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NZTA

BR05 MGI Underpass Stage 1 - 50% Design Report

Roading, Lighting, Drainage and Structures

B2B-S-RP-5600 | A

18 March 2018

2/09-024/603

Document history and status

Revision	Date	Description	By	Review	Approved
A	18-03-2019	First issue for 50% review and comment	Various	LW	AC

Distribution of copies

Revision	Issue approved	Date issued	Issued to	Comments
A	LW	18-03-2019	PR and PA	Issued for he Design Checker and Principal's Agent

Baylink

Project No:	Project Number
Document Title:	BR05 MGI Underpass 50% Design Report, Roading
Document No.:	B2B-S-RP-5600
Revision:	A
Date:	18 March 2019
Client Name:	CPB
Client No:	2/09-024/603
Project Manager:	Project Manager
Author:	s 9(2)(a)
File Name:	

Jacobs New Zealand Limited

Carlaw Park
12-16 Nicholls Lane, Parnell
Auckland 1010
PO Box 9806, Newmarket
Auckland 1149
New Zealand
T +64 9 928 5500
F +64 9 928 5501
www.jacobs.com

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1. Introduction

1.1 Purpose and Scope of the Report

This report is submitted to support the Stage 1 50% Design for the Roading, Lighting Drainage and Structural Design for the MGI underpass.

Under Roading the report describes the Geometric Design, and Traffic Services such as Barriers, Kerbs, Footpaths and Cycleways and Signage & Pavement Markings required in its design.

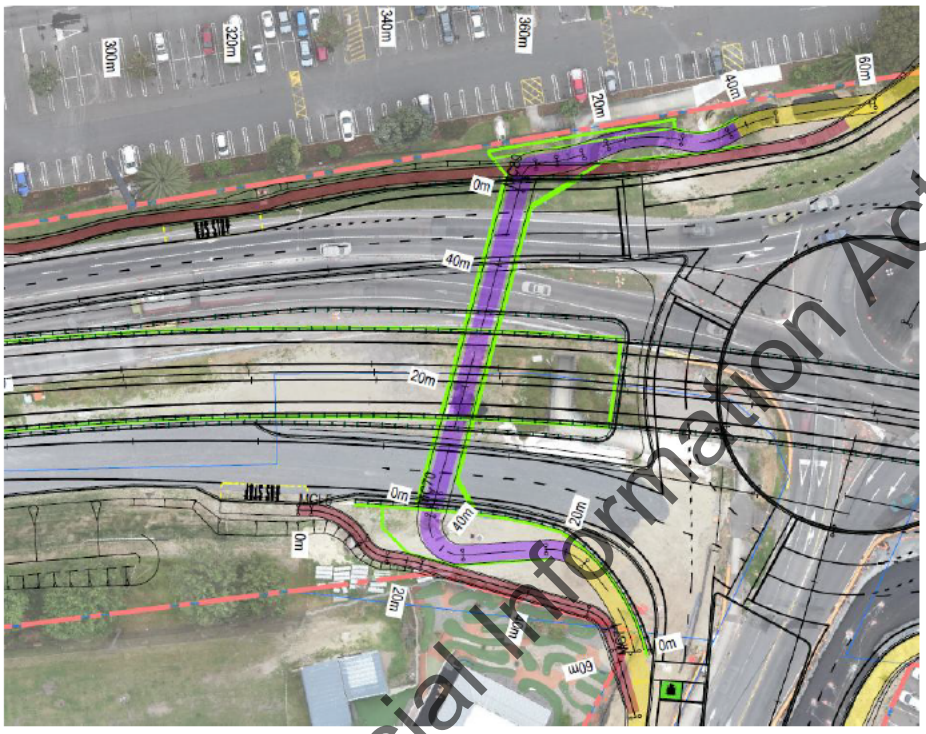
The aim of this report is to show the project is designed and developed in accordance with the Principals Requirements (PR's), Design Philosophy Statement and any subsequent agreed amendments.

This new underpass aims to minimise the impacts on the current Baylink design.

The report develops the design concepts and philosophies proposed in the Design Philosophy Report and the key design criteria adopted during the detailed design phase. It is considered that main changes of approach described within the Design Philosophy Report are limited to the structural design section and are described therein.

2. Roading

The underpass is located at approximately Chainage 360m and crosses under the full width of SH2.



The new underpass affects the configuration of the access areas in both sides of the underpass, Bayfair side and Matapihi side. This new configuration of the access areas does not require to modify the adjacent lane or shoulder configurations.

The new design requires the relocation of the bus stop on MGI northbound on-ramp approximately 32 m to the north. The bus stop on MGI southbound off-ramp remains the same in the design proposed.

The new underpass also affects the Gantry 04 located in the access area to the underpass at Bayfair side. This gantry has been moved approximately 25 m to the north.

2.1 Design Philosophy

The philosophy adopted in the geometric design, safety barriers, kerbs, footpaths and cycleways and design and signage and pavement marking design has been to provide a solution compliant with the PR's, NZ Transport Agency and TCC standards, with a significant emphasis on (CIPTED)

is intended to achieve compliance with the PR's Appendix A, Principal's Design Criteria and in accordance with the standards, specifications and guidelines detailed in Section 2.2 of this report.

2.2 Design Standards

In general, standards, guidelines and manuals used on the key roadworks for the underpass are listed below:

- The Principal's Requirements (PR)
- Sections A2 of the PR's details the requirements to be used in the geometric design.
- Sections A8 and A9 of the PR's detail the requirements to be used in the design of the barriers, kerbs, footpaths and cycleways. The location of the bus stops as described in PR A9.3 will

potentially need to change, these will be adjusted to accommodate a link to the new underpass in the north and south bound directions.

- Sections A11 and A12 of the PR's detail the requirements to be used in the design of signage and pavement markings.
- Australian / New Zealand Specifications and Guidelines
- Relevant and appropriate NZ Transport Agency Specifications, Standards and Guidelines
- Tauranga City Council (TCC) Infrastructure Development Code (IDC)
- Austroads Guide to Road Design (AGRD)

In the event of any inconsistency, ambiguity or discrepancy between the Reference Documents listed above and other standards the order of precedence followed will be the stated in the PRs.

2.3 Design constraints and assumptions

The key constraint during the development of the 50% detailed design is the existing designation boundaries on both sides of the underpass Bayfair and Matapihi.

2.4 Departures and Status

As part of the Roading design a single departure has been identified U01 Shorter Safety Barrier Length *U_01 Shorter Safety Barrier Length* due to the location of the MGI underpass and the Bus Stop on Bayfair side. This departure requires the provision of a shorter road safety barrier length than required by Austroads Guide to Road Design - Part 6: Roadside Design, Safety and Barriers since the length available is less than length required due to the location of the Bus Stop.

2.5 Geometric Design

Underpass MC70, refer also to drawing B2B-DRG-AL01-8101 for horizontal and vertical geometry. The maximum and minimum grade used is 0.600%

Location	Straight (m)	Superelevation (%)
Chainage 0.000– Chainage 54.745	54.745	-

Ramp MC71, Matapihi side, refer also to drawing B2B-DRG-AL01-8101 for horizontal and vertical geometry. The maximum and minimum grade used are -8.652% and 0.600%. Fall of 1% applied.

Horizontal Geometry	Radius (m)	Superelevation (%)
Curve 1 Chainage 0.000 – Chainage 16.442	29.293	–
Curve 2 Chainage 16.442 – Chainage 23.154	8.000	–
Straight 3 Chainage 23.154 – Chainage 36.393	–	–
Curve 4 Chainage 36.393 – Chainage 45.901	5.000	–
Straight 5 Chainage 45.901– Chainage 49.662	–	–

Vertical Geometry	K value	Grade (%)
Curve 1 Chainage 0.000 – Chainage 3.326	–	–

Grade 2 Chainage 3.326 – Chainage 42.462	–	-8.652
Curve 3 Chainage 42.462– Chainage 47.088	0.500	–
Grade 4 Chainage 47.088 – Chainage 49.662	–	0.600

Ramp MC80, Bayfair side, refer also to drawing B2B-DRG-AL01-8102 for horizontal and vertical geometry. The maximum and minimum grades used are 8.241% and 0.600%. Fall of 1% applied.

Horizontal Geometry	Radius (m)	Superelevation (%)
Straight 1 Chainage 0.000 – Chainage 2.210	–	–
Curve 2 Chainage 2.210 – Chainage 5.211	2.600	–
Straight 3 Chainage 5.211 – Chainage 8.617	–	–
Curve 4 Chainage 8.617 – Chainage 12.913	19.972	–
Straight 5 Chainage 12.913 – Chainage 17.031	–	–
Curve 6 Chainage 17.031 – Chainage 29.198	20.004	–
Curve 7 Chainage 29.198 – Chainage 36.935	9.909	–
Curve 8 Chainage 36.935 – Chainage 44.918	20.000	–
Straight 9 Chainage 44.918 – Chainage 60.836	–	–

Vertical Geometry	K value	Grade (%)
Grade 1 Chainage 0.000 – Chainage 4.515	–	0.600
Curve 2 Chainage 4.515 – Chainage 12.156	1.000	–
Grade 3 Chainage 12.156 – Chainage 27.541	–	8.241
Curve 4 Chainage 27.541 – Chainage 33.809	5.000	–
Grade 5 Chainage 33.809 – Chainage 54.365	–	6.988
Curve 6 Chainage 54.365 – Chainage 60.836	1.000	–

Bus Stop MCL5, Matapihi side, refer also to drawing B2B-DRG-AL01-8102 for horizontal and vertical geometry. The maximum and minimum grades used are -5.221% and 0.000%.

Horizontal Geometry	Radius (m)	Superelevation (%)
Straight 1 Chainage 0.000 – Chainage 2.094	–	–
Curve 2 Chainage 2.094 – Chainage 12.186	10.000	–
Curve 3 Chainage 12.186 – Chainage 16.828	5.000	–
Curve 4 Chainage 146.828 – Chainage 22.486	35.000	–

Straight 5 Chainage 22.486 – Chainage 50.006	–	–
Curve 6 Chainage 50.006 – Chainage 54.421	5.000	–
Curve 7 Chainage 54.421 – Chainage 57.913	26.492	–
Straight 8 Chainage 57.913 – Chainage 69.163	–	–

Vertical Geometry	K value	Grade (%)
Grade 1 Chainage 0.000 – Chainage 1.872	–	0.000
Curve 2 Chainage 1.872 – Chainage 7.094	1.000	–
Grade 3 Chainage 7.094 – Chainage 24.652	–	-5.221
Curve 4 Chainage 24.652 – Chainage 32.611	1.000	–
Curve 5 Chainage 32.611 – Chainage 44.043	4.834	–
Curve 6 Chainage 44.043 – Chainage 48.666	2.000	–
Curve 7 Chainage 48.666 – Chainage 67.291	4.000	–
Grade 8 Chainage 67.291 – Chainage 69.163	–	-1.973

2.6 Barriers, kerbs, footpaths and cycleways

The barrier locations have been located after undertaking the visibility checks in the areas.

Due to the underpass and the pedestrian footbridge, on the Bayfair side a TL-4 standard F shape rigid concrete barrier is located at the kerb's edge to provide protection from errant vehicles.

Terminal Type 2 - W-section X-350 (CSP Pacific Drawing FX540 and FX541) and TL-4 Thrie Beam transition (CSP Pacific Drawing FX-527-3) between the TL-4 concrete barrier and the W-section of the terminal.

A pedestrian/cyclist fence is located between the footpath at street level and the access ramp MC80 (approx. 2m lower) to the underpass to protect pedestrians from falling. Refer to Urban Design Report and drawings for details.

On the Matapihi side due to the underpass and the different levels between the carriageway and the access ramp a TL-5 T80HT rigid concrete barrier is located 0.70 m from the kerb's edge to prevent errant vehicles leaving the carriageway.

Terminal Type 2 - W-section X-350 (CSP Pacific Drawing FX540 and FX541), TL-4 Thrie Beam transition (CSP Pacific Drawing FX-527-3) between the TL-4 concrete barrier and the W-section of the terminal and transition between TL-4 and TL-5 concrete barriers.

A pedestrian/cyclist fence is located between the footpath MCL5 and the access ramp MC71 to the underpass to protect pedestrians from falling. Refer to Urban Design Report and drawings for details.

Kerbs in the area do not change due to the new underpass.

Transitions between cycle lanes on-road and shared paths are provided in Bayfair side where the shared paths start or finish. These transitions will be made according to Section 4.6 Ramps of Cycling Aspect of Austroads Guides.

Pedestrian and cyclist crossings are provided at locations shown on drawings and in accordance with the TCC T440 Berm Features Standard. This will always include TGSI (Tactile Ground Surface Indicators) according to AS/NZS 1428.4:1 2009.

The access to the new underpass through the ramps MC71 and MC80 is a shared path 3.00m wide.

The underpass MC70 is a shared path 4.50m wide.

The access to the Bus Stop on Matapihi side through the alignment MCL5 is a footpath 1.80m wide.

2.7 Signage & Pavement Markings

Shared path signage is provided in accordance with MOTSAM Part I to indicate the beginning and end of each path.

Some of the signs in the previous design have been relocated due to the new underpass as shown in drawings. The most relevant one is the gantry G04 that has been moved approximately 25 m to the north.

On Matapihi side due to the relocation of the Bus Stop the signs and pavement markings have also been relocated accordingly.

The only pavement markings that have been modified because the new underpass is the pedestrian and cyclist crossing on Matapihi Road.

Several shared path symbols have been added along the whole length of the underpass and its ramps.

2.8 Risk/Opportunities

- The risk of the Departure U_01 being rejected would mean to have to relocate the Bus Stop to achieve the required barrier length. The relocation of the Bus Stop further north would require it to be beyond Entrance 3 to Bayfair and would require users crossing Entrance 3.
- Following initial discussions undertaken by the NZTA with TCC. The designers have assumed that the triangular piece of land outside of designation within the putting green operation will be made available. The operation of the underpass on the Matapihi side relies on this land being made available.
- The proposed location of the crossing point across Matapihi Road has been moved 6m further south to facilitate a better use on the Matapihi side. This movement could affect the traffic journey times of traffic exiting Matapihi Road. This will need to be tested at the detailed design stage.
- To provide the required visibility for northbound vehicles exiting Matapihi Road has created a wider open space that could encourage pedestrians to take the direct but less safe surface route across the ramps between the Matapihi and Girven Road sides than form using the surface crossings provided through the intersection or indeed the underpass.
- Risk of collision with the relocated G04 since will not be able to be protected with a road safety barrier due to space constraints.
- An opportunity, would be to use the strip of land outside of the designation and the Bayfair Car Park to relocate Gantry G04 that may provide additional area to provide a barrier to protect the gantry base.

3. Lighting Design

3.1 Design constraints and assumptions

The key constraint during the development of the 50% detailed design is the existing designation boundaries on both sides of the underpass at Bayfair and Matapihi.

The scope of the ITS and Lighting design package include:

- The Lighting and electrical detailed design has been undertaken in accordance with Appendix A of the Principal Requirements.
- Cabling, conduit and cabinets provided to the serve the lighting.
- Feature lighting elements to support the urban and landscape design elements

3.2 Design Criteria

The ITS & lighting design will be compliant with the following:

- Appendix A13 Lighting and Electrical Work from the Principals Design Criteria
- AS/NZS 1158 Series – Lighting for Roads and Public Spaces
- M30:2014 – NZ Transport Agency Specification and Guidelines for Road Lighting Design;
- M26:2012 – NZ Transport Agency Specification and Guidelines for Lighting Columns;
- NZECP 34:2001 New Zealand Code of Practice for Electrical Safe Distances;
- AS/NZS 3000:2007 Wiring Rules

3.3 Lighting Design Levels

- Road and pathway lighting will be designed to the lighting technical parameters of the relevant lighting standards found in AS/NZS1158 Lighting for roads and public spaces.
- Pathways will be designed to Sub category P2 of AS/NZS1158.3.1:2005 Lighting for Roads and Public Spaces Pedestrian Area (Category P) Lighting – Performance and Design Requirements.

3.4 Method of Design

- PerfectLite P Category Lighting software will be used to determine the maximum compliant spacing of luminaires for the pathways.
- AGi32 lighting design and modelling software to be used to check compliance with the illuminance

3.5 Underpass Lighting

3.5.1 Luminaire Standards

LED Luminaires are used throughout the design and complies with the requirements of:

- SA/NZS TS 1158.6:2015 – Lighting for Roads and Public Spaces – Luminaires Performance
- NZTA M30:2014 Specification and Guidelines for Road Lighting Design.

3.5.2 Lighting selection

- For Matapihi and Bayfair ramps primary lighting is provided by 14.5W AEC ITALO luminaire on 4m grey light columns (Type P3)
- When retaining walls are present within the ramps secondary lighting is provided by recessed, cast in wall lights of 12W SIMES Ghost Square Lights (Type S1)

- Within the underpass, surface mounted lighting into one corner of the underpass will be provided by 21W DESIG PLAN (Type U2)
- Stairway lighting will consist of in-ground uplight, (Type S2) (Actual type to be confirmed)

3.6 Electrical Design

- The electrical design will be in accordance with AS/NZS3000:2007 and the detailed prescriptive requirements of Appendix A13.5 Electrical Work from the PRs including requirements of TCC IDC
- Lighting circuits are to be three phase. Each adjacent column shall be on a different phase to prevent failure of two adjacent luminaires because of a loss of phase.
- Compact HRC fuses will be used as circuit protection as required by the PR's and to increase reliability of supply to the luminaires.
- Final supplies to each column to be single phase via a branch cable from a nearby underground joint located within an electrical pit to negate the risk of substantive cables above the shear plane of the column. Electrical Pits are to be provided at each light column unless a pulling pit exists <10 metres from the light column.
- Four core, neutral screen cable shall be used for distribution to light columns from the electrical cabinets. Lighting columns will have their own earth stake and MEN link.

3.7 Operations and Maintenance Considerations

To facilitate future repair and maintenance of Lighting.

- Luminaires on the ramps will be accessible by boom lift for replacement or cleaning activities.
- Light column fuse boxes, pits and Montrose boxes / electrical cabinets will be accessible by foot.
- Assets are in areas where they can be accessed safely without disruption to regular traffic flow.
- All LED luminaires should undergo routine maintenance based on a 6-8-year cleaning cycle as recommended by NZTA.

3.8 Safety in Design

Lighting will be designed to minimize risk to workers during construction and future maintenance activities. Lighting design will also minimize risk to users through several design features:

- Dark spots on footpaths and intersections, light columns spaced correctly, and right column heights used to avoid dark spots.
- Locating Montrose Box / Electrical Cabinets out of crash zones.
- Use of low maintenance LED luminaires
- Staggering luminaires over different electrical phases for improved reliability.
- Use of common light column heights for easier access.
- Lighting design to Australian/New Zealand standards.

3.9 Risk and Opportunities

Key risks/opportunities identified are:

- Risk - Vandalism to lighting infrastructure within underpass, choice of lighting to include robust vandal resistant units
- Risk – Electrical pits and cabling located in areas busy with other infrastructure and utilities particularly on ramps, coordinate closely with other designers and include lighting infrastructure within the utilities model.
- Opportunity – CIPTED mitigation for the underpass relies upon correct lighting design, close coordination required with urban designer throughout the design phase.

4. Drainage

4.1 Introduction

This section provides the 50% design of the drainage works associated with the construction of the proposed underpass. The report describes the interface of the surface water and groundwater flows and provides a design solution for their long-term management.

Construction water management is not within the scope of this report.

4.2 Scope of Works

The scope and the nature of drainage works for the underpass is determined by the geometric configurations of the access ramps, their alignments and levels in relation to the underpass structure.

More importantly, the selection of the continuous pumping of groundwater or the sealing of the underpass to prevent groundwater intrusion has strongly determined the drainage design outcomes.

The scope of work covered by this design and the principal elements used for the drainage systems are discussed below:

- The proposed underpass directly affects the previously designed drainage network. Diversion of the affected surface drainage network near the underpass away from the underpass alignment to prevent clash with the underpass and associated infrastructure.
- Design of underpass to protect from a 50-year ARI storm.
- Design of underpass and associated infrastructure to address hydraulic effects from external catchment flooding near the underpass as well as to manage high groundwater levels.
- Design of a drainage mechanism to capture and dispose surface water from access ramps in a cost-effective way.
- Maximise ground water drainage by gravity.
- Pumping of groundwater which cannot be discharged by gravity.
- Provision of subsurface drainage pipes and chambers to allow future pumping to lower groundwater if required.
- Identification of an alternative alignment for a drainage pipeline to go through the Golf course to avoid utility services in the currently designed alignment at the Matapihi Ramp.
- Flood modelling has not been used and it not proposed for this element of work unless it becomes a subsequent requirement.

4.3 Design Standards and References

The underpass will be protected from the surface water flooding of 50-year ARI. The TCC COP will be used for the design as applicable.
The PRs for the B2B project will be utilised with the exclusion of PR A6.3.6 which is no longer applicable as there is no requirement to undertake flood modelling as identified by the DPS.

4.4 Design Constraints and Assumptions

4.4.1 Constraints

- The 50-year ARI HGL (Hydraulic Gradient Line) at manhole SP1.2 where access ramp runoff is discharged by gravity is 3.73 m RL acts as the tail water. This allows gravity flows only from and above 3.80m RL. Run off from areas lower than 3.80m RL on the access ramps will be required to be pumped on both sides of the Matapihi and Bayfair sides.

- High groundwater levels complicate the drainage design.
- The existing utility services and proposed B2B infrastructure constraint the drainage design and will need to be accommodated.
- The developed drainage design has used relatively a limited data set for groundwater information.

4.4.2 Assumptions

- The limited information on groundwater is representative of the long-term values.
- The utility services affecting the proposed drainage lines will be redirected/ replaced.
- Groundwater above 3.80m RL will be discharged to manhole SP1.2 by gravity.
- The proposed drainage design is based on the complete sealing of the underpass and sealing of the entrances up to 3.80m RL.

4.5 Design Approach

The proposed underpass is confined in a narrow corridor within established road systems. It has steep access ramps on both sides and is laid below groundwater level.

The design approach adopted a form design to minimise the amount of ramp runoff at the entrances by diverting flows from higher areas by gravity and pumping runoff from lower areas which cannot be discharged by gravity.

It is was also identified within the DPS to seal the underpass completely and sealing of the entrance ramps and retaining walls below the level of 3.8m RL where it was possible to drain stormwater by gravity This was undertaken to prevent groundwater intrusion and to maximise the use of the underpass.

4.6 Overview of the Underpass Drainage

4.6.1 Proposed Underpass

The proposed underpass contains a Shared Use Path (SUP) designed for the pedestrians and cyclists and consists of a 4.5m wide x 3m high rectangular concrete structure. It has a longitudinal gradient of 0.6% with its invert levels of 2.30m RL at the eastern (Bayfair) entrance and 1.97m RL at the western (Matapihi) entrance.

The cross section is cambered at the centre to keep the surface dry. Grated channels are installed at each entrance to capture surface runoff from external areas and divert away from the underpass. These arrangements will prevent any entry of external water into the underpass and will divert any seepage water to the sides avoiding water patches within the underpass and keeping it dry.

4.6.2 Existing Underpass

The existing underpass which was built in 1999 is approximately 12 m south of the proposed underpass. The as-built information of existing underpass shows an invert level of 3.18 m RL at the west end where a ground water level of 3.30m RL was recorded (4 June 1998). The as-built drawing shows 4.30m RL as the design maximum ground water level.

Initial communications with TCC (Phil Bourke) on 27 Feb 2019 suggested that the existing underpass was not designed to seal ground water and that the pumping system located at the eastern end was working satisfactorily to remove flows collected from a small catchment. The pumped water flows to the west via a channel that is created behind underpass structure. Some leakage has been observed in the underpass from this channel. It is believed that the side channel conveys pumped water as well as freely flowing groundwater collected en-route.

The underpass has not been flooded except for two occasions when a watermain broke and flooded the underpass temporarily. TCC confirmed that the existing pumping system generally operates for short durations except for 25th December 2018 when the pump ran continuously for 3 hours. We identified the reason for this longer duration of pumping was attributed to heavy rainfall on 24th December when a day's maximum rainfall of 115mm was recorded in Whakatane (90km east of Tauranga) and this storm spread out in the Bay of Plenty. The proposed underpass will be laid approximately 1.20m lower than the existing underpass which will be subjected to greater hydraulic heads.

4.6.3 Water Flood Level

An interdisciplinary workshop was held in December 2018 to discuss design approaches for the underpass. The possible effects of standing flood waters near the entrances of the underpass as well as direct effects from the groundwater were considered. The B2B Project hydraulic modelling results for the 50-year ARI (with climate change effects up to 2055 as per TCC) show a residual flooding is slightly lower than 6.0m RL at the Bayfair carpark which is close to the underpass entrance. For comparison, the TCC flood hazard map at this carpark for the 100-year ARI shows a flood level of approximately 6.0m RL. This flood remains outside of the underpass and does not enter it. Slightly lower flood levels than shown on the TCC 100-year ARI flood hazard maps can be expected at the 50-year ARI for which the underpass is designed. Also, the underpass is designed for a durability of 100 years where as the B2B model projects a climate change for 2055 only.

Higher 50-year ARI flood levels than the projected value with climate change up to 2055 can be experienced during the life span of the underpass. A conservative flood level of 6.00m RL near the underpass entrances is considered for design purpose which provides some allowance for the possible climate change effects during its life span beyond 2055. Due to the sandy nature of the soils in an around the underpass site, a direct link of the surface water and groundwater can occur through an interflow process. In view of these processes, it was decided that the underpass structure should be designed to resist uplift from a maximum water level of 6.0 m RL (See Dwg No: B2B-DRG-DG01-8411).

4.7 Underpass Options

A cost effective and safe underpass design is required to address the hydraulic effects from the external flooding as well as from high groundwater levels. Two options as discussed below were considered. Discussions were held to determine whether the underpass should be sealed, or ingress of water should be allowed. The sealed underpass option was preferred as line with the DPS, following sections discuss design options considered of the two.

4.7.1 Sealed Underpass Option (Preferred)

The underpass main structure is inaccessible for repair if it fails, a higher reliability is required. Due to complexity of the groundwater behaviour and uncertainty involved in option 1, it is proposed to waterproof the full depth of the underpass structure. The basis of design is that the underpass is provided with waterproofing to achieve 'No visible water patches or discolouration'. This design is covered in the geotechnical and structures sections as well.

The drainage management for this option is discussed below:

- As discussed previously:
  - A conservative flood level of 6.00m RL has been adopted near the underpass entrances for design purposes which covers the possible climate change effects beyond 2055.
  - Due to sandy nature of the soils in an around the underpass location, a direct link of the surface water and groundwater can occur through the interflow process in view of this the underpass structure is designed to resist buoyancy from a maximum water level of 6.0m RL.

- Existing ground water level information between 2011 and 2016 shows a range between 2.91m RL and 3.70m RL. A groundwater level of 3.80m RL was adopted for the design. This value is higher than most of the observed values and provides some allowance for the potential increase in groundwater levels in the future because of sea level rise. Sea level is expected to rise by 0.49m by 2090.

The main underpass is considered inaccessible for repair if it fails due to high groundwater when compared to the approach ramps. The main underpass structure is designed to withstand an external water head of 6.0m RL from catchment flooding. The underpass structure is completely sealed from ground water intrusion, the retaining walls on both access ramps are also sealed to prevent ground water intrusion up to 3.80m RL.

Groundwater above 3.80m RL will be captured by installing strip drainage cells and perforated Darin coils behind retaining walls and are disposed of by gravity to the Gravity Flow Chambers. Strip drains, and longitudinal drain coils are also installed on the faces of the underpass structure as a provision for future if drainage and pumping was required for the underpass.

For comparison, an alternative to the structural sealing of access ramps was considered. The groundwater sealing up to 3.80m RL is required. For this, a groundwater uplift of 1.85m at the Matapihi entrance (3.80m -1.95m = 1.85m) is considered. Deducting 150mm thick concrete slab for the access ramps approximately 1.0m thick clay blanketing would have been required to prevent groundwater intrusion near the western (Matapihi) entrance. It was considered that obtaining this amount of clay in Tauranga would be problematic. An additional proposal was to lay Geosynthetic Clay Liner (GCL) at RL 0.95m RL and place 1 m thick site obtained ordinary dirt on top of this liner to balance the uplift force. It was considered that lowering of groundwater below 0.95m RL to lay GCL would have been difficult over such a large as the ramp and entrances. However, this alternative is option could be further considered during any future value engineering exercises.

It is proposed that all surface runoff and subsurface flows from areas higher than 3.80m RL will be discharged to manhole SP-1.2. Manhole SP-1.2 (manhole for the 1350 m dia culvert) is already constructed. The hydraulic Grade Line (HGL) at manhole SP1.2 for culvert SP-1 (1350mm dia) at 50-year ARI flow is 3.73 m RL.

Surface runoff from both access ramps above 3.80m RL are captured by grated channels (installed across the ramps) and flows are directed to the Gravity Flow chambers from where they are discharged to manhole SP1.2 by gravity.

New pipes are laid to discharge flows from both ramps and connect to manhole SP1.2. The 50-year ARI runoff from areas higher than 3.8 m RL is estimated to be 15 L/s for both ramps. The HGL of 3.73m RL at manhole SP1.2m RL is taken as the tail water for the new pipeline. The hydraulics works for the worst condition of the ramp runoff and Culvert SP1 reaching the 50-year ARI peaks at the same time. Generally, it is expected that ramp runoff will reach manhole SP1.2 earlier than Culvert SP-1 reaches its peak. Groundwater flows are expected to be slower than culvert flows reach peaks and can be released continuously.

Surface runoff from both access ramps below 3.80m RL which cannot be discharged to manhole SP1.2 by gravity are collected in the catchpits via grated channels. The ramps are shaped in a way to direct surface runoff to the sides. Cycle friendly dish channels are created on edges of the ramps to convey flows to the grated channels and catchpits which are installed near the underpass entrances. The runoff collected in the catchpits finally enter the wet wells. The locations of wet wells shown on the drawings are indicative which can be confirmed later in the detailed design.

Wet wells are proposed near both entrances to collect surface runoff below 3.80m RL. Also, a small quantity of groundwater collected behind retaining walls from areas higher than 3.80m RL will

discharge to the wet wells. This provision is made for retaining walls close to the entrances because groundwater diversion from these walls to the Gravity Flow Chambers are too long and impractical.

A submersible pump is installed in each wet well to pump water to the Gravity Flow Chamber. A standby pump is provided in each wet well. Valve Chambers are also provided at each wet well for control of the pumps. The pumped water from Gravity Flow Chambers at both ramps discharge to manhole SP1.2 by gravity.

The estimated 50-year ARI surface flows for both ramps below 3.80 m RL is 15 L/s approximately (this allows climate change effects for 2055 AD as per TCC COP and uses a rainfall intensity of 180mm/hr for a 10 minutes duration storm at a 50-year ARI storm). The underpass is designed for 100-year durability, a conservative design approach has been adopted to pump 25 L/s for each ramp to include potential climate change effects after 2055 AD and to allow any groundwater that may enter the wet wells. This also makes provision for the free-flowing groundwater from below 3.80m RL to be pumped in the future if that was required. The total 50- year ARI flow from each ramp reaching manhole SP1.2 is 40 L/s.

Preliminary consultation with TCC indicates that Council is satisfied with the currently used FLYGT pump model in the existing subway. Accordingly, technical advice has been sought from Xylem Ltd who is the supplier of the FLYGT model pumps. After a preliminary assessment, Xylem has recommended the following model for each pump station. Both pump stations are identical in the design and pumping requirements, pump details are as below:

- Pump Model: FLYGT Model supplied by Xylem Ltd.
- Model No: NP3127MT3- Pump Adaptive 438 with 5.9KW of power
- 125mm OD HDPE SDR 17 delivery pipe.
- The performance curve derived by Xylem from their preliminary design is included.

If groundwater level needs to be lowered permanently at or near the underpass invert level of 1.97m RL, extensive pumping will be required requiring a different design approach. It is to be noted that lowering of groundwater by pumping below RL 1.90m RL will the difficult because the TCC hydraulic model has adopted 1.90m RL as the constant groundwater level at the Omanu Overland Drain that includes sea level rise and climate change effects for 2055.

Ground water pumping below 3.80m RL is not proposed for this design, however, future provision for pumping has been made by installing longitudinal drain coils behind the retaining walls at lower levels that lead to the wet wells. These drain coils discharge to mini-sumps behind the retaining walls before discharging to the sump wells via 150mm dia UPVC pipes.

These uPVC pipes are end-capped at the wet wells which may be opened in the future to allow ground water flows if groundwater pumping below 3.80m RL was necessary (See Dwg: B2B-DRG-DRG-8424) and B2B-SKT-DR01-8471).

The ramps and associated retaining walls up to 3.80m RL are sealed, groundwater pumping is not necessary. Future provision of pipes and chambers is to for allow pumping of any groundwater levels above the currently observed and design level of 3.8m RL. No current requirements are proposed within the design to pump groundwater this is the optimal and sustainable solution.

For the batters on sides of the access ramps, the maximum groundwater level observed in the area 4.80m RL at BH-05. If the groundwater rose to a level of 4.80m RL, the access ramps between 3.80m RL (end of the extent of retaining walls) and 4.80m RL could experience seepage from the batters. The slope of the phreatic line (topmost seepage line) for a sandy soil is 1:6 whereas the batters are at 1:3 which means that the groundwater will seep and flow over the batters which could affect the vegetation and keep the ramps wet.

To keep the ramps and batters dry, a clay- blanketing will be provided on the batters (3.80m RL to 4.80m RL,) to prevent seeped water flow over the batters. Groundwater will be intercepted behind the clay blankets and will be discharged to the Gravity Flow Chambers from where it will be discharged to manhole SP1.2 by gravity.

- The Wet wells, Valve chambers and Gravity Flow Chambers should be sealed to prevent ground water intrusion through joints.
- Two pump stations are proposed, one at the eastern entrance of the underpass (Bayfair side) and the other at the western entrance (Matapihi side). Both pump stations are identical in
- design with minor difference in the levels. The pumps for both ramps should have a minimum
- discharge capacity of 25 L/s with a power of 6 KW (Approx.).
- A duty pump and a standby pump are required for both pumping stations.
- In the case of extreme storm greater than 50- year ARI falling on the ramps and flooding of the underpass, a mechanism will be developed for the two pumps to work together for a period until the situation returns to normal design conditions.
- The SCADA (Supervisory Control and data Acquisition) operation system will be provided.
- A Pump Station control panel board will be installed for each pump station operation.
- Drainage works proposed in this design are clouded. It is assumed that other works will be covered by the previous pricing.
- In summary, the underpass will be designed as a tanked system, groundwater lowering, and pumping other than pumping of surface water for lower portions of the access ramps is an extra precaution to prevent potential leakage into the underpass.
- The allowance for groundwater pumping is a risk management option for future proofing. It is to be noted that excessive pumping of ground water can have adverse hydrogeological effects in the wider area, the attempt should be to maintain a groundwater regime like the existing.

4.7.2 Underpass with allowed water ingress (Non-preferred)

The underpass is a load bearing structure, ideally it requires to be fully water resistant. A minimum cover of 600 m depth is provided under the road. If ingress is allowed via the weep holes, the migration of sediments under road pavement should be prevented.

For the design of an effective drainage system for the underpass to protect from external water and groundwater; several factors including groundwater levels, groundwater movements including flow directions, quantities of ingress as well pumping mechanisms to keep the underpass usable should be determined accurately.

To provide a perspective of the pumping requirement, the recent experience of de-watering pumping for construction of the Matapihi stormwater treatment wetland in a similar ground condition indicates that a 75mm pump running 27/7 can lower the groundwater from 3.00m RL to 2.00m RL with support from another 50mm pump (not operated 24/7) to main the water level. To pump water to keep the underpass usable, the groundwater will need to be lowered from 3.80m RL to 1.95 m RL (approximately) which would need almost the double rate of pumping compared to the wetland dewatering rate.

Limited groundwater level information monitored between 2011 and 2016 are available at Boreholes BH-05 (near south-west corner of Bayfair Carpark), BH-06 (20 m north of the proposed underpass) and BH-312 (at the new underpass location see DWG No B2B-SKT-GT01-6052). The natural groundwater flows from BH-05 and BH-06 appear to be towards BH-312 the pattern of which is which is reflected from the higher observed groundwater levels at BH-05 and BH-06 compared to those at BH -312. This pattern is consistent with the surface water flow directions and the nature of the overall drainage pattern. However, a groundwater level of 4.83 m RL on 26/6/2011 at BH-06 and 4.0m RL at BH-05 on the same day shows a reverse pattern which cannot be explained from limited

observations. Therefore, groundwater hydraulics within the underpass site is complex and may be further complicated by the presence of the proposed stone ground improvement columns and the orientation of the underpass itself.

Detailed and accurate hydrogeological modelling is required to fully understand the groundwater hydraulics around underpass structure and to determine the ingress of water into the underpass. The development of an accurate hydrogeological model based on the existing limited monitored data is difficult in which case there is a risk that the underpass will be designed based on unreliable information.

Several weep holes will be required to allow the ingress of groundwater, a forced pumping is not anticipated. A collection and pumping system will be required to capture groundwater from all sides of the underpass to lower the groundwater from 3.80m RL to about 1.97m RL to keep the underpass usable always.

A Whole of Life cost comparison as well as an environmental sustainability assessment will be required against option 2 discussed below.

4.8 Other Drainage works

The proposed underpass affects the previously designed drainage works for the motorway. The drainage works in the affected areas are modified and the new design is prepared. The previously designed network between SDMH AC-5 and SDMH AD-2 were raised to accommodate new 225 dia pipe to discharge access ramp runoff. The modified invert levels of these pipes are shown. The 375mm dia pipe line between CPMHUP01-1 to CPMHUP01.2 is directed to the north, from CPMHUP01-2, a new 525mm dia pipeline is laid under the road which passes through the Golf course and connects to the previously designed outlet structure AE-9. The previously designed 600mm dia pipeline running west of the Matapihi entrance is eliminated. A new 225 m dia pipe is laid to drain access ramp MCL-5 at the west.

The new works associated with the construction of the proposed underpass only are clouded and reported. The works outside of this design report will form part of the original tender.

4.8.1 Line CPMHUP01-2 to SDMHUP01-3

This line passes through high embankment. The settlement under this embankment in estimated to be 72mm approximately. A 450mm dia pipe would be enough to convey the 50-year ARI flow across the motorway, to allow a potential settlement of 72mm a 525mm dia Pipe is proposed. The CPAA assessment shows that a Class 6 pipe will be required under the embankment.

The planted swale at SDMHUP01-3 is re-shaped to accommodate a 2.5m long x 2.0m wide x 150mm thick concrete apron and a 1200mm dia Scruffy Dome manhole. The 525mm dia pipe upstream of this manhole conveys 50-year ARI flow from the road. The 675mm dia pipe downstream of this manhole is designed for a 10-year ARI. The new 675mm dia pipe carries the 50-year flow from the 525mm dia pipe and 10-year ARI flow from the lower catchment. The Scruffy Dome manhole can bubble up to balance the hydraulics. A 225mm dia pipe is connected from the lowest point of access ramp (MCL-5) to this Scruffy Dome manhole to capture runoff from the access track.

4.8.2 Line connecting SDMHUP01-3; MHUP01-4 Outlet AE-9

This line runs through the Golf course. A consultation has been carried out with TCC and the owners of the Golf course and it has been agreed in principle to construct a 675mm dia RCRRJ Class 3 pipeline through the Golf course. Due to sandy nature of the soils at the Golf course, two anti-seepage collars (1200mm x 1200mm x150mm thick) are provided within the Golf course

(approximately 28 m apart) to halt the potential migration of sediments along the pipe and prevent ground settlement on top of the pipeline. Due to the nature of the business of the Golf course the 675mm dia pipeline should be laid in night shifts, the work schedule should be agreed with the land owners.

4.8.3 Lowering of Manhole Lid SP1.1

The 1350mm dia culvert (SP-1) is already constructed. The lid level of existing manhole SP1.1 should be lowered from the current 5.87m RL to 4.85m RL and to adjust with the access ramp. This lowering allows a freeboard of 500mm over the 50-year HGL at manhole SP1.1. A low retaining wall is required between the access path and the manhole .

4.9 Effects from Utility Services

The following comments should be noted in relation to the utility services.

- It is assumed that all existing utilities and B2B design elements (installed or proposed) can be redirected/ moved/protected/replaced or other means adopted to accommodate the proposed drainage design.
- Risk – There is a risk on the assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the proposed drainage design does not come to fruition. The probability of this is likely. It is to be noted that the impact may result in the additional design or alteration of the proposed design to accommodate the utilities which may incur additional costs and delay the work programme.
- Risk Mitigation – The Utility management strategy has been embedded and developed within the progress of the 50% Concept Design. A 3D model has been developed but it is based upon a limited amount of data. It is recommended that additional utility investigations are undertaken specific to the underpass but are not available to inform the development of the 50% design. It is recommended by the design team that the utilities strategy work be continuous post completion of the 50% design.

4.10 Risks and Opportunities

The following risks and opportunities should be considered I relation to drainage:

- Risk that TCC require flood modelling undertaken during the detailed design, this will impact design delivery. It is proposed to add a total of 80 L/s from both ramps at a 50-year ARI to manhole SP1.2. It is also proposed to remove the 600mm die pipe previously designed between SDMH AD.1 and SWMHAD.2 delivering 330 L/s (at Q10), a portion of which would eventually end at manhole SP1.2. A 675m dia new pipeline has been proposed through the Golf course to replace the previously designed 600mm dia pipe. It is expected that the total flow in the1350mm dia culvert at manhole SP1.2 will be reduced because of the new design. A hydraulic modelling has been previously completed for culvert SP-1. The mitigation is that we do not undertake any flood modelling as the changes are minor, risk owner is the NZTA.
- There is a risk that designing underpass, retaining walls and associated infrastructure to control leakage of groundwater can be expensive. Complete sealing between underpass and retaining walls may be difficult to achieve. A new option to allow ingress and pumping of groundwater will need to be considered which will result in the redesign and delay in the work program.
- There is a Value Engineering Opportunity to refine proposed design and to work on the details of the waterproofing system adopted during detailed design.
- Opportunity that ground water level may be lowered by gravity sufficiently (most of the time culvert SP1 is expected to run part full). The water levels in manhole SP11.2 and downstream piped systems that leads to the outfall

Opportunity to investigate concrete admixtures to resist infiltration of concrete from Ground Water to block pores and cracks in concrete.

4.11 Safety in Design and Maintenance in Design

The safe operation and maintenance of the underpass drainage is considered through the minimisation of maintenance requirements and safe to work. Maintenance is reduced through the minimisation of drainage works and pumping requirements. Safe accesses are provided to the Wet Wells and Valve Chambers. Table 1 below provides the hazards identified for construction, maintenance, operation and abandonment of the drainage system with the proposed mitigation measures to reduce the overall hazards.

Safety in Design and Maintenance in Design

Identified Hazard	Safety Issues	Proposed Mitigation Measures
Confined entries	The wet wells, Valve chambers and Gravity Flow Chambers which require entries frequently are identified as confined spaces. Assess to these confined spaces can be unsafe due to falls/slips. There is also the risk of drowning if these chambers were flooded.	Only personnel with confined space training certificates and experience will enter these chambers. A ladder/tripod must be used instead of climbing down using manhole rungs. A job safety assessment (JSA) will be undertaken before accessing. At least two people will work together to access the chambers.
Fall from heights	The wet wells are deep, and the access ramps have tall retaining walls. These can present significant risks in the form of falling from heights	The depths of Wet wells and Valve Chambers are reduced to minimise risks from fall. Ladders must always be used while working in and around these structures.
Clashing of services	There is a risk of clashing with existing services during any excavation work	The existing services must be exposed by potholing prior to commencing any excavation

4.12 Whole of Life Considerations

Whole of Life performance, maintenance, costs and sustainability have been considered in all aspects of the drainage system design. The Wet Wells, Valve Chambers and Gravity Flow Chambers are designed as shallow possible to improve safety and minimise costs whilst maintaining structural adequacy.

5. Structural Design

5.1 Purpose of the Structure

BR05 MGI Underpass is being designed and constructed to provide grade separated pedestrian and cyclist access under the new SH2 and Manganui Road alignments from Bayfair Mall in the east to Matapihi in the west.

5.2 Structural Changes from the Design Philosophy

Key changes from the Design Philosophy includes:

Mall in the east to Matapihi in the west.

- A decrease base slab thickness from 550mm to 500mm;
- Construction of the underpass in three segments followed by a stitch together after immediate settlement caused by BR01 ramp construction:
- Introduction of 50mm min. overlay to provide construction tolerance for settlement.
- Introduction of settlement slabs to transition any differential settlement perpendicular to the underpass;
- Splaying out of the underpass ends for CPTED reasons necessitating a stronger underpass section at these areas, increasing walls to 500mm thick and requiring insitu construction. Roof slab in the splayed-out areas will now consist of precast prestressed bridge beams with an in-situ concrete overlay to cater for the skew effects caused by the splaying.

5.3 Description of the Underpass Structure

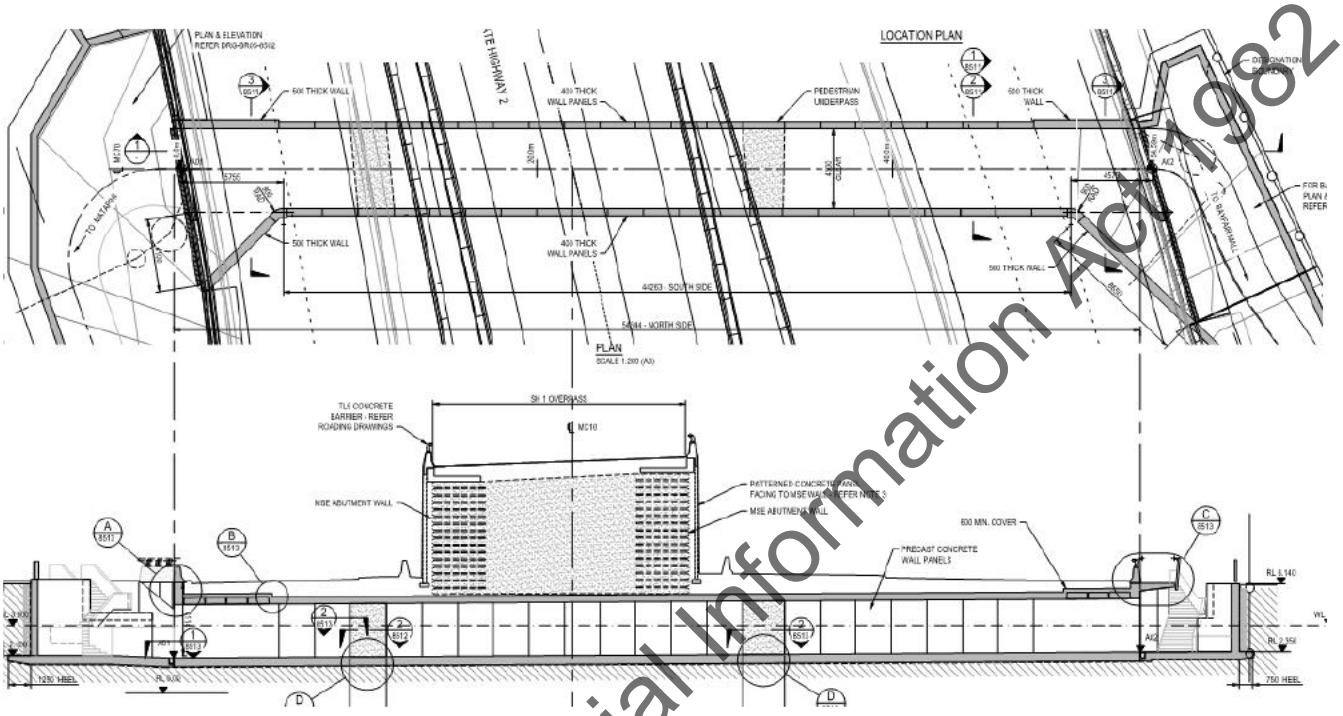
BR05 MGI Underpass is a new underpass, generally with internal dimensions of 4.5m wide by 3.0m high and approximately 54.3m in length. The underpass will provide unimpeded access for the proposed shared user path under the Maunganui Road/Girven Road Intersection (MGI) and BR01 – MGI Overpass Northern approach embankment. The structure will be located at a chainage of approximately 355m on the main alignment MC10.

The BR05 MGI Underpass will be a hybrid precast/in-situ concrete box section. To relieve the effects of instantaneous differential settlement caused by the construction of BR01 Northern Approach ramp, the box will be constructed as three separate segments and stitched together, one to three months (to be confirmed during detailed design) after the completion of the ramp. The box section will comprise of 400mm thick precast wall panels, a 400mm thick cast in-situ roof slab and a 500mm thick cast in-situ base slab box sections. To provide shear transfer, serviceability control and to assist in the waterproofing measures, the precast panels will be clamped together using post-tensioned tendons.

To provide for visibility and crime prevention through environmental design (CPTED), the internal box width will splay out at its ends, opening onto the approach ramps. The additional width will require use of 375mm deep x 1150mm wide prestressed concrete girders to span the underpass roof at both ends. Four girders will be required at the Matapihi end and three girders will be required at the Bayfair end. Atop the prestressed girders will be 200mm thick in-situ concrete topping to accommodate the large skew effects and to also provide an integral connection with the walls. The walls and base slabs at these locations will be of cast in-situ concrete construction of 500mm thickness.

A 50mm minimum topping will be applied to the box floor to provide construction tolerance (e.g. level out any discrepancies between segments after stitching), provide surface water cross-fall and to form a drainage channel at the edge of the invert.

Approach ramps at either end of the box will consist of in-situ U-shaped concrete structures of varying width and length to suit the local geometry and urban design requirements. A pedestrian walkway of concrete slab construction will be cantilevered off the headwall of the underpass at the Bayfair end, carrying the footpath along Manganui Road where it spans over the underpass opening.



BR05 MGI Underpass Plan and Elevation

5.4 Description of the Foundations and Ground Improvements

Below the entire extent of the underpass, ground improvement will consist of stone columns. The fill material surrounding the underpass will comprise of granular engineering fill. For information relating to the foundations, geotechnical design approach and ground improvements relating to the design of BR05 MGI Underpass, refer to the Geotechnical Design section of this report.

5.5 Urban Design Features

Urban design of the structure has considered the form and layout of the structure, with attention to approach and entrance to both sides of the underpass. Crime prevention through environmental design has been incorporated through the sizing of the underpass cross-section and opening of the underpass at its entrances. The fall protection pedestrian balustrade at the edge of the overhanging walkway will incorporate architectural features.

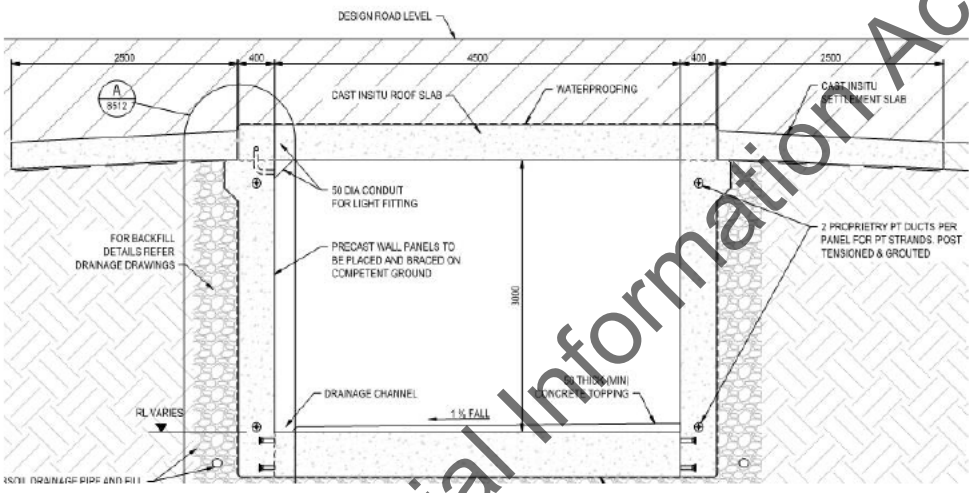
The provision for natural lightwells within the roof of the underpass will be considered during detailed design.

Refer to the Urban Design section of this report for more details on the structure's urban design features and how these are incorporated into the wider project urban design framework.

Consistent interface between the Designers and Urban Designers (Align) has occurred to achieve the desired outcomes in the design of the relevant urban design features associated with this structure.

5.6 Cross Section

The box structure will have a typical width of 4.5m and vertical clearance of approximately 3.0m above the shared user path surface before the application of a 50mm min. thickness floor overlay. This overlay provides construction tolerance and provides cross-fall to drain any surface water. While the 3.0m vertical clearance is slightly reduced, it will achieve the Supplementary PR vertical clearance requirement of 2.7m and the 'Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths' minimum cycleway height requirement of 2.5m by some margin. Refer **Error! Reference source not found.** for the typical cross-section of the structure. At the ends of the underpass, the width will increase to a maximum of 12.5m wide.



BR05 MGI Underpass Typical Cross Section

5.7 Side Protection

Barriers

Road barriers are provided at both ends of the underpass to protect the at-grade road traffic from falling and encroaching into the walkway. These barriers are mounted on the headwalls of the underpass and are of TL-5 performance level, incorporating 'F-Shape' precast concrete rigid barriers with a galvanised T80-HT steel rail. Where required, the back face is detailed with a skirt overhang to be consistent with other TL5-T80HT rail barriers in the project and to hide any construction joints between barrier and supporting elements. Starter reinforcement cast into the headwall and in-situ stitching concrete connects the precast barriers to the deck.

Precast barrier units are specified with in-situ stitch pours to connect to the reinforcement protruding from the headwall. Cast-in Reidbar threaded inserts are provided in the barrier panels for connection to temporary support bars during erection.

The top edges of the approach ramps and the walkway overhanging the Bayfair end underpass entrance are accessible by members of the public, thus fall restraint will be provided, consisting of 1100mm high balustrades complying with Clause F4 of the NZ Building code and terminating at the ends of the approach ramp walls.

5.8 Groundwater

Based on groundwater monitoring between 2011 and 2016, the design groundwater level is taken as 3.8m RL. Project hydraulic modelling shows that the Bayfair carpark will have a 50-year ARI flood level of 6.0m RL. TCC flood hazard maps also show a flood level of 6.0m RL at the underpass entrance.

5.9 Waterproofing

Waterproofing and buoyancy effects of the main box has been assessed for a flood level of 6.0m RL. For the approach ramps, waterproofing has been provided to 6.0m RL but buoyancy effects have been assessed for the groundwater level of 3.8m RL. Waterproofing of the box and approaches is proposed to consist of bentonite membrane. In addition, the joints between precast wall panels is proposed to be sealed with appropriate hydrophilic sealants both between adjacent panels and where they connect to cast in-situ concrete elements. Hydrophilic sealants are applied after post-tensioning operations have concluded. The structural waterproofing regime will be further refined and confirmed during the detailed design.

5.10 Drainage and Disposal of Stormwater

Surface drainage from the approach ramps are collected by catch pits and a full width drainage channel grate across each opening of the underpass such that no approach ramp runoff will enter the underpass. Any surface water in the underpass such as that carried by cycle/pedestrian traffic will be channelled via a 1% transverse cross fall to a drainage channel located along the edge of the underpass and in-turn channelled via longitudinal fall to the downstream catch pit.

Refer to the drainage section of this report for further drainage details.

5.11 Service Provisions

Services are provided along the underpass as follows:

a) 1 x 50 mm diameter conduit for underpass lighting (to run within and along the length of one side of the underpass roof)

CCTV will be installed at each end of the underpass and transmit bat to TTOC.

Additionally, existing services are currently proposed to be supported under the overhanging walkway at the Bayfair entrance of the underpass. This will be confirmed during detailed design.

Refer to the utilities design section of the report for further details.

5.12 Lighting

Artificial lighting will be provided at regular intervals along one side of the underpass.

Additional natural lightwells are proposed at discrete locations along the underpass. The feasibility of these lightwells will be investigated during the detailed design.

5.13 Signage

No signage is required within the structure. Refer to the urban design section of this report for any shared user path way finder signage requirements.

5.14 Vertical and Horizontal Clearances

The Supplementary PRs (via CI 0701) requires the internal dimensions of the underpass to be 4.2m wide by 3.0m high with the opportunity to reduce the dimensions to 4.0m wide by 2.7m high if agreed with NZTA. The currently proposed underpass has internal dimensions of 4.5m wide by 3.0m high before the installation of the floor overlay. The splay at the ends of the underpass will increase the internal width to a maximum of 12.5m. While the installation of the floor overlay will slightly reduce the 3.0m vertical clearance, it will achieve the Supplementary PR reduced vertical clearance requirement of 2.7m and the *'Austroads Guide to Road Design Part 6A: Pedestrian and Cyclist Paths'* minimum cycleway height requirement of 2.5m by some margin.

5.15 Collision Protection

The new pedestrian underpass alignment will result in approach ramps directly adjacent to the Maunganui Road alignment. Therefore, rigid TL-5 barriers in the modified – 'F' shape profile with a Texas 'T80HT' Rail will be located on top of ramp walls where the alignment provides a direct risk to underpass users. Refer to the Roading Design section of this report, for further information on traffic barrier requirements.

The top edges of the approach ramps will be accessible by members of the public, thus fall restraint will be provided by 1100mm high balustrades complying with Clause F4 of the NZ Building code, terminating at the ends of the approach ramp walls.

5.16 Structural Tolerance to Overloading

The underpass has been preliminarily assessed for HN-HO-72 live loads as defined by the BM. No provision has been made for loads greater than this.

The inside of the underpass and the cantilevered footpath above the underpass entrance at the Bayfair end has been preliminarily assessed for the footpath and cycle track loading as per Clause 3.4.14 of the BM as they do not form part of a carriageway as defined by Clause 3.2.3.a of the BM. The overload allowance for these elements will be based on a single HN wheel in accordance with Clause 3.2.3.e of the BM.

5.17 Structural Tolerance to Seismic Effects

The Supplementary PRs require that the structure undergoes no damage and remains watertight during the 1/100 AEP (SLS) earthquake. During the design earthquake event, damage is allowed, however should be feasible to be reinstated and made watertight. For the MCE event, damage may be extensive, but collapse will be avoided.

The repair of waterproofing is envisaged to involve injection repairs. Additionally, the box will be future-proofed for groundwater pumping.

Relevelling of the underpass will be possible with the application of further overlay.

Refer **Section 6.5** for further details relating to the seismic design philosophy and approach of the structure.

5.18 Mitigation of Scour / Waterway Issues

Not applicable for this structure.

5.19 Provisions for Climate Change

No provisions for climate change are required by the PRs for this structure.

5.20 Design Working Life

All structural elements have been designed to have a Design Working Life in accordance with Error! Reference source not found. below.

Design working life of structural elements

Element	Design Working Life
Permanent Elements (all concrete elements of the underpass, and approach ramps)	100 years without any major renovation

Replaceable Elements (proprietary movement joints etc.)	40+ years to first major maintenance or replacement
Corrosion protection for steel components as part of secondary elements	25+ years to first maintenance

5.21 Materials and Finishes

Materials and finishes are in accordance with appropriate standards. Unless requirements for specific structures state otherwise, materials and finishes for the bridge structures are as specified in Error! Reference source not found. below.

Material and Finishes

Feature	Details
Concrete	**Concrete grade** Blinding concrete grade: 10MPa In situ concrete to roof slab, base slab, walls, settlement slabs: 40 MPa Precast wall panels: 40MPa In situ concrete deck (over precast beam): 40 MPa Barriers: 50 MPa Precast beam units: 50 MPa All other elements: 40 MPa **Concrete Surface Finish** Buried formed concrete surfaces (e.g. external faces of underpass, soil face of walls): F1 Exterior formed surfaces visible to public (e.g. barriers, internal faces of underpass): F4 Buried unformed surfaces (e.g. base of base slab): U1 Exposed unformed surfaces (e.g. top of walls): U3 Unformed surfaces for composite action (e.g. top of precast slabs): U6 – including the requirements of a Type B Construction Joint Running surface of underpass and cantilevered footpath: U5
Reinforcing Steel	Grade 500 E to AS/NZS 4671, microalloy
Pre-stressing Steel	Post-tensioning tendons: pre-stressing strand dia. 15.2 mm super strands, 1750 MPa to AS/NZS 4672.1, 7 wire ordinary, relaxation class 2
Miscellaneous steelwork	Hot dip galvanised to AS/NZS4680 or zinc metal spray to the requirements of AS/NZS 2312. 25 years to first maintenance.

5.22 Durability and Maintenance Requirements

5.22.1 Concrete Durability Performance

Durability of the concrete structures has been achieved by appropriate detailing and by complying with the concrete grade and minimum requirements of Section 3 of NZS3101:2006 for the appropriate exposure categories of the concrete elements. The concrete Exposure Classifications listed in Error! Reference source not found. below are relevant for specifying structural elements for this structure.

Concrete Exposure Classifications and Concrete Durability Provisions

Exposure Classification	Element	Minimum Concrete Strength	Minimum Concrete Cover	Minimum Concrete Cover used for design
A2	Blinding concrete	10MPa	N/A	N/A
A2	Surfaces of concrete in contact with soil including: underpass (external faces), wingwall and retaining walls (soil face), settlement slabs	40MPa	35mm	Insitu cast against formwork: 40mm Insitu cast against soil: 75mm
B1	Surfaces of concrete in contact with the air including: underpass (internal faces), wingwall and retaining walls (air face)	40MPa	40mm	Insitu: 40mm
B1	Precast Bridge Barriers Precast Bridge Beams	50MPa	35mm	Precast: 35mm
B1	All Other Structural Elements	50MPa	35mm	Insitu against formwork: 40mm Insitu against soil: 75mm

Note:

Construction tolerances for the concrete cover:	Precast concrete:	-0mm, +10mm
(these tolerances are applied to the minimum covers)	In-situ concrete:	-0mm, +10mm

5.22.2 Protection of Post-tensioned Tendons

Post-tensioning tendon anchors will be recessed into the precast concrete panels allowing them to be grouted such that they will be protected, and no maintenance will be necessary for the duration of its design life.

The tendons at the precast panel joints will be protected using the following strategy:

- Tendon duct to be grouted after stressing;
- Proprietary plastic duct to be sealed;
- Proprietary duct coupler to be installed between precast panel segments;
- Precast panel segment joints to be epoxy coated;
- Entire box structure to be waterproofed (tanked).

5.22.3 Protection of Structural Steelwork Durability Performance

Structural steelwork used for the structure will be protected against atmospheric corrosion in accordance with NZTA 'Protective Coatings for Steel Bridges': 2014 and AS/NZS 2312: 2014 'Guide to Protection of Structural Steel against Atmospheric Corrosion using Protective Coating'. Local environmental effects will be assessed, using AS/NZS 2312 as the base in conjunction with HERA Report R4-133:2011 New Zealand Steelwork Corrosion Coatings Guide.

For all steelwork related to this structure, the atmospheric corrosivity category is C3 with 25 years to first maintenance.

5.22.4 Operations and Maintenance

General

BR05 MGI Underpass has been preliminarily designed with a view to minimise the ongoing maintenance requirements as far as practical within the project constraints. The design has aimed wherever possible to avoid the need for structural elements or details that would require frequent ongoing inspection and maintenance, and to provide robust structural elements that will require little, if any, maintenance throughout the service life of the structure. A durable concrete structure has been designed to provide a service life of 100 years.

Drainage

Surface water within the underpass will discharge via cross fall and flow along a drainage channel to collection points off-structure. The underpass will also be waterproofed such that no water ingress or weeping will occur and no pumping will be required for the underpass. Hence, there will be no drainage system maintenance requirements during the service life of the structure.

Lighting

Light fittings will be installed to the internal face of the underpass and are easily accessible for servicing and maintenance.

5.22.5 Movement Joints

No movement joints are currently proposed for the underpass structure. The requirement for movement joints at the entrances of the underpass will be assessed at detailed design. It is envisaged that movements joints will be accessible without the need for specialist access equipment for servicing and/or replacement.

5.22.6 Inspection and Access Provisions

All parts of the structure, except surfaces in contact with soil, will be accessible for the purposes of maintenance, repair and inspection. Access is achieved without any specialist access equipment requirement.

5.22.7 Anti-Vandal and Security Provisions

Anti-graffiti measures implemented for the underpass and approaches include the anti-graffiti coating of all exposed faces of underpass (except floor), walls and barriers (traffic face, top and outer face).

Crime prevention through environmental design (CPTED) has been incorporated using lighting and opening of the underpass entrances and approaches.

CCTV will be installed at each end of the underpass and be transmitted back to TTOC.

5.22.8 Considerations for Construction

The following considerations have been made to aid the constructability of the underpass and approaches:

- Precast wall panels have been proposed to reduce on-site construction time and complexity;
- Wall panels rather than complete precast box segments have been selected in consideration of cranage restrictions under the Tauranga Airport flight path. It is noted that the low point of the Tauranga Airport flight clearance envelope has been identified as 20.0m AMSL (above mean sea level). For the purposes of construction this could be increased to 29.0m, but would require an aeronautical study including a full safety case;
- The three box segments have been selected to match the traffic switch strategy;
- The central box will be set at a higher initial level to allow it to settle along with the BR01 ramp prior to being stitched;
- The overlay will provide an even surface should the three segments not line up perfectly prior to stitching.

The following construction sequence for the underpass and approaches is envisaged:

1) Identify/relocate/protect utilities
2) Introduce temporary traffic management and traffic staging as required (throughout construction process)
3) Excavate to design depth (under Box Segments 1 and 2) and undertake dewatering;
4) Ground treatment under substructure (under Box Segments 1 and 2)
5) Construct Box Segments 1 and 2 but unconnected:
   a) Place base waterproofing membrane;
   b) Install precast walls, brace and post-tension;
   c) Install/construct base and roof slab. (note: base slab could be alternatively cast prior to installation of precast walls. See drawing for both options);
   d) Construct headwalls and wingwalls;
   e) Complete waterproofing;
   f) Backfill up to settlement slab level;
   g) Construct settlement slabs;
   h) Complete backfilling;
   i) Protect the incomplete stitch area between Segments 1 and 2;
6) Traffic switch to run over Segment 1, construct Box Segment 3 (Refer steps 3 to 5). Leave unconnected with Segment 2;
7) Construct the BR01 north approach ramp above Box Segment 2;
8) Allow central section (Segment 2) of box-section to settle with BR01 North MSE abutment
9) When differential settlement levels have steadied (envisaged as 1-3 months after completion of the north approach ramp), cast in-situ connection stitch between central and end box sections. Complete waterproofing around stitch area;
10) Construct ancillary elements such as, footbridge, approach ramps, barriers, drainage etc
11) Install lighting;
12) Complete placement of residual back fill;
13) Lay surfacing overlay

Settlement Periods

Detailed Design drawings will include 'Design Levels' and 'Construction Levels', with the difference in levels accounting for elastic, consolidation and creep settlement over the life of the structure. The intent of the additional 'Construction Levels' is for the structure to be built above 'Design Levels' to cater to expected settlement of the foundation from the dead load of the structure and MSE wall above. Additionally, the middle box segment will be constructed at a higher level to the side segments to cater for the greater initial settlement beneath the BR01 MSE wall.

Effects of static and seismic settlement on the structure (including the effects of construction sequencing) are described in more detail in **Section 6.5 Analysis and Design of the Structure**.

Ground Improvements and MSE Walls

Considerations for construction of the Ground Improvements and MSE walls are covered in the geotechnical design section of this report by the 'Geotechnical Design Report for the BR05 MGI Underpass' (ref. B2B-G-RP-6303-B) and the MSE Abutment Wall Design Report (ref. B2B-G-RP-6004-B).

Post-tensioning

The underpass' precast wall panels will be post-tensioned together. An area of durability risk is at the joint between adjacent panel segments. Clause 4.2.1.g of the BM is referenced in development of the post-tensioning procedures and protection. The follow procedure is envisaged (to be finalised at detailed design):

1) Precast panels to have proprietary plastic ducts installed during precasting;
2) Proprietary duct couplers are installed after precasting but before lifting panels in place;
3) Precast panel to be lifted in and set to correct height and braced;
4) Subsequent adjacent panels are lifted in until all panels of both walls for a single section is lifted in. A 5mm gap is left between panels. Proprietary duct couplers should seal together during lifting in of panels;
5) Tendons, anchors and jacks are placed but left unstressed momentarily;
6) Epoxy is installed between all panel joints. Epoxy may be delay set depending on time between epoxy installation and stressing operations;
7) Tendons are stressed, and anchors locked up;
8) Connecting in-situ concrete elements are installed;
9) Hydrophilic seals are installed

6. Structural Analysis and Design

6.1 General

This section provides details of the design criteria and philosophies that the structural design is based on. For details of the design criteria and philosophies that the foundation design is based on, refer to the Geotechnical Design Section of this report.

6.2 Design Standards

The design of BR05 MGI Underpass complies with the PRs, the NZTA Bridge Manual Third Edition, 2013 (including Amendment No.1) and other Standards referred to in the NZTA Bridge Manual.

The following order of precedence applies in the event of any inconsistency, ambiguity or discrepancy between the Design Reference Documents and other standards (as per PR Clause A4.2):

- Specific provisions contained within PRs and related documents, including Supplementary Principal's Requirements (via Contract Instruction No. 0701);
- New Zealand Transport Agency (NZTA) Bridge Manual (Third Edition Amendment 1);
- New Zealand Transport Agency (NZTA) Standards, Specifications & Guidelines including the NZTA Highway Structures Design Guide (1st Ed, Amend. 0) Section 5.4;
- Acts of Parliament;
- New Zealand Building Act;
- The Building Code;
- Health and Safety in Employment Act;
- Resource Management Act;
- Austroads Guide to Road Design;
- TCC IDC:
- New Zealand Standard Specifications;
- Other Standard Specifications.

6.3 Performance and Technical Requirements

The applicable general design performance and technical requirements for BR05 MGI Underpass are detailed in **Sections 5.20 - Design Working Life, 5.21 - Materials and Finishes & 5.22 - Durability and Maintenance Requirements** of this report. There are no identified additional general performance / technical requirements applicable to the MGI Underpass design at this stage.

The following specific requirements apply to the MGI Underpass:

a) As per CI0701, internal dimensions of 4.2m wide by 3.0m high with the possibility of being reduced to 4.0m wide by 2.7m high with NZTA agreement. The design philosophy workshop identified internal dimensions of 4.5m wide x 3.0m high.

b) Wind loading: Design Wind Speeds as follows:

V_{des} SLS1 (1/R = 25): 36.6 m/s;

V_{des} ULS (1/R = 500) [temporary]: 39.3 m/s;

V_{des} ULS (1/R = 2500): 41.9 m/s;

c) Seismic Importance Level of 3 (as per the Supplementary PRs via CI 0701);

d) Seismic site subsoil classification of D (in accordance with the project Site Specific Seismic Hazard Assessment (SSSHA) as per PRs Clause A3.5.2);

e) Appropriate barriers required on the roadside, and atop retaining walls/footpaths with falling risks;

f) Structure to be designed for static and seismic settlement;

g) Construction loading: no allowance for any specific construction loading other than the 1.5 kN/m^2 construction live load stated in Clause 3.4.7 of the Bridge Manual. As per PRs Clause A4.11.4 the design shall consider BM load combinations 5A, 5B and 5C. Since the structure is being constructed adjacent to live traffic lanes, the terms 0.33EQ and 0.33WD shall be substituted by the 1/500 APE earthquake and 1/500 APE wind load for IL3 and IL2 respectively.

h) As segments of the underpass is proposed to be used for pedestrian access prior to stitching and completion of the structure, Clause A4.11.5 of the PRs will be followed for the incomplete structure. During the temporary state, the underpass and approaches will adopt annual probability of exceedance for wind, snow, floodwater and earthquake will be based on: the structure being of 'temporary' permanence if referring to Table 2.1 of the BM; and any retaining walls or retaining structures being of Importance Level 1 if referring to Table 2.2 of the BM.

6.3.1 Seismic Performance Requirements

The structure will be designed to seismic demand requirements as detailed in **Section 6.4.6 Seismic Loading**. Requirements of PRs Clause A3.5.2, A4.11.1 and the Supplementary PRs (via CI 0701) will also met. These are summarised as follows:

- Permanent displacements resulting from seismic loads (and the effects of seismic loads) are to meet the limits set in PR Clause A3.6.4, and the structures shall accommodate these moments and satisfy the criteria in BM Table 5.1
- Clarifications to the requirements of BM Table 5-1 for the Design Level earthquake - discussed below.

Structural elements will be designed such that the failure of any element in the event of an earthquake significantly exceeding design magnitude will be of a ductile (flexural yield) nature rather than a brittle failure and constrained to positions identified and detailed for this purpose. Design and detailing will be completed to ensure that structural collapse in such an event will be avoided.

Error! Reference source not found. below gives the performance expectations for the underpass associated with the requirements specified in Table 5-1 of the BM. Clause 2.2 of the Supplementary PRs (via CI 0701) and Clause A4.11.1 of the PRs provides clarification on the requirements of BM Table 5-1 for the earthquake events, summarised as follows:

Seismic Performance Expectation of Underpass

	Earthquake Severity					
	Minor Earthquake Event (1/100)		Design Earthquake Event (ULS – 1/2500)		Major Earthquake Event (MCE)	
	Bridge Manual Definition	Baypark to Bayfair Design Performance	Bridge Manual Definition	Baypark to Bayfair Design Performance	Bridge Manual Definition	Baypark to Bayfair Design Performance
Post-earthquake function – Immediate	No disruption to traffic	No disruption to traffic (above and within underpass)	Usable by emergency traffic	Ramp above underpass: Usable by emergency vehicles (defined by PR A4.11.1 & described above) and design traffic but possibly at reduced speeds.	Usable by emergency vehicles after temporary repair	Ramp above underpass: Usable by emergency vehicles at very low speeds (defined by PR A4.11.1 & descr bed above). Increased serviceability for

	Earthquake Severity					
	Minor Earthquake Event (1/100)		Design Earthquake Event (ULS – 1/2500)		Major Earthquake Event (MCE)	
	Bridge Manual Definition	Baypark to Bayfair Design Performance	Bridge Manual Definition	Baypark to Bayfair Design Performance	Bridge Manual Definition	Baypark to Bayfair Design Performance
						emergency vehicles within 48 hours.
Post-earthquake function – after reinstatement	Minimal reinstatement necessary to cater for all design-level actions	Only routine maintenance.	Feas ble to reinstate to cater for all design-level actions, including repeat design-level earthquake	Feasible to reinstate to cater for all design-level actions, including repeat design-level earthquake	Capable of permanent repair, but possibly with reduced load capacity	Relevelling to underpass running surface using addition overlay. Relevelling of ramp pavement above underpass. Allowable reduction in underpass accessibility e.g. vertical clearance and grade etc. Reduction in water tightness. Reduced speed/capacity operation of BR01 ramp. Structural and Geotechnical inspections/analysis required to determine ongoing load capacity of structure.
Acceptable damage	Damage minor	No damage. Underpass shall remain watertight.	Damage poss ble; temporary repair may be required	Minor repairs to underpass and waterproofing may be required	Damage may be extensive; collapse prevented	Hinging of box but not resulting in a structural collapse and is repairable. Damage to waterproofing

6.4 Loading and Load Combinations

Loadings have been derived following the provision of Section A4 of the Appendices to the PRs and the NZTA Bridge Manual.

6.4.1 Permanent Loads

Permanent loads are in accordance with Clause 3.4.1 of the BM. Permanent loads have been applied to the structural model as line or patch loads as appropriate to the load under consideration. The following weights of materials have been considered:

- Concrete density: 25.5kN/m^3
- Unit weight of underpass floor overlay: 25.5kN/m^3
- Unit weight of ramp pavement: 20kN/m^3

- Unit weight of pumice fill used in ramp MSE wall: 15kN/m^3
- Unit weight of all other engineered granular fill above and around underpass: 17kN/m^3

6.4.2 Live Loads

Traffic Loads

For the sections of the underpass below the at grade roads, HN-HO-72 traffic loading was applied as per Clause 4.10.2 of the BM. The wheel load components were spread through the pavement and overlying fill as per Clause 6.12 of AS5100.2 Section 6.12. The 3.5kPa uniform load was not spread. Dynamic load factors were applied as per Clause 3.2.5 of the BM with a factor of 1.3 if the structure had no fill to 1.0 with at least 1m of fill.

Lane reduction factors as defined by Clause A4.11.2 of the PRs have been applied dependent on the number of load lanes being used to determine critical load effects. This clause amends HO lane reduction factors as follows:

- The reduction factor for the HO load element shall be taken as 1.0 regardless of the total number of load elements present, and the reduction factors given in the table shall apply to any additional load elements present (i.e. a reduction factor of 1.0 for the first additional load element reducing thereafter).
- For the section of the underpass below the BR01 approach ramp, due to the large load spread and distribution expected, HN and HO loading was applied as uniform 12kPa and 24kPa pressures respectively (as per Clause 3.4.12.b of the BM) with no additional dynamic load factors.

Braking and Traction Loads

No vehicular traffic is expected in the underpass so braking and traction loads are not considered.

Centrifugal Force

Centrifugal forces are not considered within the underpass.

Traffic Fatigue

Loading used in fatigue assessment of steel reinforcement will be in accordance with Clause 4.2.1(j) of the BM. The effects of fatigue on reinforcement will be designed in accordance with NZS3101:2006 Clauses 2.5.2 and 19.3.3.6.2.

Excecptionally Abnormal Loading

The structure is on a designated over-dimension route; however, this is no specific requirements for abnormal loads. Abnormal vehicle loads will require specific assessment against the structure's load carrying capacity. Bridge Data Sheets will be provided to NZTA to allow specific consideration of over-weight vehicles.

Accidental Loading

The PRs have no provisions for specific assessment of accidental loads.

Construction Loading

No specific construction loads have been determined for this structure, therefore a construction live load of 1.5kN/m^2 will be applied to all relevant horizontal surfaces during intermediate construction stages as an allowance for general construction load on the given surface.

As per PRs Clause A4.11.4 the structure will be checked for BM load combinations 5A, 5B and 5C. Since the structure is being constructed adjacent to live traffic lanes, the terms 0.33EQ and 0.33WD have been substituted by the 1/500 APE earthquake and 1/500 APE wind load for IL3 respectively.

Footpath and Cycle Track Loading

Footpath and cycle track loading will be applied to the running surface of the underpass and the cantilevered footpath as per Clause 3.4.14 of the BM.

Collision Loading

Impact loading on the road barriers has followed Appendix B6 of the NZTA Bridge Manual for a TL-5 rigid barrier. Loads on the footpath barrier have been assessed as per Clause 3.4.13 of the BM.

Vibration

Vibration on the cantilevered footpath will be assessed as per Clause 3.4.15 of the BM.

6.4.3 Snow, Wind, Thermal, Ponding and Flood, Groundwater Loading

Snow have been preliminarily determined to be non-critical load effects on the structure due to the location and arrangement of the structure.

Hydrostatic pressure and buoyancy of up to 6.0m RL has been considered. This is higher than the top of the underpass.

Wind loads will be applied to the relevant structural elements (such as the footpath balustrade) as line and patch loads in accordance with Clause 3.4.5 of the BM. Parameters for wind calculations relevant to all bridges are given in Error! Reference source not found. below:

Wind Load Parameters

Parameter	Value
Regional 3s gust wind speed, SLS1 (1/R = 25)	37.0 m/s Region A7
Regional 3s gust wind speed, ULS (1/R = 500) [temporary]	45.0 m/s Region A7
Regional 3s gust wind speed, ULS (1/R = 2500)	48.0 m/s Region A7

No ponding effects have been assessed.

6.4.4 Creep and Shrinkage

Creep and shrinkage properties will be assessed in accordance with AS5100, including the modifications as per the BM to reflect the New Zealand environmental conditions and the material characteristic of locally produced concrete. Properties to be used are as follows:

- Relative humidity of 77% as per Figure 4.1 of the BM;
- Final drying basic shrinkage strain, $\varepsilon^*_{csd,b}$ = 1315 x10^{-6} as per Table 4.4 of the BM;
- Coefficient of thermal expansion of 12 x10^{-6}/°C.

6.4.5 Earth Loads and Settlements

Earth pressures have been applied to the underpass walls and retaining walls as defined by Clause 3.4.12 of the NZTA Bridge Manual. Care has been taken to apply the appropriate load factors to earth pressure loads in accordance with Item C of the Clause 3.4.12. The following earth pressures have been considered.

Static Earth Pressure

At-rest earth pressure (K_o) has been applied to the structural model.

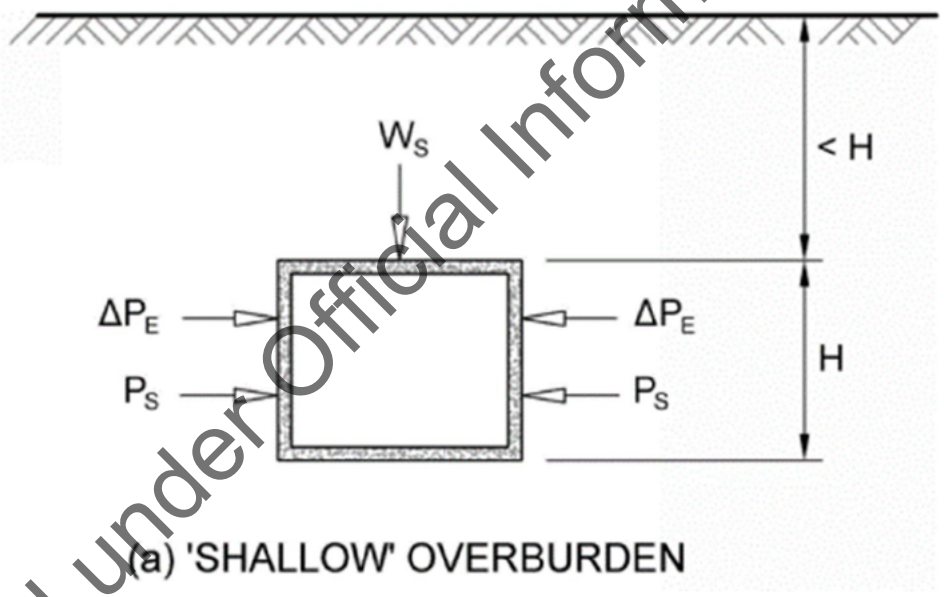
Surcharge Loading due to HN / HO Traffic

For HN (normal) loading this is assumed to be 12kPa, and for HO (overload) loading this is assumed to be 24kPa. This is in addition to static earth pressure (K_o).

Seismic Earth Pressure

For the sections of the underpass below the at grade roads, the soil cover is less than the height of the structure and the earthquake induced stresses on the cross section were determined as per Figure 4.3.a of the BM (reproduced as **Error! Reference source not found.** here). The seismic increment in lateral earth pressure was determined as per *'RRU84, Volume 2 - Seismic Design of Bridge Abutments and Retaining Walls'* (Wood & Elms, 1990) for a 'rigid wall'.

For the sections of the underpass below the BR01 ramp, the soil cover exceeds the height of the structure and the earthquake induced stresses on the cross section were determined by applying the static orthogonal stresses at 'infinity' as shown in Figure 4.3.b of the BM (reproduced as Figure 1 here). Equivalent static stresses were determined using *'Seismic Design of Bridges, Section 9 Earth Retaining Structures'* (Matthewson, Wood & Berrill, 1980).



Earthquake forces for underpass with 'shallow' overburden

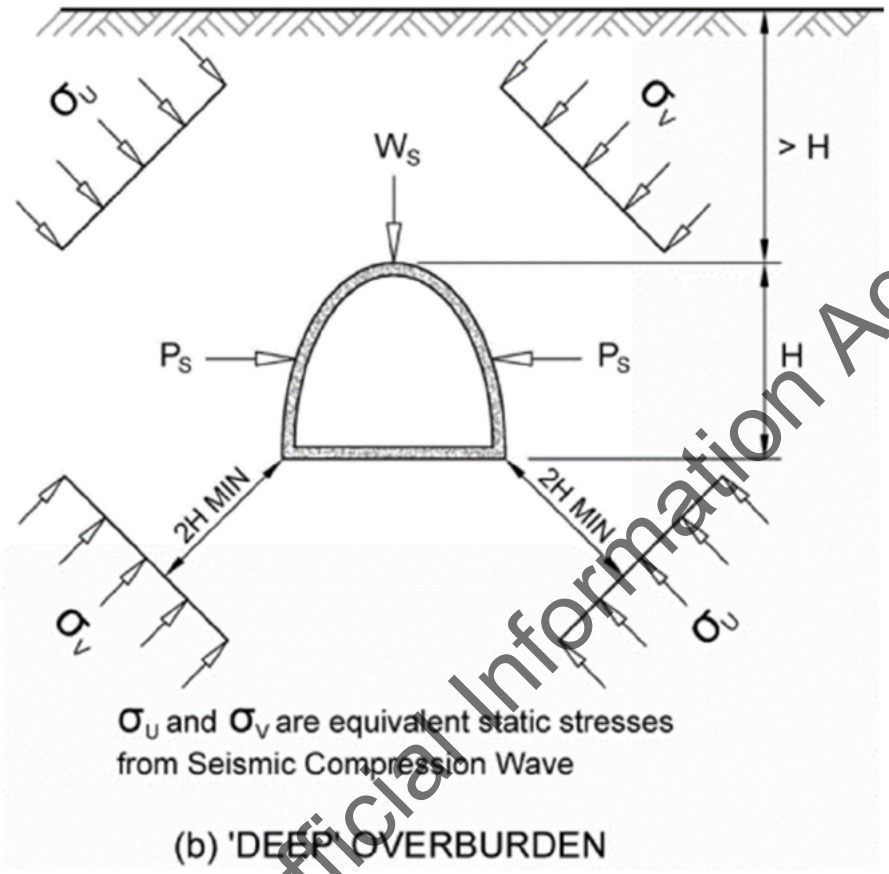


Figure 1: Earthquake forces for underpass with 'deep' overburden

Settlement

The magnitude of settlement and foundation displacements are provided by the Geotechnical Designer. Significant differential settlement longitudinally along the underpass is expected immediately after the completion BR01 ramp. Initial assessment of this differential settlement has necessitated the requirement to build the underpass as three separate segments. Subsequent static and seismic settlement is more uniform and is expected to be accommodated by the completed underpass. This will be fully investigated during detailed design.

Slope movement

Soil slope movement intersecting the longitudinal profile of the underpass is expected during the MCE event. The effect of this soil movement on the structure will be investigated during the detailed design.

Refer to the geotechnical design section of this report for further detail on the expected earth loads and soil movements.

6.4.6 Seismic Loading

Structure seismic loading has been derived using applicable provisions from NZS 1170.5 and Section 5 of the NZTA Bridge Manual, with modifications as prescribed by the project Site Specific Seismic Hazard Analysis (ref. 'Hairini Link Stage IV Site Specific Seismic Hazard Analysis'.

The structure has an Importance Level of 3 and is designed for an ULS seismic Annual Probability of exceedance of 1/2500 using a Return Period Factor, RU of 1.66 (as prescribed by the SSSHA).

Seismic accelerations are based on Soil Class D parameters for a "locked in' structure based on the seismic spectra presented in the SSSHA. This indicates a seismic demand within 30% of the codified values. Refer Error! Reference source not found. for a summary of seismic design parameters that have been adopted for the structure:

BR05 MGI Underpass Seismic Design Criteria

BR05 MGI Underpass	SLS	ULS	MCE
Structural Period, T	0s (locked in)		
Return Period	1/100	1/2500	Magnitude 6.9 Event
Site Subsoil Class	Class D		
Hazard Factor, Z	0.19		
Near Fault Factor, N(T,D)	1.00		
Return Period Factor	R_S = 0.57	R_U = 1.66	
Horizontal Spectral Shape Factor, $C_h(T)$	1.12 *(as a locked in structure take the spectral shape factor taken as that used for modal response spectrum etc)*		Spectral Acceleration at T_0= 0.46g
Vertical Spectra	70% of the horizontal spectra		

6.4.7 Incomplete Structures

While the structure may be put into service prior to all requirements of practical completion being met (e.g. surfacing may not be in place), the structure itself will be complete. Therefore, the design requirements of PRs Clause A4.11.5 for reduced APE's for wind, snow, floodwater and earthquake are not applicable.

The Design, Design Review, Construction and Construction Review producer statements as well as a Certificate of Public Use will be provided prior to the structure being put into service. The requirements of PRs Clause 7.4 for Bridge Update Data will also be satisfied.

6.4.8 Load Combinations

Load combinations have been prepared for Serviceability and Ultimate Limit State effects in accordance with Table 3.1 and Table 3.2 of the Bridge Manual respectively.

6.5 Analysis and Design of the Structure

6.5.1 Design and Analysis Software

For the design and analysis of BR05 MGI Underpass, the following software has been used:

a) LUSAS Bridge Plus Structural Analysis (Modeller/Solver), Version 16.0 (FEA Ltd., 2018): main software for the structural modelling and analysis;

b) Response-2000, Version1.0.5, Reinforced Concrete Sectional Analysis Software (University of Toronto, 2000): for the design of reinforced concrete structural sections, with appropriate corrections for use with New Zealand codes;

c) In-house spreadsheets (Microsoft Excel): for various design tasks, including reinforced concrete design.

6.5.2 Structural Modelling

The structure was modelled in two-dimensions, in the transverse and longitudinal directions using LUSAS. Vertical soil springs have been applied to the base of these models. The spring values used are described in Section 6.6 of this report.

Transverse Cross Section 2D Model

A two-dimensional model representing a metre slice of the underpass cross-section was modelled with frame elements representing the roof, base and wall slabs of the underpass as shown in **Error! Reference source not found.**. Loadings discussed in Section 6.4 above were applied to the transverse 2D model. Variance of specific loadings such as lateral earth pressure, buoyancy and seismic were applied as separate load cases and enveloped to determine the worst-case loadings for different elements. SLS and ULS load combinations as discussed in Section 6.4.8 above were included in this model.

Longitudinal 2D Model

A 2D beam model has been used to model the effects of varying dead loading and settlement along the length of the underpass. The vertical springs were changed include the omission of vertical springs at certain locations along the length of the underpass. This is used to reflect the differential settlement expected along the underpass.

Section Properties

The effective section properties used for modelling the structure were taken as those suggested by Table C6.6 of NZS 3101.

6.5.3 Structural Design

Main Underpass Structure

The main underpass structure is a hybrid precast/in-situ cast concrete box section carrying the shared user path traffic under Maunganui road and SH2. To relieve the effects of instantaneous differential settlement caused by the construction of BR01 Northern Approach ramp, the box will be constructed as three separate segments and stitched together, one to three months after the completion of the ramp. The box section comprises 400mm thick precast walls, a 400mm thick cast in-situ roof slab and a 500mm thick cast in-situ base slab box sections.

To provide shear transfer, serviceability control and to assist in the waterproofing measures, the precast panels will be clamped together via post-tensioned strands. The box internal dimensions are approximately 4.5m wide by 3m high. A 50mm minimum topping will be applied to the box floor to take out construction tolerance, provide surface water cross-fall and to form a drainage channel.

Splayed Ends

Due to visibility and CPTED factors, the internal box width splays out at the ends, opening onto the approach ramp surfaces (refer drawings for splay dimensions). The additional width requires usage of 375mm deep x 1150mm wide prestressed concrete girders to span the roof at both ends. 4 No. girders will be required at the Matapihi end and 3 No. girders will be required at the Bayfair end.

Atop the prestressed girders will be 200mm thick in-situ concrete topping to accommodate the large skew effects and to also provide an integral connection with the walls. The walls and base slab will be of cast in-situ concrete construction of 500mm thickness.

Settlement Slab

To allow a gradual transition in settlement between the ground above the underpass and the surrounding ground, reinforced concrete settlement slabs of 2500mm length by 300mm thick have been provided at both sides of the box along the full length of the underpass.

Cantilevered Footpath

A 1800mm wide concrete footpath is located directly above the Bayfair end of the underpass. The deck will be cantilevered from the Bayfair end headwall and consists of a reinforced concrete slab of 400mm thickness at its stem, tapering to 270mm at its tip. A 1100mm high architectural balustrade will be provided to protect pedestrians from falling. This barrier will comply with Clause F4 of the NZ Building Code.

Approach Ramps

The driving requirement behind the size of the structural sections in the approach ramps has been both design loading and a need to prevent buoyancy of the ramps in the design ground water level of 3.8m RL. Thus, structural sections vary based on depth to slab level, width between opposing wall faces and load carrying need.

The Matapihi approach ramp consists of a 500mm thick base slab and 500mm thick walls on the east side and 400mm thick walls on the west side. For this approach ramp structure, the base slab projects 1.25m from the back face of the walls to provide extra buoyancy mass and stability.

The Bayfair approach ramp consists of a 400mm thick base slab, 400mm thick walls on all sides (bar an 8.0m long section at the south east corner of the main box-structure which has 500mm thick walls). For this approach ramp structure, the base slab projects 0.75m from the back face of the walls to provide extra buoyancy mass and stability.

Barriers

The road barriers have been designed to accommodate the ULS collision loading corresponding to a TL-5 barrier containment as specified in Appendix B6 (Table B3) of the Bridge Manual. A 45° dispersal of load has been applied on one side from the point of impact down the height of the barrier.

The stitch connecting the barrier to the headwall will be designed to resist overstrength actions generated by the ultimate capacity of the precast section of barrier as per Clause B6.3a of the Bridge Manual. A 45° dispersal of load in the barrier has been used to account for distribution when designing for the critical section of the stitch at the interface of the stitch and headwall. Capacity design principles have been followed to ensure the stitch and headwall section capacities exceed the capacity of the adjacent section.

To eliminate the use of grouted shear keys between adjacent barriers, precast segments are detailed for a minimum length. This reduces the construction effort and ensures that individual barrier segments are independent of the adjacent segments for strength. A dowelled connection between on-structure and off-structure barriers is provided to maintain the continuity of the barrier face in the event of an impact.

6.6 Geotechnical Design Parameters

Geotechnical soil springs, slope displacement data, static ground settlement information and liquefaction-induced total ground settlements used in the structural design of the BR05 MGI Underpass are provided by the Geotechnical Design Team. The following information and tables provide a summary of the pertinent information for the structural analyses. Refer to the Geotechnical Design section of this report for further details on the geotechnical design.

Soil Springs

Soil spring stiffnesses are preliminarily taken as those provided by the geotechnical design for the BR01 pier design (Refer to **Error! Reference source not found.**).

Soil Spring Stiffness Preliminarily Adopted for Underpass Design

Soil Spring	Spring Stiffness
Vertical soil spring (coefficient of vertical subgrade reaction)	8 kPa/mm (Design bearing capacity 500kPa)
Horizontal soil spring	42 kPa/mm (limiting displacement 15 mm)

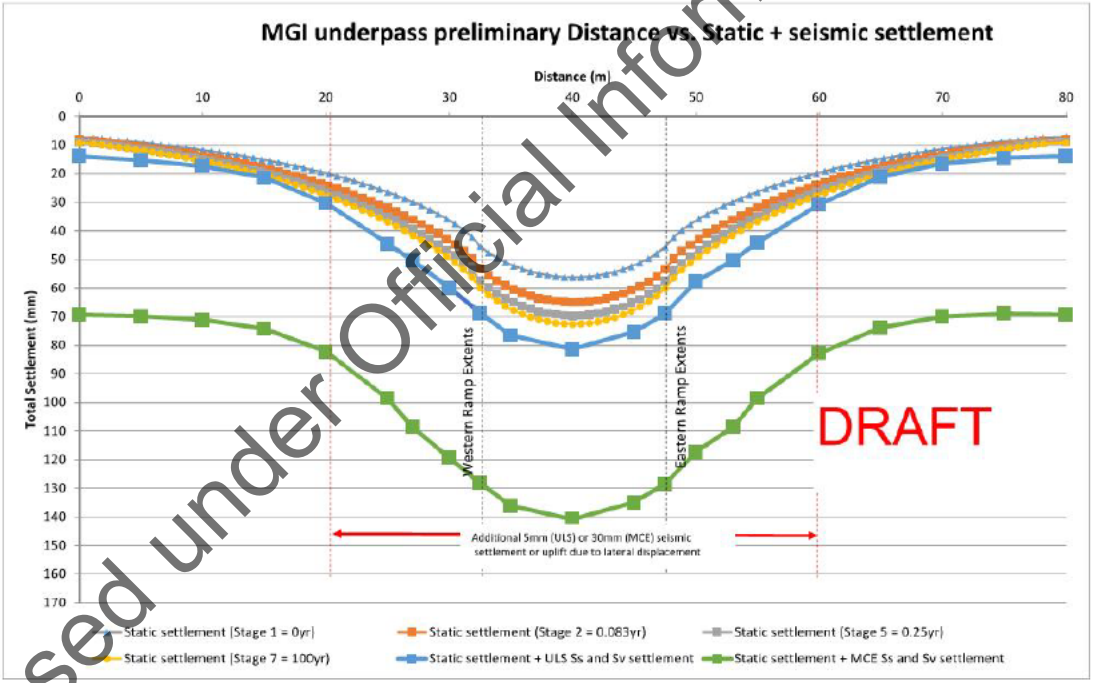
Soil Spring Stiffness Providing Resistance to Pier Pad Foundations

Sensitivity checks of 50% to 200% of the spring stiffness values given in the tables above will be completed during the detailed design.

Soil resistance reduction factors have been taken as 0.55 for bearing and 0.8 for sliding in compliance with Clause B1/VM4 of the NZ Building Code.

Settlement

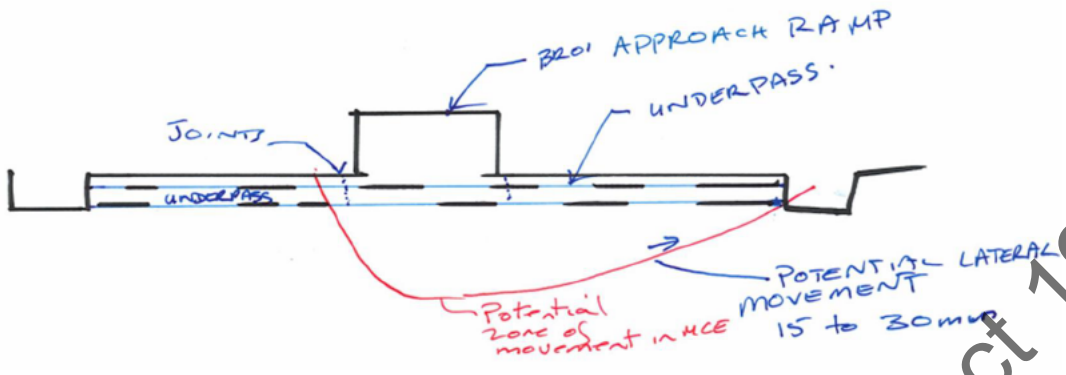
Preliminary static and seismic (included liquefaction induced) settlements along the length of the underpass have been provided by the geotechnical designers.



Static and Seismic Settlement Along Underpass Length

Slope Movement

Preliminary assessment has shown that there is potentially 15-30mm of slope movement intersecting over part of the underpass during the MCE event as shown below



MCE seismic slope movement

6.7 Safety in Design / Risks

6.7.1 Construction Phase

- Temporary fall protection fences to be installed where falling risk during construction exists;
- Precast wall panels have been used to reduce on-site construction time and complexity;
- Wall panels rather than complete precast box segments have been selected in consideration of cranage restrictions under the Tauranga Airport flight path;
- The three box segments have been selected to match the traffic switch strategy
- All crane movements to allow for vertical clearance limits of the Tauranga Airport flight path.

6.7.2 Operation Phase

- CPTED workshop feedback comments such as splayed openings, lighting and urban design have been incorporated into the design – to be led by the Urban Designers;
- Clause F4 Pedestrian barriers have been incorporated to mitigate fall hazards;
- Anti-graffiti finishes are applied to ease graffiti remediation;
- Running surfaces of the underpass and approaches will have non-slip concrete finishes.
- Maintenance access is available for local roads/footpaths with no requirement for specialist access equipment or permitting;
- Low maintenance materials and finishes have been selected.

6.8 Special Studies

Seismic design criteria for the structure (and the project) have been provided through the completion of a Site-Specific Seismic Hazard Analysis (SSSHA), completed by Beca (ref. 'Hairini Link Stage IV Site Specific Seismic Hazard Analysis').

6.9 Approvals Required – Authorities Consulted & Special Conditions

The resource consent conditions presented in Appendix H of the PRs will be complied with.

6.10 Issues Requiring Resolution

It is considered that design concept issues identified in the design philosophy statement have been addressed within the body of this report, and that no issues are outstanding.

6.11 Resource / Planning Requirements

There are no specific consent conditions identified that are for this structure.

6.12 Design Verification

BR05 MGI Underpass requires a Category 1 Design Check. The independent Peer Reviewer for the Baypark to Bayfair Link Upgrade is GHD. For Code of Compliance and later Certification of Public Use purposes, a Producer Statement PS3 – "Construction" and PS4 – "Construction Review" will be required. It is proposed to carry out construction monitoring to CM Level 4, as per Clause 8.1.6 of the PRs.

6.13 Proposed Method of Building Code Compliance

Building Code Compliance is achieved as follows:

- Clause B1 Structure – via the NZTA Bridge Manual (3rd Ed, Amdt 1) as an alternative solution;
- Clause B2 Durability – via the NZTA Bridge Manual (3rd Ed, Amdt 1) as an alternative solution;
- Clause F4 Safety from falling – via the NZTA Bridge Manual (3rd Ed, Amdt 1) as an alternative solution (with reference to New Zealand Building Code Acceptable Solution F4/AS1).

6.14 Building Consents / Council Approvals

Building Consents for bridge structures are required by Tauranga City Council for the Baypark to Bayfair project, as per PR Clause H8.

6.15 Definitions and Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
AS/NZS	Australian / New Zealand Standard
ASTM	American Society of Testing and Materials
BM	The New Zealand Transport Agency's Bridge Manual (3rd Edition, Amendment 1)
Ch	Chainage
DBH	Department of Building and Housing
DMRB	Design Manual for Roads and Bridges (UK Highways Agency)
DPS	Design Philosophy Statement
ECMTR	East Coast Main Trunk Rail
HERA	Heavy Engineering Research Association
LRFD	Load and Resistance Factor Design
MCE	Maximum Considered Event
MGI	Maunganui-Girven Interchange
MSE	Mechanically Stabilised Earth
NB/SB	Northbound / Southbound
NZS	New Zealand Standard
NZBC	New Zealand Building Code
NZTA	The New Zealand Transport Agency
PGA	Peak Ground Acceleration
PRs	Principal's Requirements
RL	Reduced Level
RONS	Roads of National Significance
RRU	Road Research Unit
SH2	State Highway 2
SH29A	State Highway 29A
SID	Safety in Design
SLS	Serviceability Limit State
TBC	To Be Confirmed
ULS	Ultimate Limit State
WB/EB	Westbound / Eastbound

FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
DRAINAGE				
B2B-DRG-AD01-8405	A	UNDERPASS UPGRADE	DRAW NG INDEX SHEET	UT LIT ES
B2B-DRG-UT01-8020	A	UNDERPASS UPGRADE	POTHOLE LOCATIONS	
B2B-DRG-UT01-8025	A	UNDERPASS UPGRADE	ALTERNATIVE ALIGNMENTS	

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LW	LW	50% ISSUE

NZ TRANSPORT AGENCY
WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	N.T.S.
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	GK
DRAWING CHECK	GK
APPROVED	LW
DESIGNED	AC
DESIGN REVIEW	LW
TITLE	UNDERPASS UPGRADE DRAWING INDEX SHEET UTILITIES
DRAWING No	B2B-DRG-AD01-8405
REV	A

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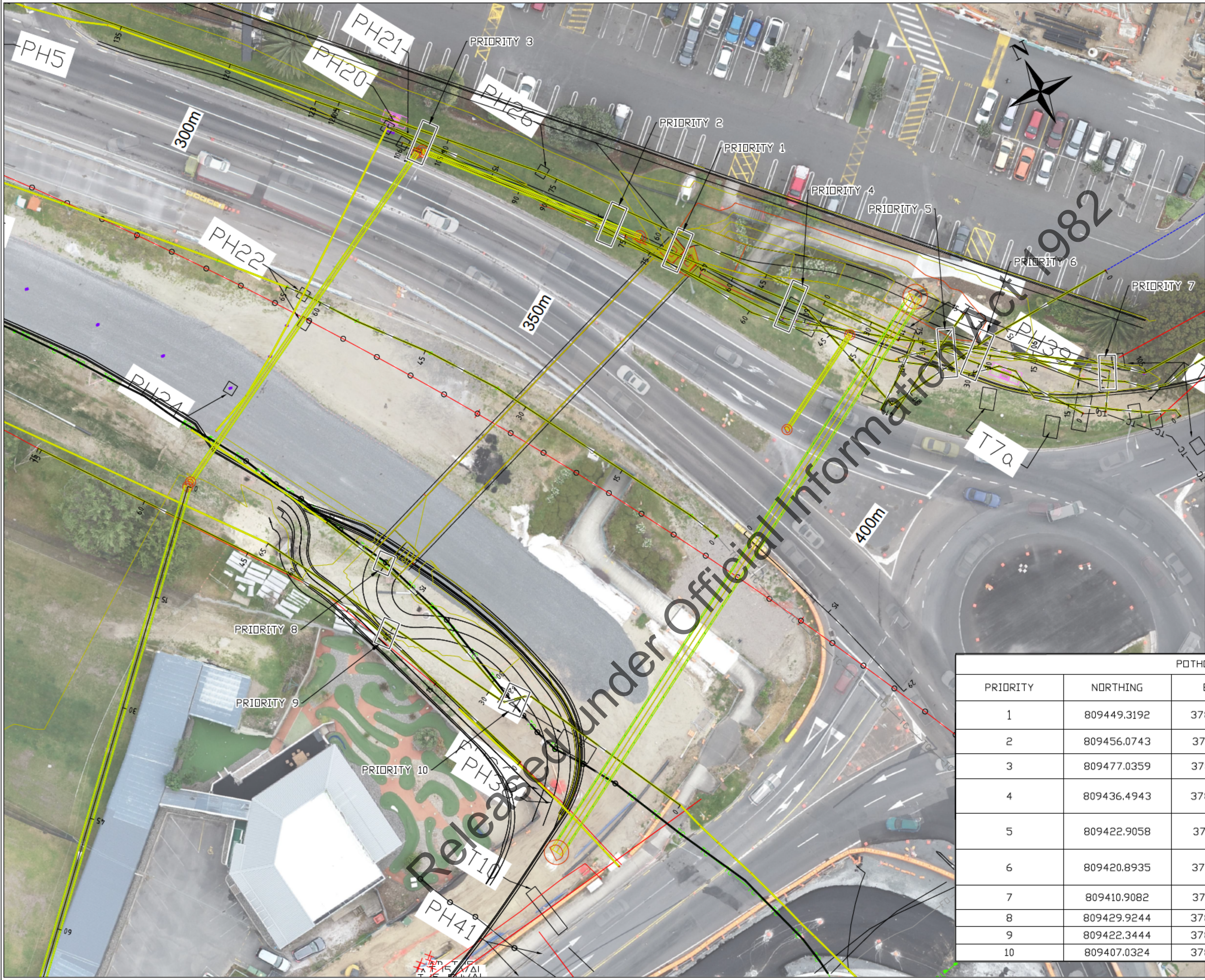

NOTES:

1. ALL COORDINATES ARE IN NZTM.
2. NORTHINGS AND EASTINGS INDICATE APPROXIMATE CENTRES OF HYDROVAC TRENCH ONLY.
3. SUGGESTED HYDROVACING SEQUENCING IS BY PRIORITY.

POTHOLE LOCATIONS

PRIORITY	NORTHING	EASTING	UTILITIES TO LOCATE
1	809449.3192	378488.9937	ULTRAFAST FIBER, VODAFONE FIBER, WATER, CHORUS 12-PAIR
2	809456.0743	378482.5031	ULTRAFAST FIBER, VODAFONE FIBER, WATER, CHORUS 12-PAIR
3	809477.0359	378465.2806	ULTRAFAST FIBER, VODAFONE FIBER, WATER, CHORUS 12-PAIR
4	809436.4943	378499.2945	ULTRAFAST FIBER, VODAFONE FIBER, WATER, CHORUS 12-PAIR, (POWER MAY BE PRESENT)
5	809422.9058	378513.5619	ULTRAFAST FIBER, VODAFONE FIBER, WATER X 2, CHORUS 12-PAIR, HIGH VOLT POWER, GAS
6	809420.8935	378518.2284	ULTRAFAST FIBER, VODAFONE FIBER, WATER, CHORUS 12-PAIR, HIGH VOLT POWER, GAS
7	809410.9082	378532.3130	VODAFONE FIBER, HIGH VOLT POWER, GAS
8	809429.9244	378436.6576	FIBER, UT METRO FIBER
9	809422.3444	378432.7786	HIGH VOLT POWER, WW
10	809407.0324	378443.6446	FIBER, WW

DATE: 12/02/2019 12:34:38 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\gkaminska\appdata\local\projectwise\jacobs_anz_knd\d1455948\B2B-DRG-UT01-8020.dwg

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A	12/02/19	AC	LW	LW	ISSUED FOR INFORMATION

NZ TRANSPORT AGENCY
WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:250 (A3)

STATUS: FOR INFORMATION

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR (B2B)

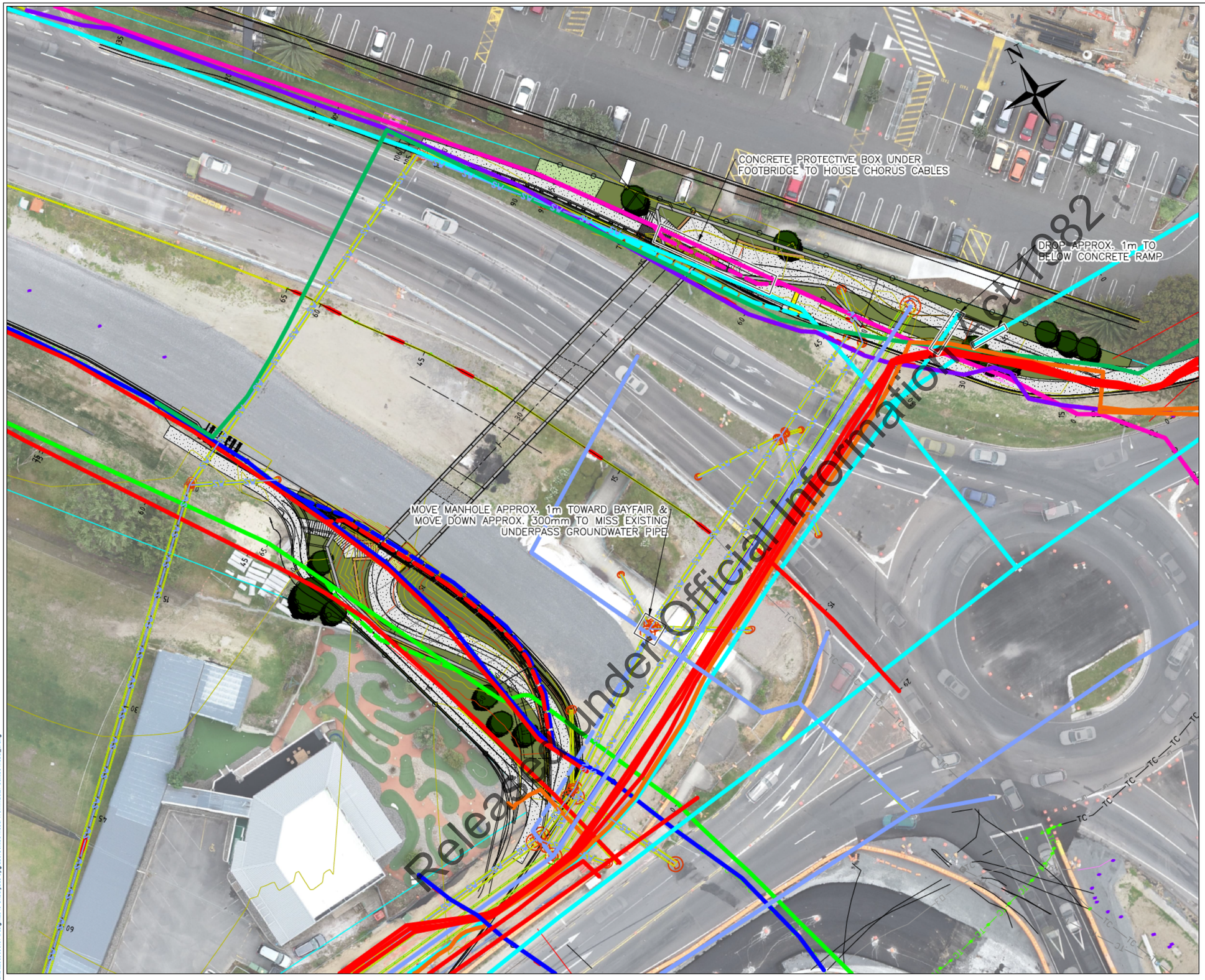
SURVEYED: AC | SURVEY CHECK: LW | APPROVED: LW

DRAWN: AC | DRAWING REVIEW: LW

TITLE: UNDERPASS UPGRADE POTHOLE LOCATIONS

DRAWING No: B2B-DRG-UT01-8020

REV: A



NOTES:

1. ALL COORDINATES ARE IN NZTM.
2. UTILITY LOCATIONS TAKEN FROM CONTRACTOR POTHOLE & OTHER INFORMATION AND ARE INDICATIVE ONLY.

LEGEND

- EXISTING SEWER ALIGNMENT
- PROPOSED SEWER ALIGNMENT
- EXISTING TCC METRO FIBER ALIGNMENT
- PROPOSED TCC METRO FIBER ALIGNMENT
- EXISTING ULTRAFAST FIBER ALIGNMENT
- PROPOSED ULTRAFAST FIBER ALIGNMENT
- EXISTING CHORUS FIBER ALIGNMENT
- PROPOSED CHORUS FIBER ALIGNMENT
- EXISTING POWER ALIGNMENT
- PROPOSED POWER ALIGNMENT
- EXISTING WATER ALIGNMENT
- PROPOSED WATER ALIGNMENT
- EXISTING GAS ALIGNMENT
- PROPOSED GAS ALIGNMENT
- EXISTING STORMWATER ALIGNMENT
- DESIGNED STORMWATER ALIGNMENT
- PROPOSED STORMWATER ALIGNMENT
- EXISTING VODAFONE ALIGNMENT
- PROPOSED VODAFONE ALIGNMENT

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	02-19	GK	LW	LW	DRAFT ISSUE

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:250 (A3)
STATUS	DRAFT
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR (B2B)
SURVEYED	HR
SURVEY CHECK	
APPROVED	LW
DRAWN	AC
DRAWING REVIEW	GK

TITLE: UTILITIES PLAN ALTERNATIVE ALIGNMENTS PAGE 1 OF 1

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FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
DRAINAGE				
B2B-DRG-AD01-8404	A	UNDERPASS UPGRADE	DRAW NG INDEX SHEET	DRAINAGE
B2B-DRG-DR01-8401	A	UNDERPASS UPGRADE	DRAINAGE GROUNDWATER	MONITORING NFORMATION
B2B-DRG-DR01-8402	A	UNDERPASS UPGRADE	DRAINAGE	TCC FLOOD MAP
B2B-DRG-DR01-8421	A	UNDERPASS UPGRADE	GENERAL ARRANGEMENT	DRAINAGE LAYOUT - OVERALL
B2B-DRG-DR01-8422	A	UNDERPASS UPGRADE	GENERAL ARRANGEMENT	UNDERPASS AREA
B2B-DRG-DR01-8423	A	UNDERPASS UPGRADE	DRAINAGE LONG SECTION	
B2B-DRG-DR01-8424	A	UNDERPASS UPGRADE	DRAINAGE TYPICAL DETA LS	
B2B-DRG-DR01-8431	A	UNDERPASS UPGRADE	MATAP HI PUMP STATION	DETA LS

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LOCATION:

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NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: N.T.S.

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

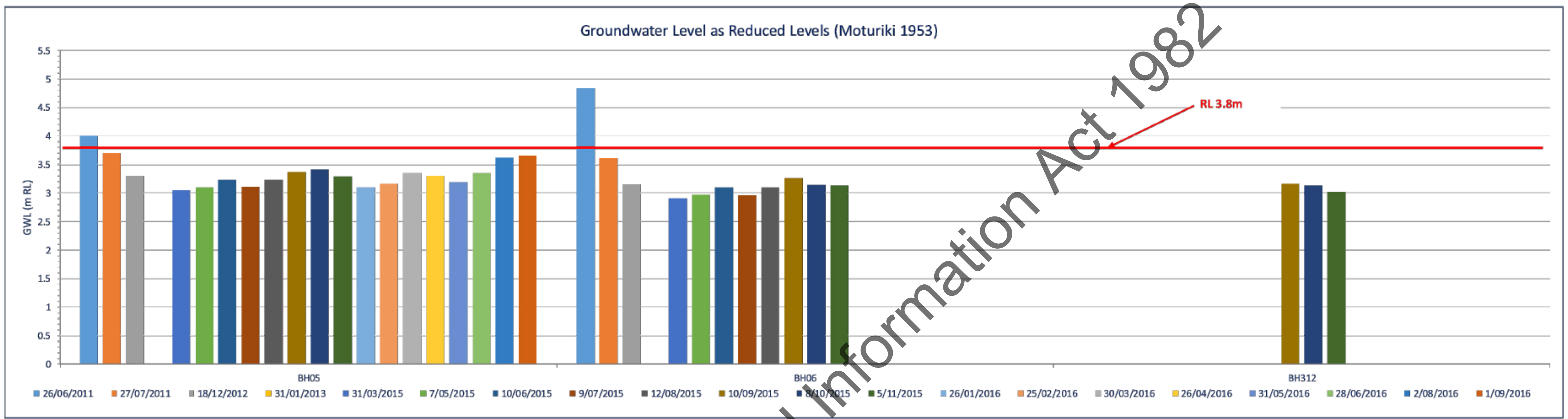
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW
DESIGNED: YA | DESIGN REVIEW: LW

TITLE: UNDERPASS UPGRADE
DRAWING INDE□ SHEET
DRAINAGE

DRAWING No: B2B-DRG-AD01-8404 | REV: A

Ground Water Level (mRL)																				
Piezo ID	26/06/2011	27/07/2011	18/12/2012	31/01/2013	31/03/2015	7/05/2015	10/06/2015	9/07/2015	12/08/2015	10/09/2015	8/10/2015	5/11/2015	26/01/2016	25/02/2016	30/03/2016	26/04/2016	31/05/2016	28/06/2016	2/08/2016	1/09/2016
BH05	4	3.7	3.3		3.05	3.1	3.23	3.11	3.23	3.37	3.41	3.29	3.1	3.16	3.35	3.3	3.19	3.35	3.62	3.65
BH06	4.83	3.61	3.15		2.91	2.97	3.1	2.96	3.1	3.26	3.14	3.13								
BH312										3.16	3.13	3.02								



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NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: N.T.S.

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

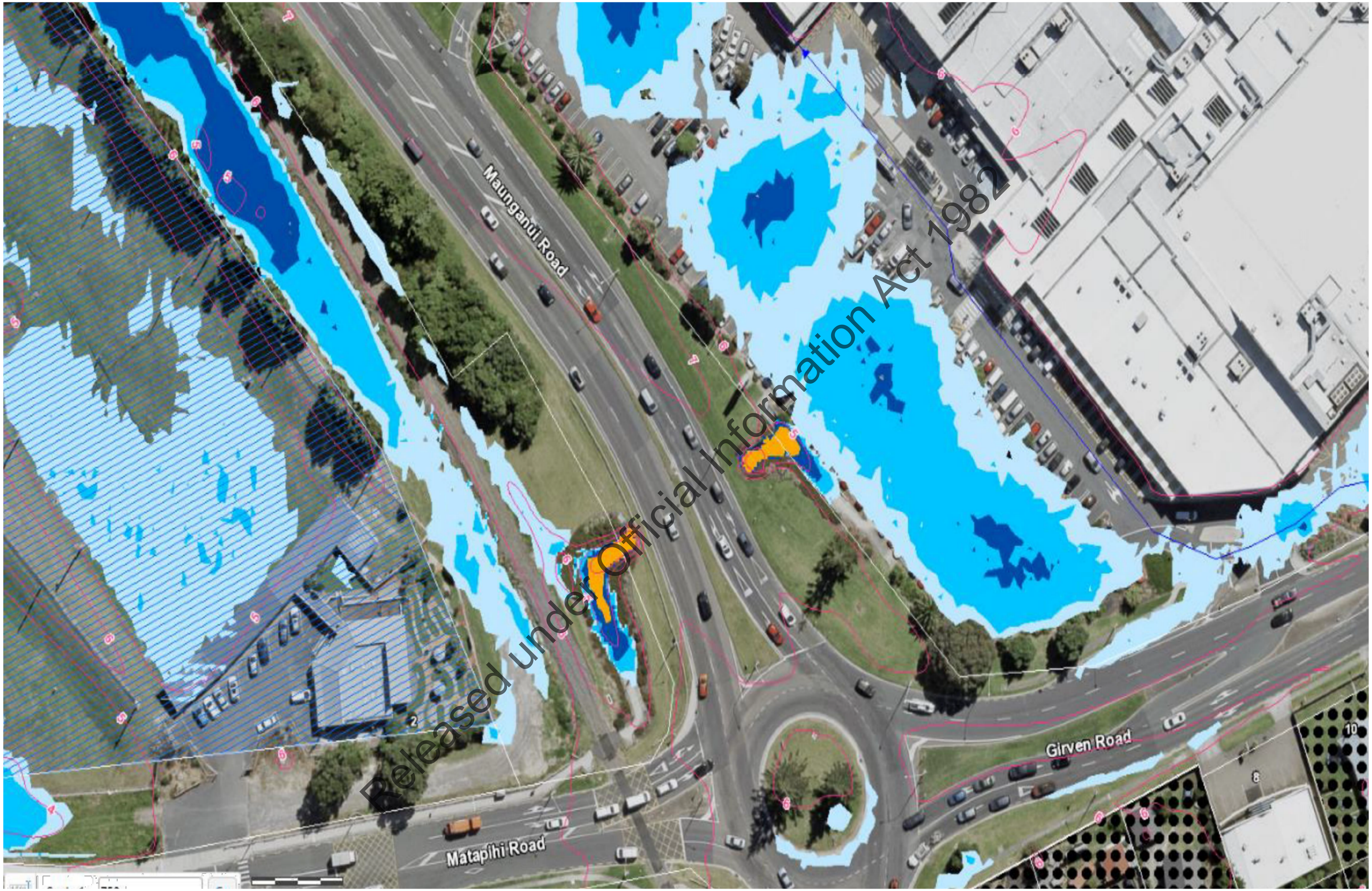
DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW

DESIGNED: YA | DESIGN REVIEW: LW

TITLE: UNDERPASS UPGRADE DRAINAGE GROUNDWATER MONITORING INFORMATION

DRAWING No: B2B-DRG-DR01-8410

REV: A



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A	15/03/19	GK	YA	LW	50% ISSUE

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: N.T.S.

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW

DESIGNED: YA | DESIGN REVIEW: LW

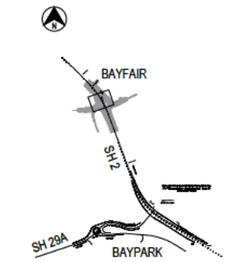
TITLE: UNDERPASS UPGRADE DRAINAGE TCC FLOOD MAP

DRAWING No: B2B-DRG-DR01-8411

REV: A

NOTES

1. Drainage works included in this design are clouded. t is assumed that other works will be covered by the previous pricing.
2. t is assumed that all existing utilities and B2B design elements (installed or proposed) can be redirected/ moved/protected/replaced or other means adopted to accommodate the design.
3. Risk - The assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the design, does not come to fruition. The probability of this is likely. t is to be noted that the impact may result in the additional design or alteration of the proposed design to accommodate the utilities which may incur additional costs and delay the work programme.
4. Mitigation - Utility strategy has been embedded and developed within the progress of the 50% Concept Design. 3D model developed but based upon a limited amount of data. Additional utility investigations are undertaken specific to the underpass but are not available to inform the development of the concept design. t is recommended by the design team that the utilities strategy work be continuous post completion of the 50% design.



SHEET KEY

EXISTING:

- STORMWATER P PE
- CATCHPITS/MANHOLES/ CATCHPIT MANHOLES
- CREEK/STREAM
- CULVERT
- SUBSOIL DRAINAGE
- ITS
- POWER OVERHEAD
- POWER UNDERGROUND
- POWER UNDERGROUND
- TELECOM
- TELSTRA
- GAS
- SEWER
- STORMWATER
- WATER

PROPOSED:

- PERMANENT DESIGNATION
- STORMWATER (FOR ROAD CONSTRUCTION EXCLUDED)
- STORMWATER UNDER PASS (INCLUDED N THIS DESIGN)
- EXISTING SW P PE/MH/CP TO BE ABANDONED
- STORMWATER MANHOLE
- SCRUFFY DOME MANHOLE
- CATCH PIT MANHOLE
- BICYCLE FRIENDLY CATCHPIT R P RAP
- 110Ø DRAINCO L (WRAPPED WITH FILTER SOCK) LA D > 3.8m RL
- 110Ø DRAINCO L (WRAPPED WITH FILTER SOCK) LA D < 3.8m RL
- RETA NING WALL

PLAN
SCALE 1:500 (A3)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	CTC	YA		50% ISSUE

1:1000 @ A1
1:2000 @ A3
0 10 20 30 40 50 60 70 80 90 100 m

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

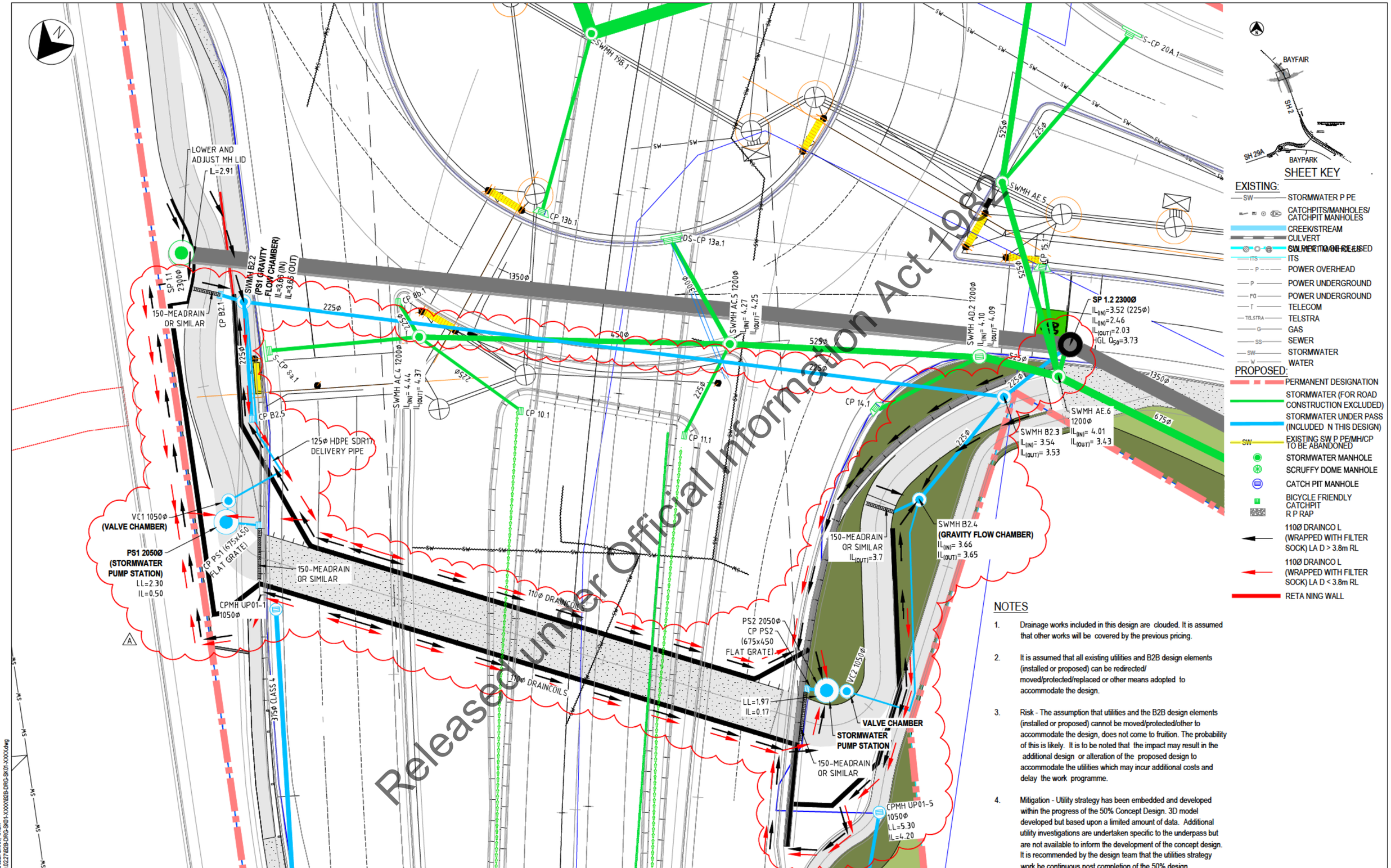
SCALE: AS SHOWN
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: CTC
DESIGNED: YA
DRAWING CHECK:
DESIGN REVIEW:
APPROVED:

TITLE: UNDERPASS UPGRADE
GENERAL ARRANGEMENT
DRAINAGE LAYOUT - OVERALL

DRAWING No: B2B-DRG-DRG-8421
REV: A

DATE: 15/03/2019 11:11:50 AM
LOGIN NAME: CHAN, TACK
LOCATION: C:\Users\TChan\Desktop\B2B\2019 02\27\B2B-DRG-SK01-XXXX.dwg



NOTES

1. Drainage works included in this design are clouded. It is assumed that other works will be covered by the previous pricing.
2. It is assumed that all existing utilities and B2B design elements (installed or proposed) can be redirected/ moved/protected/replaced or other means adopted to accommodate the design.
3. Risk - The assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the design, does not come to fruition. The probability of this is likely. It is to be noted that the impact may result in the additional design or alteration of the proposed design to accommodate the utilities which may incur additional costs and delay the work programme.
4. Mitigation - Utility strategy has been embedded and developed within the progress of the 50% Concept Design. 3D model developed but based upon a limited amount of data. Additional utility investigations are undertaken specific to the underpass but are not available to inform the development of the concept design. It is recommended by the design team that the utilities strategy work be continuous post completion of the 50% design.

PLAN
SCALE 1:333 (A3)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	CTC	YA		50% ISSUE

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DATE: 15/03/2019 11:12:10 AM

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

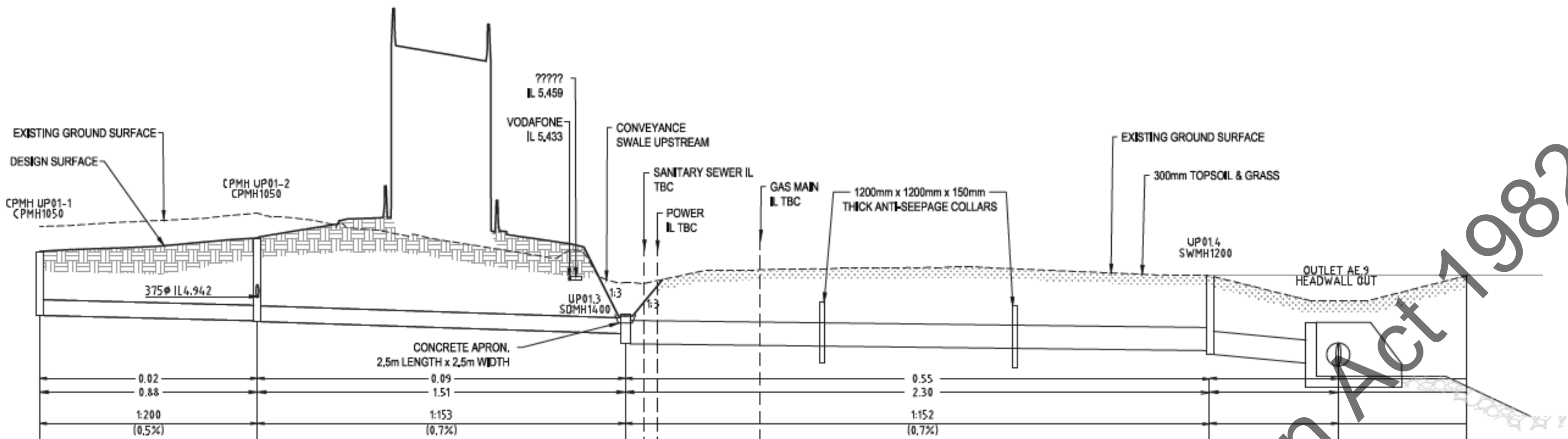
DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: AS SHOWN
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: CTC
DESIGNED: YA
DRAWING CHECK:
DESIGN REVIEW:
APPROVED:

TITLE: UNDERPASS UPGRADE GENERAL ARRANGEMENT UNDERPASS AREA

DRAWING No: B2B-DRG-DRG-8422
REV: A



PIPE FLOW (m³/s) - Q_{10}		0.02	0.09	0.55		
PIPE FLOW VELOCITY (m/s)		0.88	1.51	2.30		
PIPE GRADE (1:X)		1:200 (0.5%)	1:153 (0.7%)	1:152 (0.7%)		
INTERNAL PIPE DIAMETER (mm)/TYPE		NB525Ø RCRRJ CLASS 4 ON HS2 BEDDING	NB525Ø RCRRJ CLASS 6 ON HS2 BEDDING	NB675Ø RCRRJ CLASS 3 ON HS2 BEDDING		
DATUM R.L.		-1.0				
H.G.L. LEVEL (Q10)	4.52	4.52 / 4.50 4.51	4.46 / 4.31	4.07		3.62
EXISTING GROUND LEVEL	6.99	7.38	5.38	5.58	3.98	
FINISHED SURFACE LEVEL	6.27	6.67	4.41	5.58	3.63	
CUT TO INVERT (FINISHED SURFACE LEVEL TO INVERT)		1.85 / 2.40	2.42 / 0.51	0.81 / 2.18	2.28 / 0.67	0.67
DESIGN INVERT		4.42 / 4.27	4.25 / 3.90	3.60 / 3.40	3.30 / 2.95	2.95
PIPE LENGTH (FROM CENTRE OF MH)		31.46	53.18	84.44	18.60	

SCALE H1:500 : V1:100

SW LINE - UP01

SW LINE - UP01

DATE: 15/03/2019 11:12:30 AM LOGIN NAME: CHAN, TACK
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No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	CTC	YA		50% ISSUE

1:1000 @ A1 / 1:2000 @ A3 — 0 10 20 30 40 50 60 70 80 90 100 m

NZ TRANSPORT AGENCY WAKA KOTAHI

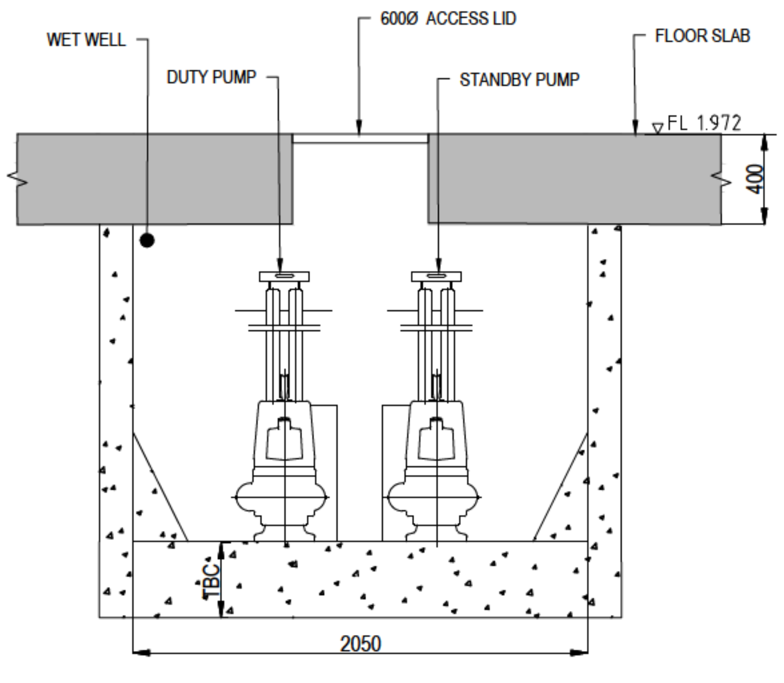
CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

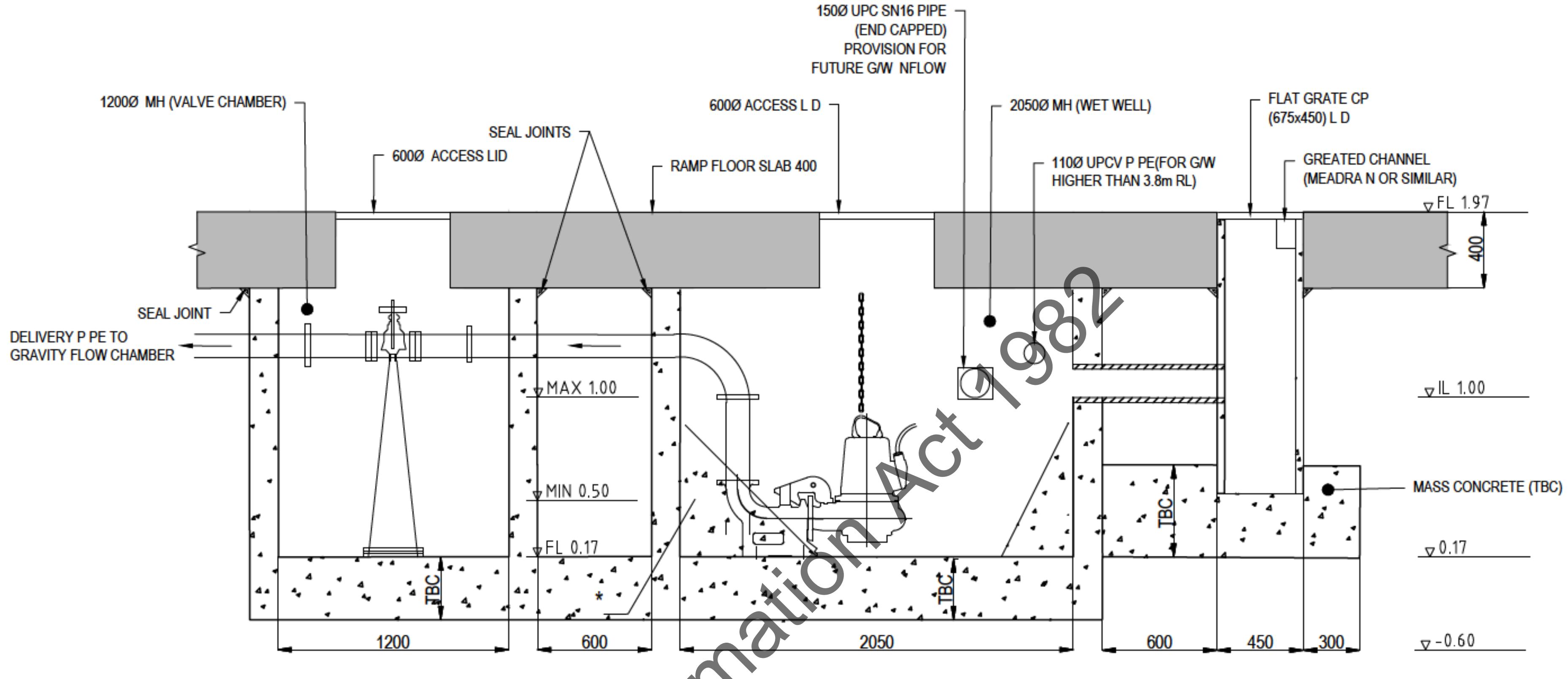
SCALE: 1:250 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: CTC | DRAWING CHECK | APPROVED
DESIGNED: YA | DESIGN REVIEW

TITLE: UNDERPASS UPGRADE DRAINAGE LONG SECTION
DRAWING No: B2B-DRG-DRG-8423
REV: A



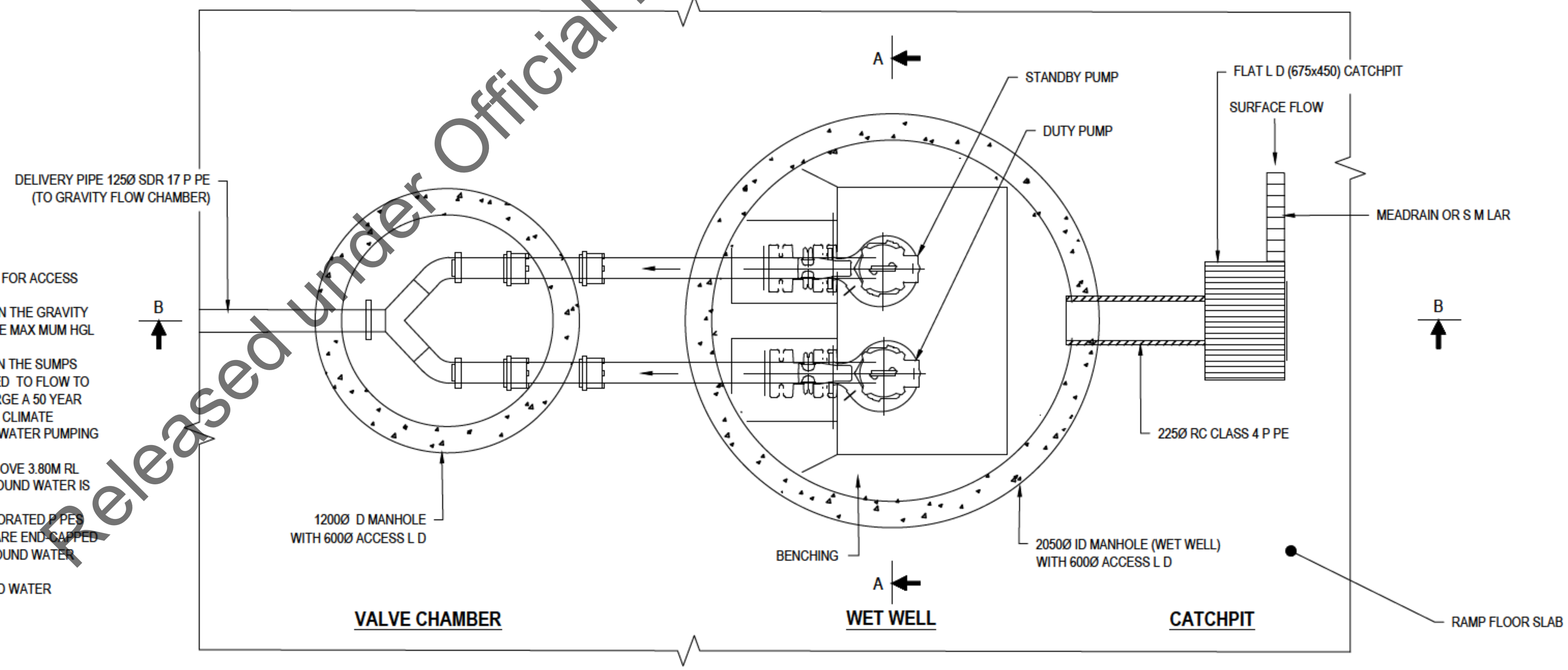
SECTION A-A



SECTION B-B

NOTES

1. THE UNDERPASS STRUCTURE IS COMPLETELY SEALED. RETAIN NG WALLS FOR ACCESS RAMPS ARE SEALED FOR A GROUND WATER LEVEL OF 3.8 M RL.
2. SURFACE RUNOFF FROM ACCESS RAMPS ABOVE 3.80M RL IS COLLECTED IN THE GRAVITY FLOW CHAMBERS AND IS DISCHARGED TO MANHOLE SP1 2 BY GRAVITY. THE MAX MUM HGL AT MANHOLE SP1.2 AT A 50 YEAR ARI IS 3.73 M RL.
3. SURFACE RUNOFF FROM ACCESS RAMPS BELOW 3.80M RL IS COLLECTED IN THE SUMPS AND PUMPED TO THE GRAVITY FLOW CHAMBERS WHICH THEN IS ALLOWED TO FLOW TO MANHOLE SP1 2 BY GRAVITY . THE PUMPS HAVE BEEN SIZED TO DISCHARGE A 50 YEAR ARI 10 MINUTE STORM. A PROVISION HAS BEEN MADE FOR THE POTENTIAL CLIMATE CHANGE EFFECTS AFTER 2055 AD AND FOR REQUIREMENTS FOR GROUND WATER PUMPING IN THE FUTURE.
4. CLAY BLANKET NG IS PROVIDED ON THE FACES OF THE RAMP BATTERS ABOVE 3.80M RL TO NTERCEPT GROUND WATER ABOVE 3.80M RL . THE INTERCEPTED GROUND WATER IS DISCHARGED TO THE GRAVITY FLOW CHAMBERS.
5. GROUND WATER BELOW 3.80M RL W LL NOT BE PUMPED. HOWEVER, PERFORATED P PES LEADING TO THE SUMP WELLS ARE LAID AT LOWER LEVELS. THESE P PES ARE END-CAPPED FOR THE CURRENT DESIGN WHICH MAY BE OPENED N THE FUTURE F GROUND WATER PUMP NG WAS NECESSARY .
6. THE WET WELLS AND VALVE CHAMBERS ARE SEALED TO PREVENT GROUND WATER INTRUSION, THEIR DESIGN IS A PART OF THE STRUCTURAL DESIGN.
7.



PLAN

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	YA	LW	50% ISSUE

1:250@ A1 1:500@ A3 0 4 8 12 16 20 24 m

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: N.T.S.

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

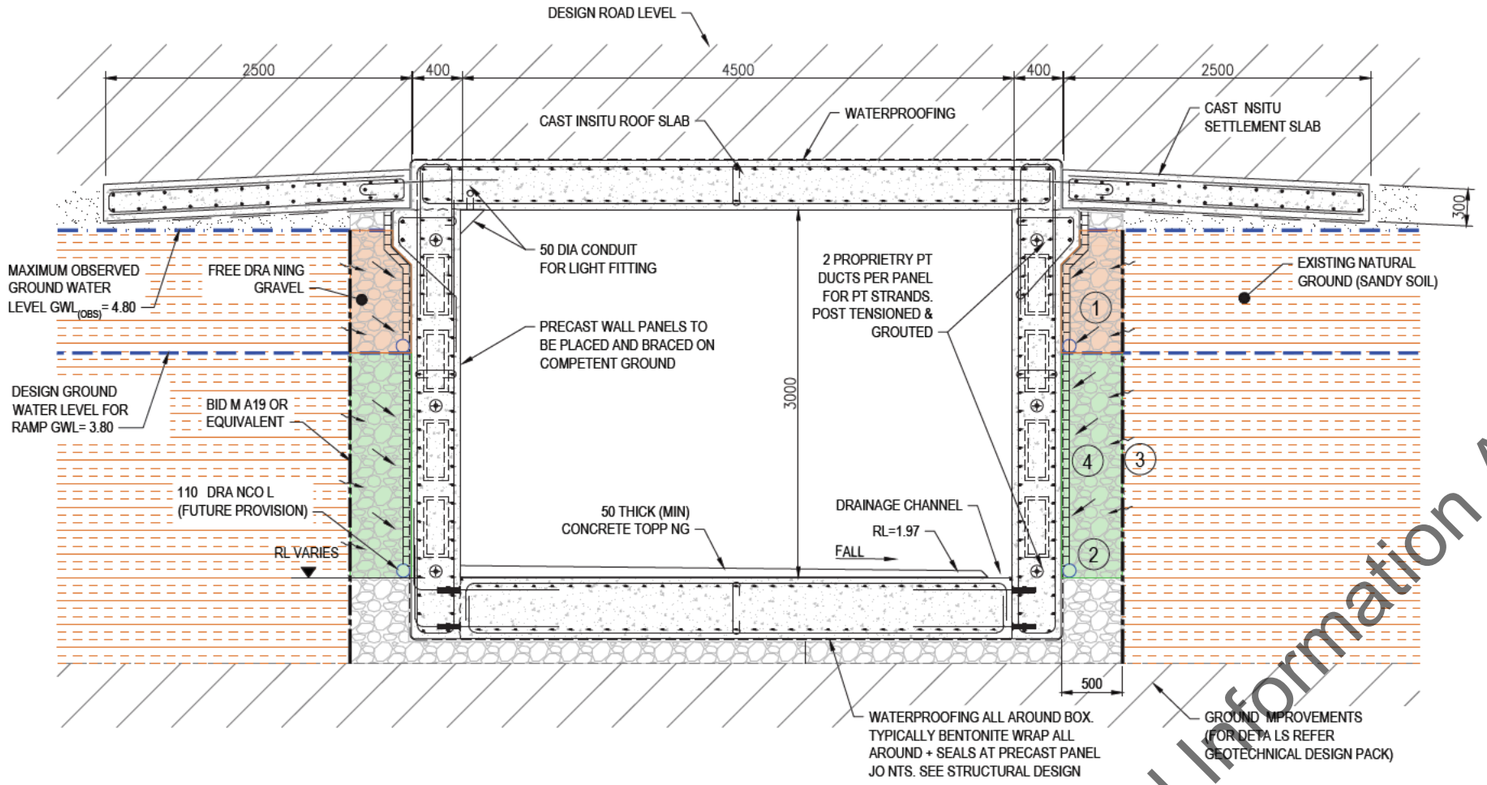
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW
DESIGNED: YA | DESIGN REVIEW: LW

TITLE: UNDERPASS UPGRADE MATAPIHI PUMP STATION DETAILS

DRAWING No: B2B-DRG-DR01-8431 | REV: A

DATE: 15/03/2019 1:07:41 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\gkaminsk\appdata\local\projectwise\jacobs_anz_ind\d1455961\B2B-DRG-DR01-8431.dwg



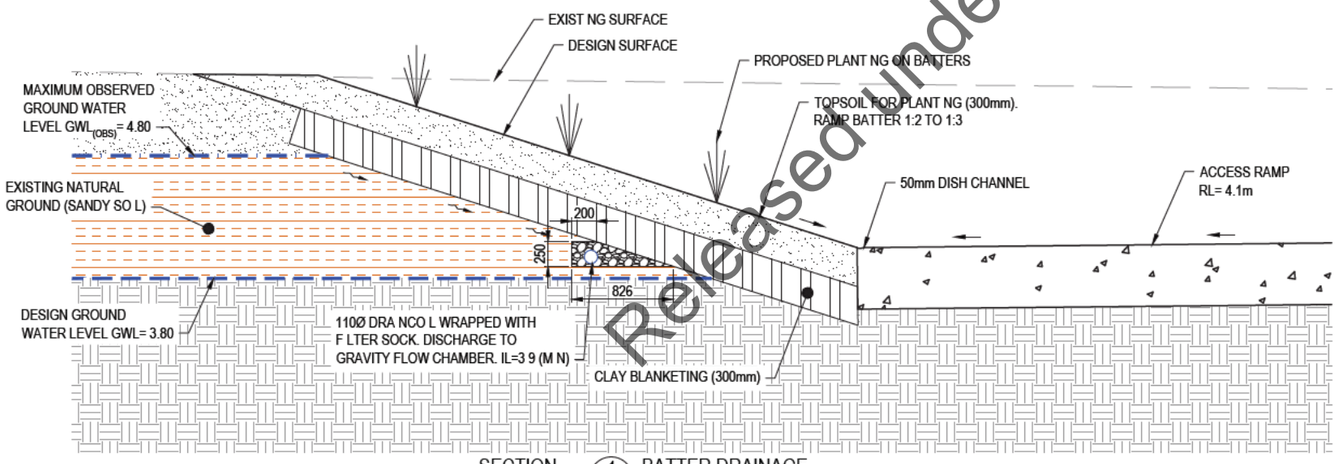
TYPICAL UNDERPASS GROUNDWATER DRAINAGE (FUTURE PROVISION)
SCALE 1:50 (A3)

NOTES

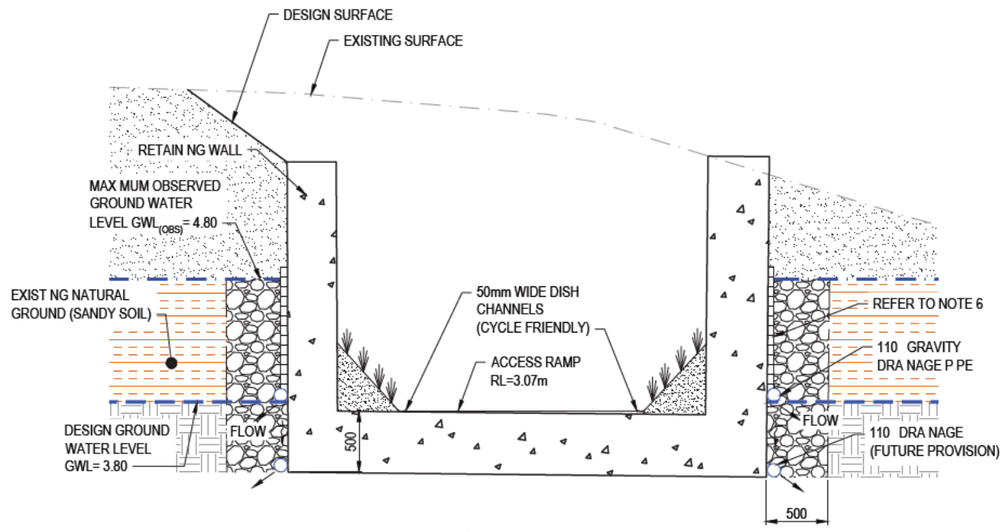
1. ALL DIMENSIONS ARE IN MILL METRES UNLESS STATED OTHERWISE.
2. THE UNDERPASS IS SEALED FROM EXTERNAL WATER PRESSURE UP TO A MAXIMUM LEVEL OF RL=6.0m.
3. GROUNG WATER IS GENERALLY AT OR BELOW RL=3.8m. IT HAS RISEN TO RL=4.8m DUR NG RARE EVENTS.
4. IT IS NOT PROPOSED TO PUMP GROUNDWATER BELOW RL=3.8m BUT PROVISION IS MADE TO DRAIN FREELY FLOWING GROUNDWATER (FOR FUTURE). DRAINCOILS AT SUMP WELLS ARE ENDCAPPED.
5. RETAIN NG WALLS AND ACCESS RAMPS ARE SEALED FOR GROUNDWATER UP TO RL=3.8m.
6. VERTICAL STRIP DRAINS (ATLANTIS DRA N OR S MILAR) ARE NSTALLED BEHIND RETA NING WALLS TO INTERCEPT FREELY DRA NING GROUNDWATER (RL=3.8m TO RL=4.8m).
7. THE INTERCEPTED GROUNDWATER IS PUMPED TO GRAVITY FLOW CHAMBER FROM WHERE IT DISCHARGES TO MH SP1 2 BY GRAVITY.

KEY - DRAINAGE

1. 110Ø DRAINCO L WRAPPED WITH F LTER SOCK AT RL= 3.8m.
2. 110Ø DRAINCO L WRAPPED WITH F LTER SOCK AT RL=2.0m.
3. GEOTEXTILE (A29 OR S MILAR).
4. VERTICAL STRIP DRAINAGE CELLS WRAPPED WITH GEOTEXT LE.



SECTION 1 8422 BATTER DRAINAGE
SCALE 1 50 (A3)



SECTION 2 8422 RETAINING WALL DRAINAGE
SCALE 1:50 (A3)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	CTC	YA		50% ISSUE

1:1000 @ A1
1:2000 @ A3
0 10 20 30 40 50 60 70 80 90 100 m

CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:50 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	CTC
DRAWING CHECK	
APPROVED	
DESIGNED	YA
DESIGN REVIEW	
TITLE	UNDERPASS UPGRADE DRAINAGE TYPICAL DETAILS
DRAWING No	B2B-DRG-DRG-8424
REV	A

DATE: 15/03/2019 11:12:44 AM LOGIN NAME: CHAN, TACK
LOCATION: C:\Users\TChan\Desktop\B2B\2019.02.27\B2B-DRG-8001-XXXX\B2B-DRG-8001-XXXX.dwg

DRAWING NUMBER	REVISION	TITLE 1	TITLE 2	TITLE 3
B2B-DRG-BR05-8500	B	BR05 - PEDESTRIAN UNDERPASS	DRAWING LIST	
B2B-DRG-BR05-8501	B	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - UNDERPASS
B2B-DRG-BR05-8502	B	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - MATAP HI RAMP
B2B-DRG-BR05-8503	B	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - BAYFA R RAMP
B2B-DRG-BR05-8511	B	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS	
B2B-DRG-BR05-8512	B	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS & DETAILS	SHEET 1
B2B-DRG-BR05-8513	B	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS & DETAILS	SHEET 2
B2B-DRG-BR05-8521	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	TYPE BR05-PB1
B2B-DRG-BR05-8522	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	TYPE BR05-PB1
B2B-DRG-BR05-8523	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	STEEL RAIL ELEVATIONS
B2B-DRG-BR05-8524	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	STEEL RAIL DETAILS

DATE: 15/03/2019 4:30:09 PM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_ie\d0145599\B2B-DRG-BR05-8500.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	TFK	LW	50□ ISSUE
A	08/03/19	GKK	TKF	LW	PRELIMINARY - FOR PRICING

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: N.T.S.

STATUS: 50□ ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW MAR 2019

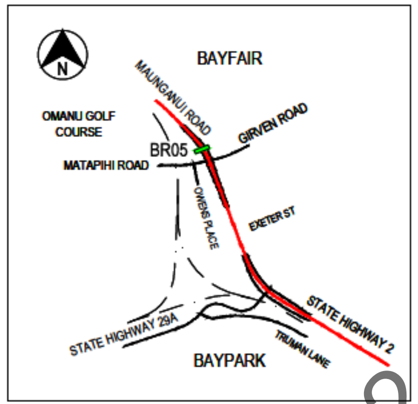
DESIGNED: TKF | DESIGN REVIEW: SKK

TITLE: BR05 - PEDESTRIAN UNDERPASS DRAWING LIST

DRAWING No: B2B-DRG-BR05-8500 | REV: B

BR05 - PEDESTRIAN UNDERPASS

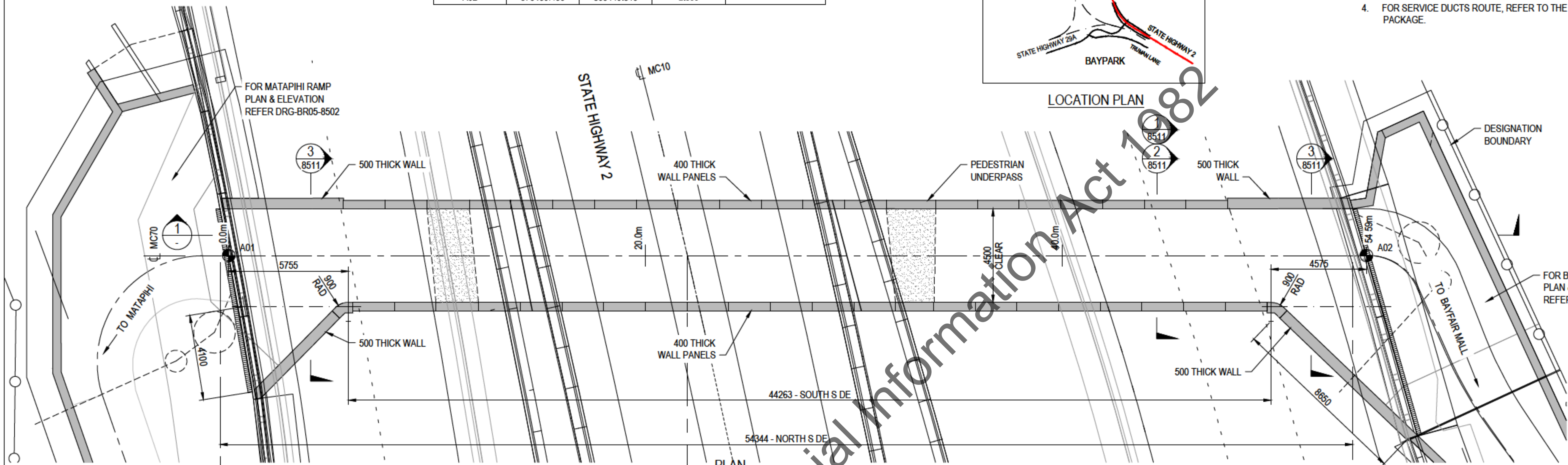
SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
A01	378438.244	809430.359	1.980	
A02	378489.436	809449.319	2.300	



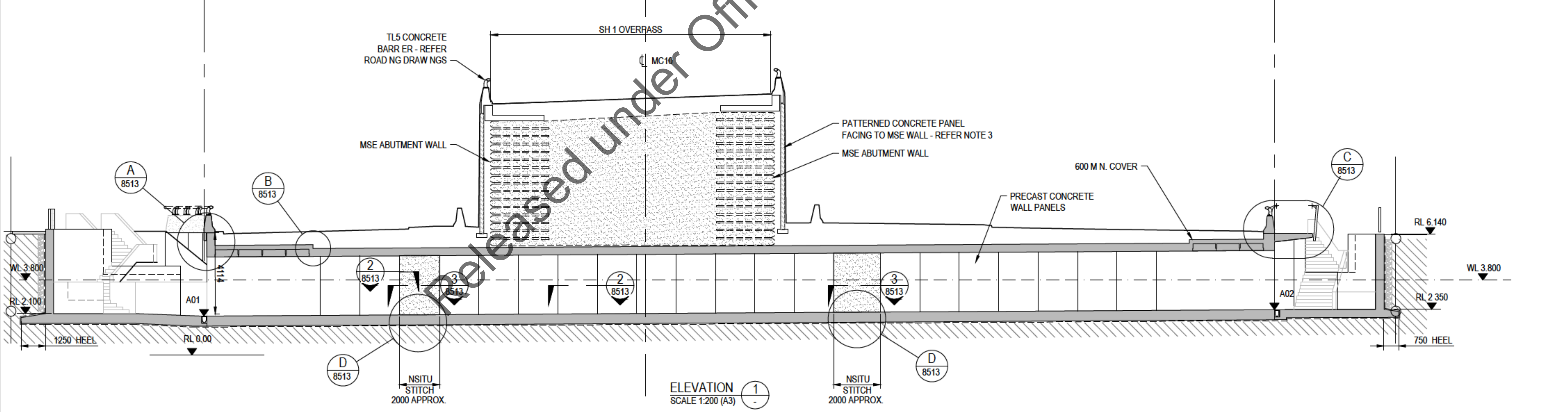
LOCATION PLAN

NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
3. FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. FOR SERVICE DUCTS ROUTE, REFER TO THE UTILITIES DESIGN PACKAGE.



PLAN
SCALE 1:200 (A3)



ELEVATION
SCALE 1:200 (A3)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:100 A1 / 1:200 A3 — 0 1 2 3 4 5 6 7 8 9 10

CLIENT: NZ TRANSPORT AGENCY
CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor

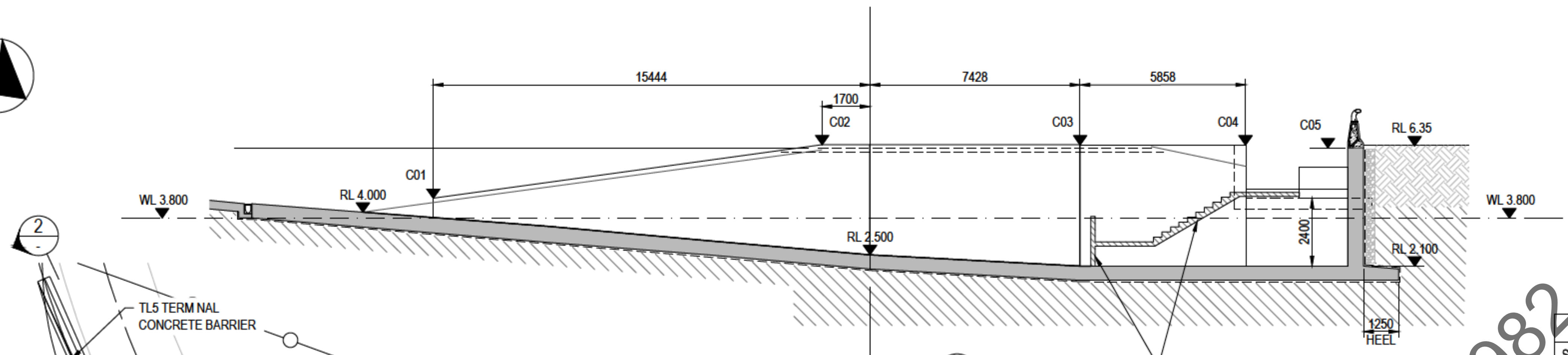
SCALE: 1:200 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN	DRAWING CHECK	APPROVED
DCC	GKK	LW
DESIGNED	DESIGN REVIEW	MAR 2019
TKF	SKK	

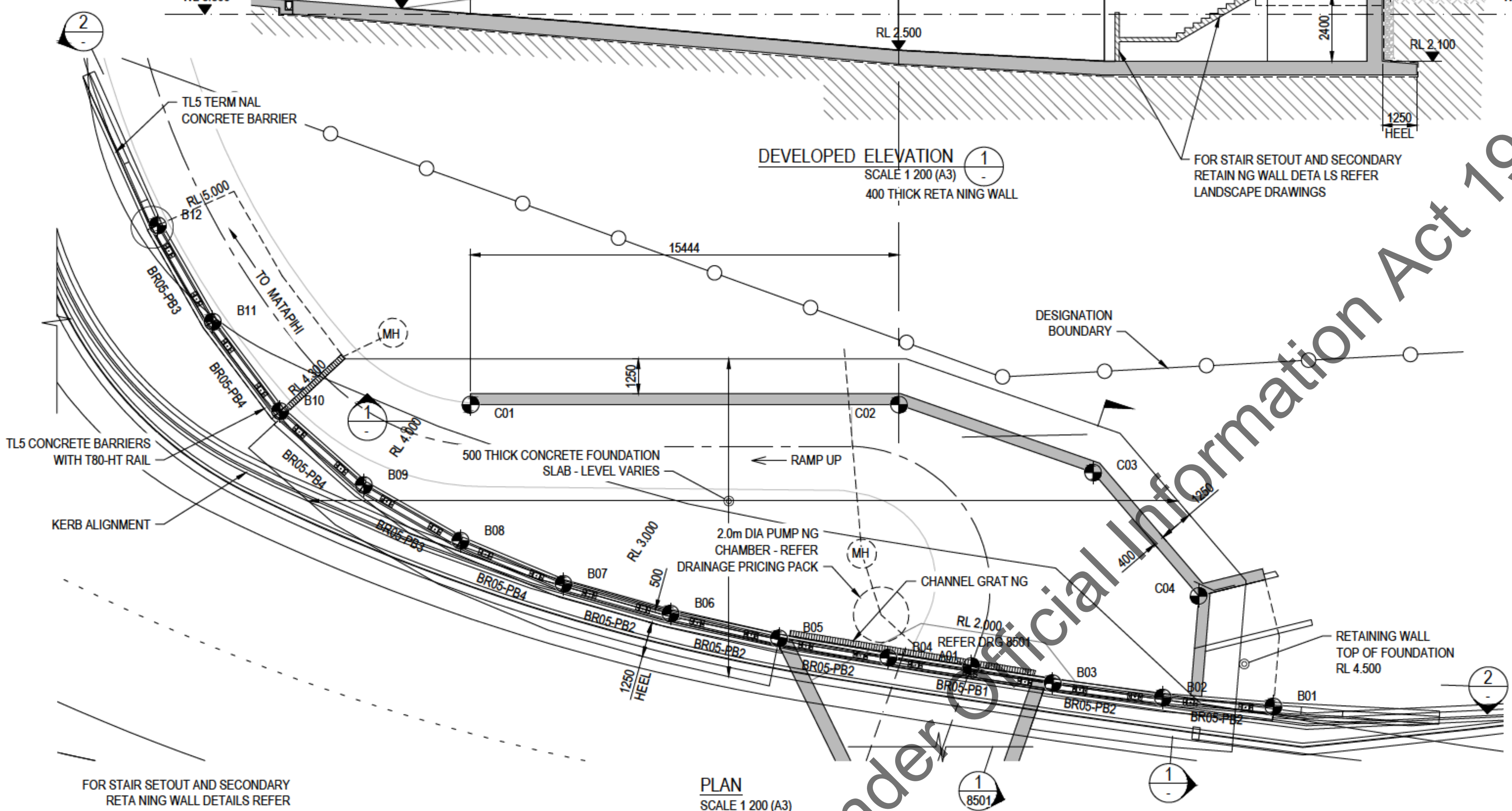
TITLE: BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT UNDERPASS - PLAN & ELEVATION

DRAWING No: B2B-DRG-BR05-8501 REV: B

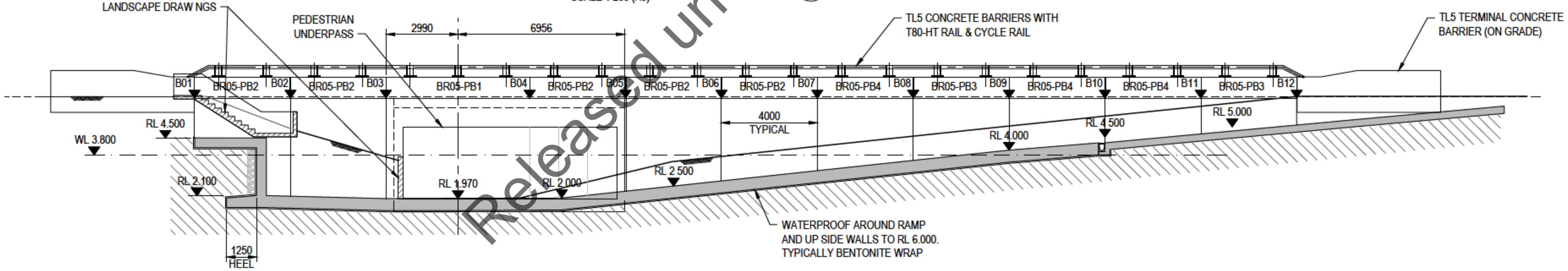


DEVELOPED ELEVATION 1
SCALE 1:200 (A3)
400 THICK RETAINING WALL

FOR STAIR SETOUT AND SECONDARY RETAINING WALL DETAILS REFER LANDSCAPE DRAWINGS



PLAN
SCALE 1:200 (A3)



DEVELOPED ELEVATION 2
SCALE 1:200 (A3)
500 THICK RETAINING WALL

NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
3. FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. FOR SERVICE DUCTS ROUTE REFER TO THE UTILITIES DESIGN PACKAGE.

BR05 - PEDESTRIAN UNDERPASS				
SETOUT POINT No.	CO-ORDINATES (m) E	CO-ORDINATES (m) N	DESIGN LEVEL (TOP OF WALL)	CONSTRUCTION LEVEL
B01	378432.430	809439.692	6.350	
B02	378434.717	809436.413	6.350	
B03	378436.848	809433.020	6.350	
B04	378439.916	809427.864	6.350	
B05	378441.892	809424.377	6.350	
B06	378443.696	809420.798	6.350	
B07	378445.326	809417.137	6.350	
B08	378446.498	809413.266	6.350	
B09	378447.170	809409.315	6.350	
B10	378447.036	378447.036, 809405.284	6.350	
B11	378446.098	809401.366	6.350	
B12	378444.684	809397.610	6.350	
C01	378442.478	809410.431	6.350	
C02	378432.644	809422.337	6.350	
C03	378430.059	809429.303	6.350	
C04	378431.063	809435.074	6.350	
C05	378434.018	809437.135	6.350	

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:100 A1 / 1:200 A3 — 0 1 2 3 4 5 6 7 8 9 10

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:200 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

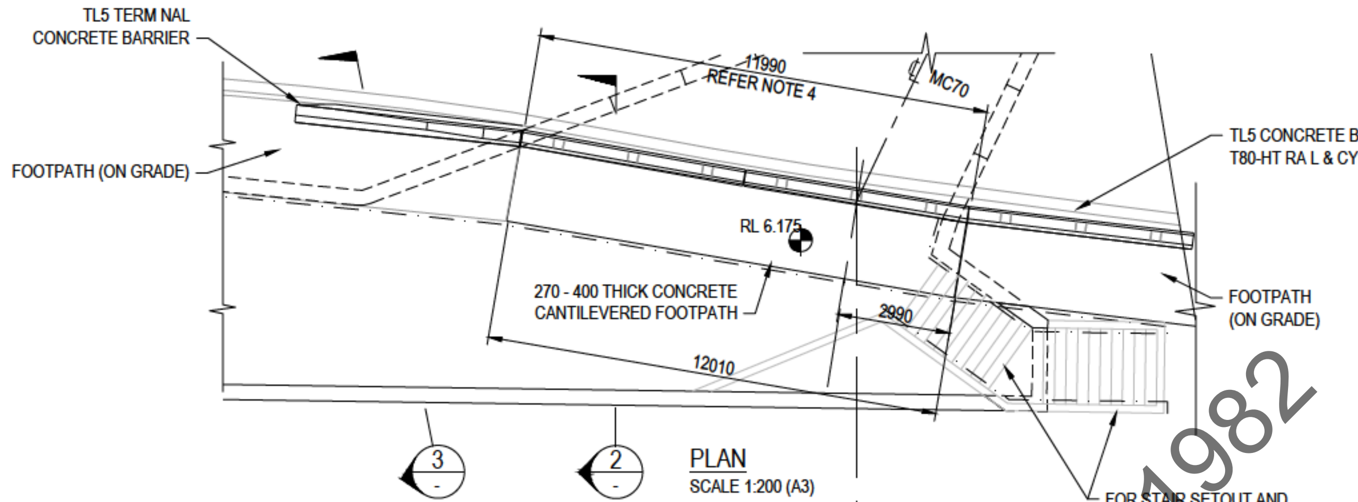
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

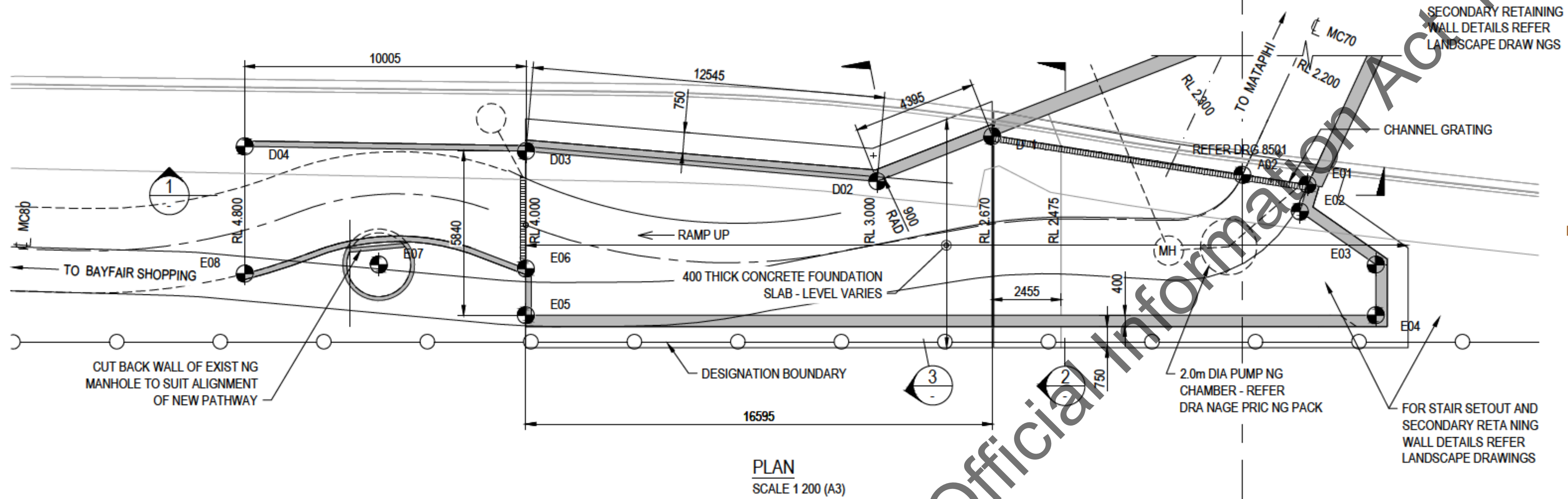
DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW
DESIGNED: TKF | DESIGN REVIEW: SKK | MAR 2019

TITLE: BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - MATAPIHI RAMP

DRAWING No: B2B-DRG-BR05-8502 | REV: B

DATE: 15/03/2019 4:50:37 PM LOGIN NAME: CONNON, DAVID C



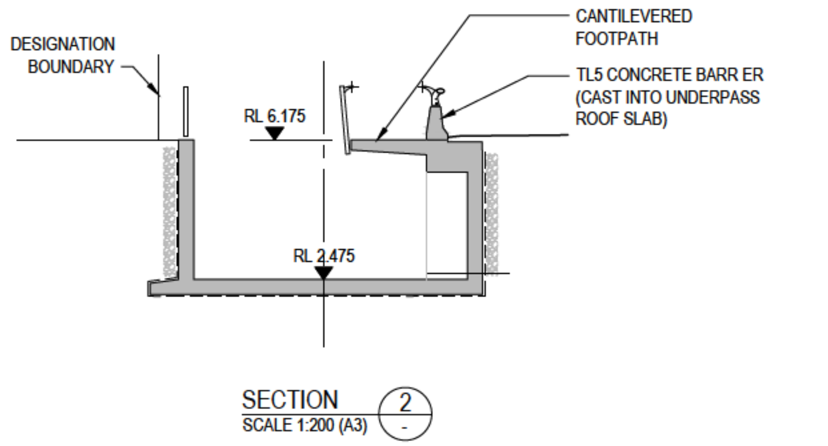


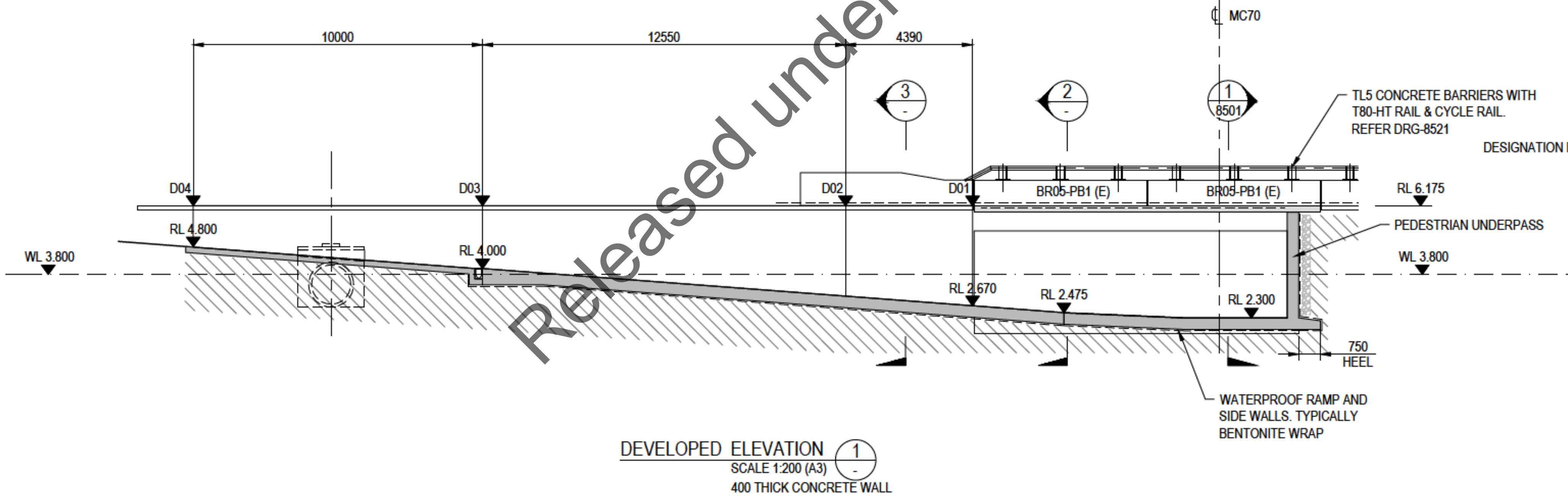
NOTES

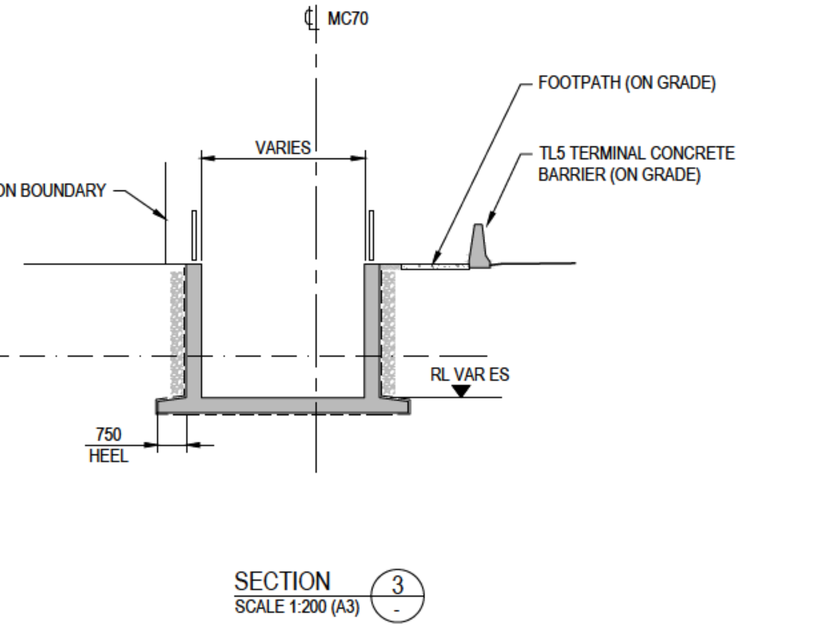
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS EITHER SIDE OF UNDERPASS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
3. FOR BARRIER & WALL PANEL PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. ROAD SAFETY BARRIER TO BE CENTRED ON THE UNDERPASS.

BR05 - PEDESTRIAN UNDERPASS

SETOUT POINT No.	CO-ORDINATES (m) E	CO-ORDINATES (m) N	DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
D01	378494.776	809442.061	6,000	
D02	378498.804	809440.317	6.000	
D03	378506.912	809430.736	6.000	
D04	378513.878	809423.560	6.000	
E01	378488.036	809451.200	6.000	
E02	378488.907	809451.684	6.000	
E03	378488.323	809454.932	6.000	
E04	378489.594	809456.209	6.000	
E05	378511.029	809434.873	6.000	
E06	378509.858	809433.697	4.850	
E07	378513.467	809429.906	6.000	
E08	378517.073	809426.773	6.000	







No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50 ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:100 A1 / 1:200 A3

CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:200 (A3)
STATUS: 50 ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

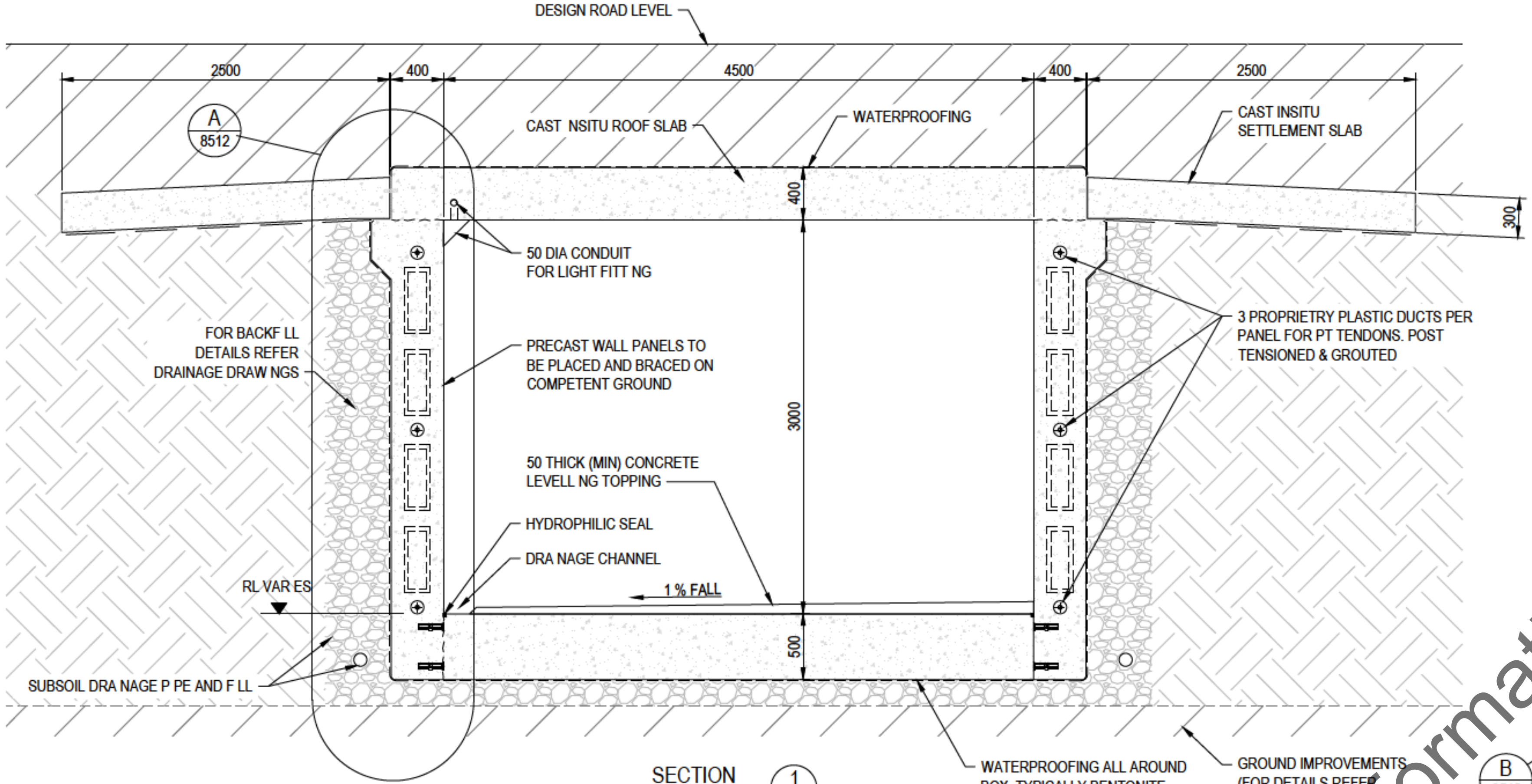
DRAWN: DCC
DESIGNED: TKF
DRAWING CHECK: GKK
DESIGN REVIEW: SKK
APPROVED: LW, MAR 2019

TITLE: BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - BAYFAIR RAMP

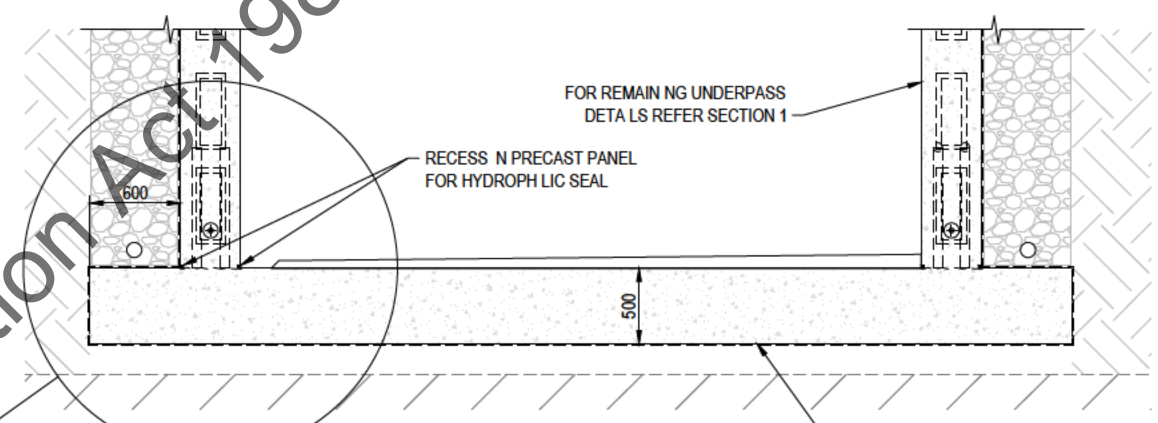
DRAWING No: B2B-DRG-BR05-8503
REV: B

NOTES

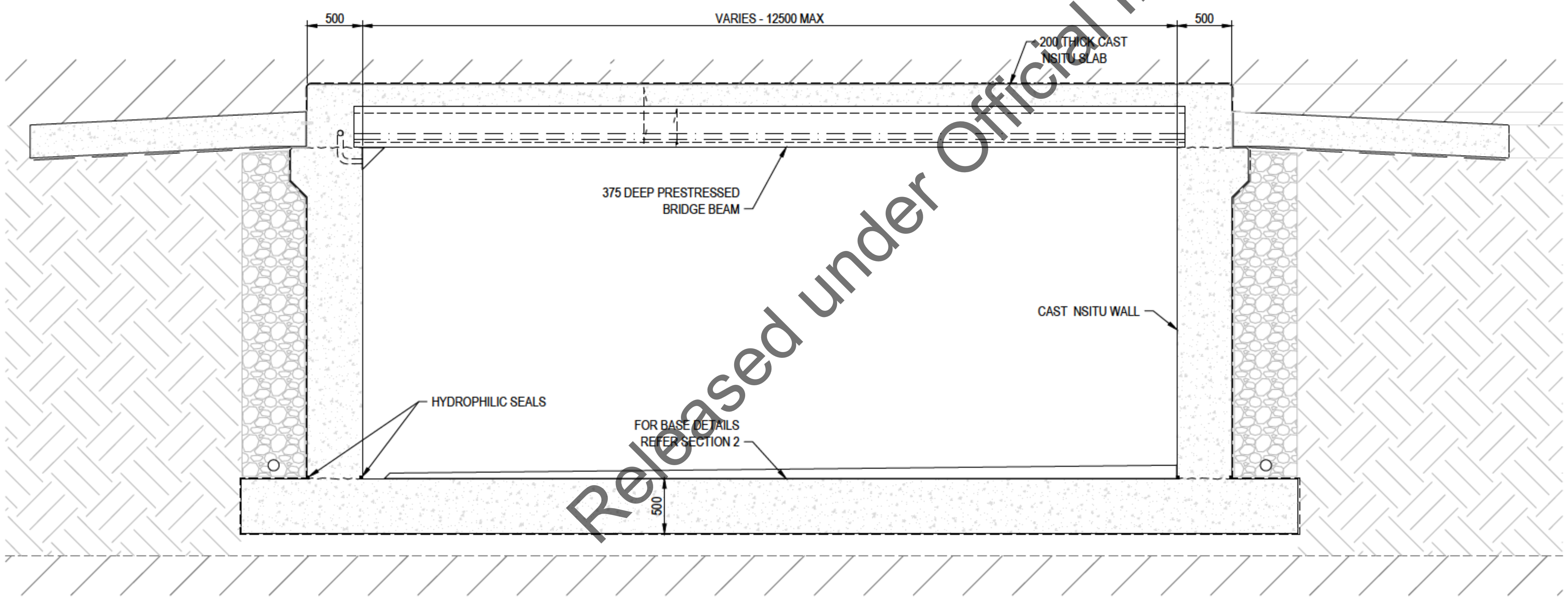
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS, REFER TO THE UT LITIES DESIGN PACKAGE.



SECTION 1/8101
SCALE 1 50 (A3)
TYPICAL UNDERPASS SECTION



SECTION 2/8101
SCALE 1:50 (A3)
ALTERNATIVE BASE OPTION



SECTION 3/8101
SCALE 1 50 (A3)
SPLAYED UNDERPASS END SECTION

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50 ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:25 A1 / 1:50 A3 — 0 400 800 1200 1600 2000 2400

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:50 (A3)
STATUS: 50 ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW
DESIGNED: TKF | DESIGN REVIEW: SKK | MAR 2019

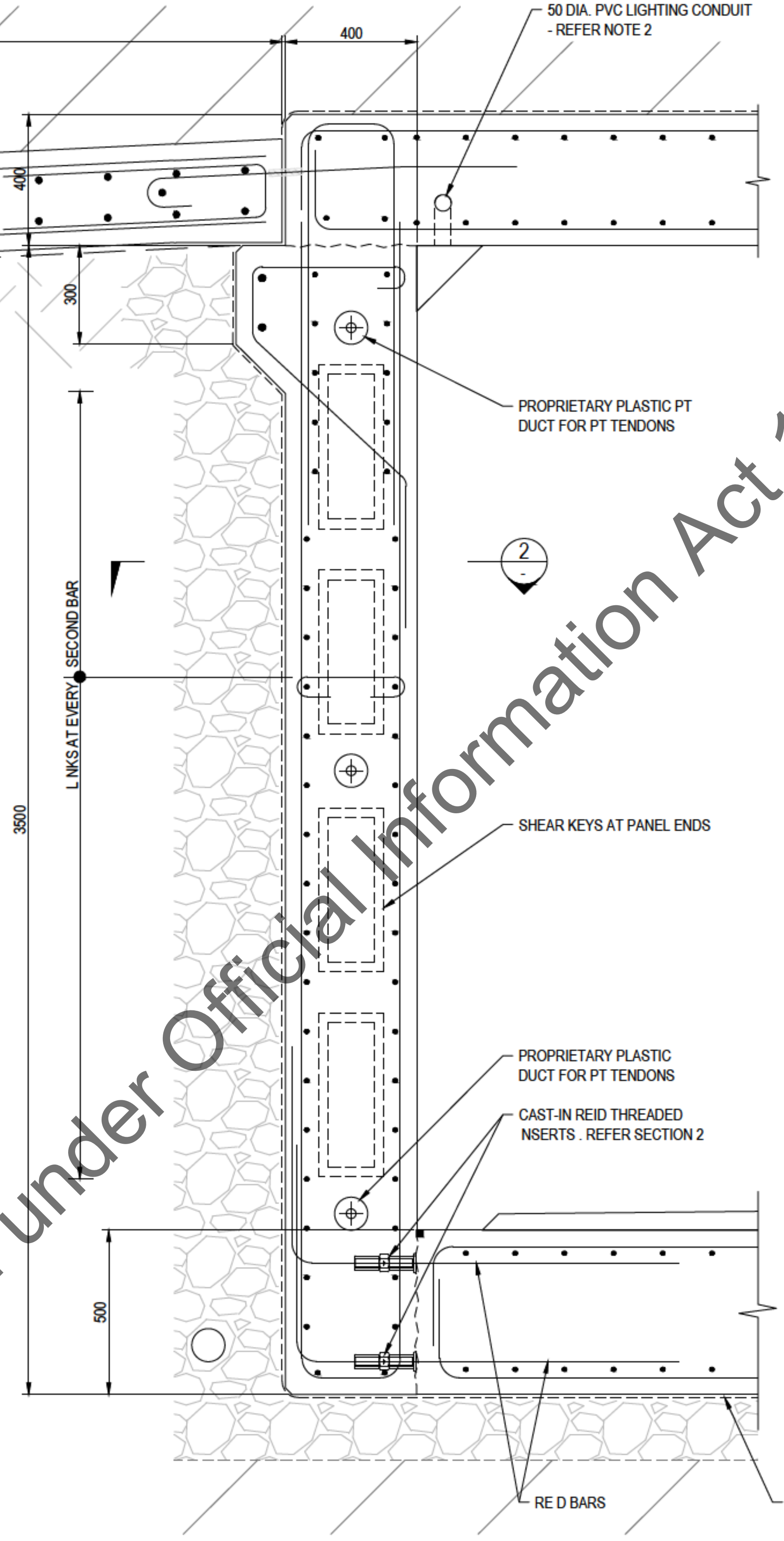
TITLE: BR05 - PEDESTRIAN UNDERPASS TYPICAL SECTIONS

DRAWING No: B2B-DRG-BR05-8511 | REV: B

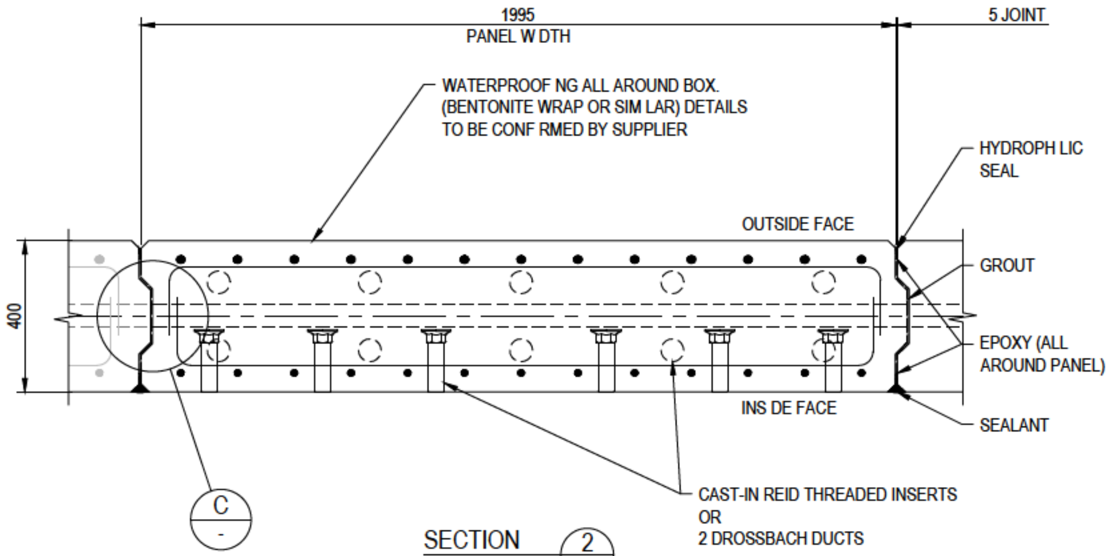
DATE: 15/03/2019 5:14:26 PM LOGIN NAME: CONNON, DAVID C

NOTES

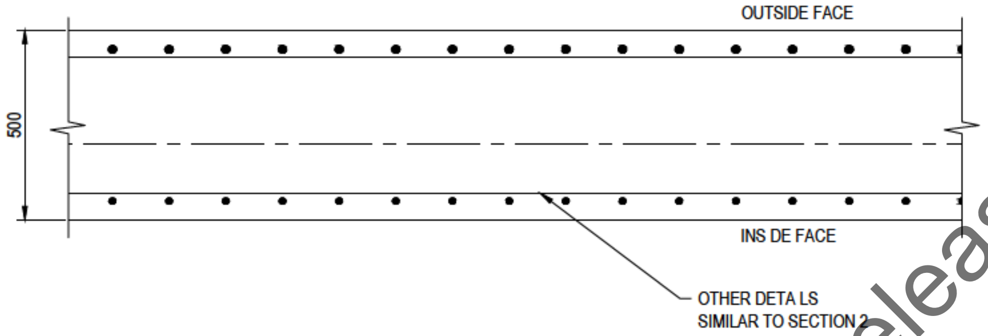
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS, REFER TO THE UT LITIES DESIGN PACKAGE.



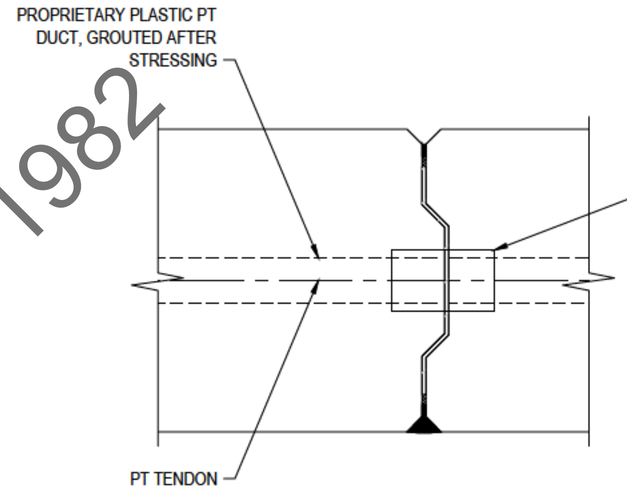
DETAIL A (8511)
SCALE 1:20 (A3)
REIDBAR OPTION



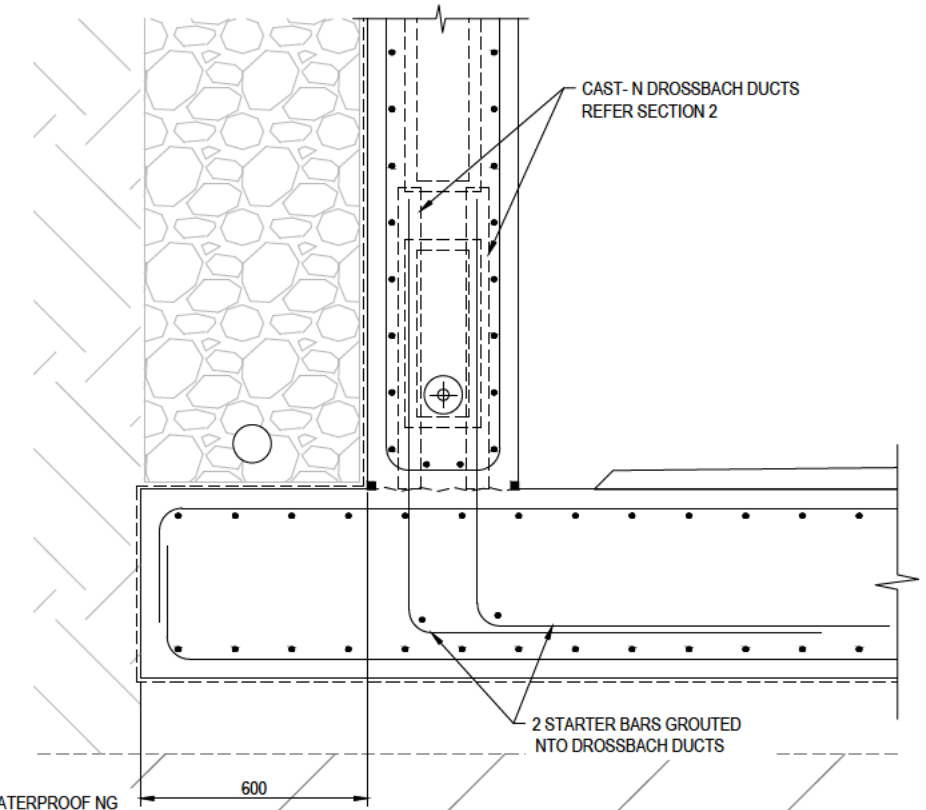
SECTION 2
SCALE 1 20 (A3)
TYPICAL 400 THICK PRECAST PANEL SECTION



SECTION 3 (8511)
SCALE 1 20 (A3)
TYPICAL 500 THICK CAST INSITU WALL



DETAIL C
SCALE 1:10 (A3)



DETAIL B (8511)
SCALE 1 20 (A3)
DROSSBACH OPTION

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50□ ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:10□ A1 / 1:20□ A3 — 0 100 200 300 400 500 600 700 800 900 1000

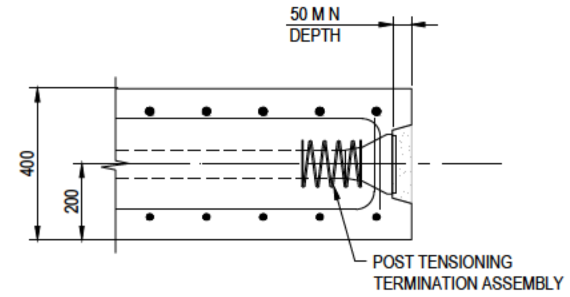
CONTRACTOR	CPB CONTRACTORS
DESIGNER	JACOBS / Align / Tonkin+Taylor
SCALE	1:20 (A3)
STATUS	50□ ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	DCC
DRAWING CHECK	GKK
DESIGNED	TKF
DESIGN REVIEW	SKK
APPROVED	LW MAR 2019
TITLE	BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS SHEET 1
DRAWING No	B2B-DRG-BR05-8512
REV	B

NZ TRANSPORT AGENCY WAKA KOTAHI

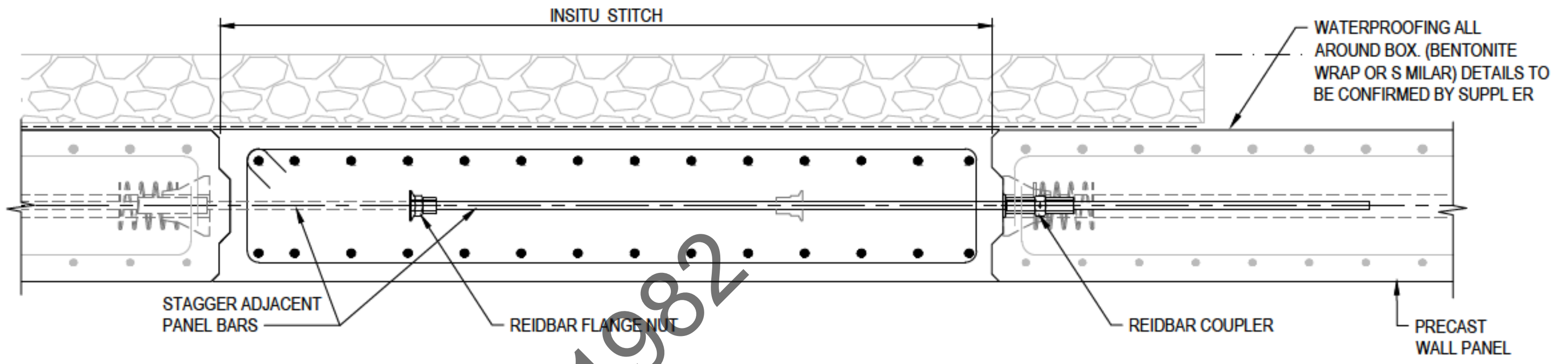
DATE: 15/03/2019 7:16:08 PM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_id\d0145598\B2B-DRG-BR05-8512.dwg

NOTES

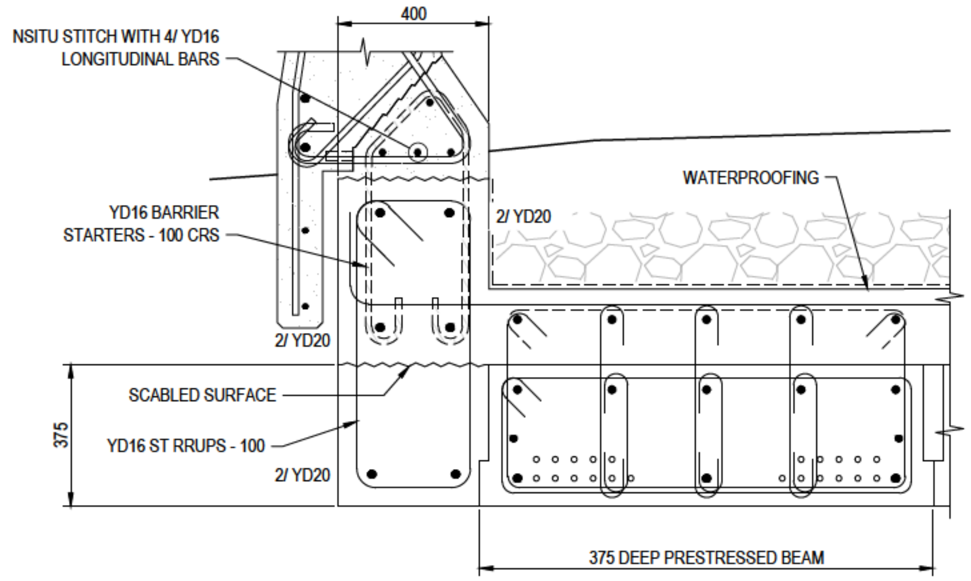
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.



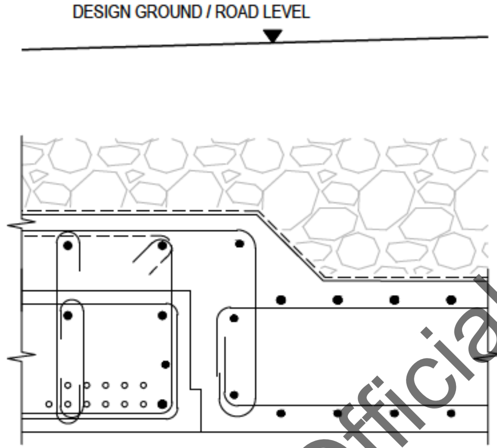
SECTION 2 / 8501
SCALE 1 20 (A3)
POST TENSIONING TERMINATION
AT STITCH PANEL & END PANEL



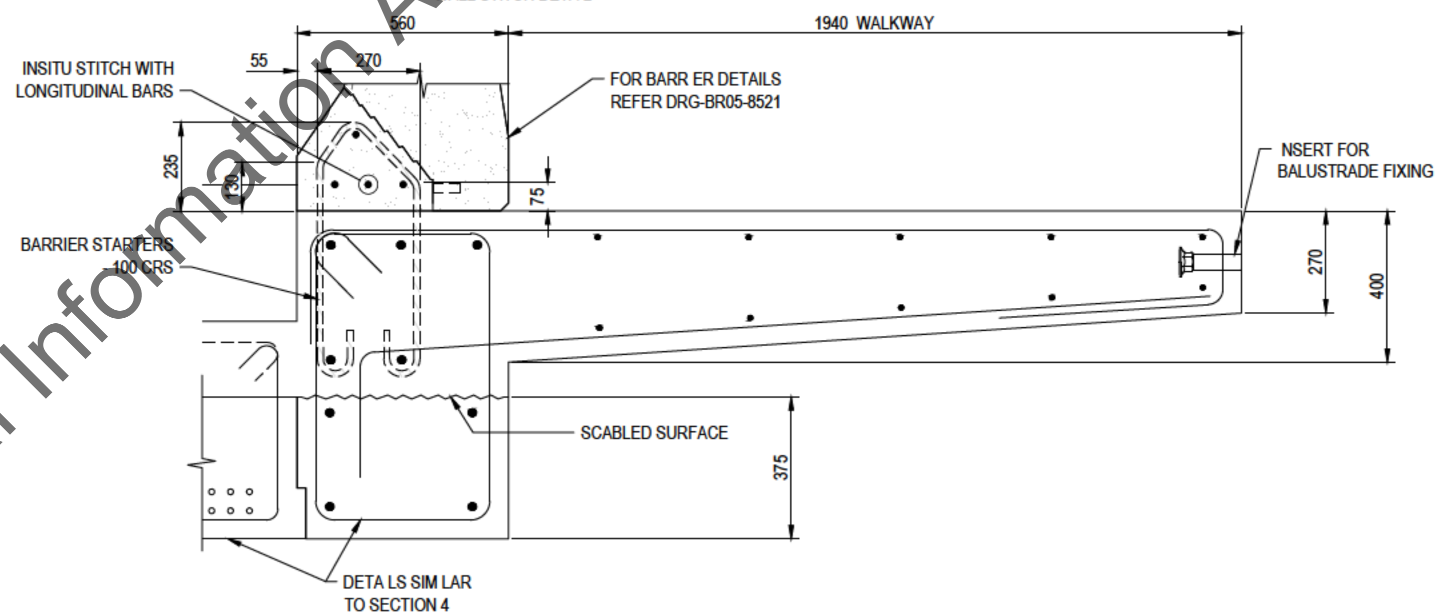
SECTION 3 / 8501
SCALE 1 20 (A3)
WALL STITCH DETA L



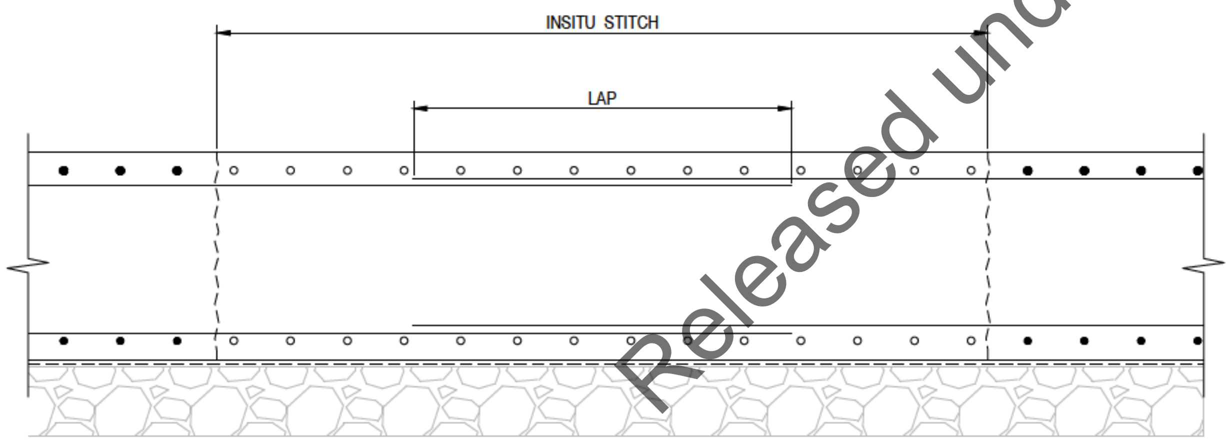
DETAIL 4 / 8501
SCALE 1 20 (A3)



DETAIL 5 / 8501
SCALE 1:20 (A3)
ROOF STEP DETAIL



DETAIL 6 / 8501
SCALE 1:20 (A3)



DETAIL 8 / 8501
SCALE 1:20 (A3)
BASE STITCH DETAIL
(ROOF STITCH SIM LAR)

DATE: 15/03/2019 7:22:37 PM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dcconnon\appdata\local\projectwise\jacobs_anz_ids\d0145559\B2B-DRG-BR05-8513.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50 ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

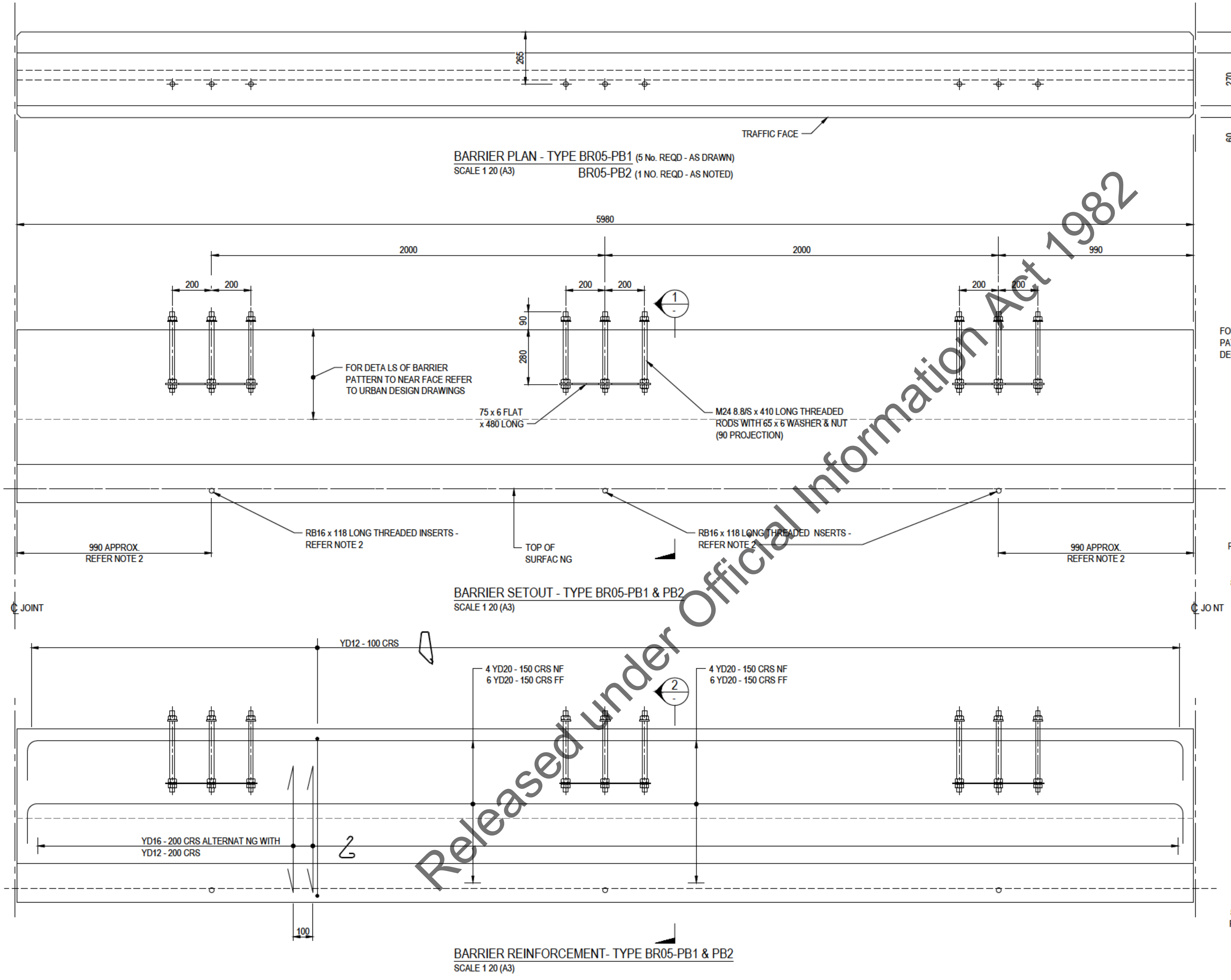
1:10 A1 / 1:20 A3 — 0 100 200 300 400 500 600 700 800 900 1000

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

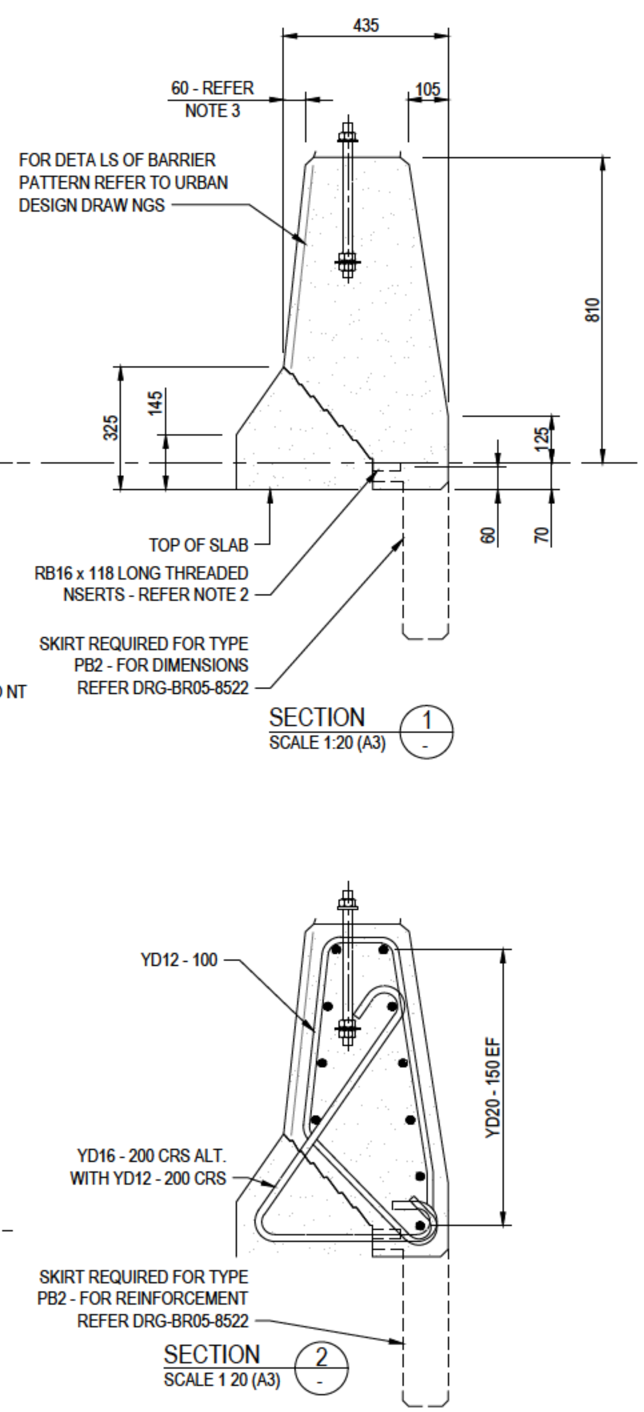
DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:20 (A3)
STATUS	50 ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	DCC
DRAWING CHECK	GKK
DESIGNED	TKF
DESIGN REVIEW	SKK
APPROVED	LW, MAR 2019
TITLE	BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS SHEET 2
DRAWING No	B2B-DRG-BR05-8513
REV	B



NOTES

1. FOR GENERAL NOTES REFER DRAW NGS DRG-BG01-5001 TO DRG-BG01-5005.
2. PROVIDE RB16 x 118 LONG THREADED NSERTS (PART No. RBA16TI) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS F REQU RED.
3. FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAW NGS.
4. ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)



No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50 ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:50 A1 / 1:100 A3 — 0 50 100 150 200 250 300 350 400 450 500

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)

STATUS: 50 ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

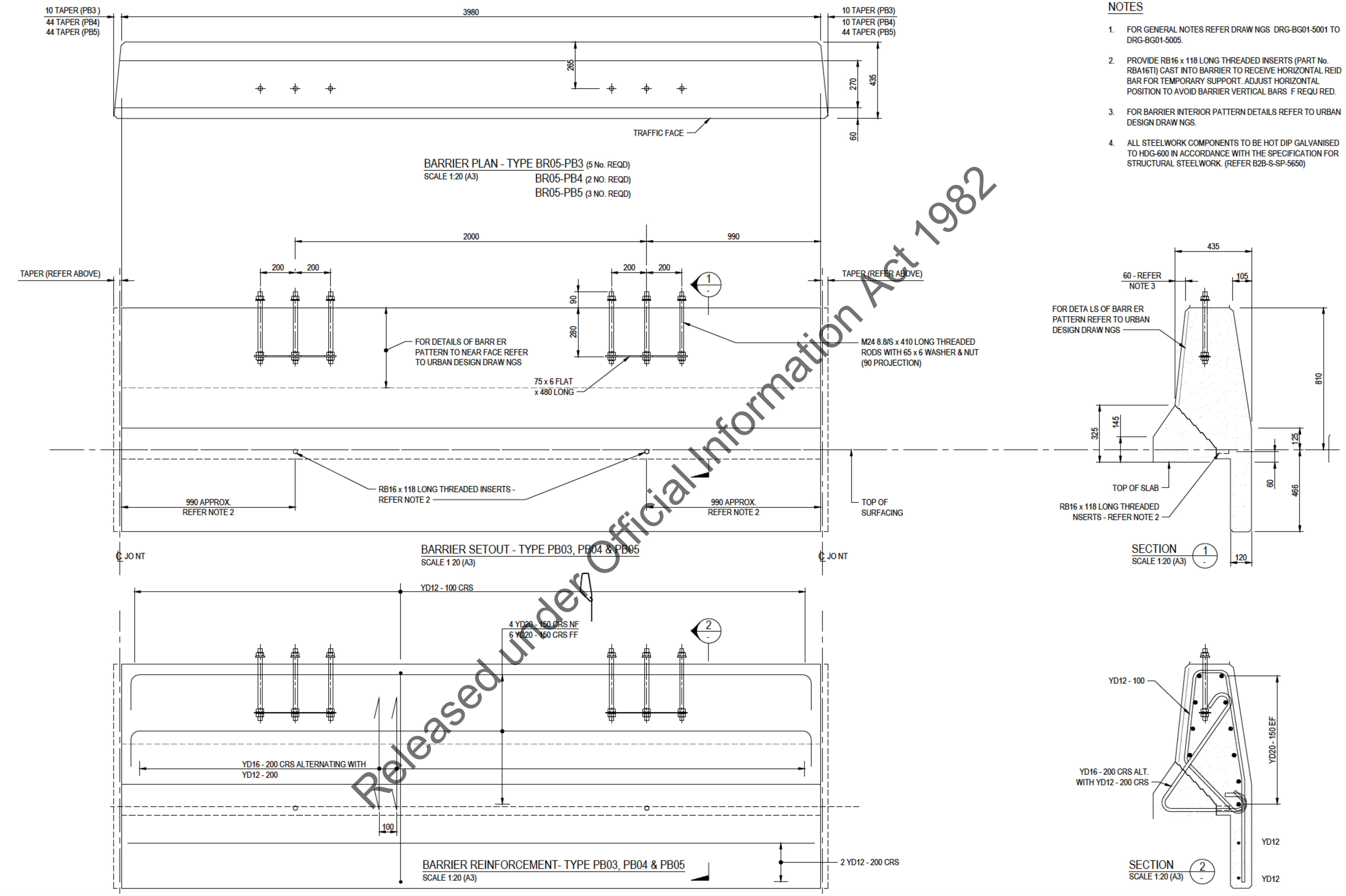
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW MAR 2019
DESIGNED: TKF | DESIGN REVIEW: SKK

TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB1 & PB2

DRAWING No: B2B-DRG-BR05-8521 | REV: B

DATE: 15/03/2019 7:28:23 PM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_id\d0145598\B2B-DRG-BR05-8521.dwg



NOTES

1. FOR GENERAL NOTES REFER DRAW NGS DRG-BG01-5001 TO DRG-BG01-5005.
2. PROVIDE RB16 x 118 LONG THREADED INSERTS (PART No. RBA16TI) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS F REQU RED.
3. FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAW NGS.
4. ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50 ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:5 A1 / 1:10 A3 — 0 50 100 150 200 250 300 350 400 450 500

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)

STATUS: 50 ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

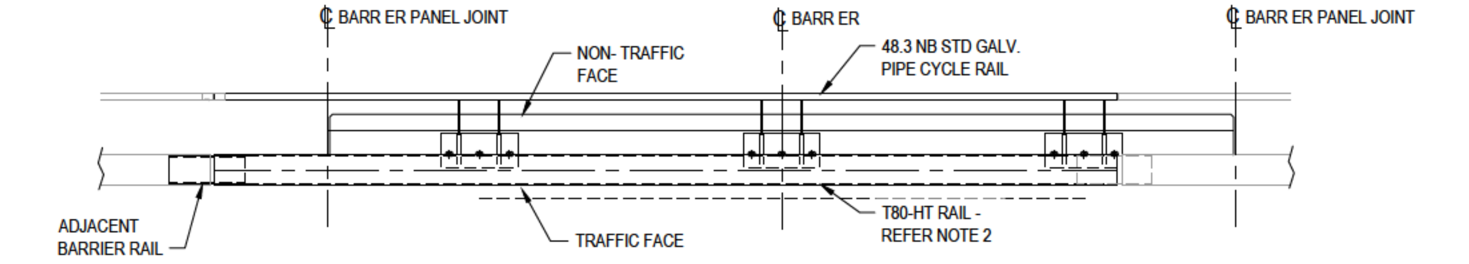
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN	DRAWING CHECK	APPROVED
DCC	GKK	LW
DESIGNED	DESIGN REVIEW	MAR 2019
TKF	SKK	

TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB3, PB4 & PB5

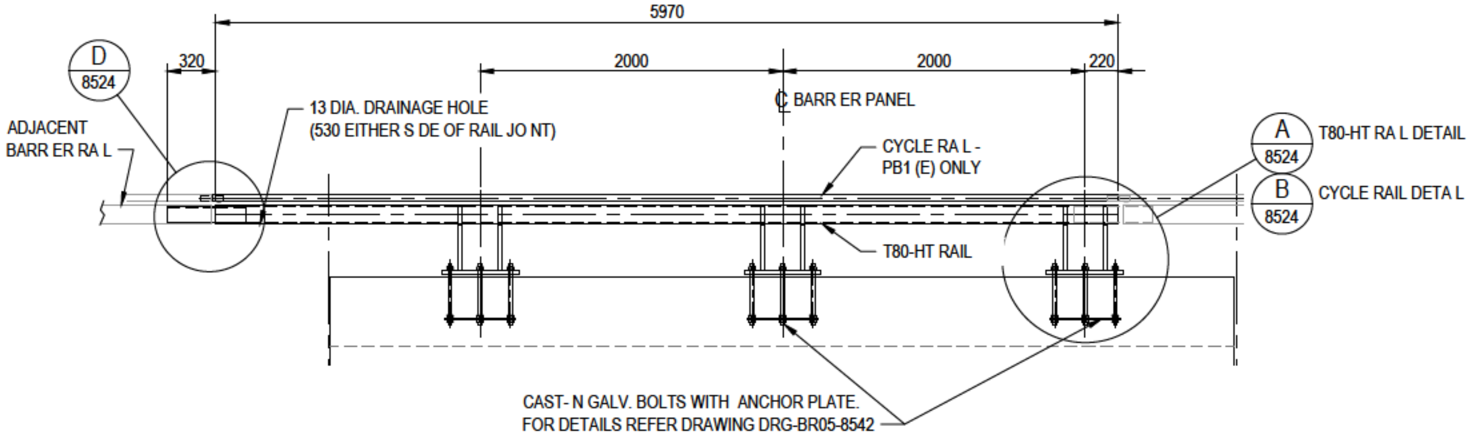
DRAWING No: B2B-DRG-BR05-8522 REV B

DATE: 15/03/2019 7:32:51 PM LOGIN NAME: CONNON, DAVID C



PLAN - PB1 (E)
SCALE 1:50 (A3)
EAST RAIL PLAN - AS DRAWN

PLAN - PB1 (W)
SCALE 1:50 (A3)
WEST RAIL PLAN - SIMILAR (NO CYCLE RAIL)



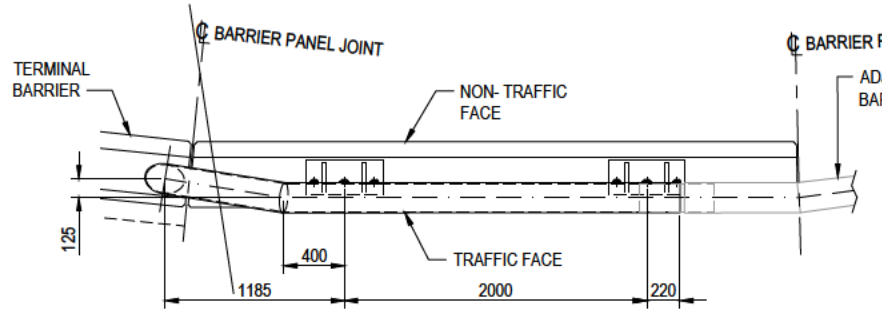
TYPICAL RAILING ELEVATION
SCALE 1:50 (A3)
XX No. REQD

NOTES

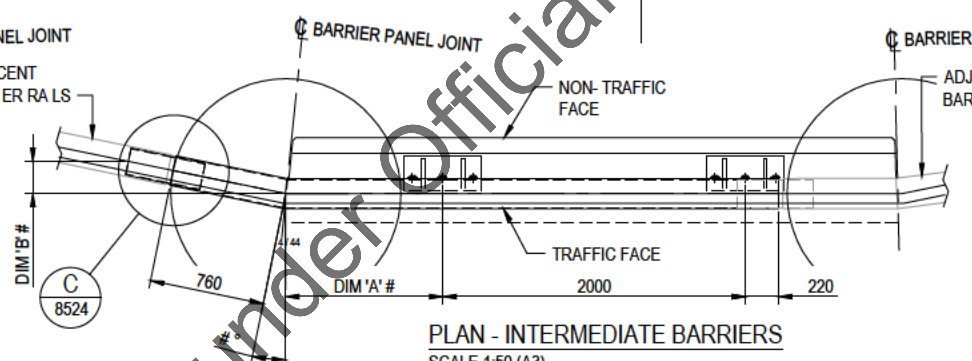
1. FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
2. BARRIER RAIL TO BE -
   EITHER 150 NB ULTRAP PE C350LO AS/NZS1163,
   OR 6" DIAMETER STEEL PIPE ASTM A53 TYPE E OR S, GRADE B
   OR 6 5/8" O.D. PIPE x .188" API-5LX52
   AND ROLLED TO 203 WIDE x 124 DEEP ELLIPTICAL SHAPE.
3. # - DENOTES DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL

RAIL SCHEDULE

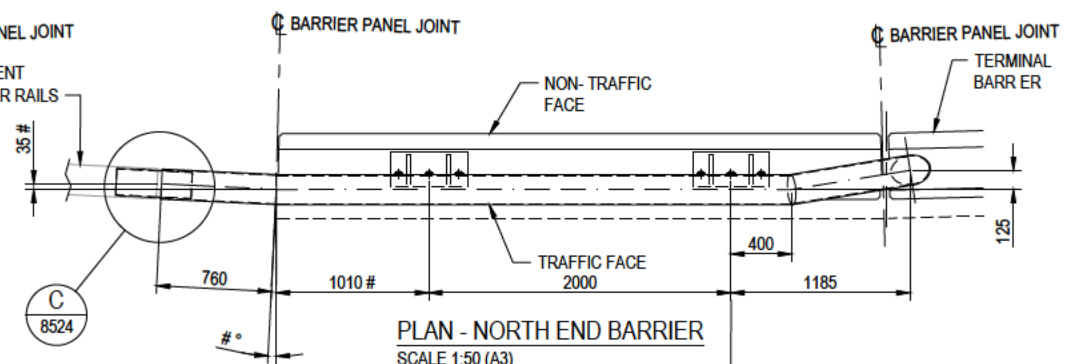
BARRIER TYPE	DIM 'A'	DIM 'B'
PB3	REFER NORTH END PLAN BELOW	
PB3	1010	18
PB2	1000	18
PB3	1010	37
PB3	1010	37
PB3	1005	95
PB5	1040	95
PB4	1040	152
PB5	1040	152
PB5	1040	95
PB4	REFER SOUTH END PLAN BELOW	



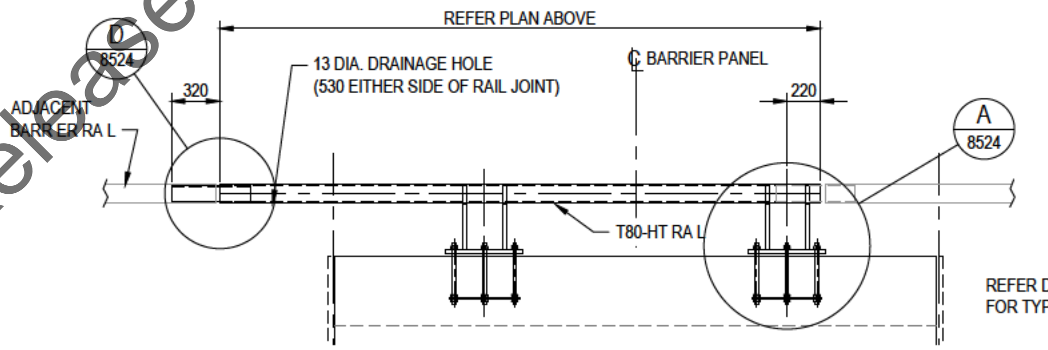
PLAN - SOUTH END BARRIER
SCALE 1:50 (A3)
1 No. REQD



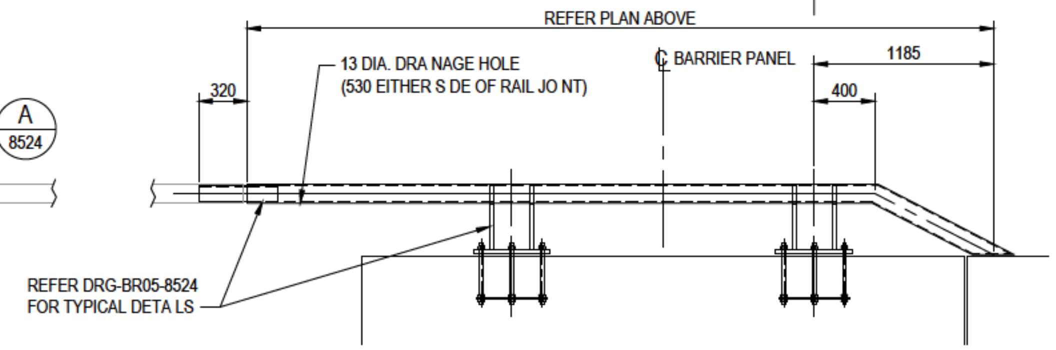
PLAN - INTERMEDIATE BARRIERS
SCALE 1:50 (A3)
NOTE : PB1(W) BARRIER HAS 3 BARRIER FIXINGS
- REFER 6.0m BARRIER ABOVE



PLAN - NORTH END BARRIER
SCALE 1:50 (A3)
1 No. REQD



TYPICAL RAILING ELEVATION
SCALE 1:50 (A3)



END RAILING ELEVATION
SCALE 1:50 (A3)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:25 A1 / 1:50 A3 — 0 400 800 1200 1600 2000 2400

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW, MAR 2019
DESIGNED: TKF | DESIGN REVIEW: SKK

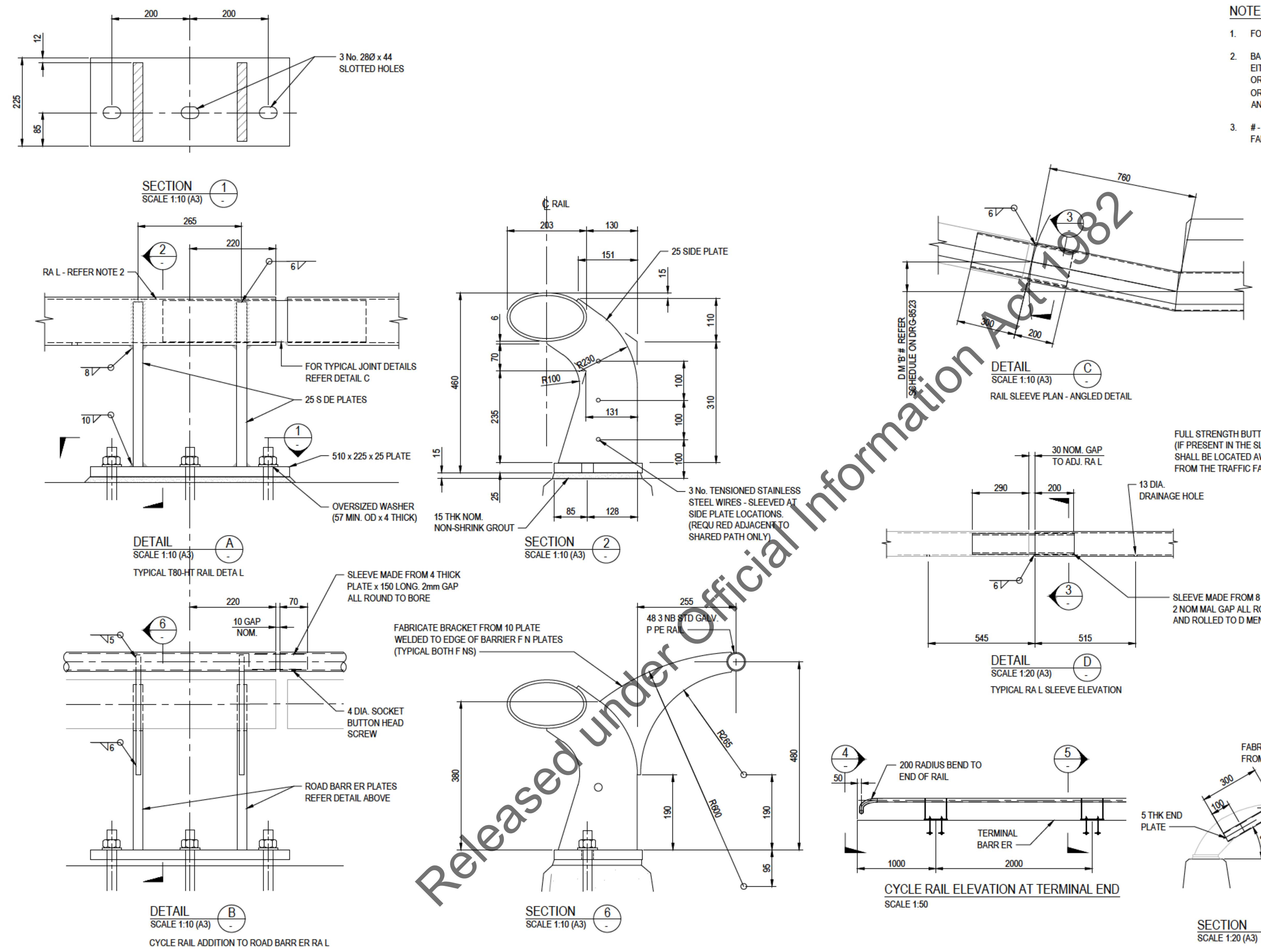
TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 1

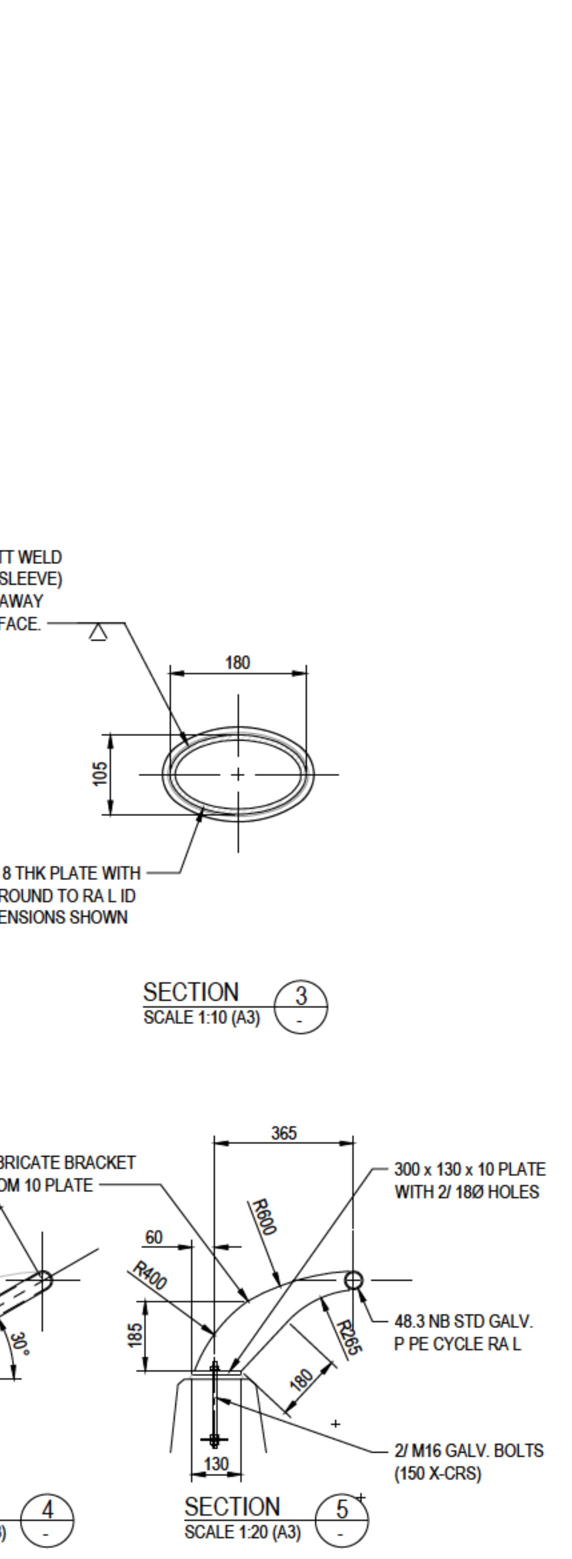
DRAWING No: B2B-DRG-BR05-8523 | REV: B

DATE: 15/03/2019 7:37:10 PM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_id\d0145599\B2B-DRG-BR05-8523.dwg

NOTES

1. FOR GENERAL NOTES REFER DRAW NGS DRG-BG01-001 TO 5005.
2. BARR ER RA L TO BE -
   EITHER 150 NB ULTRAP PE C350LO AS/NZS1163,
   OR 6" DIAMETER STEEL PIPE ASTM A53 TYPE E OR S, GRADE B
   OR 6 5/8" O.D. P PE x .188" API-5LX52
   AND ROLLED TO 203 WIDE x 124 DEEP ELL PTICAL SHAPE.
3. # - DENOTES D MENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL





1:10 A1 / 1:20 A3 — 0 100 200 300 400 500 600 700 800 900 1000
1:25 A1 / 1:50 A3 — 0 400 800 1200 1600 2000 2400
1:5 A1 / 1:10 A3 — 0 50 100 150 200 250 300 350 400 450 500

DATE: 15/03/2019 7:42:57 PM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_id\d0145596\B2B-DRG-BR05-8524.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50 ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

NZ TRANSPORT AGENCY — WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)
STATUS: 50 ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW
DESIGNED: TKF | DESIGN REVIEW: SKK | MAR 2019

TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 2

DRAWING No: B2B-DRG-BR05-8524 | REV: B

DRAWING NUMBER	REVISION	TITLE 1	TITLE 2	TITLE 3
B2B-DRG-BR05-8500	C	BR05 - PEDESTRIAN UNDERPASS	DRAWING LIST	
B2B-DRG-BR05-8501	C	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - UNDERPASS
B2B-DRG-BR05-8502	C	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - MATAP HI RAMP
B2B-DRG-BR05-8503	C	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - BAYFA R RAMP
B2B-DRG-BR05-8511	C	BR05 - PEDESTRIAN UNDERPASS	TYPICAL SECTIONS	
B2B-DRG-BR05-8512	C	BR05 - PEDESTRIAN UNDERPASS	SECTIONS & DETAILS	SHEET 1
B2B-DRG-BR05-8513	C	BR05 - PEDESTRIAN UNDERPASS	SECTIONS & DETAILS	SHEET 2
B2B-DRG-BR05-8521	C	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	TYPE BR05-PB1 & PB2
B2B-DRG-BR05-8522	C	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	TYPE BR05-PB3, PB4 & PB5
B2B-DRG-BR05-8523	C	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	STEEL RAIL ELEVATIONS
B2B-DRG-BR05-8524	C	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	STEEL RAIL DETAILS

DATE: 22/03/2019 9:39:13 AM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_ie\d0145598\B2B-DRG-BR05-8500.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50□ REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50□ ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: N.T.S.

STATUS: 50□ ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

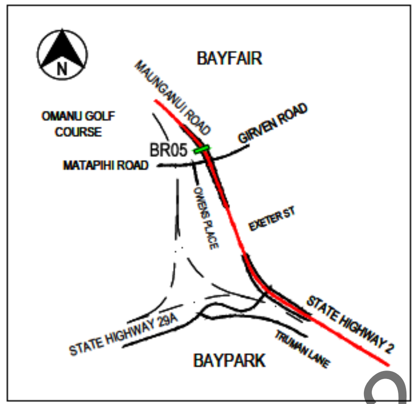
DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW MAR 2019
DESIGNED: TKF | DESIGN REVIEW: SKK

TITLE: BR05 - PEDESTRIAN UNDERPASS DRAWING LIST

DRAWING No: B2B-DRG-BR05-8500 | REV: C

BR05 - PEDESTRIAN UNDERPASS

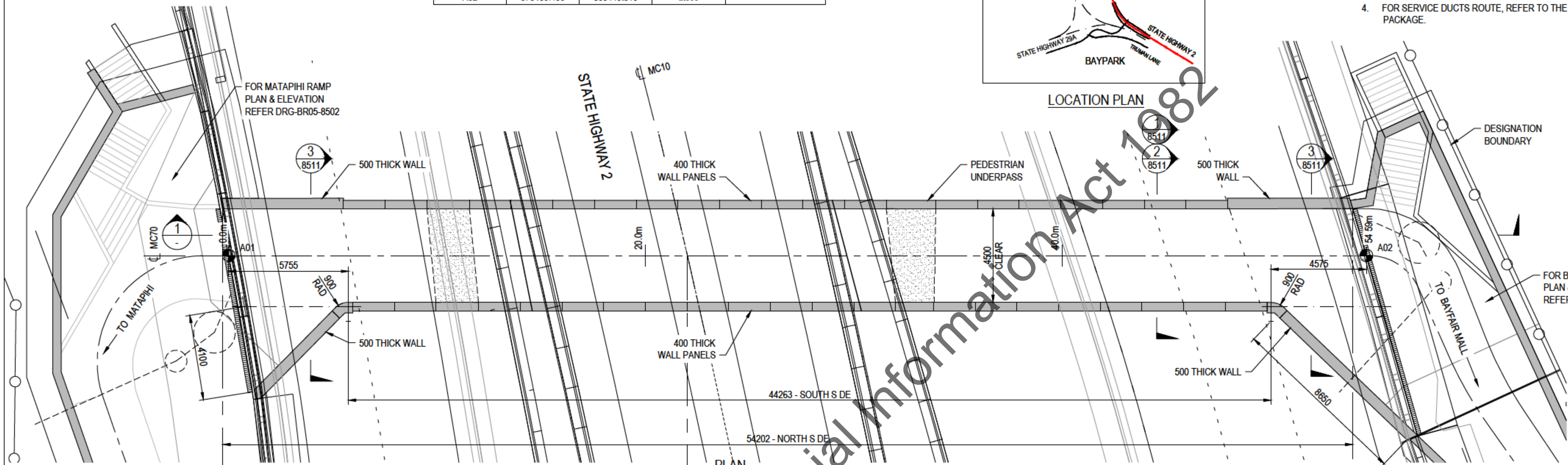
SETOUT POINT No.	CO-ORDINATES (m) E	CO-ORDINATES (m) N	DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
A01	378438.244	809430.359	1.980	
A02	378489.436	809449.319	2.300	



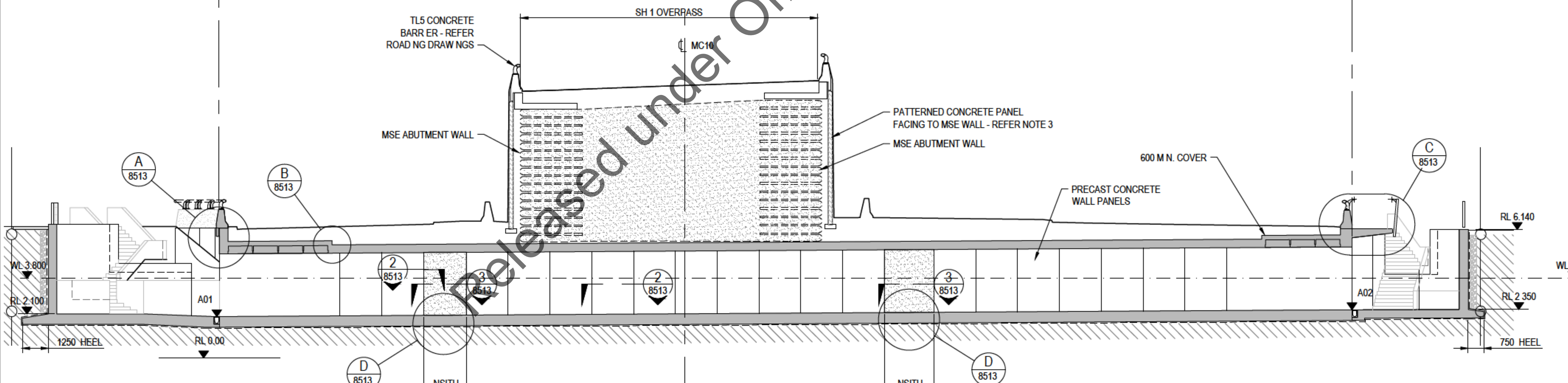
LOCATION PLAN

NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
3. FOR BARR ER PATTERN DETA LS REFER TO URBAN DESIGN DRAWINGS.
4. FOR SERVICE DUCTS ROUTE, REFER TO THE UTILITIES DESIGN PACKAGE.



PLAN
SCALE 1:200 (A3)

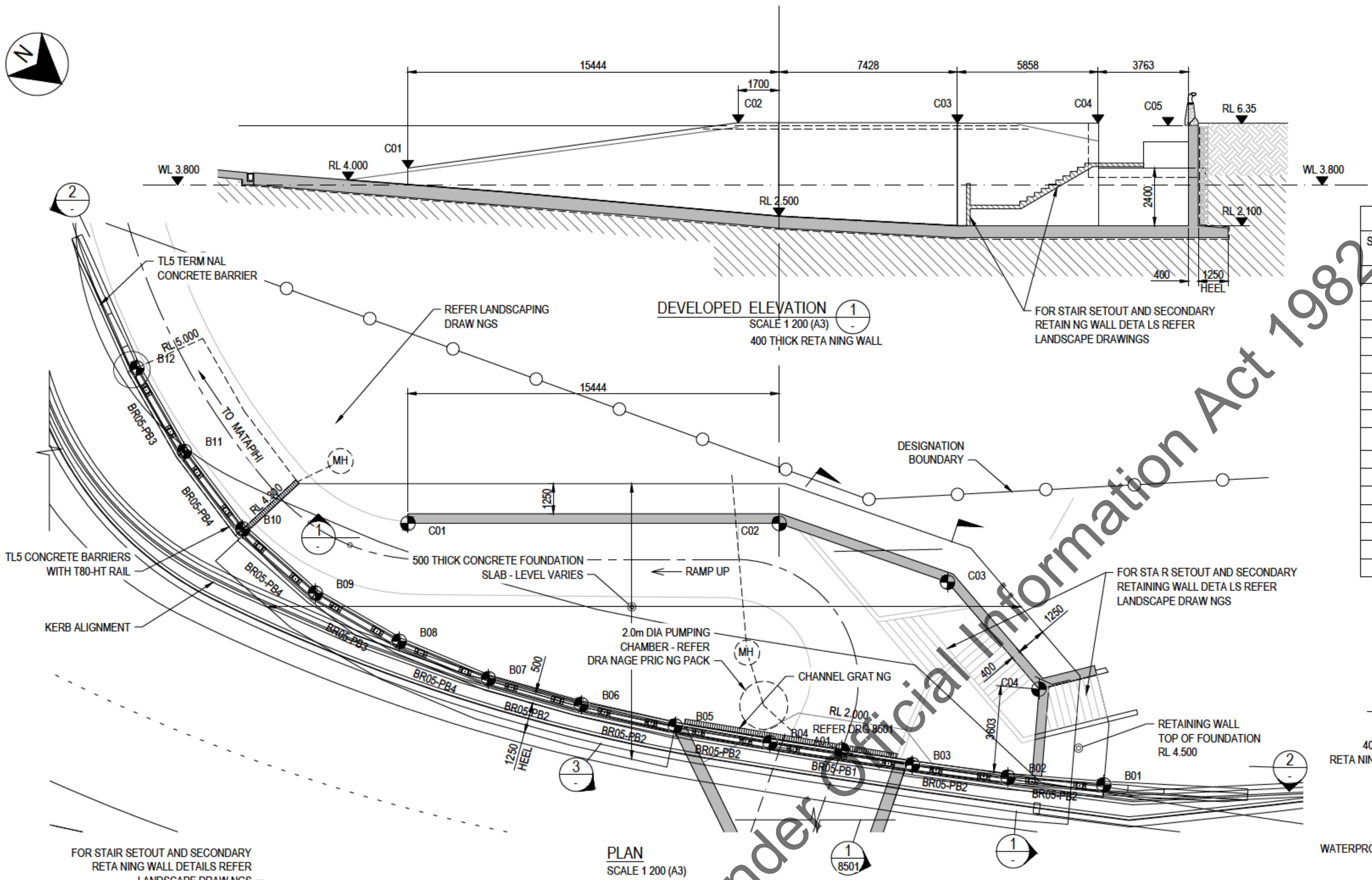


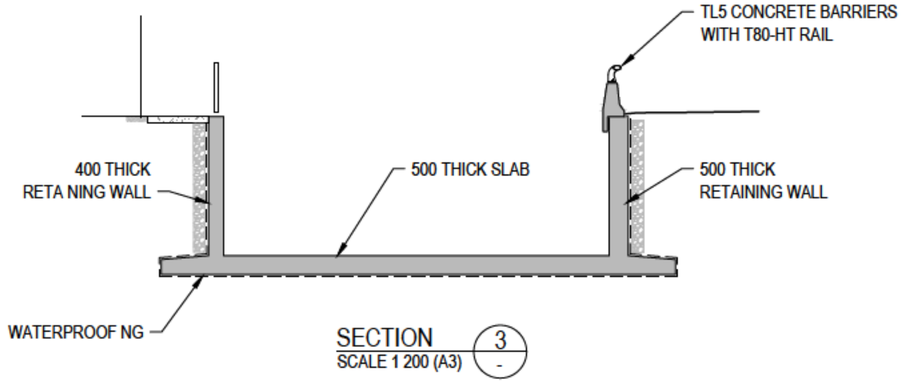
ELEVATION 1
SCALE 1:200 (A3)

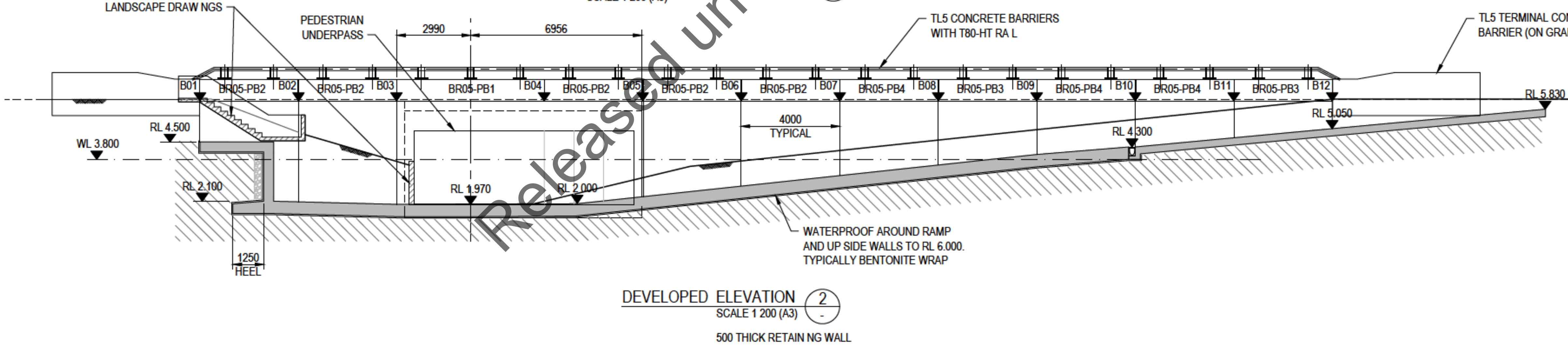
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50 REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50 ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:200 (A3)
STATUS	50 ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	DCC
DRAWING CHECK	GKK
APPROVED	LW, MAR 2019
DESIGNED	TKF
DESIGN REVIEW	SKK
TITLE	BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT UNDERPASS - PLAN & ELEVATION
DRAWING No	B2B-DRG-BR05-8501
REV	C







NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
3. FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. FOR SERVICE DUCTS ROUTE REFER TO THE UTILITIES DESIGN PACKAGE.

BR05 - PEDESTRIAN UNDERPASS

SETOUT POINT No.	CO-ORDINATES (m) E	CO-ORDINATES (m) N	DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
B01	378432.430	809439.692	6.350	
B02	378434.717	809436.413	6.350	
B03	378436.848	809433.020	6.350	
B04	378439.916	809427.864	6.350	
B05	378441.892	809424.377	6.350	
B06	378443.696	809420.798	6.350	
B07	378445.326	809417.137	6.350	
B08	378446.498	809413.266	6.350	
B09	378447.170	809409.315	6.350	
B10	378447.036	378447.036, 809405.284	6.350	
B11	378446.098	809401.366	6.350	
B12	378444.684	809397.610	6.350	
C01	378442.478	809410.431	6.350	
C02	378432.644	809422.337	6.350	
C03	378430.059	809429.303	6.350	
C04	378431.063	809435.074	6.350	
C05	378434.018	809437.135	6.350	

NOTE : SETOUT IS TO FRONT FACE OF RETAINING WALL

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50% REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:100 A1 / 1:200 A3

CLIENT: NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:200 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

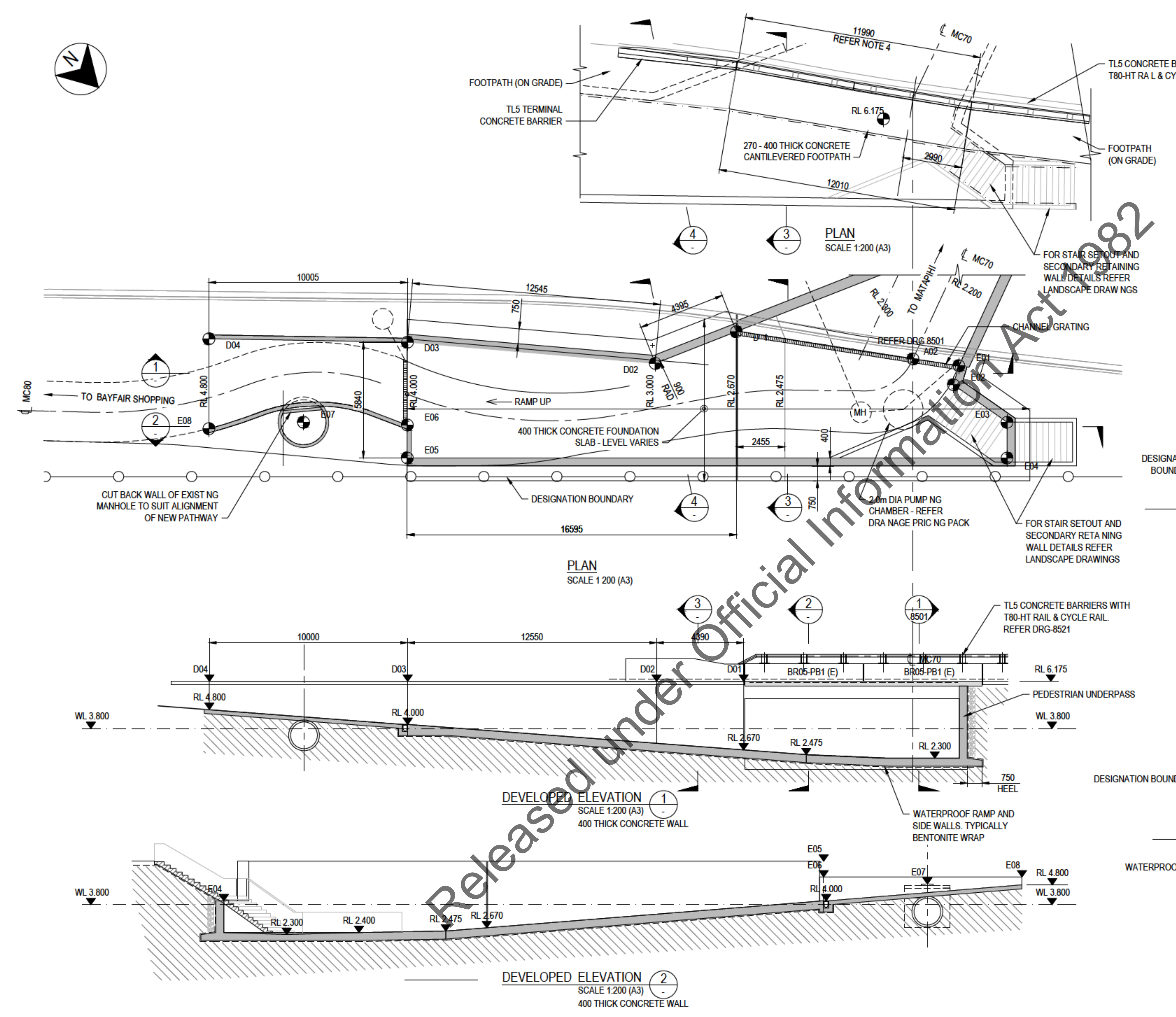
DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW MAR 2019

DESIGNED: TKF | DESIGN REVIEW: SKK

TITLE: BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - MATAPIHI RAMP

DRAWING No: B2B-DRG-BR05-8502 | REV: C

DATE: 22/03/2019 9:46:49 AM LOGIN NAME: CONNON, DAVID C

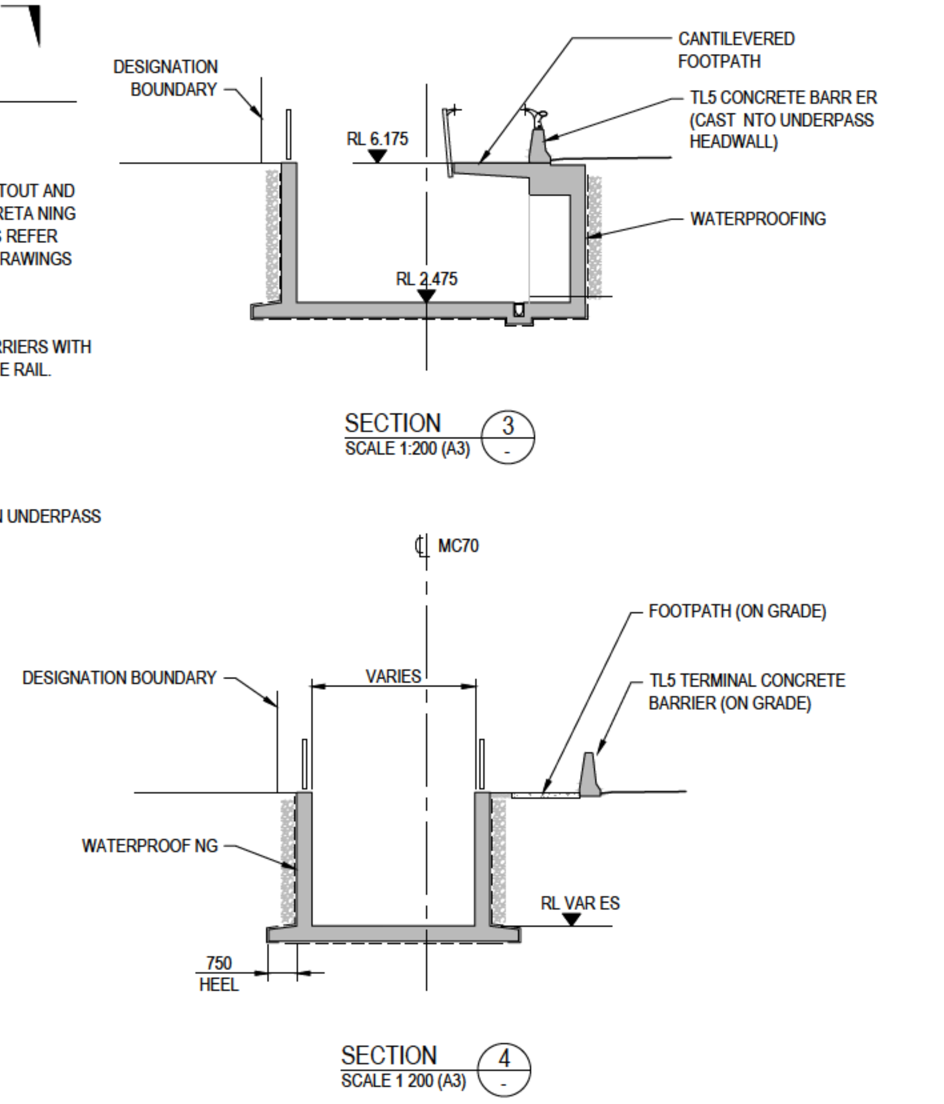


NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS EITHER SIDE OF UNDERPASS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
3. FOR BARRIER & WALL PANEL PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. ROAD SAFETY BARRIER TO BE CENTRED ON THE UNDERPASS.

BR05 - PEDESTRIAN UNDERPASS

SETOUT POINT No.	CO-ORDINATES (m) E	CO-ORDINATES (m) N	DESIGN LEVEL (TOP OF WALL)	CONSTRUCTION LEVEL
D01	378494.776	809442.061	6.000	
D02	378498.804	809440.317	6.000	
D03	378506.912	809430.736	6.000	
D04	378513.878	809423.560	6.000	
E01	378488.036	809451.200	6.000	
E02	378488.907	809451.684	6.000	
E03	378488.323	809454.932	6.000	
E04	378489.594	809456.209	6.000	
E05	378511.029	809434.873	6.000	
E06	378509.858	809433.697	4.850	
E07	378513.467	809429.906	6.000	
E08	378517.073	809426.773	6.000	



No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50% REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:100 A1 / 1:200 A3

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:200 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW MAR 2019

DESIGNED: TKF | DESIGN REVIEW: SKK

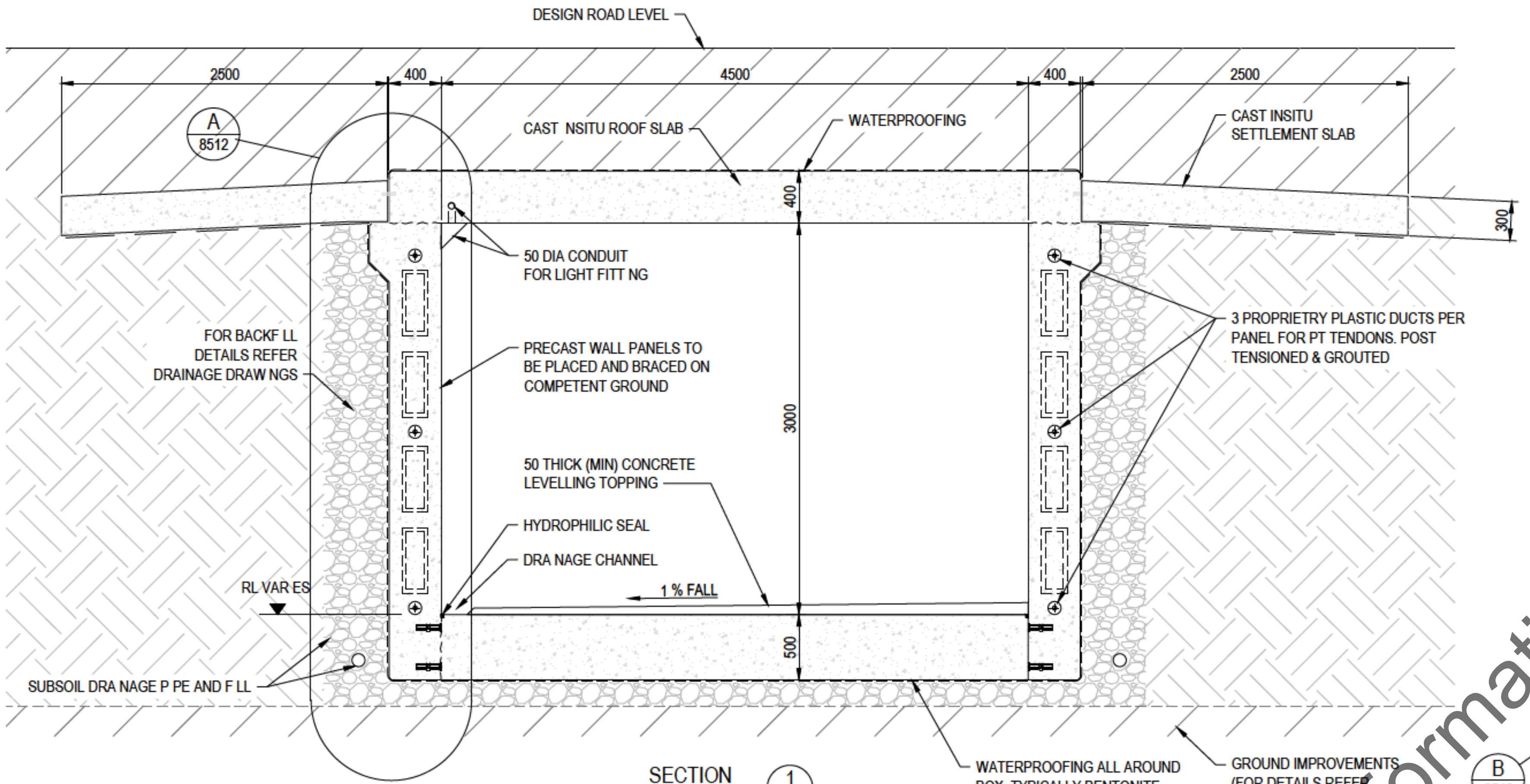
TITLE: BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - BAYFAIR RAMP

DRAWING No: B2B-DRG-BR05-8503 | REV: C

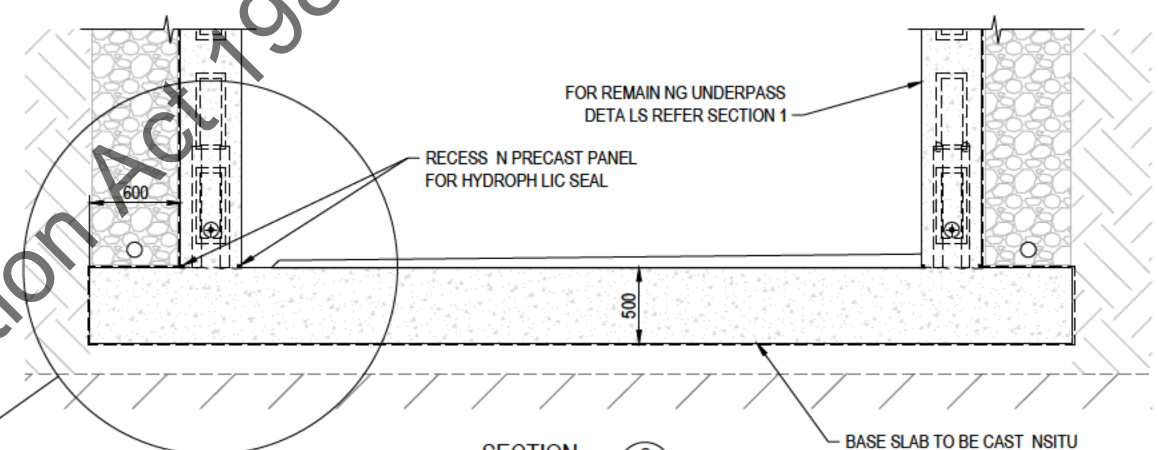
DATE: 22/03/2019 9:51:19 AM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_ids\d0145598\B2B-DRG-BR05-8503.dwg

NOTES

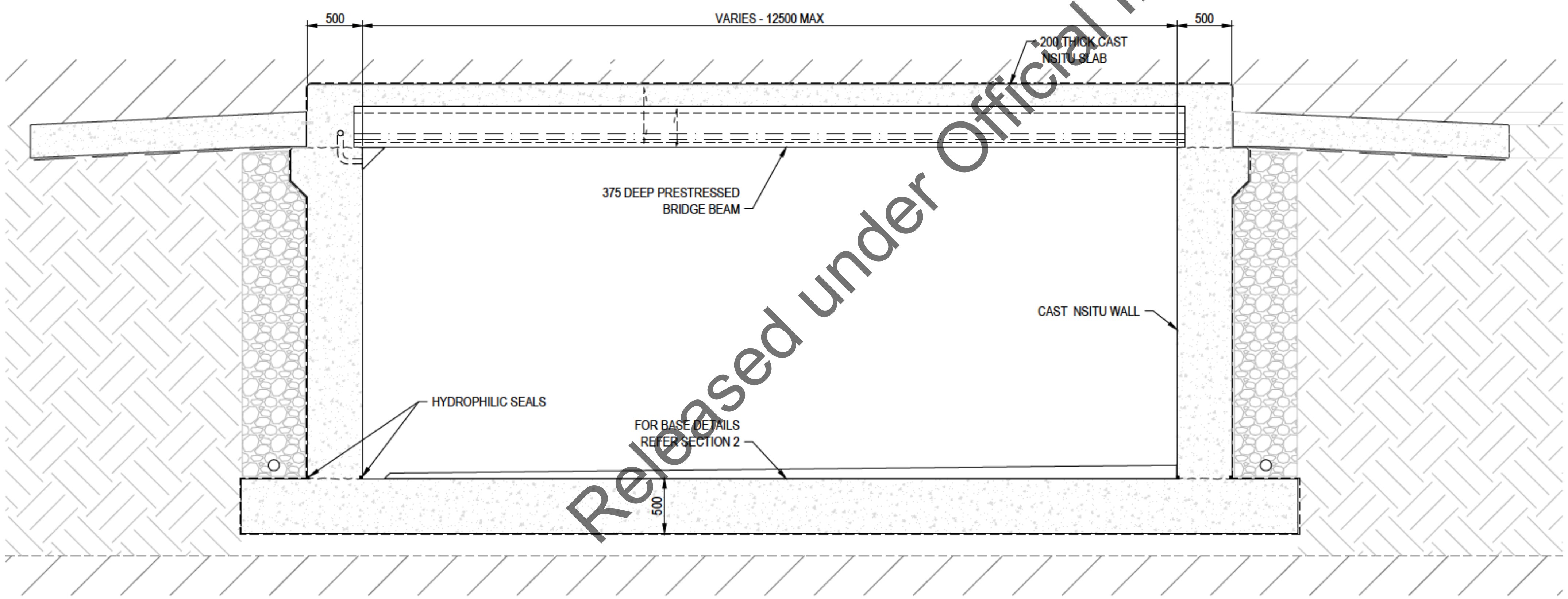
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS, REFER TO THE UT LITIES DESIGN PACKAGE.



SECTION 1
SCALE 1:50 (A3) 8101
TYPICAL UNDERPASS SECTION



SECTION 2
SCALE 1:50 (A3) 8101
ALTERNATIVE BASE OPTION



SECTION 3
SCALE 1:50 (A3) 8101
SPLAYED UNDERPASS END SECTION

No	DATE	DRG CHECK	DESIGN REVIEW	APP D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50□ REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50□ ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:25□ A1 / 1:50□ A3 — 0 400 800 1200 1600 2000 2400

CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:50 (A3)
STATUS: 50□ ISSUE
PROJECT NUMBER: 2/09-024/603

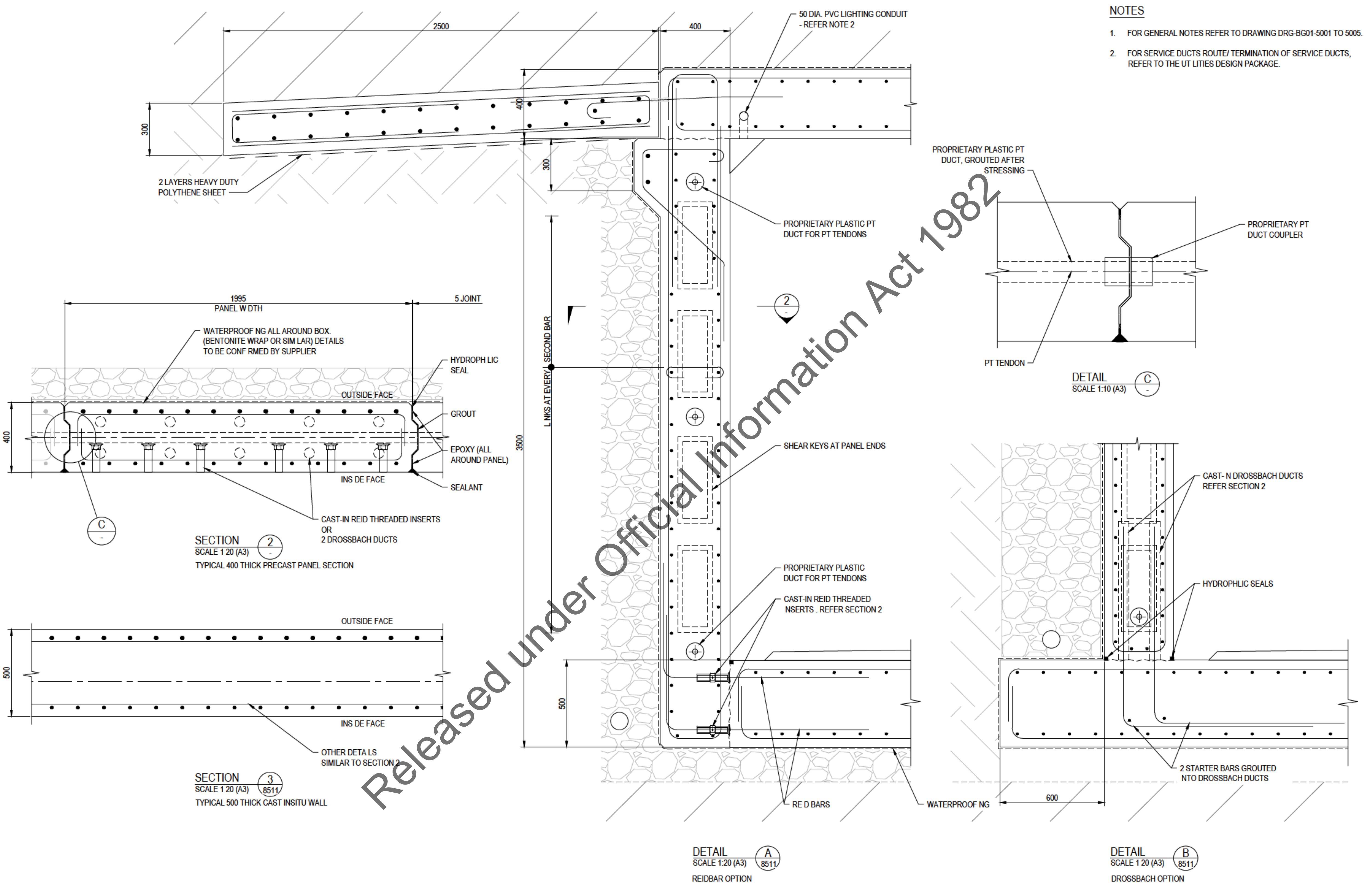
CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW
DESIGNED: TKF | DESIGN REVIEW: SKK | MAR 2019

TITLE: BR05 - PEDESTRIAN UNDERPASS TYPICAL SECTIONS

DRAWING No: B2B-DRG-BR05-8511 | REV: C

DATE: 22/03/2019 9:37:17 AM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_ie\d0145596\B2B-DRG-BR05-8511.dwg



NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS, REFER TO THE UTILITIES DESIGN PACKAGE.

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50 REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50 ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:10 A1 / 1:20 A3 — 0 100 200 300 400 500 600 700 800 900 1000

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)

STATUS: 50 ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN	DRAWING CHECK	APPROVED
DCC	GKK	LW
DESIGNED	DESIGN REVIEW	MAR 2019
TKF	SKK	

TITLE: BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS SHEET 1

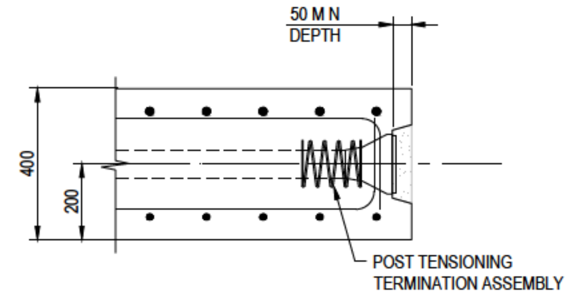
DRAWING No: B2B-DRG-BR05-8512

REV: C

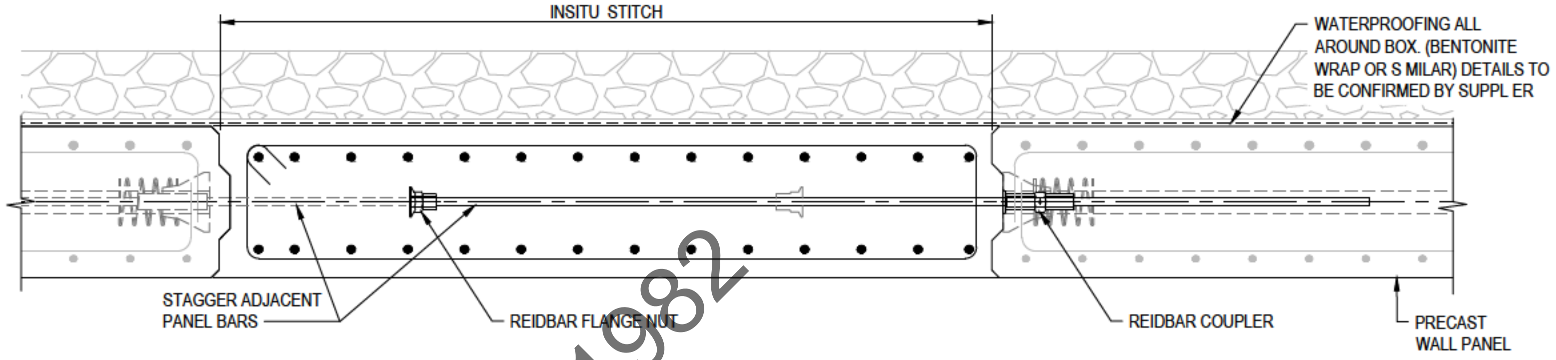
DATE: 22/03/2019 9:54:54 AM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\...\B2B-DRG-BR05-8512.dwg

NOTES

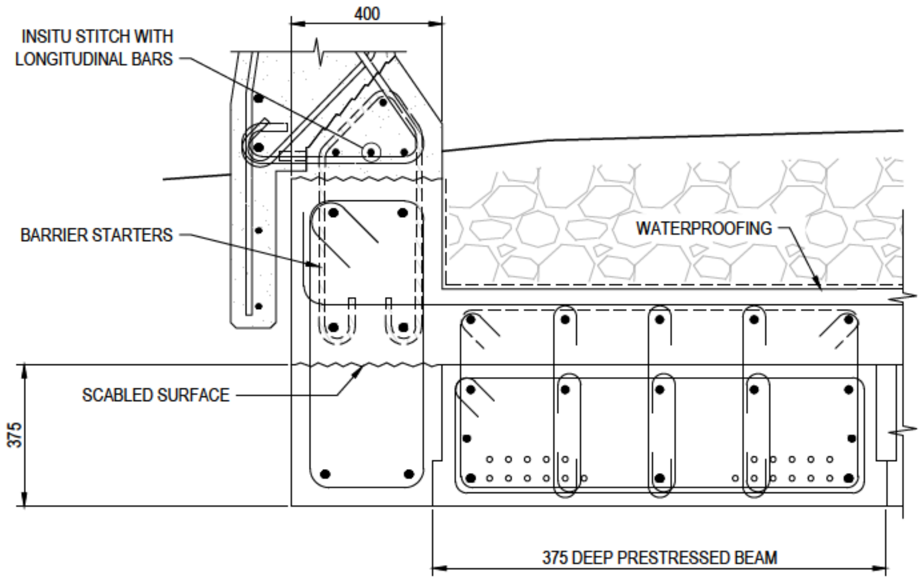
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.



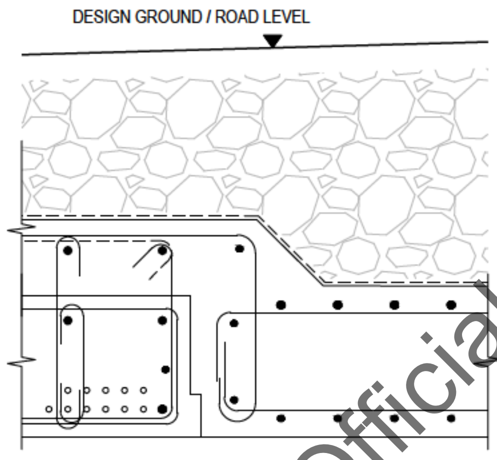
SECTION 2 / 8501
SCALE 1:20 (A3)
POST TENSIONING TERMINATION
AT STITCH PANEL & END PANEL



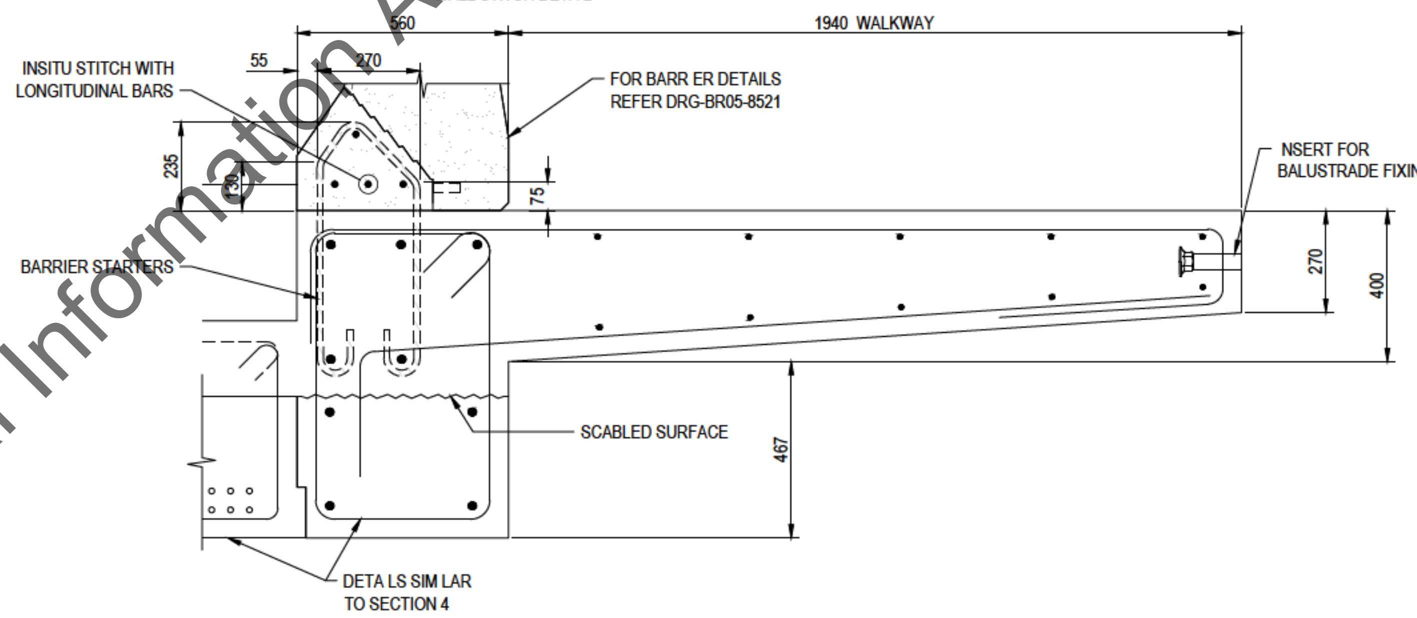
SECTION 3 / 8501
SCALE 1:20 (A3)
WALL STITCH DETAIL



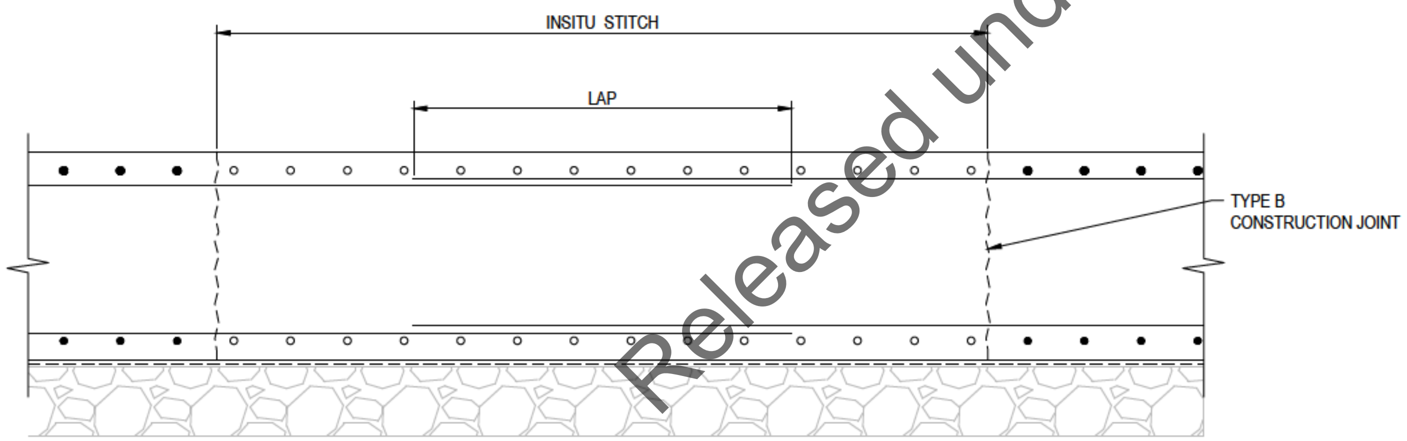
DETAIL A / 8501
SCALE 1:20 (A3)



DETAIL B / 8501
SCALE 1:20 (A3)
ROOF STEP DETAIL



DETAIL C / 8501
SCALE 1:20 (A3)



DETAIL D / 8501
SCALE 1:20 (A3)
BASE STITCH DETAIL
(ROOF STITCH SIMILAR)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50% REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:10 A1 / 1:20 A3 — 0 100 200 300 400 500 600 700 800 900 1000

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

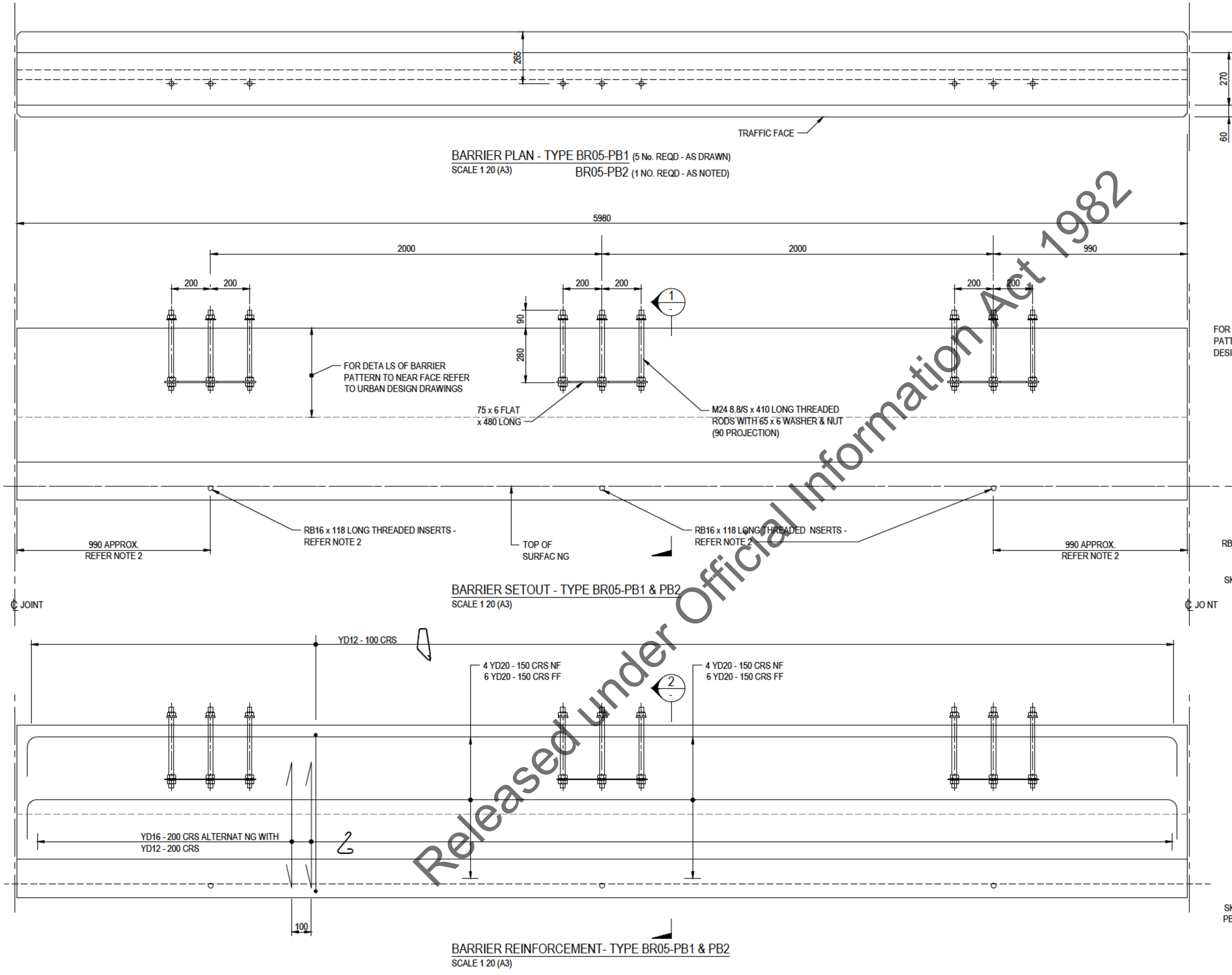
DESIGNER: JACOBS, Align, Tonkin+Taylor

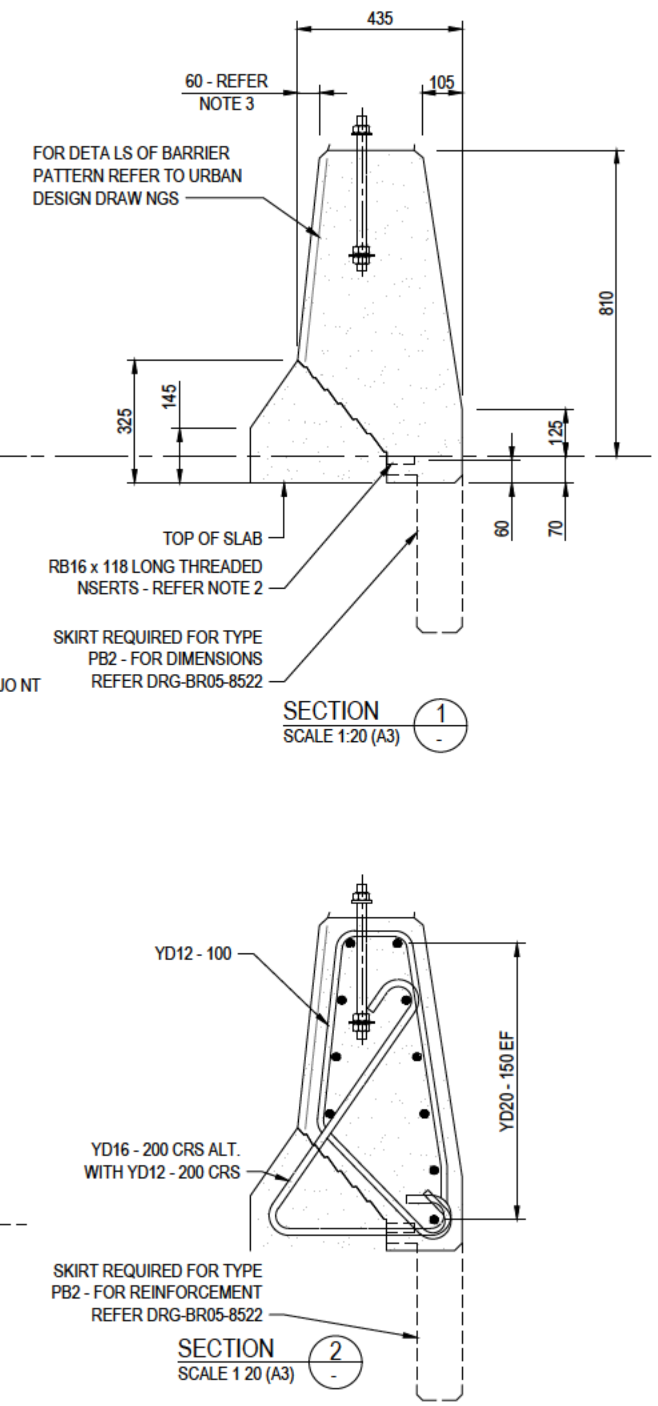
SCALE	1:20 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	DCC
DESIGNED	TKF
DRAWING CHECK	GKK
DESIGN REVIEW	SKK
APPROVED	LW, MAR 2019
TITLE	BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS SHEET 2
DRAWING No	B2B-DRG-BR05-8513
REV	C

DATE: 22/03/2019 9:58:28 AM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_ie\d0145598\B2B-DRG-BR05-8513.dwg

NOTES

1. FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
2. PROVIDE RB16 x 118 LONG THREADED INSERTS (PART No. RBA16TI) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS IF REQUIRED.
3. FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)





No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50% REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:50 A1 / 1:100 A3 — 0 50 100 150 200 250 300 350 400 450 500

CLIENT: NZ TRANSPORT AGENCY
CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

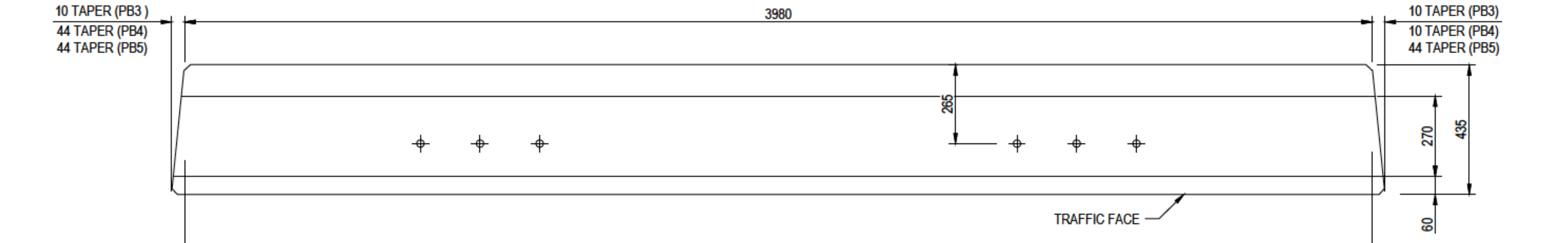
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW, MAR 2019
DESIGNED: TKF | DESIGN REVIEW: SKK

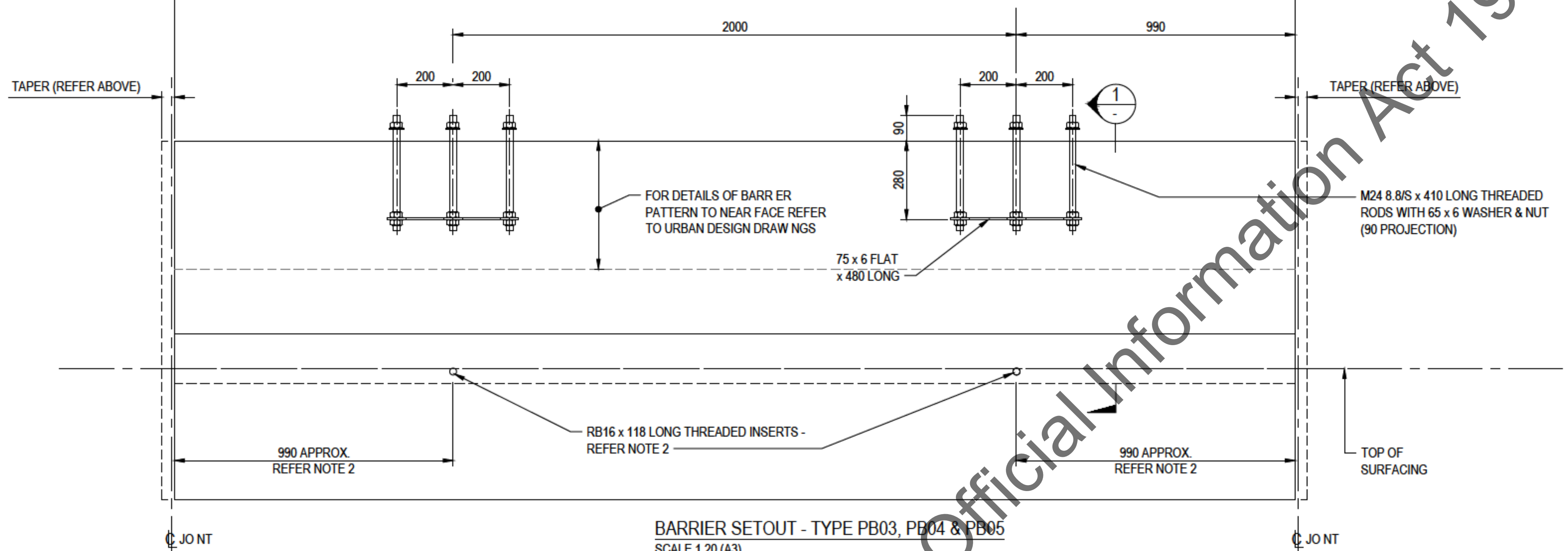
TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB1 & PB2

DRAWING No: B2B-DRG-BR05-8521 | REV: C

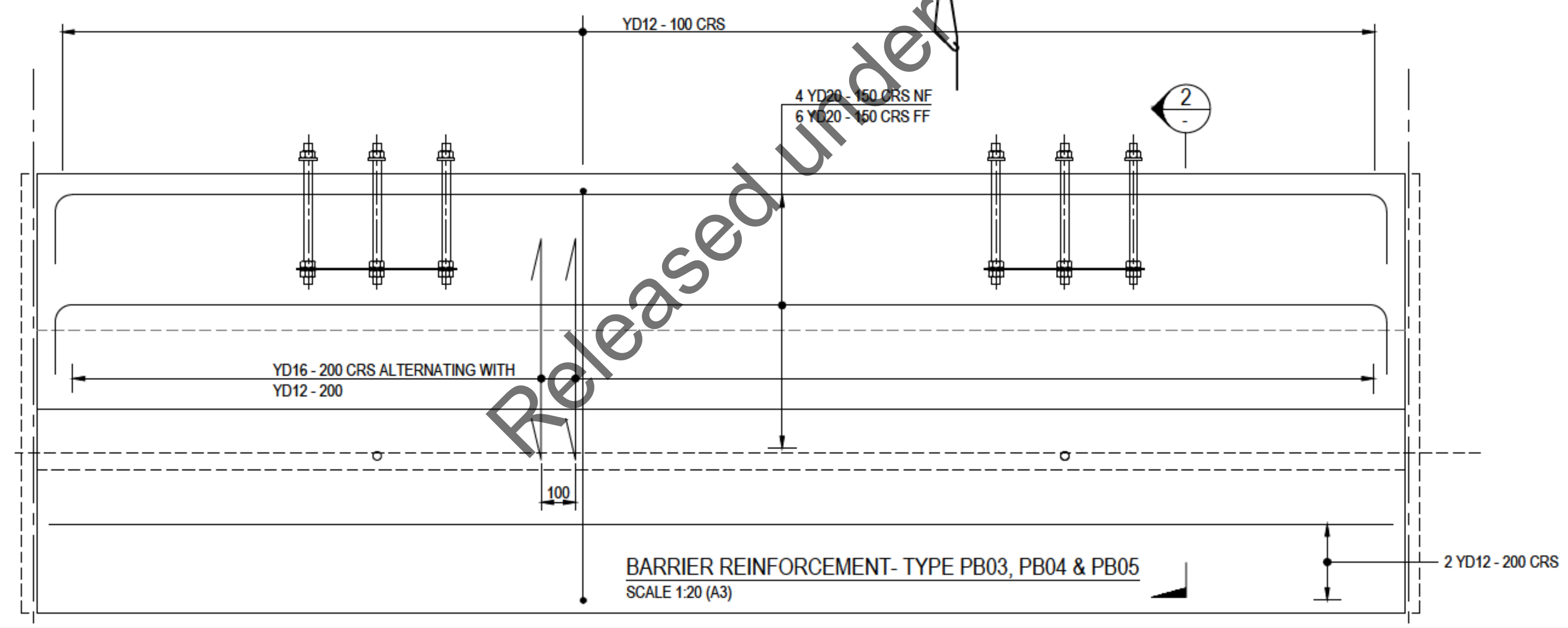
DATE: 22/03/2019 10:01:49 AM
LOGIN NAME: CONNON, DAVID C



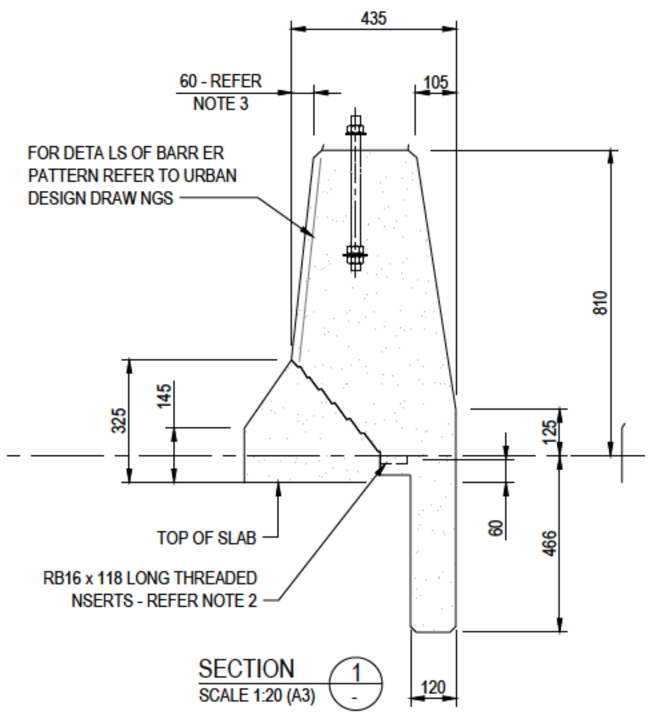
BARRIER PLAN - TYPE BR05-PB3 (5 No. REQD)
BR05-PB4 (2 NO. REQD)
BR05-PB5 (3 NO. REQD)
SCALE 1:20 (A3)



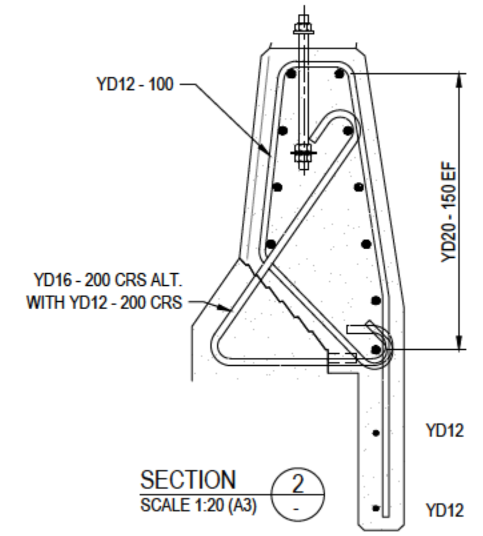
BARRIER SETOUT - TYPE PB03, PB04 & PB05
SCALE 1:20 (A3)



BARRIER REINFORCEMENT- TYPE PB03, PB04 & PB05
SCALE 1:20 (A3)



SECTION 1
SCALE 1:20 (A3)



SECTION 2
SCALE 1:20 (A3)

NOTES

1. FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
2. PROVIDE RB16 x 118 LONG THREADED INSERTS (PART No. RBA16TI) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS IF REQUIRED.
3. FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50% REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:50 A1 / 1:100 A3 — 0 50 100 150 200 250 300 350 400 450 500

LOGIN NAME: CONNON, DAVID C
DATE: 22/03/2019 10:05:12 AM

CLIENT: NZ TRANSPORT AGENCY
CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

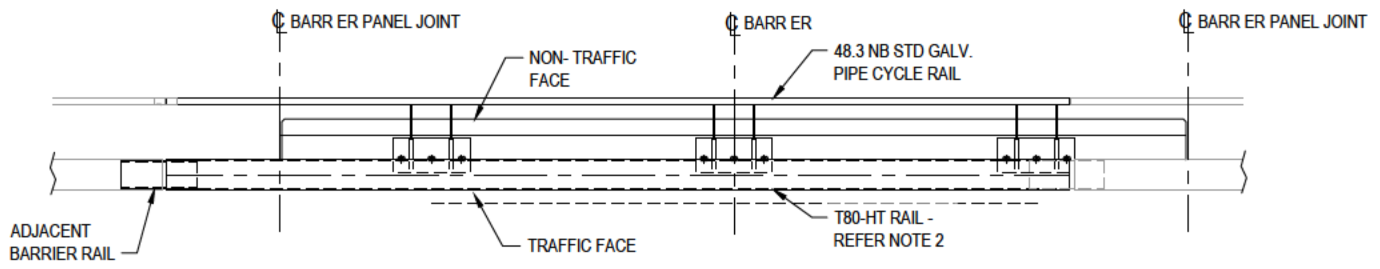
DRAWN	DRAWING CHECK	APPROVED
DCC	GKK	LW
DESIGNED	DESIGN REVIEW	MAR 2019
TKF	SKK	

TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB3, PB4 & PB5

DRAWING No: B2B-DRG-BR05-8522
REV: C

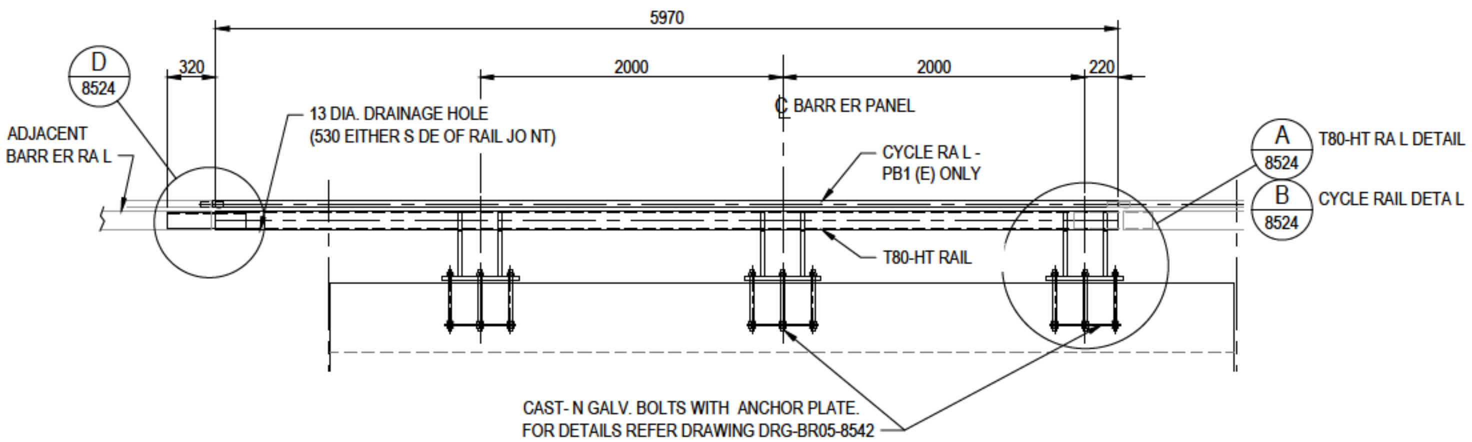
NOTES

1. FOR GENERAL NOTES REFER DRAW NGS DRG-BG01-001 TO 5005.
2. BARR ER RA L TO BE -
   EITHER 150 NB ULTRAP PE C350LO AS/NZS1163,
   OR 6" DIAMETER STEEL PIPE ASTM A53 TYPE E OR S, GRADE B
   OR 6⅝" O.D. P PE x .188" API-5LX52
   AND ROLLED TO 203 W DE x 124 DEEP ELL PTICAL SHAPE.
3. # - DENOTES D MENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL



PLAN - PB1
SCALE 1:50 (A3)
EAST RAIL PLAN - AS DRAWN

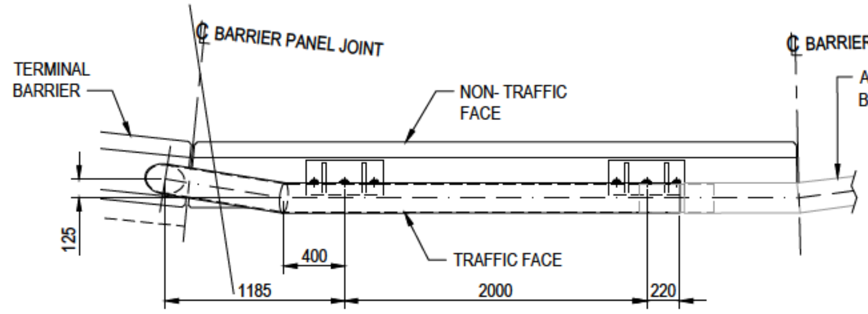
PLAN - PB2
SCALE 1:50 (A3)
WEST RAIL PLAN - SIM LAR (NO CYCLE RAIL)



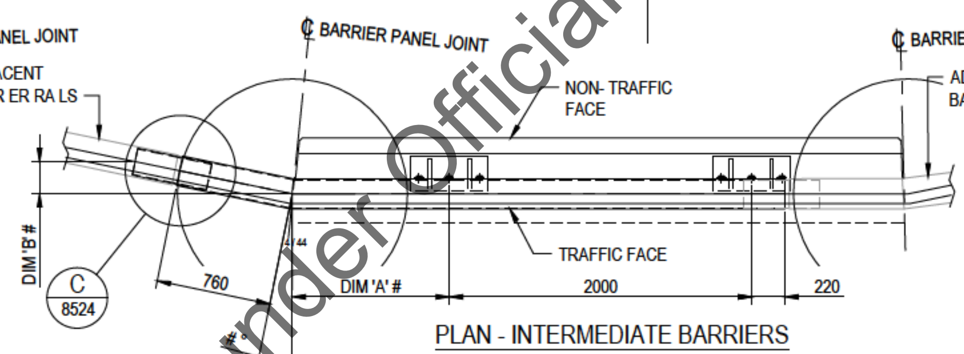
TYPICAL RAILING ELEVATION
SCALE 1 50 (A3)
XX No. REQD

RAIL SCHEDULE

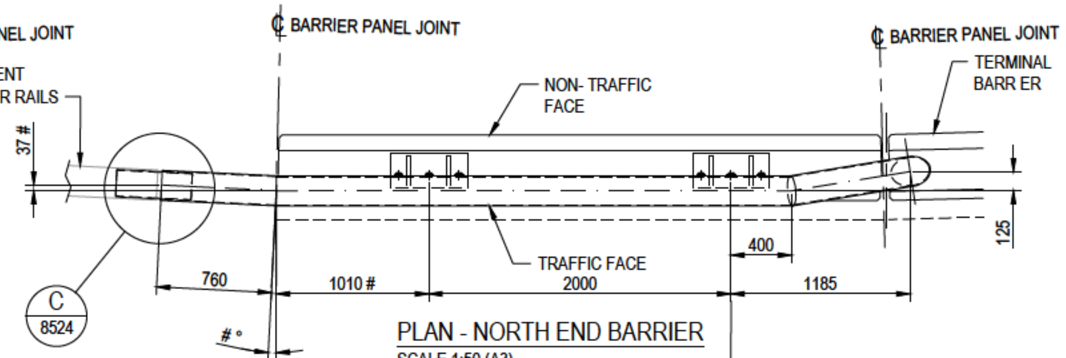
BARRIER TYPE	D M 'A'	D M 'B'
PB3	REFER NORTH END PLAN BELOW	
PB3	1010	18
PB2	1000	18
PB3	1010	37
PB3	1010	37
PB3	1005	95
PB5	1040	95
PB4	1040	152
PB5	1040	152
PB5	1040	95
PB4	REFER SOUTH END PLAN BELOW	



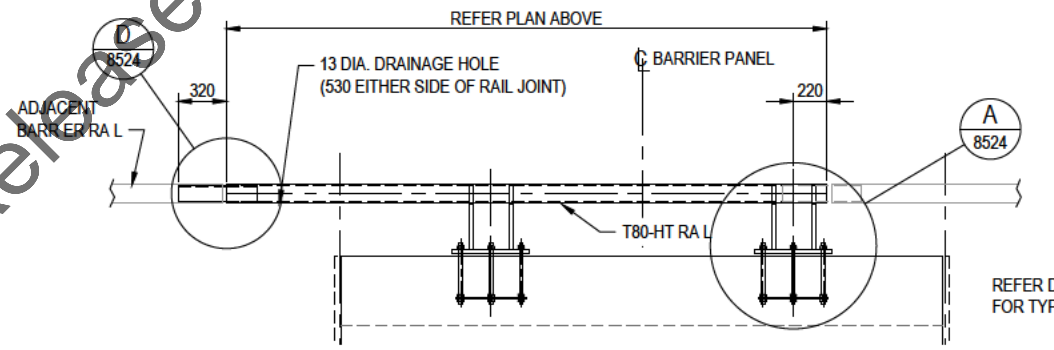
PLAN - SOUTH END BARRIER
SCALE 1:50 (A3)
1 No. REQD



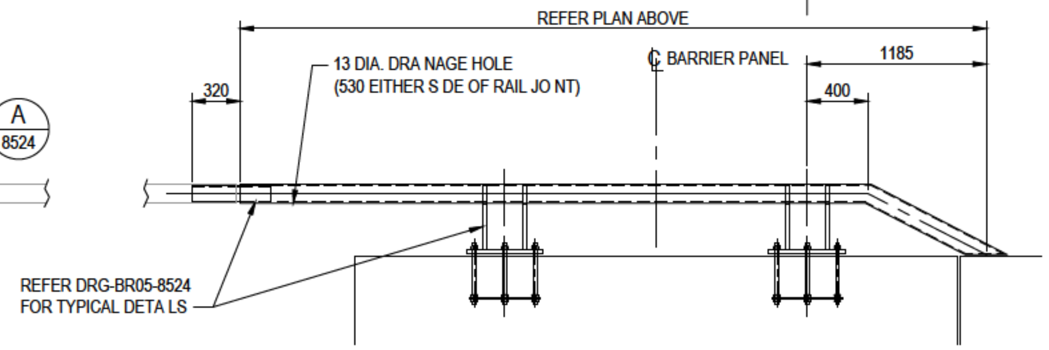
PLAN - INTERMEDIATE BARRIERS
SCALE 1:50 (A3)
NOTE : PB2 BARR ER HAS 3 RA L FIX NGS - REFER 6.0m BARRIER ABOVE



PLAN - NORTH END BARRIER
SCALE 1:50 (A3)
1 No. REQD



TYPICAL RAILING ELEVATION
SCALE 1 50 (A3)



END RAILING ELEVATION
SCALE 1:50 (A3)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50□ REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50□ ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:25□ A1 / 1:50□ A3 — 0 400 800 1200 1600 2000 2400

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)
STATUS: 50□ ISSUE
PROJECT NUMBER: 2/09-024/603

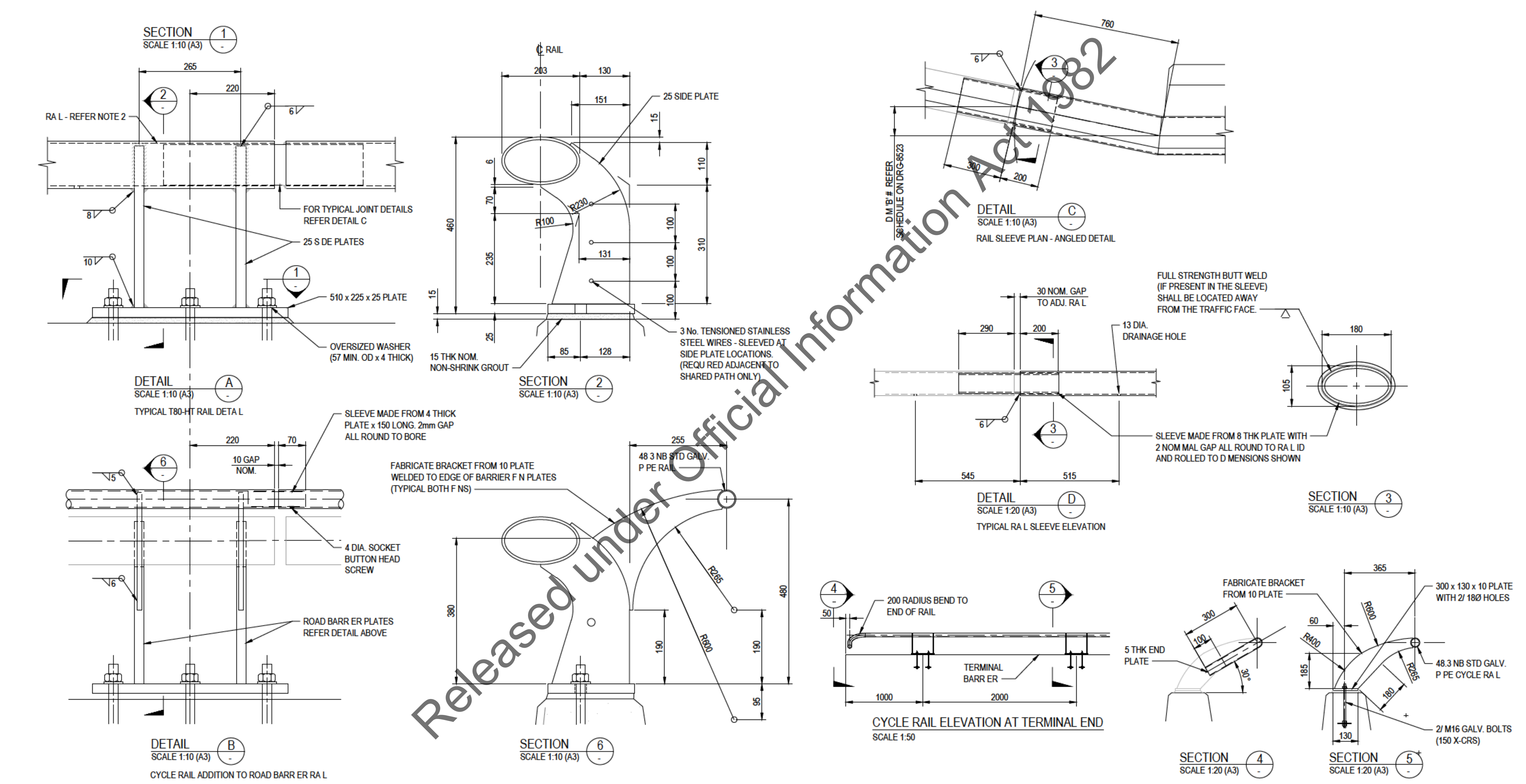
CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW
DESIGNED: TKF | DESIGN REVIEW: SKK | MAR 2019

TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 1
DRAWING No: B2B-DRG-BR05-8523
REV: C

DATE: 22/03/2019 10:09:08 AM LOGIN NAME: CONNON, DAVID C

NOTES

1. FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
2. BARRIER RAIL TO BE -
   EITHER 150 NB ULTRAPIPE C350LO AS/NZS1163,
   OR 6" DIAMETER STEEL PIPE ASTM A53 TYPE E OR S, GRADE B
   OR 6 5/8" O.D. PIPE x .188" API-5LX52
   AND ROLLED TO 203 WIDE x 124 DEEP ELLIPTICAL SHAPE.
3. # - DENOTES DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL.



1:10 A1 / 1:20 A3 — 0 100 200 300 400 500 600 700 800 900 1000

1:25 A1 / 1:50 A3 — 0 400 800 1200 1600 2000 2400

1:5 A1 / 1:10 A3 — 0 50 100 150 200 250 300 350 400 450 500

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50% REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

NZ TRANSPORT AGENCY — WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW, MAR 2019

DESIGNED: TKF | DESIGN REVIEW: SKK

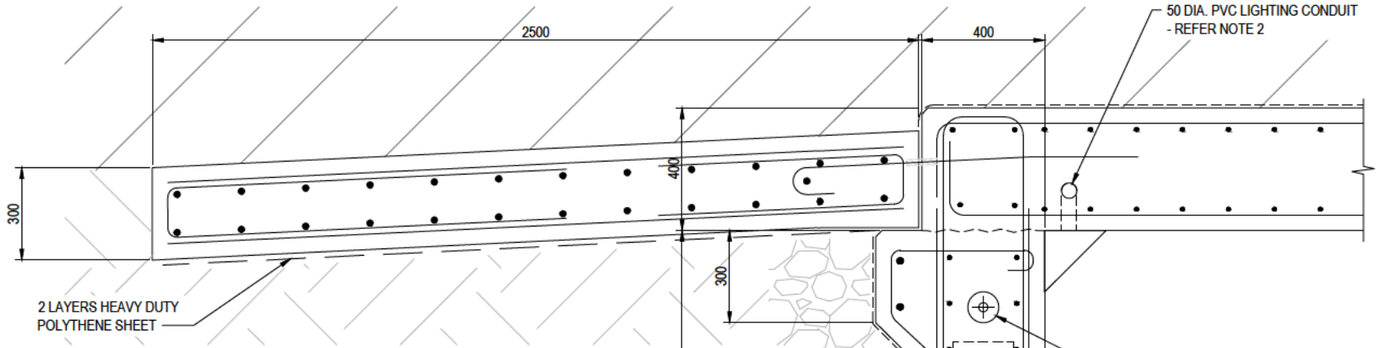
TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 2

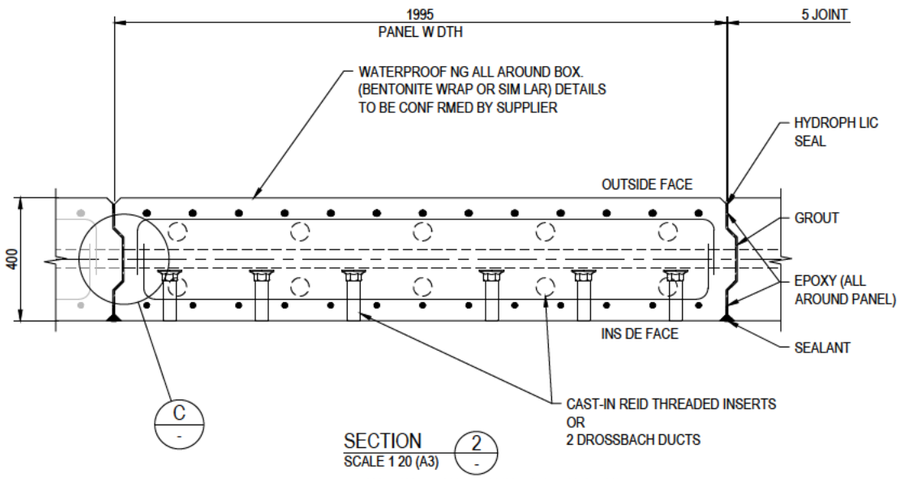
DRAWING No: B2B-DRG-BR05-8524 | REV: C

DATE: 22/03/2019 10:14:49 AM
LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\...\B2B-DRG-BR05-8524.dwg

NOTES

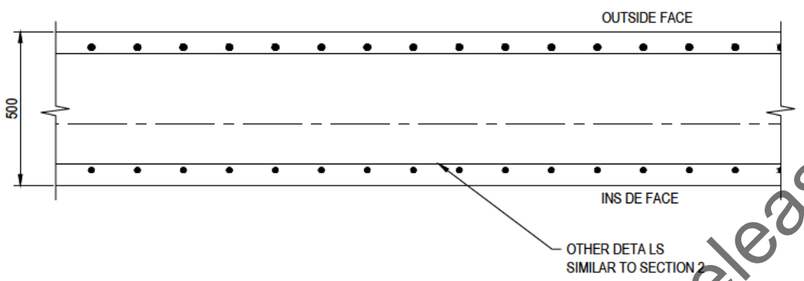
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS, REFER TO THE UT LITIES DESIGN PACKAGE.





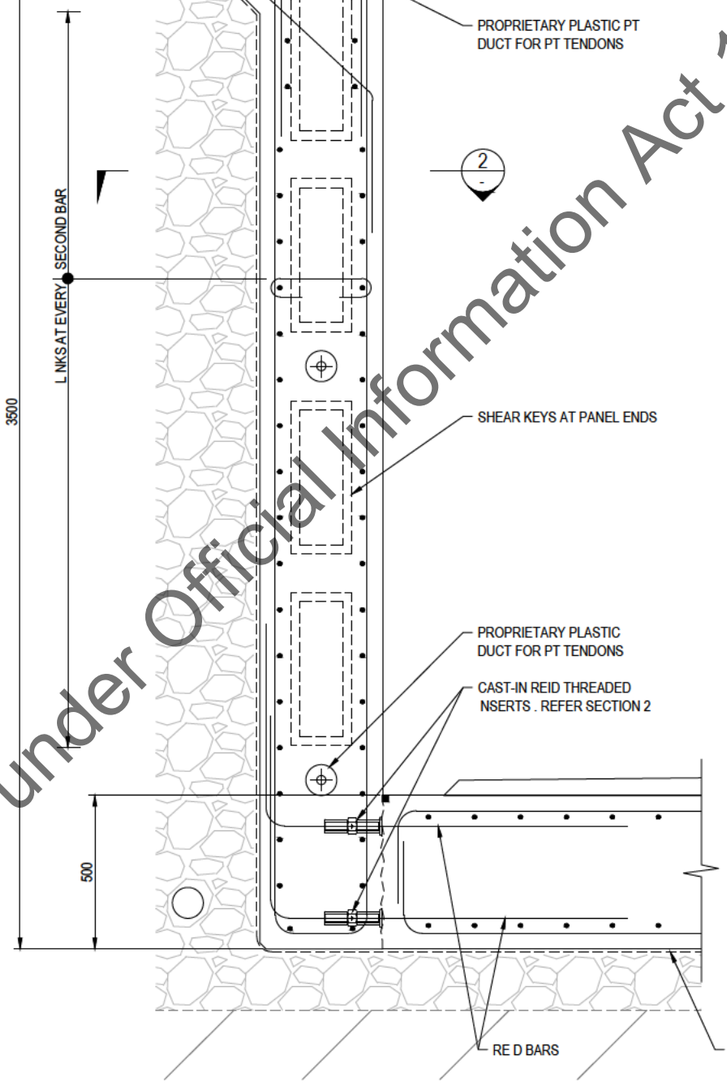
SECTION 2 / - / SCALE 1 20 (A3)

TYPICAL 400 THICK PRECAST PANEL SECTION



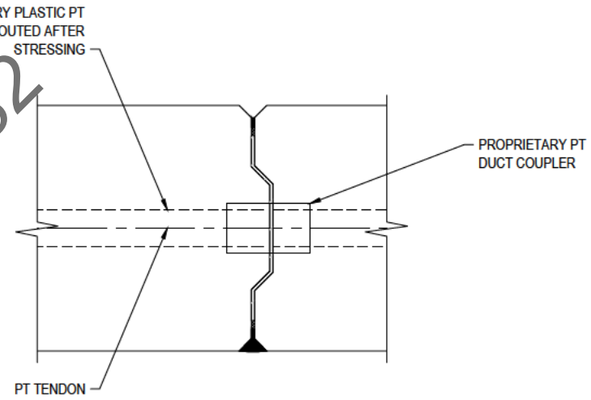
SECTION 3 / 8511 / SCALE 1 20 (A3)

TYPICAL 500 THICK CAST INSITU WALL

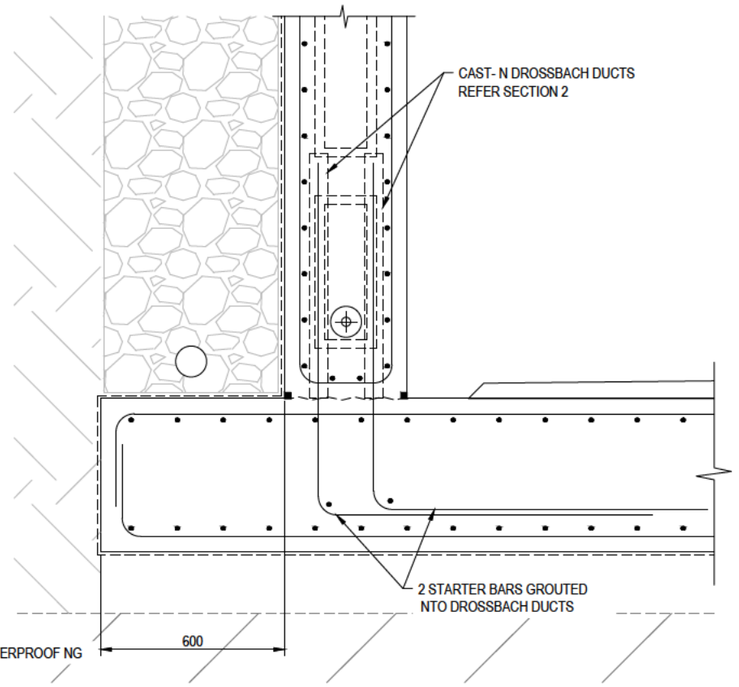


DETAIL A / 8511 / SCALE 1:20 (A3)

REIDBAR OPTION



DETAIL C / - / SCALE 1:10 (A3)



DETAIL B / 8511 / SCALE 1 20 (A3)

DROSSBACH OPTION

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50□ ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:10□ A1 / 1:20□ A3 — 0 100 200 300 400 500 600 700 800 900 1000 □□

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:20 (A3)
STATUS	50□ ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN	DRAWING CHECK	APPROVED
DCC	GKK	LW MAR 2019
DESIGNED: TKF	DESIGN REVIEW: SKK	

TITLE: BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS SHEET 1

DRAWING No: B2B-DRG-BR05-8512 REV: B

DRAWING NUMBER	REVISION	TITLE 1	TITLE 2	TITLE 3
B2B-DRG-BR05-8500	B	BR05 - PEDESTRIAN UNDERPASS	DRAWING LIST	
B2B-DRG-BR05-8501	B	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - UNDERPASS
B2B-DRG-BR05-8502	B	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - MATAP HI RAMP
B2B-DRG-BR05-8503	B	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - BAYFA R RAMP
B2B-DRG-BR05-8511	B	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS	
B2B-DRG-BR05-8512	B	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS & DETAILS	SHEET 1
B2B-DRG-BR05-8513	B	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS & DETAILS	SHEET 2
B2B-DRG-BR05-8521	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	TYPE BR05-PB1
B2B-DRG-BR05-8522	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	TYPE BR05-PB1
B2B-DRG-BR05-8523	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	STEEL RAIL ELEVATIONS
B2B-DRG-BR05-8524	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARR ERS	STEEL RAIL DETAILS

DATE: 15/03/2019 4:30:09 PM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_ie\d0145598\B2B-DRG-BR05-8500.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	TFK	LW	50□ ISSUE
A	08/03/19	GKK	TKF	LW	PRELIMINARY - FOR PRICING

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: N.T.S.
STATUS: 50□ ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

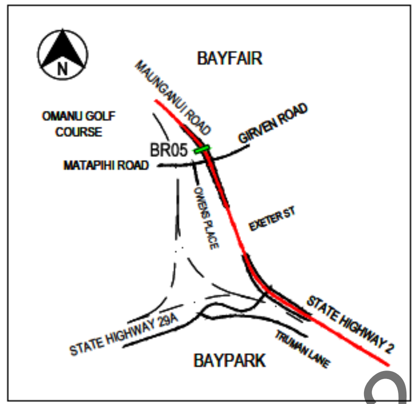
DRAWN: DCC
DESIGNED: TKF
DRAWING CHECK: GKK
DESIGN REVIEW: SKK
APPROVED: LW MAR 2019

TITLE: BR05 - PEDESTRIAN UNDERPASS DRAWING LIST

DRAWING No: B2B-DRG-BR05-8500
REV: B

BR05 - PEDESTRIAN UNDERPASS

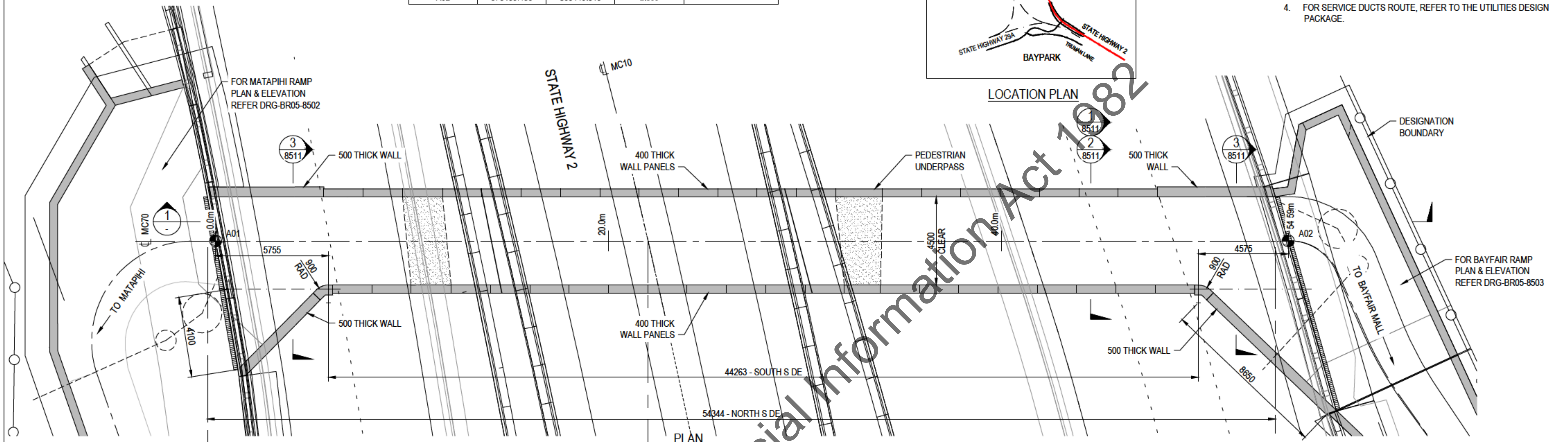
SETOUT POINT No.	CO-ORDINATES (m) E	CO-ORDINATES (m) N	DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
A01	378438.244	809430.359	1.980	
A02	378489.436	809449.319	2.300	



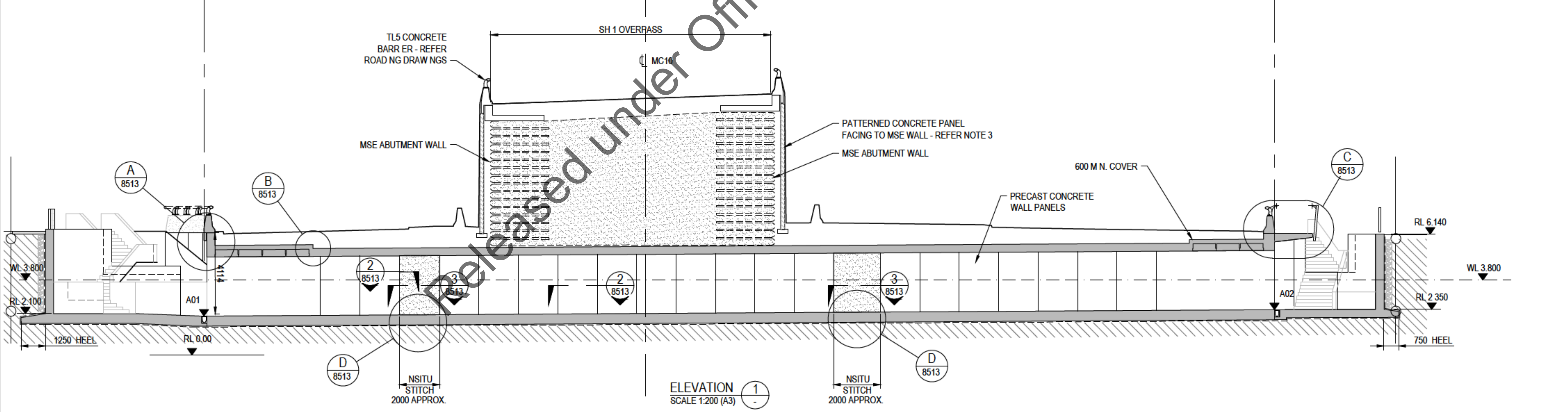
LOCATION PLAN

NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
3. FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. FOR SERVICE DUCTS ROUTE, REFER TO THE UTILITIES DESIGN PACKAGE.



PLAN
SCALE 1:200 (A3)



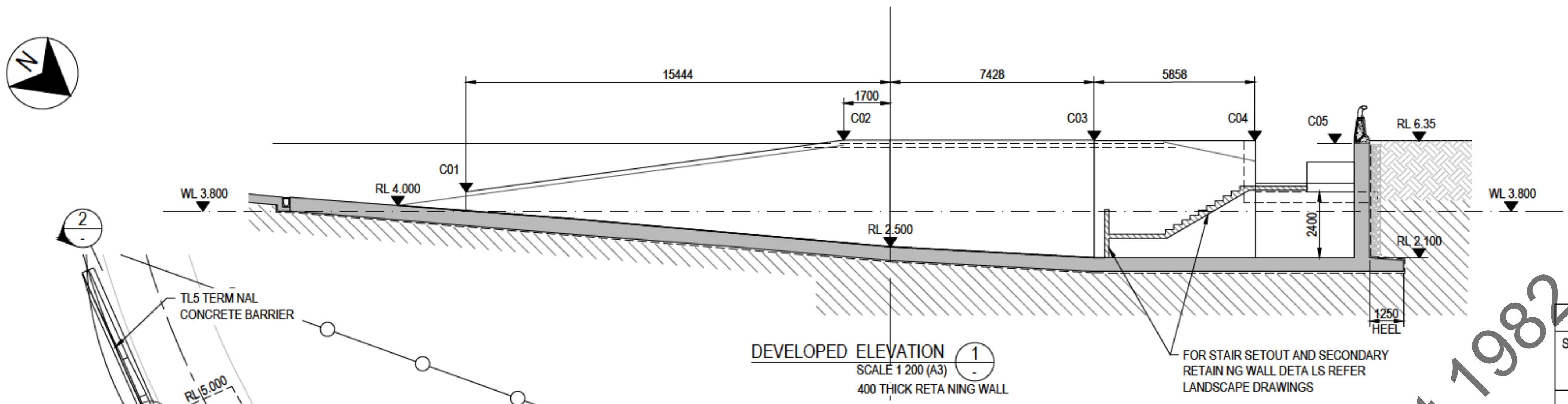
ELEVATION
SCALE 1:200 (A3)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

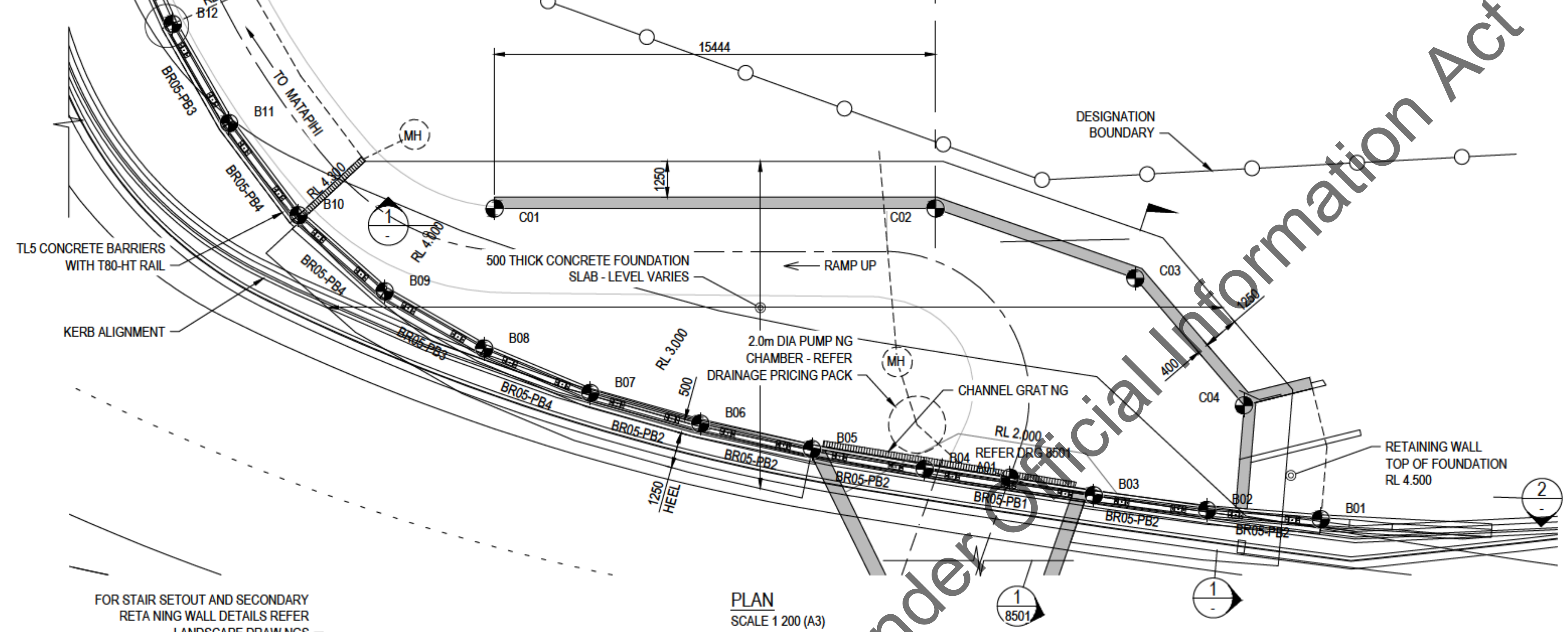
1:100 A1 / 1:200 A3 — 0 1 2 3 4 5 6 7 8 9 10

CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor
NZ TRANSPORT AGENCY WAKA KOTAHI

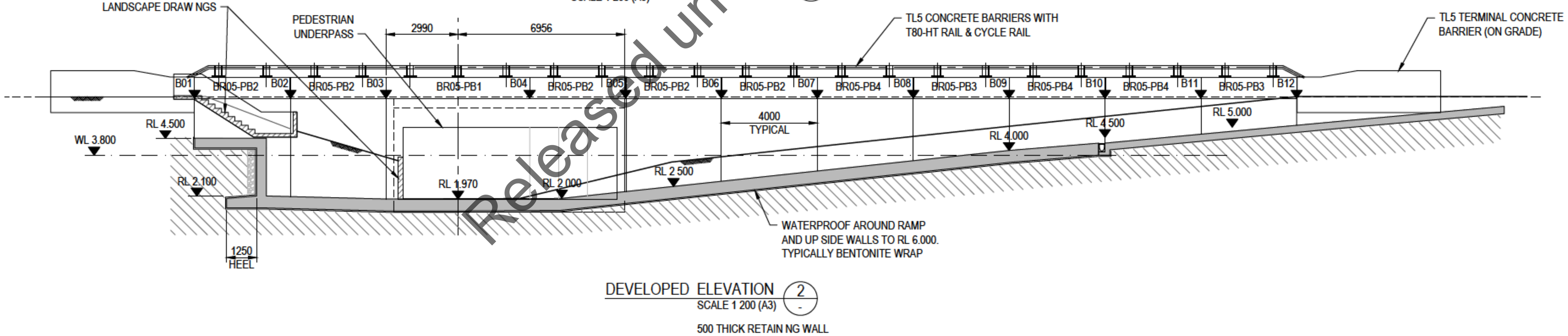
SCALE: 1:200 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603
CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW
DESIGNED: TKF | DESIGN REVIEW: SKK | MAR 2019
TITLE: BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT UNDERPASS - PLAN & ELEVATION
DRAWING No: B2B-DRG-BR05-8501 REV B



DEVELOPED ELEVATION 1
SCALE 1:200 (A3)
400 THICK RETAINING WALL



PLAN
SCALE 1:200 (A3)



DEVELOPED ELEVATION 2
SCALE 1:200 (A3)
500 THICK RETAINING WALL

NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
3. FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. FOR SERVICE DUCTS ROUTE REFER TO THE UTILITIES DESIGN PACKAGE.

BR05 - PEDESTRIAN UNDERPASS				
SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL
	E	N	(TOP OF WALL)	
B01	378432.430	809439.692	6.350	
B02	378434.717	809436.413	6.350	
B03	378436.848	809433.020	6.350	
B04	378439.916	809427.864	6.350	
B05	378441.892	809424.377	6.350	
B06	378443.696	809420.798	6.350	
B07	378445.326	809417.137	6.350	
B08	378446.498	809413.266	6.350	
B09	378447.170	809409.315	6.350	
B10	378447.036	378447.036, 809405.284	6.350	
B11	378446.098	809401.366	6.350	
B12	378444.684	809397.610	6.350	
C01	378442.478	809410.431	6.350	
C02	378432.644	809422.337	6.350	
C03	378430.059	809429.303	6.350	
C04	378431.063	809435.074	6.350	
C05	378434.018	809437.135	6.350	

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:100 A1 / 1:200 A3 — 0 1 2 3 4 5 6 7 8 9 10

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:200 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW
DESIGNED: TKF | DESIGN REVIEW: SKK | MAR 2019

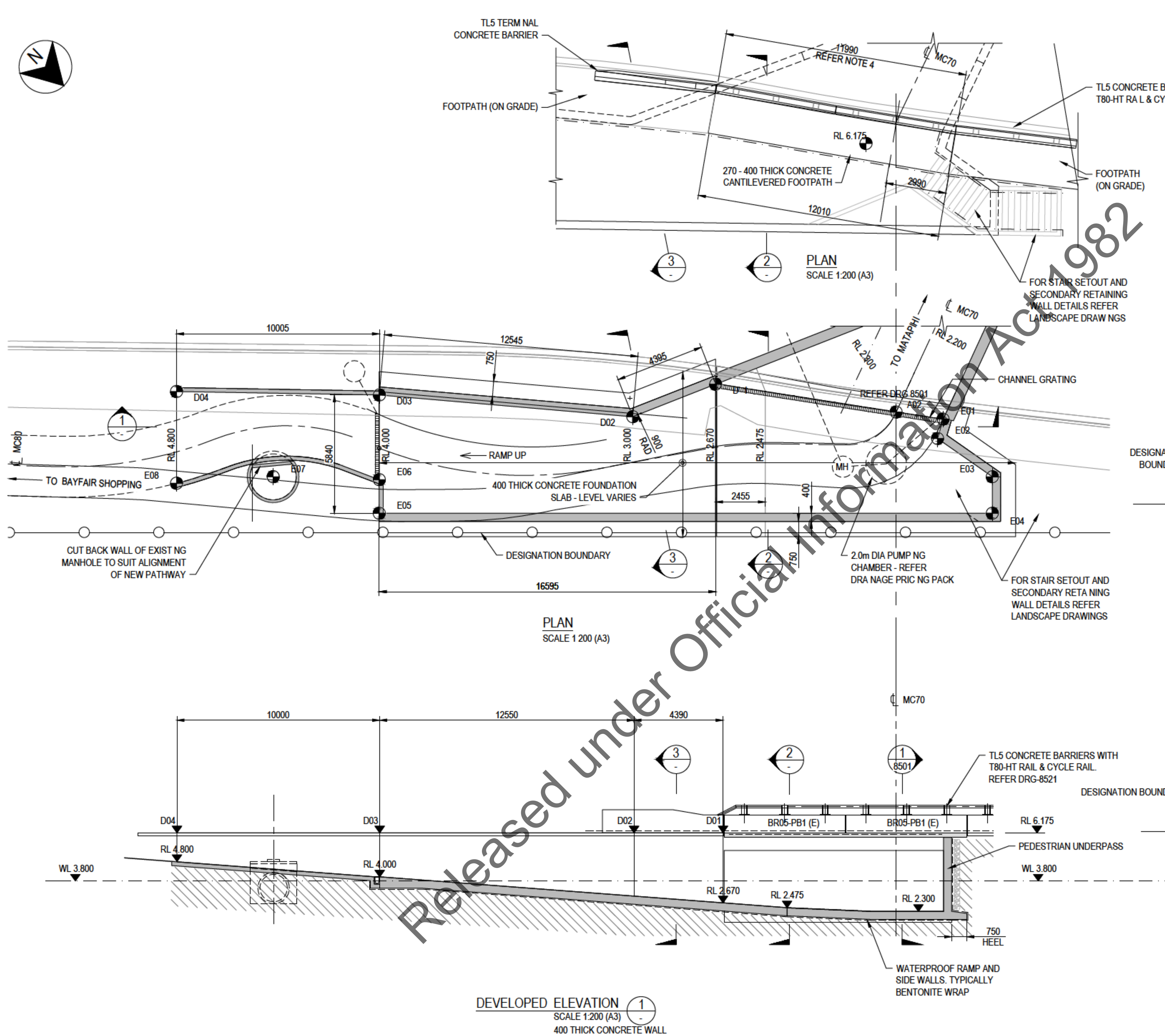
TITLE: BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - MATAPIHI RAMP

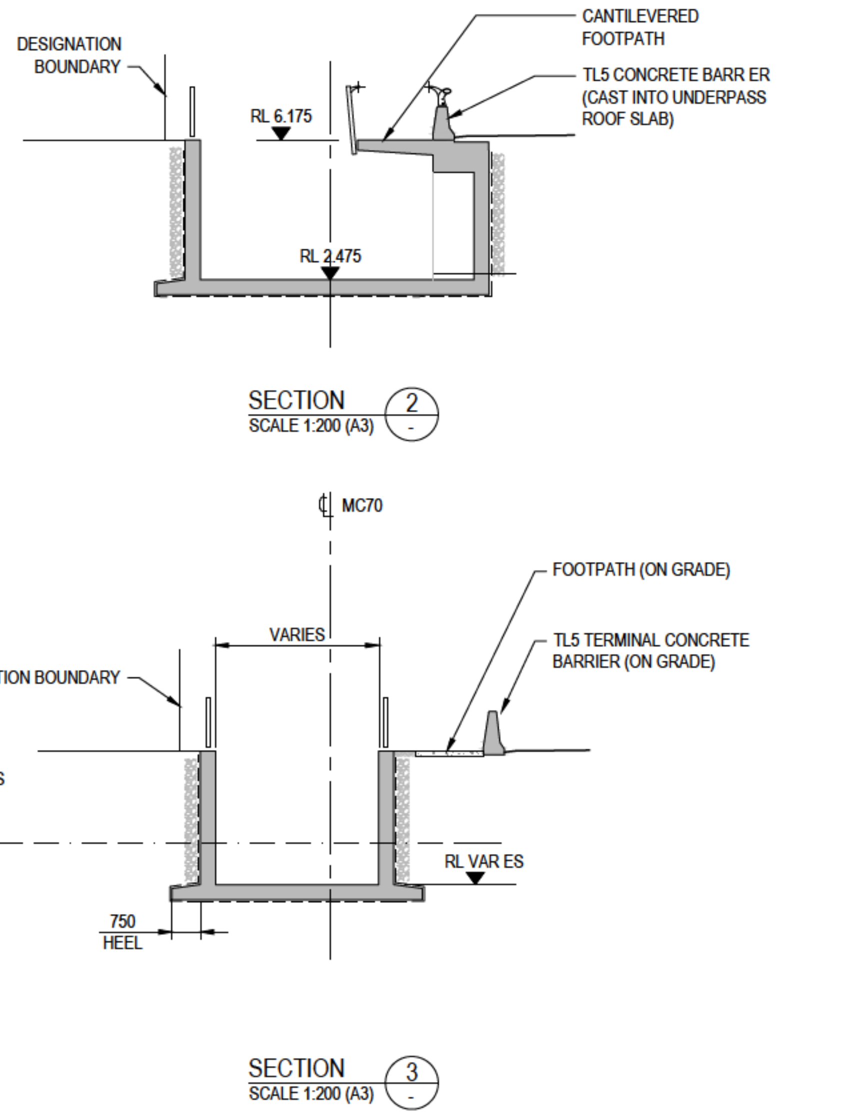
DRAWING No: B2B-DRG-BR05-8502 | REV: B

NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS EITHER SIDE OF UNDERPASS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
3. FOR BARR ER & WALL PANEL PATTERN DETAILS REFER TO URBAN DESIGN DRAW NGS.
4. ROAD SAFETY BARR ER TO BE CENTRED ON THE UNDERPASS .

BR05 - PEDESTRIAN UNDERPASS				
SETOUT POINT No.	CO-ORDINATES (m) E	CO-ORDINATES (m) N	DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
D01	378494.776	809442.061	6.000	
D02	378498.804	809440.317	6.000	
D03	378506.912	809430.736	6.000	
D04	378513.878	809423.560	6.000	
E01	378488.036	809451.200	6.000	
E02	378488.907	809451.684	6.000	
E03	378488.323	809454.932	6.000	
E04	378489.594	809456.209	6.000	
E05	378511.029	809434.873	6.000	
E06	378509.858	809433.697	4.850	
E07	378513.467	809429.906	6.000	
E08	378517.073	809426.773	6.000	





No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50□ ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor

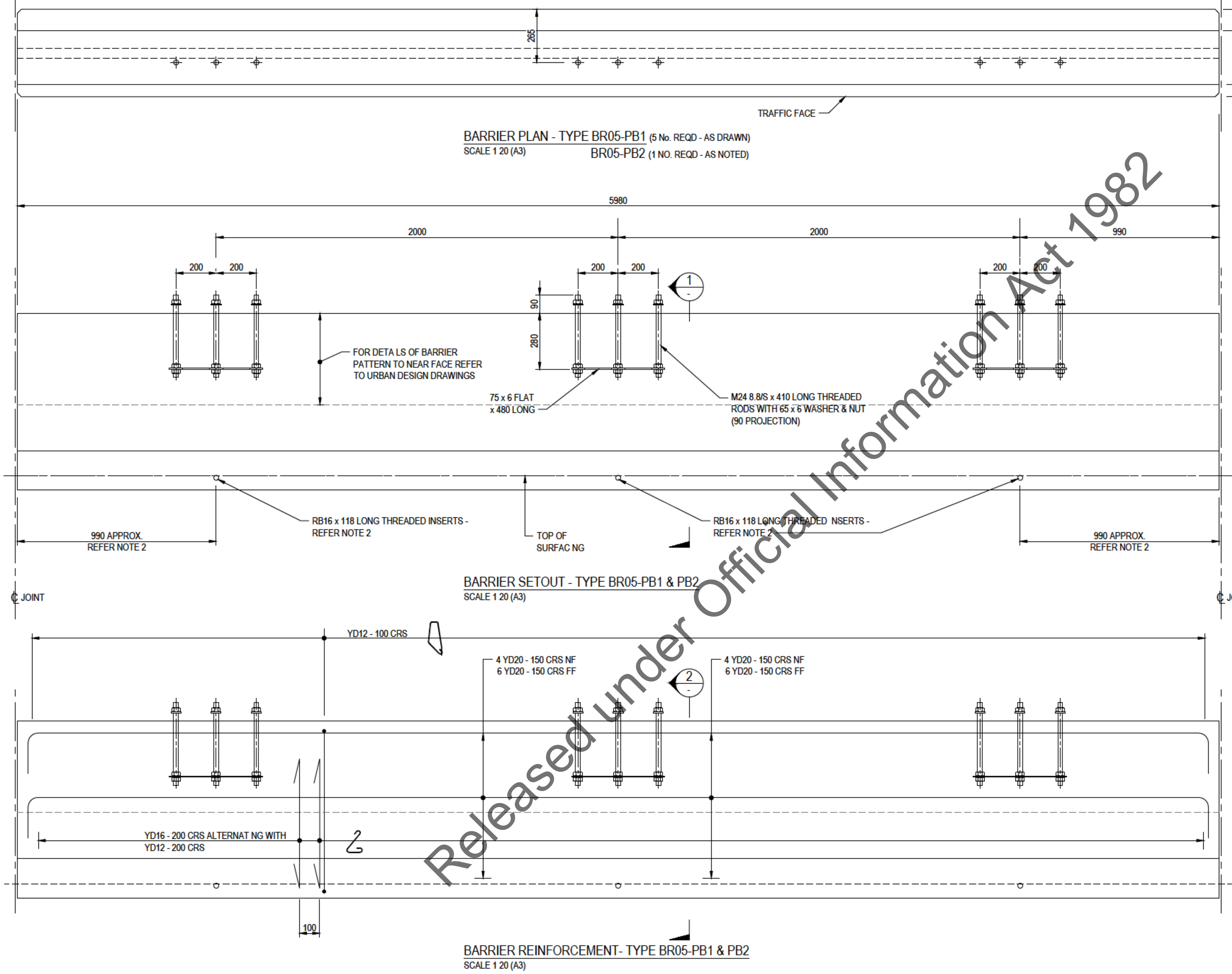
SCALE: 1:200 (A3)
STATUS: 50□ ISSUE
PROJECT NUMBER: 2/09-024/603

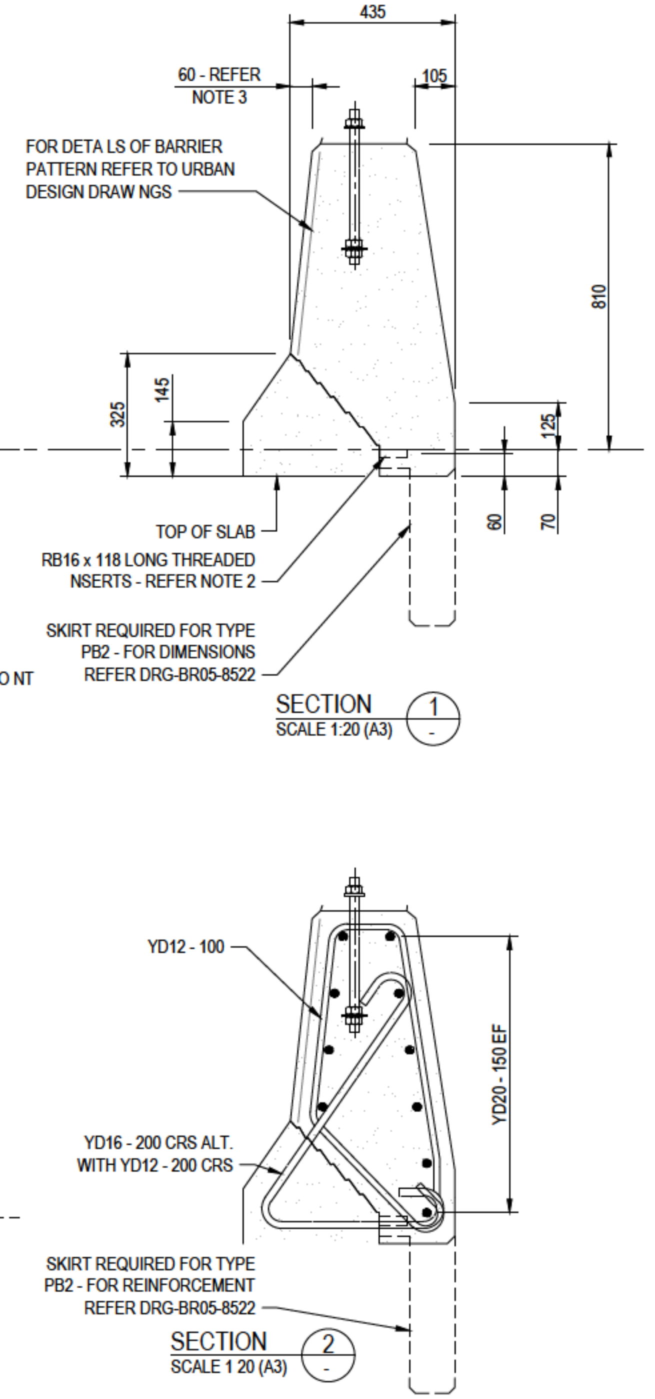
CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: DCC; DRAWING CHECK: GKK; APPROVED: LW, MAR 2019
DESIGNED: TKF; DESIGN REVIEW: SKK

TITLE: BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - BAYFAIR RAMP
DRAWING No: B2B-DRG-BR05-8503
REV: B

NOTES

1. FOR GENERAL NOTES REFER DRAW NGS DRG-BG01-5001 TO DRG-BG01-5005.
2. PROVIDE RB16 x 118 LONG THREADED NSERTS (PART No. RBA16TI) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS F REQU RED.
3. FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAW NGS.
4. ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)





No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50 ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:50 A1 / 1:100 A3 — 0 50 100 150 200 250 300 350 400 450 500

DATE: 15/03/2019 7:28:23 PM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_ie\d0145598\B2B-DRG-BR05-8521.dwg

NZ TRANSPORT AGENCY WAKA KOTAHI

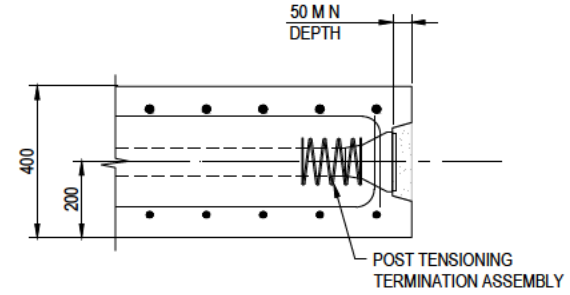
CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

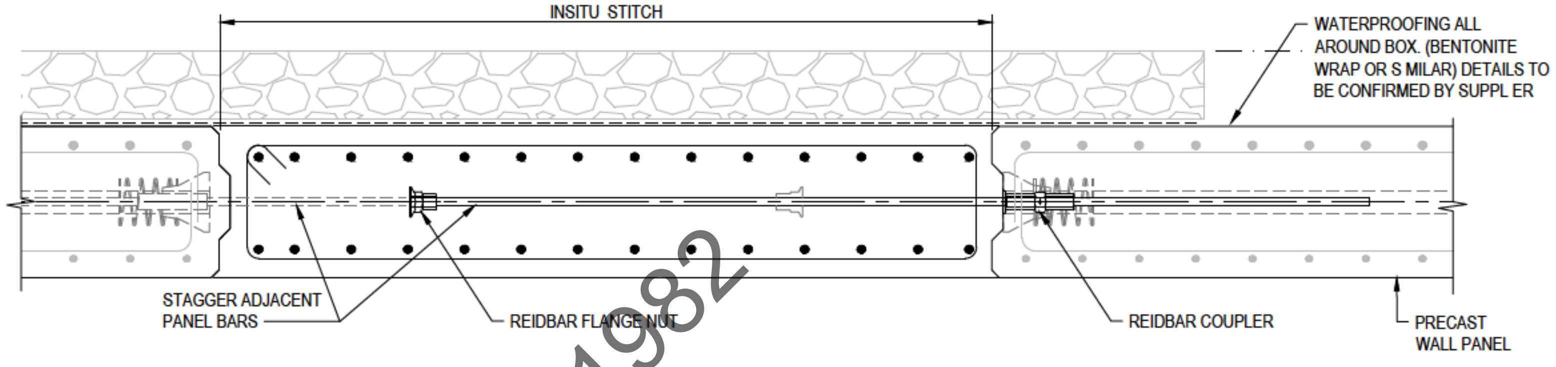
SCALE	1:20 (A3)
STATUS	50 ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	DCC
DRAWING CHECK	GKK
APPROVED	LW MAR 2019
DESIGNED	TKF
DESIGN REVIEW	SKK
TITLE	BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB1 & PB2
DRAWING No	B2B-DRG-BR05-8521
REV	B

NOTES

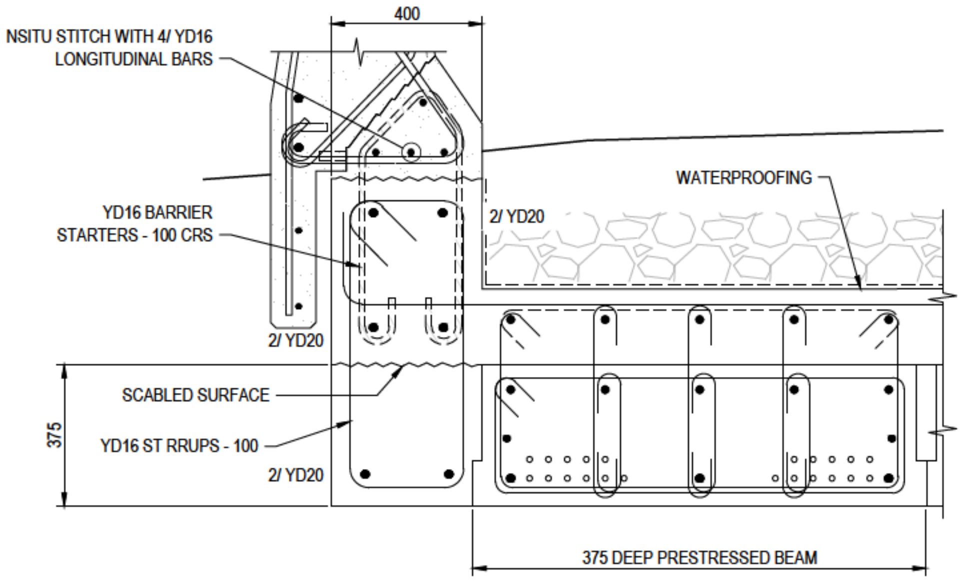
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.



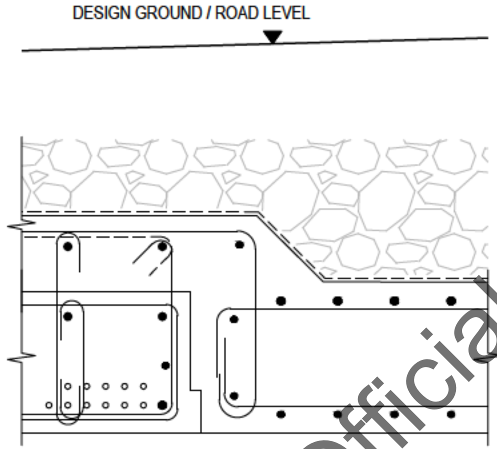
SECTION 2 / 8501
SCALE 1:20 (A3)
POST TENSIONING TERMINATION
AT STITCH PANEL & END PANEL



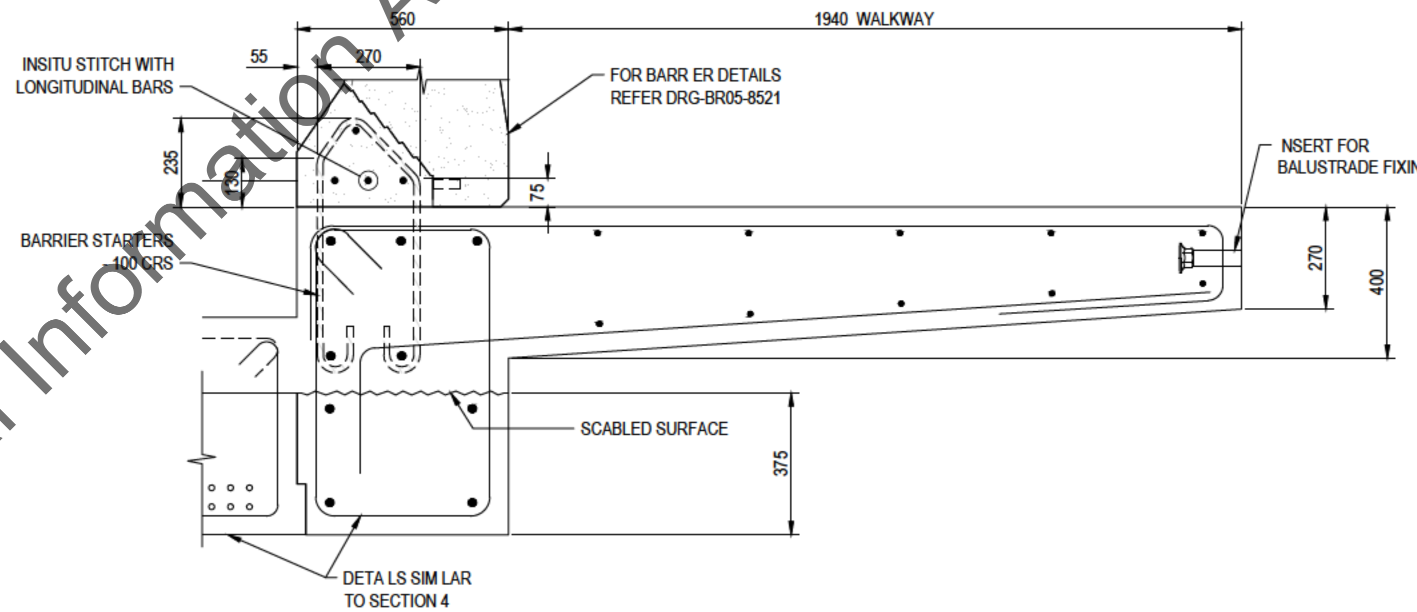
SECTION 3 / 8501
SCALE 1:20 (A3)
WALL STITCH DETAIL



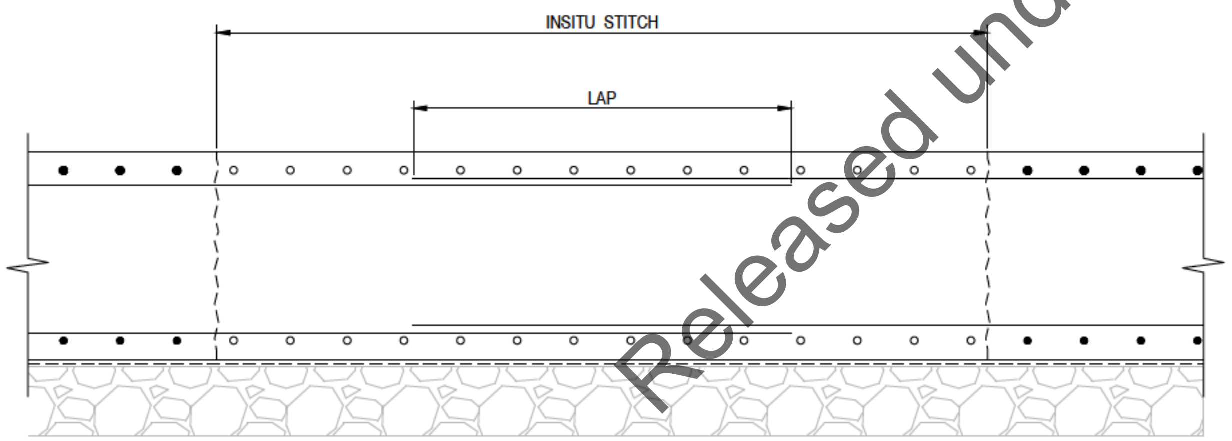
DETAIL 4 / 8501
SCALE 1:20 (A3)



DETAIL 5 / 8501
SCALE 1:20 (A3)
ROOF STEP DETAIL



DETAIL 6 / 8501
SCALE 1:20 (A3)



DETAIL 8 / 8501
SCALE 1:20 (A3)
BASE STITCH DETAIL
(ROOF STITCH SIMILAR)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:10 A1 / 1:20 A3 — 0 100 200 300 400 500 600 700 800 900 1000

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

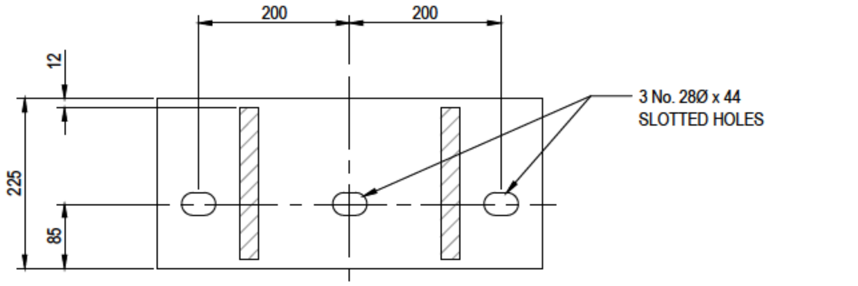
CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW
DESIGNED: TKF | DESIGN REVIEW: SKK | MAR 2019

TITLE: BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS SHEET 2

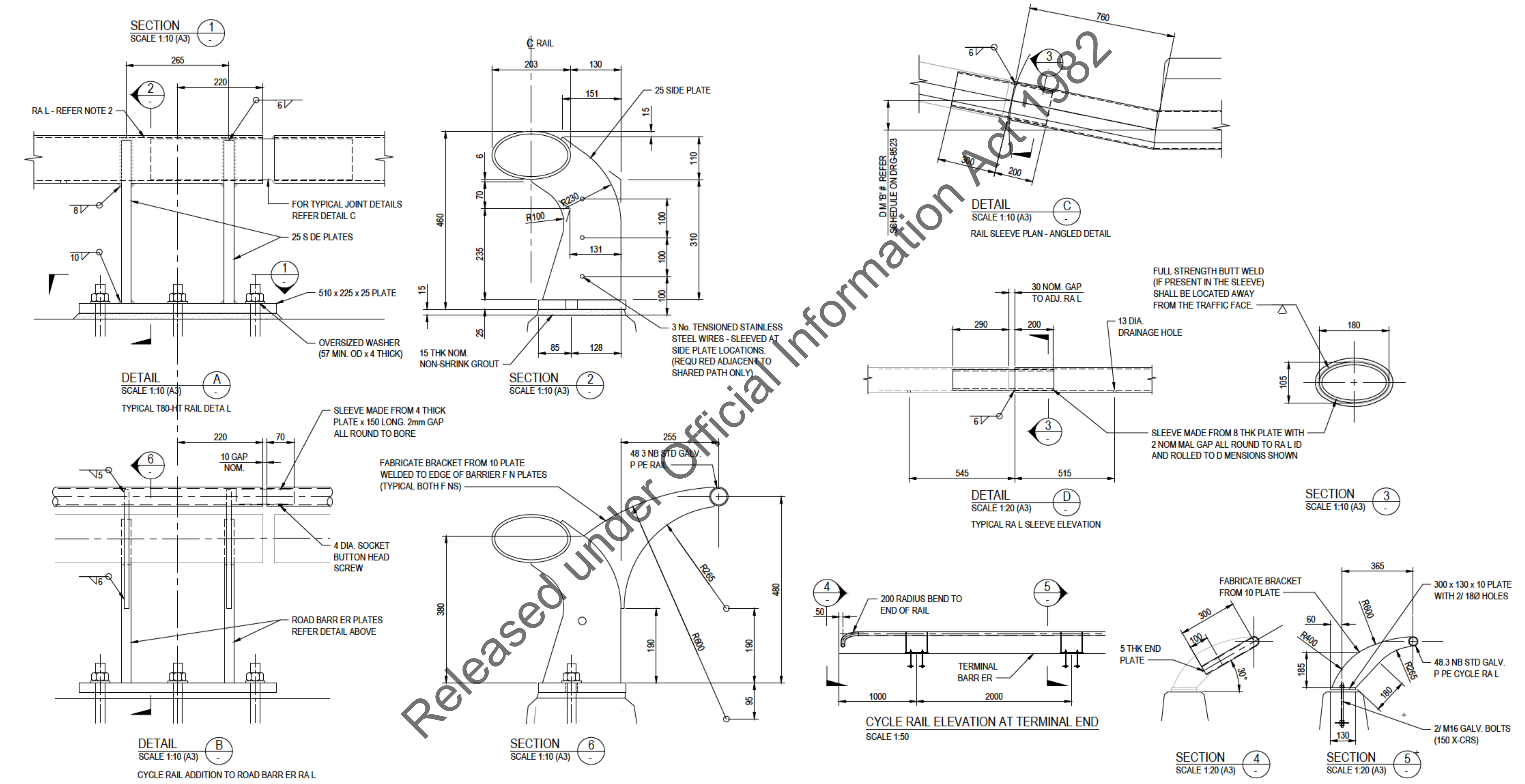
DRAWING No: B2B-DRG-BR05-8513
REV: B

DATE: 15/03/2019 7:22:37 PM LOGIN NAME: CONNON, DAVID C



NOTES

1. FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
2. BARRIER RAIL TO BE -
   EITHER 150 NB ULTRAPIPE C350LO AS/NZS1163,
   OR 6" DIAMETER STEEL PIPE ASTM A53 TYPE E OR S, GRADE B
   OR 6⅝" O.D. PIPE x .188" API-5LX52
   AND ROLLED TO 203 WIDE x 124 DEEP ELLIPTICAL SHAPE.
3. # - DENOTES DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL.



1:10 A1 / 1:20 A3 — 0 100 200 300 400 500 600 700 800 900 1000
1:25 A1 / 1:50 A3 — 0 400 800 1200 1600 2000 2400
1:5 A1 / 1:10 A3 — 0 50 100 150 200 250 300 350 400 450 500

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

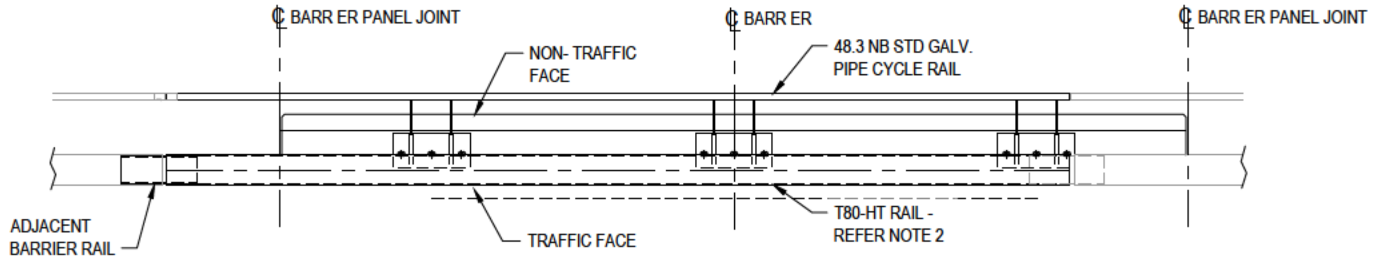
NZ TRANSPORT AGENCY — WAKA KOTAHI
CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:20 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	DCC
DRAWING CHECK	GKK
APPROVED	LW, MAR 2019
DESIGNED	TKF
DESIGN REVIEW	SKK
TITLE	BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 2
DRAWING No	B2B-DRG-BR05-8524
REV	B

DATE: 15/03/2019 7:42:57 PM LOGIN NAME: CONNON, DAVID C

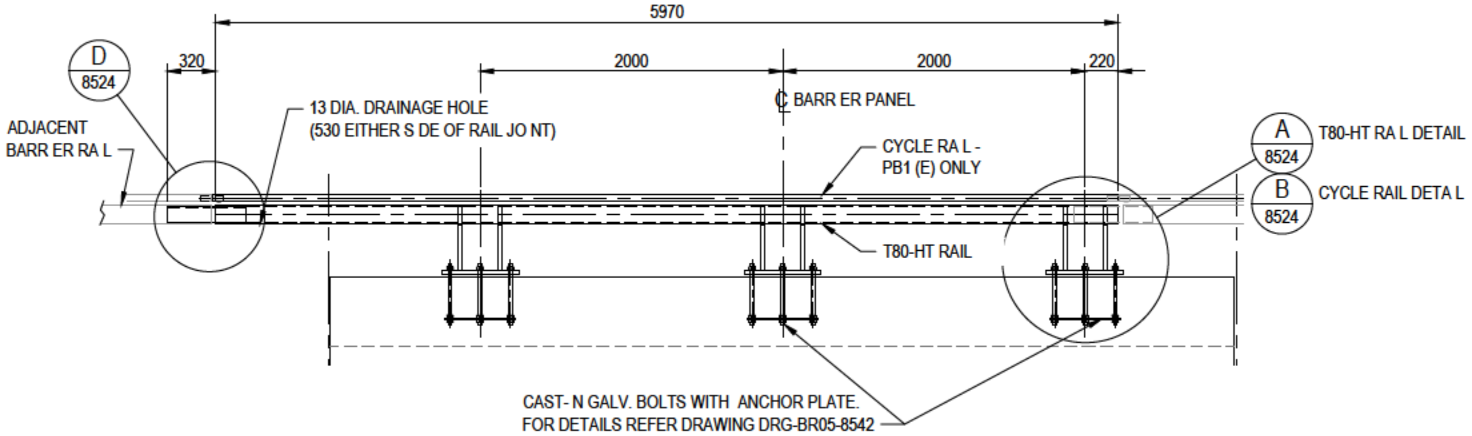
NOTES

1. FOR GENERAL NOTES REFER DRAW NGS DRG-BG01-001 TO 5005.
2. BARR ER RA L TO BE -
   EITHER 150 NB ULTRAP PE C350LO AS/NZS1163,
   OR 6" DIAMETER STEEL PIPE ASTM A53 TYPE E OR S, GRADE B
   OR 6 5/8" O.D. P PE x .188" API-5LX52
   AND ROLLED TO 203 W DE x 124 DEEP ELL PTICAL SHAPE.
3. # - DENOTES D MENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL



PLAN - PB1 (E)
SCALE 1:50 (A3)
EAST RAIL PLAN - AS DRAWN

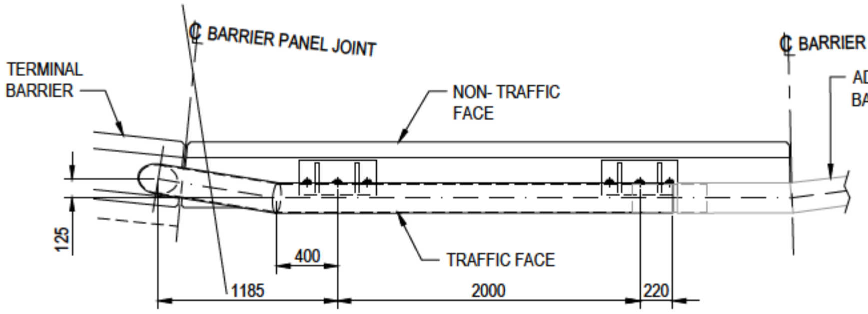
PLAN - PB1 (W)
SCALE 1:50 (A3)
WEST RAIL PLAN - SIM LAR (NO CYCLE RAIL)



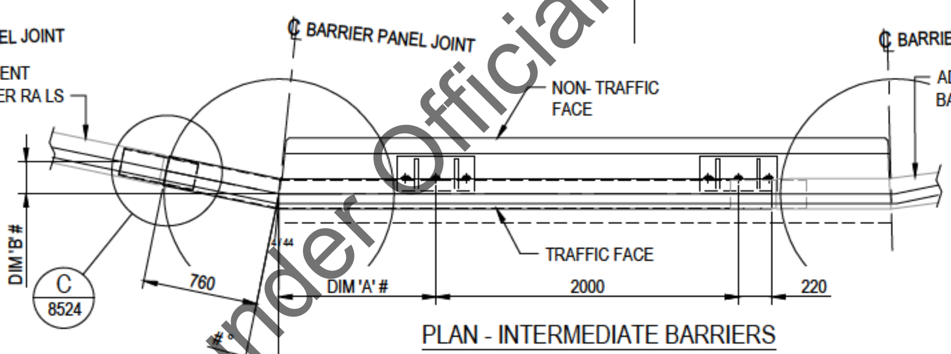
TYPICAL RAILING ELEVATION
SCALE 1 50 (A3)
XX No. REQD

RAIL SCHEDULE

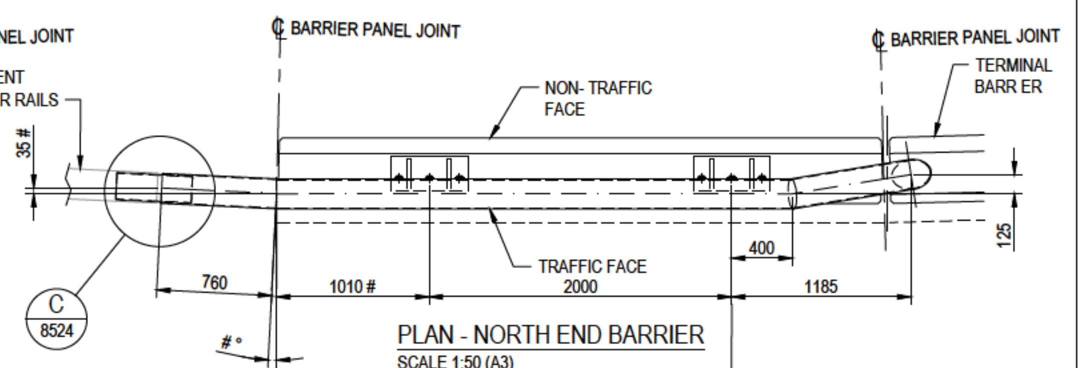
BARRIER TYPE	D M 'A'	D M 'B'
PB3	REFER NORTH END PLAN BELOW	
PB3	1010	18
PB2	1000	18
PB3	1010	37
PB3	1010	37
PB3	1005	95
PB5	1040	95
PB4	1040	152
PB5	1040	152
PB5	1040	95
PB4	REFER SOUTH END PLAN BELOW	



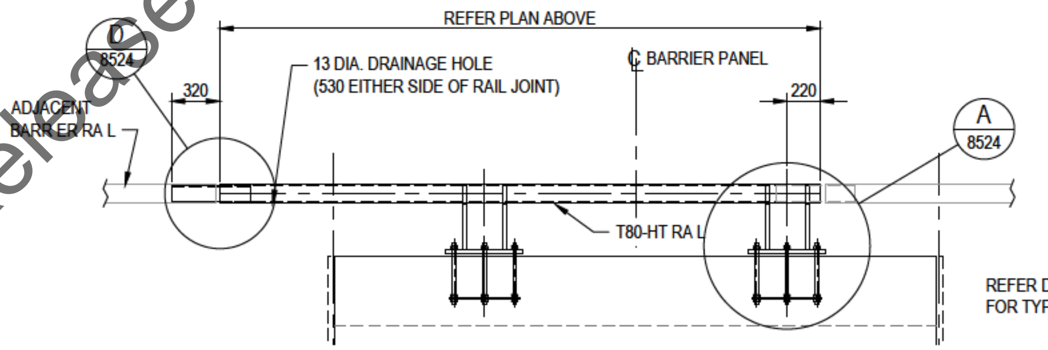
PLAN - SOUTH END BARRIER
SCALE 1:50 (A3)
1 No. REQD



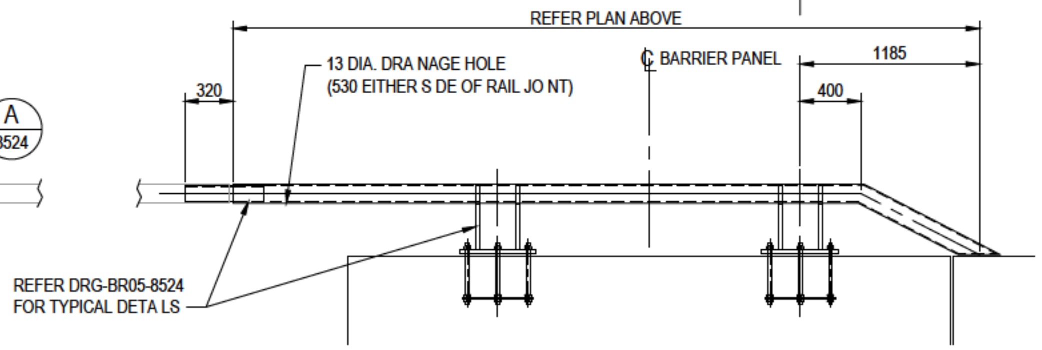
PLAN - INTERMEDIATE BARRIERS
SCALE 1:50 (A3)
NOTE : PB1(W) BARRIER HAS 3 BARR ER FIX NGS
- REFER 6.0m BARR ER ABOVE



PLAN - NORTH END BARRIER
SCALE 1:50 (A3)
1 No. REQD



TYPICAL RAILING ELEVATION
SCALE 1 50 (A3)



END RAILING ELEVATION
SCALE 1:50 (A3)

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50□ ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:25□ A1 / 1:50□ A3 — 0 400 800 1200 1600 2000 2400

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:20 (A3)
STATUS: 50□ ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: DCC | DRAWING CHECK: GKK | APPROVED: LW
DESIGNED: TKF | DESIGN REVIEW: SKK | MAR 2019

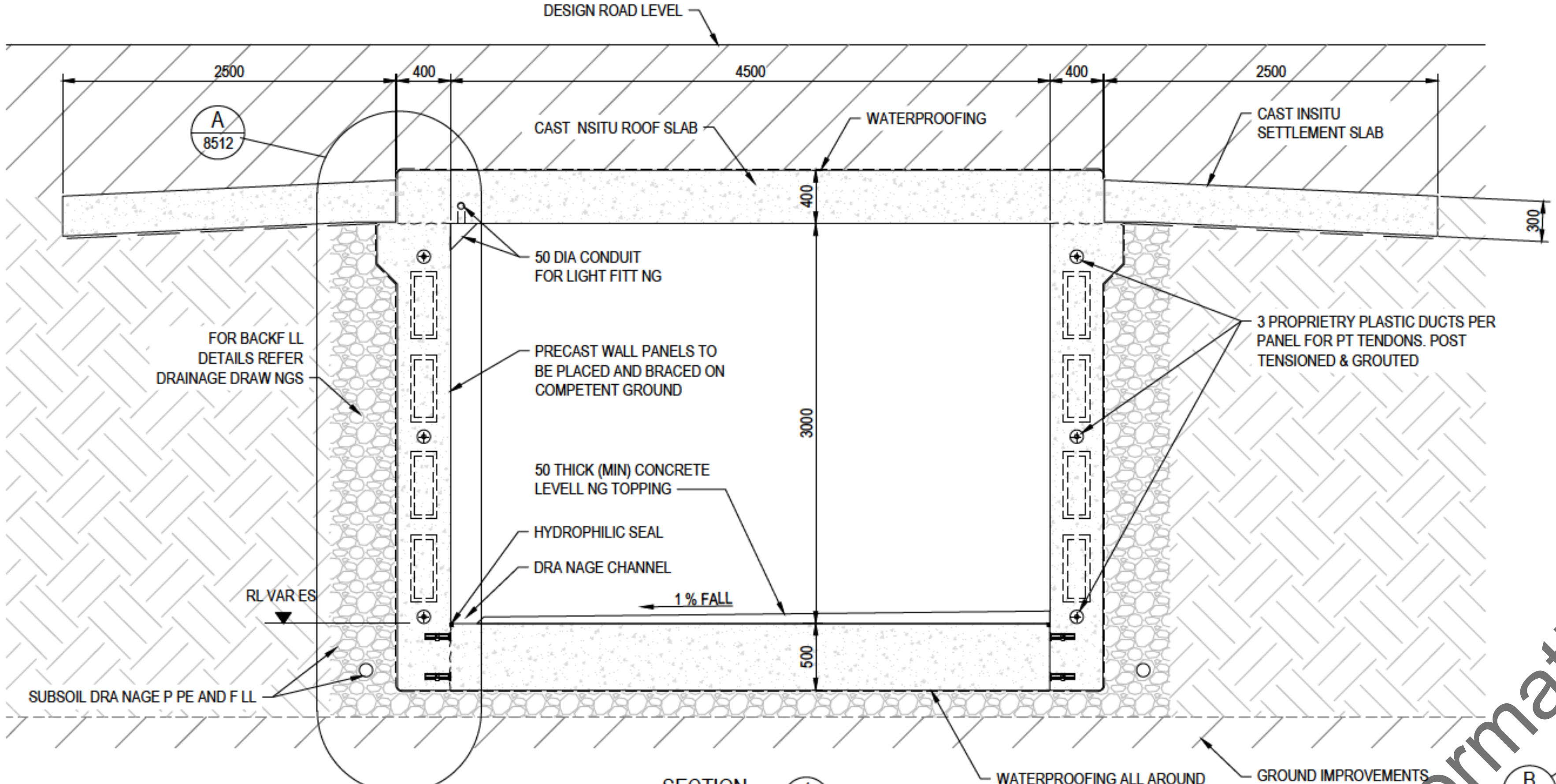
TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 1

DRAWING No: B2B-DRG-BR05-8523
REV: B

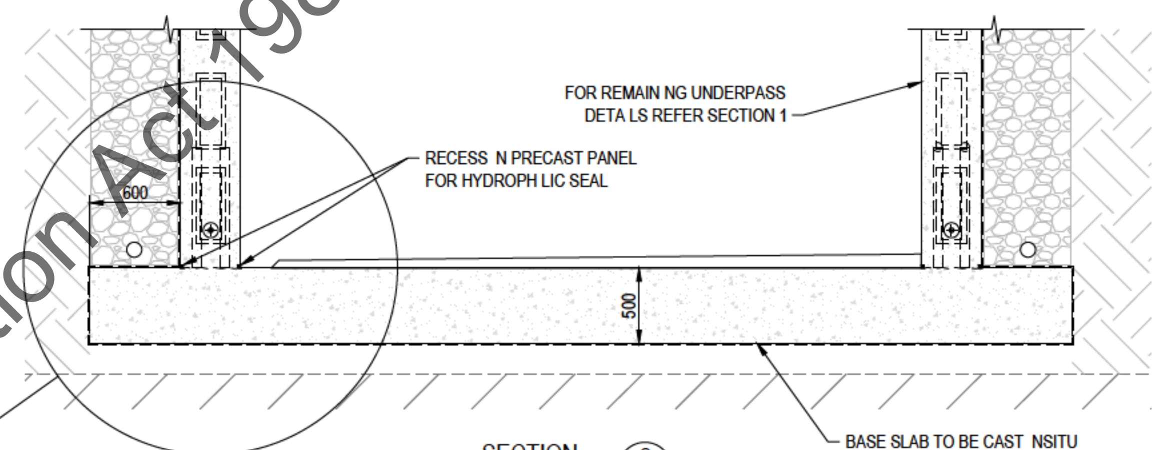
DATE: 15/03/2019 7:37:10 PM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_ieb\d0145599\B2B-DRG-BR05-8523.dwg

NOTES

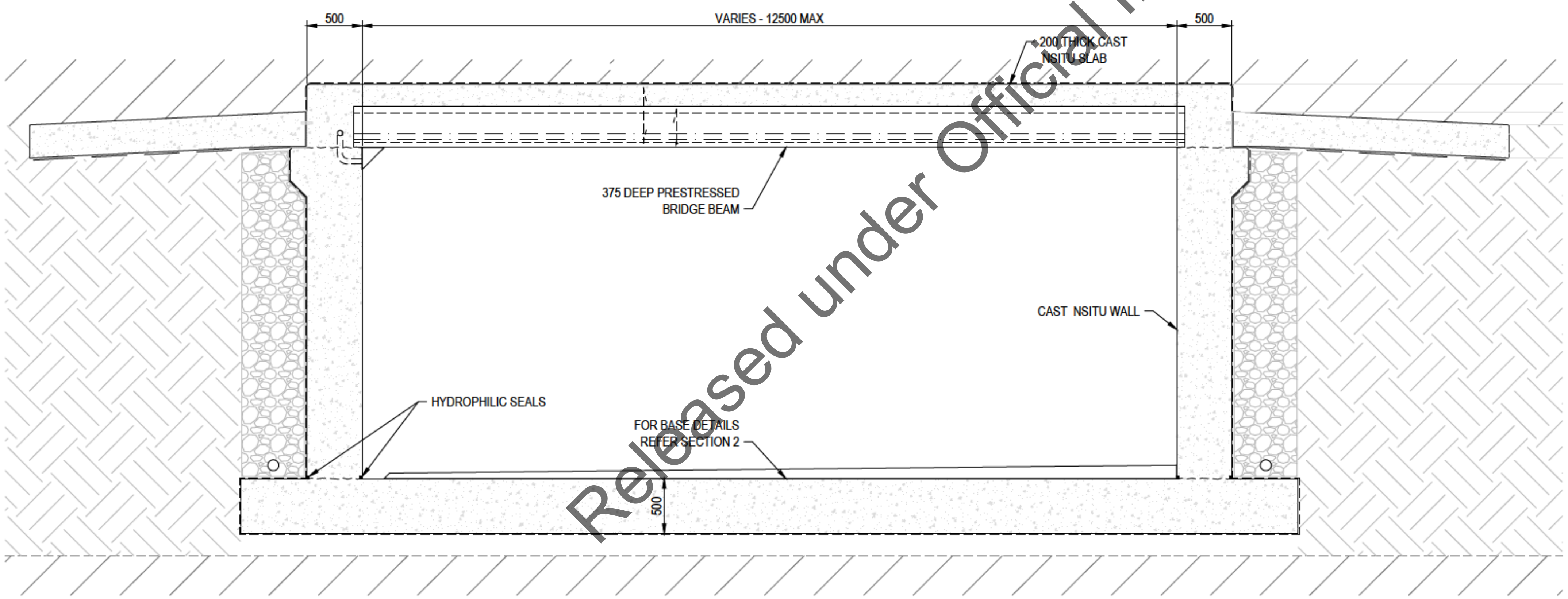
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS, REFER TO THE UT LITIES DESIGN PACKAGE.



SECTION 1 / 8101
SCALE 1 50 (A3)
TYPICAL UNDERPASS SECTION



SECTION 2 / 8101
SCALE 1:50 (A3)
ALTERNATIVE BASE OPTION



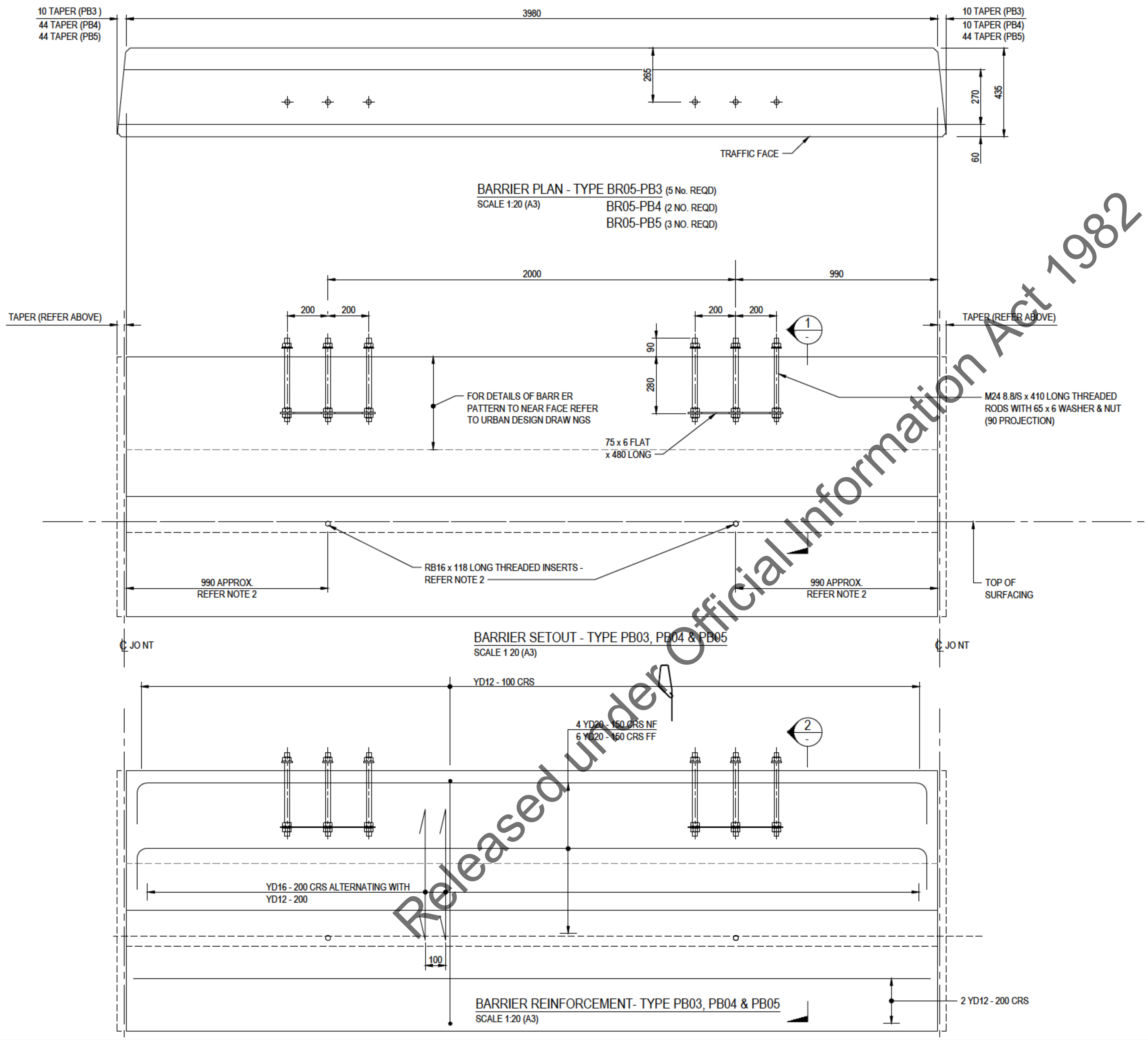
SECTION 3 / 8101
SCALE 1 50 (A3)
SPLAYED UNDERPASS END SECTION

DATE: 15/03/2019 5:14:26 PM LOGIN NAME: CONNON, DAVID C
LOCATION: C:\users\dconnon\appdata\local\projectwise\jacobs_anz_ie\d0145598\B2B-DRG-BR05-8511.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50 ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

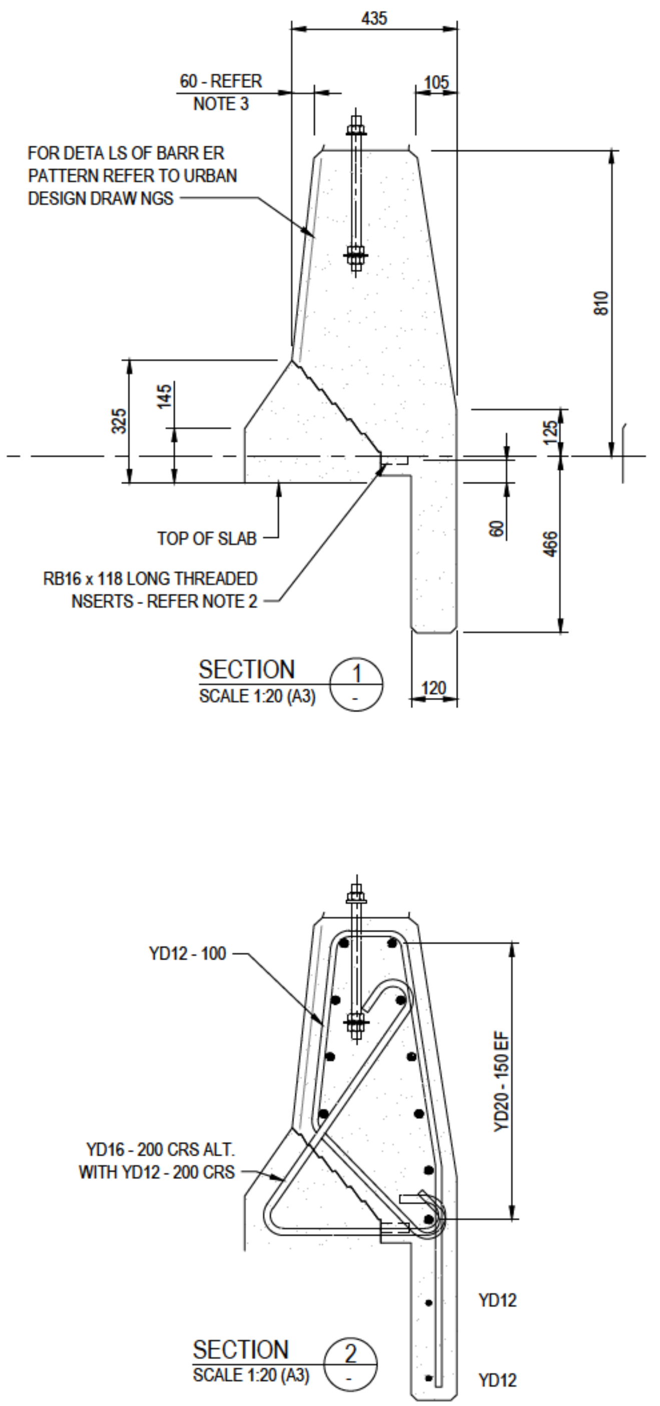
1:25 A1 / 1:50 A3 — 0 400 800 1200 1600 2000 2400

CONTRACTOR	CPB CONTRACTORS
DESIGNER	JACOBS, Align, Tonkin+Taylor
SCALE	1:50 (A3)
STATUS	50 ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	DCC
DRAWING CHECK	GKK
APPROVED	LW MAR 2019
DESIGNED	TKF
DESIGN REVIEW	SKK
TITLE	BR05 - PEDESTRIAN UNDERPASS TYPICAL SECTIONS
DRAWING No	B2B-DRG-BR05-8511
REV	B



NOTES

1. FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
2. PROVIDE RB16 x 118 LONG THREADED INSERTS (PART No. RBA16TI) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS IF REQUIRED.
3. FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)



No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

1:50 A1 / 1:100 A3 — 0 50 100 150 200 250 300 350 400 450 500

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:20 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	DCC
DESIGNED	TKF
DRAWING CHECK	GKK
DESIGN REVIEW	SKK
APPROVED	LW MAR 2019
TITLE	BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB3, PB4 & PB5
DRAWING No	B2B-DRG-BR05-8522
REV	B

DATE: 15/03/2019 7:32:51 PM LOGIN NAME: CONNON, DAVID C

BAYPARK TO BAYFAIR EXPRESSWAY UNDERPASS UPGRADE
CONTRACT No: NZTA 2/09-024/603

ISSUED FOR INFORMATION

Project No: IZ089300

Date: MARCH, 2019

FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
INDEX & LAYOUT				
B2B-DRG-AD01-8001	A	COVER SHEET		
B2B-DRG-AD01-8002	A	UNDERPASS UPGRADE	DRAW NG INDEX SHEET	
ROAD PLANS				
B2B-DRG-AL01-8051	A	UNDERPASS UPGRADE	PLAN	SHEET 1
B2B-DRG-AL01-8052	A	UNDERPASS UPGRADE	BAYFA R RAMP PLAN	SHEET 2
B2B-DRG-AL01-8053	A	UNDERPASS UPGRADE	MATAP HI RAMP PLAN	SHEET 3
B2B-DRG-AL01-8054	A	UNDERPASS UPGRADE	UNDERPASS PLAN	SHEET 4
PLAN & LONG-SECTION				
B2B-DRG-AL01-8101	A	UNDERPASS UPGRADE	PLAN & LONG SECTIONS	UNDERPASS MC70 & RAMP MC71
B2B-DRG-AL01-8102	A	UNDERPASS UPGRADE	PLAN & LONG SECTIONS	BUS STOP MCL5 & RAMP ACCESS MC80
BARRIERS				
B2B-DRG-RF01-8271	A	UNDERPASS UPGRADE	BARRIERS	
KERBS,FOOTPATH & CYCLEWAYS				
B2B-DRG-PT01-8451	A	UNDERPASS UPGRADE	KERBS, FOOTPATH & CYCLEWAYS	
SIGNS				
B2B-DRG-SL01-8211	A	UNDERPASS UPGRADE	SIGNAGE	
B2B-DRG-SL01-8222	A	UNDERPASS UPGRADE	GUIDE SIGN DETA LS	
B2B-DRG-SL01-8226	A	UNDERPASS UPGRADE	SIGN DETAILS	REGULATORY & WARNING
PAVEMAENT MARKINGS				
B2B-DRG-SL01-8240	A	UNDERPASS UPGRADE	PAVEMENT MARK NGS	LEGEND
B2B-DRG-SL01-8245	A	UNDERPASS UPGRADE	PAVEMENT MARK NGS	

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LW	LW	50% ISSUE

NZ TRANSPORT AGENCY
WAKA KOTAHI

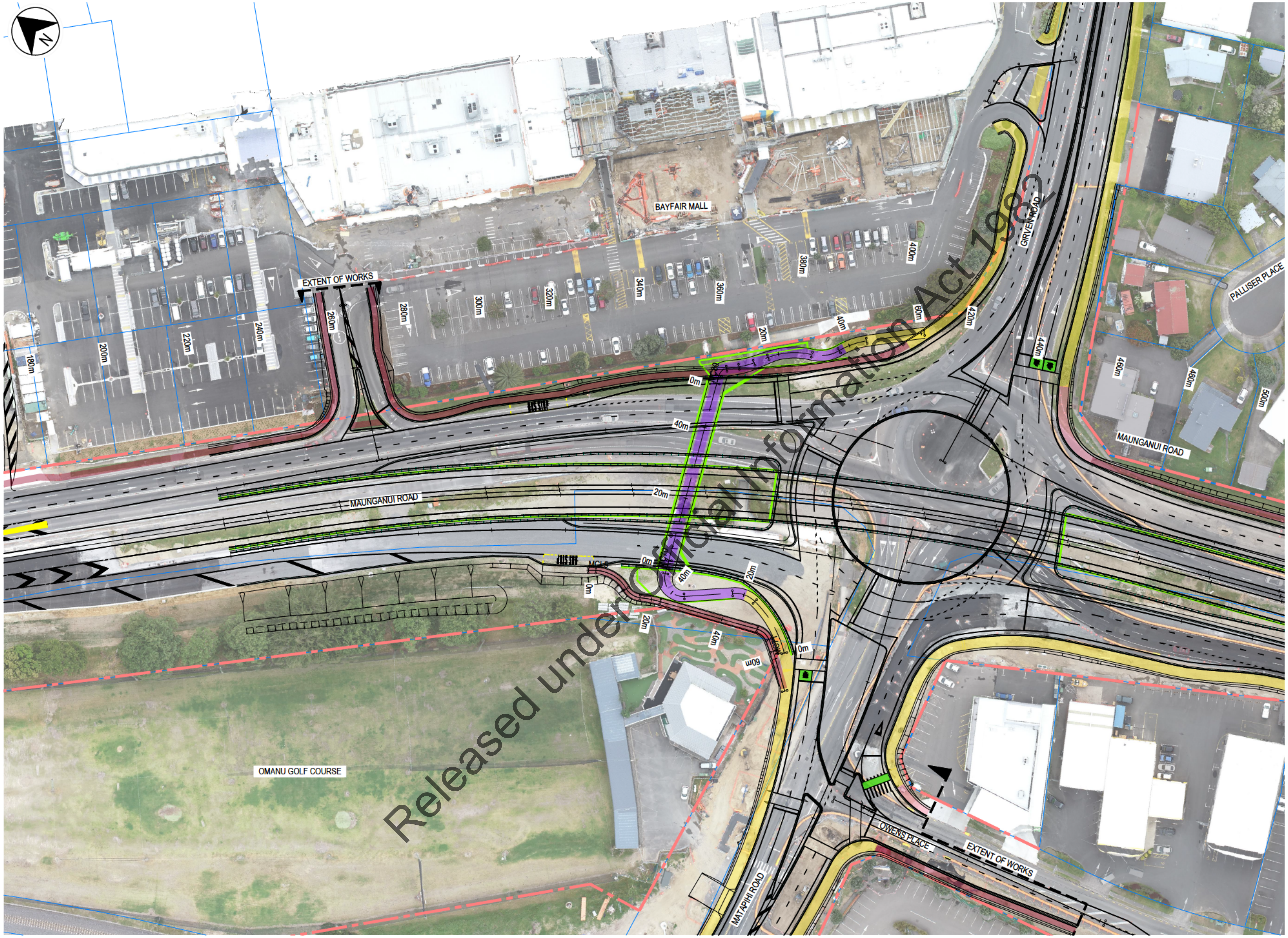
CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: N.T.S.
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: GK
DRAWING CHECK: GK
APPROVED: LW
DESIGNED: LW
DESIGN REVIEW: LW

TITLE: UNDERPASS UPGRADE DRAWING INDEX SHEET
DRAWING No: B2B-DRG-AD01-8002
REV: A



LEGEND

- EXISTING CADASTRAL
- DESIGNATION BOUNDARY
- SHOULDER /VERGE
- RETAINING WALL
- SHARED PATH CONSTRUCTION
- SHARED PATH ON SLAB

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LG	LW	50% ISSUE

1:500 @ A1
1:1000 @ A3
0 5 10 15 20 25 30 35 40 45 50 m

NZ TRANSPORT AGENCY
WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:1000 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

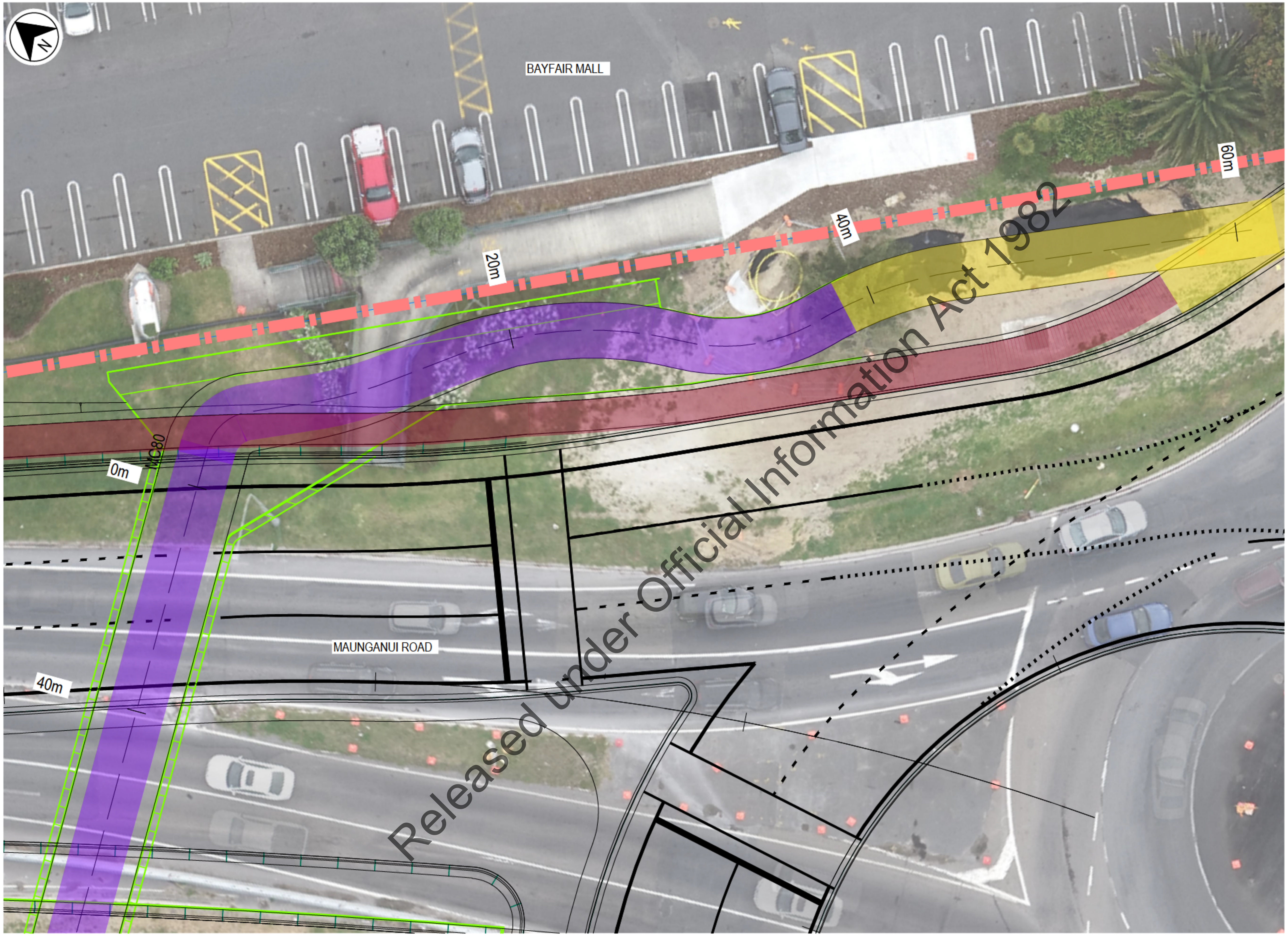
DRAWN: GK
DRAWING CHECK: GK
APPROVED: LW
DESIGNED: KR
DESIGN REVIEW: LG

TITLE: UNDERPASS UPGRADE PLAN SHEET 1

DRAWING No: B2B-DRG-AL01-8051

REV: A

DATE: 14/03/2019 1:49:38 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\g\kaminska\appdata\local\projectwise\jacobs_anz_ie\d0145596\B2B-DRG-AL01-8051.dwg



LEGEND

- EXISTING CADASTRAL
- DESIGNATION BOUNDARY
- SHOULDER /VERGE
- RETA NING WALL
- SHARED PATH CONSTRUCTION
- SHARED PATH ON SLAB

DATE: 14/03/2019 1:46:03 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\gkaminska\appdata\local\projectwise\jacobs_anz_je\d0145598\B2B-DRG-AL01-8052.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	KR	LW	50% ISSUE

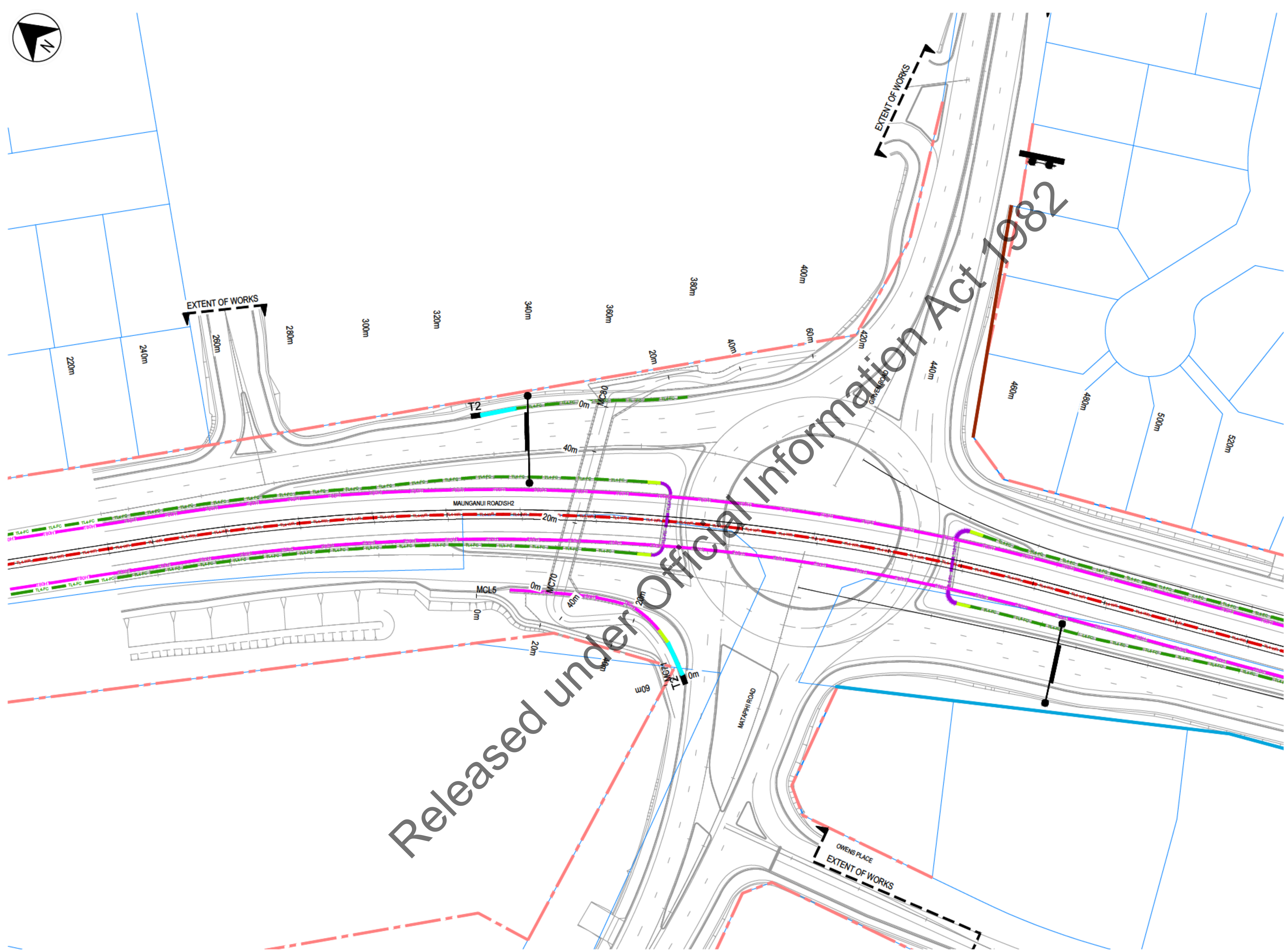
1:100 @ A1
1:200 @ A3
0 1 2 3 4 5 6 7 8 9 10 m

NZ TRANSPORT AGENCY
WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:200 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	GK
DRAWING CHECK	GK
APPROVED	LW
DESIGNED	KR
DESIGN REVIEW	LG
TITLE	UNDERPASS UPGRADE BAYFAIR RAMP PLAN SHEET 2
DRAWING No	B2B-DRG-AL01-8052
REV	A



BARRIER NOTES

1. REFER TO CSP PACIFIC DRAWINGS FOR TL4 "NU-GUARD" W-SECTION GUARD RAIL DETAILS AND TERMINALS (TERMINAL TYPE 2 AND TERMINAL TYPE 3)
2. REFER TO DRAWING NZTA RSB 5 FOR TRANSITION FROM W-SECTION TO CONCRETE (THRIE BEAM TRANSITION)
3. REFER TO URBAN DESIGN DRAWINGS FOR PEDESTRIAN/CYCLIST FENCES

LEGEND

- DESIGNATION
- BOUNDARY

BARRIER LEGEND

- TL4-FC — CONCRETE BARRIER - (TL-4)
- T80HT — CONCRETE BARRIER - (TL-5 T80HT)
- TL4-WR — WIRE ROPE (TL-4)
- TL5-FC — CONCRETE BARRIER - (TL-5)
- TL4 THRIE BEAM TRANSITION (CSP PACIFIC FX 527-3)
- TL4 TO TL5 CONCRETE TRANSITION (RF-01 3282)
- T2 — TERMINAL TYPE 2 X-350 W-SECTION
- NEW 1.8m HIGH TIMBER BOUNDARY FENCE
- NEW 1.8m MIN. HIGH CHAIN LINK SECURITY FENCE

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LG	LW	50% ISSUE

1:500 @ A1 / 1:1000 @ A3 — 0 5 10 15 20 25 30 35 40 45 50 m

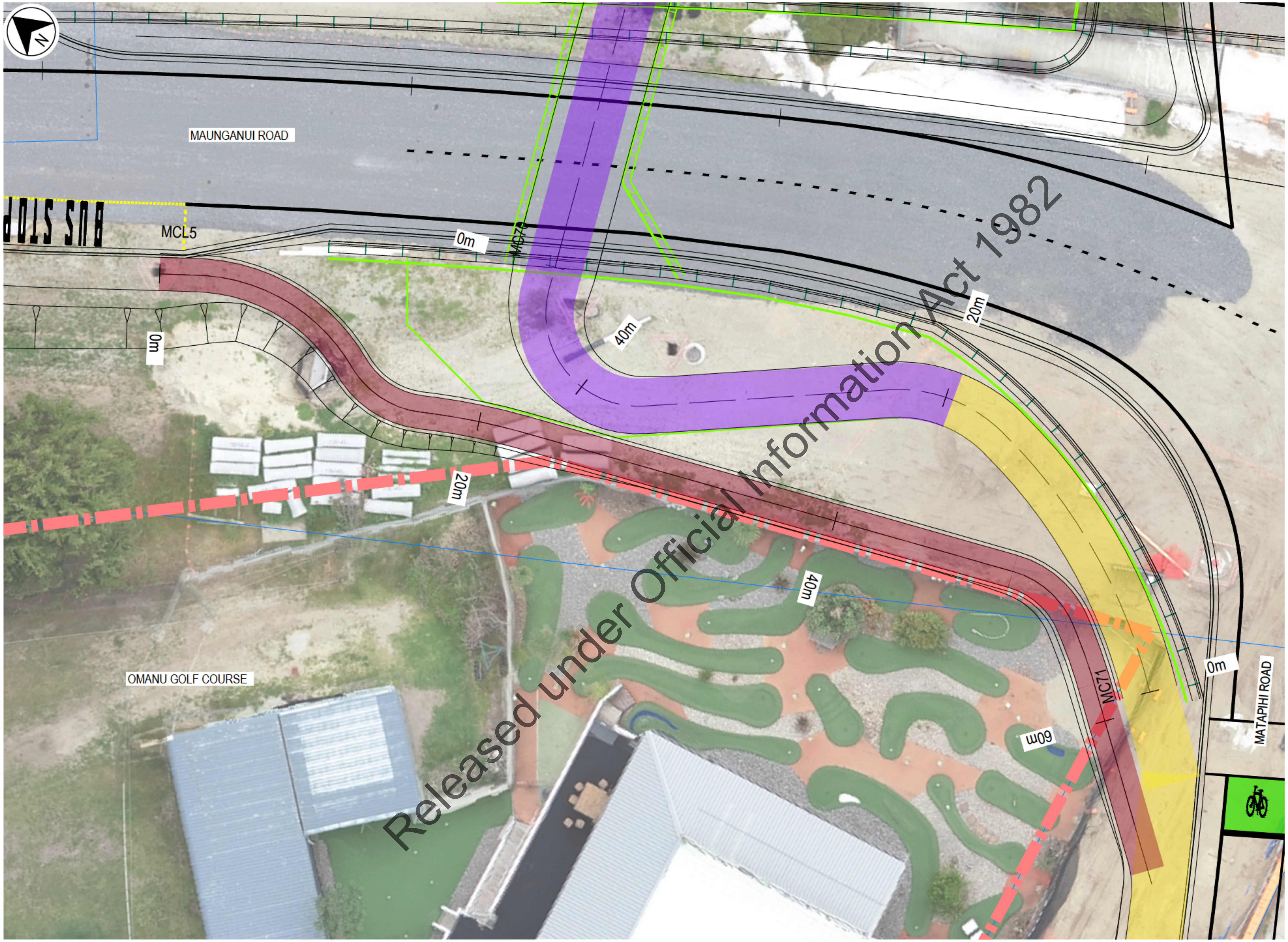
NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:1000 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	GK
DRAWING CHECK	GK
APPROVED	LW
DESIGNED	LG
DESIGN REVIEW	LG
TITLE	UNDERPASS UPGRADE BARRIERS
DRAWING No	B2B-DRG-RF01-8271
REV	A

LOGIN NAME: KAMINSKA, GRACE
DATE: 15/03/2019 10:00:17 AM
LOCATION: C:\users\gkaminska\appdata\local\projectwise\jacobs_anz_ie\d0145596\B2B-DRG-RF01-8271.dwg



LEGEND

- EXIST NG CADASTRAL
- DESIGNATION BOUNDARY
- SHOULDER /VERGE
- RETAINING WALL
- SHARED PATH CONSTRUCTION
- SHARED PATH ON SLAB

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	KR	LW	50% ISSUE

1:100 @ A1
1:200 @ A3
0 1 2 3 4 5 6 7 8 9 10 m

NZ TRANSPORT AGENCY
WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:200 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN	DRAWING CHECK	APPROVED
GK	GK	LW
DESIGNED	DESIGN REVIEW	
KR	LG	

TITLE: UNDERPASS UPGRADE MATAPIHI RAMP PLAN SHEET 3

DRAWING No: B2B-DRG-AL01-8053
REV: A

DATE: 14/03/2019 1:47:35 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\gkaminska\appdata\local\projectwise\jacobs_anz_...\B2B-DRG-AL01-8053.dwg

LEGEND	PAVEMENT MARKINGS	SYMBOL	SPECFICATION	MATERIALS
A1	EDGE LINE / MEDIAN LANE		HPLL 150mm WIDE, CONTINUOUS	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
A2	EDGE LINE SH29A		HPLL 150mm WIDE, CONTINUOUS, AUDIO TACT LE PROFILE BLOCKS 250 CENTRES	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B1	LANE L NE SH29A		HPLL 100mm WIDE INTERMITTED, 3m LONG, 7m GAP, AUDIO TACTILE PROFILE BLOCKS 250 CENTRES, 1 WHITE MONO-DIRECTIONAL RRPM AT START OF L NE, 0.1m GAP FROM RRPM END	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B2	LANE L NE - ROUNDABOUTS		HPLL 100mm WIDE INTERMITTED, 3m LONG, 7m GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B3	LANE L NE		HPLL 100mm WIDE INTERMITTED, 3m LONG, 7m GAP, 1 WHITE MONO-DIRECTIONAL RRPM AT START OF L NE, 0.1m GAP FROM RRPM END	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B4	CENTER L NE		HPLL 100mm WIDE CONT NUOUS, AUDIO TACT LE PROF LE BLOCKS 250 CENTRES	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B5	CENTER L NE (TRACK NG)		HPLL 100mm WIDE INTERMITTED	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
C	LANE ARROW - STRAIGHT AHEAD (POSTED SPEED < 70 km/h)		AS PER MOTSAM, SECTION 3.05, 4.8m LENGTH	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
D	LANE ARROW - LEFT/RIGHT TURN (POSTED SPEED < 70 km/h)		AS PER MOTSAM, SECTION 3.05, 4.8m LENGTH	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
E	LANE ARROW - COMB NED LEFT/RIGHT TURN (LOCAL ROAD) (POSTED SPEED < 70 km/h)		AS PER MOTSAM, SECTION 3.05, 6.8m LENGTH	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
F	LANE ARROW - COMB NED BEAR RIGHT TURN (POSTED SPEED ≤ 70 km/h)		AS PER MOTSAM, SECTION 3.05, 6.8m LENGTH	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
G	LANE ARROW - BEAR LEFT/RIGHT TURN (POSTED SPEED ≤ 70 km/h)		AS PER MOTSAM, SECTION 3.05, 4.8m LENGTH	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
H	CHEVRON MARKING (GORE AREA)		HPLL 900mm WIDE, 1:2 SLOPE, 10m SPACING/200mm WIDE, CONT NUOUS	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
I	FLUSH MEDIAN (URBAN)		POSITION INDICATED ON LAYOUT PLANS, HPLL 600mm WIDE DIAGONAL BAR, 100mm W DE, CONTINUOUS	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
J1	CONT NUITY LINE (POSTED SPEED < 80kph)		HPLL 150mm WIDE, 1m STR PE, 3m GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
J2	CONT NUITY LINE (POSTED SPEED > 80kph)		HPLL 200mm WIDE, 1m STR PE, 3m GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
J3	CONT NUITY LINE (LANE DROP)		HPLL 200mm, 3m STRIPE, 7m GAP, WHITE RRPMS CENTRALLY LOCATED N EVERY SECOND GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20

LEGEND	PAVEMENT MARK NGS	SYMBOL	SPECFICATION	MATERIALS
K	SHOULDER MARK NG		HPLL 300mm W DE, SLOPE 1:2 AT 25m SPAC NG	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
L	VEHICLE LIMIT LINE		HPLL 300mm W DE, CONT NUOUS LINE	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
M1	BORDER L NE		HPLL 200mm W DE, CONT NUOUS	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
M2	BORDER L NE (ATP)		HPLL 200mm W DE, CONT NUOUS AUDIO TACTILE PROFILE BLOCKS 250mm CENTRES	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
N	PEDESTRIAN CROSS WALK LINES		HPLL 100mm W DE, CONT NUOUS LINE	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
O	GIVE WAY SYMBOL (LOCAL ROAD)		AS PER MOTSAM, SECTION 3.09.06, 4m (URBAN)/6m (RURAL) LENGTH	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
P	BUS STOP		HPLL 100mm W DE AS PER MOTSAM PART 2, FIG 2.15	YELLOW, REFLECTORISED PAINT, NZTA
Q	SPEED LIMIT		AS PER MOTSAM, FIG 4.1	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
R	CYCLE LANE SYMBOL		AS PER MOTSAM, FIG 2.12	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
S	CYCLE LANE COLOURED SURFACING		AS PER MOTSAM. PART 2 SECTION 3.18.06 AND NZTA P33:2017	GREEN AS 2700 S 1996 COLOUR G13 EMERALD PREFERRED COLOUR
T	SPEED LIMIT COLOURED SURFACING		AS PER NZTA P33 2017	RED R13 SIGNAL RED THERMOPLASTIC PREFERRED COLOUR
U	KERB FACE ON NOSE OF RAISED ISLAND		AS PER MOTSAM PART 2 SECTION 2.08.03	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
V	SHARED PATH SYMBOL		AS PER NZTA SHARED PATH GUIDE, 50m SPAC NG, FINAL DETA L TO BE CONFIRMED WITH TCC	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
W	CROSS-HATCHED YELLOW BOX		AS PER NZTA CROSS-HATCHED YELLOW CLEAR ZONE MARKING	YELLOW, REFLECTORISED PAINT, NZTA P22, P30 AND M20
Z	ZEBRA MARKINGS		AS PER MOTSAM PART 2 SECTION 402.06	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LG	LW	50% ISSUE

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: N.T.S.

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

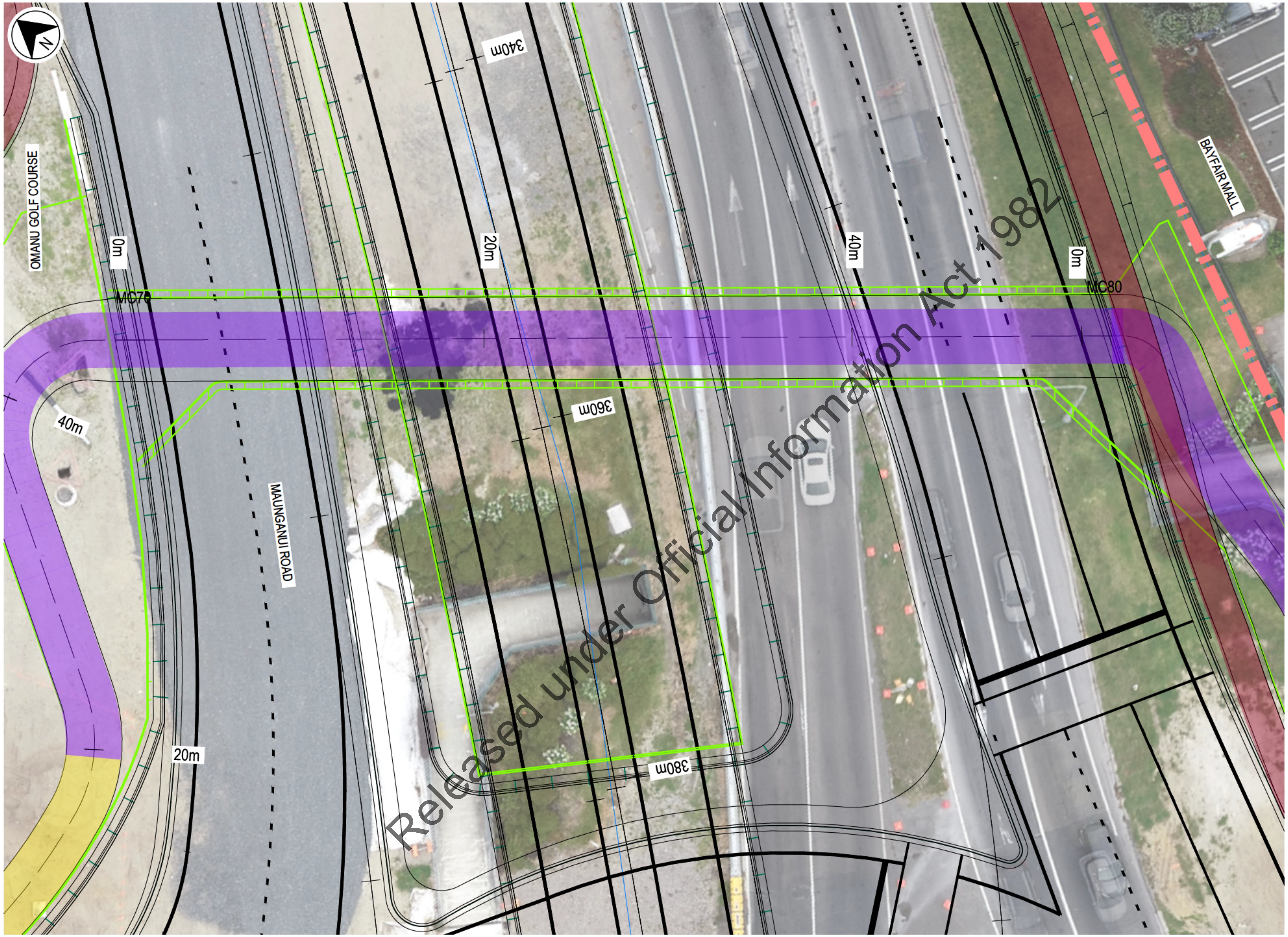
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW | DESIGNED: LG | DESIGN REVIEW: LG

TITLE: UNDERPASS UPGRADE PAVEMENT MARKINGS LEGEND

DRAWING No: B2B-DRG-SL01-8240 | REV: A

DATE: 14/03/2019 2:57:17 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\gkaminsk\appdata\local\projectwise\jacobs_anz_ind\0145598\B2B-DRG-SL01-8240.dwg



LEGEND

- EXIST NG CADASTRAL
- DESIGNATION BOUNDARY
- SHOULDER /VERGE
- RETAINING WALL
- SHARED PATH CONSTRUCTION
- SHARED PATH ON SLAB

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	KR	LW	50% ISSUE

1:100 @ A1 / 1:200 @ A3 — 0 1 2 3 4 5 6 7 8 9 10 m

DATE: 14/03/2019 1:41:50 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\gkaminska\appdata\local\projectwise\jacobs_anz_ie\d0145696\B2B-DRG-AL01-8054.dwg

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:200 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

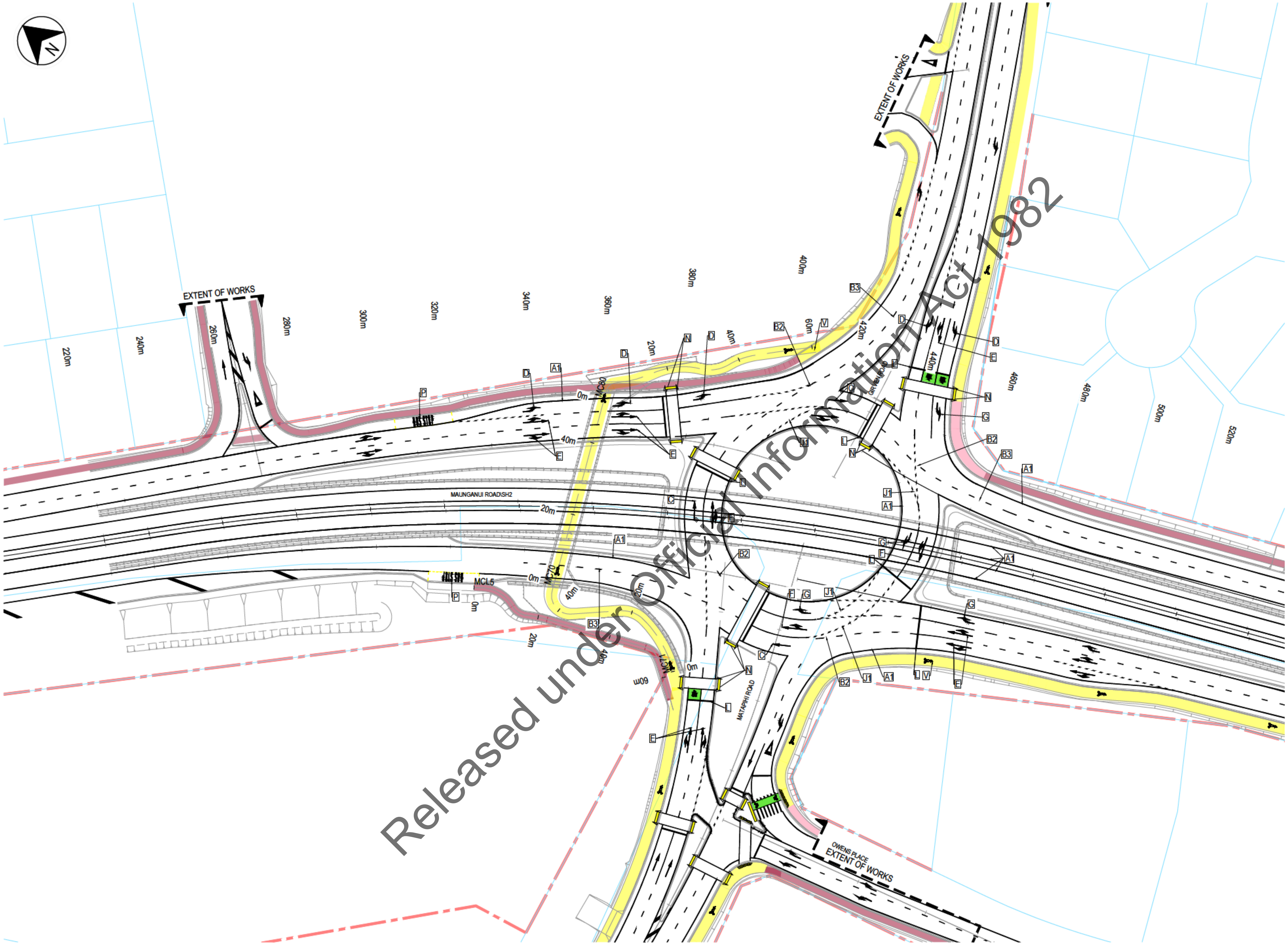
CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW
DESIGNED: KR | DESIGN REVIEW: LG

TITLE: UNDERPASS UPGRADE
UNDERPASS PLAN
SHEET 4

DRAWING No: B2B-DRG-AL01-8054 | REV: A



PATH LEGEND

- FOOTPATH (1.8m W DE)
- FOOTPATH (3.0m W DE)
- SHARED PATH (3.0m WIDE)
- X — REFER TO B2B-DRG-SL01-8240 FOR PAVEMENT MARKING LEGEND

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LG	LW	50% ISSUE

1:500@ A1 / 1:1000@ A3 — 0 5 10 15 20 25 30 35 40 45 50 m

NZ TRANSPORT AGENCY
WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:1000 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

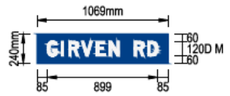
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

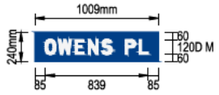
DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW
DESIGNED: KR | DESIGN REVIEW: LG

TITLE: UNDERPASS UPGRADE PAVEMENT MARKINGS

DRAWING No: B2B-DRG-SL01-8245 | REV: A

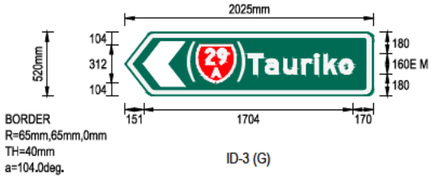
LOGIN NAME: KAMINSKA, GRACE
DATE: 15/03/2019 12:40:59 PM





BORDER
R=90mm,90mm,0mm
TH=40mm

ID-1 (G)



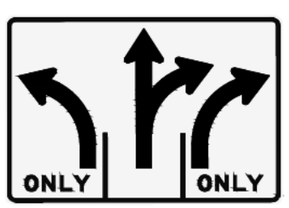
BORDER
R=65mm,65mm,0mm
TH=40mm
a=104.0deg.

ID-3 (G)

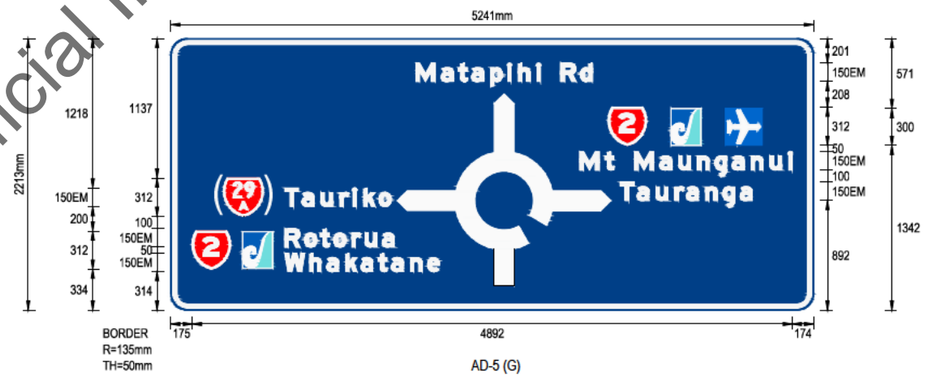
MI-13.2 (OH)

0mm,0mm

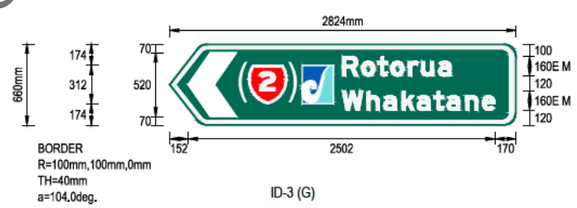
D-1 (G)



RG-29 (G)

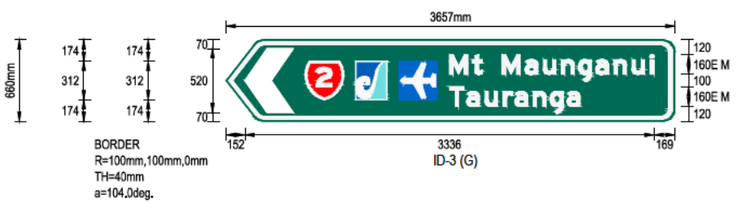


AD-5 (G)



BORDER
R=100mm,100mm,0mm
TH=40mm
a=104.0deg.

ID-3 (G)



BORDER
R=100mm,100mm,0mm
TH=40mm
a=104.0deg.

ID-3 (G)

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LG	LW	50% ISSUE

1:25@ A1
1:50@ A3
0 400 800 1200 1600 2000 2400 mm

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:50 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

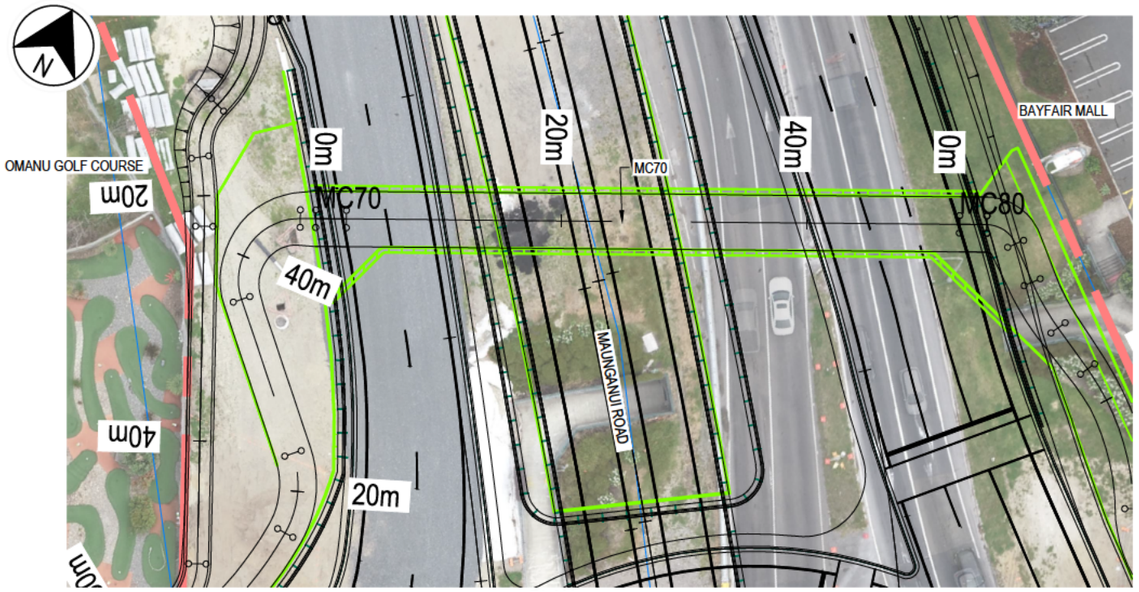
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN	DRAWING CHECK	APPROVED
GK	GK	LW
DESIGNED: JK	DESIGN REVIEW: LG	

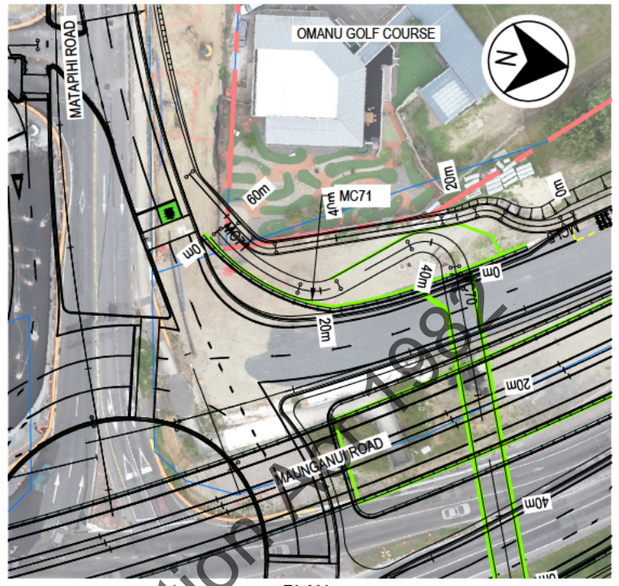
TITLE: UNDERPASS UPGRADE GUIDE SIGN DETAILS

DRAWING No: B2B-DRG-SL01-8222

REV: A



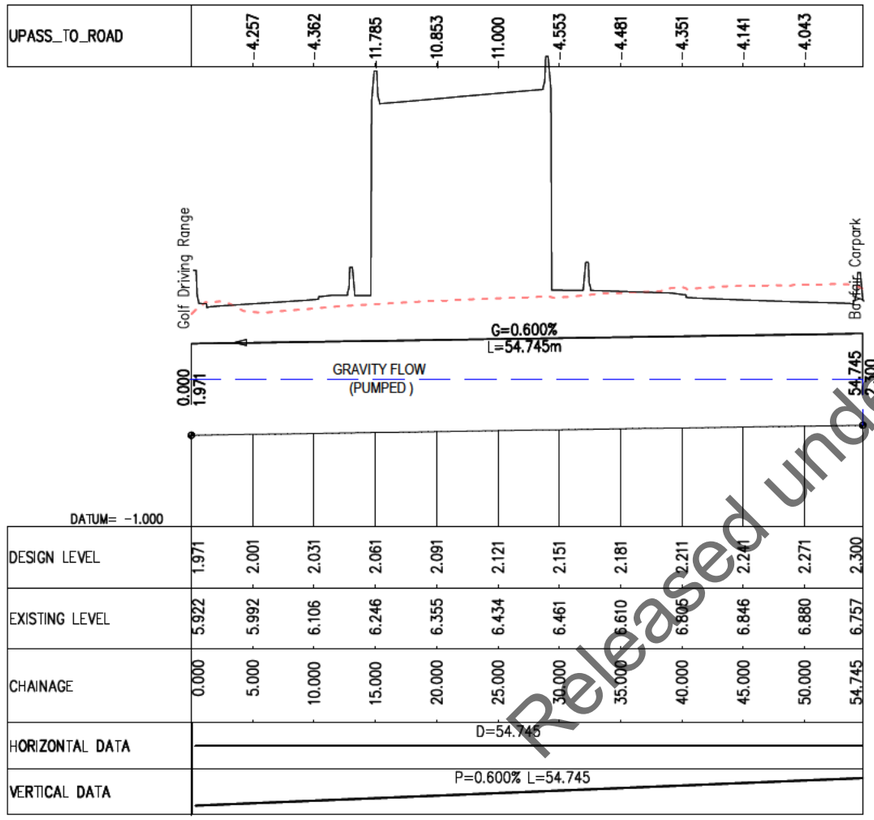
PLAN
SCALE 1 500 (A3)



PLAN
SCALE 1:1000 (A3)

LEGEND

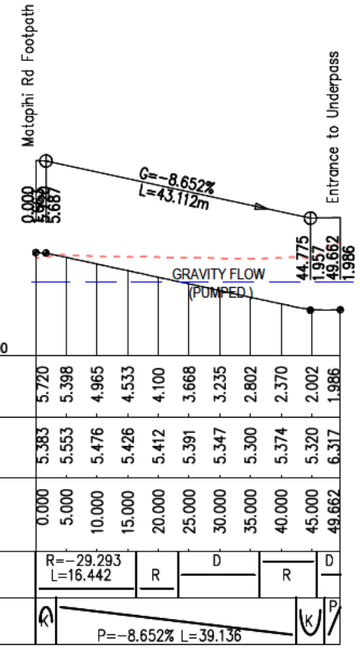
- EXISTING CADASTRAL
- DESIGNATION BOUNDARY
- SHOULDER /VERGE
- RETA NING WALL



UPASS_TO_ROAD		4.257	4.362	11.785	10.853	11.000	4.553	4.481	4.351	4.141	4.043
DESIGN LEVEL	1.971	2.001	2.031	2.061	2.091	2.121	2.151	2.181	2.211	2.241	2.271	2.300
EXISTING LEVEL	5.922	5.992	6.106	6.246	6.355	6.434	6.461	6.610	6.806	6.846	6.880	6.757
CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	54.745
HORIZONTAL DATA	D=54.745											
VERTICAL DATA	P=0.600% L=54.745											

LONGITUDINAL SECTION

HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:100



DESIGN LEVEL	5.720	5.398	4.965	4.533	4.100	3.668	3.235	2.802	2.370	2.002	1.986
EXISTING LEVEL	5.383	5.553	5.476	5.426	5.412	5.391	5.347	5.300	5.374	5.320	6.317
CHAINAGE	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	49.662
HORIZONTAL DATA	R=-29.293 L=16.442	R	D	R	D						
VERTICAL DATA	P=-8.652% L=39.136										

LONGITUDINAL SECTION
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:200

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	KR	LW	50% ISSUE

1:250@ A1
1:500@ A3
0 4 8 12 16 20 24 m

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

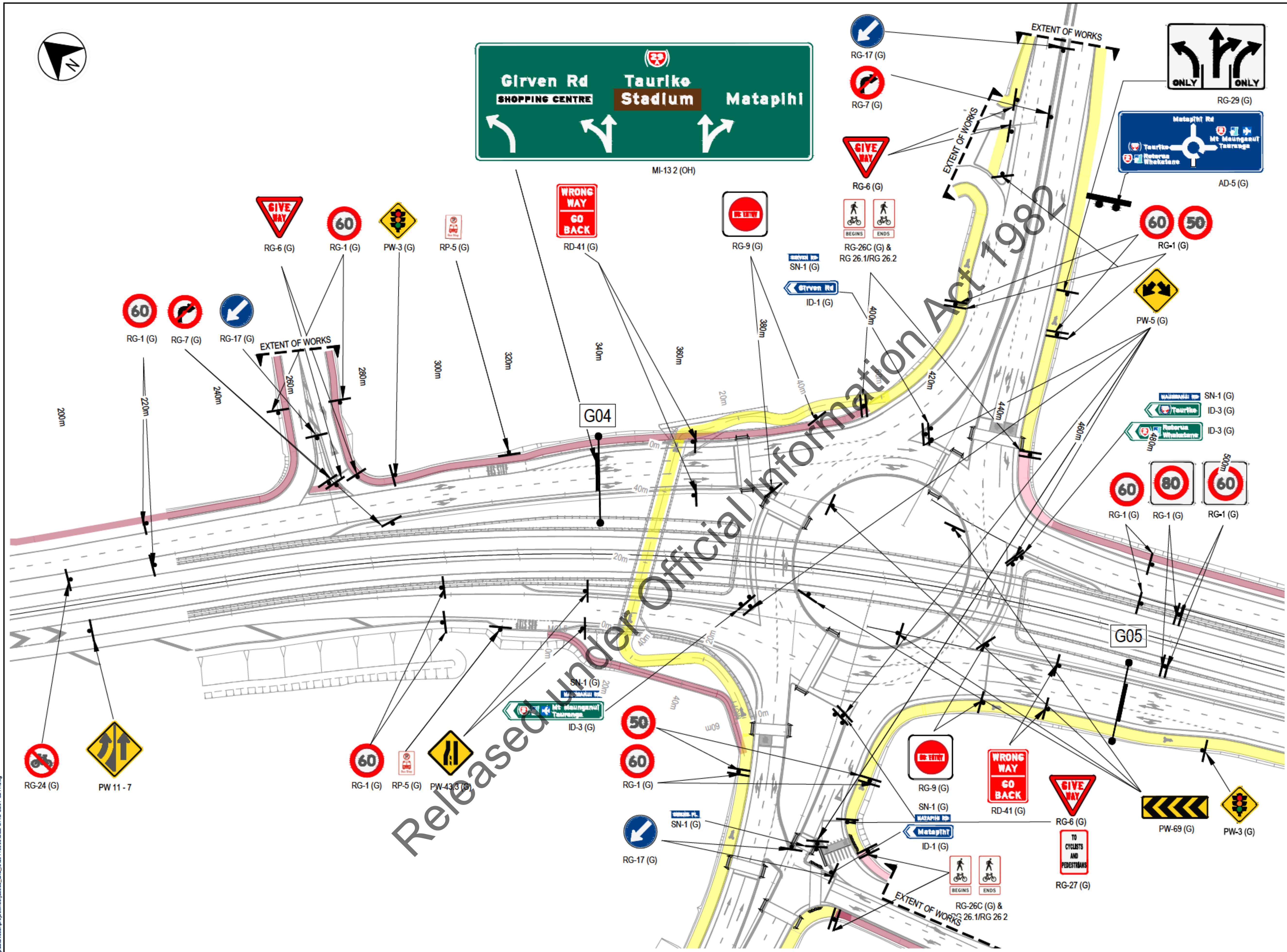
SCALE: AS SHOWN
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW
DESIGNED: KR | DESIGN REVIEW: LG

TITLE: UNDERPASS UPGRADE
PLAN & LONG SECTIONS
UNDERPASS MC70 & RAMP MC71

DRAWING No: B2B-DRG-AL01-8101
REV: A

DATE: 14/03/2019 1:54:56 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\gkamins\desktop\data\local\projectwise\jacobs_anz_jv\d0145698\B2B-DRG-AL01-8101.dwg



NOTES

1. ALL SIGNS TO BE N ACCORDANCE WITH TRAFFIC CONTROL DEVICES (TCD) MANUAL AND MANUAL OF TRAFFIC SIGNS AND MARK NGS (MOTSAM).
2. SIGN LOCATIONS SHOWN ARE INDICATIVE ONLY. LOCATION TO BE N ACCORDANCE WITH TCD MANUAL & MOTSAM.
3. ALL SIGN NUMBERS ARE N ACCORDANCE WITH MOTSAM NUMBERING.
4. ALL PERMANENT WARNING, INFORMATION, AND GUIDE SIGNS WILL DISPLAY THE NZ TRANSPORT AGENCY LOGO.

SIGN LEGEND

(G) GROUND MOUNTED SIGNS
(OH) OVERHEAD GANTRY MOUNTED SIGN
MI-21 MOTSAM SIGN REFERENCE

PATH LEGEND

FOOTPATH (1.8m WIDE)
FOOTPATH (3m WIDE)
SHARED PEDESTRIAN/CYCLEWAY (3.0m W DE)

No	DATE	DRG CHECK	DESIGN REVIEW	APP D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LG	LW	50% ISSUE

1:500 @ A1 / 1:1000 @ A3 — 0 5 10 15 20 25 30 35 40 45 50 m

CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:1000 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: GK | DRAWING CHECK: LG | APPROVED: LW
DESIGNED: TC | DESIGN REVIEW: LG

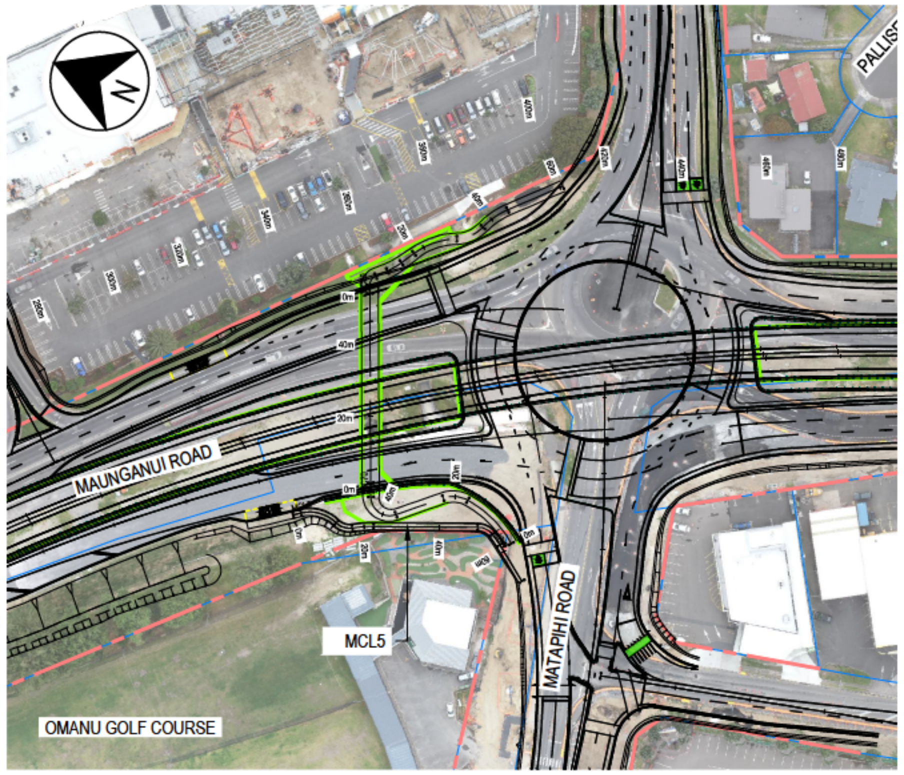
TITLE: UNDERPASS UPGRADE SIGNAGE

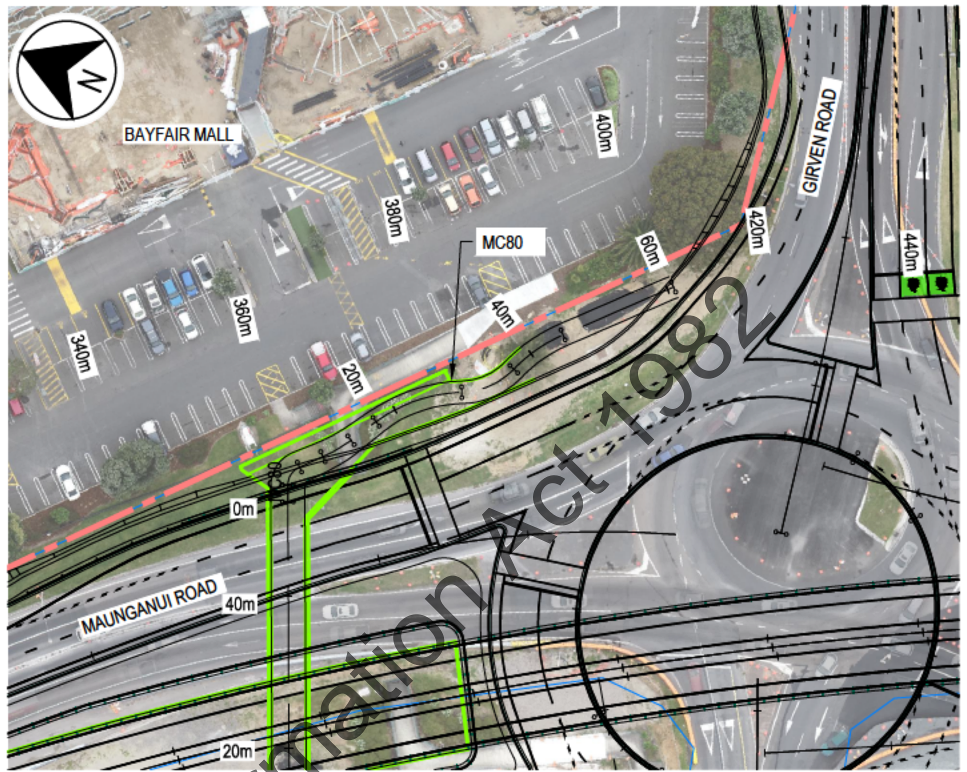
DRAWING No: B2B-DRG-SL01-8211 | REV: A

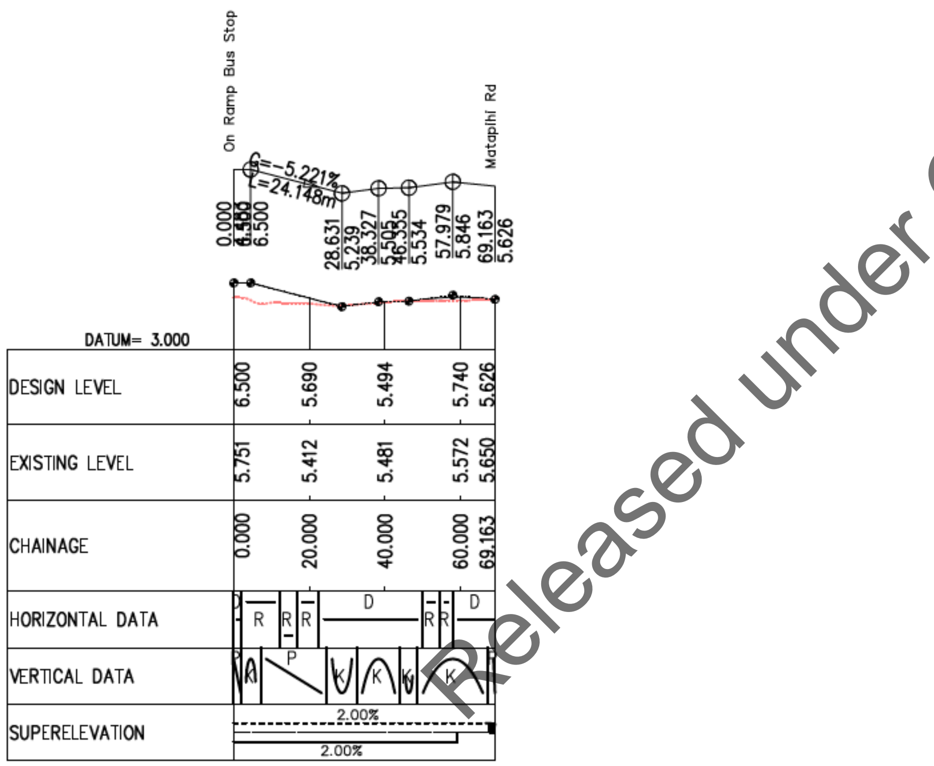
DATE: 14/03/2019 2:34:10 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\kaminska\appdata\local\projectwise\jacobs_anz_ind\0145598\B2B-DRG-SL01-8211.dwg

LEGEND

- EXISTING CADASTRAL
- DESIGNATION BOUNDARY
- SHOULDER /VERGE
- RETAIN NG WALL

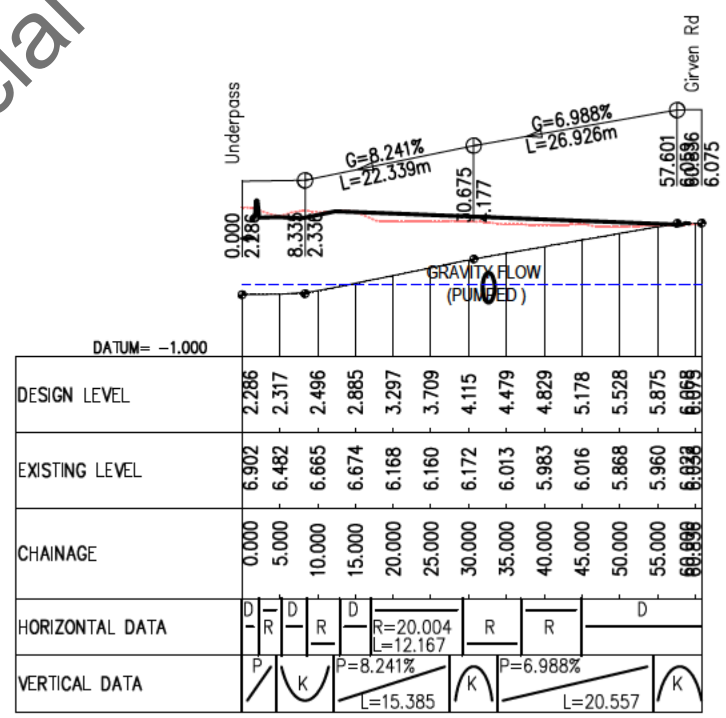






LONGITUDINAL SECTION

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200



LONGITUDINAL SECTION
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:200

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	KR	LW	50% ISSUE

1:1000@ A1 / 1:2000@ A3 — 0 10 20 30 40 50 60 70 80 90 100 m

NZ TRANSPORT AGENCY — WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:1000 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	GK
DRAWING CHECK	GK
APPROVED	LW
DESIGNED	KR
DESIGN REVIEW	LG
TITLE	UNDERPASS UPGRADE PLAN & LONG SECTIONS BUS STOP MCL5 & RAMP ACCESS MC80
DRAWING No	B2B-DRG-AL01-8102
REV	A

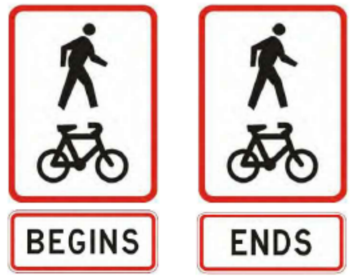
DATE: 14/03/2019 1:57:36 PM LOGIN NAME: KAMINSKA, GRACE

RG-1
SPEED L MIT

RG-1
SPEED L MIT

RG-1
SPEED LIMIT


RG-24
NO CYCL NG



RG 26C - COMB NED CYCLE / FOOTPATH
RG 26.1/RG 26.2 - CYCLE / FOOTPATH BEGINS/ENDS

RP-5
NO PARK NG
BUS STOP STANDARD

RG-1
SPEED LIMIT WITH
BACK NG BOARD

RG-9
NO ENTRY WITH
BACK NG BOARD

RD41
WRONG WAY GO BACK


PW 11 - 7
LANE GANE


RG-7
NO RIGHT TURN


PW-69
ROUNDABOUT CHEVRON BOARD


RG-17
KEEP LEFT

RG-6
GIVE WAY


PW 43.3
LANE REDUCTION


PW-3


PW-5
DIVERGE

RG-1
SPEED L MIT WITH
BACKING BOARD

RG 27


RG-6R - PRIORITY GIVE WAY
ROUNDABOUT

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LG	LW	50% ISSUE

1:10@ A1 1:20@ A3 0 100 200 300 400 500 600 700 800 900 1000 mm

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS Align Tonkin+Taylor

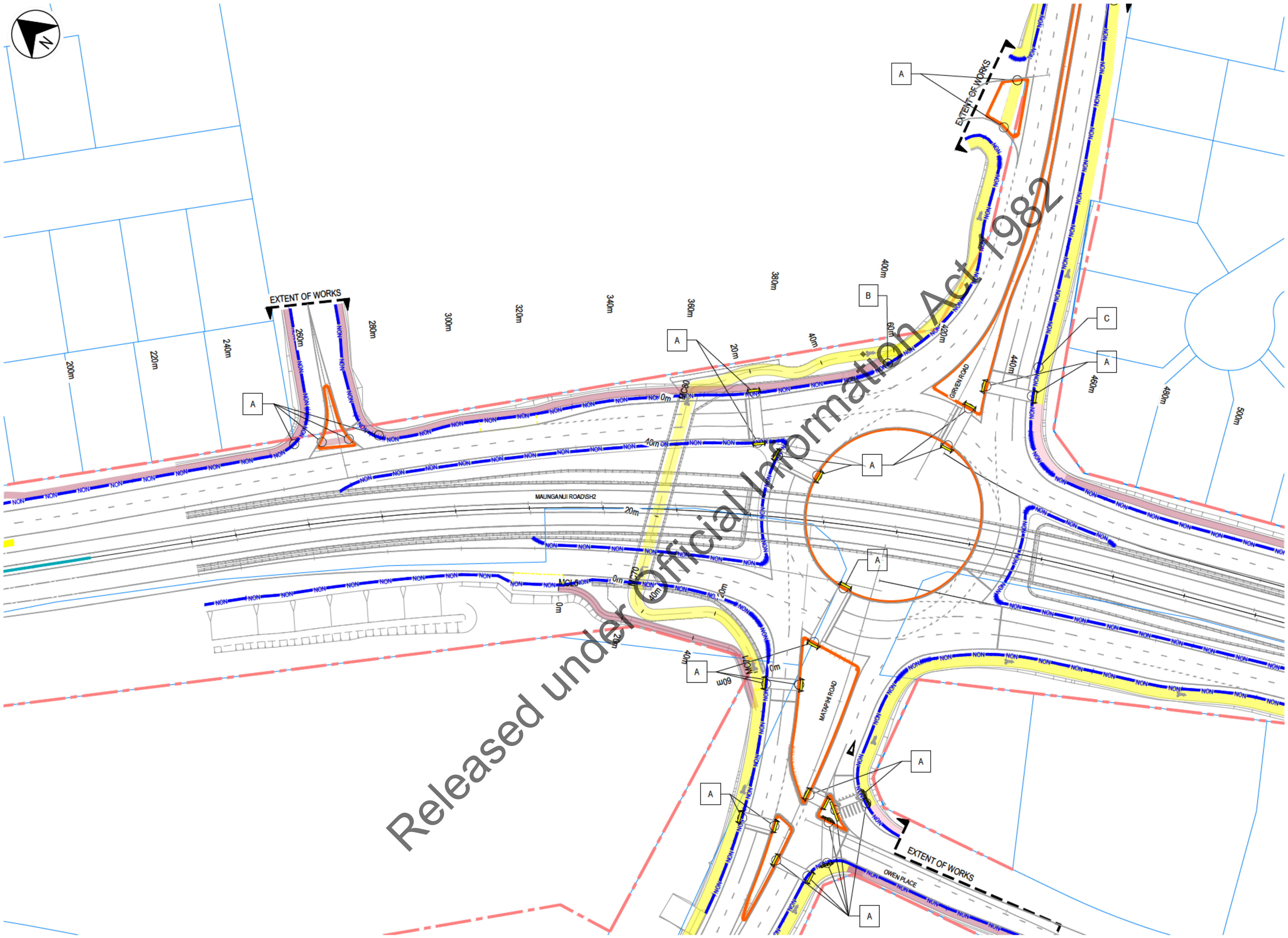
SCALE: 1:20 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW
DESIGNED: JK | DESIGN REVIEW: LG

TITLE: UNDERPASS UPGRADE
SIGN DETAILS
REGULATORY & WARNING

DRAWING No: B2B-DRG-SL01-8226
REV: A

DATE: 14/03/2019 2:55:43 PM LOGIN NAME: KAMINSKA, GRACE



LEGEND

DESIGNATION

EXISTING CADASTRAL BOUNDARY

KERB AND CHANNEL LEGEND

TCC KERB FOR TRAFFIC ISLAND (T422)

NON — TCC NON-MOUNTABLE KERB AND CHANNEL (T421)

TCC CHANNEL (T424)

PATH LEGEND

FOOTPATH (1.8m W DE)

SHARED PATH (3.0m W DE)

FOOTPATH (3.0m W DE)

LEGEND

A — TCC T440 STANDARD NCLUD NG TGSI

B — RAMP UP B2B-DRG-PT01-3460

C — RAMP DOWN B2B-DRG-PT01-3460

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LG	LW	50% ISSUE

1:500 @ A1
1:1000 @ A3
0 5 10 15 20 25 30 35 40 45 50 m

NZ TRANSPORT AGENCY
WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:1000 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW

DESIGNED: KR | DESIGN REVIEW: LG

TITLE: UNDERPASS UPGRADE KERBS, FOOTPATH AND CYCLEWAYS

DRAWING No: B2B-DRG-PT01-8451 | REV: A

DATE: 14/03/2019 2:28:48 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: B2B-DRG-PT01-8451.dwg

FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
LIGHTINGS				
B2B-DRG-AD01-8003	A	UNDERPASS UPGRADE	DRAW NG INDEX SHEET	ITS, LIGHTING & ELECTRICAL
B2B-DRG-LV01-8401	A	UNDERPASS UPGRADE	LIGHTING	SCHEDULE & NOTES
B2B-DRG-LV01-8402	A	UNDERPASS UPGRADE	ELECTRICAL	DETA LS
B2B-DRG-LV01-8411	A	UNDERPASS UPGRADE	LIGHTING LAYOUT	MATAPIHI RAMP
B2B-DRG-LV01-8412	A	UNDERPASS UPGRADE	LIGHTING LAYOUT	BAYFAIR RAMP
B2B-DRG-LV01-8420	A	UNDERPASS UPGRADE	LIGHTING LAYOUT	INTERFACE WITH B2B
B2B-DRG-LV01-8421	A	UNDERPASS UPGRADE	POWER LAYOUT	INTERFACE WITH B2B

DATE: 15/03/2019 10:47:09 AM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\gkaminska\appdata\local\projectwise\jacobs_anz_je\d0145598\B2B-DRG-AD01-8003.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	LW	LW	50% ISSUE

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: N.T.S.

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

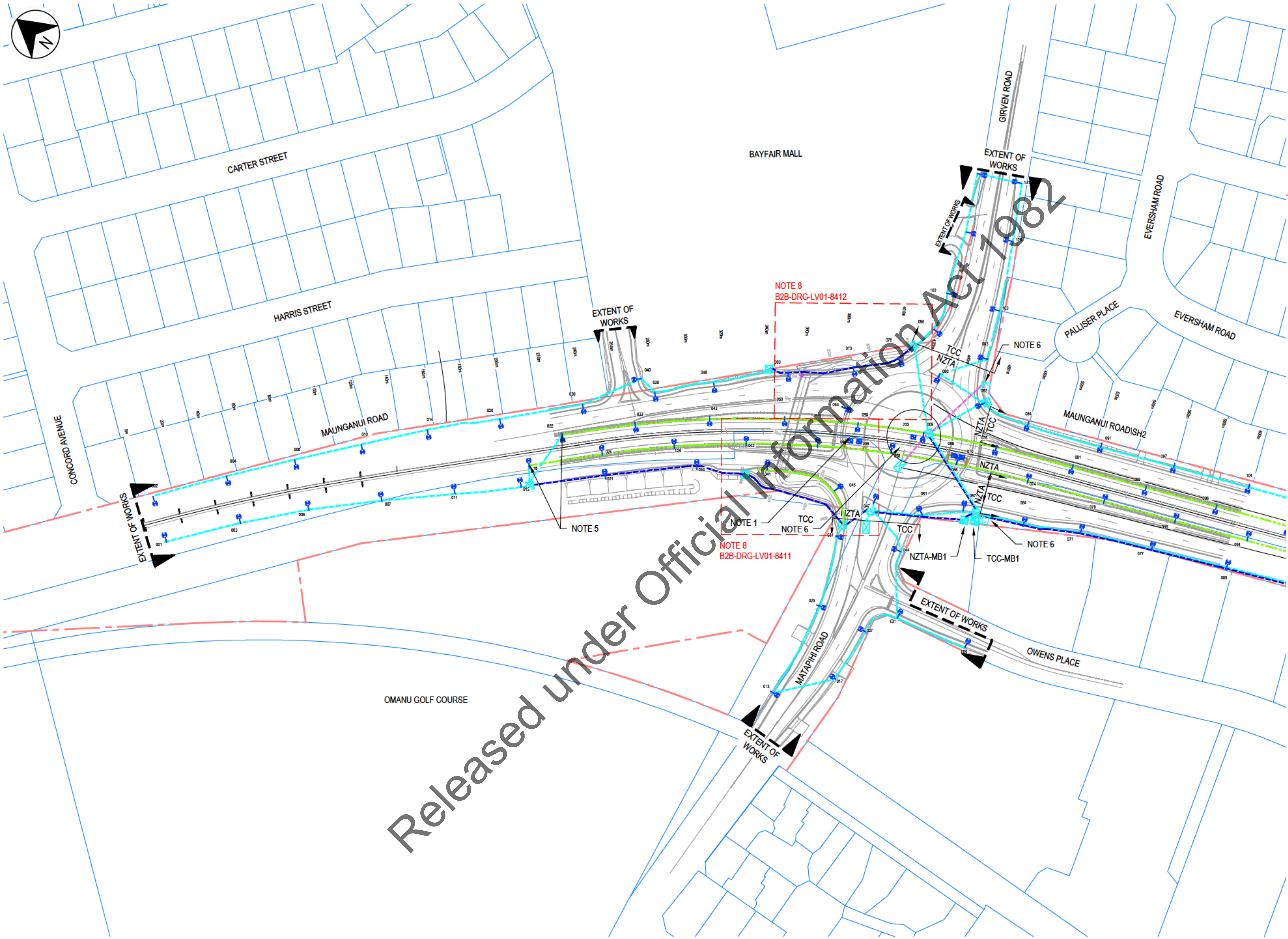
CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW
DESIGNED: JW | DESIGN REVIEW: LW

TITLE: UNDERPASS UPGRADE
DRAWING INDEX SHEET
ITS, LIGHTING & ELECTRICAL

DRAWING No: B2B-DRG-AD01-8003 | REV: A



LEGEND

- MONTROSE BOX
- ELECTRICAL PULLING PIT
- LIGHTING TRAFFIC SIGNAL CONTROLLER BOX AND ROAD SIDE CABINET
- 63mm ELECTRICAL CONDUIT
- 80mm ELECTRICAL CONDUIT
- 100mm ELECTRICAL CONDUIT
- 150mm ELECTRICAL CONDUIT
- 100mm M N. ELECTRICAL CONDUIT INSTALLED N BARR ER
- SERVICE CABLE TRAY
- DESIGNATION

NOTES

1. 1x63mm ELECTRICAL CONDUIT IN SERVICE TRAYS CONNECTED TO BARR ER CONDUITS FOR UNDERBRIDGE LIGHT NG
2. MONTROSE BOX LOCATIONS SUBJECT TO CHANGE DEPENDENT ON LOCATION OF UT LITY POWER CONNECTION & DIVISION OF ASSETS BETWEEN NZTA & TCC
3. SIZE AND QUANTITY OF ELECTRICAL CONDUITS TO BE CONFIRMED ONCE LOCATION OF UTILITY POWER CONNECTIONS HAVE BEEN CONFIRMED
4. PITS PROV DED AT EACH LIGHT POLE
5. INGROUND CONDUIT TO TRANSITION NTO BARRIER
6. ROAD SIDE CAB NET LOCATION TO BE CONFIRMED
7. SH29A LIGHT NG C RCUITS PROV DED BY NZTA-MB2. SH2 LIGHTING CIRCUIT PROVIDED BY NZTA-MB3
8. REFER DRAWING B2B-DRG-LV01-8411, B2B-DRG-LV01-8412 FOR DETA L ON UNDERPASS UPGRADE ELECTRICAL RETICULATION

DATE: 15/03/2019 2:50:04 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\gkaminska\appdata\local\projectwise\jacobs_anz_ire\d0145598\B2B-DRG-LV01-8421.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	CH	LW	50% ISSUE

1:1000 @ A1
1:2000 @ A3 0 10 20 30 40 50 60 70 80 90 100 m

NZ TRANSPORT AGENCY
WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE: 1:2000 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN	DRAWING CHECK	APPROVED
GK	GK	LW
DESIGNED	DESIGN REVIEW	
AS	CH	

TITLE: UNDEPASS UPGRADE POWER LAYOUT INTERFACE WITH B2B

DRAWING No: B2B-DRG-LV01-8421

REV: A

LUMINAIRE SCHEDULE

M1 117W POLE MOUNTED (SIDE ENTRY) P66 RATED LED LUM NAIRE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUM NIUM AND GLASS OPTICS, MEDIUM WIDTH ASYMMETRICAL STREETLIGHTING DISTRIBUTION, 12,520 LUMEN OUTPUT, 4000K, CRI>70, K09, GRAPHITE GREY FINISH, AEC ITALO 2 STU-S 4.7 - 6M OR APPROVED EQUIVALENT.

M2 152W POLE MOUNTED (SIDE ENTRY) P66 RATED LED LUM NAIRE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUM NIUM AND GLASS OPTICS, MEDIUM WIDTH ASYMMETRICAL STREETLIGHTING DISTRIBUTION, 16,240 LUMEN OUTPUT, 4000K, CRI>70, K09, GRAPHITE GREY FINISH, AEC ITALO 2 STU-S 4.7 - 8M OR APPROVED EQUIVALENT.

P1 27 5W POLE TOP MOUNTED P66 RATED LED LUMINA RE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUMINIUM AND GLASS OPTICS, ASYMMETRICAL PATHWAY DISTR BUTION, 2,790 LUMEN OUTPUT, 4000K, CRI>70, K09, GRAPHITE GREY F NISH, AEC ITALO 1 STA 4 5 - 2M OR APPROVED EQUIVALENT.

P2 14.5W POLE TOP MOUNTED IP66 RATED LED LUMINAIRE, HIGH PRESSURE D ECAST ALUM NIUM WITH ALUMINIUM AND GLASS OPTICS, ASYMMETRICAL PATHWAY DISTR BUTION, 1,520 LUMEN OUTPUT, 4000K, CRI>70, K09, GRAPHITE GREY F NISH, AEC ITALO 1 SV 4.5 - 1M OR APPROVED EQUIVALENT

U1 78W SURFACE MOUNTED P66 RATED LED LUMINA RE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUMINIUM AND GLASS OPTICS, W DE ASYMMETRICAL STREETLIGHTING DISTRIBUTION, 8,990 LUMEN OUTPUT, 4000K, CRI>70, IK09, GRAPHITE GREY F NISH, AEC GAL LEO STW 4 5 - 4M OR APPROVED EQUIVALENT.

W1 148W POLE MOUNTED (SIDE ENTRY) P66 RATED LED LUM NAIRE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUM NIUM AND GLASS OPTICS, WIDE ASYMMETRICAL STREETLIGHTING DISTRIBUTION, 16,630 LUMEN OUTPUT, 4000K, CRI>70, IK09, GRAPHITE GREY FINISH, AEC ITALO 2 STW 4.7 - 6M OR APPROVED EQUIVALENT.

X1 208W POLE MOUNTED (SIDE ENTRY) IP66 RATED LED LUMINAIRE, HIGH PRESSURE D ECAST ALUMINIUM WITH ALUM NIUM AND GLASS OPTICS, WIDE ASYMMETRICAL STREETLIGHTING DISTRIBUTION, 21,740 LUMEN OUTPUT, 4000K, CRI>70, IK09, GRAPHITE GREY FINISH, AEC ITALO 3 STW 4.7 - 8M OR APPROVED EQUIVALENT.

B1 59 5W POLE TOP MOUNTED P66 RATED LED LUMINA RE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUMINIUM AND GLASS OPTICS, MEDIUM WIDTH ASYMMETRICAL STREETLIGHT NG DISTRIBUTION, 6,720 LUMEN OUTPUT, 4000K, CRI>70, IK09, GRAPHITE GREY FINISH, AEC ITALO 2 STU-M 4.5 - 4M OR APPROVED EQUIVALENT.

UNDERPASS LUMINAIRE SCHEDULE

P3 14.5W POLE TOP MOUNTED IP66 RATED LED LUMINAIRE, HIGH PRESSURE D ECAST ALUM NIUM, ALUMINIUM AND GLASS OPTICS, ASYMMETRICAL PATHWAY DISTR BUTION, 1,520LUMENS, 4000K, CRI70+, K09, GRAPHITE GREY FINISH, NSTALLED ON 4M LIGHT COLUMN WITH SPIGOT TO SUIT LUMINAIRE.
LUMINAIRE PRODUCT NUMBER: AEC ITALO 1 SV 4.5-1M
POLE SPECIFICATION: W NDSOR URBAN, 4m 'STEPPED' POLE, 60mm DIA SPIGOT TOP, GRAPHITE GREY FINISH

U2 21W P54 SURFACE MOUNTED LINEAR LUMINAIRE, STEEL BODY, POLYCARBONATE DIFFUSER, 2167 LUMENS, 4000K, CRI80, 1250MM LONG, INSTALLED NTO CORNERS OF PEDESTRIAN UNDERPASS.
LUMINAIRE PRODUCT NUMBER: DESIGN PLAN
PARKALUX ANGLED
D323-4-2000NW-XC49

S1 12W IP65 CAST-IN WALL LIGHT, CONCRETE FORMED OPTIC, 590 LUMENS, 4000K, CRI80
THIS PRODUCT NSTALLED IN POSITION AND THEN CONCRETE IS POURED AROUND IT, ENSURE PRODUCT IS NSTALLED AS PER MANUFACTURERS NSTRUCTIONS
LUMINAIRE PRODUCT NUMBER: SIMES
GHOST SQUARE
C8026W

S2 NGROUND UPLIGHT (TO BE CONFIRMED)

INSTALLATION AND COLUMN TYPE

TYPE	LOCATION OF NSTALLATION	OUTREACH ARM	MOUNTING HEIGHT (m)
B	NSTALLED VIA BRACKET TO REAR OF BARRIER	POLE TOP (NO OUTREACH)	7
BM	NSTALLED VIA BRACKET TO REAR OF BARRIER	POLE TOP (NO OUTREACH)	8.5
BT	NSTALLED VIA BRACKET TO REAR OF BARRIER	POLE TOP (NO OUTREACH)	10
BL	NSTALLED 1.5m BEHIND BARR ER	4m OUTREACH	12
BP	NSTALLED 1.5m BEHIND BARR ER	2m OUTREACH	12
C	NSTALLED WITH N CONCRETE BARR ER	2m OUTREACH	12
CL	NSTALLED WITH N CONCRETE BARR ER	4m OUTREACH	12
CP	NSTALLED 0.5m BEHIND CONCRETE BARRIER	2m OUTREACH	12
CE	NSTALLED 0.5m BEHIND CONCRETE BARRIER	4m OUTREACH	12
CB	NSTALLED VIA BRACKET TO REAR OF BARRIER. (NOTE 11)	3m OUTREACH	12
F	NSTALLED 0.3m BEHIND CYCLIST FENCE	4m OUTREACH	12
K	SETBACK 1m FROM KERB EDGE	2m OUTREACH	12
KL	SETBACK 1m FROM KERB EDGE	4m OUTREACH	12
PL	PATHWAY EDGE	4m OUTREACH	12
P	PATHWAY EDGE	2m OUTREACH	12
E	PATHWAY EDGE	POLE TOP (NO OUTREACH)	7
U	SURFACE MOUNTED ON BR DGE UNDERS DE	-	HEIGHT OF BRIDGE
XL	NSTALLED 1.5m BEHIND BARR ER	4m OUTREACH (SUPPORT LARGER ITALO 3)	12
XP	NSTALLED 0.5m BEHIND BARR ER	4m OUTREACH (SUPPORT LARGER ITALO 3)	12
LL	NSTALLED 1.0m BEHIND ROAD SHOULDER	4m OUTREACH	12
L	NSTALLED 1.0m BEHIND ROAD SHOULDER	2m OUTREACH	12
T	PATHWAY EDGE	POLE TOP (NO OUTREACH)	4

INSTALLATION AND COLUMN TYPE ADD ON	COLUMN CONSTRUCTION
-S	SL P BASE TYPE
-I	MPACT ABSORBING TYPE
NO EXTRA TAG	RIG D TYPE

TYPICAL COLUMN DESIGNATION

M1 CB
INSTALLATION & COLUMN TYPE
LUMINAIRE TYPE

GENERAL NOTES

1. ALL WORKS SHALL COMPLY WITH THE CURRENT NZTA M30 SPEC FICATION AND GUIDELINES FOR ROAD LIGHTING DESIGN, AS/NZS 1158 - LIGHTING FOR ROAD AND PUBLIC SPACES AND AS/NZS 3000 W RING REGULATIONS.
2. ERECT LIGHT NG COLUMNS WITH ACCESS DOOR ORIENTATED TOWARDS THE ROADWAY
3. ALL DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
4. ENSURE THAT NZTA ASSET DATABASE IS UPDATED FOR EACH NEW OR MODIFIED ROAD LIGHT LOCATION
5. EXISTING LUMINA RES, COLUMNS, LAMPS ETC THAT HAVE BEEN REMOVED SHALL BE RETURNED TO THE ASSETS OWNER (TCC OR NZTA) IN WORKING CONDITIONS AT THE OWNER'S DESIGNATED STORE LOCATION
6. LIGHT NG COLUMNS TO BE COMPLIANT WITH NZTA M26:2012 ROAD LIGHT NG COLUMN SPECIFICATION.
7. LUMINAIRE TILT SHALL BE 0 DEGREES TO THE HORIZONTAL FOR ALL NEW LUM NAIRES.
8. MONTROSE BOXES TO BE PROVIDED AS PER THE PR NC PLE REQUIREMENTS APPENDIX A SECTION A13.5 AND NZTA SPEC FICATION FOR ROADS DE CABINETS ITS-02-04.
9. LUMINAIRES SHALL BE COMPLETE WITH INTERNAL SURGE PROTECTION DEVICE AS STANDARD NCLUSION
10. ALL WIRING SHALL BE CONCEALED THROUGHOUT. NCLUDE IN TENDER ALL NECESSARY WIR NG DUCTS, CONDUITS etc. FOR THIS PURPOSE WHETHER NDICATED N DETAIL OR NOT ON THE DRAW NGS.
11. REFER DRAWING B2B-DRG-BR01-5145 FOR DETAIL CORRESPONDING TO POLE TYPE "CB"
12. LIGHT COLUMNS SHALL HAVE CURVED OUTREACH ARMS
13. LIGHT NG COLUMN SETBACK BEHIND CONCRETE BARRIER (0.5M) CAN BE REDUCED WHERE THE COLUMN FOUNDATIONS ARE EXTENDING BEYOND H NGE POINT AND NTO THE BATTER
14. ALL LUMINAIRES PROVIDED FOR ROAD LIGHTING SHALL BE FITTED WITH 7 CONTACT NEMA SOCKET WITH SHORTING CAP
15. ELECTRICAL CONDUITS SHALL BE HEAVY DUTY RIG D ORANGE UPVC. DIAMETER AS NOTED ON THE LAYOUTS
16. REFER DRAWING B2B-DRG-AD01-8003 FOR LIGHT NG ELECTRICAL & ITS DRAWING INDEX FOR UNDERPASS UPGRADE PROJECT

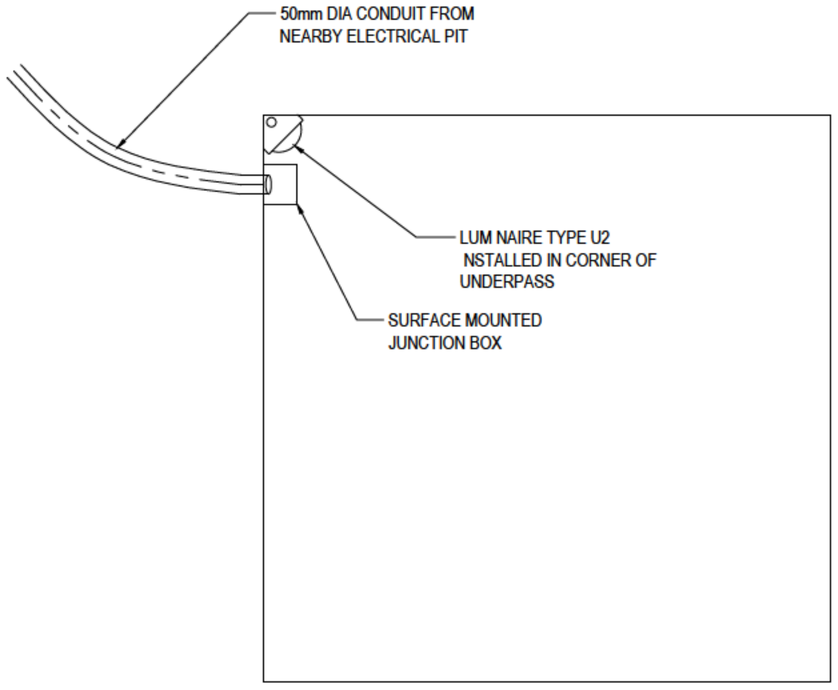
DATE: 15/03/2019 9:18:54 AM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\gkaminska\appdata\local\projectwise\...\B2B-DRG-LV01-8401.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	AT	LW	50% ISSUE

NZ TRANSPORT AGENCY WAKA KOTAHI
CONTRACTOR: CPB CONTRACTORS
DESIGNER: JACOBS, Align, Tonkin+Taylor
SCALE: N.T.S.
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603
CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: AK
DESIGNED: JW
DRAWING CHECK: GK
DESIGN REVIEW: AT
APPROVED: LW
TITLE: UNDERPASS UPGRADE LIGHTING SHEDULES & NOTES
DRAWING No: B2B-DRG-LV01-8401
REV: A

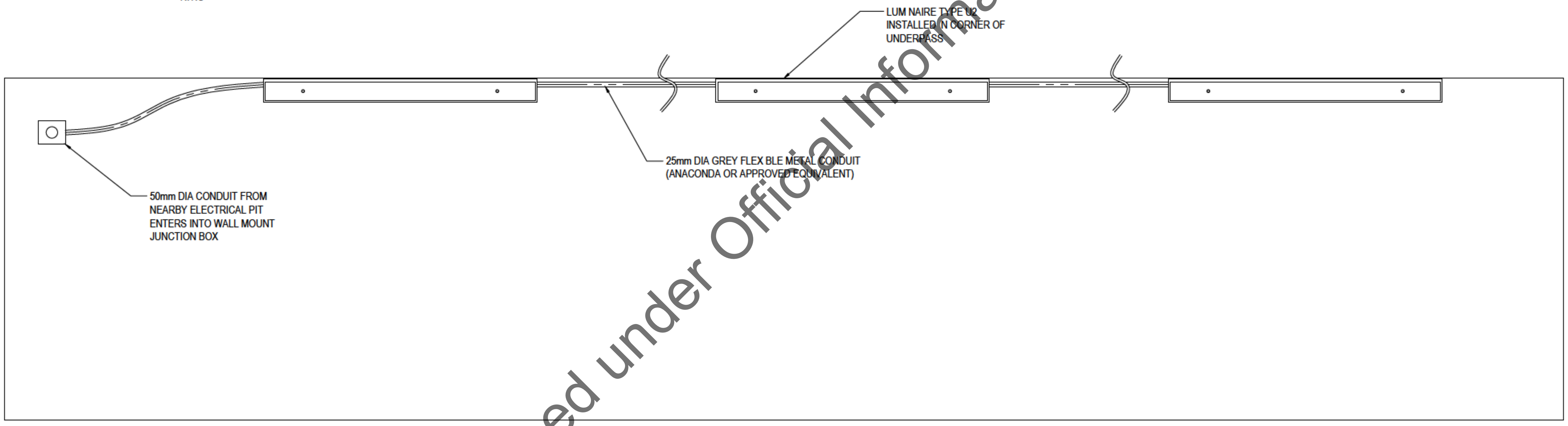
NOTES:

1. REFER DRAWING B2B-DRG-LV01-8401 FOR LUMINAIRE SCHEDULE & GENERAL NOTES



UNDERPASS LIGHTING CROSS SECTION

N.T.S



UNDERPASS LIGHTING LONG SECTION

N.T.S

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	CH	LW	50% ISSUE

1:1@ A1 1:2@ A3 0 10 20 30 40 50 60 70 80 90 100 mm

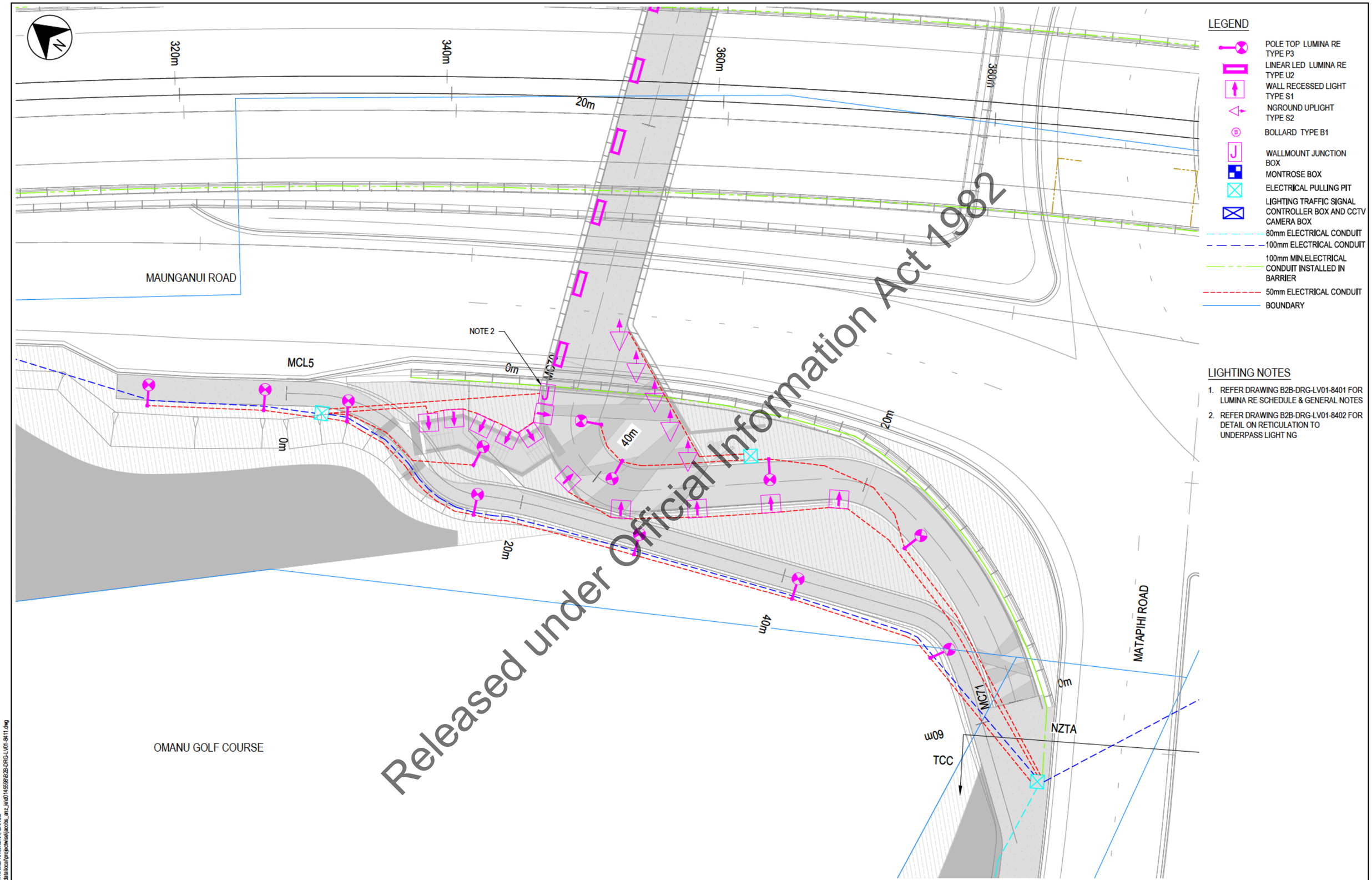
NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	N.T.S.
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	AK
DRAWING CHECK	GK
APPROVED	LW
DESIGNED	AS
DESIGN REVIEW	CH
TITLE	UNDERPASS UPGRADE ELECTRICAL DETAILS
DRAWING No	B2B-DRG-LV01-8402
REV	A

DATE: 15/03/2019 3:46:41 PM LOGIN NAME: KAMINSKA, GRACE



LIGHTING NOTES

1. REFER DRAWING B2B-DRG-LV01-8401 FOR LUMINA RE SCHEDULE & GENERAL NOTES
2. REFER DRAWING B2B-DRG-LV01-8402 FOR DETAIL ON RETICULATION TO UNDERPASS LIGHT NG

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	AT	LW	50% ISSUE

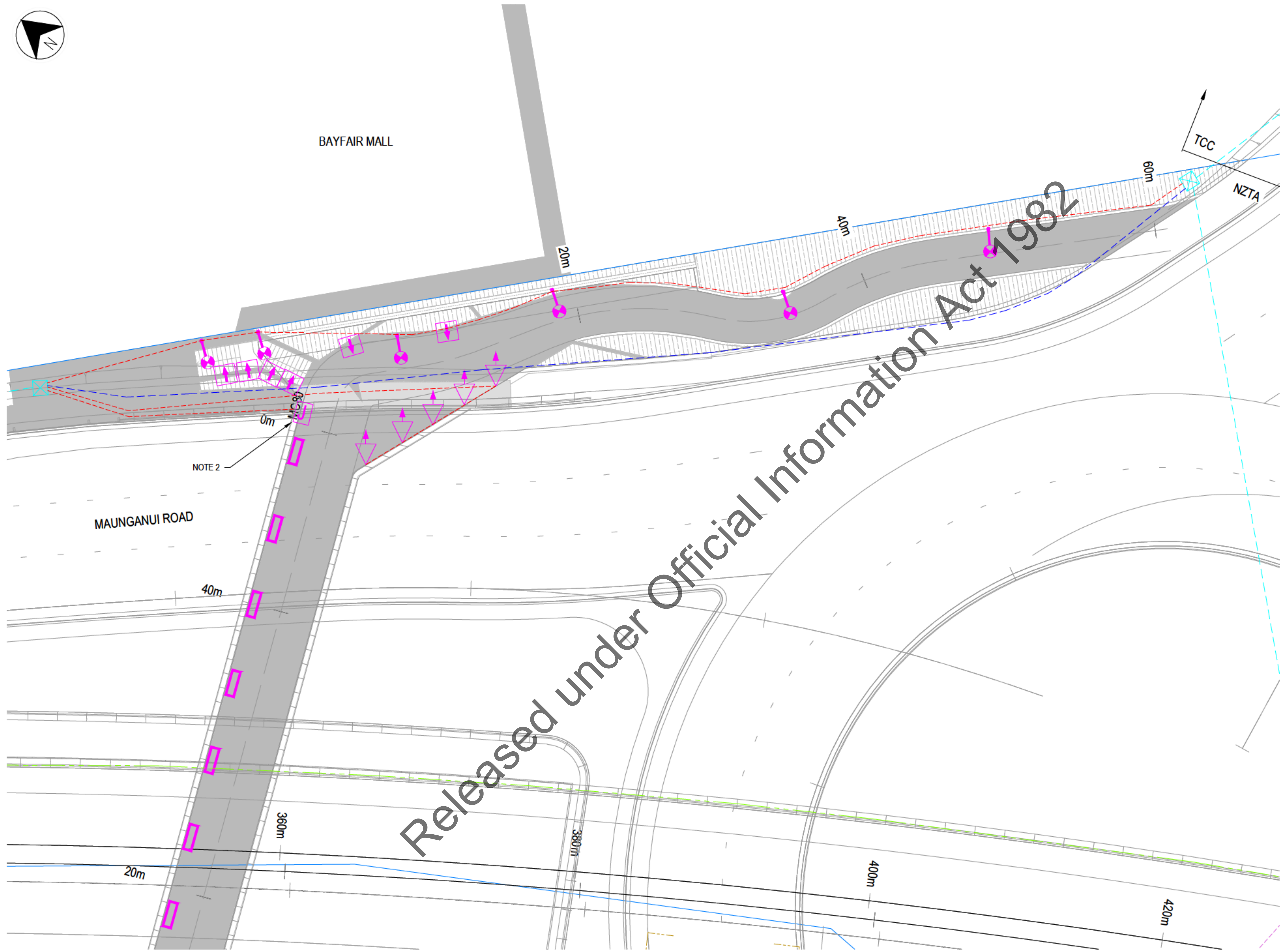
1:125@ A1
1:250@ A3
0 2 4 6 8 10 12 m

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:250 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	GK
DRAWING CHECK	GK
APPROVED	LW
DESIGNED	JW
DESIGN REVIEW	AT
TITLE	UNDERPASS UPGRADE LIGHTING LAYOUT MATAPIHI RAMP
DRAWING No	B2B-DRG-LV01-8411
REV	A



LEGEND

- POLE TOP LUMINA RE TYPE P3
- LINEAR LED LUMINA RE TYPE U2
- WALL RECESSED LIGHT TYPE S1
- NGROUND UPLIGHT TYPE S2
- BOLLARD TYPE B1
- WALLMOUNT JUNCTION BOX
- MONTROSE BOX
- ELECTRICAL PULLING PIT
- LIGHTING TRAFFIC SIGNAL CONTROLLER BOX AND CCTV CAMERA BOX
- 80mm ELECTRICAL CONDUIT
- 100mm ELECTRICAL CONDUIT
- 100mm MIN.ELECTRICAL CONDUIT INSTALLED IN BARRIER
- 50mm ELECTRICAL CONDUIT
- BOUNDARY

LIGHTING NOTES

1. REFER DRAWING B2B-DRG-LV01-8401 FOR LUMINA RE SCHEDULE & GENERAL NOTES
2. CONDUIT TO PENETRATE THROUGH UNDERPASS WALL TO ENTER WALL MOUNT JUNCTION BOX. REFER TO DRAWING B2B-DRG-LV01-8402 FOR DETAIL

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	AT	LW	50% ISSUE

1:125@ A1 1:250@ A3 0 2 4 6 8 10 12 m

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

NZ TRANSPORT AGENCY WAKA KOTAHI

SCALE: 1:250 (A3)

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

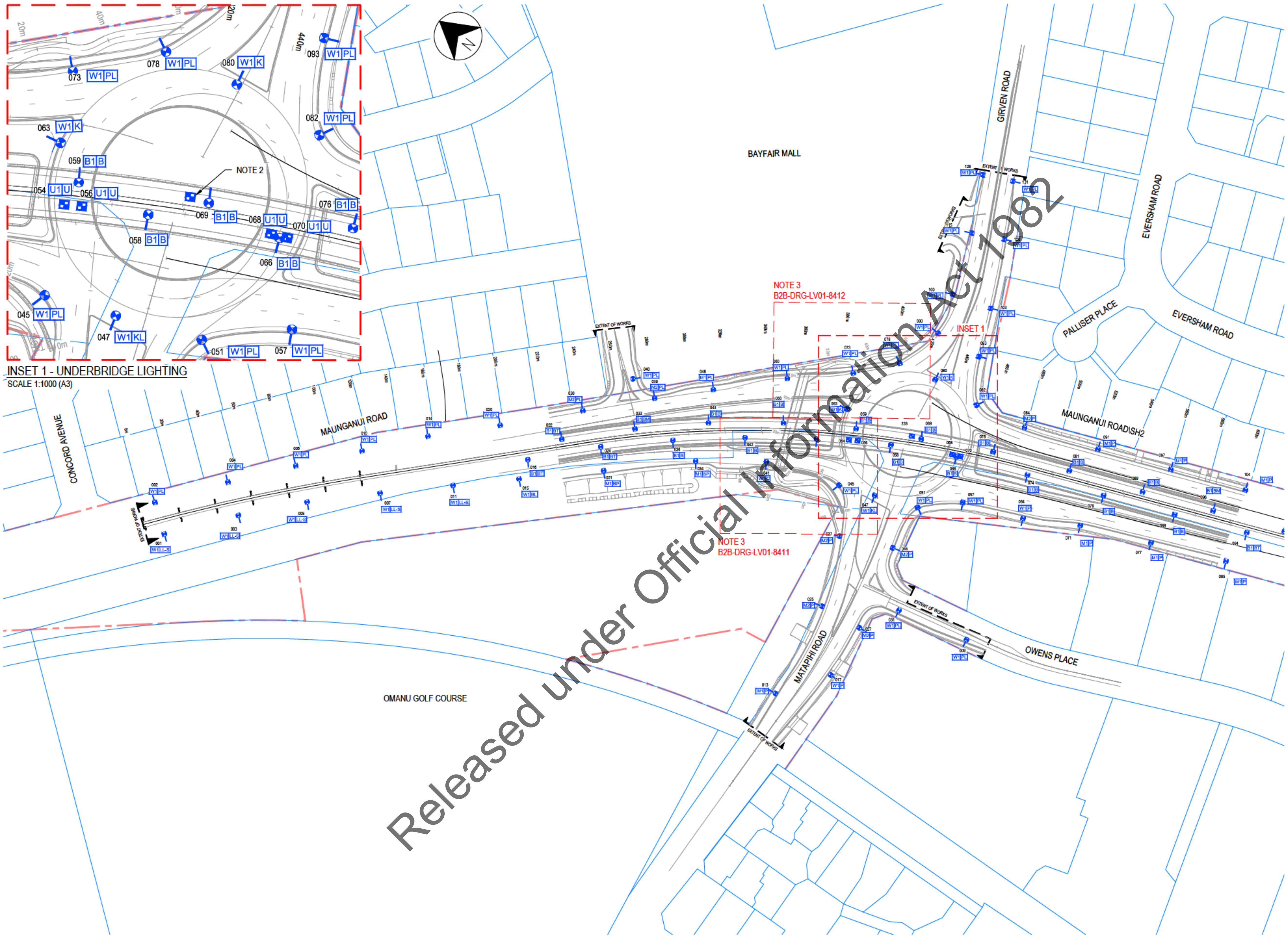
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN: GK | DRAWING CHECK: GK | APPROVED: LW

DESIGNED: JW | DESIGN REVIEW: AT

TITLE: UNDERPASS UPGRADE LIGHTING LAYOUT BAYFAIR RAMP

DRAWING No: B2B-DRG-LV01-8412 | REV: A



LEGEND

- COLUMN DESIGNATION
- COLUMN NUMBER
- LIGHTING COLUMN
- UNDERBRIDGE LUMINAIRE
- DESIGNATION

LIGHTING NOTES

1. REFER DRAWING B2B-DRG-LV01-8401 FOR LUMINAIRE SCHEDULE & GENERAL NOTES
2. UNDERBRIDGE LUMINAIRE (233) INSTALLED ABOVE INTERSECTION OF PEDESTRIAN PATHWAYS PARALLEL TO DIRECTION OF PEDESTRIAN TRAVEL
3. REFER DRAWING B2B-DRG-LV01-8411, B2B-DRG-LV01-8412 FOR DETAIL FOR FUNCTIONAL & FEATURE LIGHTING FOR UNDERPASS PROJECT

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	GK	AT	LW	50% ISSUE

1:1000 @ A1 / 1:2000 @ A3 — 0 10 20 30 40 50 60 70 80 90 100 m

NZ TRANSPORT AGENCY WAKA KOTAHI

CONTRACTOR: CPB CONTRACTORS

DESIGNER: JACOBS, Align, Tonkin+Taylor

SCALE	1:2000 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603
CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN	AK
DRAWING CHECK	GK
APPROVED	LW
DESIGNED	JW
DESIGN REVIEW	AT
TITLE	UNDERPASS UPGRADE LIGHTING LAYOUT INTERFACE WITH B2B
DRAWING No	B2B-DRG-LV01-8420
REV	A

DATE: 15/03/2019 2:51:46 PM LOGIN NAME: KAMINSKA, GRACE