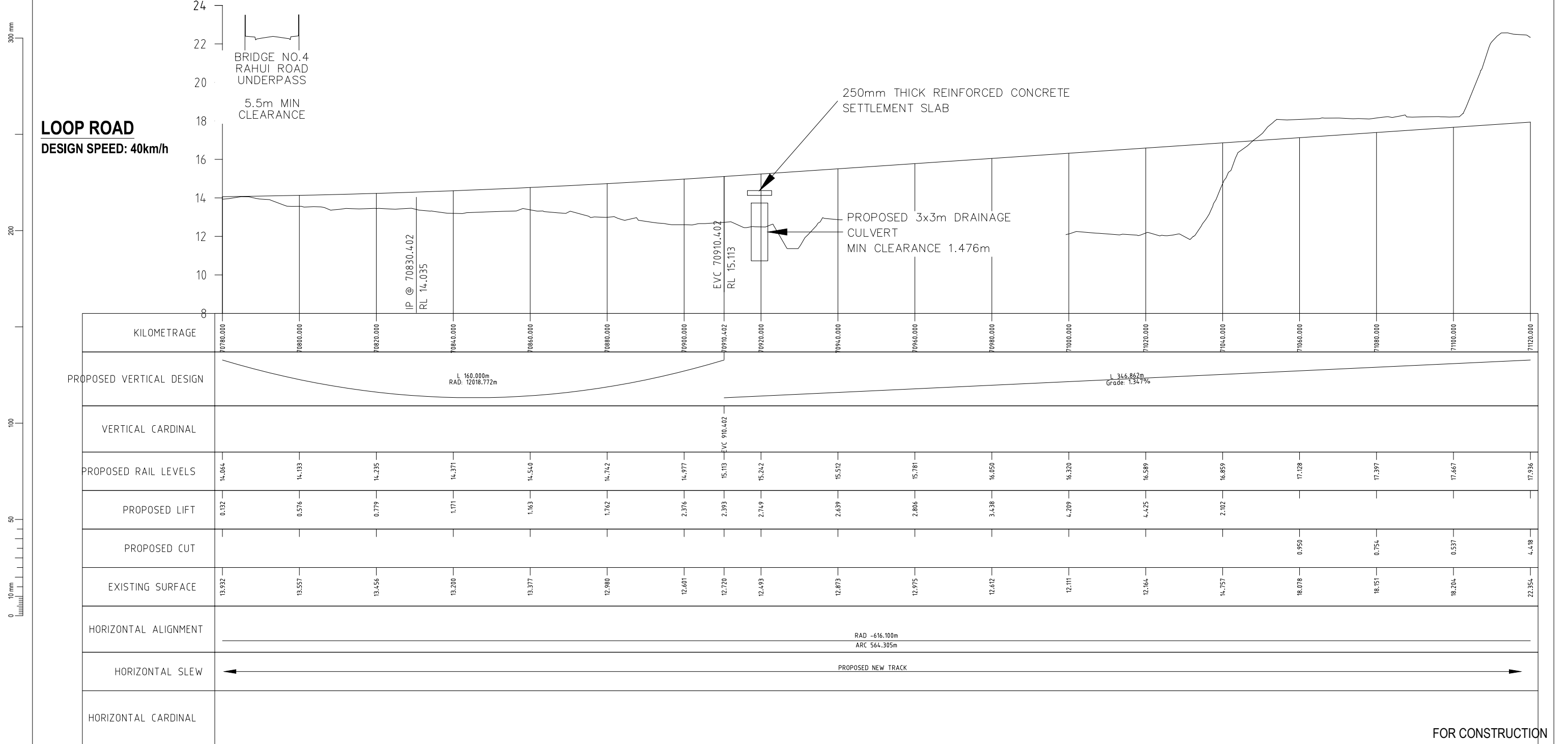
Project		NZ Transport Agency S.H.1 REGION 9 R.P.995/2.738 - 15.423 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN	
Sheet		RAIL VERTICAL ALIGNMENT - LOOP SHEET 2 OF 4	
Drawn	Scales	Project No.	Sheet No.
M.XERRI	1:500 (A1), 1:1000 (A3)	5-C2771.00	R127
Approved	Approved Date	Revision	
R.McFADYEN	3 / 11 / 2015	1	

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NORTH ISLAND MAIN TRUNK LOOP ROAD

NORTH ISLAND MAIN TRUNK LOOP ROAD



LOOP ROAD
DESIGN SPEED: 40km/h

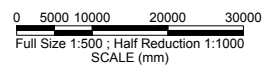
300 mm
200
100
50
10 mm
0

KILOMETRAGE	70780.000	70800.000	70820.000	70840.000	70860.000	70880.000	70900.000	70920.000	70940.000	70960.000	70980.000	71000.000	71020.000	71040.000	71060.000	71080.000	71100.000	71120.000	
PROPOSED VERTICAL DESIGN	[Graphical representation of vertical design curve]																		
VERTICAL CARDINAL	[Graphical representation of vertical cardinal points]																		
PROPOSED RAIL LEVELS	14.064	14.133	14.235	14.371	14.540	14.742	14.977	15.113	15.242	15.512	15.781	16.050	16.320	16.589	16.859	17.128	17.397	17.667	17.936
PROPOSED LIFT	0.132	0.576	0.779	1.171	1.163	1.762	2.376	2.393	2.749	2.639	2.806	3.438	4.209	4.425	2.102				
PROPOSED CUT																0.950	0.754	0.537	4.418
EXISTING SURFACE	13.932	13.557	13.456	13.200	13.377	12.980	12.601	12.720	12.493	12.873	12.975	12.612	12.111	12.164	14.757	18.078	18.151	18.204	22.354
HORIZONTAL ALIGNMENT	[Graphical representation of horizontal alignment]																		
HORIZONTAL SLEW	[Graphical representation of horizontal slew]																		
HORIZONTAL CARDINAL	[Graphical representation of horizontal cardinal points]																		

FOR CONSTRUCTION

LEGEND

PROPOSED RAIL LEVEL	_____
EXISTING RAIL / SURFACE LEVEL	_____



Revision	Amendment	Approved	Revision Date
C	FINAL ISSUE	R.J.M.	3 / 11 / 15
1	ISSUED FOR CONSTRUCTION	R.J.M.	4 / 15 / 16



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New Zealand

Approved
R.McFADYEN
3 / 11 / 2015

Drawn
M.XERRI
1:500 (A1), 1:1000 (A3)

Project NZ TRANSPORT AGENCY S.H.1 REGION 9 R.P.995/2.738 - 15.423 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN	
Sheet RAIL VERTICAL ALIGNMENT - LOOP SHEET 3 OF 4	
Project No. 5-C2771.00	Sheet No. / Revision R128 / 1

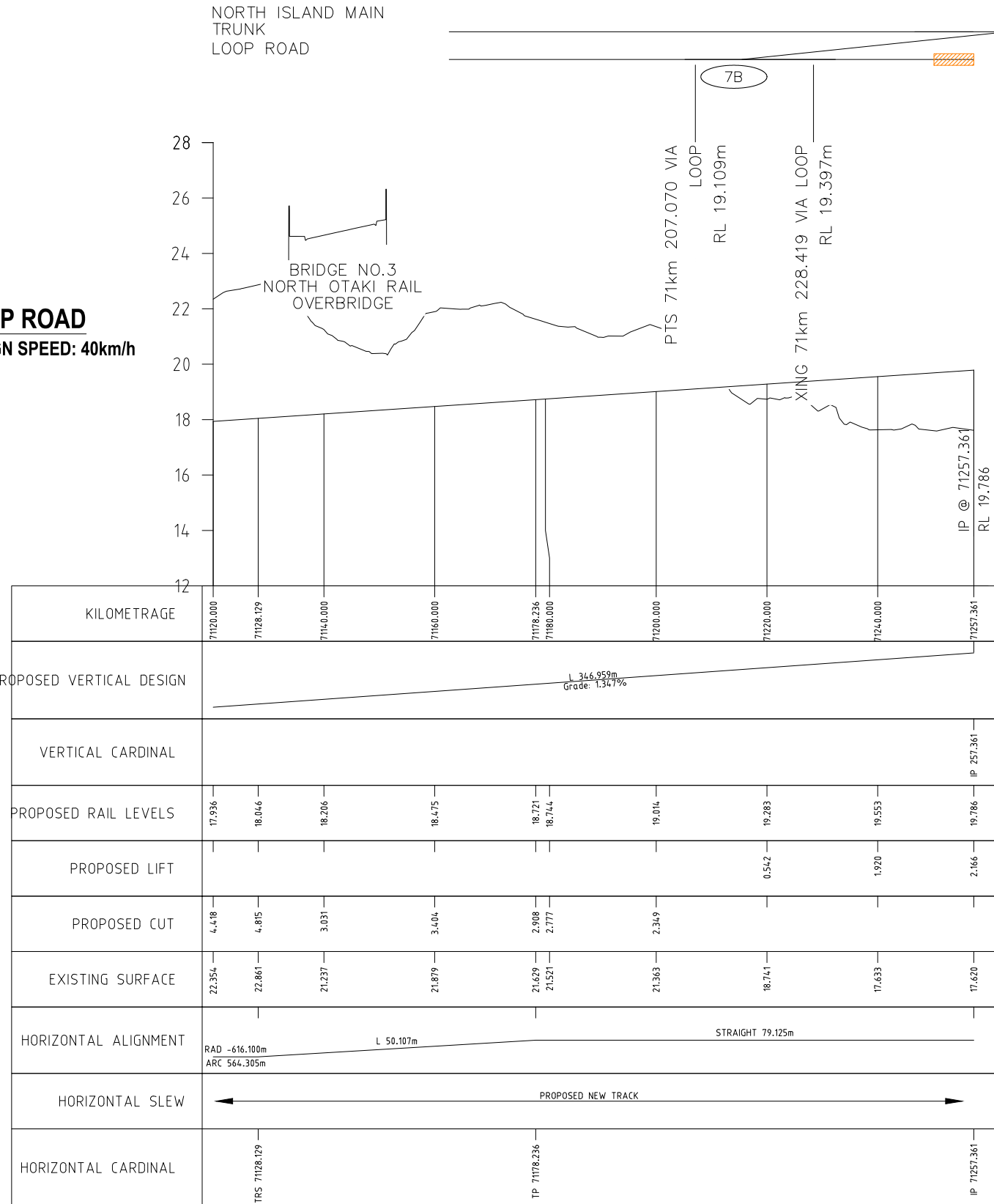
NOTES:

1. METRAGE DATUM OF THE NORTH ISLAND MAIN TRUNK 70km 010.000 E 1781576.273, N 5485086.667
2. HEIGHT DATUM: NEW ZEALAND VERTICAL DATUM 2009 (NZVD2009).
3. TOPOGRAPHICAL SURVEY TO MSL WELLINGTON 1953 HEIGHT DATUM. SURVEY LINE STRINGS SHIFTED -440mm TO CONVERT TO NEW ZEALAND VERTICAL DATUM.
4. RAIL LEVELS QUOTED ARE LOW RAIL LEVELS.
5. SURVEY RECEIVED FROM OPUS 8/01/2015.

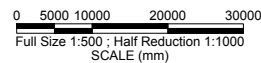
NORTH ISLAND MAIN TRUNK LOOP ROAD

LOOP ROAD
DESIGN SPEED: 40km/h

300 mm
200
100
50
10 mm
0



LEGEND	
PROPOSED RAIL LEVEL	—————
EXISTING RAIL / SURFACE LEVEL	—————



Revision	Amendment	Approved	Revision Date
C	FINAL ISSUE	R.J.M.	3 / 11 / 15
1	ISSUED FOR CONSTRUCTION	R.J.M.	4 / 5 / 16



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Project	
NZ TRANSPORT AGENCY S.H.1 REGION 9 R.P.995/2.738 - 15.423 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN	
Sheet	
RAIL VERTICAL ALIGNMENT - LOOP SHEET 4 OF 4	
Drawn	Project No.
M.XERRI	5-C2771.00
Approved	Approved Date
R.McFADYEN	3 / 11 / 2015
Drawn	Scales
M.XERRI	1:500 (A1), 1:1000 (A3)
Sheet No.	Revision
R129	1

FOR CONSTRUCTION

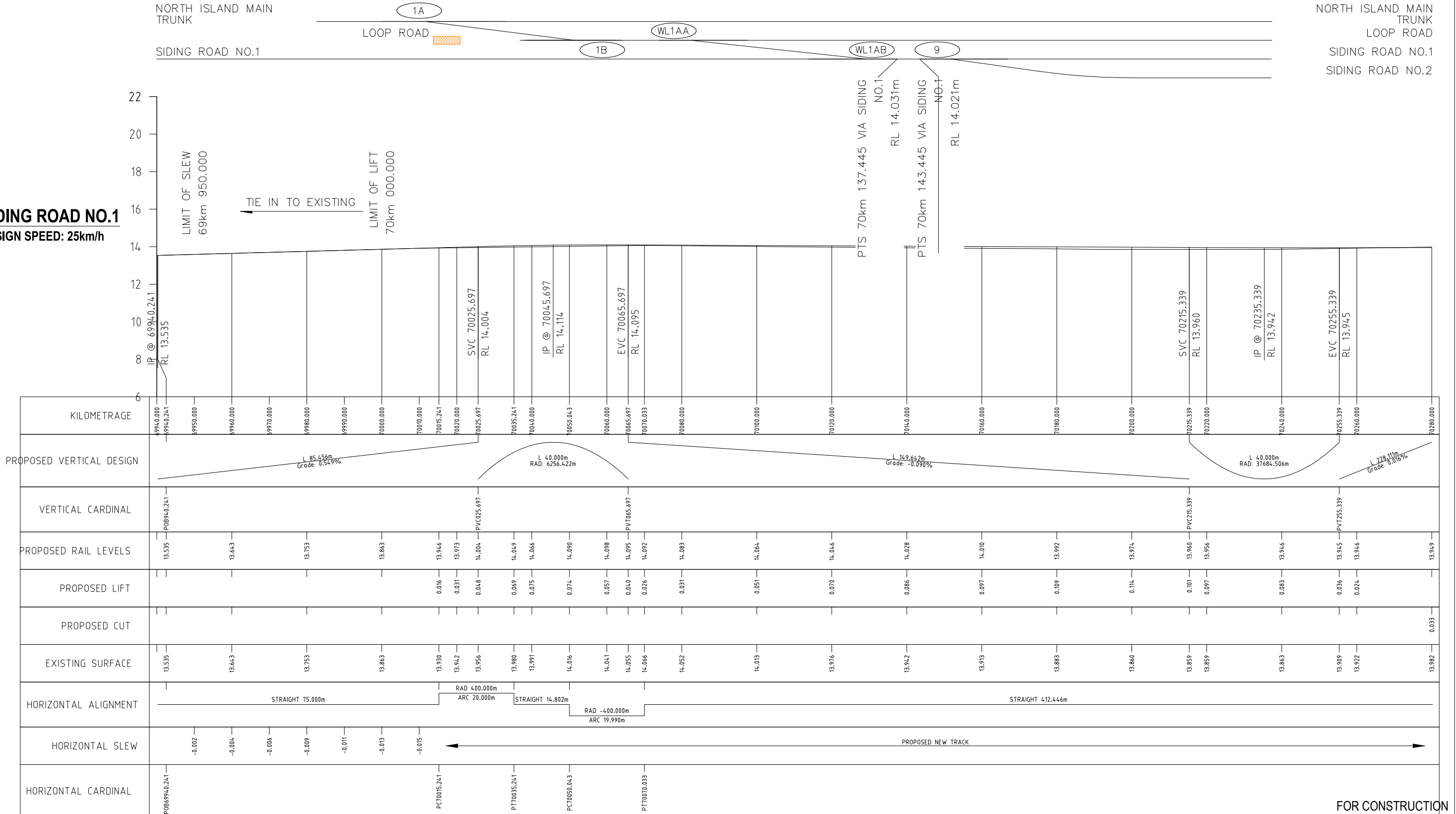
NOTES:

1. METRAGE DATUM OF THE NORTH ISLAND MAIN TRUNK 70km 010.000 E 1781576.273, N 5485086.667
2. HEIGHT DATUM: NEW ZEALAND VERTICAL DATUM 2009 (NZVD2009).
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4. RAIL LEVELS QUOTED ARE LOW RAIL LEVELS.
5. SURVEY RECEIVED FROM OPUS 8/01/2015.

NORTH ISLAND MAIN TRUNK
 LOOP ROAD
 SIDING ROAD NO.1

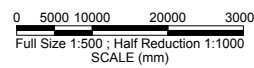
NORTH ISLAND MAIN TRUNK
 LOOP ROAD
 SIDING ROAD NO.1
 SIDING ROAD NO.2

SIDING ROAD NO.1
 DESIGN SPEED: 25km/h



LEGEND

PROPOSED RAIL LEVEL	—————
EXISTING RAIL / SURFACE LEVEL	—————



Revision	Amendment	Approved	Revision Date
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Approved
 R.McFADYEN
 3 / 11 / 2015

Drawn
 M.XERRI
 Scales
 1:500 (A1), 1:1000 (A3)

Project
 NZ TRANSPORT AGENCY
 S.H.1 REGION 9 R.P.995/2.738 - 15.423
 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN

Sheet
RAIL VERTICAL ALIGNMENT - SIDING 1
SHEET 1 OF 2

Project No.
 5-C2771.00

Sheet No.
 R130

Revision
 1

FOR CONSTRUCTION

NOTES:

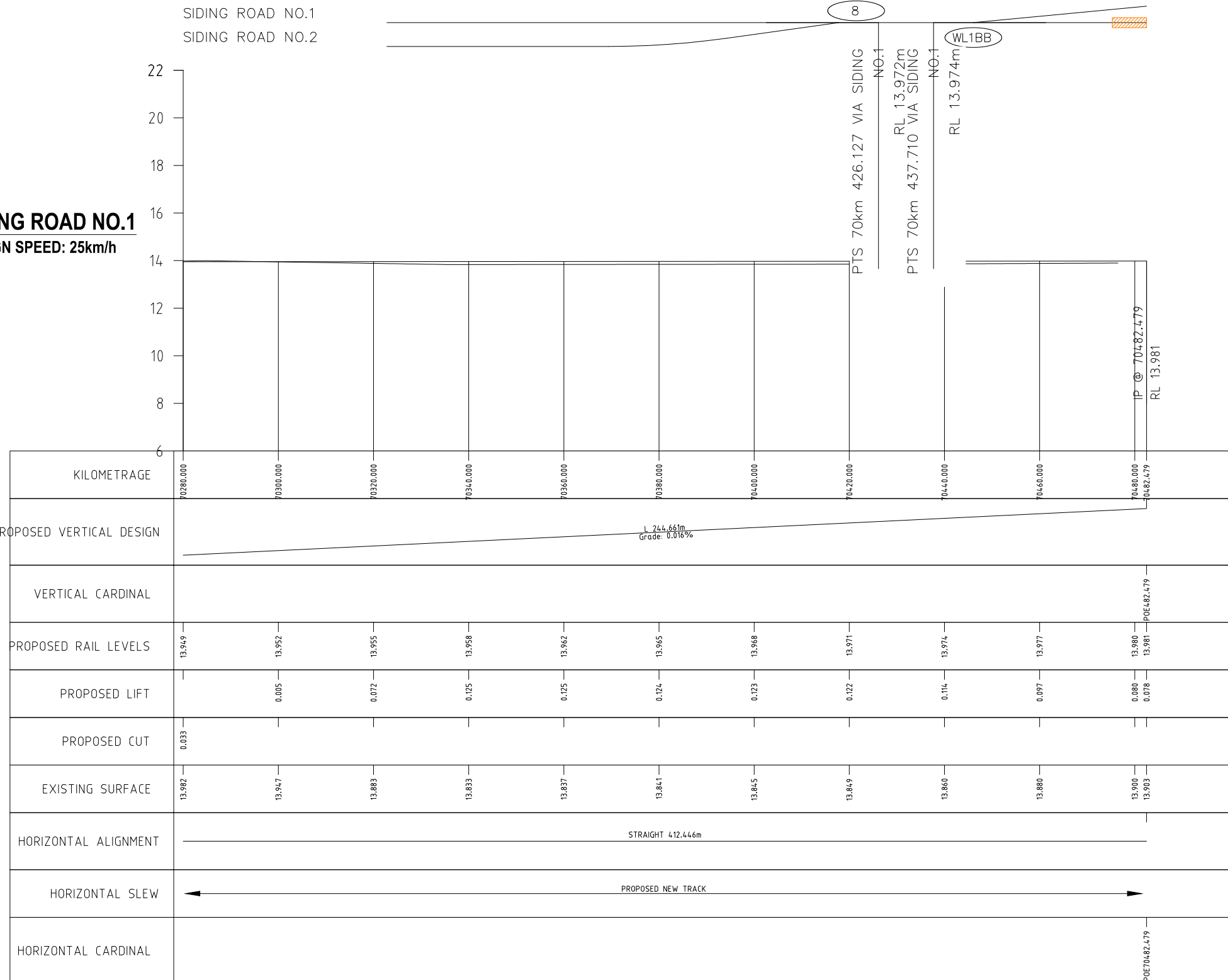
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2. HEIGHT DATUM: NEW ZEALAND VERTICAL DATUM 2009 (NZVD2009).
3. TOPOGRAPHICAL SURVEY TO MSL WELLINGTON 1953 HEIGHT DATUM. SURVEY LINE STRINGS SHIFTED -440mm TO CONVERT TO NEW ZEALAND VERTICAL DATUM.
4. RAIL LEVELS QUOTED ARE LOW RAIL LEVELS.
5. SURVEY RECEIVED FROM OPUS 8/01/2015.

NORTH ISLAND MAIN TRUNK LOOP ROAD
 SIDING ROAD NO.1
 SIDING ROAD NO.2

NORTH ISLAND MAIN TRUNK LOOP ROAD

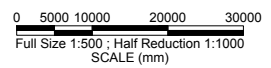
SIDING ROAD NO.1
 DESIGN SPEED: 25km/h

300 mm
200
100
50
10 mm
0



LEGEND

PROPOSED RAIL LEVEL	—————
EXISTING RAIL / SURFACE LEVEL	—————



Revision	Amendment	Approved	Revision Date
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Approved	Approved Date
R.McFADYEN	3 / 11 / 2015
Drawn	Scales
M.XERRI	1:500 (A1), 1:1000 (A3)

Project	
NZ TRANSPORT AGENCY S.H.1 REGION 9 R.P.995/2.738 - 15.423 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN	
Sheet	
RAIL VERTICAL ALIGNMENT - SIDING 1 SHEET 2 OF 2	
Project No.	Sheet No. Revision
5-C2771.00	R131 1

FOR CONSTRUCTION

NOTES:

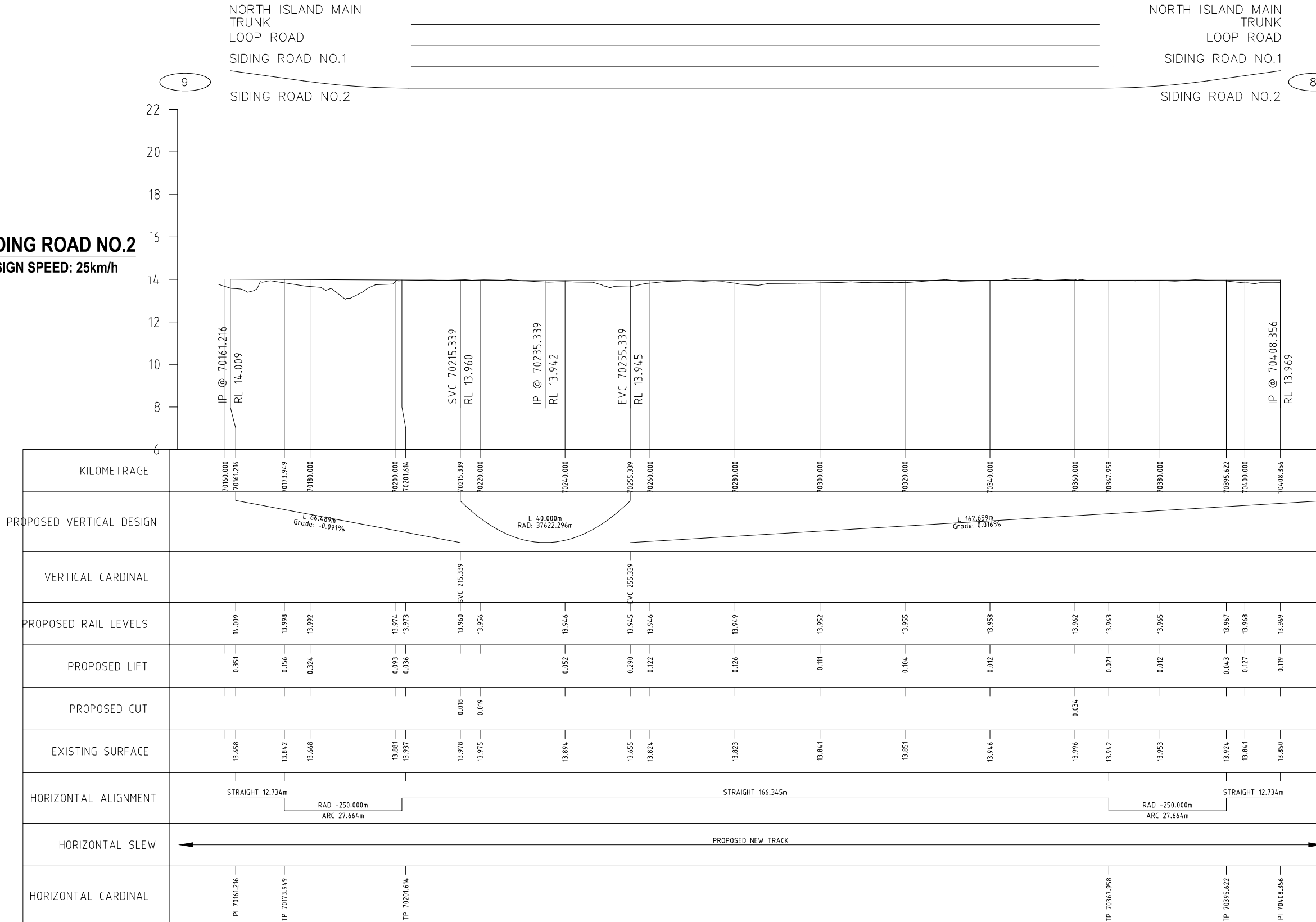
1. METRAGE DATUM OF THE NORTH ISLAND MAIN TRUNK 70km 010.000 E 1781576.273, N 5485086.667
2. HEIGHT DATUM: NEW ZEALAND VERTICAL DATUM 2009 (NZVD2009).
3. TOPOGRAPHICAL SURVEY TO MSL WELLINGTON 1953 HEIGHT DATUM. SURVEY LINE STRINGS SHIFTED -440mm TO CONVERT TO NEW ZEALAND VERTICAL DATUM.
4. RAIL LEVELS QUOTED ARE LOW RAIL LEVELS.
5. SURVEY RECEIVED FROM OPUS 8/01/2015.

NORTH ISLAND MAIN TRUNK LOOP ROAD
SIDING ROAD NO.1
SIDING ROAD NO.2

NORTH ISLAND MAIN TRUNK LOOP ROAD
SIDING ROAD NO.1
SIDING ROAD NO.2

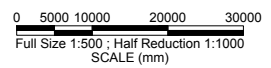
SIDING ROAD NO.2
DESIGN SPEED: 25km/h

300 mm
200
100
50
10 mm
0



LEGEND

PROPOSED RAIL LEVEL	_____
EXISTING RAIL / SURFACE LEVEL	_____



Revision	Amendment	Approved	Revision Date
C	FINAL ISSUE	R.J.M.	3 / 11 / 15
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New Zealand

Approved	Approved Date
R.McFADYEN	3 / 11 / 2015
Drawn	Scales
M.XERRI	1:500 (A1), 1:1000 (A3)

Project	
NZ TRANSPORT AGENCY S.H.1 REGION 9 R.P.995/2.738 - 15.423 PEKA PEKA TO OTAKI (PP20) EXPRESSWAY - SPECIMEN DESIGN	
Sheet	
RAIL VERTICAL ALIGNMENT - SIDING 2 SHEET 1 OF 1	
Project No.	Sheet No. Revision
5-C2771.00	R132 1

FOR CONSTRUCTION

**Appendix I Kiwi Rail Pre-Works Scoping Document (M134), Site
Completion Audit Check List (M135), and Final
Completion Certificate (M136)**

1. LOCATION							
WO Number	3972003		Job Type	Project PP20			
Asset No.	1000000		Asset Description	NIMT MainL, Wellington - Auckland			
From km	69	From m	985	To km	71	To m	524
Datum Reference Point		From km	69	From m	985		

2. SITE OBSERVATIONS - DILAPIDATION SURVEY

CORRIDOR LOG	Type	Condition	Corridor Log Comments
Rail			
Sleepers			
Fastenings			
Turnout(s)			
Ballast			
Other features			

Brief description of issue

Describe the Scope of Work
 What is to be delivered?
 Consider the following;
 Access Points
 Signage
 Scrap
 Track Gemetry
 Marks
 Vegetation
 Signals
 Cabling
 Traction
 Other

Materials & Quantities	Material	Qty	Material	Qty
Note down key material/quantities required				

3. ACTIONS TO BE TAKEN PRIOR TO WORKS STARTING

4. SIGNED

Name: Ryan Curry Title: FPM Sign: *R Curry* Date: 01/04/2019

Name: Jainend Kumar Title: FAE Sign: *Jkumar* Date: 01/04/2019

1. LOCATION							
WO Number	3972003		Job Type	Project PP2O			
Asset No.	1000000		Asset Description	NIMT MainL, Wellington - Auckland			
From km	69	From m:	985	To Km:	71	To m:	524
Datum Reference Point	From km	69	From m	985			

2. Ganger / Team Leader to complete Items 1 to 14					
	NA	Yes	No	Comment:	
Refer to T200, Code & Code Supplements					
1. Formation meets Code requirements Drain, Culverts, subgrade & vegetation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
2. Track structure meets Code requirements Gauge, alignment, grade & cant		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
3. Rails meets Code requirements Wear, joints, IJs, correct fastenings etc		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
4. Turnout meets Code requirements Frog, switch check rails, fastenings etc.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
5. Ballast Profile meets Code requirements Cribs, shoulders size, ballast depth, cleanliness etc.		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
6. Level Crossing meets Code requirements Signs, view lines, runners, resurfacing complete, etc	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
7. Thermic Welding meets Code requirements ID numbers, punch/paint marks, grinding all completed etc	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
8. Site left neat & tidy Unused material removed, excess dirt/ballast removed		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
9. Offset Data Plates Plates updated		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
10 WO Completed Signed, dated & returned to Production Manager etc		<input checked="" type="checkbox"/>	<input type="checkbox"/>		
11 Material Transfer Completed Unused material returned to stock	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
12 Plant Hire Log sheet completed Signed, dated & return to Production Manager	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
13 Does the disturbed track need a H40 Does site need destressing, is site marked for destress	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
14 Other Comment or Follow up work:	<hr/> Redundant GIJs to be removed at the 70.073km <hr/> <hr/> <hr/>				

Name: Ryan Curry Title: FPM Sign: *R Curry* Date: 10/12/2019

3. Field Production Manager to complete Items A to C			
	Yes	No	Comment:
A. Riew Workorder details materials, costs / accruals accounted for	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
B. Documentation Completed Satisfactorily Signed/dated WO, Asset update sheet completed, log entry etc	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
C. Other Comment	<hr/> <hr/> <hr/>		

Name: Ryan Curry Title: FPM Sign: *R Curry* Date: 10/12/2019

1. LOCATION							
WO Number	3972003		Job Type		Project PP20		
Asset No.	1000000		Asset Description		NIMIT MainL, Wellington - Auckland		
From km	69	From m	985	To Km:	71	To m:	524
Datum Reference Point	From km	69	From m	985			

Rail													
Installed Date	19/04/2019			Weight	50kg	Manufacturer		CR5BG			Manu_yr	2017	
From	To	Length	Side	H/Hard (Y/N)	S/Hand (Y/N)	Temp Laid	T'posed (Y/N)	T'posed Date	H'l Legged (Y/N)	Fishplates	Condition	Cond. Date	
1	69.985	69.996	CWR	BOTH	N	N	32				1	9/11/2019	
2	70.024	70.035	CWR	BOTH	N	N	32				1	9/11/2019	
3	70.511	71.245	CWR	BOTH	N	N	32				1	9/11/2019	
4	71.274	71.524	CWR	BOTH	N	N	32				1	9/11/2019	
Revised Rail Wear Readings				HT:	HS:	HF:	LT:	LS:	LF:	Lp:	Metrage of reading		
				0	0	0	0	0	0	0	71.000		
Adjustment to previous or following Records				The distance between the 71km and 72km is now a short Kilometer - actual distance is 932m									
Comment:				Remove old wear readings, Rahui Rd is no longer a level crossing - remove from corridor log									

Sleepers												
From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	X'bored (Y/N)	Vortok (Y/N)	Manufacturer	Condition	Cond. Date	
1	70.511	71.237	T	CONC25	N	19/04/2019	100		HUMESHAML	1	9/11/2019	
2	71.277	71.524	T	CONC25	N	19/04/2019	100		HUMESHAML	1	9/11/2019	
3												
Adjustment to previous or following Records				The distance between the 71km and 72km is now a short Kilometer - actual distance is 932								
Comment:												

Fastenings												
From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	Insulator Type	Spacer Type	Double Screwed (Y/N)	Condition	Cond. Date	
1	70.511	71.237	T	PCE	N	19/04/2019	100	GREY-BLUE		1	9/11/2019	
2	71.277	71.524	T	PCE	N	19/04/2019	100	GREY-BLUE		1	9/11/2019	
3												
4												
5												
Adjustment to previous or following Records												
Comment:												

Level Crossing									
From	To	Width	Date Upgraded	Surface					
1									
Comment:									

Insulated Joint									
From	To	Length	Type	Side	Installed Date	Manufacturer			
1	70.071	70.075	4.25	GLUED	BOTH		THERMIT		
2									
Comment: Redundant GIJ to be removed Axle counter at 69.982 (2R Signal) Axle counter at 70.129 (8RA Signal)									

Name: Ryan Curry Title: FPM Sign: *R Curry* Date: 10/12/2019
 Name: Jainend Kumar Title: FAE Sign: *J Kumar* Date: 10/12/2019

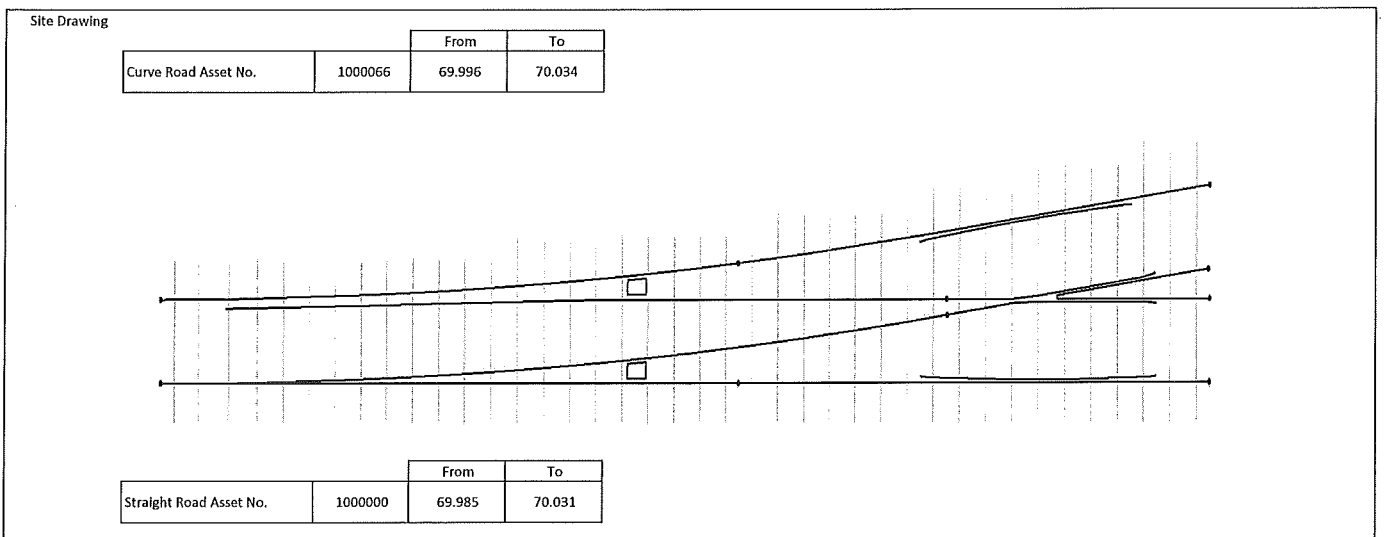
1. LOCATION							
WO Number	3972003			Job Type	Project PP20		
Asset No.	1000000			Asset Description	NIMT MainL, Wellington - Auckland		
From km	69	From m	985	To Km:	71	To m:	524
Datum Reference Point	From km	69	From m	985			

Asset No.	POS Metrage	POF Metrage	Hand (L/R/Split)	Face / Trall	Actuator Type	Strike Angle	Switch Length	Anchors (Y/N)	Hucks (Y/N)	Reinforced (Y/N)	T/O Condition	Cond. Date
7015609	69.996	70.019	R	Facing	MOTORISED	12	HEEL-LESS	N	N	N	1	9/11/2019
Installed Date	T'out Manuf.	Type	Frog Manuf.	Frog S/H (Y/N)	Frog Type	Connection	S/Hand (Y/N)					
22/10/2018	MARTINUS	TURNOUT	MARTINUS	N	CAST	Welded	N					
Comment:												

Rail													
Installed Date	22/10/2018		Weight	50kg		Manufacturer				Manu_yr	2018		
Asset No.	From	To	Length	Side	H/Hard (Y/N)	S/Hand (Y/N)	Temp Laid	T'posed (Y/N)	T'posed Date	H' Legged (Y/N)	Fishplates	Condition	Cond. Date
1	1000000	69.985	70.024	CWR	BOTH	Y	32					1	9/11/2019
2	1000066	69.996	70.027	CWR	BOTH	Y	32					1	9/11/2019
3													
4													
Adjustment to previous or following Records													
Comment:													

Sleepers													
Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	X'bored (Y/N)	Vortok (Y/N)	Manufacturer		Condition	Cond. Date
1	1000000	69.985	TO	CONC	N	22/10/2018	100			NOTLISTED		1	9/11/2019
2	1000066	69.996	TO	CONC	N	22/10/2018	100			NOTLISTED		1	9/11/2019
3													
4													
Adjustment to previous or following Records													
Comment:													

Fastenings													
Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	Insulator Type		Spacer Type	Double Screwed (Y/N)	Condition	Cond. Date
1	1000000	69.985	TO	PXFC	N	22/10/2018	100					1	9/11/2019
2	1000066	69.996	TO	PXFC	N	22/10/2018	100					1	9/11/2019
3													
4													
Adjustment to previous or following Records													
Comment:													



Name: Ryan Curry Title: FPM Sign: *R Curry* Date: 10/12/2019

Name: Jainend Kumar Title: FAE Sign: *J Kumar* Date: 10/12/2019

1. LOCATION							
WO Number	3972003			Job Type	Project PP20		
Asset No.	1000000			Asset Description	NIMT Maint, Wellington - Auckland		
From km	69	From m	985	To Km:	71	To m:	524

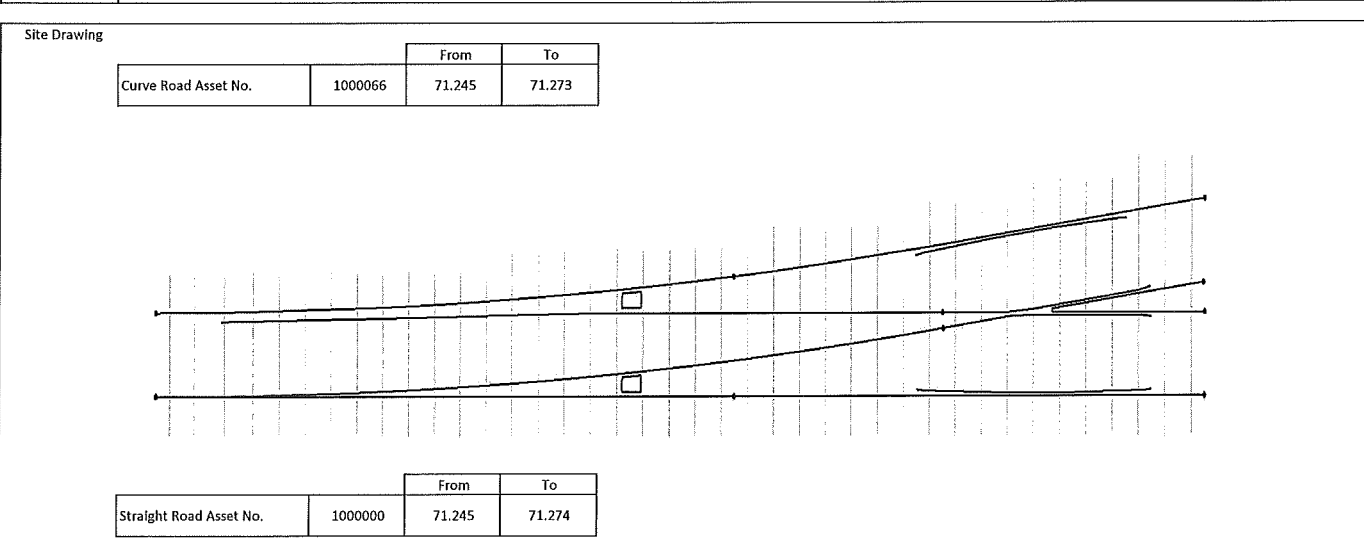
Datum Reference Point	From km	69	From m	985
-----------------------	---------	----	--------	-----

Asset No.	POS Metrage	POF Metrage	Hand (L/R/Split)	Face / Trail	Actuator Type	Strike Angle	Switch Length	Anchors (Y/N)	Hucks (Y/N)	Reinforced (Y/N)	T/O Condition	Cond. Date
7015610	71.273	71.250	L	Trailing	MOTORISED	12	HEEL-LESS	N	N	N	1	9/11/2019
Installed Date	T'out Manuf.	Type	Frog Manuf.	Frog S/H (Y/N)	Frog Type	Connection	S/Hand (Y/N)					
19/04/2019	MARTINUS	TURNOUT	MARTINUS	N	CAST	Welded	N					

Installed Date	19/04/2019		Weight	50kg		Manufacturer						Manu_yr	2018	
Asset No.	From	To	Length	Side	H/Hand (Y/N)	S/Hand (Y/N)	Temp Laid	T'posed (Y/N)	T'posed Date	H' Legged (Y/N)	Fishplates	Condition	Cond. Date	
1	1000000	71.245	71.274	CWR	BOTH	Y						1	9/11/2019	
2	1000066	71.245	71.273	CWR	BOTH	Y						1	9/11/2019	
3														
4														

Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	X'bored (Y/N)	Vortok (Y/N)	Manufacturer	Condition	Cond. Date
1	1000000	71.237	71.277	TO	CONC	19/04/2019	100			NOTLISTED	1	9/11/2019
2	1000066	71.237	71.273	TO	CONC	19/04/2019	100			NOTLISTED	1	9/11/2019
3												
4												

Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	Insulator Type	Spacer Type	Double Screwed (Y/N)	Condition	Cond. Date
1	1000000	71.237	71.277	TO	PXFC	19/04/2019	100				1	9/11/2019
2	1000066	71.237	71.273	TO	PXFC	19/04/2019	100				1	9/11/2019
3												
4												



Name: Ryan Curry Title: FPM Sign: *R Curry* Date: 10/12/2019

Name: Jainend Kumar Title: FAE Sign: *JKumar* Date: 10/12/2019

1. LOCATION							
WO Number	3972003		Job Type	Project			
Asset No.	1000066		Asset Description	NIMT Loop, Otaki (69+999 to 71+272)			
From km	69	From m	996	To km	71	To m	273
Datum Reference Point		From km	69	From m	996		

2. SITE OBSERVATIONS - DILAPIDATION SURVEY

CORRIDOR LOG	Type	Condition	Corridor Log Comments
Rail			
Sleepers			
Fastenings			
Turnout(s)			
Ballast			
Other features			
Brief description of issue			
Describe the Scope of Work What is to be delivered? Consider the following; Access Points Signage Scrap Track Gemetry Marks Vegetation Signals Cabling Traction Other			

Materials & Quantities	Material	Qty	Material	Qty
Note down key material/quantities required				

3. ACTIONS TO BE TAKEN PRIOR TO WORKS STARTING

4. SIGNED

Name:	Title:	FPM	Sign:	Date:
Name:	Title:	FAE	Sign:	Date:

1. LOCATION							
WO Number	3972003		Job Type	Project			
Asset No.	1000066		Asset Description	NIMT Loop, Otaki (69+999 to 71+272)			
From km	69	From m:	996	To Km:	71	To m:	273
Datum Reference Point	From km	69	From m	996			

2. Ganger / Team Leader to complete Items 1 to 14				
	NA	Yes	No	Comment:
Refer to T200, Code & Code Supplements				
1. Formation meets Code requirements Drain, Culverts, subgrade & vegetation	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
2. Track structure meets Code requirements Gauge, alignment, grade & cant		<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
3. Rails meets Code requirements Wear, joints, IJs, correct fastenings etc		<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
4. Turnout meets Code requirements Frog, switch check rails, fastenings etc.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
5. Ballast Profile meets Code requirements Cribs, shoulders size, ballast depth, cleanliness etc.		<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
6. Level Crossing meets Code requirements Signs, view lines, runners, resurfacing complete, etc	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
7. Thermic Welding meets Code requirements ID numbers, punch/paint marks, grinding all completed etc	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
8. Site left neat & tidy Unused material removed, excess dirt/ballast removed		<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
9. Offset Data Plates Plates updated		<input type="checkbox"/>	<input checked="" type="checkbox"/>	None Required
10 WO Completed Signed, dated & returned to Production Manager etc		<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
11 Material Transfer Completed Unused material returned to stock	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	_____
12 Plant Hire Log sheet completed Signed, dated & return to Production Manager	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	_____
13 Does the disturbed track need a H40 Does site need destressing, is site marked for distress	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	_____
14 Other Comment or Follow up work:				_____ _____ _____

Name: Ryan Curry Title: FPM Sign: *Rearry* Date: 10/12/2019

3. Field Production Manager to complete Items A to C			
	Yes	No	Comment:
A. Reiew Workorder details materials, costs / accruals accounted for	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
B. Documentation Completed Satisfactorily Signed/dated WO, Asset update sheet completed, log entry etc	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
C. Other Comment			_____ _____ _____

Name: Ryan Curry Title: FPM Sign: *Rearry* Date: 10/12/2019

1. LOCATION							
WO Number	3972003			Job Type	Project		
Asset No.	1000066			Asset Description	NIMT Loop, Otaki (69+999 to 71+272)		
From km	69	From m	996	To Km:	71	To m:	273

Datum Reference Point	From km	69	From m	996
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Rail													
Installed Date	19/04/2019			Weight	50kg	Manufacturer			CRSBG			Manu_yr	2018
From	To	Length	Side	H/Hard (Y/N)	S/Hand (Y/N)	Temp Laid	T'posed (Y/N)	T'posed Date	H' Legged (Y/N)	Fishplates	Condition	Cond. Date	
1	70.025	70.038	CWR	BOTH	N	N	32				1	9/11/2019	
2	70.066	70.074	CWR	BOTH	N	N	32				1	9/11/2019	
3	70.096	70.105	CWR	BOTH	N	N	32				1	9/11/2019	
4	70.457	70.480	CWR	BOTH	N	N	32				1	9/11/2019	
5	70.579	71.205	CWR	BOTH	N	N	32				1	9/11/2019	
6	71.234	71.247	CWR	BOTH	N	N	32				1	9/11/2019	
Revised Rail Wear Readings				HT:	HS:	HF:	LT:	LS:	LF:	Up:	Metrage of reading		
Adjustment to previous or following Records				Between 70.105 & 70.457 the rail is 91lb CWR condition 3									
Comment:													

Sleepers												
From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	X'bored (Y/N)	Vortok (Y/N)	Manufacturer	Condition	Cond. Date	
1	70.102	70.106	T	CONC25	N	22/10/2018	100		HUMESHAML	1	9/11/2019	
2	70.106	70.457	T	TPR		1/01/1980	75	N	NOTLISTED	3	9/11/2019	
3	70.106	70.457	T	TPR		1/01/1980	25	N	NOTLISTED	4	9/11/2019	
4	70.457	71.202	T	CONC25	N	19/04/2019	100		HUMESHAML	1	9/11/2019	
Adjustment to previous or following Records												
Comment:				Date unknown for 'N' Type installation on the loop, Mainline were installed in 1976 so could be around the same date.								

Fastenings												
From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	Insulator Type	Spacer Type	Double Screwed (Y/N)	Condition	Cond. Date	
1	70.102	70.106	T	PCE	N	22/10/2018	100	GREY-BLUE		1	9/11/2019	
2	70.106	70.457	T	N		1/01/1980	100			3	9/11/2019	
4	70.457	71.202	T	PCE	N	19/04/2019	100	GREY-BLUE		1	9/11/2019	
5												
6												
Adjustment to previous or following Records												
Comment:				Date unknown for TPR installation on the loop, Mainline were installed in 1976 so could be around the same date.								

Level Crossing												
From	To	Width	Date Upgraded	Surface								
1												
Comment:												

Insulated Joint												
From	To	Length	Type	Side	Installed Date	Manufacturer						
1												
2												
Comment:				Axle counter at 70.318 Axle counter at 70.129 (8RB Signal)								

Name: Ryan Curry Title: FPM Sign: *R Curry* Date: 10/12/2019
 Name: Jainend Kumar Title: FAE Sign: *JKumar* Date: 10/12/2019

1. LOCATION							
WO Number	3972003			Job Type	Project		
Asset No.	1000066			Asset Description	NIMT Loop, Olaki (69+999 to 71+272)		
From km	69	From m	996	To km:	71	To m:	273

Datum Reference Point	From km	69	From m	996
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Asset No.	POS Metrage	POF Metrage	Hand (L/R/Split)	Face / Trail	Actuator Type	Strike Angle	Switch Length	Anchors (Y/N)	Hucks (Y/N)	Reinforced (Y/N)	T/O Condition	Cond. Date
7015624	70.065	70.043	R	Trailing	MOTORISED	12	HEEL-LESS	N	N	N	1	9/11/2019
Installed Date	T'out Manuf.	Type	Frog Manuf.	Frog S/H (Y/N)	Frog Type	Connection	S/Hand (Y/N)					
22/10/2018	MARTINUS	TURNOUT	MARTINUS	N	CAST	Welded	N					

Comment: This is now a turnout, current description is trap switch.

Installed Date	22/10/2019		Weight	50kg		Manufacturer				Manu_yr	2018		
Asset No.	From	To	Length	Slide	H/Hard (Y/N)	S/Hand (Y/N)	Temp Laid	T'posed (Y/N)	T'posed Date	Hi' Legged (Y/N)	Fishplates	Condition	Cond. Date
1	1000066	70.038	70.066	CWR	BOTH	Y	N	32				1	9/11/2019
2	7016488	70.037	70.065	CWR	BOTH	Y	N	32				1	9/11/2019
3	7016488	70.012	70.037	CWR	BOTH	N	N	32				1	9/11/2019
4													

Adjustment to previous or following Records

Comment: No asset number currently for Backshunt/Sand drag off Turnout 1B. Backshunt/Sand drag asset information all on this sheet. Sand drag is installed from 70.012 to 70.025.

Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	X'bored (Y/N)	Vortok (Y/N)	Manufacturer	Condition	Cond. Date
1	1000066	70.031	TO	CONC		22/10/2018	100			NOTLISTED	1	9/11/2019
2	7016488	70.028	TO	CONC		19/04/2019	100			NOTLISTED	1	9/11/2019
3	7016488	70.012	T	CONC25		19/04/2019	100			HUMESHAML	3	9/11/2019
4												

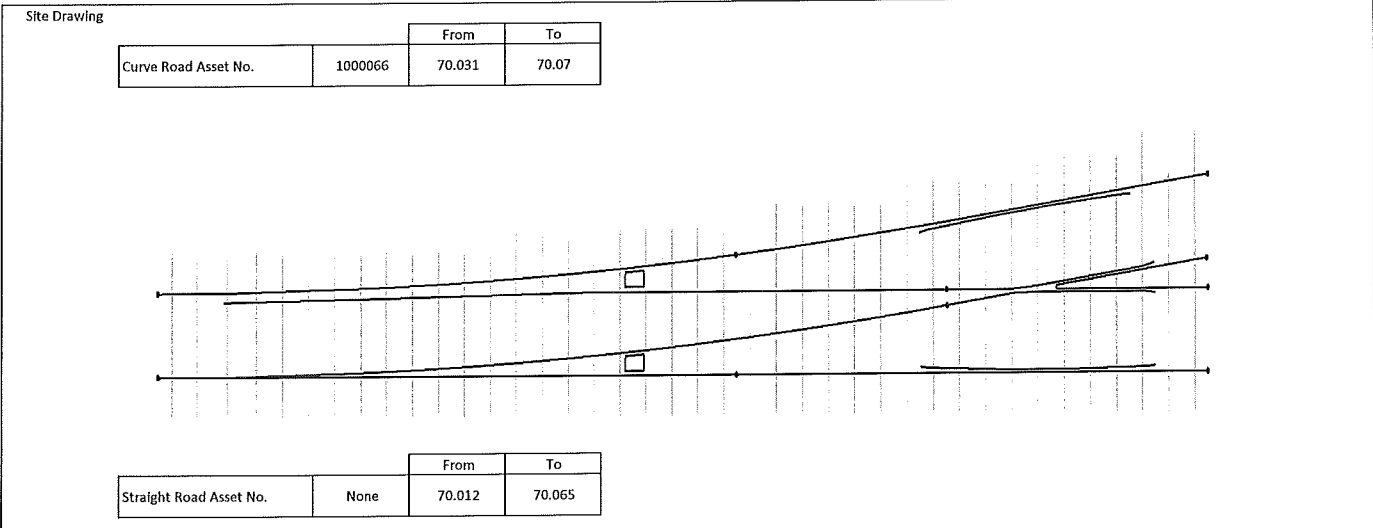
Adjustment to previous or following Records

Comment: No asset number currently for Backshunt/Sand drag off Turnout 1B. Backshunt/Sand drag asset information all on this sheet. Sand drag is installed from 70.012 to 70.025.

Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	Insulator Type	Spacer Type	Double Screwed (Y/N)	Condition	Cond. Date
1	1000066	70.031	TO	PXFC	N	22/10/2018	100			Y	1	9/11/2019
2	7016488	70.028	TO	PXFC	N	19/04/2019	100			Y	1	9/11/2019
3	7016488	70.012	T	PCE	N	19/04/2019	100				3	9/11/2019
4												

Adjustment to previous or following Records

Comment: No asset number currently for Backshunt/Sand drag off Turnout 1B. Backshunt/Sand drag asset information all on this sheet. Sand drag is installed from 70.012 to 70.025.



Name: Ryan Curry

Title: FPM

Sign: *R Curry*

Date: 10/12/2019

Name: Jainend Kumar

Title: FAE

Sign: *J Kumar*

Date: 10/12/2019

1. LOCATION							
WO Number	3972003			Job Type	Project		
Asset No.	1000066			Asset Description	NIMT Loop, Otaki (69+999 to 71+272)		
From km	69	From m	996	To Km:	71	To m:	273

Datum Reference Point	From km	69	From m	996
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Asset No.	POS Metrage	POF Metrage	Hand (L/R/Split)	Face / Trail	Actuator Type	Strike Angle	Switch Length	Anchors (Y/N)	Hucks (Y/N)	Reinforced (Y/N)	T/O Condition	Cond. Date
7015625	70.075	70.092	R	Facing	HIGHLEVEL	9	HEEL-LESS	N	N	N	1	9/11/2019
Installed Date	T'out Manuf.	Type	Frog Manuf.	Frog S/H (Y/N)	Frog Type	Connection	S/Hand (Y/N)					
1/12/2018	MARTINUS	TURNOUT	MARTINUS	N	CAST	Welded	N					

Comment:

Installed Date	1/12/2018		Weight	50g		Manufacturer			Manu_yr	2018			
Asset No.	From	To	Length	Side	H/Hand (Y/N)	S/Hand (Y/N)	Temp Laid	T'posed (Y/N)	T'posed Date	H' Legged (Y/N)	Fishplates	Condition	Cond. Date
1	1000066	70.074	70.096	CWR	BOTH	Y		32				1	9/11/2019
2	1001872	0.000	0.020	CWR	BOTH	Y		32				1	9/11/2019
3													
4													

Adjustment to previous or following Records

Comment: Number one road (1001872) started as zero from WLIAA POS

Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	X'bored (Y/N)	Vortok (Y/N)	Manufacturer	Condition	Cond. Date
1	1000066	70.070	TO	CONC	N	1/12/2018	100			NOTLISTED	1	9/11/2019
2	1001872	0.000	TO	CONC	N	1/12/2018	100			NOTLISTED	1	9/11/2019
3												
4												

Adjustment to previous or following Records

Comment: Number one road (1001872) started as zero from WLIAA POS

Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	Insulator Type	Spacer Type	Double Screwed (Y/N)	Condition	Cond. Date
1	1000066	70.070	TO	PXFC		1/12/2018	100			Y	1	9/11/2019
2	1001872	0.000	TO	PXFC		1/12/2018	100			Y	1	9/11/2019
3												
4												

Adjustment to previous or following Records

Comment: Number one road (1001872) started as zero from WLIAA POS

Site Drawing

Curve Road Asset No.	1001872	From	0	To	0.027
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Straight Road Asset No.	1000066	From	70.070	To	70.102
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Name: Ryan Curry Title: FPM Sign: *R Curry* Date: 10/12/2019

Name: Jainend Kumar Title: FAE Sign: *J Kumar* Date: 10/12/2019

1. LOCATION							
WO Number	3972003			Job Type	Project		
Asset No.	1000066			Asset Description	NIMT Loop, Otaki (69+999 to 71+272)		
From km	69	From m	996	To Km:	71	To m:	273
Datum Reference Point	From km	69	From m	996			

Asset No.	POS Metrage	POF Metrage	Hand (L/R/Split)	Face / Trail	Actuator Type	Strike Angle	Switch Length	Anchors (Y/N)	Hucks (Y/N)	Reinforced (Y/N)	T/O Condition	Cond. Date
7015627	70.500	70.483	L	Trailing	HIGHLEVEL	9	HEEL-LESS	N	N	N	1	9/11/2019
Installed Date	T'out Manuf.	Type	Frog Manuf.	Frog S/H (Y/N)	Frog Type	Connection	S/Hand (Y/N)					
10/02/2019	MARTINUS	TURNOUT	MARTINUS	N	CAST	Welded	N					

Comment:

Installed Date	10/02/2019		Weight	50kg		Manufacturer						Manu_yr	2018	
Asset No.	From	To	Length	Side	H/Hand (Y/N)	S/Hand (Y/N)	Temp Laid	T'posed (Y/N)	T'posed Date	H/ Legged (Y/N)	Fishplates	Condition	Cond. Date	
1	1000066	70.480	70.501	CWR	BOTH	Y		32				1	9/11/2019	
2	1001872	0.406	0.426	CWR	BOTH	Y		32				1	9/11/2019	
3														
4														

Adjustment to previous or following Records

Comment: Number one road (1001872) started as zero from WL1AA POS, finishes at WL1BA POS

Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	X'bored (Y/N)	Vortok (Y/N)	Manufacturer	Condition	Cond. Date
1	1000066	70.473	TO	CONC		10/02/2019	100			NOTLISTED	1	9/11/2019
2	1001872	0.399	TO	CONC		10/02/2019	100			NOTLISTED	1	9/11/2019
3												
4												

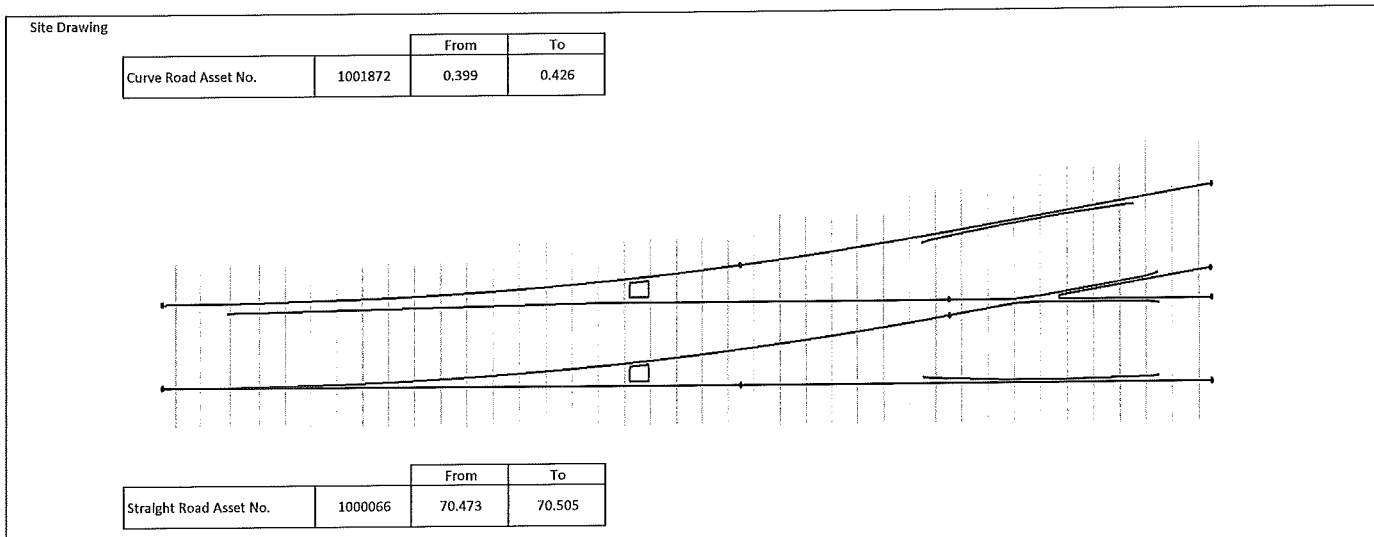
Adjustment to previous or following Records

Comment: Number one road (1001872) started as zero from WL1AA POS, finishes at WL1BA POS

Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	Insulator Type	Spacer Type	Double Screwed (Y/N)	Condition	Cond. Date
1	1000066	70.473	TO	PXFC		10/02/2019	100			Y	1	9/11/2019
2	1001872	0.399	TO	PXFC		10/02/2019	100			Y	1	9/11/2019
3												
4												

Adjustment to previous or following Records

Comment: Number one road (1001872) started as zero from WL1AA POS, finishes at WL1BA POS



Name: Ryan Curry

Title: FPM

Sign: *R Curry*

Date: 10/12/2019

Name: Jainend Kumar

Title: FAE

Sign: *J Kumar*

Date: 10/12/2019

1. LOCATION							
WO Number	3972003			Job Type	Project		
Asset No.	1000066			Asset Description	NIMT Loop, Otaki (69+999 to 71+272)		
From km	69	From m	996	To Km:	71	To m:	273
Datum Reference Point	From km	69	From m	996			

Asset No.	POS Metrage	POF Metrage	Hand (L/R/Split)	Face / Trail	Actuator Type	Strike Angle	Switch Length	Anchors (Y/N)	Hucks (Y/N)	Reinforced (Y/N)	T/O Condition	Cond. Date
7015629	71.206	71.228	L	Facing	MOTORISED	12	HEEL-LESS	N	N	N	1	9/11/2019
Installed Date	T'out Manuf.	Type	Frog Manuf.	Frog S/H (Y/N)	Frog Type	Connection	S/Hand (Y/N)					
19/04/2019	MARTINUS	TURNOUT	MARTINUS	N	CAST	Welded	N					

Rail														
Installed Date	19/04/2019		Weight	50kg		Manufacturer					Manu_yr	2018		
Asset No.	From	To	Length	Slide	H/Hard (Y/N)	S/Hand (Y/N)	Temp Laid	T'posed (Y/N)	T'posed Date	H' Legged (Y/N)	Fishplates	Condition	Cond. Date	
1	1000066	71.205	71.234	CWR	BOTH	Y	N	32				1	9/11/2019	
2	1001874	71.205	71.234	CWR	BOTH	Y	N	32				1	9/11/2019	
3	1001874	71.234	71.259	CWR	BOTH	N	N	32				1	9/11/2019	
4														

Adjustment to previous or following Records

Comment: Rail for Runaway off 7B (1001874) added to this sheet.
Sand drag installed between 71.246 to 71.259

Sleepers													
Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	X'bored (Y/N)	Vortok (Y/N)	Manufacturer	Condition	Cond. Date	
1	1000066	71.202	TO	CONC	N	19/04/2019	100			NOTLISTED	1	9/11/2019	
2	1001874	71.202	TO	CONC	N	19/04/2019	100			NOTLISTED	1	9/11/2019	
3	1001874	71.240	T	CONC25	N	19/04/2019	100			HUMESHAML	1	9/11/2019	
4													

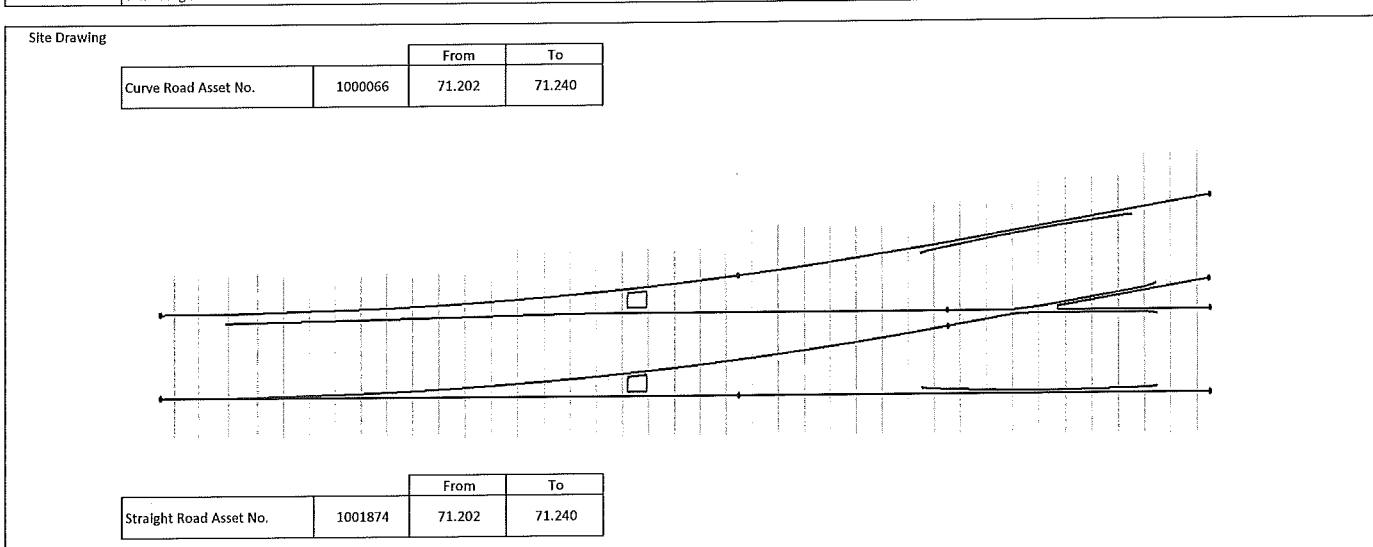
Adjustment to previous or following Records

Comment: Sleepers for Runaway off 7B (1001874) added to this sheet.
Sand drag installed between 71.246 to 71.259

Fastenings													
Asset No.	From	To	Situation	Type	S/Hand (Y/N)	Installed Date	Percent	Insulator Type	Spacer Type	Double Screwed (Y/N)	Condition	Cond. Date	
1	1000066	71.202	TO	PXFC	N	19/04/2019	100				1	9/11/2019	
2	1001874	71.202	TO	PXFC	N	19/04/2019	100				1	9/11/2019	
3	1001874	71.240	T	PCE	N	19/04/2019	100	GREY-BLUE			1	9/11/2019	
4													

Adjustment to previous or following Records

Comment: Fastenings for Runaway off 7B (1001874) added to this sheet.
Sand drag installed between 71.246 to 71.259



Name: Ryan Curry

Title: FPM

Sign: *R Curry*

Date: 10/12/2019

Name: Jainend Kumar

Title: FAE

Sign: *J Kumar*

Date: 10/12/2019

1. LOCATION							
WO Number	3972003		Job Type	Project			
Asset No.	1000066		Asset Description	NIMT Loop, Otaki (69+999 to 71+272)			
From km	69	From m	996	To km	71	To m	273
Datum Reference Point	From km	69	From m	996			

2. DESCRIPTION

3. DECLARATION

FAE is to confirm that all Deliverables for the above WO and Job Type have been completed and attached as required:

Documentation & Records:	Yes	No	Comment:
A. Documentation Completed Satisfactorily Signed/dated WO, Audit sheet etc	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
B. Data Bases Updated or Documentation Email Asset Data Base, Renewals Spreadsheet, etc	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
C. Follow Up Work Programmed Rework programmed or Maintenance tasks assigned	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
D. FAE Audit Completed Min.20% of completed renewal jobs require FAE site audit	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Audit Date: 9-11-2019
E. FAE Other Comment or Follow up work:			

Dipped weld on high leg at 70.596 which should either be built up or cut out

This WO is now deemed complete and a copy of the M136 in addition to the M134 and M135 are to be held by AE and an electronic copy sent to Track Engineering Head Office

4. SIGNED

Name: Jainend Kumar	Title: FAE	Sign: <i>Jkumar</i>	Date: 10/12/2019
Name: Duncan Neild	Title: AE	Sign: <i>[Signature]</i>	Date: 11/12/19

Appendix J Noise Mitigation Assessment Matrix

Project name
PP20

Area	Area name	Noise mitigation options	
A	Cluster 1	A	High boundary fence up to 4.8m
	275A and 277A Otaki Main Hwy		

Area	Area name	Noise mitigation options	
B	Cluster 2	A	Upgraded 2m boundary fence
	Motel, 268 Otaki Main Hwy		

Area	Area name	Noise mitigation options	
C	Cluster 3	A	Upgraded 2m boundary fence
	288-296 Mill Rd		

Area	Area name	Noise mitigation options	
E	Cluster 5	A	varying height barrier up to 5m
	Rahui Milk Factory	B	2.4m barrier (182m)
		C	3m barrier (94m)

NZS 6806 – Assessment matrix

Project		Assessment area						
PP2O		A - Cluster 1						
Assesment criteria	Discipline	Issues / Risks	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Availability of sufficient land for construction and maintenance and the extent to which NZTA would need to acquire land, or interests in land	Property		-- Land/space: Sufficient space available for boundary fence – but slope of land such that the bottom of the fence may end up acting as a retaining wall Landowner/affected party approvals: 2x properties affected (both cross-lease so may require 4x landowner/affected party approvals) Maintenance: If on boundary may require maintenance easement Planning approval: Authorisation of new fence exceeding permitted activity standards (2m) would be required. Other comment: A boundary fence 3-4.8m high would be contrary to prior consultation with these property owners who preferred alternative noise reduction options. Their back yards face east and fencing would create a shaded, enclosed area.					
Compliance with relevant safety standards and guidelines	Roading	1 High retaining wall is built close to the road and needs road safety barrier protection. 2 Location of wall or barrier reduces sight distances to left hand curve south of this location	- A 4.8m high timber wall could be accomodated in between the ramp and the designation. Depending on the offset to the wall additional roadside barrier maybe required. Placement of the wall and barrier would need to be appropriately set back to maintain sight distances around the corner just north of this area.					
Public safety and security	Roading	Only concern is protecting the wall with safety barrier	- Introducing a more rigid barrier could result in higher energy crashes					
Constructability/technical feasibility	Stormwater	Potential clash with swale and scruffy dome (avoided if wall outside of designation). Potential clash with substantial overland flow path. Wall possibly located on steep slope depending on exact position. May need extra infrastructure to get large flows past wall.	- If overland flow is cutoff or if clashes with swale and scruffy dome, otherwise neutral for stormwater					
Constructability/technical feasibility	Structures	Massive wall. Needs specific design. Will require steel posts, or large timber poles if available >6m.	--- ---					
Compliance with relevant safety standards and guidelines	Structures							
Constructability/technical feasibility	Traffic	A 4.8 high timber wall is very high and will be quite difficult to build, especially when designing for wind loads	- 4.8m high timber retaining wall maybe difficult to build. A wall on their property would be significantly shorter as the ground slopes up to the residences.					
Consistency with NZ urban design protocol	Urban design	– Location of this noise walls is a visual issue – A timber fence up to 4.8 would have an over bearing visual impact effect on both road users and residents. It is noted that the location of the wall is already elevated form the expressway – Large timber walls are inconsistant with materials / structures in the existing landscape and road corridor in general – Planting to the east of the wall will be in heavy shade. Establishing planting in this area would be a challenge – Afternoon sun to the residential property may be compromised – Due to narrow space between property and expressway, the options to mitigate the visual impact of the wall are limited.	--- This would be a particularly bad outcome visually for the residents and road users.					
Value for money, including maintenance costs and consideration	Acoustics		+ Benefit cost ratio 1.07					
Compliance with NZS 6806 noise criteria	Acoustics		+++ Both PPFs in Category A. No negative changes when compared to the NoR assessment. Do minimum option would see PPFs change from Category A to B, as previously assessed.					
Achievement of the NZS 6806 structural mitigation performance	Acoustics		o 3.3dB reduction achieved					
Requirement for building-modification measures	Acoustics		+++ No PPFs in Category C					

NZS 6806 – Assessment matrix

Project		Assessment area						
PP2O		B - Cluster 2						
Assessment criteria	Discipline	Issues / Risks	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Availability of sufficient land for construction and maintenance and the extent to which NZTA would need to acquire land, or interests in land	Property		- Land/space: Sufficient space available for boundary fence. Landowner/affected party approvals: 2x landowner/affected party approvals Maintenance: If on boundary may require maintenance easement. ONRM will be passed back to KCDC so on-going maintenance responsibility would need to be considered. Planning approvals: Authorisation of fence structure exceeding permitted activity standards (1.8m) would be required (unless existing fence is already 2m).					
Compliance with relevant safety standards and guidelines	Roading	None, replacing an existing timber wall with a new timber wall in the same location	o No change roading wise					
Public safety and security	Roading	None, replacing an existing timber wall with a new timber wall in the same location	o No change roading wise					
Constructability/technical feasibility	Stormwater	Potential clash with substantial overland flow path. Likely to require extra infrastructure / gaps under wall to get large flows past. Likely would need to be verified by hydraulic modelling.	--					
Constructability/technical feasibility	Structures		o Standard fence					
Compliance with relevant safety standards and guidelines	Structures							
Constructability/technical feasibility	Traffic	No issues or risks as replacing an existing timber fence with a new timber fence	o No change for traffic					
Consistency with NZ urban design protocol	Urban design	- Likely that it would integrate in to the various fence details and heights of neighbouring properties	o Assessment against District Plan rules for maximum fence heights is required					
Value for money, including maintenance costs and consideration	Acoustics		+++ Benefit cost ratio 2.95					
Compliance with NZS 6806 noise criteria	Acoustics		+ 4 PFFs in Category A, 1 PPF in Category B. No negative changes when compared to the NoR assessment.					
Achievement of the NZS 6806 structural mitigation performance	Acoustics		o 3.2dB reduction achieved					
Requirement for building-modification measures	Acoustics		+++ No PFFs in Category C					

NZS 6806 – Assessment matrix

Project		Assessment area						
PP20		C - Cluster 3						
Assesment criteria	Discipline	Issues / Risks	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Availability of sufficient land for construction and maintenance and the extent to which NZTA would need to acquire land, or interests in land	Property		- Land /space: Sufficient space probably available Landowner/affected party approvals: 3x properties (2 are cross lease so 5x landowner/affect party approvals) Maintenance: If on boundary may require maintenance easement. ONRM will be passed back to KCDC so on-going maintenance responsibility would need to be considered. Planning approvals: Authorisation of fence exceeding permitted activity standards (2m) may be required – I understand there are retaining walls in this area so would need to confirm if 2m is from OMRN level or property yard level. These properties are outside designation.					
Compliance with relevant safety standards and guidelines	Roading	None, replacing an existing timber wall with a new timber wall in the same location	o No change roading wise					
Public safety and security	Roading	None, replacing an existing timber wall with a new timber wall in the same location	o No change roading wise					
Constructability/technical feasibility	Stormwater	No significant stormwater issues. A small area to be drained at the northern end of the wall where ground falls towards wall.	o					
Constructability/technical feasibility	Structures		o Standard fence					
Compliance with relevant safety standards and guidelines	Structures							
Constructability/technical feasibility	Traffic	No issues or risks as replacing an existing timber fence with a new timber fence	o No change for traffic					
Consistency with NZ urban design protocol	Urban design	- Likely that it would integrate in to the various fence details and heights of neighbouring properties - Fence would be very close to the house and in some cases may effect light access to existing windows. This may need to be assessed on site. It is possible that this will not be a suitable solution to the property owner.	- Assessment against District Plan rules for maximum fence heights to street edges would be required.					
Value for money, including maintenance costs and consideration	Acoustics		+ + + Benefit cost ratio 2.4					
Compliance with NZS 6806 noise criteria	Acoustics		+ + + All PPFs in Category A					
Achievement of the NZS 6806 structural mitigation performance	Acoustics		+ + + 5.8dB reduction achieved					
Requirement for building-modification measures	Acoustics		+ + + No PPFs in Category C					

NZS 6806 – Assessment matrix

Project		Assessment area						
PP2O		E - Cluster 5						
Assessment criteria	Discipline	Issues / Risks	Option 1	Option 2	Option 3	Option 4	Option 5	Option 6
Availability of sufficient land for construction and maintenance and the extent to which NZTA would need to acquire land, or interests in land	Property		Land /space: There is an existing pinch point by the Milk Factory and the bund around the Racecourse Wetland is already hard up against the designation boundary so space may not be available. Appears that a wall would clash with stormwater infrastructure and require extension to a culvert Landowner/affected party approvals: Assuming it fits within designation would require consultation with the Milk Factory (under the LUDP requirements) and will be difficult if they are not agreeable. Likely to also require approval from property south of Milk Station (as will in effect by a boundary structure). 5m is getting up there in terms of height and there is a risk that KCDC would require public notification of such a structure. Maintenance: Within current designation, but would need to consider what land is returned to KCDC as part of the Milk Station access road Planning approvals: Authorisation of new fence exceeding permitted activity standards (2m) would be required. Potentially also require approval for a culvert extension. Other comment:	Land /space: There is an existing pinch point by the Milk Factory and the bund around the Racecourse Wetland is already hard up against the designation boundary so space may not be available. Appears that a wall would clash with stormwater infrastructure and require extension to a culvert Landowner/affected party approvals: Assuming it fits within designation would require consultation with the Milk Factory (under the LUDP requirements) and will be difficult if they are not agreeable. Likely to also require approval from property south of Milk Station (as will in effect by a boundary structure). 5m is getting up there in terms of height and there is a risk that KCDC would require public notification of such a structure. Maintenance: Within current designation, but would need to consider what land is returned to KCDC as part of the Milk Station access road Planning approvals: Authorisation of new fence exceeding permitted activity standards (2m) would be required. Potentially also require approval for a culvert extension. Other comment:	Land /space: There is an existing pinch point by the Milk Factory and the bund around the Racecourse Wetland is already hard up against the designation boundary so space may not be available. Appears that a wall would clash with stormwater infrastructure and require extension to a culvert Landowner/affected party approvals: Assuming it fits within designation would require consultation with the Milk Factory (under the LUDP requirements) and will be difficult if they are not agreeable. Likely to also require approval from property south of Milk Station (as will in effect by a boundary structure). 5m is getting up there in terms of height and there is a risk that KCDC would require public notification of such a structure. Maintenance: Within current designation, but would need to consider what land is returned to KCDC as part of the Milk Station access road Planning approvals: Authorisation of new fence exceeding permitted activity standards (2m) would be required. Potentially also require approval for a culvert extension. Other comment:			
Compliance with relevant safety standards and guidelines	Roading	1 Concrete wall would have to sit behind a concrete barrier (TL-4) and outside of the rollover zone.	-	-	-			
			Option A would have the biggest impact of the three as it introduces the longest length of rigid concrete barrier, wire rope barrier designed there currently	Option B would be better than Option A as it has a shorter length of rigid concrete barrier, wire rope barrier designed there currently	Option C is preferred as it has the shortest length of concrete rigid barrier, wire rope barrier designed there currently			
Public safety and security	Roading	1 As above need to protect motorists from the noise wall with a concrete barrier, which is less forgiving than the wire rope barrier proposed	--	--	--			
			Increased length of concrete rigid barrier means an increased risk in high energy impacts	Increased length of concrete rigid barrier means an increased risk in high energy impacts	Increased length of concrete rigid barrier means an increased risk in high energy impacts. However this option has the shortest length of concrete barrier so is preferable to Options A and B			
Constructability/technical feasibility	Stormwater	Wall may clash with Pipe 69, Culvert 14, wingwalls, milkstation swales, and retaining wall used to provide space	---	---	---			
					May have less impact on wetland			
Constructability/technical feasibility	Structures	Decent size walls – quite imposing. Would be piled.	---	0	-			
			5m is very high. Varying heights would mean a few different designs, however better transition-wise.	Would be relatively straight forward compared to other options.				
Compliance with relevant safety standards and guidelines	Structures							
Constructability/technical feasibility	Traffic	Not enough room for the stormwater swales and Milk Station Access	--	--	-			
			This area is very tight to fit in stormwater swales and the Milk Station Access Path. If the concrete fence is introduced it will increase the verge width and may cause issues for stormwater and geometrics. Option C preferred due to shorter wall length	This area is very tight to fit in stormwater swales and the Milk Station Access Path. If the concrete fence is introduced it will increase the verge width and may cause issues for stormwater and geometrics. Option C preferred due to shorter wall length	This area is very tight to fit in stormwater swales and the Milk Station Access Path. If the concrete fence is introduced it will increase the verge width and may cause issues for stormwater and geometrics. Option C preferred due to shorter wall length			
Consistency with NZ urban design protocol	Urban design	<ul style="list-style-type: none"> - The form, scale and appearance of any barriers will need to be considered closely, as will their association with planting to soften general appearance. - Visual complexity, clutter and lack of continuity of look and form within this context. - Visual tension with bridge form and barrier - Large and long concrete walls are inconsistent with materials / structures in the existing landscape and road corridor - Negative visual impact effect on both road users and residents. - Due to narrow space between property and expressway, the options to mitigate the visual impact of the wall are limited. - The proximity of the barrier to the road will have a direct bearing on the visual experience of the road user. - A wall of this scale and in this location is contrary to the LUDP where the visual and physical severance, through this community is to be minimised. ie physical lengths of bridges have been reduced, landscaping up to abutments have been maximised etc. To minimise the visual prominence of the bulk of the bridge 	---	---	---			
			This would be a particularly bad outcome visually for the community and road users.	This would be a particularly bad outcome visually for the community and road users.	This would be a particularly bad outcome visually for the community and road users.			
Value for money, including maintenance costs and consideration	Acoustics		0	-	+			
			Benefit cost ratio 0.78	Benefit cost ratio 0.52	Benefit cost ratio 1.01			
Compliance with NZS 6806 noise criteria	Acoustics		+++	+	+			
			Both buildings on the site Category A	Both buildings on the site Category B	Both buildings on the site Category B			
Achievement of the NZS 6806 structural mitigation performance	Acoustics		+++	+++	+++			
			9.3dB reduction achieved	5.3dB reduction achieved	5.3dB reduction achieved			
Requirement for building-modification measures	Acoustics		+++	+++	+++			
			No PPFs in Category C	No PPFs in Category C	No PPFs in Category C			