

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 - MATAPIHI RAMP
B2B-DRG-BR05-8503	B	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - BAYFAIR 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 BARRIERS	TYPE BR05-PB1
B2B-DRG-BR05-8522	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	TYPE BR05-PB1
B2B-DRG-BR05-8523	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	STEEL RAIL ELEVATIONS
B2B-DRG-BR05-8524	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	STEEL RAIL DETAILS

Released under the Official Information Act 1982

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 KOTAHĪ



CPB CONTRACTORS



JACOBS
Align 

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

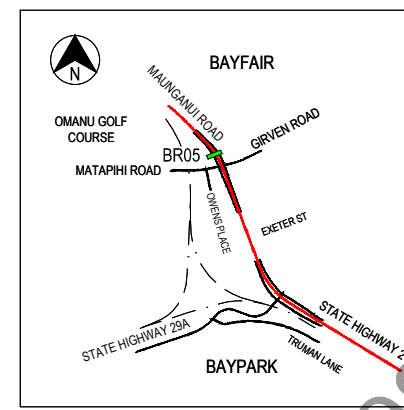
CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: DCC
DESIGNED: TKF
DRAWING CHECK: GKK
DESIGN REVIEW: SKK
APPROVED: LW MAR 2019

TITLE: BR05 - PEDESTRIAN UNDERPASS DRAWING LIST
DRAWING No: B2B-DRG-BR05-8500
REV: B

DATE: 15/03/2019 4:30:09 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\work\jacobson_je10115596922-DRG-BR05-8500.dwg

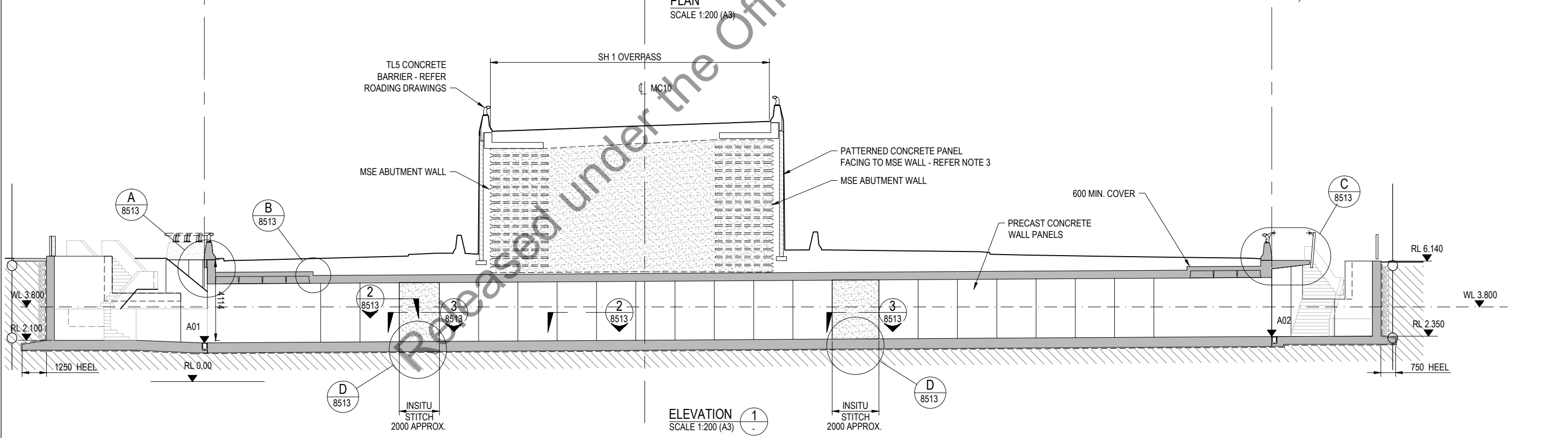
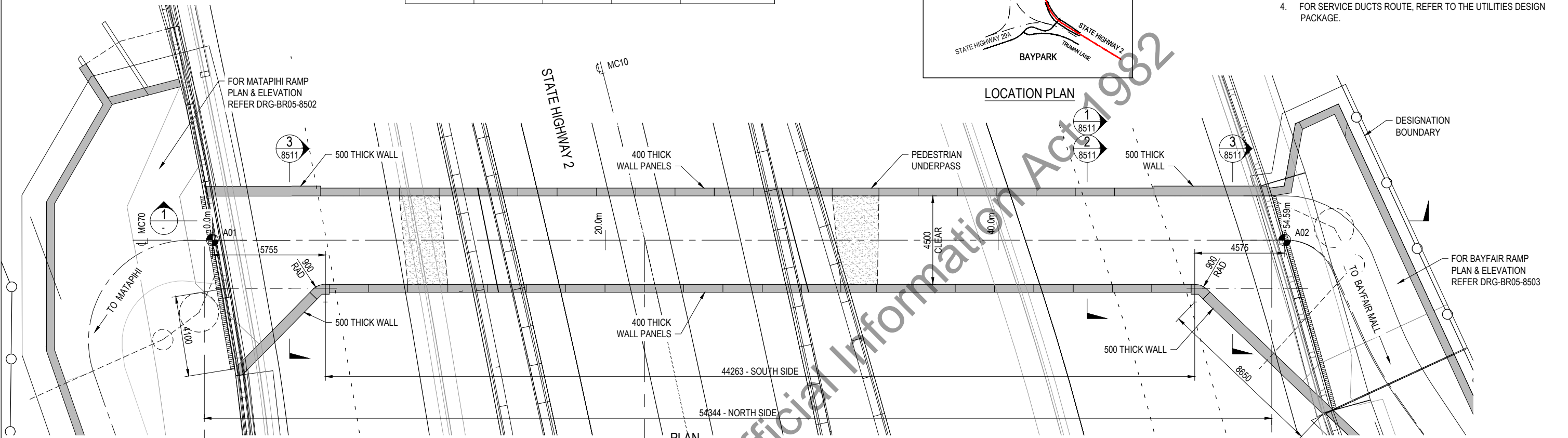


BR05 - PEDESTRIAN UNDERPASS				
SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
A01	378438.244	809430.359	1.980	
A02	378489.436	809449.319	2.300	



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.



DATE: 15/03/2019 4:43:48 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\work\proj\br05-8501.dwg

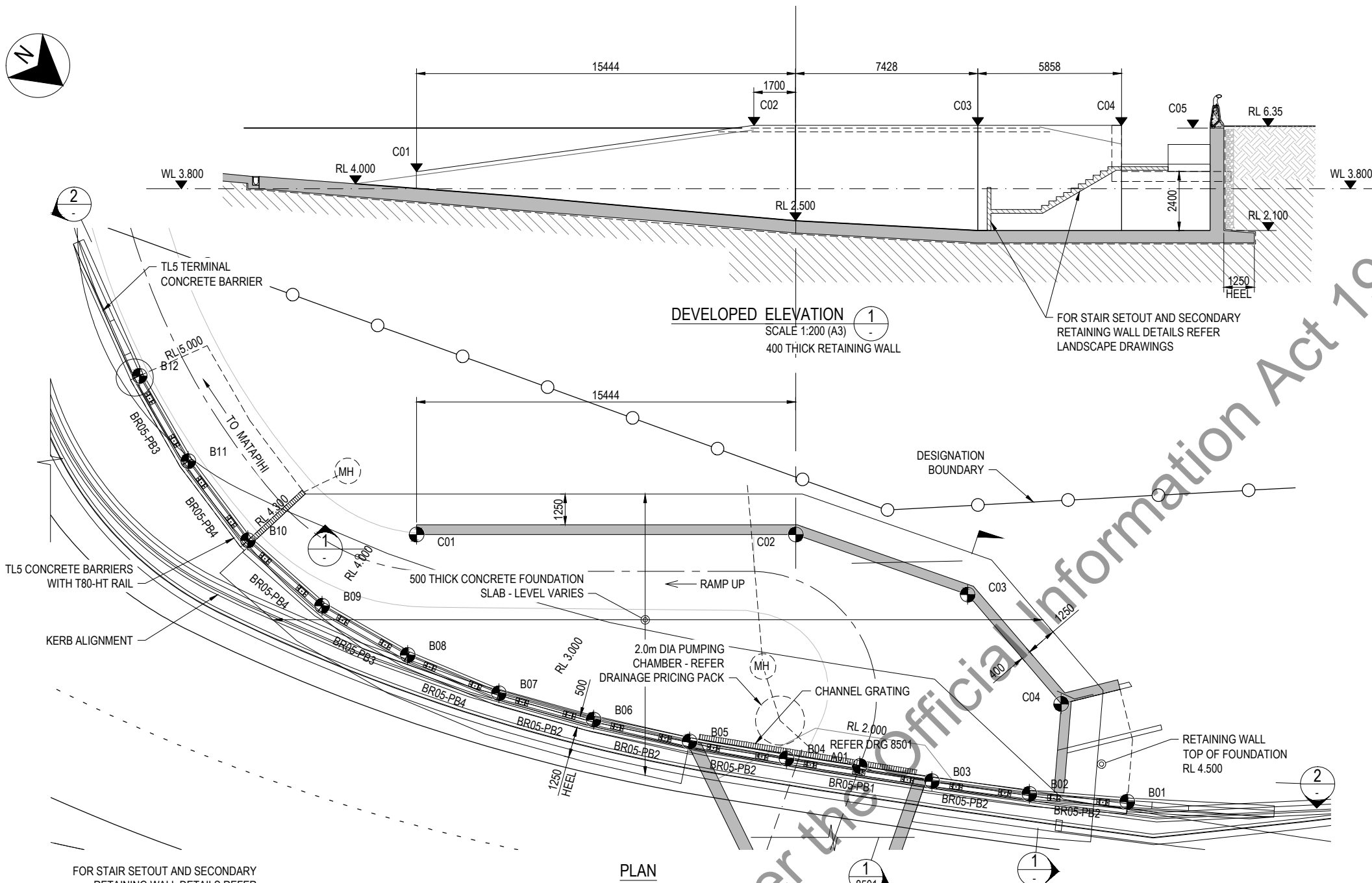
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

				SCALE 1:200 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT UNDERPASS - PLAN & ELEVATION
				STATUS 50% ISSUE			
				DRAWN DCC	DESIGN REVIEW SKK	DRAWING NO. B2B-DRG-BR05-8501	REV B



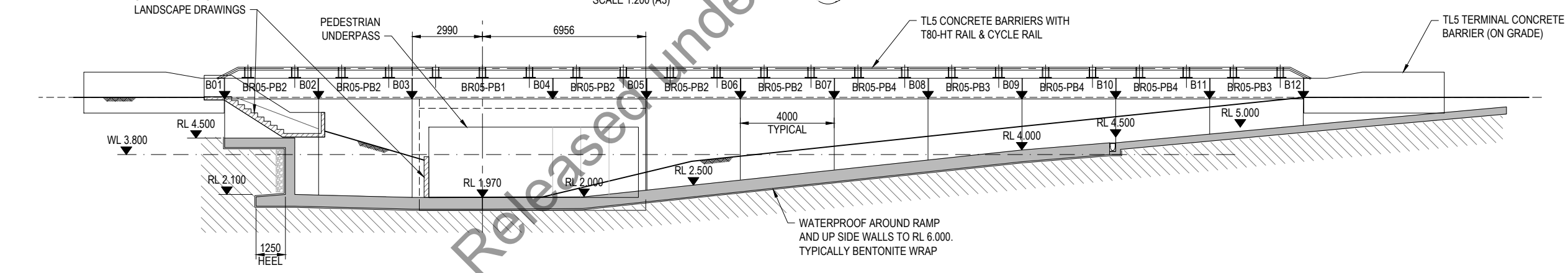
NOTES

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



BR05 - PEDESTRIAN UNDERPASS

SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
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	



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

DATE: 15/03/2019 4:50:37 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\workspace\jacobs_snr_ie014598822-DRG-BR05-8502.dwg

B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:100 @ A1	0	1	2	3	4
1:200 @ A3	5	6	7	8	9

<p>NZ TRANSPORT AGENCY WAKA KOTAHĪ</p>	<p>CPB CONTRACTORS</p>	<p>JACOBS</p>	<p>Align Tonkin+Taylor</p>	SCALE	1:200 (A3)	CLIENT	NZ TRANSPORT AGENCY		TITLE	BR05 - PEDESTRIAN UNDERPASS	
				STATUS	50% ISSUE		PROJECT			BAYPARK TO BAYFAIR LINK (BAY LINK)	
				PROJECT NUMBER	2/09-024/603	DRAWN	DCC	DRAWING CHECK	GKK	APPROVED	LW
						DESIGNED	TKF	DESIGN REVIEW	SKK		MAR 2019
										DRAWING No.	B2B-DRG-BR05-8502
										REV	B

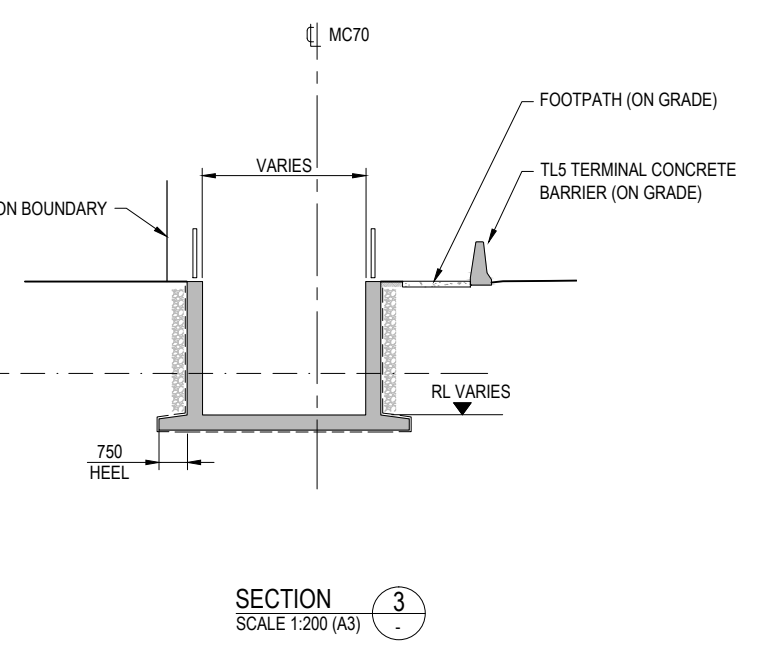
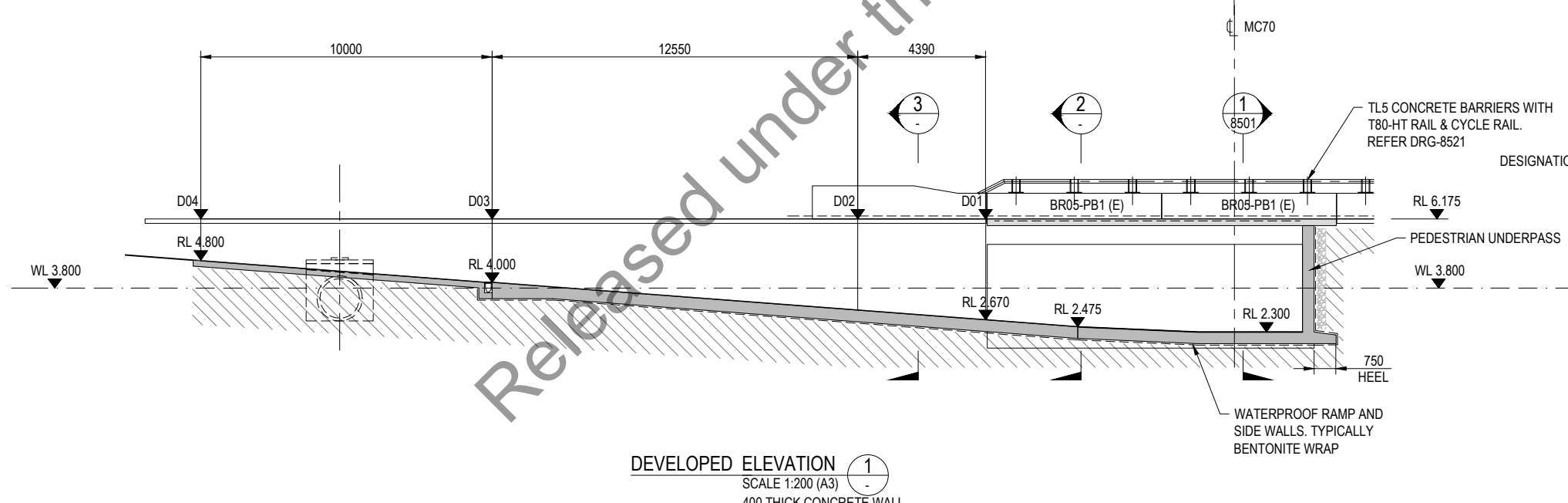
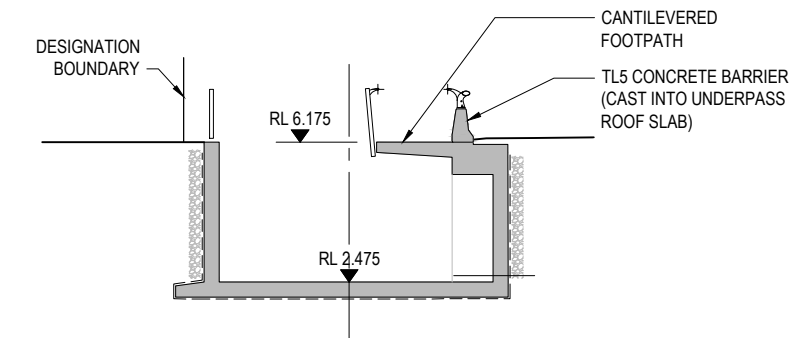
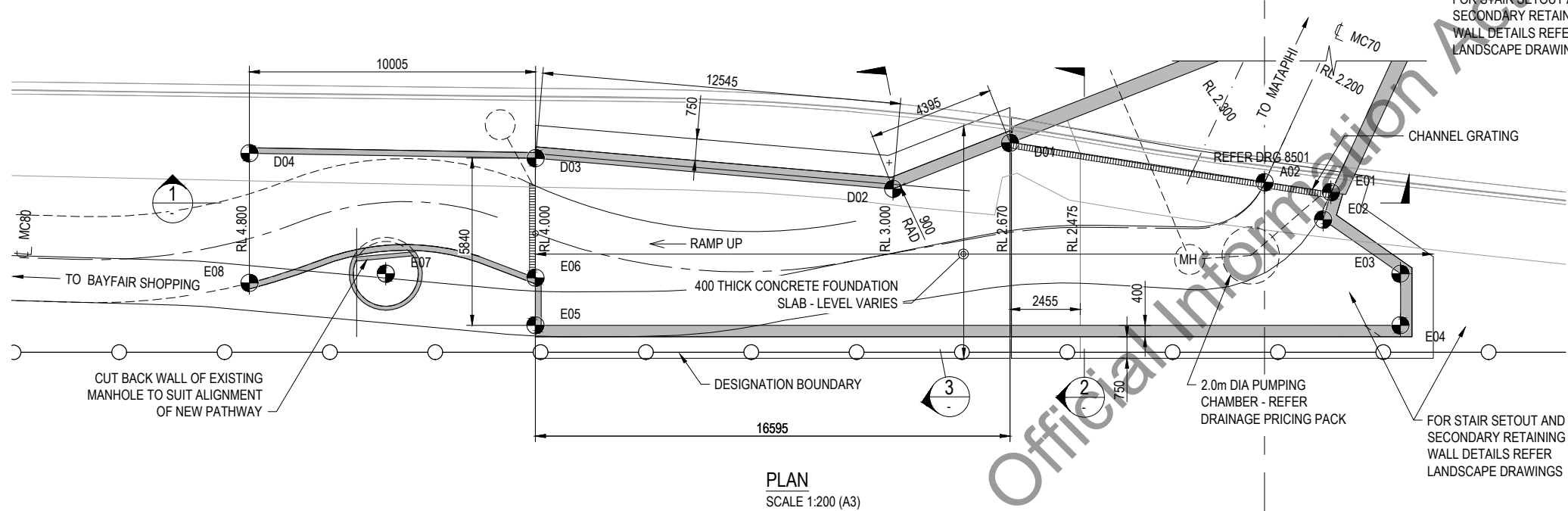
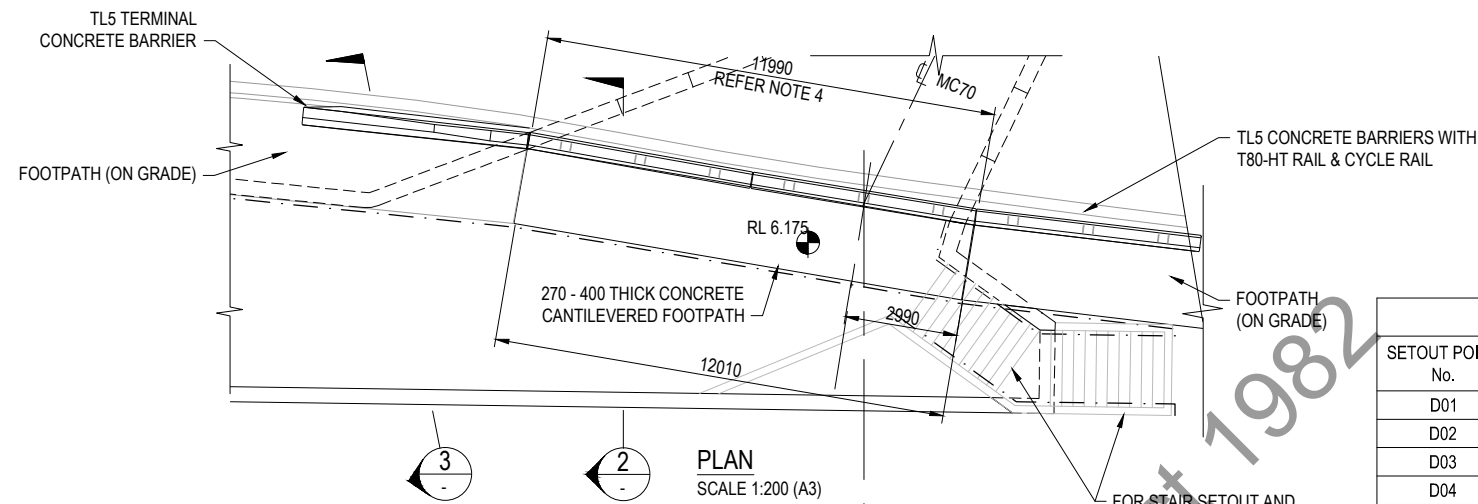


NOTES

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 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)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
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	



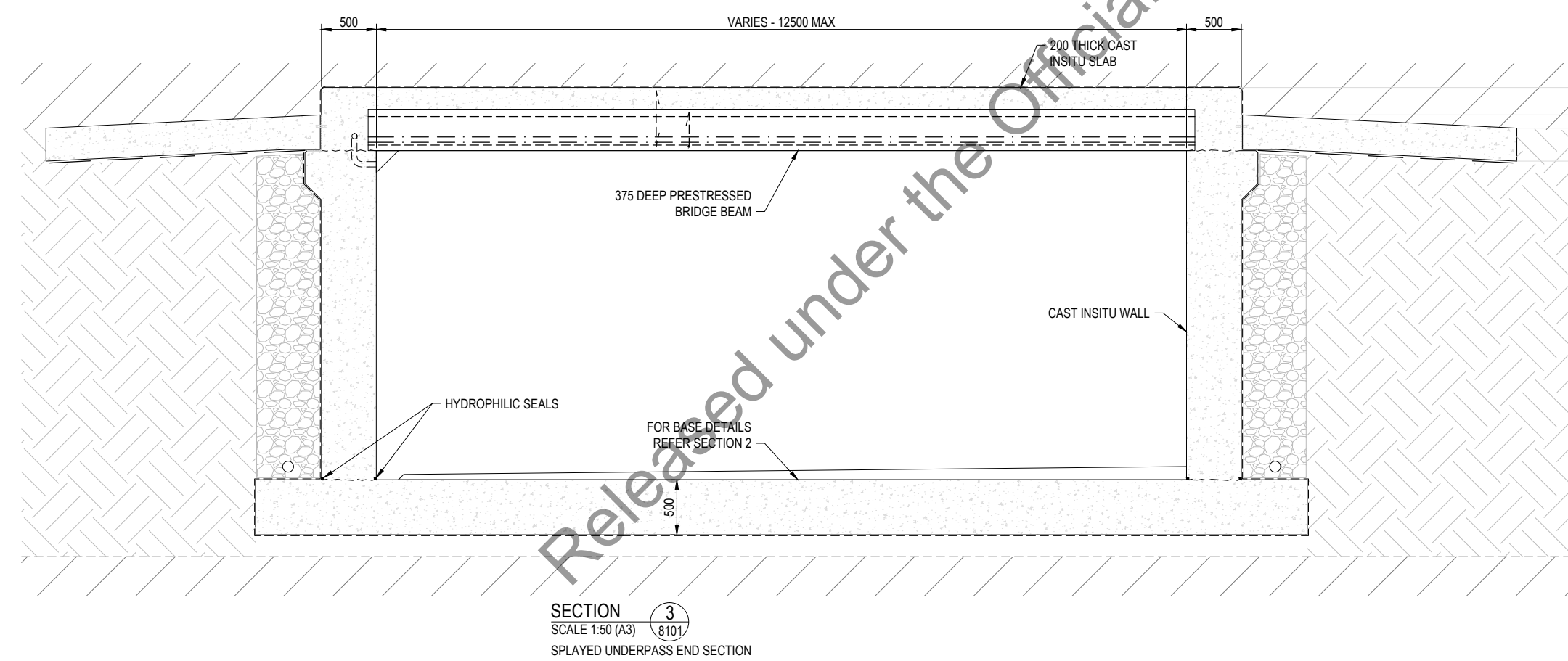
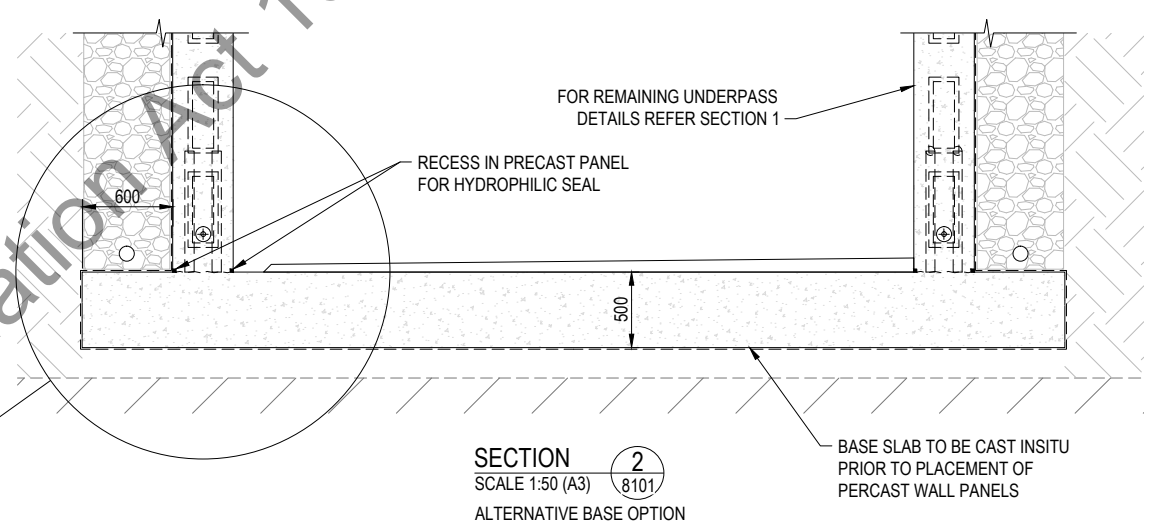
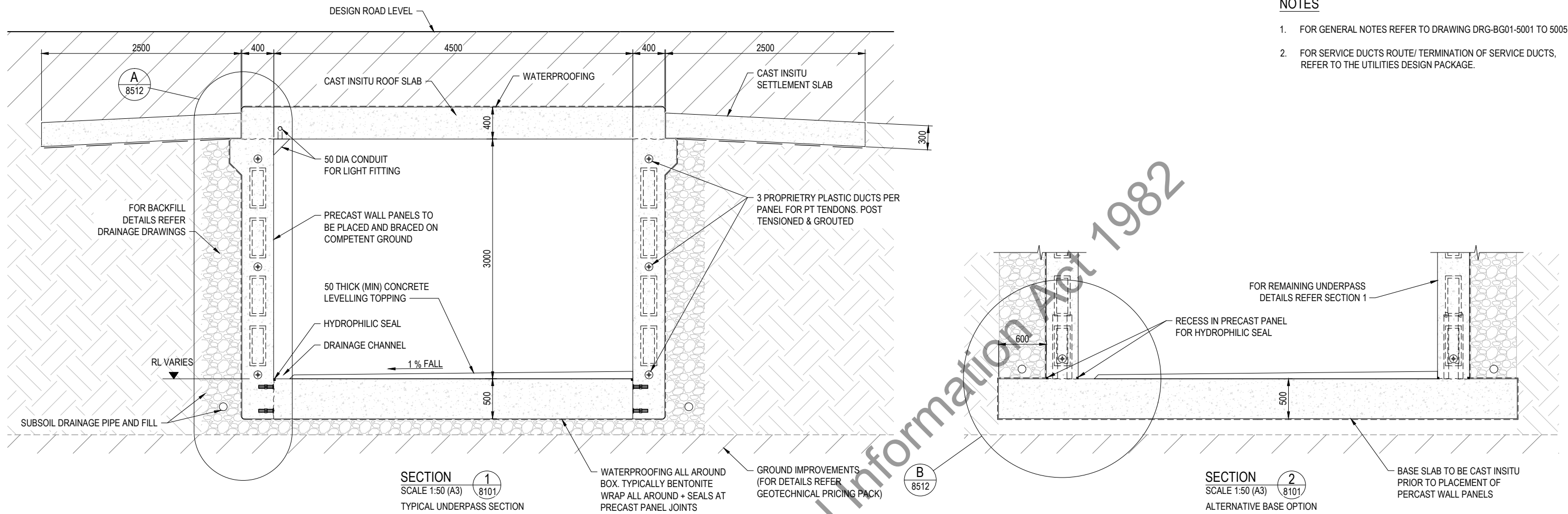
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No	DATE	DRG CHECK	DESIGN REVIEW	APP'D	DMGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW		50% ISSUE
A	08/03/19	GKK	SKK	LW		PRELIMINARY - FOR PRICING

 NZ TRANSPORT AGENCY WAKA KOTAHU	 CPB CONTRACTORS	 JACOBS	 Tonkin+Taylor	SCALE	1:200 (A3)	CLIENT	NZ TRANSPORT AGENCY		TITLE	BR05 - PEDESTRIAN UNDERPASS	
				STATUS	50% ISSUE		PROJECT			BAYPARK TO BAYFAIR LINK (BAY LINK)	
				PROJECT NUMBER	2/09-024/603	DRAWN	DCC	DRAWING CHECK	GKK	APPROVED	LW
						DESIGNED	TKF	DESIGN REVIEW	SKK	MAR 2019	
										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 UTILITIES DESIGN PACKAGE.



DATE: 15/03/2019 5:14:26 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\workspace\jacobson_je\014559822-DRG-BR05-8511.dwg

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



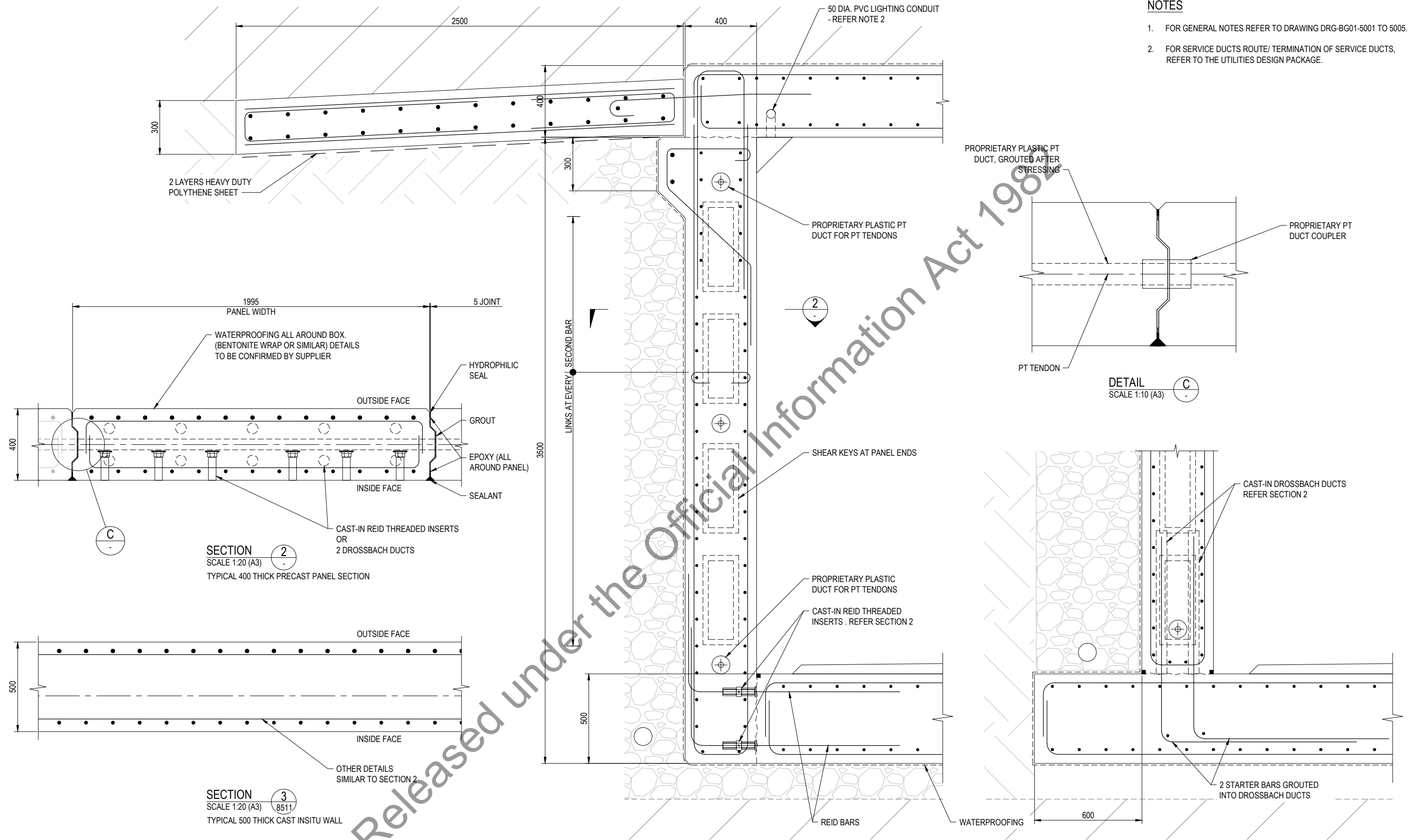
SCALE: 1:50 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

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

TITLE: BR05 - PEDESTRIAN UNDERPASS TYPICAL SECTIONS
DRAWING No: B2B-DRG-BR05-8511
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 UTILITIES DESIGN PACKAGE.



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

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

DETAIL A
SCALE 1:20 (A3)
REIDBAR OPTION

DETAIL B
SCALE 1:20 (A3)
CROSSBATCH OPTION

DATE: 15/03/2019 7:16:08 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\proj\waka\jacobsonz\el014598922-DRG-BR05-8512.dwg

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



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

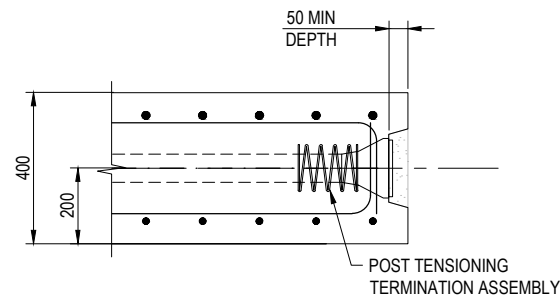
CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: DCC
DESIGNED: TKF
DRAWING CHECK: GKK
DESIGN REVIEW: SKK
APPROVED: LW
MAR 2019

TITLE: BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS SHEET 1
DRAWING No: B2B-DRG-BR05-8512
REV: B

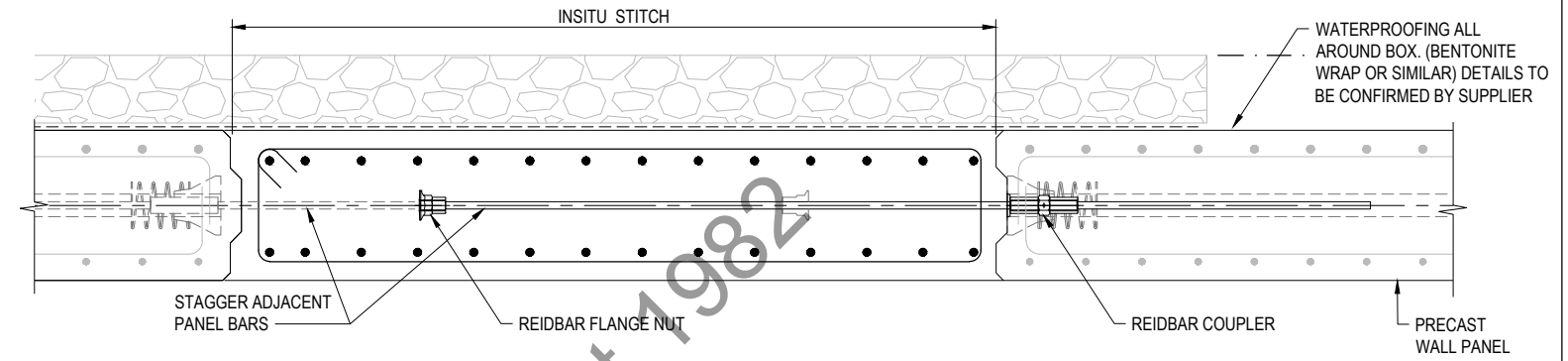
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NOTES

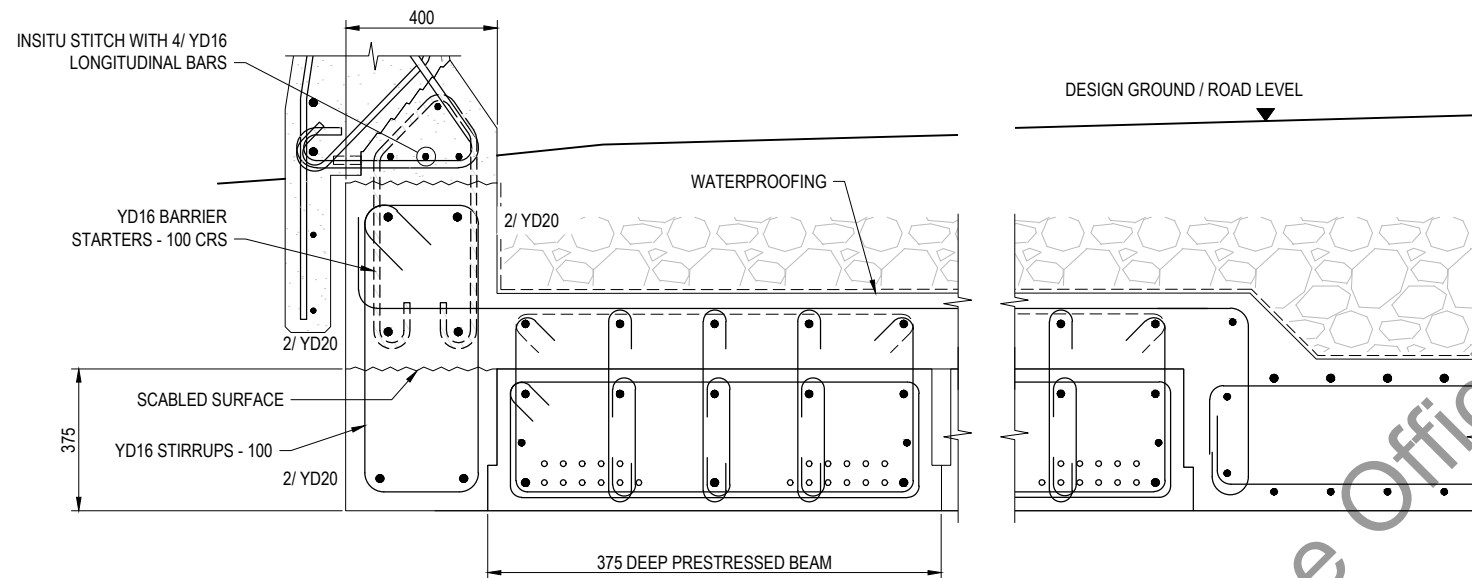
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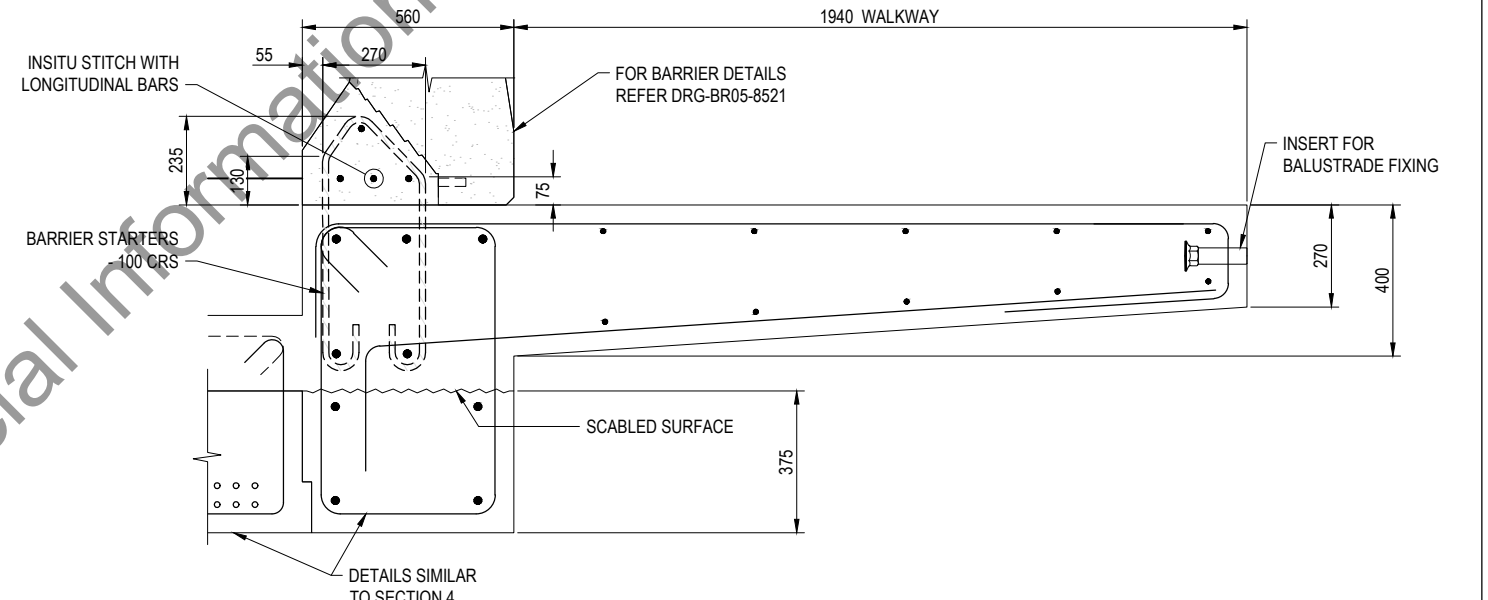
SECTION 2
SCALE 1:20 (A3) 8501
POST TENSIONING TERMINATION
AT STITCH PANEL & END PANEL



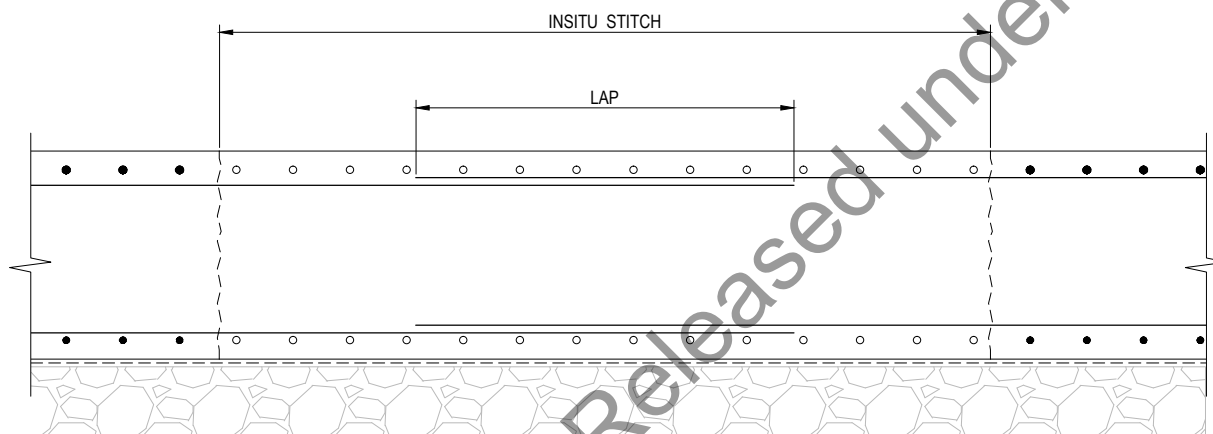
SECTION 3
SCALE 1:20 (A3) 8501
WALL STITCH DETAIL



DETAIL 4
SCALE 1:20 (A3) 8501



DETAIL 6
SCALE 1:20 (A3) 8501



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

DATE: 15/03/2019 7:22:37 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\pawes\pawes.dwg

<p>B 15/03/19 GKK SKK LW 50% ISSUE</p> <p>A 08/03/19 GKK SKK LW PRELIMINARY - FOR PRICING</p>						
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES	
1:10 @ A1	0	100	200	300	400	500
1:20 @ A3	0	100	200	300	400	500



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 B

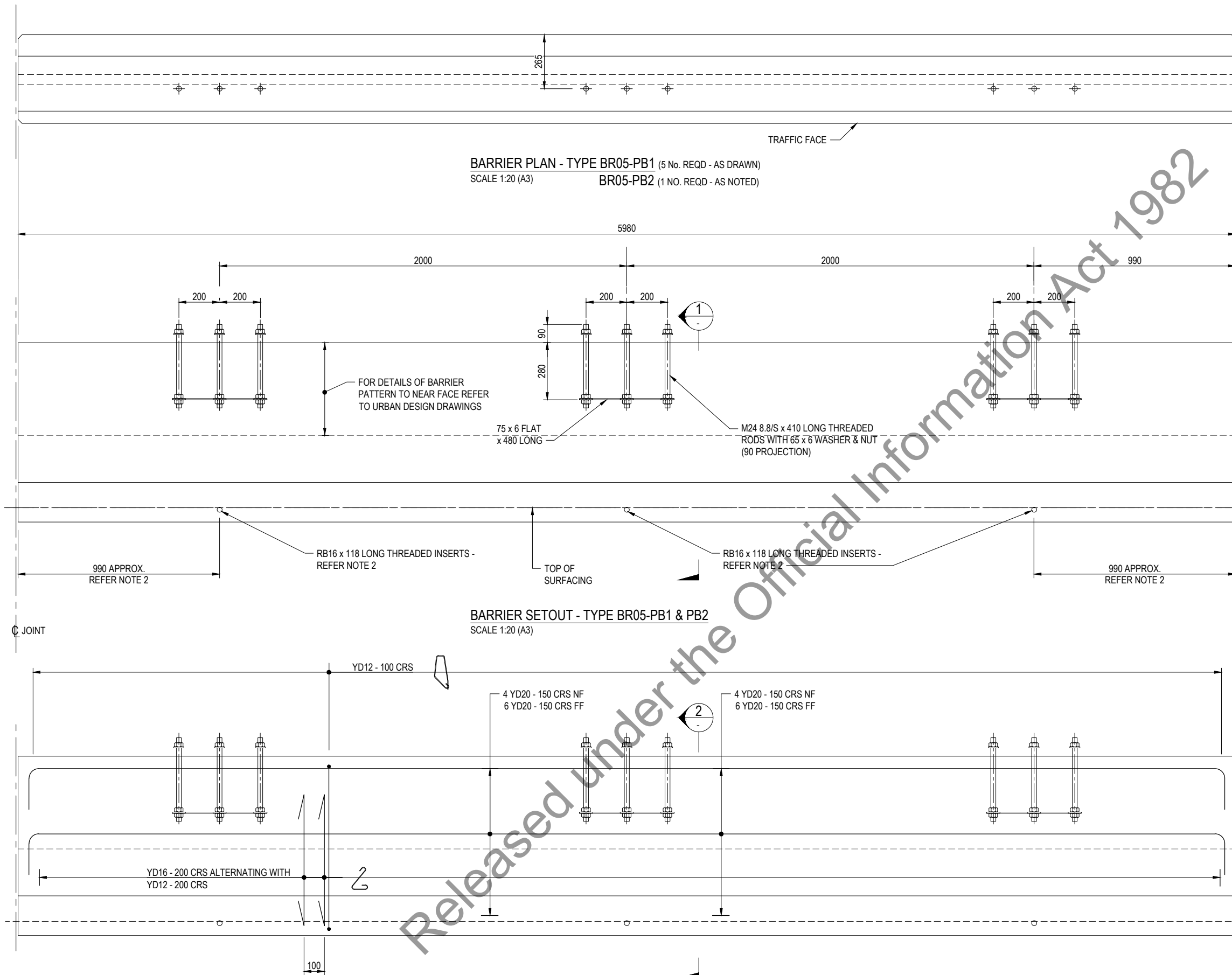
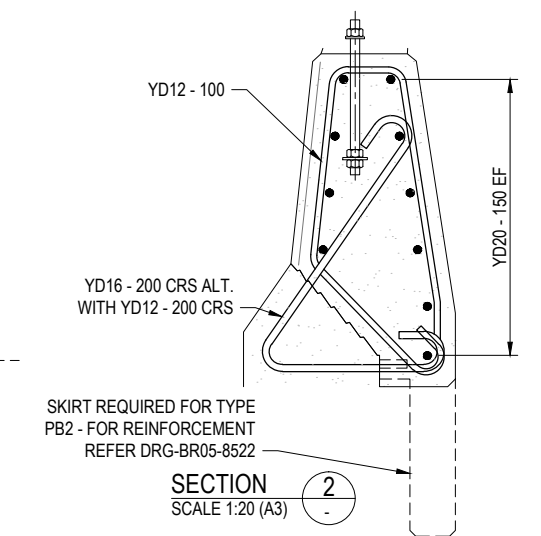
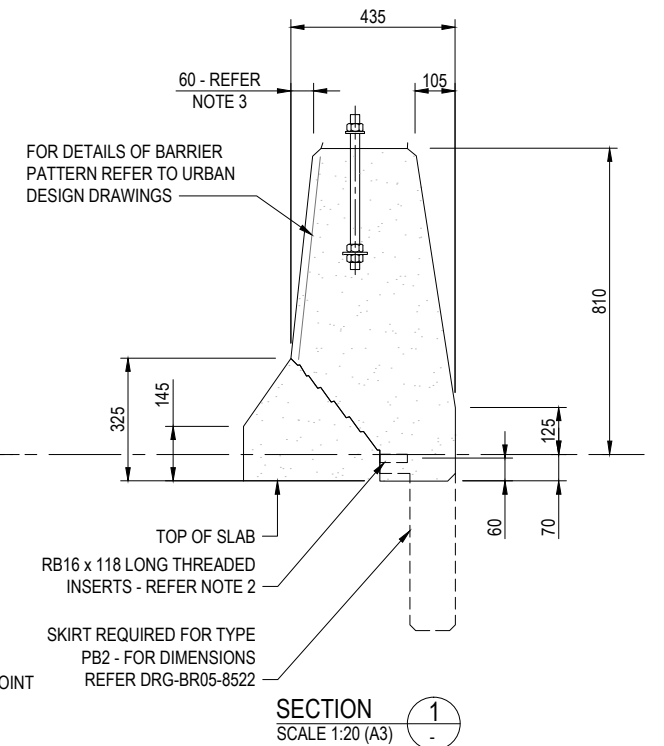
NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
- 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.
- FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
- ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)

BARRIER PLAN - TYPE BR05-PB1 (5 No. REQD - AS DRAWN)
SCALE 1:20 (A3) **BR05-PB2** (1 NO. REQD - AS NOTED)

BARRIER SETOUT - TYPE BR05-PB1 & PB2
SCALE 1:20 (A3)

BARRIER REINFORCEMENT - TYPE BR05-PB1 & PB2
SCALE 1:20 (A3)



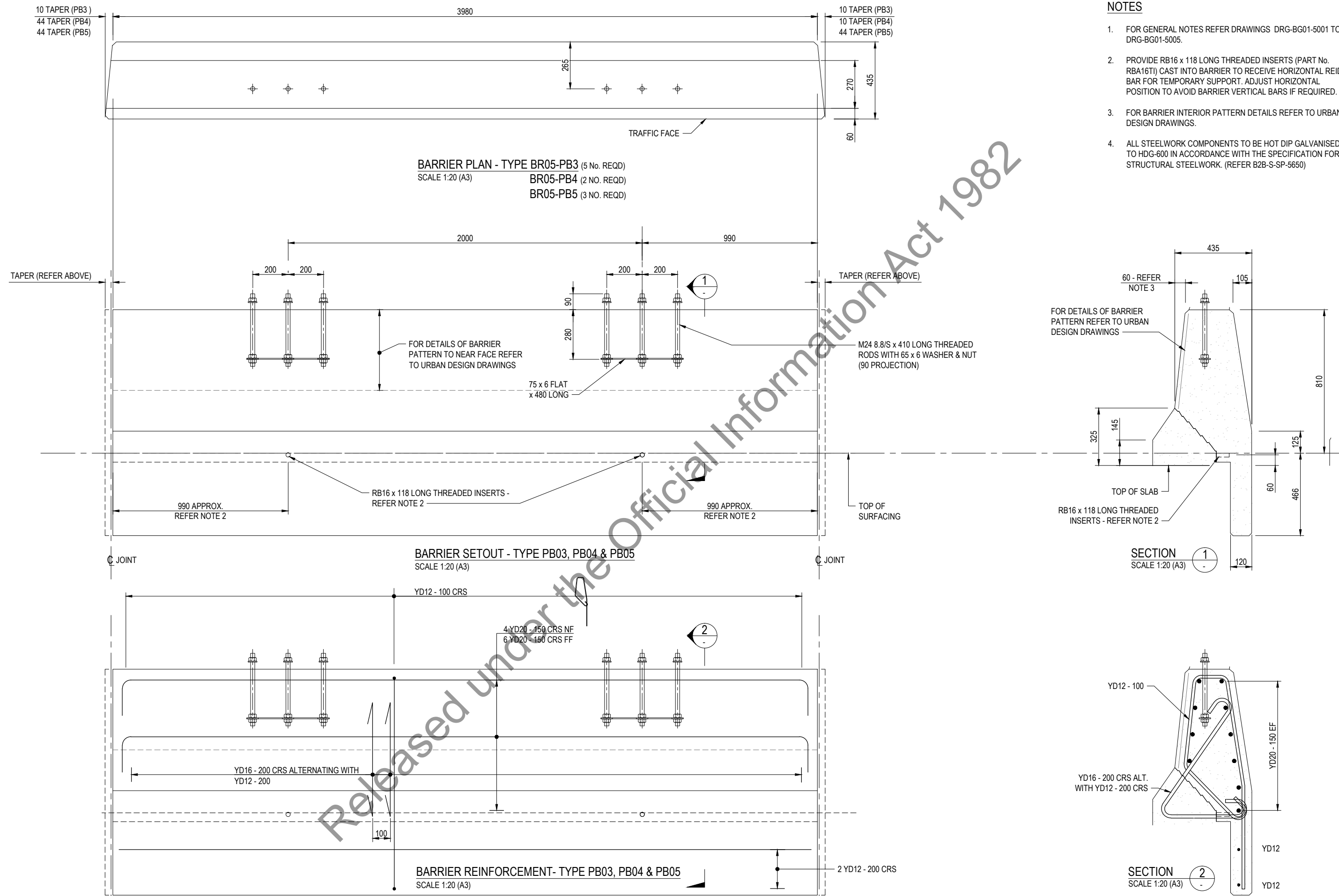
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B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D DMGR	REVISIONS & ISSUES
1:5 @ A1					
1:10 @ A3					

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

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
- 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.
- FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
- ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)



DATE: 15/03/2019 7:32:51 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\jacobsonz\16014559822-DRG-BR05-8522.dwg

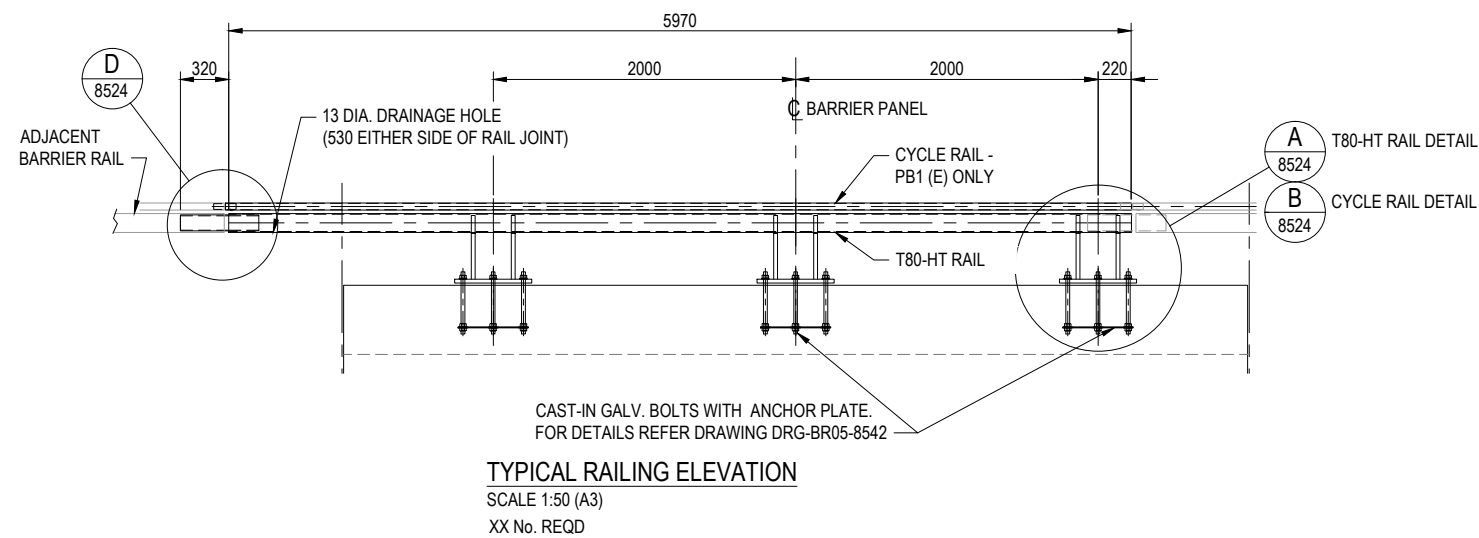
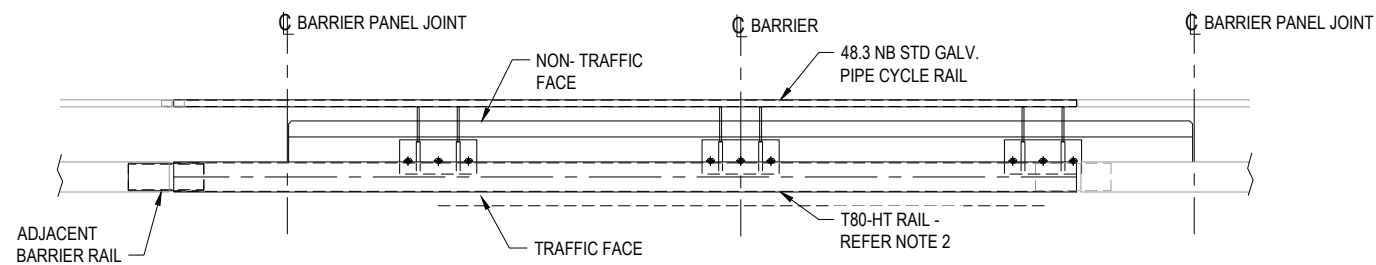
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B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

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

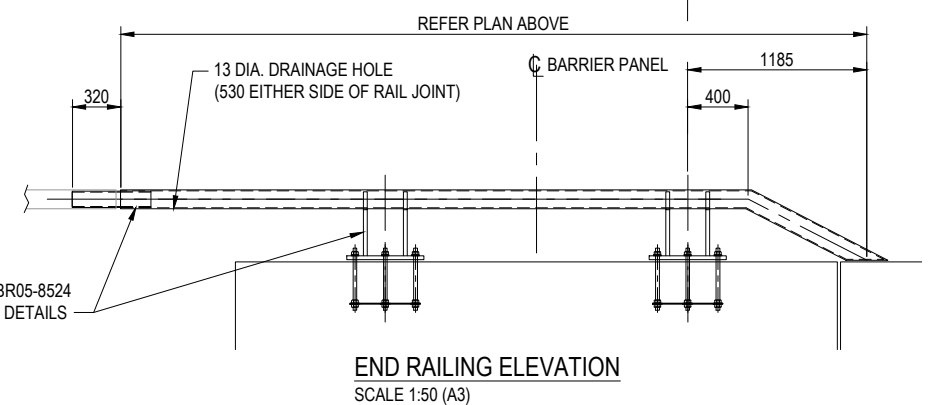
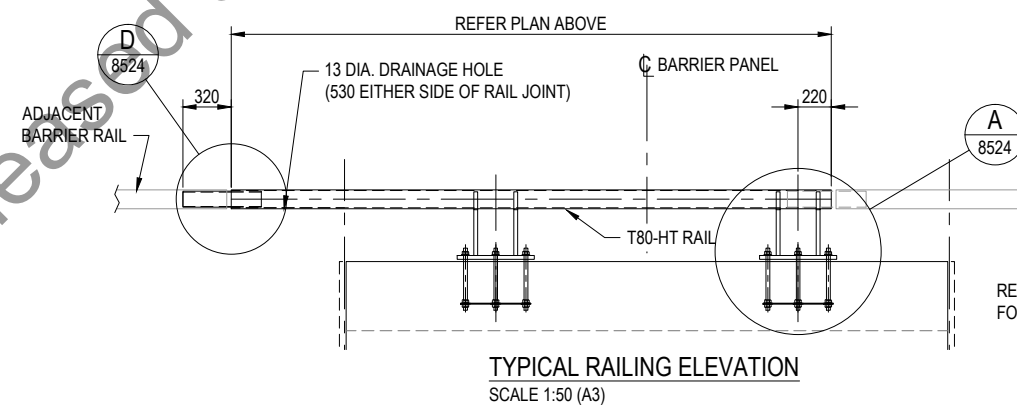
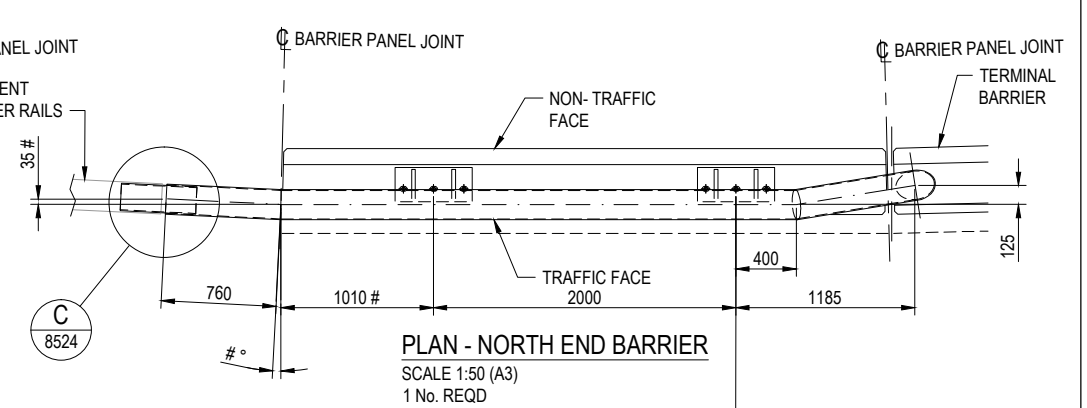
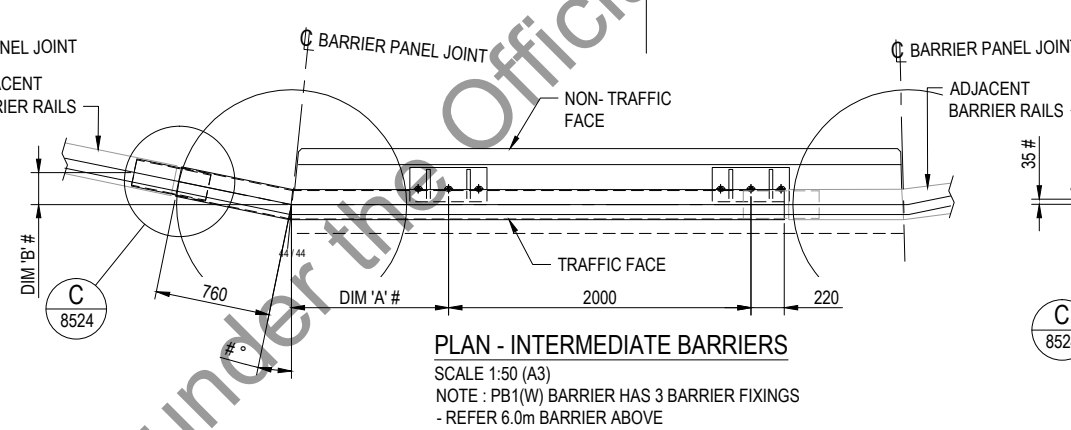
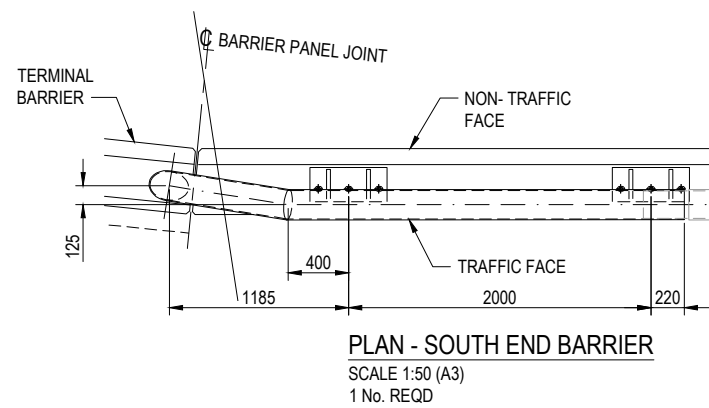
<p>NZ TRANSPORT AGENCY WAKA KOTAHĪ</p>	<p>CPB CONTRACTORS</p>	<p>JACOBS</p>	<p>Align Tonkin+Taylor</p>	<p>SCALE</p> <p>1:20 (A3)</p>	<p>CLIENT</p> <p>NZ TRANSPORT AGENCY</p>	<p>PROJECT</p> <p>BAYPARK TO BAYFAIR LINK (BAY LINK)</p>	<p>TITLE</p> <p>BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB3, PB4 & PB5</p>
				<p>STATUS</p> <p>50% ISSUE</p>			

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
- 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.
- # - 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	



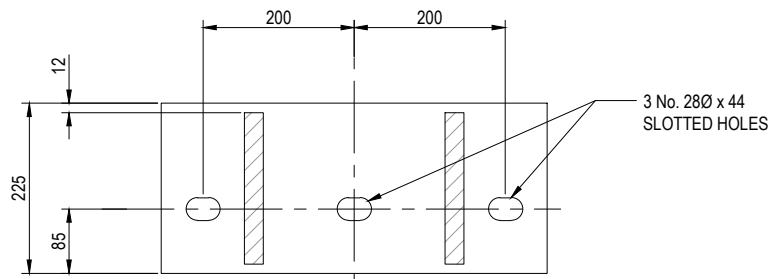
DATE: 15/03/2019 7:37:10 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\jacobson\proj\br05-8523.dwg

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

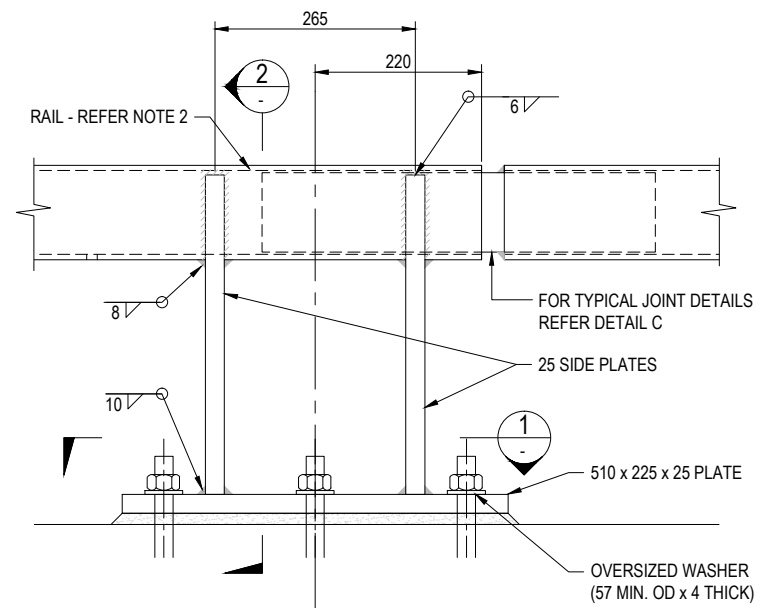
0 400 800 1200 1600 2000 2400 mm

<p>NZ TRANSPORT AGENCY WAKA KOTAHĪ</p>	<p>CPB CONTRACTORS</p>	<p>JACOBS</p>	<p>Align Tonkin+Taylor</p>	SCALE 1:20 (A3)	CLIENT NZ TRANSPORT AGENCY PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 1
				STATUS 50% ISSUE		



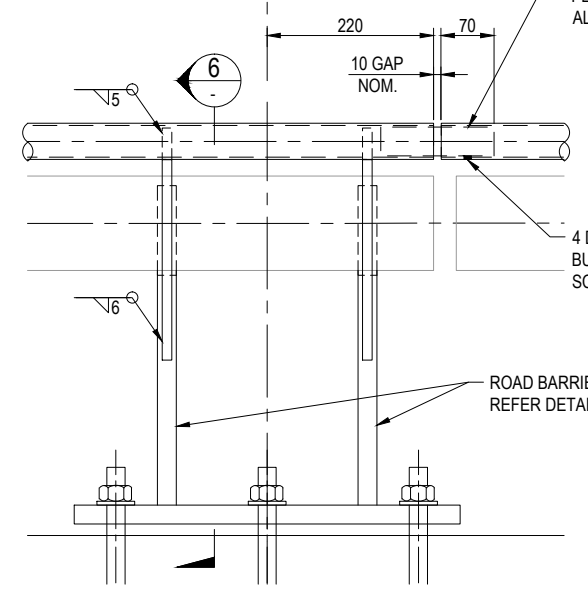
3 No. 28Ø x 44
SLOTTED HOLES

SECTION 1
SCALE 1:10 (A3)



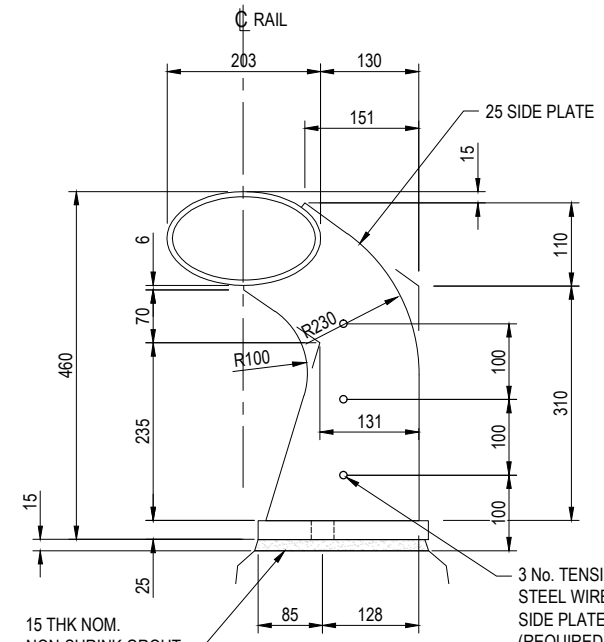
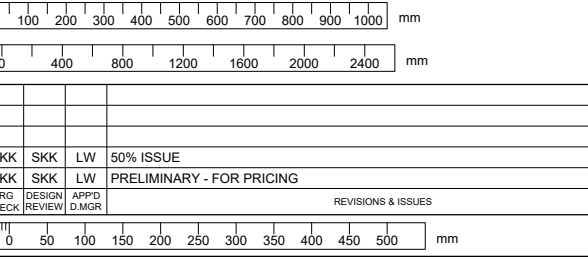
DETAIL A
SCALE 1:10 (A3)

TYPICAL T80-HT RAIL DETAIL

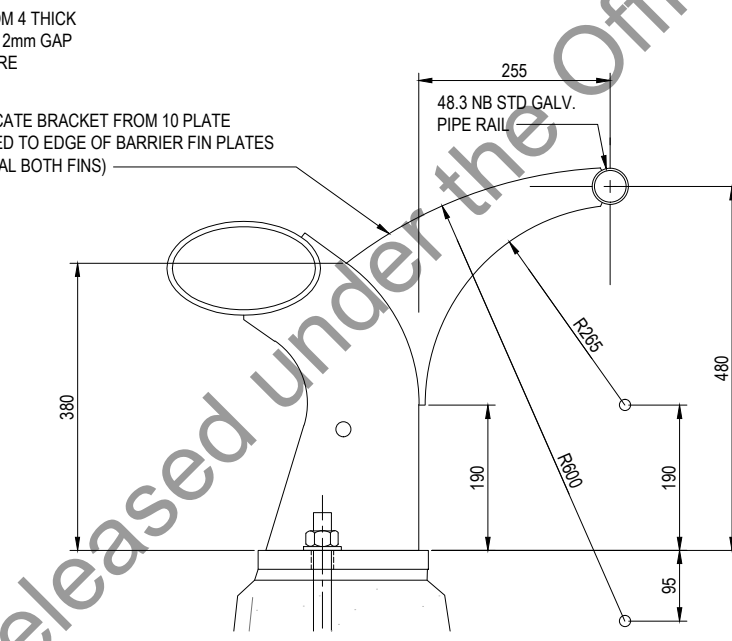


DETAIL B
SCALE 1:10 (A3)

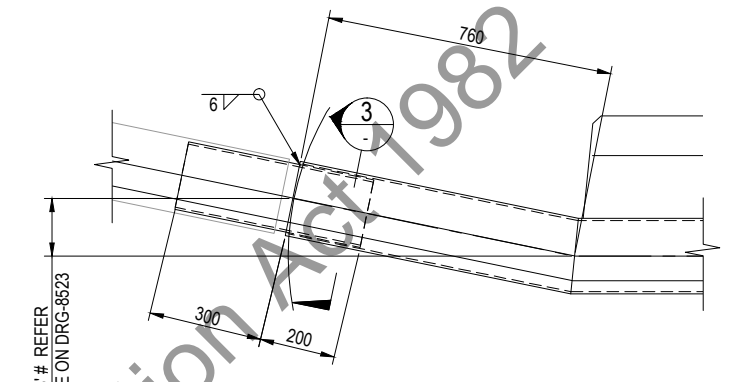
CYCLE RAIL ADDITION TO ROAD BARRIER RAIL



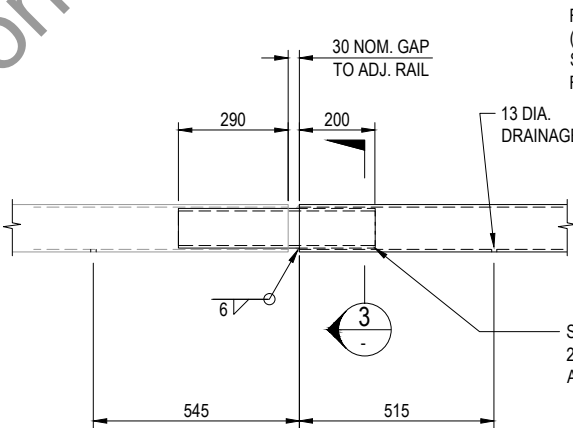
SECTION 2
SCALE 1:10 (A3)



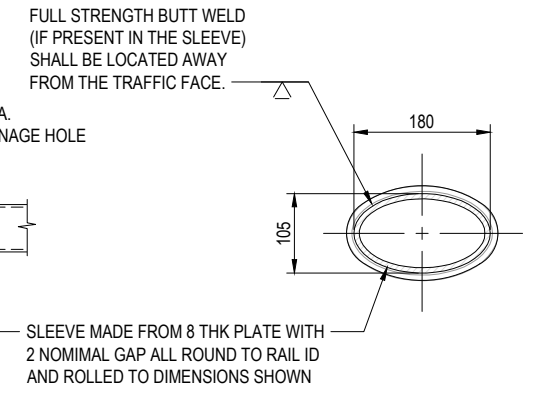
SECTION 6
SCALE 1:10 (A3)



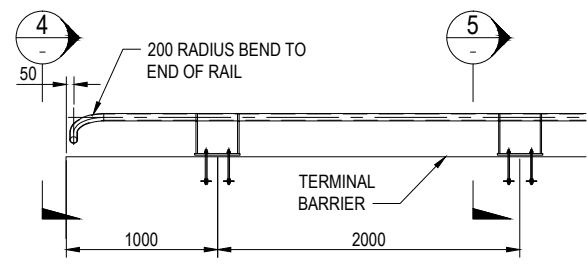
DETAIL C
SCALE 1:10 (A3)
RAIL SLEEVE PLAN - ANGLED DETAIL



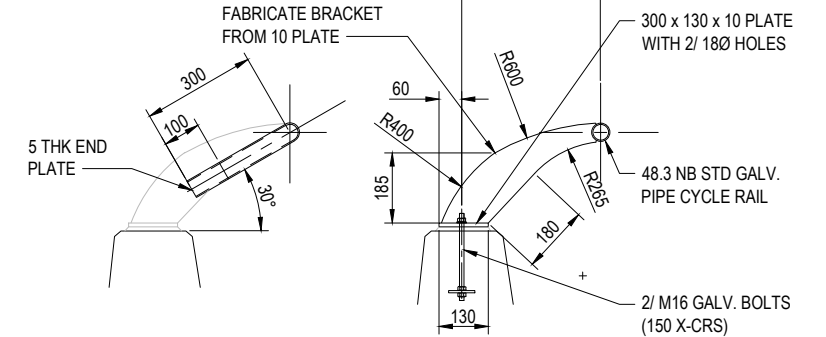
DETAIL D
SCALE 1:20 (A3)
TYPICAL RAIL SLEEVE ELEVATION



SECTION 3
SCALE 1:10 (A3)



SECTION 4
SCALE 1:20 (A3)



SECTION 5
SCALE 1:20 (A3)

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
- 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.
- # - DENOTES DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL

DATE: 15/03/2019 7:42:57 PM LOGIN NAME: CONNOR, DAVID C
LOCATION: C:\users\connor\appdata\local\temp\work\jacobsonz\1501455982\BR05-8524.dwg

1:10 @ A1	0	100	200	300	400	500	600	700	800	900	1000	mm	
1:20 @ A3	0	400	800	1200	1600	2000	2400	mm					

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

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



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

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 - MATAPIHI RAMP
B2B-DRG-BR05-8503	C	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - BAYFAIR 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 BARRIERS	TYPE BR05-PB1 & PB2
B2B-DRG-BR05-8522	C	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	TYPE BR05-PB3, PB4 & PB5
B2B-DRG-BR05-8523	C	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	STEEL RAIL ELEVATIONS
B2B-DRG-BR05-8524	C	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	STEEL RAIL DETAILS

Released under the Official Information Act 1982

DATE: 22/03/2019 9:35:13 AM LOGIN NAME: CONNOR, DAVID C
 LOCATION: C:\users\connor\appdata\local\temp\cawpawg\jaco05_anz_ie014559822-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



CONTRACTOR



DESIGNER



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

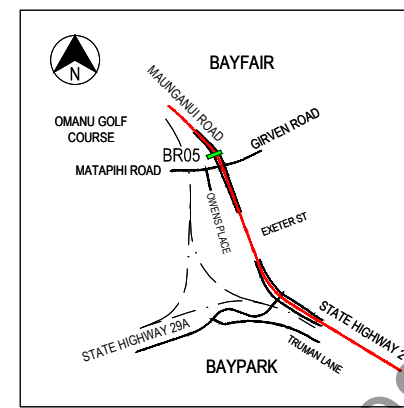
B2B-DRG-BR05-8500

REV

C

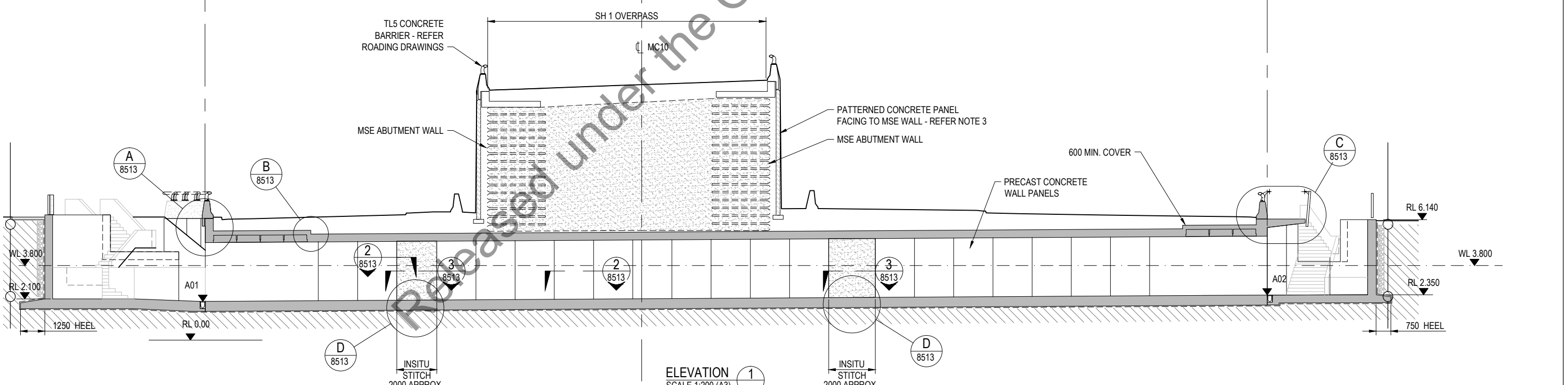
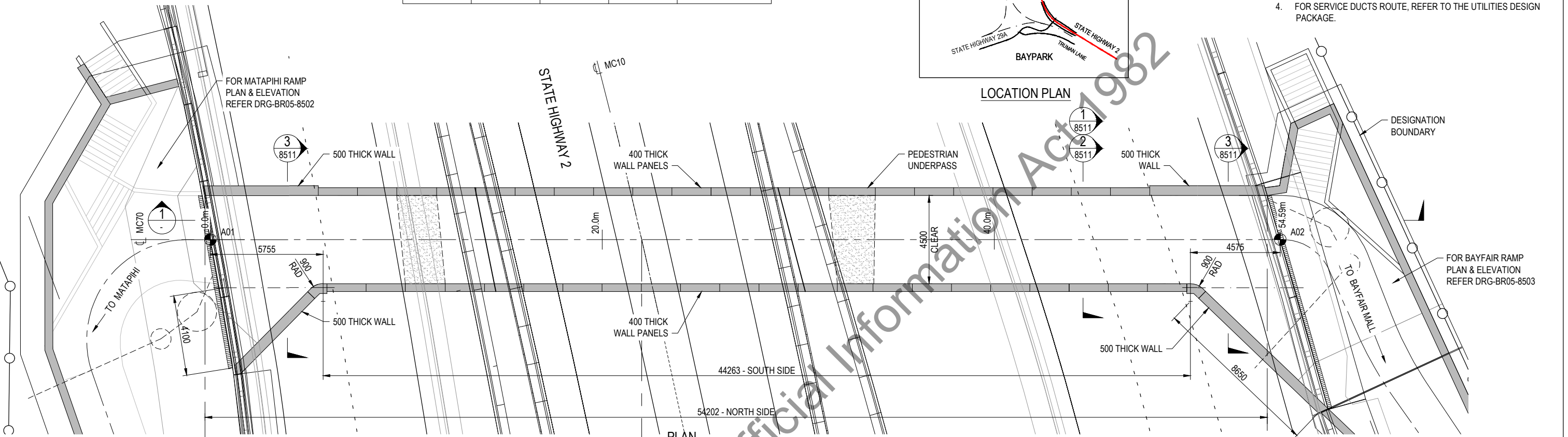


BR05 - PEDESTRIAN UNDERPASS				
SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
A01	378438.244	809430.359	1.980	
A02	378489.436	809449.319	2.300	



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.



DATE: 22/03/2019 9:43:03 AM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\work\jacobsonz_ie\01455982\B2B-DRG-BR05-8501.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

				SCALE	1:200 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT UNDERPASS - PLAN & ELEVATION
				STATUS	50% ISSUE			
				PROJECT NUMBER	2/09-024/603	DESIGNED	TKF	DRAWING No B2B-DRG-BR05-8501

REV C

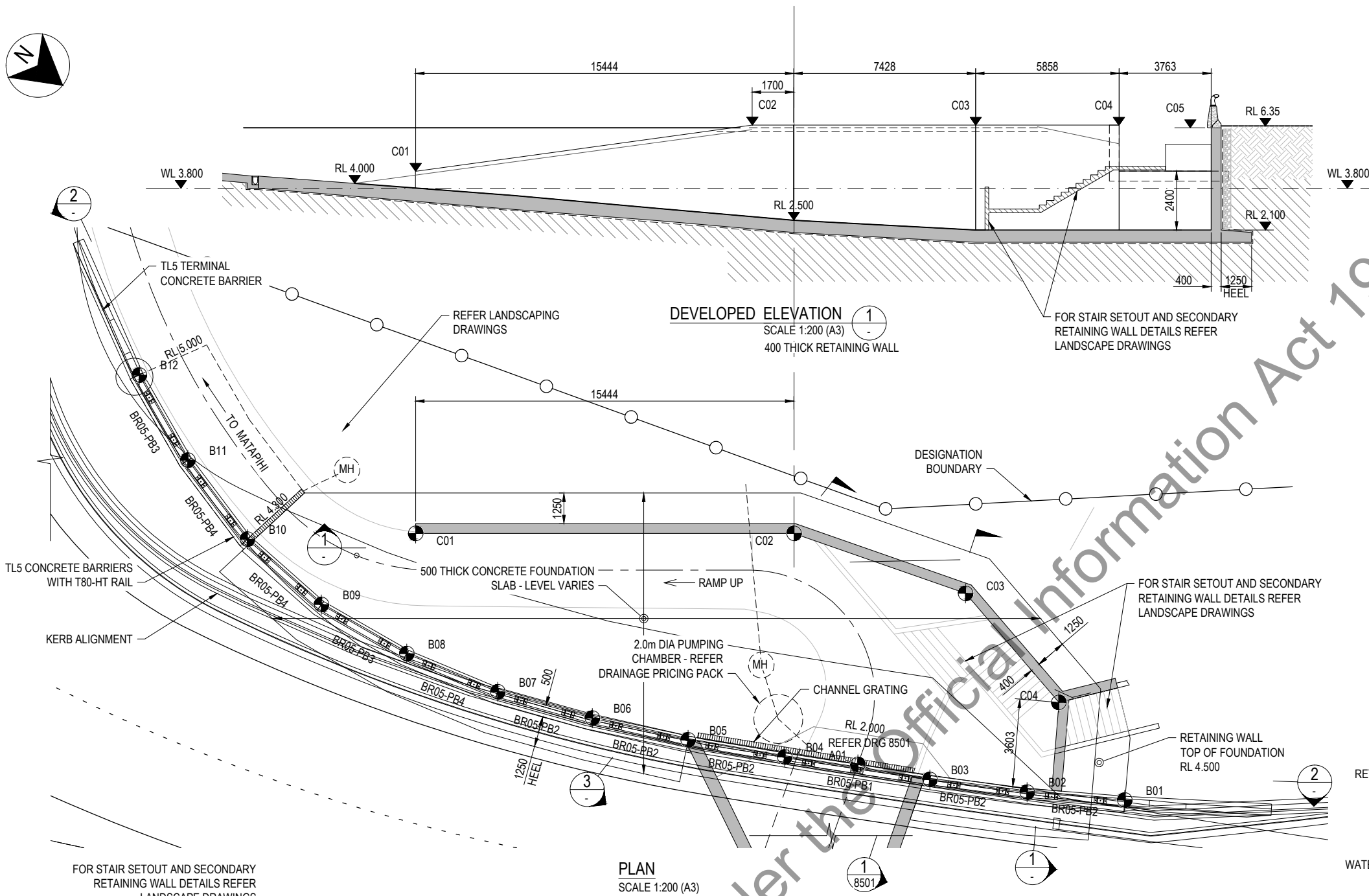


NOTES

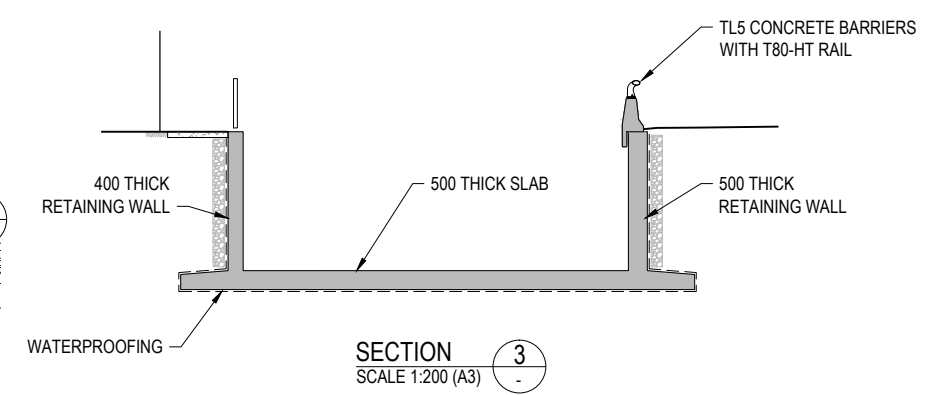
- FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
- FOR ROAD SAFETY BARRIERS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
- FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
- FOR SERVICE DUCTS ROUTE REFER TO THE UTILITIES DESIGN PACKAGE.

BR05 - PEDESTRIAN UNDERPASS				
SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
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	

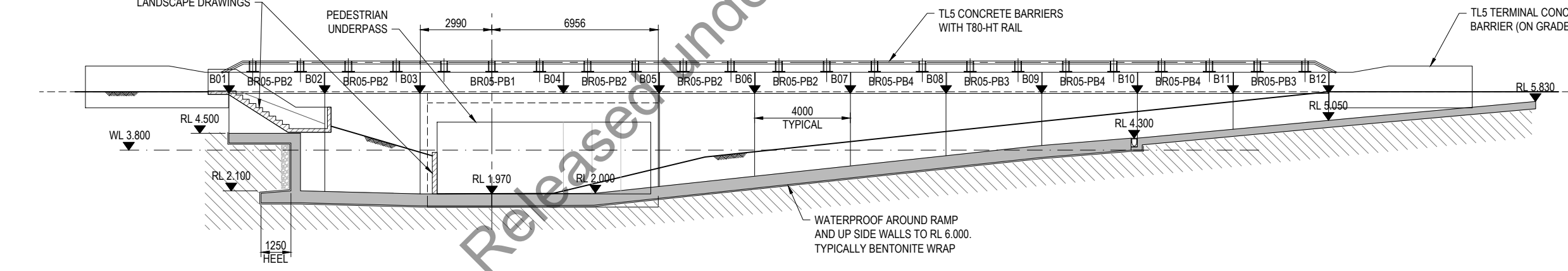
NOTE: SETOUT IS TO FRONT FACE OF RETAINING WALL



PLAN SCALE 1:200 (A3)



SECTION 3 SCALE 1:200 (A3)



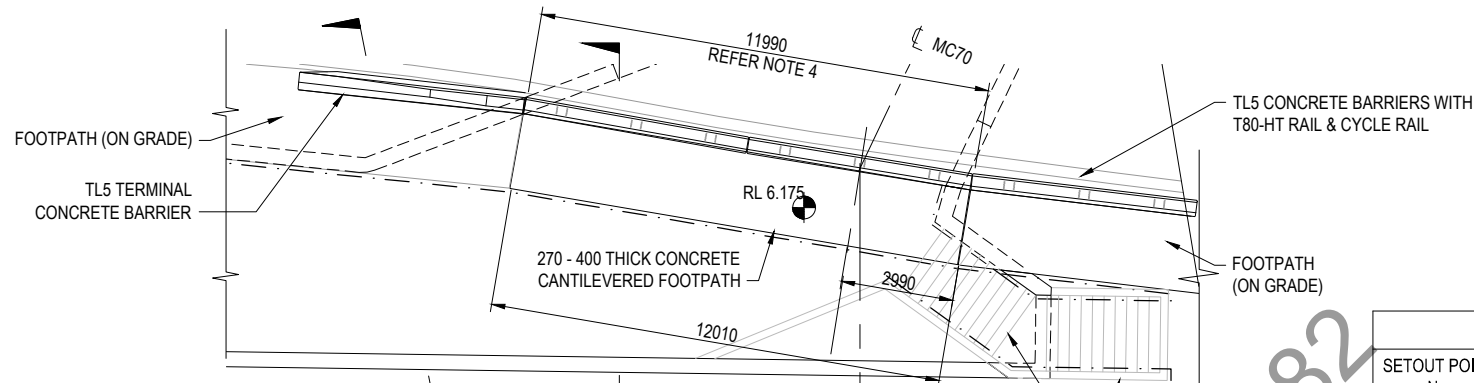
DEVELOPED ELEVATION 2 SCALE 1:200 (A3)
500 THICK RETAINING WALL

DATE: 22/03/2019 9:46:49 AM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\work\jacobsonz\el014559822-DRG-BR05-8502.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D	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

				SCALE	1:200 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - MATAPIHI RAMP
				STATUS	50% ISSUE			
				PROJECT NUMBER	2/09-024/603	DESIGNED	TKF	DRAWING No B2B-DRG-BR05-8502

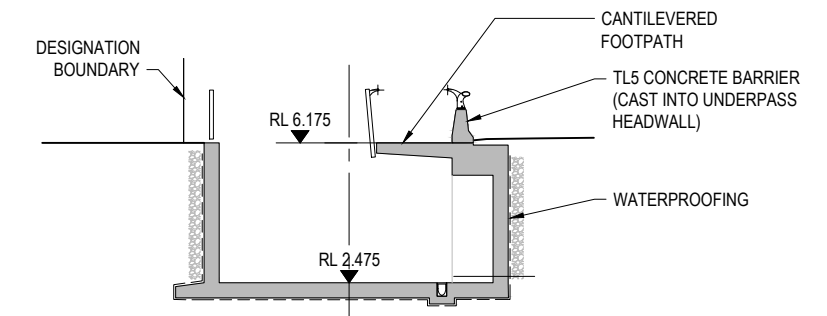
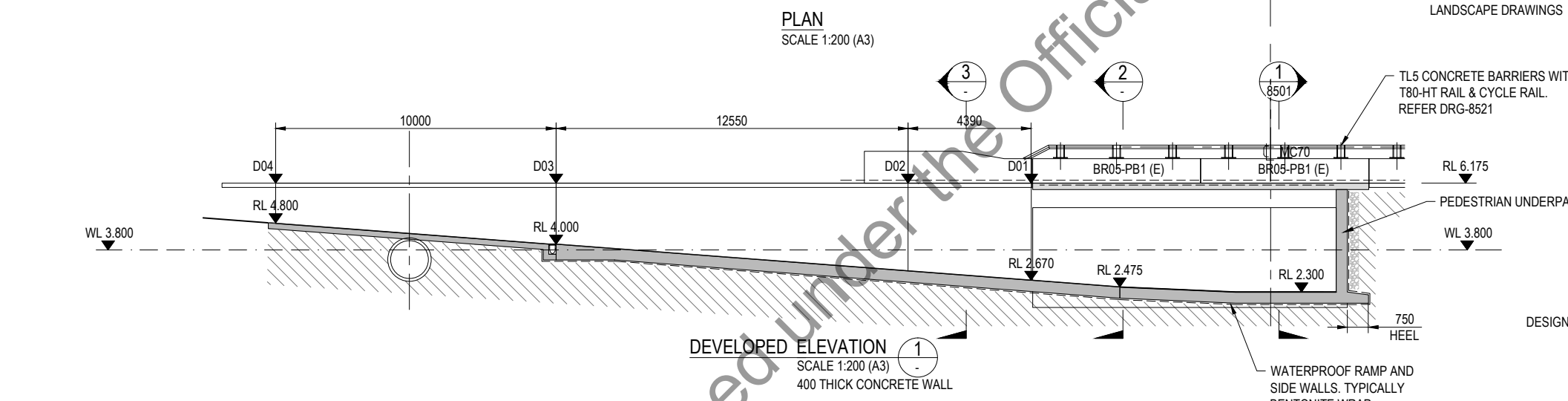
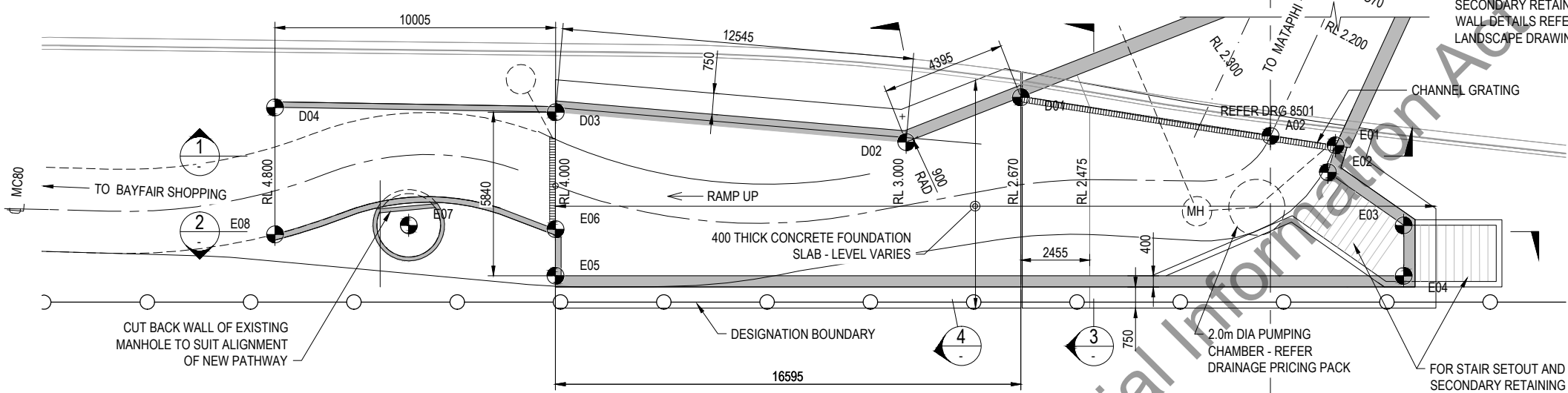
REV C



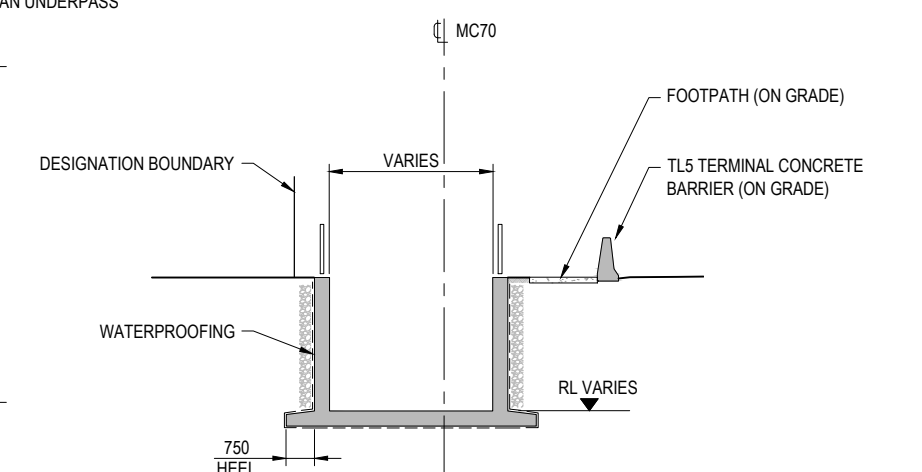
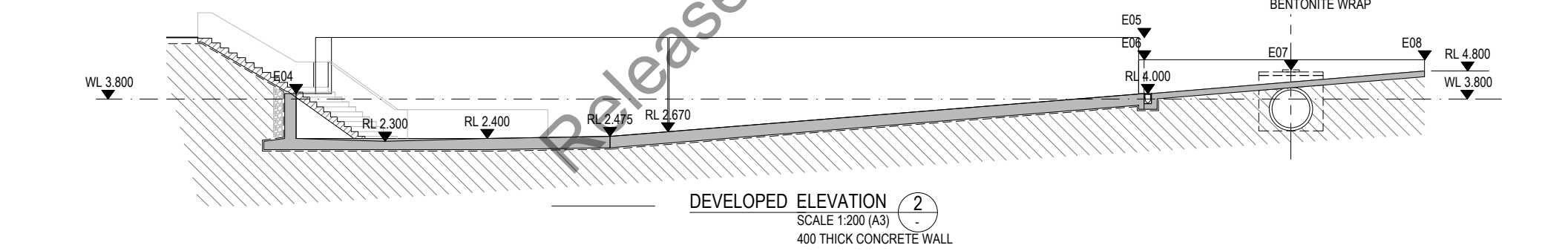
- NOTES**
- FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
 - FOR ROAD SAFETY BARRIERS EITHER SIDE OF UNDERPASS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
 - FOR BARRIER & WALL PANEL PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
 - ROAD SAFETY BARRIER TO BE CENTRED ON THE UNDERPASS.

BR05 - PEDESTRIAN UNDERPASS

SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
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	



SECTION 3
SCALE 1:200 (A3)



SECTION 4
SCALE 1:200 (A3)

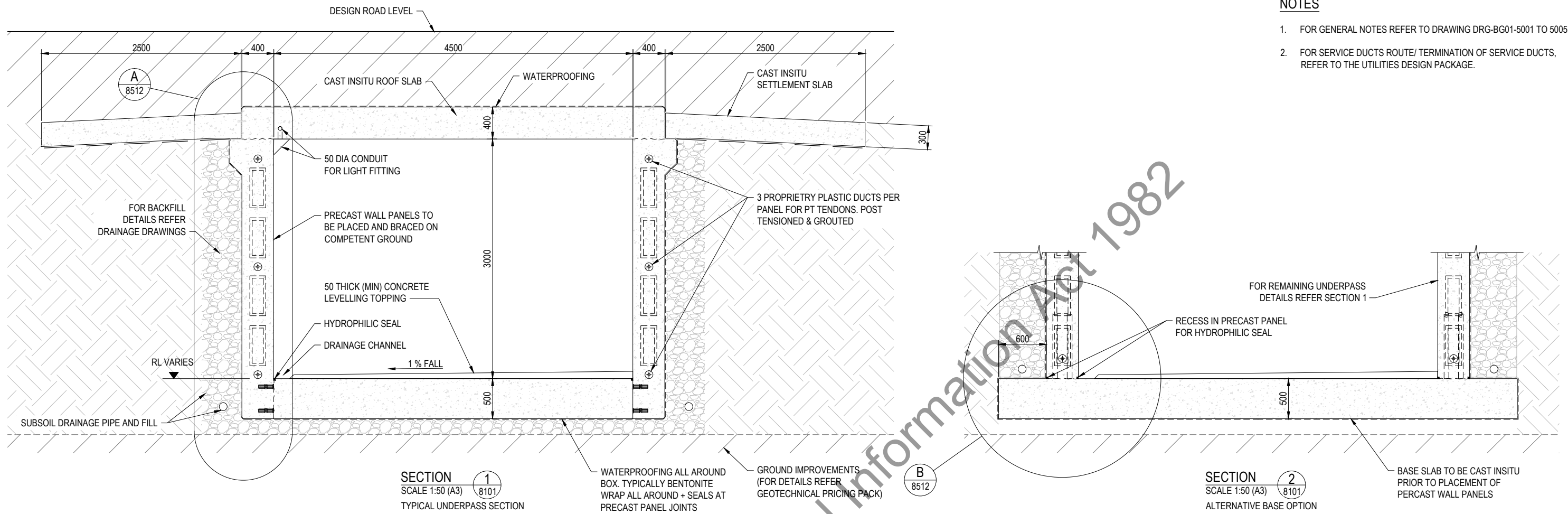
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No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50% REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

				SCALE	1:200 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - BAYFAIR RAMP	
				STATUS	50% ISSUE				PROJECT NUMBER
				PROJECT NUMBER 2/09-024/603	DRAWN DCC	DRAWING CHECK GKK	APPROVED LW MAR 2019	DRAWING No B2B-DRG-BR05-8503	
								REV	C

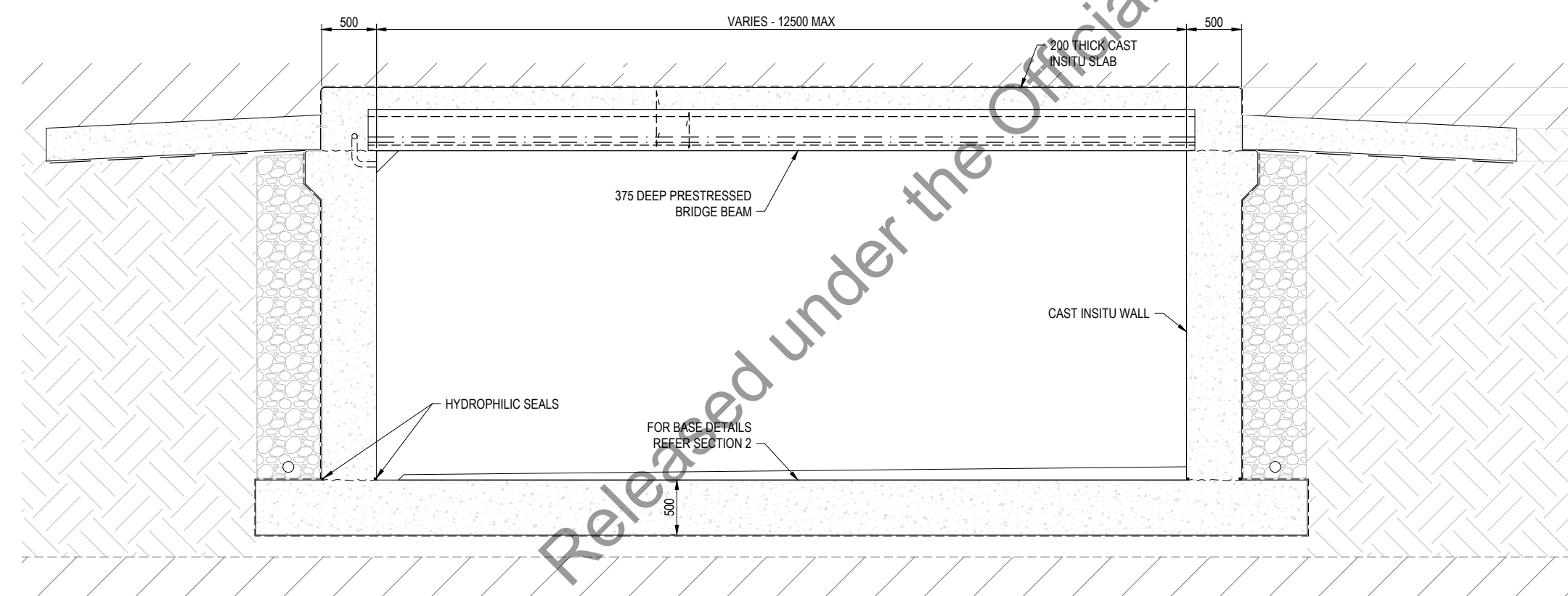
NOTES

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

DATE: 22/02/2019 9:37:17 AM LOGIN NAME: CONNON, DAVID C LOCATION: C:\users\connon\appdata\local\temp\work\jacobsonz\ar_je014559622-DRG-BR05-8511.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



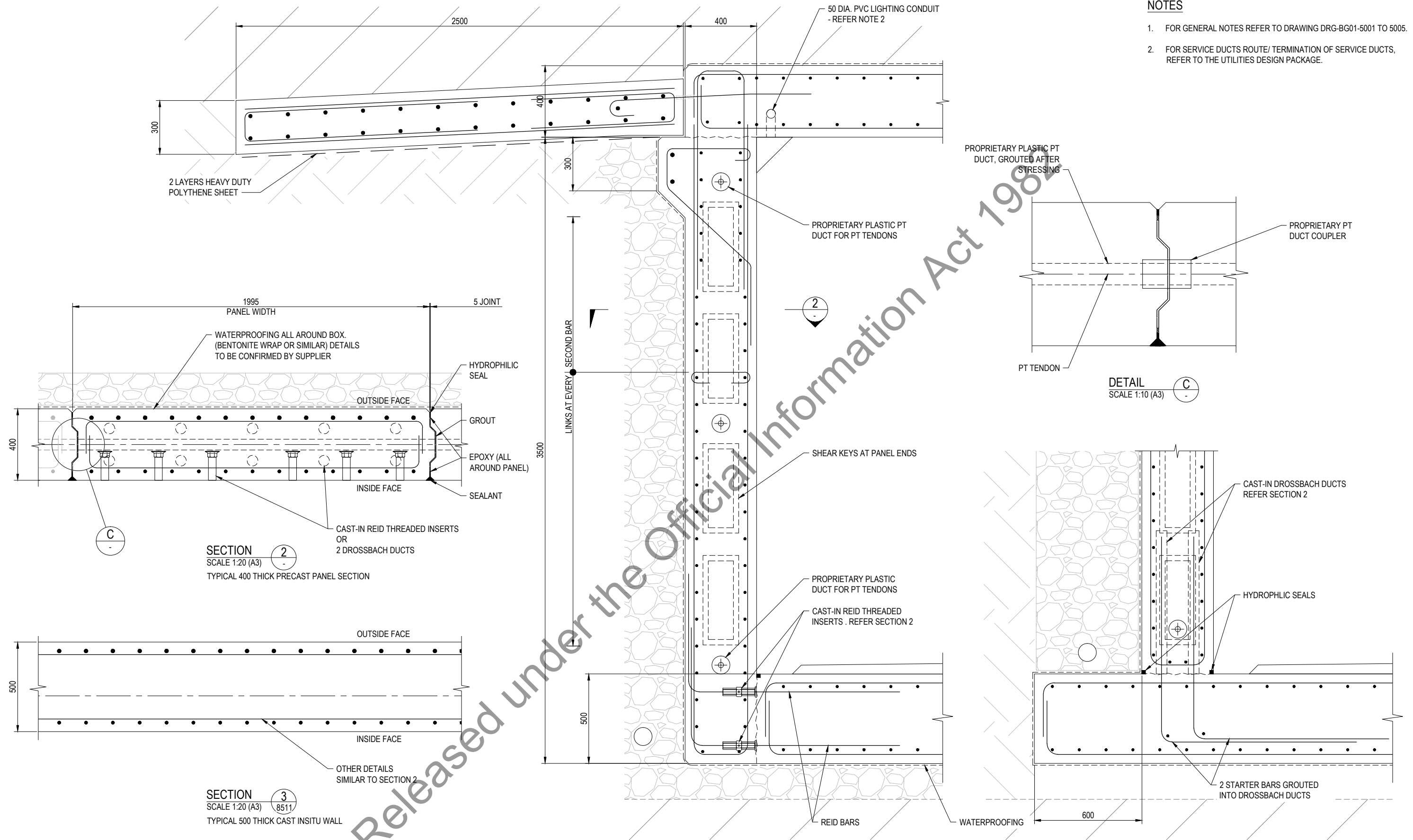
SCALE: 1:50 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

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

TITLE: BR05 - PEDESTRIAN UNDERPASS TYPICAL SECTIONS
DRAWING No: B2B-DRG-BR05-8511
REV: 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 UTILITIES DESIGN PACKAGE.



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

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

DETAIL A
SCALE 1:20 (A3)
REIDBAR OPTION

DETAIL B
SCALE 1:20 (A3)
DROSSBACH OPTION

DATE: 22/04/19 9:54:54 AM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\proj\waka\jacobsonz\jaco014589822-DRG-BR05-8512.dwg

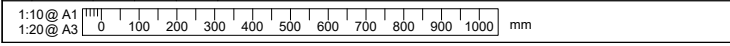
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
C	22/04/19	GKK	SKK	LW	50% REVISED ISSUE
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING



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

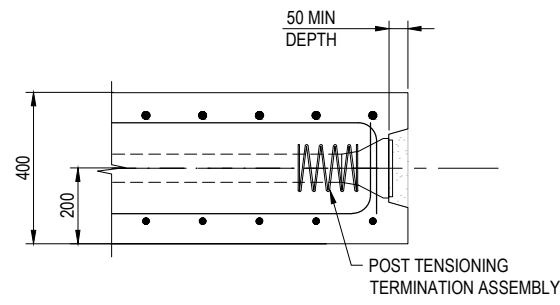
CLIENT NZ TRANSPORT AGENCY
PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN DCC
DESIGNED TKF
DRAWING CHECK GKK
DESIGN REVIEW SKK
APPROVED LW
MAR 2019

TITLE BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS SHEET 1
DRAWING No B2B-DRG-BR05-8512
REV C

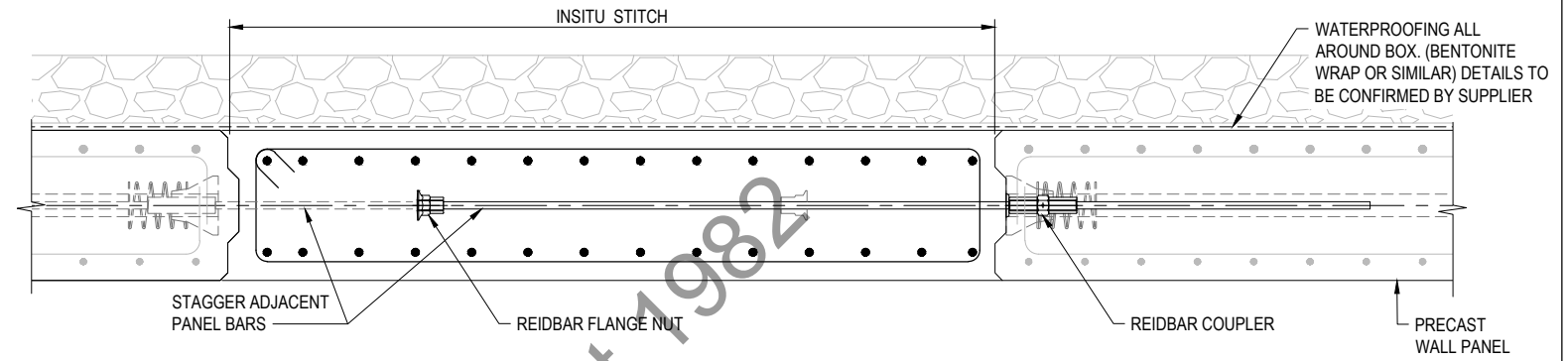


NOTES

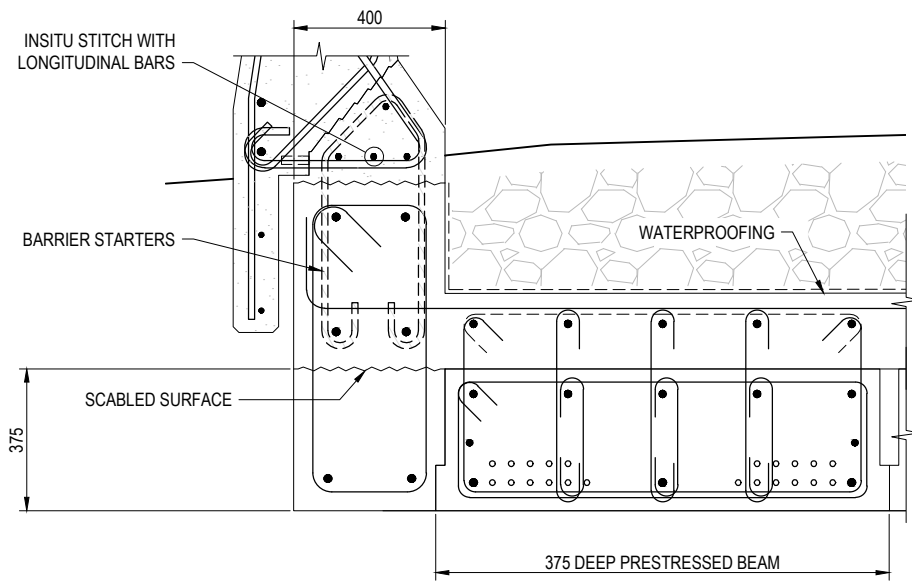
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.



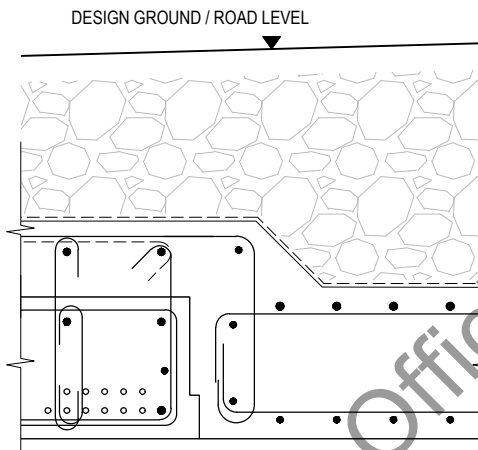
SECTION 2
SCALE 1:20 (A3) 8501
POST TENSIONING TERMINATION
AT STITCH PANEL & END PANEL



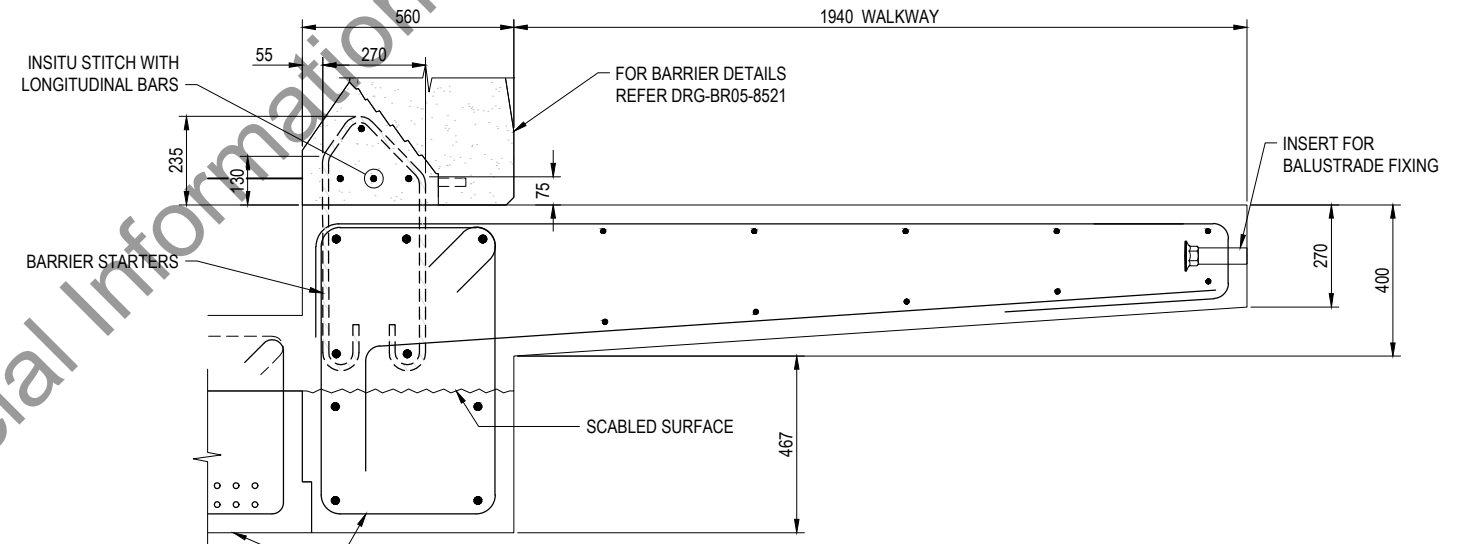
SECTION 3
SCALE 1:20 (A3) 8501
WALL STITCH DETAIL



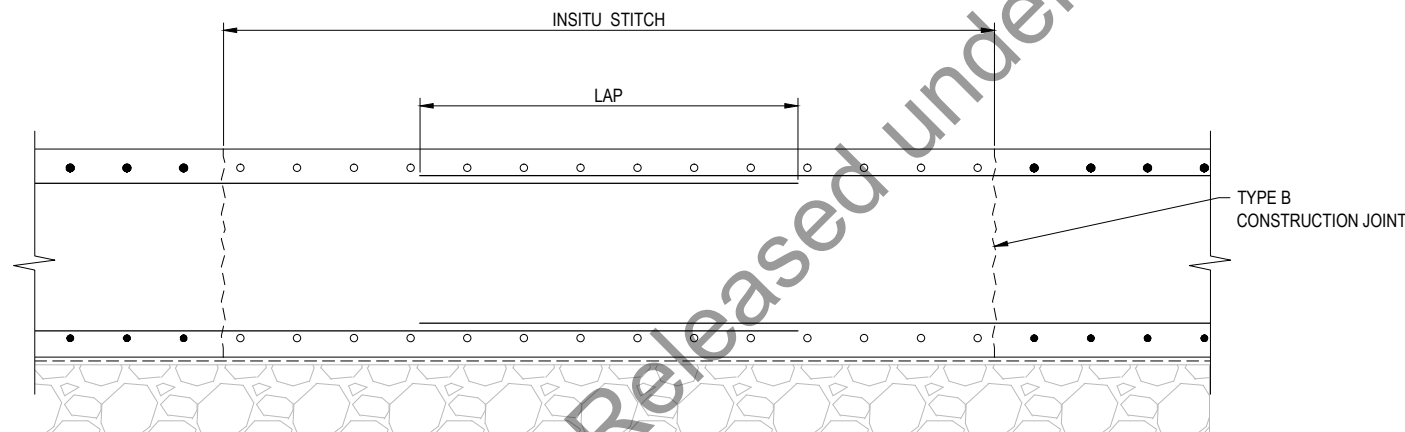
DETAIL A
SCALE 1:20 (A3) 8501



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



DETAIL C
SCALE 1:20 (A3) 8501



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

DATE: 22/03/2019 9:56:28 AM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\work\jacobson_je1014598622-DRG-BR05-8513.dwg

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B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING



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

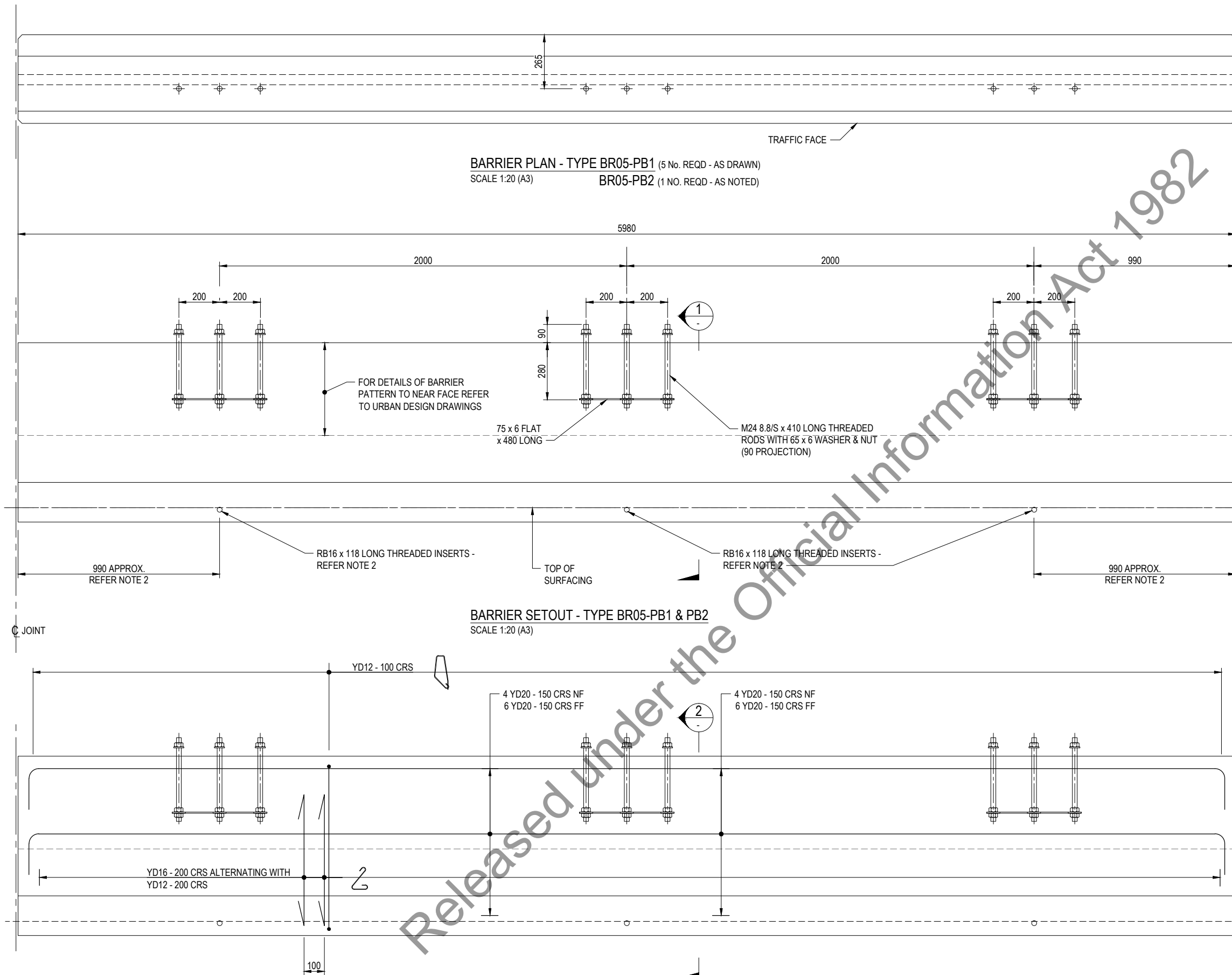
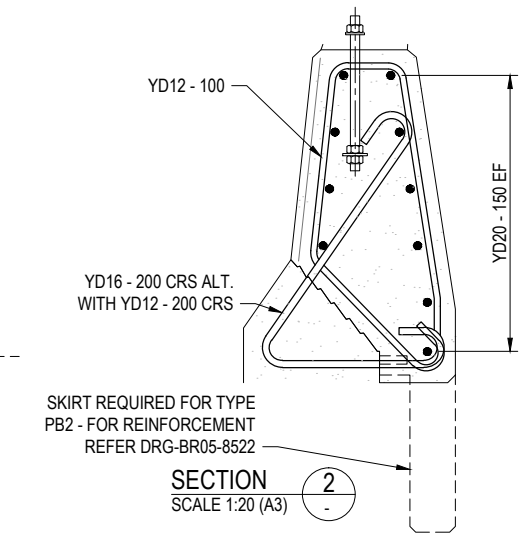
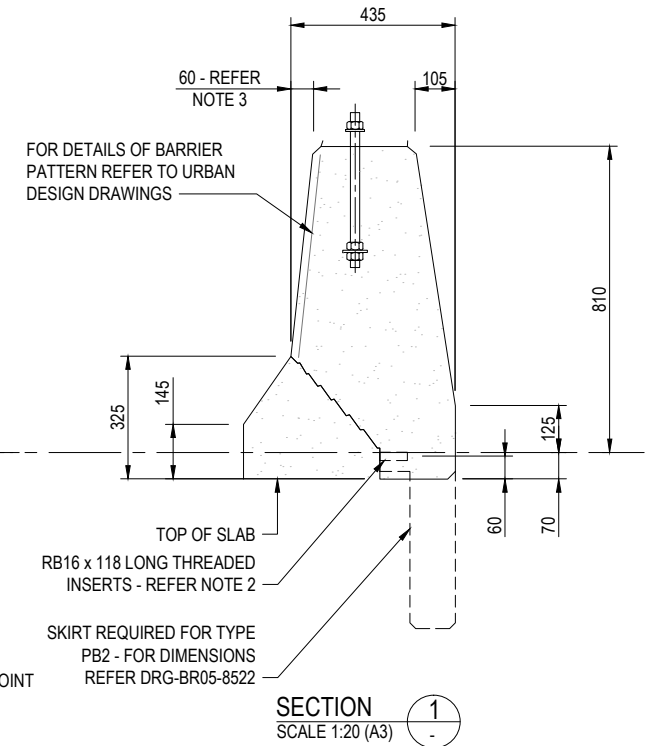
NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
- PROVIDE RB16 x 118 LONG THREADED INSERTS (PART No. RBA16T1) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS IF REQUIRED.
- FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
- ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)

BARRIER PLAN - TYPE BR05-PB1 (5 No. REQD - AS DRAWN)
SCALE 1:20 (A3) **BR05-PB2** (1 NO. REQD - AS NOTED)

BARRIER SETOUT - TYPE BR05-PB1 & PB2
SCALE 1:20 (A3)

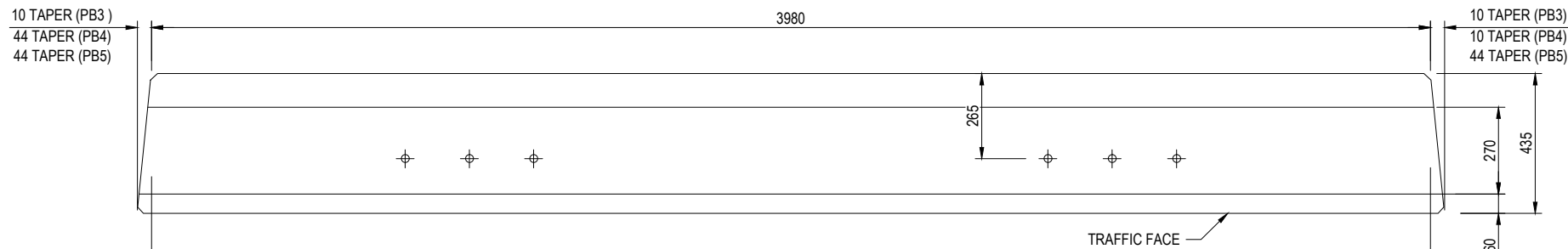
BARRIER REINFORCEMENT - TYPE BR05-PB1 & PB2
SCALE 1:20 (A3)



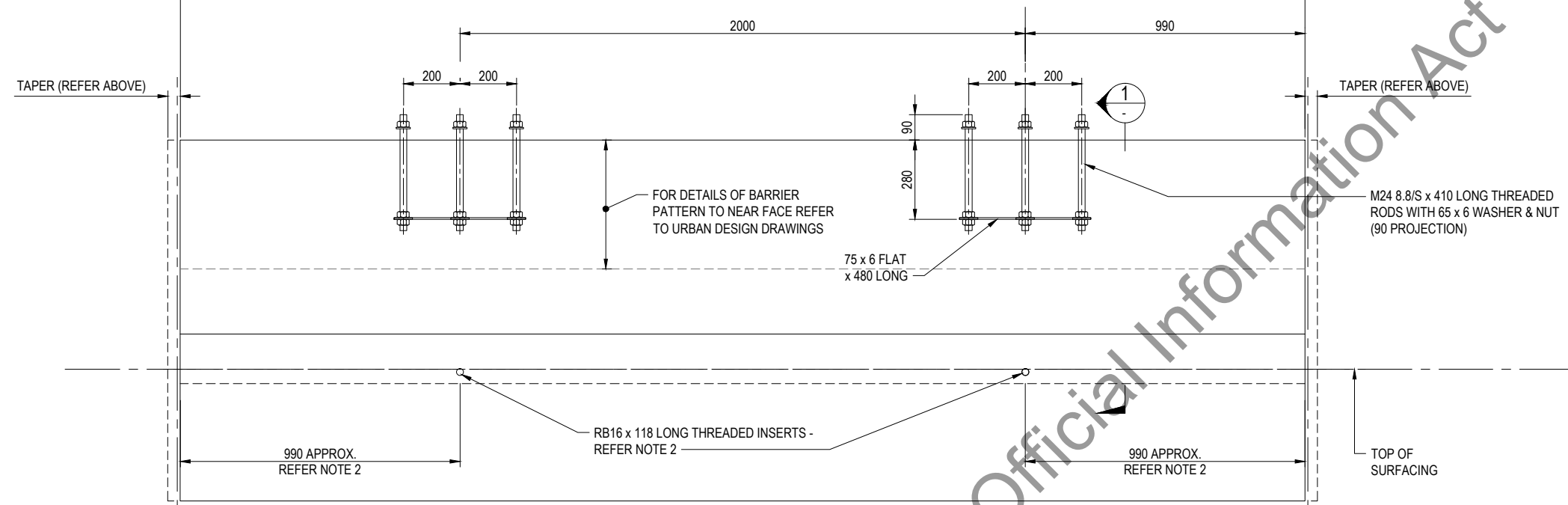
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A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

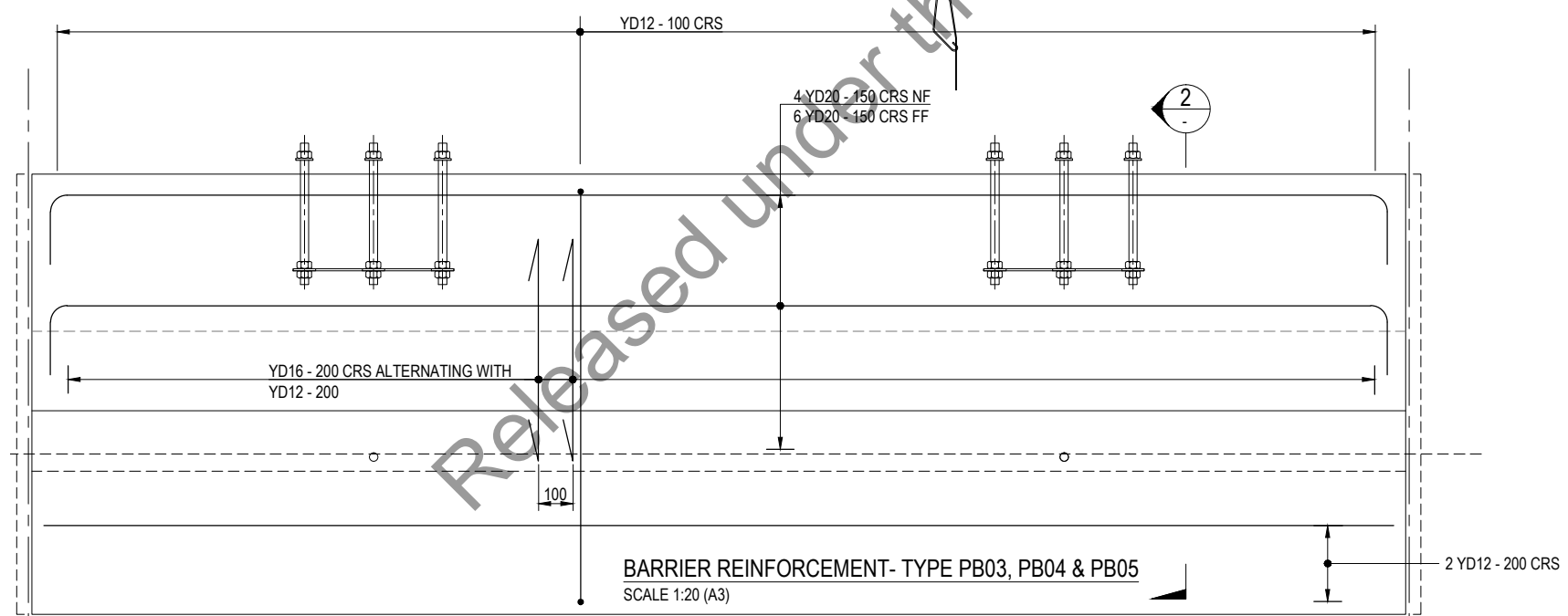
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PROJECT NUMBER 2/09-024/603				DRAWN	DCC	DRAWING CHECK	GKK	
REVISIONS & ISSUES 1:5 @ A1 1:10 @ A3				DESIGNED	TKF	DESIGN REVIEW	SKK	
				APPROVED	LW	MAR 2019	DRAWING No	
						B2B-DRG-BR05-8521		
							REV	C



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



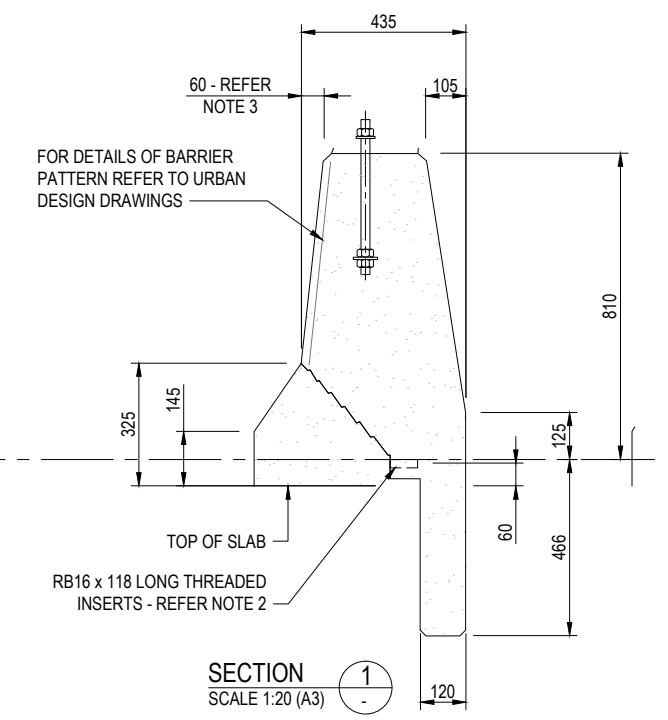
BARRIER SETOUT - TYPE PB03, PB04 & PB05
 SCALE 1:20 (A3)



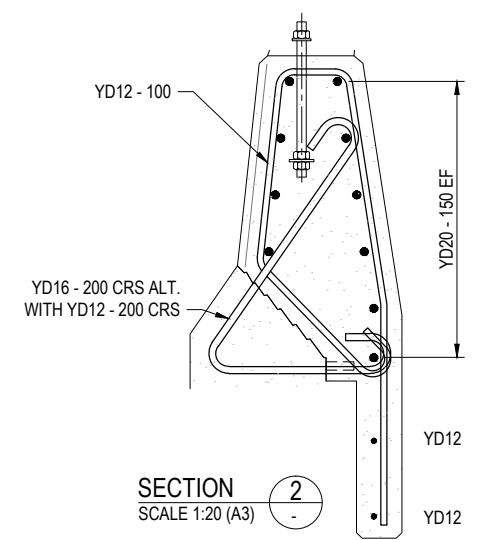
BARRIER REINFORCEMENT - TYPE PB03, PB04 & PB05
 SCALE 1:20 (A3)

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
- 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.
- FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
- ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)



SECTION 1
 SCALE 1:20 (A3)



SECTION 2
 SCALE 1:20 (A3)

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 LOCATION: C:\users\connor\appdata\local\temp\jacobsonz\proj\B2B-DRG-BR05-8522.dwg

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



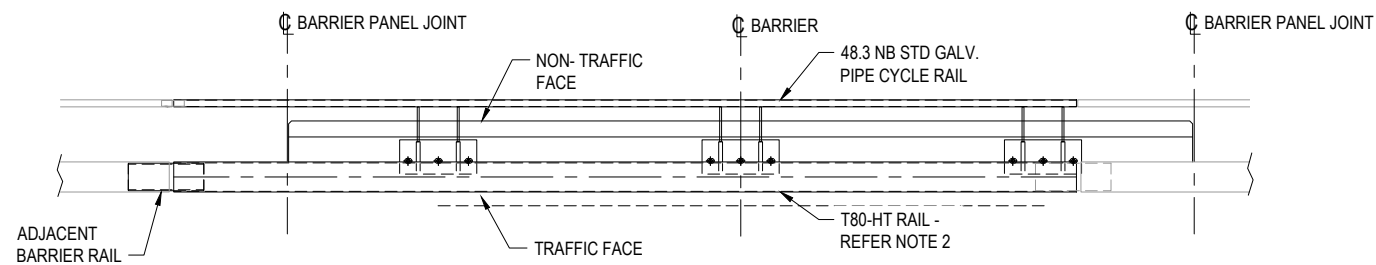
SCALE: 1:20 (A3)
 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

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: C

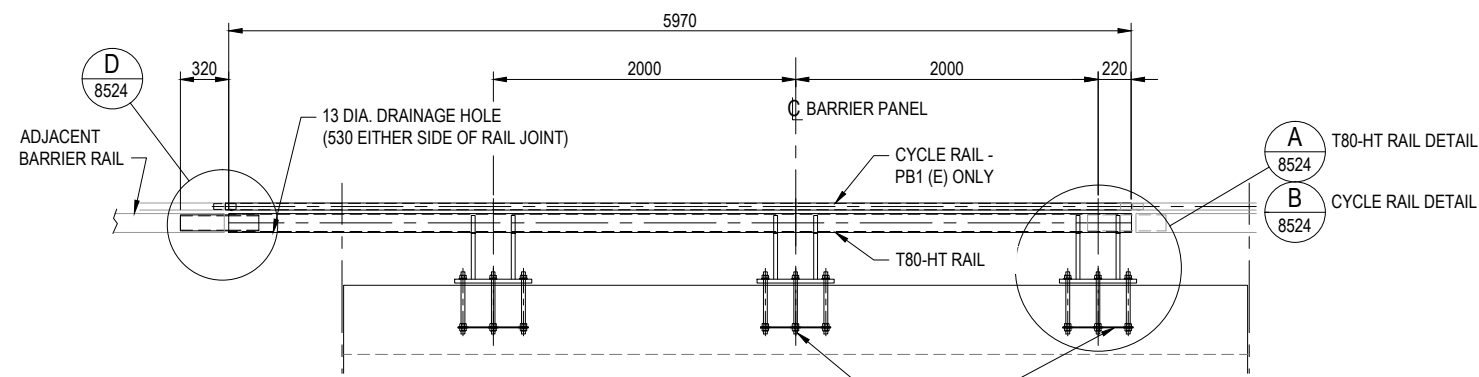
NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
- 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.
- # - DENOTES DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL



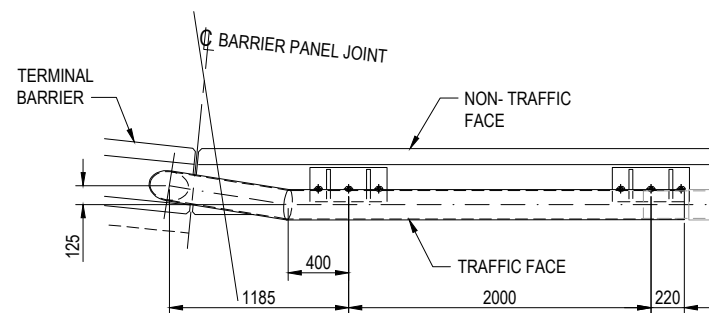
PLAN - PB1
SCALE 1:50 (A3)
EAST RAIL PLAN - AS DRAWN

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

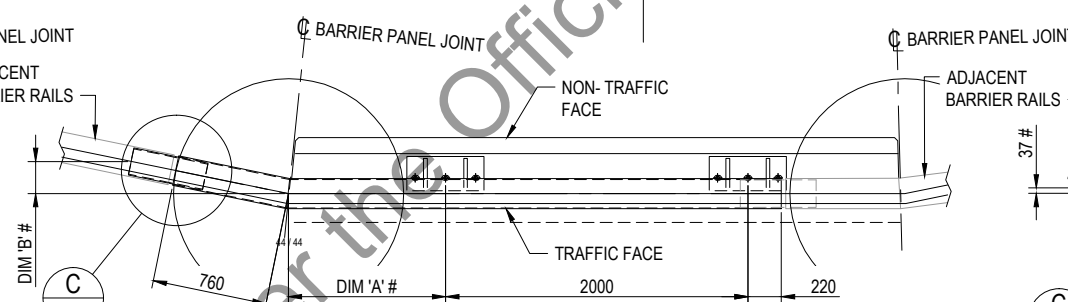


TYPICAL RAILING ELEVATION
SCALE 1:50 (A3)
XX No. REQD

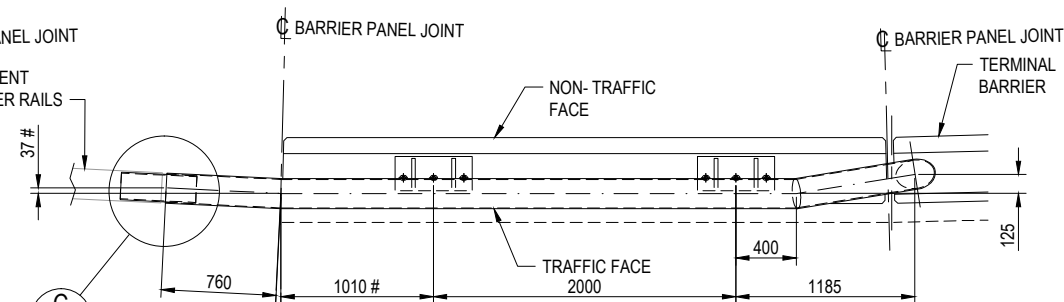
RAIL SCHEDULE		
BARRIER TYPE	DIM 'A'	DIM 'B'
PB3	REFER NORTH END PLAN BELOW	
PB3	1010	18
PB2	1000	18
PB3	1010	37
PB3	1010	37
PB3	1005	95
PB5	1040	95
PB4	1040	152
PB5	1040	152
PB5	1040	95
PB4	REFER SOUTH END PLAN BELOW	



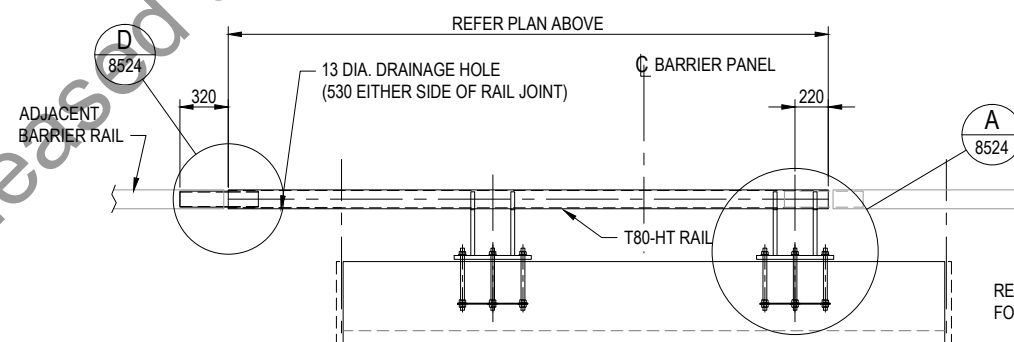
PLAN - SOUTH END BARRIER
SCALE 1:50 (A3)
1 No. REQD



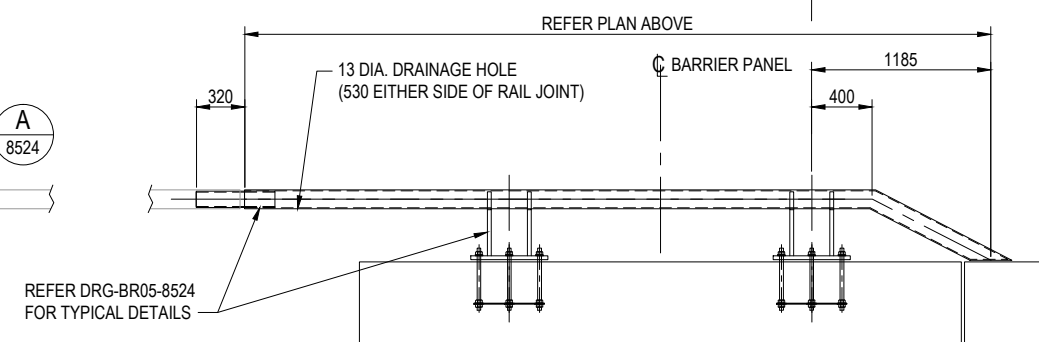
PLAN - INTERMEDIATE BARRIERS
SCALE 1:50 (A3)
NOTE : PB2 BARRIER HAS 3 RAIL FIXINGS - REFER 6.0m BARRIER ABOVE



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



TYPICAL RAILING ELEVATION
SCALE 1:50 (A3)



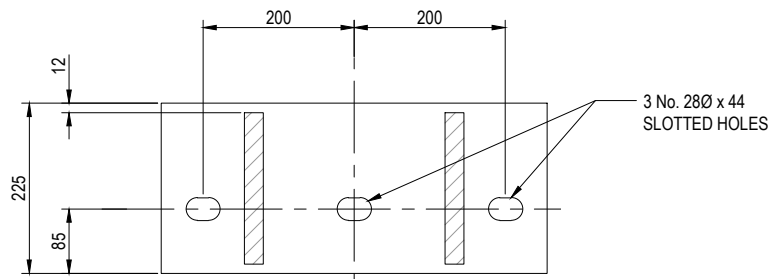
END RAILING ELEVATION
SCALE 1:50 (A3)

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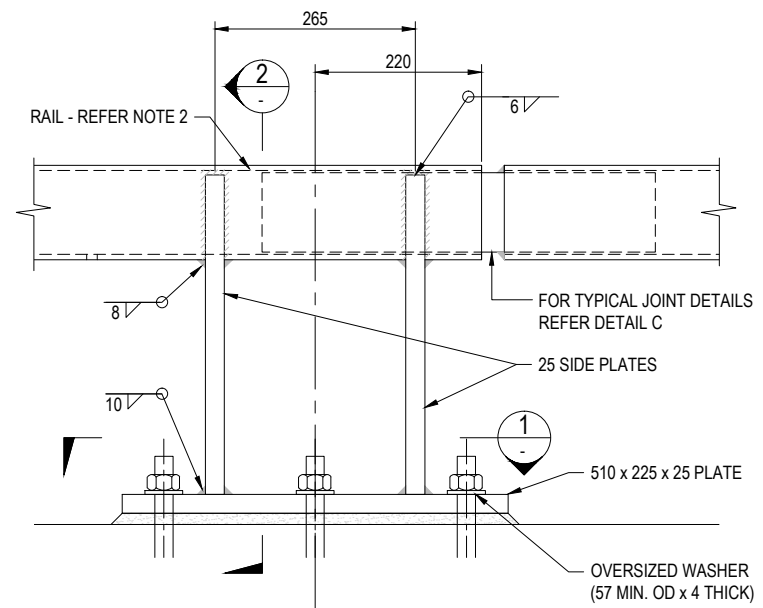
1:25 @ A1
1:50 @ A3

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				STATUS	50% ISSUE		
				PROJECT NUMBER	2/09-024/603	DRAWN	DCC
						DRAWING CHECK	GKK
						APPROVED	LW
						DESIGNED	TKF
						DESIGN REVIEW	SKK
						MAR 2019	
						DRAWING No.	B2B-DRG-BR05-8523
						REV	C



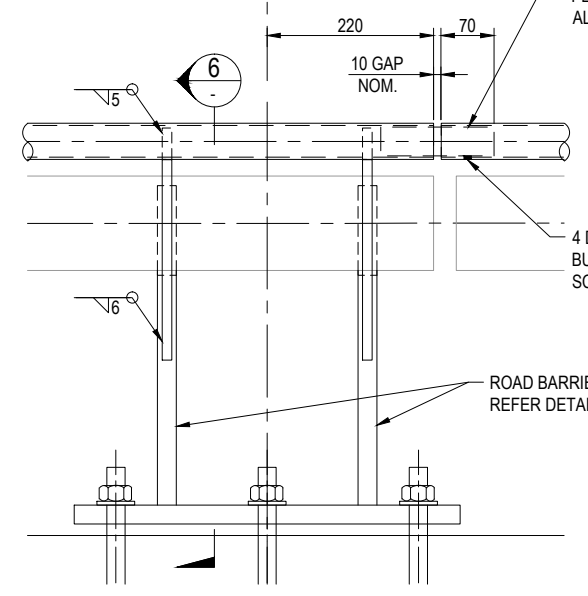
3 No. 28Ø x 44
SLOTTED HOLES

SECTION 1
SCALE 1:10 (A3)



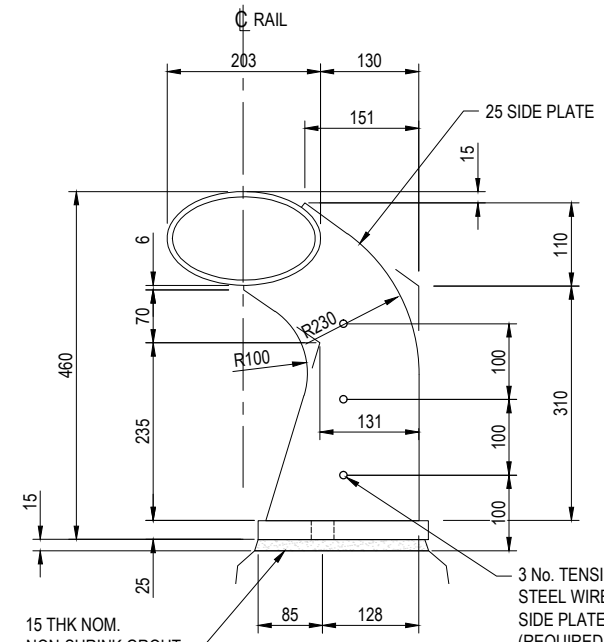
DETAIL A
SCALE 1:10 (A3)

TYPICAL T80-HT RAIL DETAIL



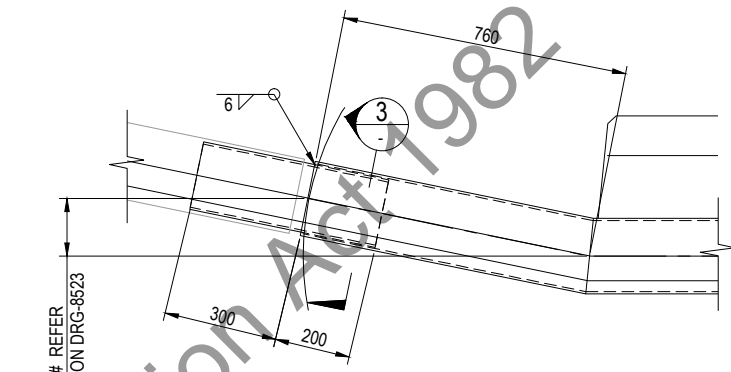
DETAIL B
SCALE 1:10 (A3)

CYCLE RAIL ADDITION TO ROAD BARRIER RAIL



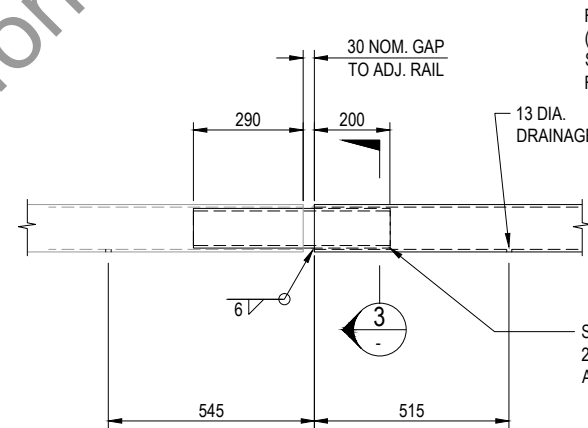
SECTION 2
SCALE 1:10 (A3)

3 No. TENSIONED STAINLESS
STEEL WIRES - SLEEVED AT
SIDE PLATE LOCATIONS.
(REQUIRED ADJACENT TO
SHARED PATH ONLY)



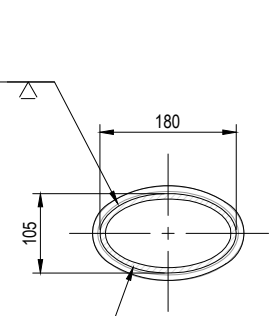
DETAIL C
SCALE 1:10 (A3)

RAIL SLEEVE PLAN - ANGLED DETAIL



DETAIL D
SCALE 1:20 (A3)

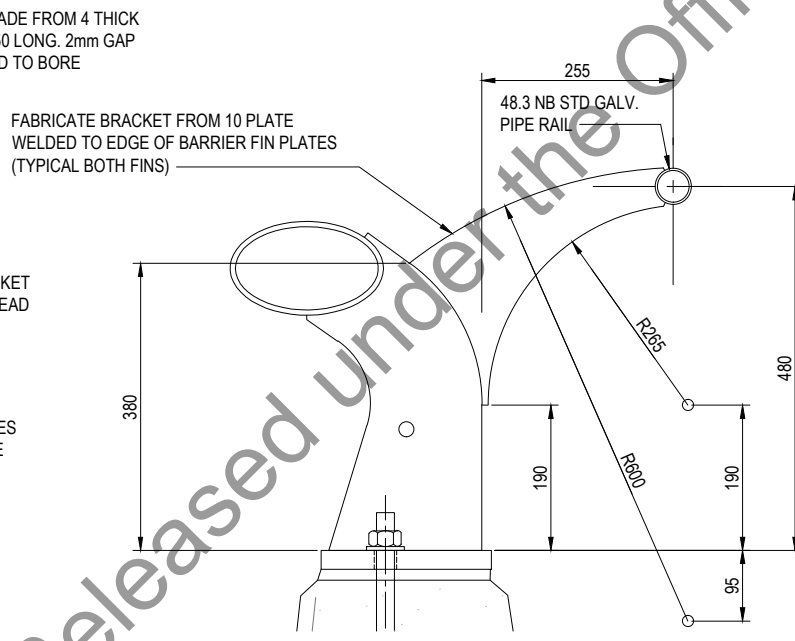
TYPICAL RAIL SLEEVE ELEVATION



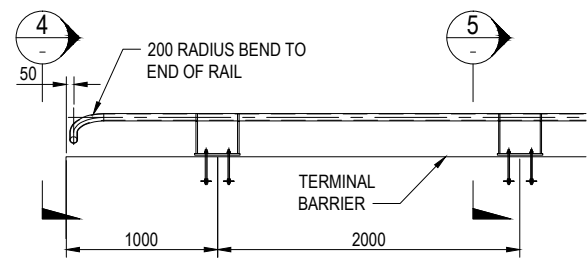
SECTION 3
SCALE 1:10 (A3)

FULL STRENGTH BUTT WELD
(IF PRESENT IN THE SLEEVE)
SHALL BE LOCATED AWAY
FROM THE TRAFFIC FACE.

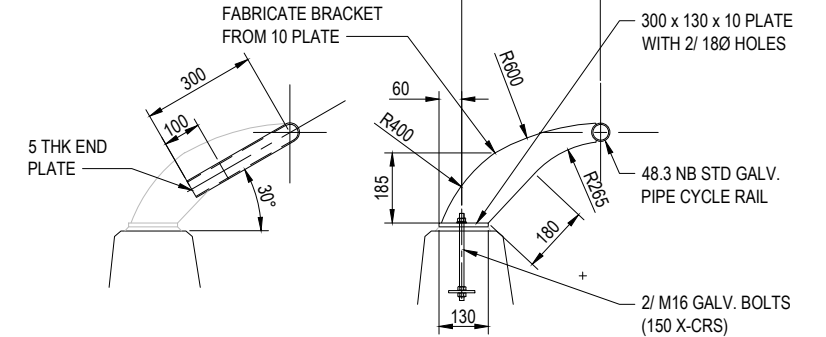
SLEEVE MADE FROM 8 THK PLATE WITH
2 NOMINAL GAP ALL ROUND TO RAIL ID
AND ROLLED TO DIMENSIONS SHOWN



SECTION 6
SCALE 1:10 (A3)



SECTION 4
SCALE 1:20 (A3)



SECTION 5
SCALE 1:20 (A3)

SECTION 4
SCALE 1:20 (A3)

FABRICATE BRACKET
FROM 10 PLATE

300 x 130 x 10 PLATE
WITH 2/ 18Ø HOLES

48.3 NB STD GALV.
PIPE CYCLE RAIL

2/ M16 GALV. BOLTS
(150 X-CRS)

SECTION 4
SCALE 1:20 (A3)

SECTION 5
SCALE 1:20 (A3)

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
- 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.
- # - DENOTES DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL

Released under the Official Information Act 1982

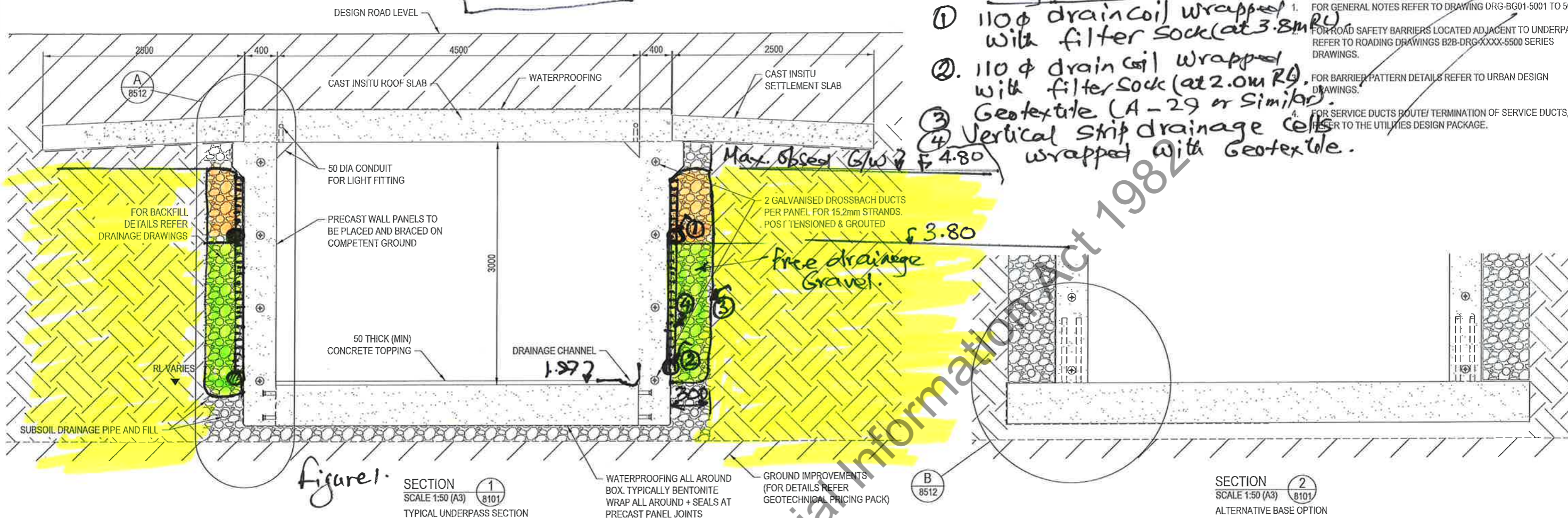
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1:20 @ A3	0	400	800	1200	1600	2000	2400					

1:5 @ A1	0	50	100	150	200	250	300	350	400	450	500
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No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

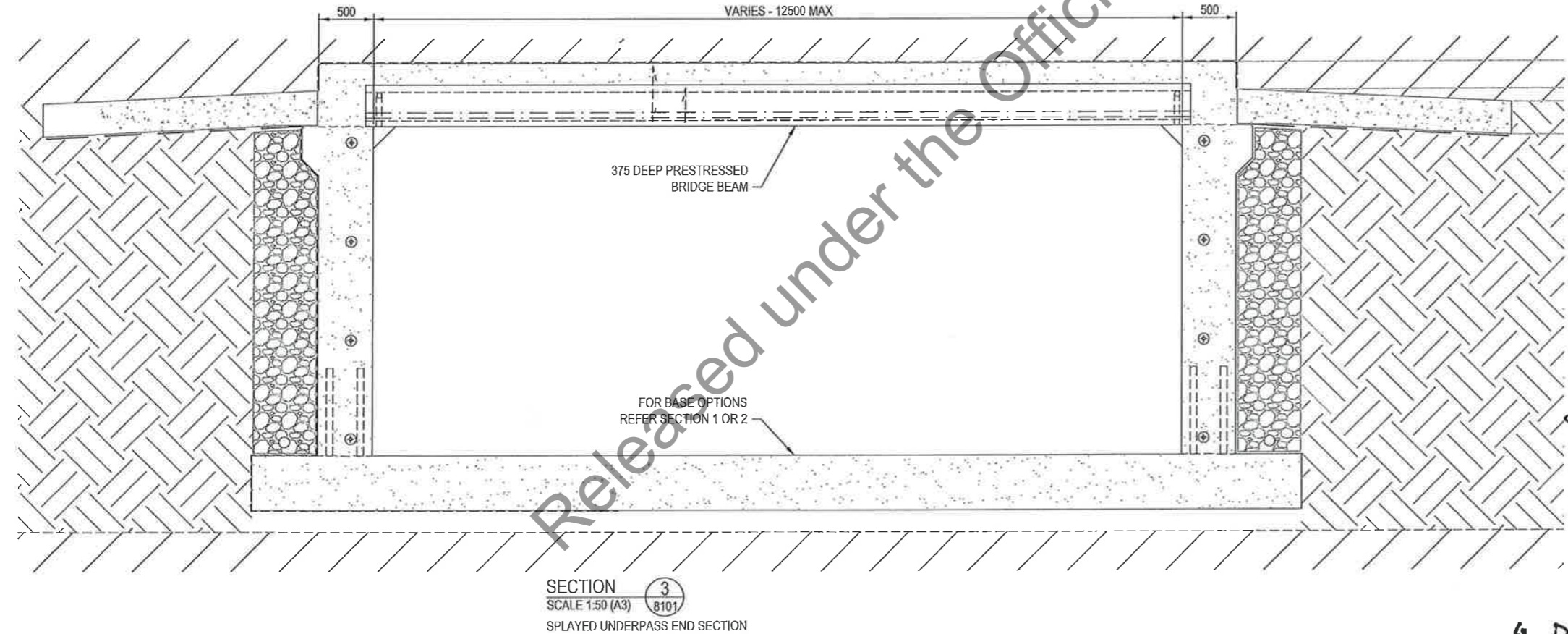
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			STATUS	50% ISSUE			
			PROJECT NUMBER	2/09-024/603	DRAWN DCC	DRAWING CHECK GKK	APPROVED LW MAR 2019
					DESIGNED	SKK	DRAWING NO B2B-DRG-BR05-8524

Sketch No 1



- Key - Drainage**
- 110 φ draincoil wrapped with filter sock (at 3.8m RL)
 - 110 φ draincoil wrapped with filter sock (at 2.0m RL)
 - Geotextile (A-29 or similar)
 - Vertical strip drainage cells wrapped with Geotextile.
- NOTES**
- FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
 - FOR ROAD SAFETY BARRIERS LOCATED ADJACENT TO UNDERPASS REFER TO ROADING DRAWINGS B2B-DRG-XXXX-5500 SERIES DRAWINGS.
 - FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
 - FOR SERVICE DUCTS ROUTE/TERMINATION OF SERVICE DUCTS, REFER TO THE UTILITIES DESIGN PACKAGE.

Figure 1



Notes - Drainage

1. The Underpass is sealed from external water pressure upto a maximum level of 6.0m RL.
2. Groundwater is generally at & below 3.80m RL. It has risen to 4.80m RL during rare events.
3. It is not proposed to pump groundwater but provision is made to drain freely flowing groundwater to the sump wells (fig 1) - (for future)
4. Draincoils at sump wells are end capped.

DATE: 7/03/2019 12:37:17 PM, LOGIN NAME: CONNOR, DAVID C
LOCATION: C:\Users\connor\AppData\Local\Temp\145996828-DRG-BR05-8511.dwg

E					
D					
C					
B					
A	XX	GKK	PWC	LW	PRELIMINARY
No	DATE	CHK	DESIGN	APPRO	REVISIONS & ISSUES
125	A1				
150	A3				



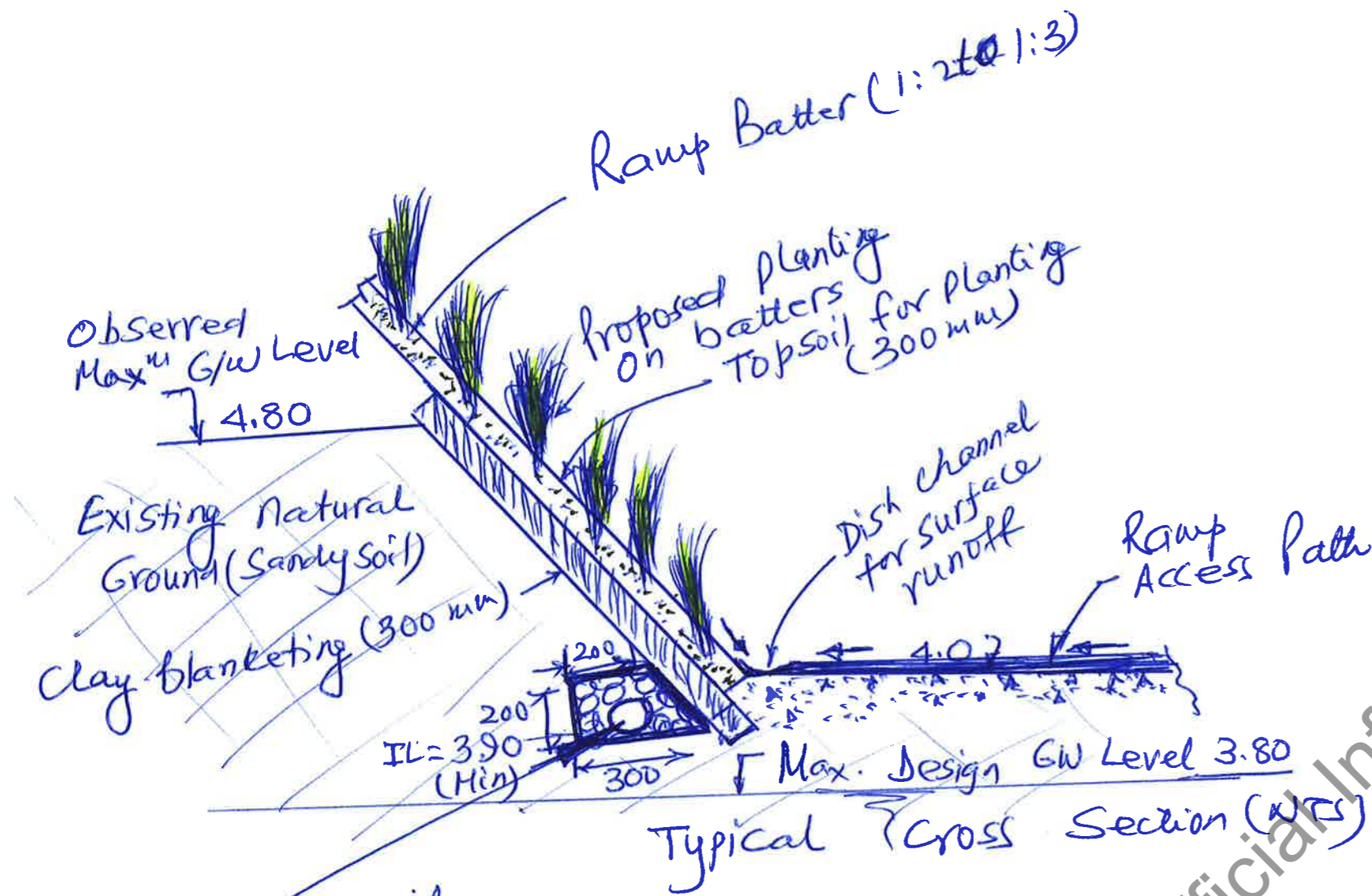
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STATUS: FOR INFORMATION
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: DCC
DESIGNED: SKK

TITLE: BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS
G/W Drainage - future provision
DRAWING No: B2B-DRG-BR05-8511

Released under the Official Information Act 1982

Skech N02



110mm ϕ drain coil wrapped with filter sock. Discharge to Gravity flow chamber

Ground Water Drainage From Access Ramp Batters.

Released under the Official Information Act 1982

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Urban Design	Page:	1 of 7
Package Ref No.:	B2B-PP-UD-01	Prepared By:	§ 9(2)(a)
Date:	08 March 2019	Reviewed By:	§ 9(2)(a)
Issued to:	§ 9(2)(a) CPB		
Reference:	B2B Urban Design and Landscape Pricing Pack		

The following is provided for the purposes of estimating the pricing package for the MGI Underpass

Package Inclusions / Exclusions

This package covers the following project elements:

- Urban Design Hardscapes
- Fencing
- Footbridge Features
- Landscaping

Not included in this package:

- Lighting
- Irrigation
- Structure Design including Underpass, Retaining walls
- Barriers
- Drainage
- Road signage, geometry, markings etc
- Moving signage, such as the Bayfair mall sign

Compliance with the Principal's Requirements

This package has been prepared in accordance with the following sections of the PR's and the Design Philosophy Statement.

- The design has been prepared generally in accordance with Principal's Requirements (PRs) Appendix A8.
- There is a departure required for the use of the designation boundary to the south corner of the underpass.
- There is a departure required from the p39 specification. The approach used will be consistent with that used across the rest of the BayLink project that has been approved.
- Departure from the Urban and Landscape Design Framework (ULDF) as per PR A5.3, as this did not include an underpass within the design.

Attachments

Drawings:

- B2B-DRG-LA-UP-000 COVER SHEET

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Urban Design	Page:	2 of 7
Package Ref No.:	B2B-PP-UD-01	Prepared By:	§ 9(2)(a)
Date:	08 March 2019	Reviewed By:	§ 9(2)(a)
Issued to:	§ 9(2)(a) CPB		
Reference:	B2B Urban Design and Landscape Pricing Pack		

- B2B-DRG-LA-UP-010 DRAWING LIST
- B2B-DRG-LA-UP-050 KEY NOTES/ LEGEND
- B2B-DRG-LA-UP-060 PLANTING SCHEDULE
- B2B-DRG-LA-UP-100 OVERALL SITE PLAN
- B2B-DRG-LA-UP-101 NORTH CONCEPT PLAN
- B2B-DRG-LA-UP-102 SOUTH CONCEPT PLAN
- B2B-DRG-LA-UP-110 NORTH GENERAL ARRANGEMENT PLAN 1 OF 3
- B2B-DRG-LA-UP-120 UNDERPASS GENERAL ARRANGEMENT PLAN 2 OF 3
- B2B-DRG-LA-UP-130 SOUTH GENERAL ARRANGEMENT PLAN 3 OF 3
- B2B-DRG-LA-UP-310 NORTH PLANTING PLAN 1 OF 2
- B2B-DRG-LA-UP-320 SOUTH PLANTING PLAN 2 OF 2
- B2B-DRG-LA-UP-410 SECTIONS 1 OF 2
- B2B-DRG-LA-UP-420 SECTIONS 2 OF 2
- B2B-DRG-LA-UP-710 NORTH LEVELS PLAN 1 OF 2
- B2B-DRG-LA-UP-720 SOUTH LEVELS PLAN 2 OF 2
- B2B-DRG-LA-UP-800 DETAILS - SURFACES
- B2B-DRG-LA-UP-810 DETAILS - STREET FURNITURE AND STRUCTURES
- B2B-DRG-LA-UP-820 DETAILS - FENCES AND WALLS
- B2B-DRG-LA-UP-830 DETAILS - VEGETATION
- B2B-DRG-LA-UP-900 NORTH LIGHTING PLAN 1 OF 2
- B2B-DRG-LA-UP-910 SOUTH LIGHTING PLAN 2 OF 2

Other Documents:

- LUDMP Design Report for Underpass to be provided 15 March
- Urban Design and Landscape Schedule of Works for Pricing (attached)

Specification Details

- Not included. Updated hardscape specification to be provided between 50 to 100% design stage.

Completeness of Design for Pricing

This is 50% design package. Further coordination with other disciplines is required and therefore changes to layout and quantities are expected. The following items are required to be taken into account prior to pricing:

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Urban Design	Page:	3 of 7
Package Ref No.:	B2B-PP-UD-01	Prepared By:	§ 9(2)(a)
Date:	08 March 2019	Reviewed By:	§ 9(2)(a)
Issued to:	§ 9(2)(a) CPB		
Reference:	B2B Urban Design and Landscape Pricing Pack		

- Final hardscape treatments on approaches to each underpass entrance, in particular changes that may result from integrating directional signage for wayfinding of pedestrians and cyclists
- Light design within the tunnel. The Jacobs lighting design has only taken into account lighting to meet lighting standards and a final design around the type of fittings still needs to be completed. Further design coordination between Align and Jacobs is required to confirm the location and specification of light fixtures.
- Light well design locations, quantum and size are still to be resolved
- No design work to integrate the new cycle path with the with the proposed new pedestrian crossing at Bayfair Mall has been undertaken
- The pricing pack does not include any hardscape improvements or artwork within the Underpass. These will be designed and priced as part of 50%-100% design if required.

Qualifications / Assumptions / Departures / Awaiting information

In preparing this price package the following assumptions have been made:

- This work has still been completed without updated survey information. As such the design response may need to change once final levels are confirmed.
- It is assumed that all existing utilities and B2B design elements (installed or proposed) can be moved/protected/other to accommodate the design shown within this pricing pack.
- It is assumed that changes will be made to the structural retaining walls to accommodate the staircase design.
- Batter slopes will be planted to a maximum of 1V:3H
- No wayfinding signage is included or allowed for within our pricing.
- No works outside of designation being either redesign or reinstatement has been quantified. This excludes the section of path and ramp adjacent to the golf course which has been included in costings. It is assumed that this area of land will be made available to accommodate the direct design requirements as shown.

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

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- We have allowed for retaining wall patterning within our pricing pack based upon the cultural interpretation patterning developed and provided by the Hapu Group, however this has not been finalised and the extent and patterning used is subject to approval. No allowance for artwork has been allowed for.
- We have assumed that the underpass is designed to be water tight with no pumping required within the tunnel.
- PRA5.5 states that CPTED needs to be considered in the selection of design options. Movement of the underpass further away from the intersection has reduced the ability of the design to meet ideal CPTED outcomes. Mitigation of CPTED issues primarily related to the deactivation of the underpass for pedestrians when cyclists are not using the underpass will be considered further in the next stage of design. Key areas for mitigation incorporated into the design is the splay of the culvert at each end and lighting design.
 - Outside of this pricing pack an option for providing an ideal level of splay to increase sightlines will be provided in the design report.

The following departures have been accepted by the Principal:

- We understand the departure to use the area by the golf course is accepted by the client.

The following departures have been applied for and declined by the Principal:

None to our knowledge.

Designer needs to complete the following actions to verify the tender advice:

- Resolve all exact quantities as included within the Urban Design and Landscape Schedule of Works for Pricing, following completion of the next stages of design.

Supplementary investigation or further information required:

- Resolution of design of Bayfair Mall including paths and existing sign and the reinstatement of existing underpass ramp.
- Lighting design
- Re-confirmation of design once survey information is provided

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Urban Design	Page:	5 of 7
Package Ref No.:	B2B-PP-UD-01	Prepared By:	§ 9(2)(a)
Date:	08 March 2019	Reviewed By:	§ 9(2)(a)
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Reference:	B2B Urban Design and Landscape Pricing Pack		

<ul style="list-style-type: none"> Design around cycleway and pedestrian interface at each underpass portal and confirmation of any cycle and pedestrian lanes. 		
<p>Other relevant comments including Safety-in-Design / Maintenance-in-Design Constructability / O&M:</p> <ul style="list-style-type: none"> All additional raised planters as shown within Urban and Landscape Design package have been designed with level changes less than 1m in height to avoid any safety/ maintenance issue regarding risk from falling. This means safety fencing is not required on these structures. Lighting as indicated on our drawings is concept only and is required to be developed by Jacobs Lighting Engineer further to achieve legal lighting requirements, balanced with not creating a CPTED issue. For example, over lighting introducing glare. 		
<p>Innovations & WOL considerations:</p> <ul style="list-style-type: none"> The element has been made integrated with the other element to aid construction 		
<p>Overview of <u>RISKS</u> and Design Unknowns (to be considered in Pricing) (Note: This list may not be exhaustive. There may be other risks associated with this advice not listed below)::</p>		
Risk Description	Likely Impact	Suggested Mitigation
The assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the design shown within this pricing pack, does not come to fruition	Likely. Additional design required to accommodate the utilities, additional costs and delay to programme.	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 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

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PRICING PACKAGE COVER SHEET

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Package Ref No.:	B2B-PP-UD-01	Prepared By:	§ 9(2)(a)
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		utilities strategy work be continuous post completion of the 50% design.
Change in alignment of the underpass/ ramps/ path/ structural retaining walls or stair locations requiring redesign of approaches and quantities	High Additional design required to accommodate any major changes, additional costs and delay to programme	Continual coordination has occurred between Urban and Landscape Design and other disciplines to avoid any major changes and develop an agreed alignment.
Bayfair Mall decides to not integrate the mall car park design into the underpass layout	Medium Pedestrian flow and usability of the underpass decreased. Possibly redesign of northern area to accommodate a change in mall signage location.	Continue to engage with the mall on proposed design changes.
Change in drainage design allowing the underpass to have water enter the underpass and pumping of the underpass to occur	Medium Potential change in level of amenity and usability of the underpass when rainfall occurs	Change of surface treatments on walls and footpaths and spacing from drainage channel and balancing this with pedestrian and cyclist spacing.
Separation of cyclist	Medium Potential change to underpass width in order to meet CPTED requirements	Identification of issues has been completed. Resolution can only be worked through in next stage of detailed design.
<p>Opportunities for further cost / time / WOL savings (e.g. challenges to the PR's, standards, etc.):</p> <p>The following opportunities:</p> <ul style="list-style-type: none"> Change to surfacing specification 		

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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Designer: § 9(2)(a)	Date: 8/03/2019
Urban Design Project Manager: § 9(2)(a)	Date: 8/03/2019

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Baypark to Bayfair

Urban Design and Landscape Schedule **DRAFT**

Area: **Underpass Landscape**

Date: 11/03/2019



EMAIL: treed@align.net.nz
 WEB: www.align.net.nz

#	Description	North Quantity	South Quantity	Underpass	Unit	Rate	Amount	Total	Notes
B	HARD WORKS								
B1	Paving and Surfaces								
B1.1	P01A • INSITU CONCRETE - SUPPLIER: CPB TO CONFIRM - FINISH: SPONGED US, PFL NATURAL SEALER - COLOUR: PETER FELL COLOUR RANGE GELATO RASPBERRY - THICKNESS: 100MM - AGGREGATE SIZE AND TYPE: 13MM STANDARD - REINFORCING: SE72 SEISMIC MESH - STRENGTH: 25MPA - REFER LANDSCAPE HARDSCAPE SPECIFICATION	24	25	TBA	M2				
B1.2	P01B • INSITU CONCRETE - SUPPLIER: CPB TO CONFIRM - FINISH: SANDBLASTED TO UNIFORM FINISH - COLOUR: PLAIN - THICKNESS: 100MM - AGGREGATE SIZE AND TYPE: 13MM STANDARD - REINFORCING: SE72 SEISMIC MESH - STRENGTH: 25MPA - REFER LANDSCAPE HARDSCAPE SPECIFICATION	24	32	TBA	M2				
B1.3	P03 • INSITU CONCRETE - SUPPLIER: CPB TO CONFIRM - FINISH: BRUSHED - COLOUR: PLAIN - THICKNESS: 100MM - AGGREGATE SIZE AND TYPE: 13MM STANDARD - REINFORCING: SE72 SEISMIC MESH - STRENGTH: 25MPA - REFER LANDSCAPE HARDSCAPE SPECIFICATION	247	129	229	M2				
B1.4	P07 • TSGI WARNING INDICATOR - SUPPLIER: MOBILITY RESEARCH CENTRE - STYLE: POLYURETHANE TACTILE STUD - WARNING/HAZARD: TYPE B - COLOUR: SAFETY YELLOW - SIZE: 35DIA - REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION - REFER TO GEOMETRICS DRAWINGS FOR LOCATIONS	5	3	0	M2				
B1.5	P08 • TSGI DIRECTIONAL INDICATOR - SUPPLIER: MOBILITY RESEARCH CENTRE - STYLE: POLYURETHANE TACTILE STUD - WARNING/HAZARD: TYPE C - COLOUR: SAFETY YELLOW - SIZE: 288 X 35DIA MM - REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION - REFER TO GEOMETRICS DRAWINGS FOR LOCATIONS	1	3	0	M2				
B2	Street furniture and structures								
B2.1	S01 • BOLLARDS - SUPPLIER: BOLLARDS NZ - TYPE: B2 (114MM) SERIES - FINISH: STAINLESS STEEL TUBE, REMOVABLE WITH REFLECTOR STRIP - REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION	8	0	0	Item				
B2.2	O6 • HAND RAIL - SUPPLIER: CONTRACTOR TO CONFIRM - TYPE: WALL MOUNTED HANDRAIL - FINISH: GALVANISED STEEL - REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION	18	22	0	LM				
B2.3	S06A • HAND RAIL - SUPPLIER: CONTRACTOR TO CONFIRM - TYPE: DISABILITY HANDRAIL - FINISH: GALVANISED STEEL - REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION - REFER DRAWING B2B-DRG-LA-UP-110 & 130	0	0	0	LM				
B2.4	S07 SKATE BOARD DETERRANTS - REFER DRAWING B2B-DRG-LA-UP-110 & 120 - REFER LANDSCAPE HARDSCAPE SPECIFICATION	INCLUDED IN F05DESIGN	INCLUDED IN F05 DESIGN	0	Item				
B2.5	S08 • STAIR NOSING - SUPPLIER: TOTAL TACTILEZ - TYPE: LBR127 TREDX LUMAWAY STAIR NOSING - FINISH: NATURAL WITH YELLOW INSERTS - REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION - REFER DRAWING B2B-DRG-LA-UP-110 & 120	44	48	0	LM				
B2.6	S09 • PRE-CAST CONCRETE STAIRS - SUPPLIER: CONTRACTOR TO CONFIRM	1	1		Item				
B2.7	S10 • PRE-CAST CONCRETE BRIDGE - SUPPLIER: CONTRACTOR TO CONFIRM	1	0	0	Item				
B3	Fences, walls and renderings								
B3.1	F01 • SAFETY FENCING - SUPPLIER: CONTRACTOR TO CONFIRM - TYPE: STEEL RAILING AS PER DESIGN - FINISH: ZINC COATED AND POWERCOATED STEEL - HEIGHT: 1200MM - REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION - REFER DRAWING B2B-DRG-LA-UP-110 & 130	64	42	0	LM				
B3.2	F02 • RAISED PLANTER WALLS - REFER DRAWING B2B-DRG-LA-UP-110 & 120 - REFER UDIMP FOR GENERAL AESTHETICS	35	17		LM				AVERAGE HEIGHT 80MM
B3.3	F03 • BRIDGE FENCING (ROAD SIDE) - SUPPLIER: CONTRACTOR TO CONFIRM - TYPE: STEEL RAILING AS PER DESIGN - FINISH: ZINC COATED AND POWDER COATED STEEL - HEIGHT: 1200MM - REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION - REFER DRAWING B2B-DRG-LA-UP-110	JACOBS TO CONFIRM	0	0					

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#	Description	North Quantity	South Quantity	Underpass	Unit	Rate	Amount	Total	Notes
B3.4	F04 • BRIDGE WALL / FENCING , GUARDRAIL - REFER DRAWING B2B-DRG-LA-UP-110 - REFER UDLMP FOR GENERAL AESTHETICS	INCLUDED IN F08	0	0	Item				
B3.5	F05 • RETAINING WALL INSERT PANELS - REFER DRAWING B2B-DRG-LA-UP-110 & 120 - REFER UDLMP FOR GENERAL AESTHETICS	12	1	0	M2				.7 X .7M PANELS = APPROX 13 PANELS
B3.6	F06 • WALL PAINTING - WHITE - SUPPLIER: DULUX - TYPE: WHITE - FINISH: MATT AND GRAFFITI RESISTANT - REFER DRAWING B2B-DRG-LA-UP-110 & 130	0	324	0	M2				
B3.7	F07 • WALL PAINTING - RED - SUPPLIER: DULUX - TYPE: ELECTRO F RED 9064164K - FINISH: MATT AND GRAFFITI RESISTANT - REFER DRAWING B2B-DRG-LA-UP-110	9	0	0	M2				
B3.8	F08 • DESIGNER FENCING - SUPPLIER: CONTRACTOR TO CONFIRM - TYPE: STEEL RAILING AS PER DESIGN - FINISH: ZINC COATED AND POWDER COATED STEEL - HEIGHT: 1200MM - REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION - REFER DRAWING B2B-DRG-LA-UP-110 & 130	63	42	0	LM				
B3.9	F09 • RETAINING WALL RELIEF PATTERNING - REFER DRAWING B2B-DRG-LA-UP-110 & 130	144	72	80	M2				
C SOFT LANDSCAPING									
C1 Soil and Mulching									
C1.1	F09 •GARDEN BED -Prepare cultivated seed bed to a depth of 100mm. Apply approved hydroseed mix.	0	401		M2				
C1.2	F09 •GARDEN BED -Shrub bed to be cultivated to a depth 300mm. Install soil / compost mix.	194	639		M2				
C1.3	F09 •GARDEN BED -Apply wool mulch as per manufacturers specification.	155	190		M2				
C1.4	F09 •GARDEN BED -Apply approved bark mulch to a consolidated depth of 100mm.	39	449		M2				
C2 Planting (Shrubs / Groundcovers et)									
C2.1	Shrub planting	194	639		M2				
C2.2	Install all shrubs as per the planting schedule.	REFER TO SCHEDULE	0						
C3 Trees									
C3.1	Install trees – As per plant schedule	0	7EA		EA				
C3.2	Double stake all trees as per schedule above with 50 x 50mm Untreated timber stake, and 40mm hessian strip tied in figure eight, stakes to be stained ebony colour.	REFER TO SCHEDULE	7EA		EA				
C3.3									
E LIGHTING AND ELECTRICAL									
E.1	LED Strip lighting	34	0	100	LM				
E.2	In wall lighting	10	9	0	Item				
E.3	Lightpoles	10	12	0	Item				
E.4	Up lighting	16	8	0	Item				
E.5	Light wells	0		4	Item				
NOTES:									
ALL PAINTED SURFACES TO BE ANTI GRAFFITI COATED.									

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Bayfair Underpass Design

Doc Name	BAYLINK URBAN AND LANDSCAPE DESIGN: UNDERPASS DEVELOPMENT		
Outline	Details	Date	Commentary
Produced by	Align	18/03/19	s 9(2)(a)
Document No.	Revision History	Date	Sign-off
Draft	0.1 Align	18/03/19	s 9(2)(a)

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Project Principles

The below are the overall principles extracted from the UDLMP for the BayLink project. Refer to UDLMP for further information.



1. Context Sensitive Design

Design solutions based in ecological, historical and site specific contexts, in order to celebrate the unique character of the Bay Link site.



2. Wayfinding

Creating clear and legible connections between areas located adjacent to and within the highway corridor. Includes design of gateways, signage and patterning.



3. Connectivity

Creating pedestrian, cycle and vehicle links to and from the site and within the corridor to connect and integrate successfully with the wider landscape.



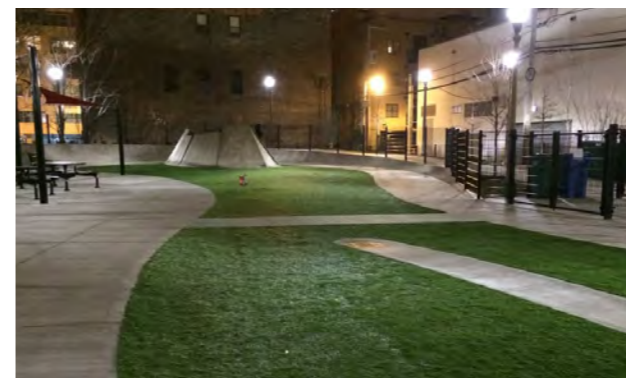
4. Cultural Influences

Linking the project principles, designs and way-finding elements into the cultural and historical narrative of the place. Integration of Maturanga Maori in the design approach, structure and patterning.



5. Ecological Design

Creating landscapes based on integrating wider ecological patterns. Designing for long-term maintenance strategies that include whole of life, value for money, access and operation.



6. Safety of Place

Designing for dynamic and functional landscapes that include safety in design, CPTED, lighting, with a range of site furnishings and features to create high quality spaces.

Design Context

Overarching elements/drivers

- Similar location as existing underpass
- Priority for pedestrians provided through at-grade crossings
- Connected to wider movement networks
- Design will accommodate a wide range of users
- Increased convenience and connectivity for the cycling community

High-level Principles

- CPTED and daylighting
- Urban design shared spaces
- Cyclist clear sight and movement lines
- 'Decision points' & route alternatives
- Materiality choices
- Links and choices for movement

Placement and Position

The underpass location has been decided upon to effectively 'replace' the existing underpass.

The high level principles described would be better achieved through a full consideration of alternatives of placement. This would include:

- approaches and entrances
- location for best use and desire lines

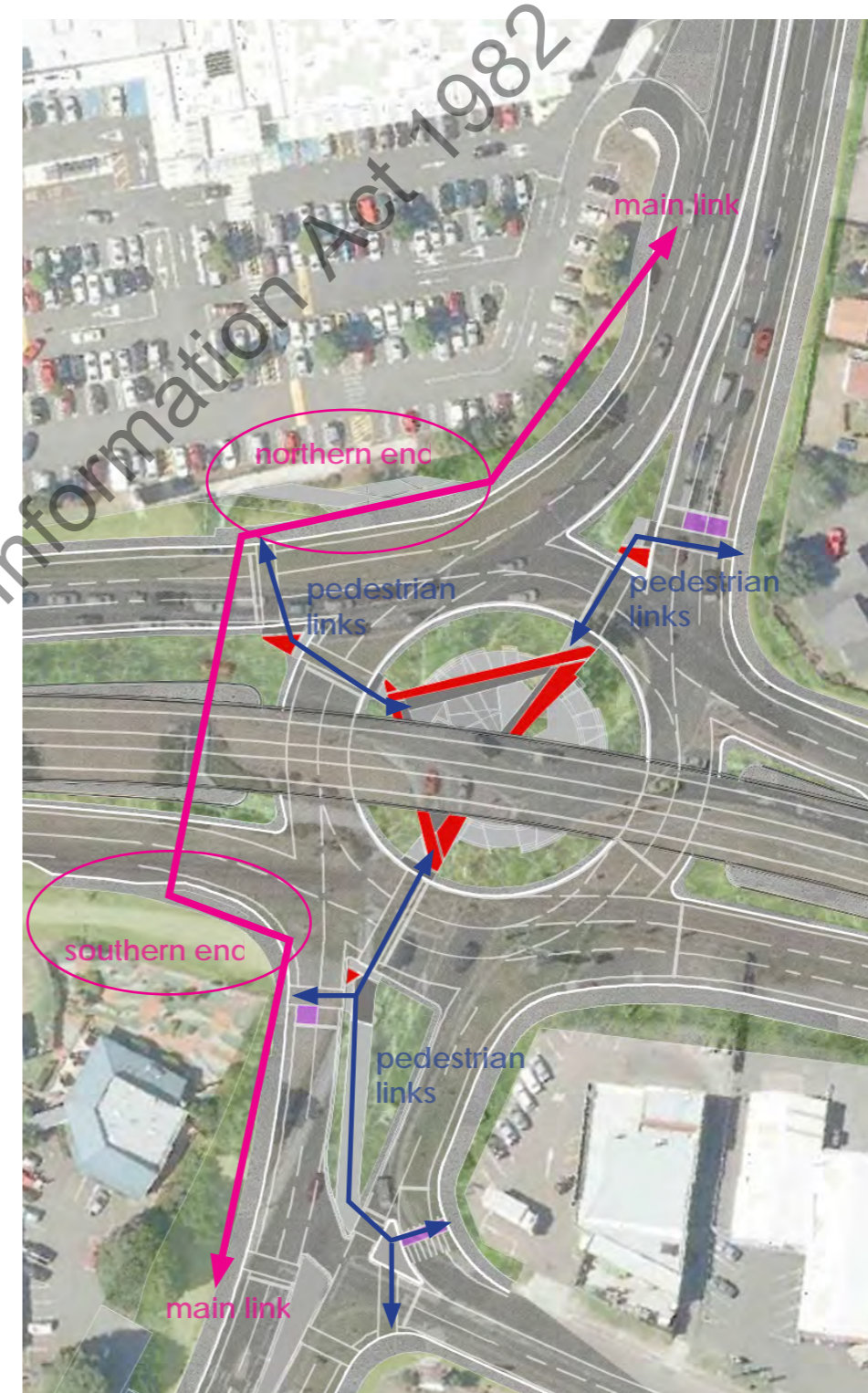
However, the location is fixed given the confines of the project that include:

- being inside designation
- structural components such as bridge embankments
- geotechnical requirements such as ground improvements
- construction staging for build; and
- the Bay fair project being already in construction.

Therefore an achievement of principles will be focused around a 'best case' scenario within the confines of the overall placement.

See principles following for description.

Location & Connectivity



plan view // showing main links, and the location of either end of the underpass

Underpass Principles

The following principles identify the outcomes sought from the design of the underpass.

Wayfinding

Defined pathways through retaining walls and planting boxes. Staggered wall heights around stairs for legibility. Combined with variety of surface textures and explicit signage in locations visible along the ramp, staircase, and through underpass. Lighting of different routes and signage to create a clearly understood space with a range of paths.

Decision Points

Combined with the wayfinding design elements, decision points for the different routes users can take through the site need to be clear for determining how to reach their destination. Design choices will allow maximum visibility at these decision points for clarity and safety. Signage will be used where required.

Landscape

Consistent with the wider development, including the use of similar plant species. Use of planting that softens the amount of hardscape (retaining walls, underpass, ground surfacing), while maintaining sightlines within the space. Terracing of planting to offset large scale walls and provide visual variation within space.

Stormwater and Drainage

Integration of drainage services within space.

Structures

Multipurpose structures through the space that fulfill both landscape and movement goals. Cohesive with the wider site and developments, including materials and forms.

Safety in Design and Crime Prevention through Environmental Design (CPTED)

Clear and wide viewlines entering and exiting the underpass for visibility and safety. Lighting through the underpass and around corners that is inviting through the space. Also include items such as:

- Height of walls and barriers through site designed so users head is generally above the barrier.
- minimum shared path width of 3m through space,
- expansion and opening up of approaches where possible,
- flaring of walls at entrances to allow for improved sightlines in and out of underpass space.

Materials

Include materials and common design elements within underpass area that have been used across the rest of the BayLink project:

- Coloured concrete
- Open style fencing to allow for views into and out of approach environment
- Angled steps at decision node to provide direct pedestrian link to at grade footpath to and from underpass approach

Maintenance

Whole of life considered for materials including safe maintenance. Including use of appropriate planting and anti graffiti coating applied to all walls.

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Exemplar Imagery

1.

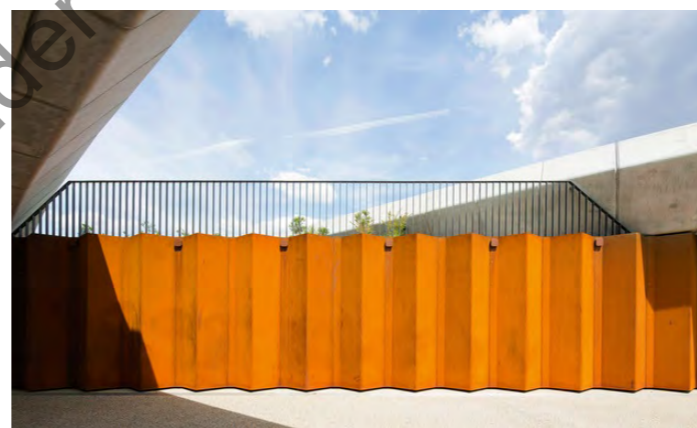


1: Wide entry and visibility for safe movement by a variety of users

2: Visual interest and variety of levels to define entrance. Different access routes and alternative paths, as well as waiting areas.

3: Internal details, natural as well as artificial lighting for visibility and safety as according to CPTED principles

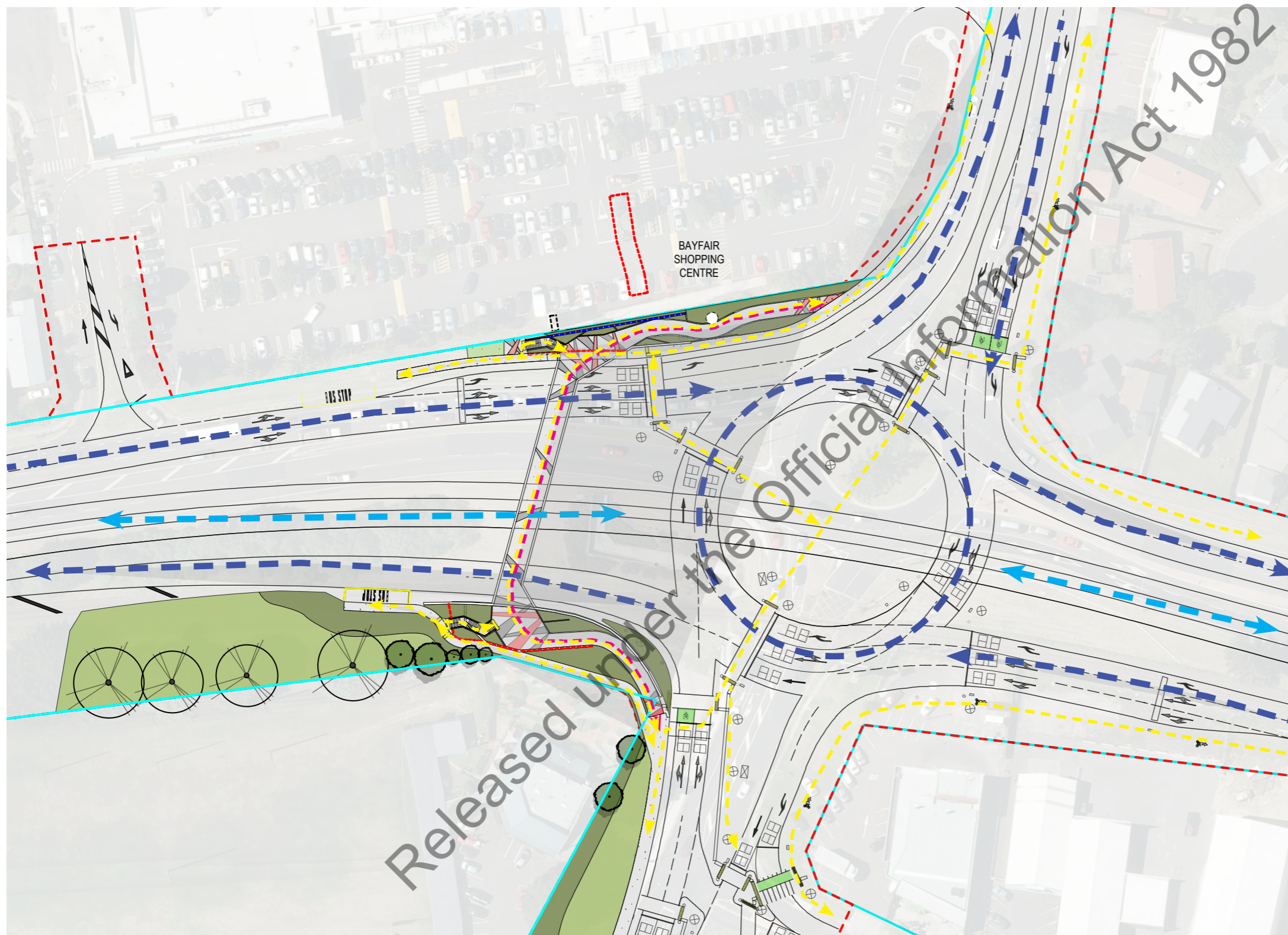
2.



3.



Overview of Route



LEGEND

- PROPOSED GRASS
- PROPOSED PLANTING
- BRUSHED CONCRETE
- SANDBLASTED CONCRETE/ EXPOSED AGGREGATE
- COLOURED CONCRETE
- TREES - PROPOSED SPECIMEN GRADE
- +
 TREES - EXISTING TO BE RETAINED
- PROJECT DESIGNATION

- Pedestrian traffic
- Cycle traffic
- Vehicle traffic
- Vehicle overpass traffic

CPTED Development

Overview for Underpass

Alignment

As outlined in the Jacobs design report there are geotechnical and civil engineering requirements that have meant the proposed underpass has had to be moved to its proposed location. The proposed design has focussed on providing pedestrian priority and enhancement of these routes at grade across MGI. The primary cycling route is provided through the underpass, however there will always be the possibility that pedestrians will use the underpass. From a CPTED perspective the alignment is not ideal as it takes people away from the primary pedestrian pathways and "eyes on the street". Other than moving the alignment back to the original location this cannot be mitigated.

Flaring of the underpass and entranceways

A bare minimum amount of flaring has been incorporated in the 50% design to address blind corners if this flaring was not provided. This minimum has been recommended based on what would likely be increased capex costs if further flaring in the tunnel was provided. Ideally further flaring of the underpass tunnel (up to 15m -ideal) would be provided. Corners around stairwells would also be improved to provide for clearer sightlines as shown on sketches to the right, especially for people choosing how to exit a very long tunnel of 60m. In terms of priority of investment, if further improvement of sight lines was provided, the tunnel should be prioritized first and then stairwells.

Vehicular access for supervision and maintenance

Design of the approaches to the underpasses are building in the possibility of a sweeper maintenance vehicle, police or community crime prevention vehicle to drive to the entrance to look down the tunnel, turn around exit

Length and perceptions of the underpass

Other than flaring of the underpass, key ways of addressing the safety perception within the underpass is with daylighting and lighting plans. Nominal lighting locations and treatments have been identified in the design drawings. These two areas need further work in the next stage of design and will require commitment to addressing these two fundamental design parameters

Thresholds/entrances of underpass

Providing clear threshold treatments with a consistent colour scheme that provides visual cues for pedestrians and cyclists have been started with the design. These need to be further refined in the next stage of design to balance the conflict points where multiple users converge at each entrance. This also needs to be balanced with typical signage treatments for pedestrians and cyclists to develop a unique situation that accommodates all users. Currently the design has also provided or minimised of concealment opportunities outside of the underpass. This needs to be retained in the next stage of design.

Overall assessment

The entrances to the underpass and approach ramps are able to meet CPTED requirements sought from the UDLMP and NZTA's bridging the gap document as the design is developed further. Due to the location of the alignment the underpass will never be able to score a 10/10 rating from a CPTED perspective. However, as identified in our design report and also indicated in the independent CPTED review attached, if further design work is done within the tunnel (interior, lighting and entrance) and working further with the design team a possible 7/10 CPTED rating would be able to be achieved.

Imagery

1. Potential additional splay; Bayfair approach

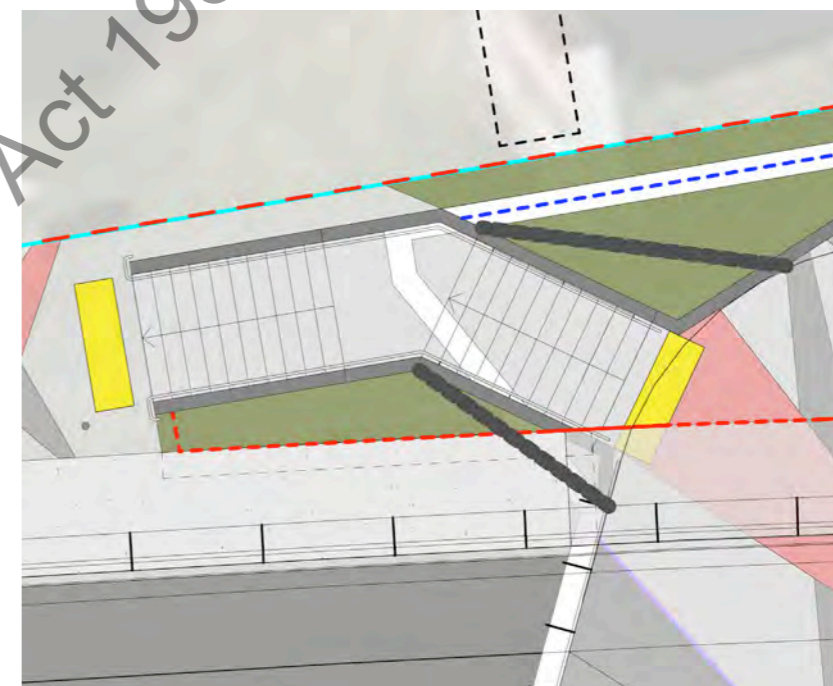
- Added visibility when traversing down the stairs to enter the underpass and vice versa.
- Improved integration with the structural design for the retaining wall (underneath stair area)
- Widened base of staircase means a bigger 'decision node' for directional movement.

2. Potential additional splay; Matapihi approach

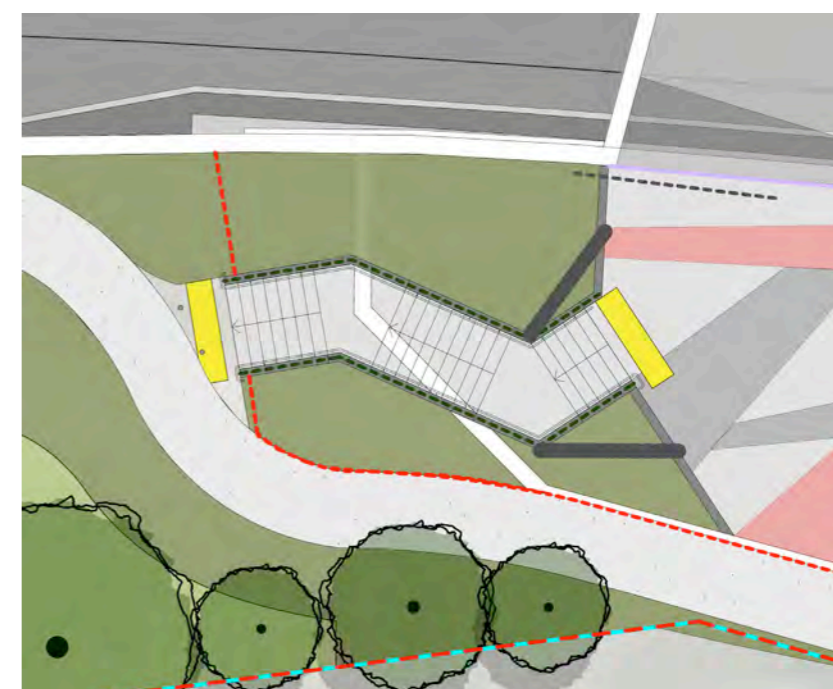
- Added visibility when traversing down the stairs to enter the underpass and vice versa.

3. Potential additional splay; underpass

- The further the splay intersects 'into' the underpass the more improved the environment is, as it adds to feeling of openness and breaks up the space.
- Ideally, the width of the underpass would be 5.0 metres (currently 4.5m).

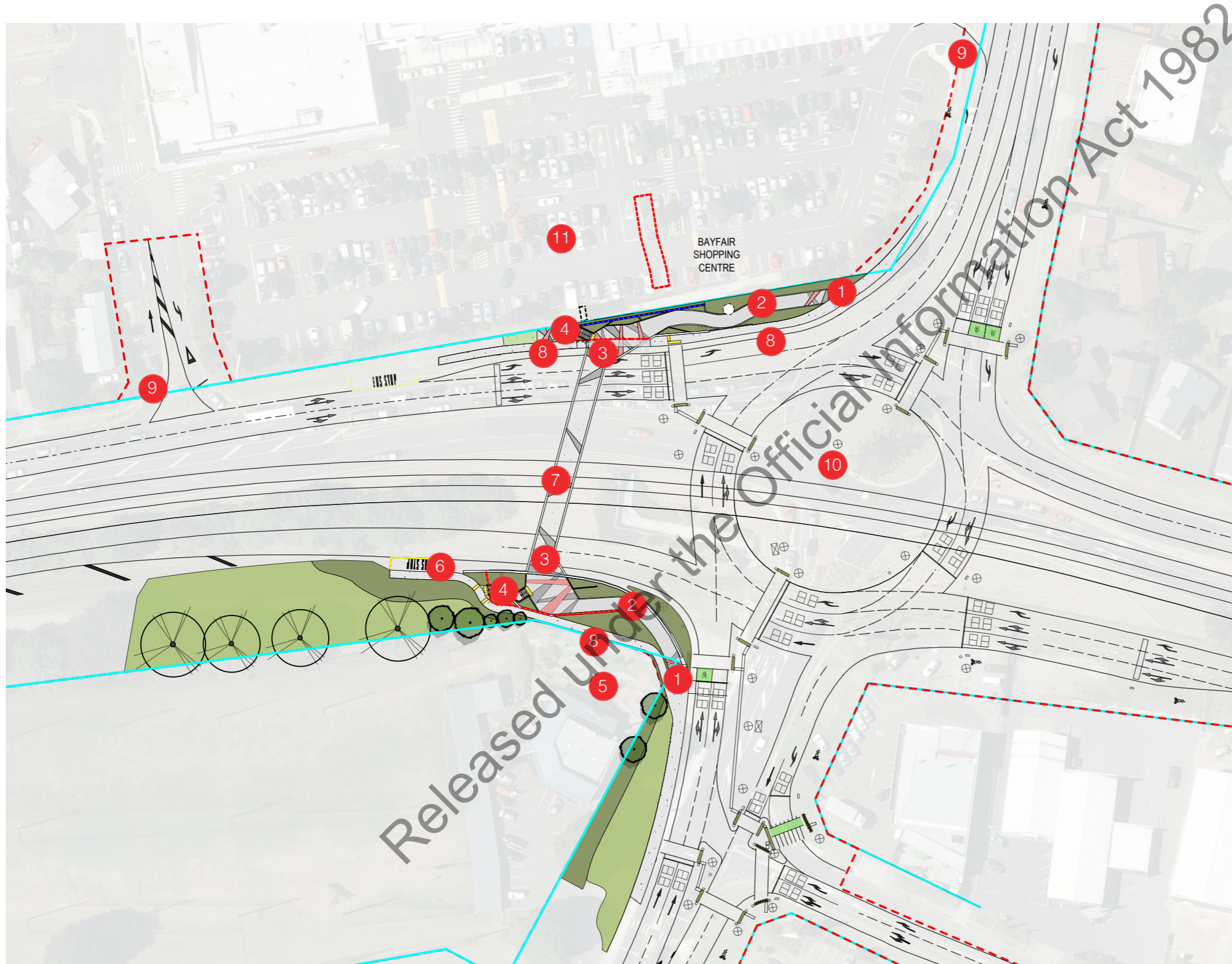


Bayfair approach



Matapihi approach

Overall Landscape Concept Plan

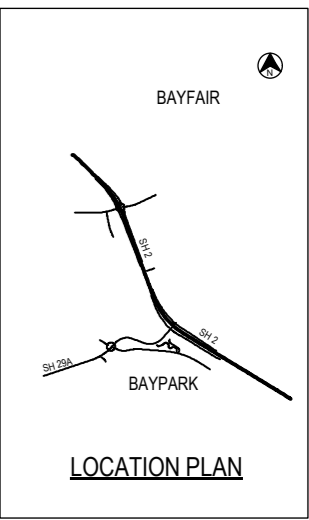
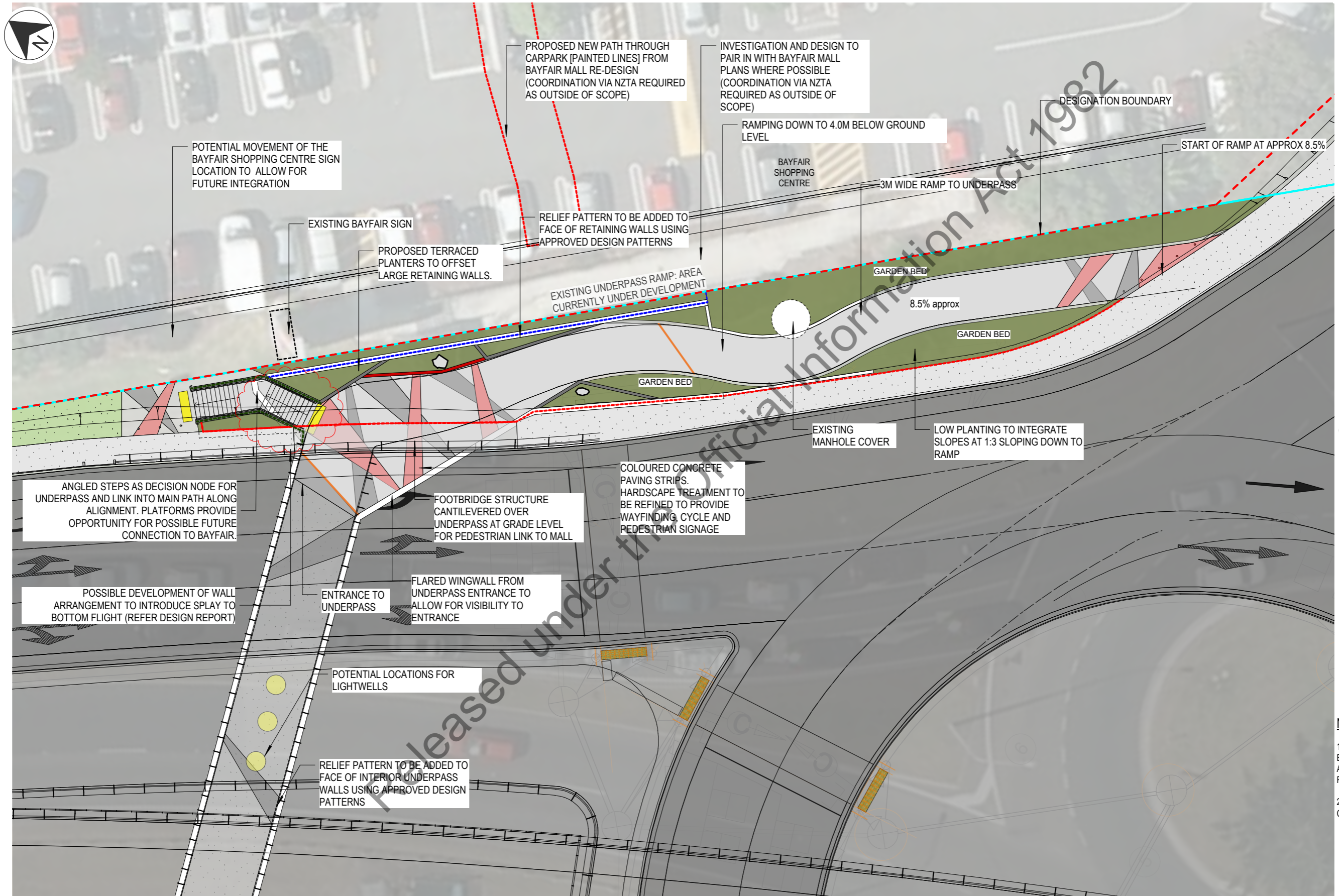


LEGEND

- PROPOSED GRASS
- PROPOSED PLANTING
- BRUSHED CONCRETE
- SANDBLASTED CONCRETE/
EXPOSED AGGREGATE
- COLOURED CONCRETE
- ⊕ TREES - PROPOSED
SPECIMEN GRADE
- ⊗ TREES - EXISTING TO
BE RETAINED
- PROJECT DESIGNATION

- 1 Cycle underpass ramp entry
- 2 Cycleway ramp
- 3 Underpass entry
- 4 Pedestrian access steps to
underpass
- 5 Mini golf course
- 6 Bus stop
- 7 Underpass
- 8 Footpaths
- 9 Bayfair shopping mall car park
- 10 MGI roundabout
- 11 Bayfair shopping mall car park

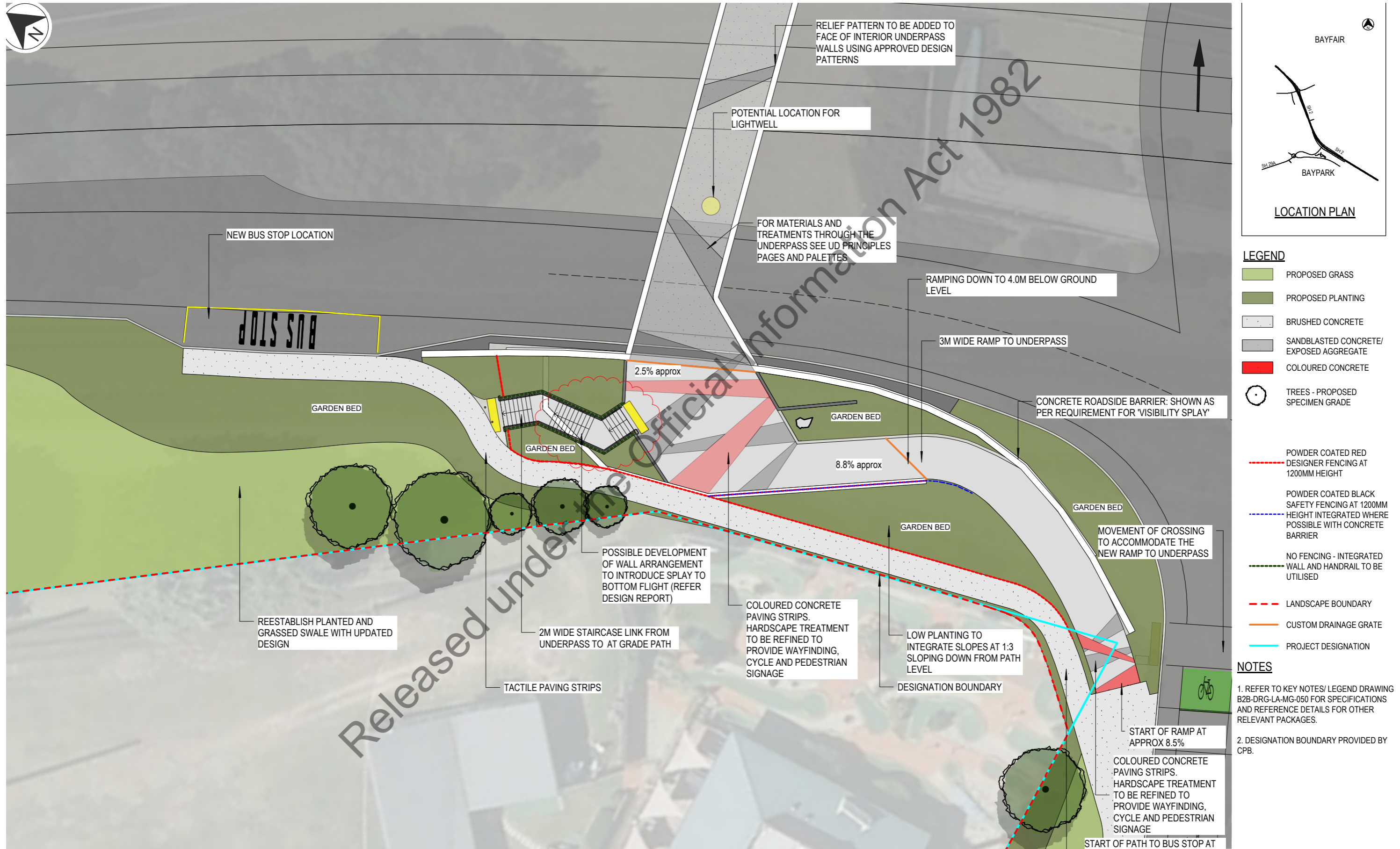
Bayfair Landscape Concept



- LEGEND**
- PROPOSED GRASS
 - PROPOSED PLANTING
 - BRUSHED CONCRETE
 - SANDBLASTED CONCRETE/ EXPOSED AGGREGATE
 - COLOURED CONCRETE
 - TREES - PROPOSED SPECIMEN GRADE
 - POWDER COATED RED DESIGNER FENCING AT 1200MM HEIGHT
 - POWDER COATED BLACK SAFETY FENCING AT 1200MM HEIGHT INTEGRATED WHERE POSSIBLE WITH CONCRETE BARRIER
 - NO FENCING - INTEGRATED WALL AND HANDRAIL TO BE UTILISED
 - LANDSCAPE BOUNDARY
 - CUSTOM DRAINAGE GRATE
 - PROJECT DESIGNATION

- NOTES**
1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
 2. DESIGNATION BOUNDARY PROVIDED BY CPB.

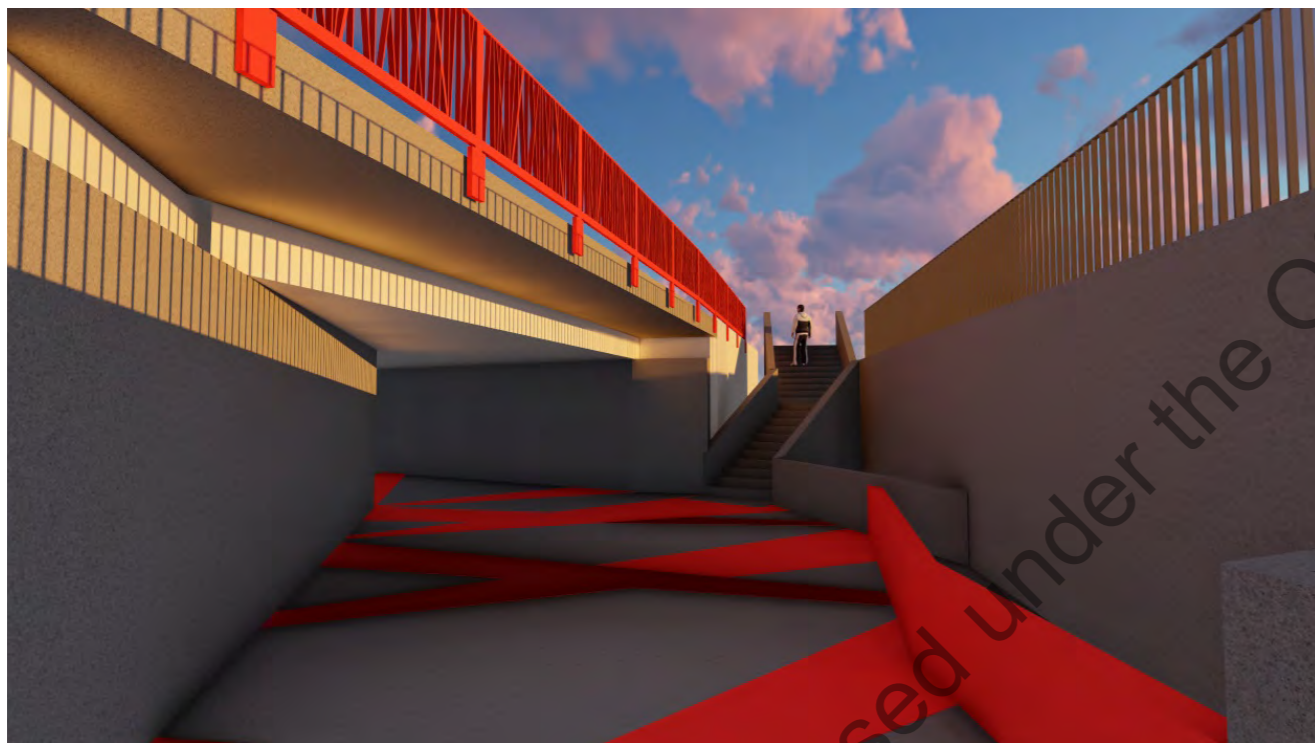
Matapihi Landscape Concept



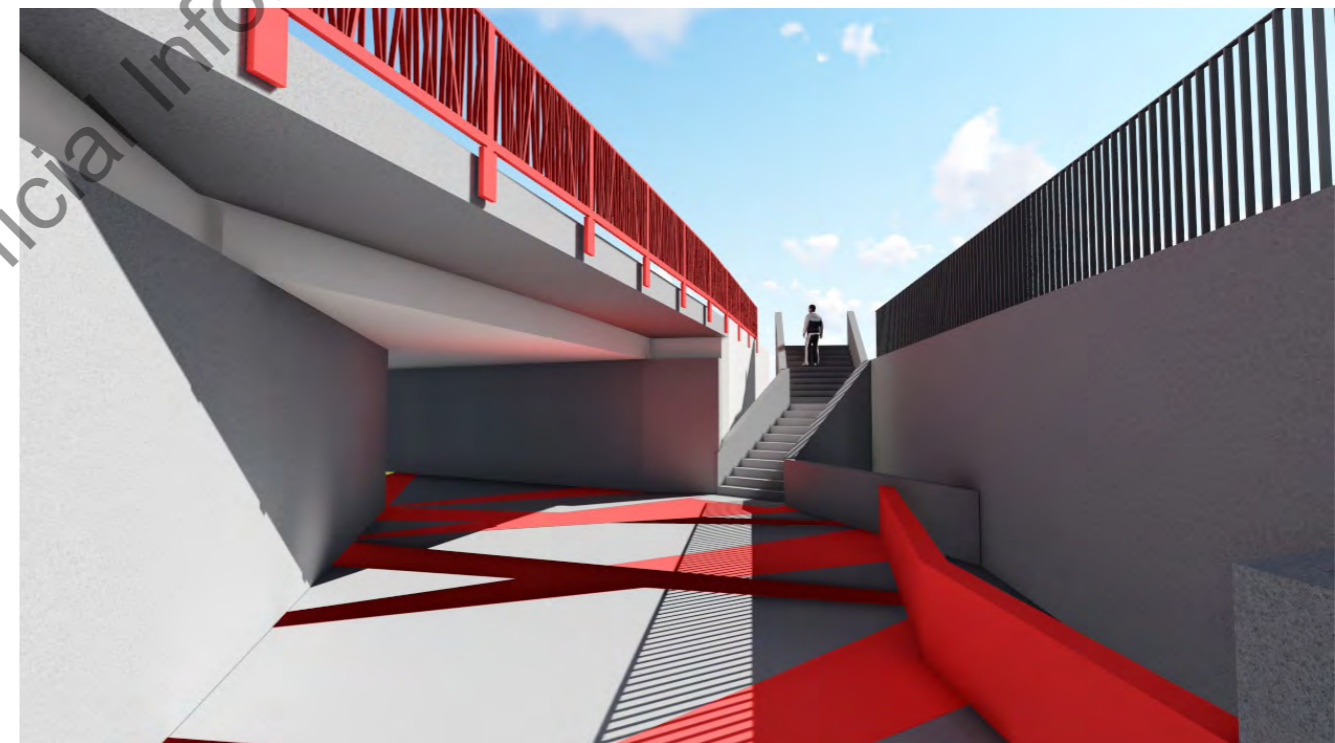
Working Renders

Bayfair (North) Side Temporal Views

The above is a visual representation of what the approach on the North side of the Underpass adjacent to Bayfair Mall will appear like during the morning and afternoon 'rush hour commute'. Due to the height of the sun during these times, the underpass approaches will be relatively shaded. This view highlights the flared wall allowing partial views into the entrance of the underpass. Staggered wall heights around stairs, combined with variety of surface textures, low planted walls, open up the space as much as possible. Lighting will be required to further open up the area and illuminate potentially shadowed areas.



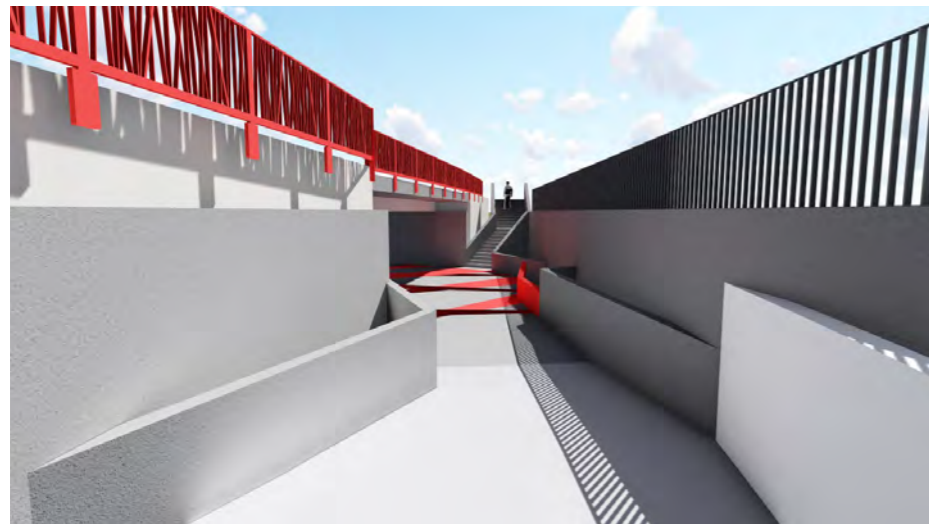
Morning and Afternoon



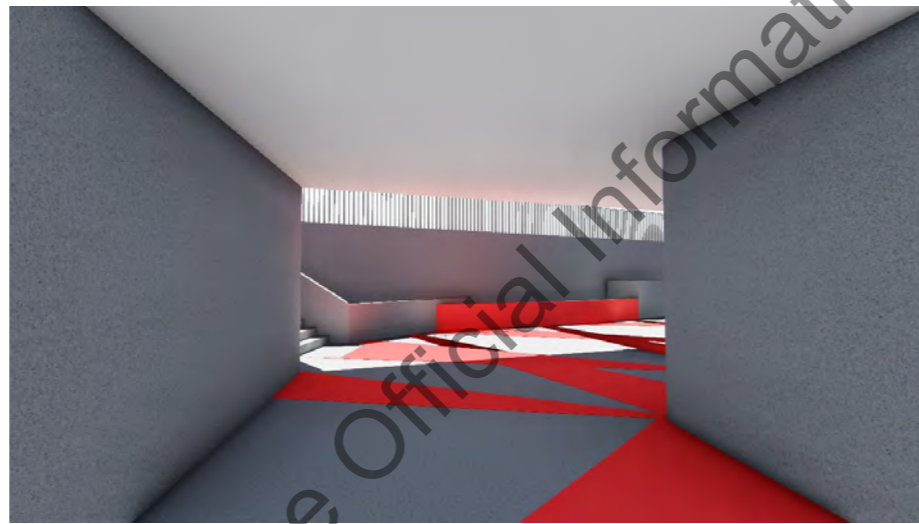
Day

Working Renders

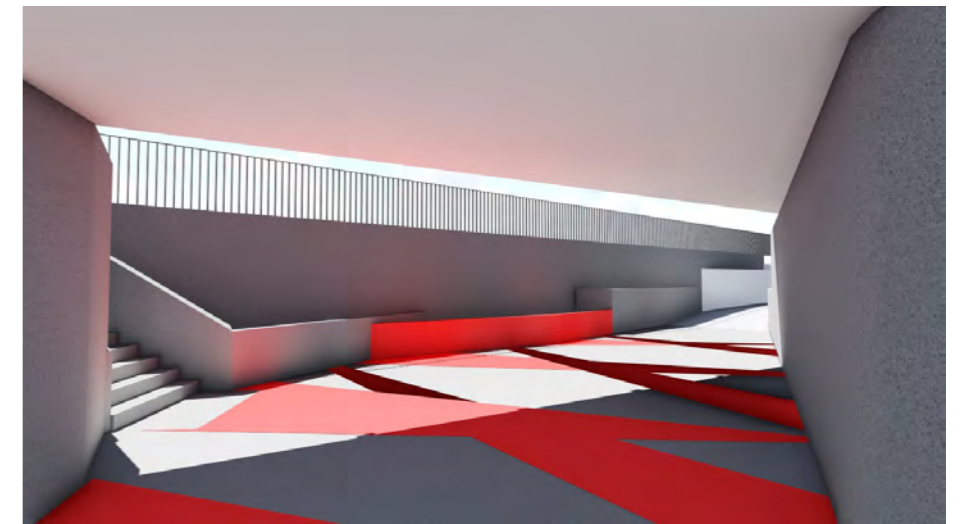
Bayfair Side Steps and Views Study



Underpass Approach



Underpass Exit



Underpass Flared Walls

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Working Renders

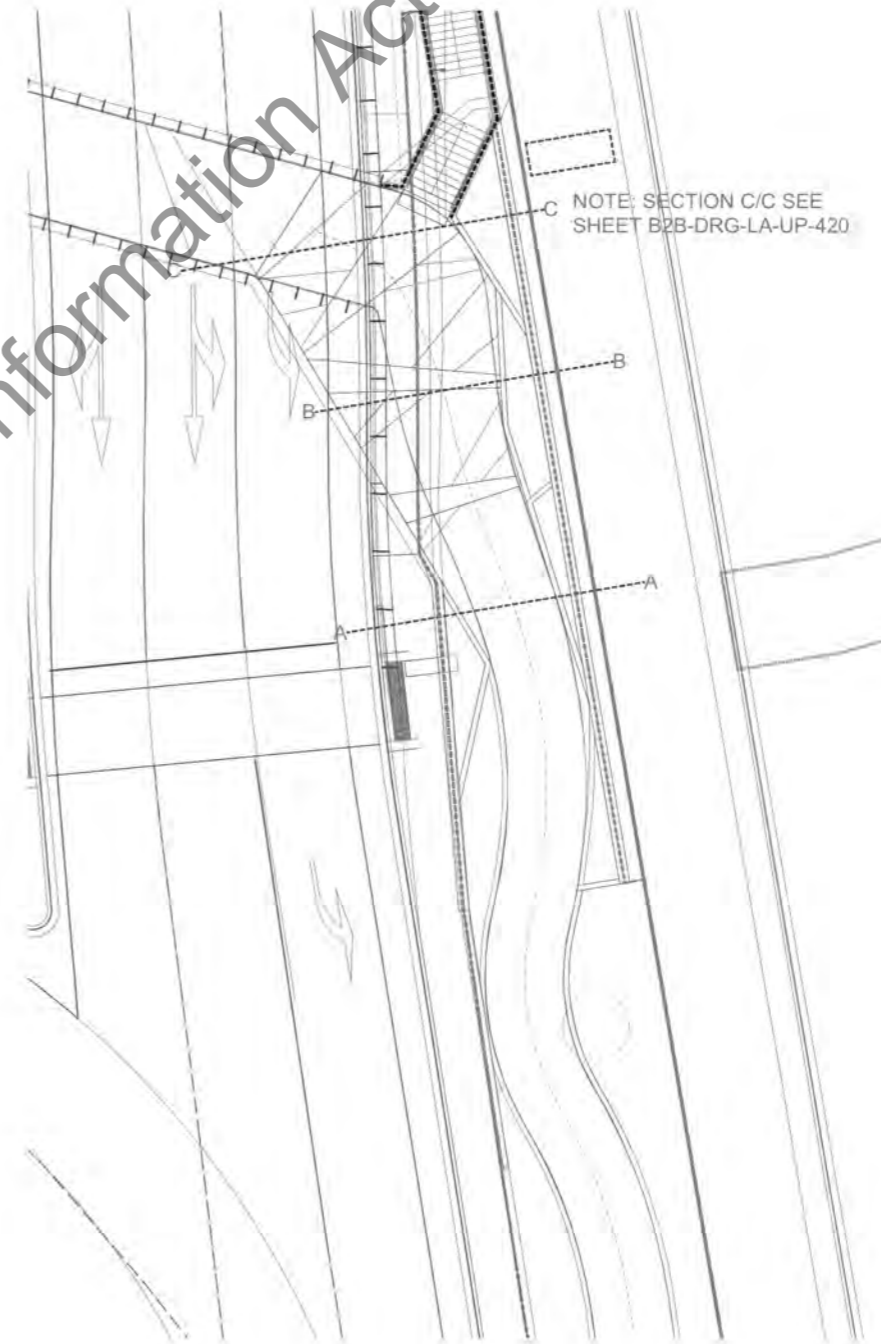
Bayfair Sections



UNDERPASS NORTH ENTRANCE - SECTION A-A
SCALE 1:100



UNDERPASS NORTH ENTRANCE - SECTION B-B
SCALE 1:100



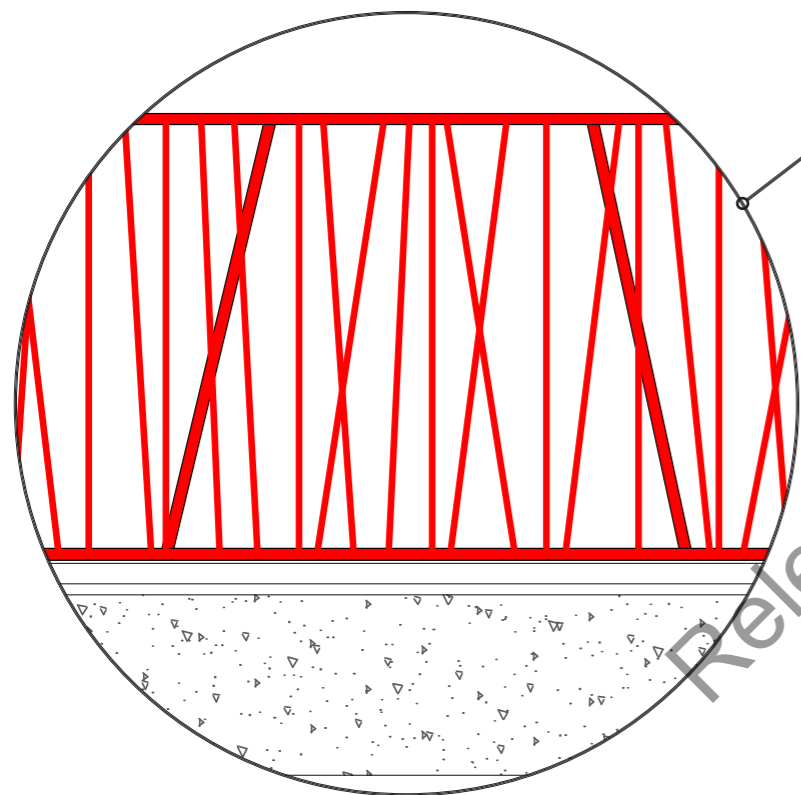
Released under the Official Information Act 1982

Pedestrian Footbridge

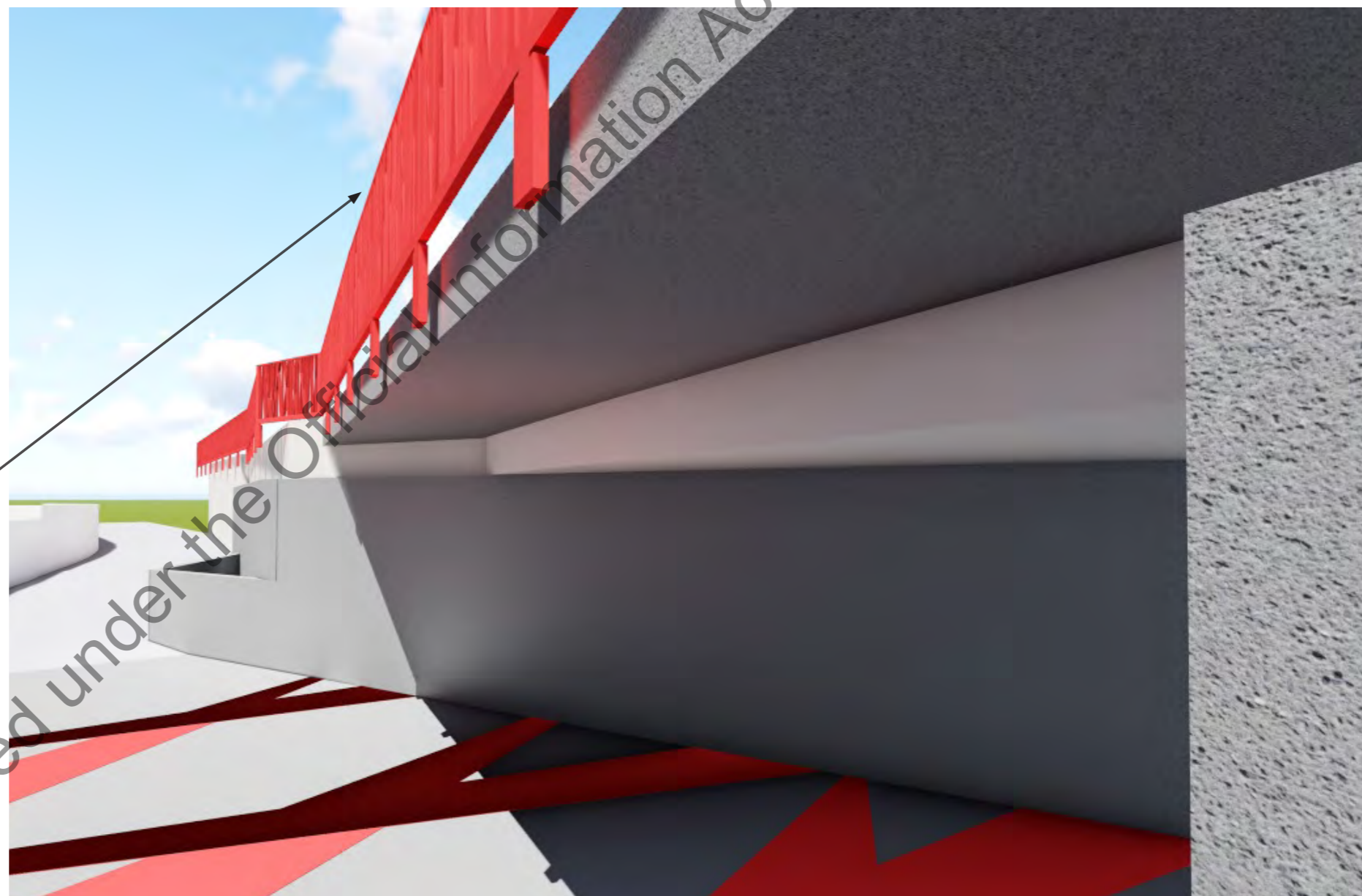
Concept Development

Development of:

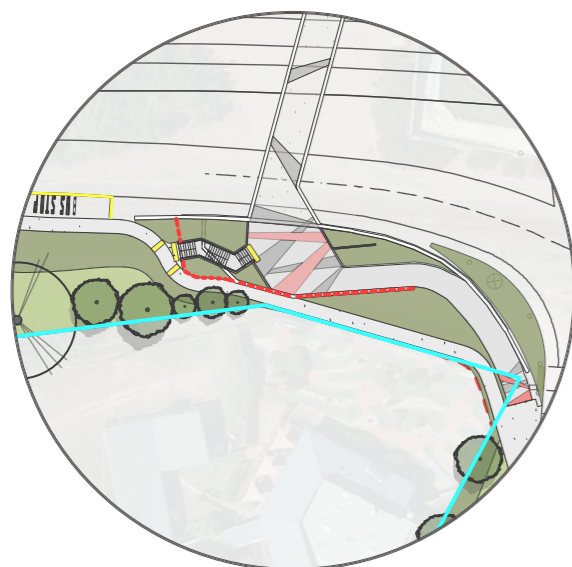
- designing for human scale
- concrete TL5 barrier and fence required
- remove any boxed in feeling as much as possible
- consistency of design and materials
- placate the concrete barrier with a focus on the pedestrian safety fencing
- remove 'fenced in' feel
- potential for splay at either end
- looking upwards - view from below to be aesthetically designed and smooth
- less constrictin; remove the heavy feel
- angles to incorporate interest
- throw screen matching



Barrier elevation



Matapihi Retaining Wall Study



LOCATION



OPTION 1: WINGWALL / RETAINING WALLS IMMEDIATELY BESIDE RAMP AND INTERFACE

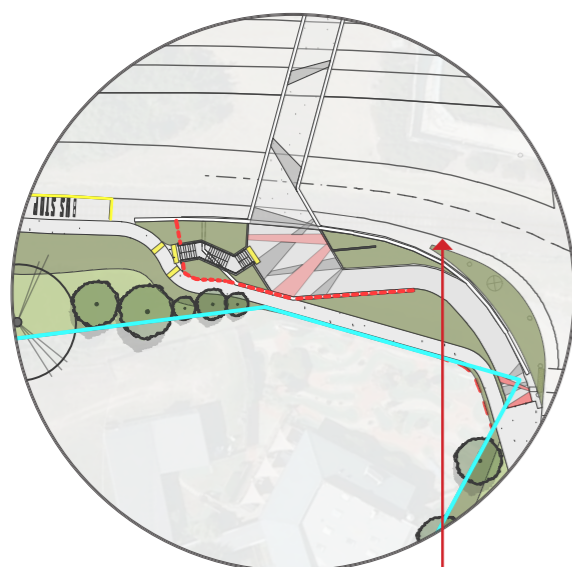
- not designing for human scale
- concrete TL5 barrier as well as safety fence required
- encloses space
- blocks entrance to the underpass
- dangerous to cyclists lack of visibility
- cpted issues



OPTION 2

OPTION 2: WINGWALL / RETAINING WALLS MIDWAY THROUGH AREA

- not designing for human scale
- concrete TL5 barrier as well as safety fence required i.e. double barriers on each level
- aesthetically not streamlined
- partially opens out entrance to the underpass
- reduces the need for large heavy walls i.e. breaks up surfacing



OPTION 3: RECOMMENDED



OPTION 3

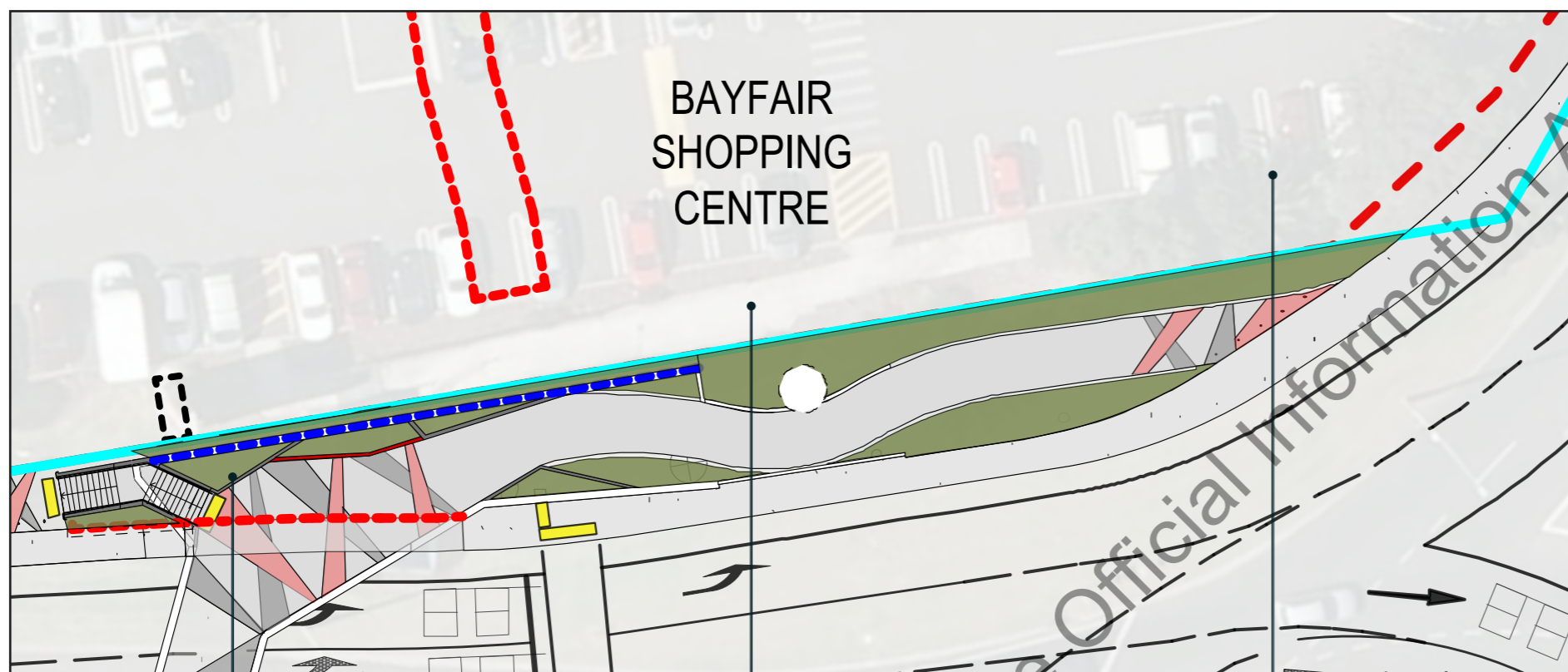
OPTION 3: WINGWALL / RETAINING WALLS IMMEDIATELY BESIDE ROADSIDE

- designing for human scale
- concrete TL5 barrier will be required, no safety fence as the barrier will act as both
- opens out into sloped planting area
- opens out entrance to the underpass
- **recommended option**

Images are indicative only in draft

Materials Palette

Horizontal Materials



Exposed concrete
 - FINISH: EXPOSED, MATT SEALER
 - COLOUR: PLAIN
 - THICKNESS: 100MM
 - AGGREGATE SIZE AND TYPE: 13MM STANDARD

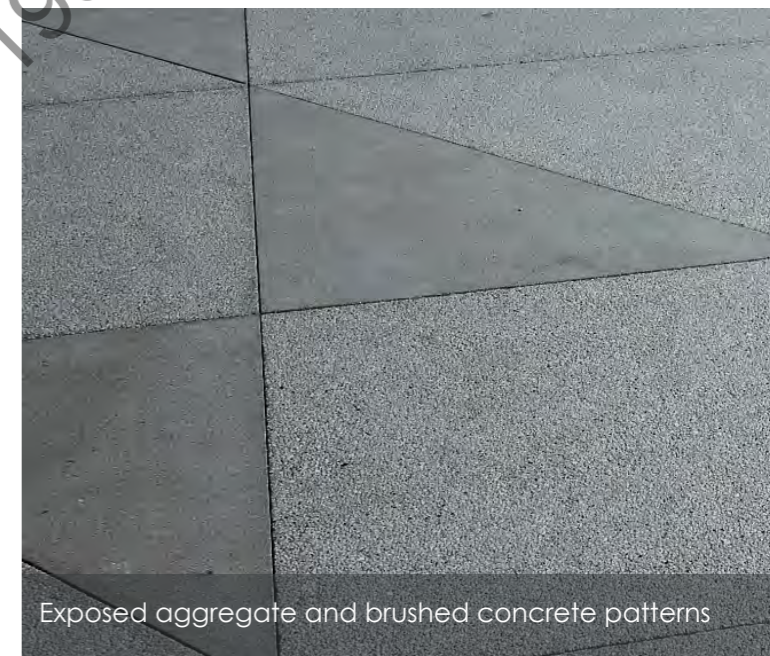


Plain concrete
 - FINISH: BRUSHED
 - COLOUR: PLAIN
 - THICKNESS: 100MM
 - AGGREGATE SIZE AND TYPE: 13MM STANDARD

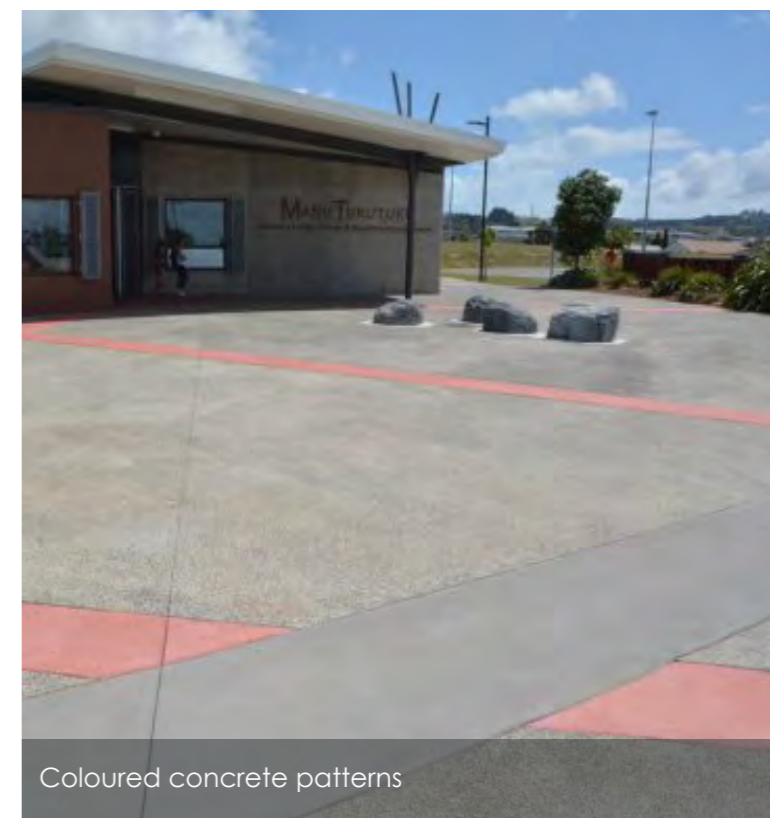


Coloured concrete
 - FINISH: SPONGED U5, PFL NATURAL SEALER
 - COLOUR: PETER FELL COLOUR RANGE GELATO RASPBERRY
 - THICKNESS: 100MM
 - AGGREGATE SIZE AND TYPE: 13MM STANDARD

Precedent images:



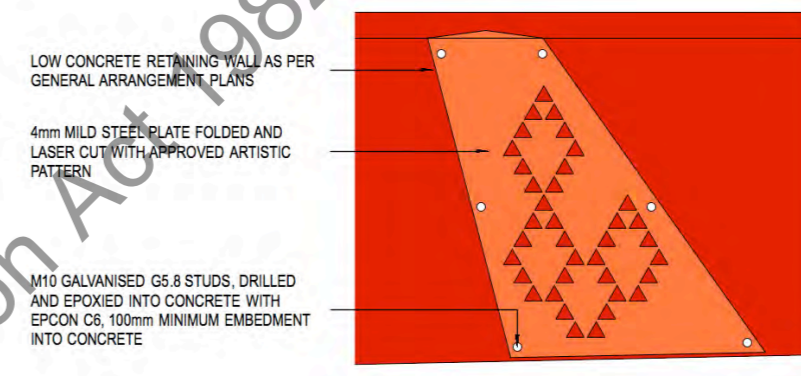
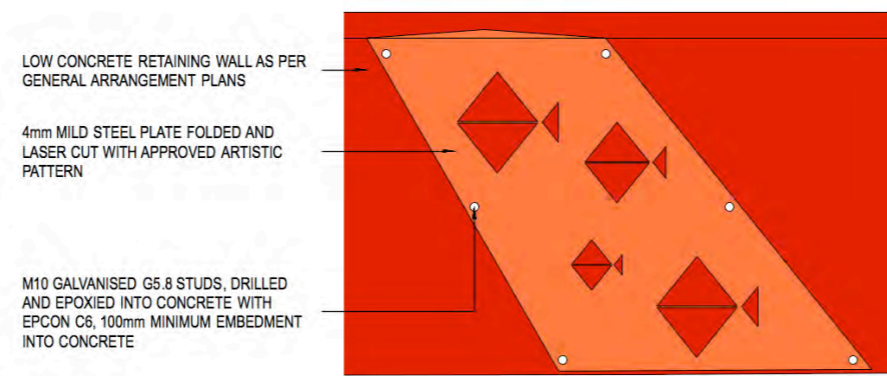
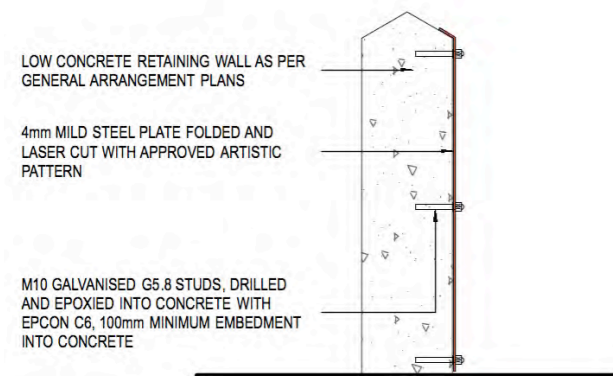
Exposed aggregate and brushed concrete patterns



Coloured concrete patterns

Materials Palette

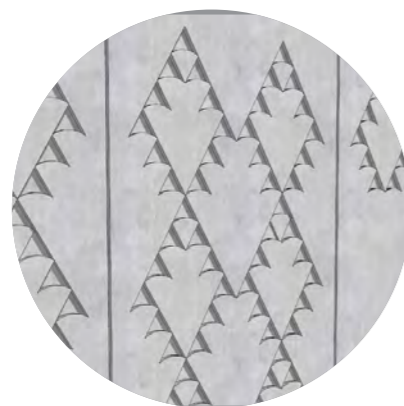
Vertical Materials



Continuity of themes

Including common design elements as used elsewhere, ensuring a unified experience through the underpass in connection to the wider design and site.

Urban design elements and finishes to tie in with wider design context



Iwi pattern



Corten steel



Insitu blasted patterns



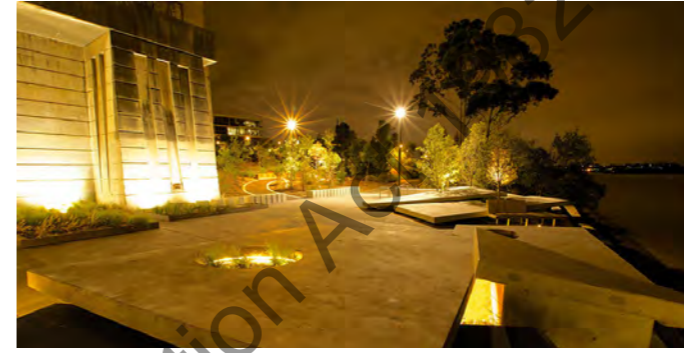
Pre cast relief patterns

Lighting Strategy

FOOTBRIDGE



UNDERPASS ENTRANCES



STEPS AND RAMP



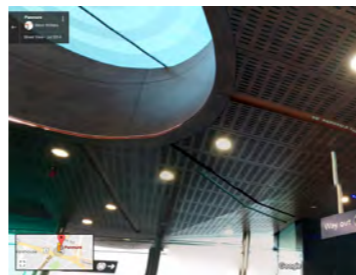
WALLS



UNDERPASS CENTRAL



LIGHTWELLS



Planting Strategy

Principles

Visual interest

Continual stretches of retaining walls are visually broken up by planting variety at eye level. Massed areas of similar species will be distributed throughout the garden beds. There will be a variety of foliage texture and colour arranged along the user pathways. These areas will be overlapped to enhance contrast and variety.

Application:

Bands of low level species (Meuhlenbeckia and Coprosma) along the sides of the main path from the bus stop and taller species (Astelia and Choinichloa) at offset intervals behind.

Bank Stabilisation

On the sloped areas, species with fibrous root systems are selected to stabilise slopes, these species will be selected and applied alongside all other conditions. The planting of the slopes will reduce the visual dominance of the walls of the alleyways.

Application:

Species selected include Choinichloa and Astelia. These are found in a range of conditions, and will establish on engineered slopes. Slopes exposed to the sun will largely be covered by Choinichloa, and shady slopes by the Astelia. Where these slopes meet through fares, low growing species will be located along the boundary.

Safety

Consistent with the wider development strategy, the placing of taller species at the rear of garden beds, with lower growing species in the foreground to improve visibility and safety through the site.

Species with tall or sharp flowers and fruit will also be set away from thoroughfares and stairways or located at a height where injury is no longer a risk.

Application:

Species below 1m tall alongside paths, with broad leafed species immediately adjacent to path. Other flax or tussock species set 1m back from any thoroughfares. Smaller growing species (Dianella) located in the raised planters around the northern stairs.

Conditions & Maintenance

The species are to be located in the site best suited for the light and moisture requirements of each species. The considered application of species will reduce the resources required to firstly get species established, and to secondly, maintain the design.

Application:

Due to the height of the walls and the angle of the underpass, the plated areas around the northern stairs and entry to the underpass are heavily shaded. Therefore Dianella and Astelia species are utilized.

Consistency

Species selected for the underpass will be consistent with those used throughout the wider context, including MGI roundabout. Similar planting patterns and forms will also be applied. The consistency of planting also serves to differentiate the areas that are a part of the new routes.

Application:

All species applied to this design are present in the MGI planting palette. Symmetrical species at entry ways and repeating patterns throughout site.

Local species

To aid in being consistent to the design context and suiting the conditions, the plants will be those available locally and better suited to the site. Therefore enhancing biodiversity and expression of local landscape identity.

Application:

None of the species are cultivars or hybrids that are not found in the surrounding landscape. Combined with being derived from previous plant schedules, the planting will express a familiar landscape character.



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END OF DOC



Memo.	Tauranga underpass. B2B. CPTED 02
Subject:	Tauranga Baypark to Bayfair Link; underpass; CPTED; 50% Design Review
To:	s 9(2)(a) – Align.
From:	s 9(2)(a)
Distribution	By Align
Date:	15 March 2019.

- I have been commissioned to provide CPTED advice and explanatory notes in support of the U&L design work being carried out by Align on the B2B project underpass. The following is a review of Align's 50% Issue; B2B-DRG-LA-UP drawings dated 09 March 2019.

Context and prior design givens

- The LA-UP work Align is doing takes over from prior base infrastructure design and alignment of roads, paths, crossings, project designated areas and the like, which are now deemed givens.
- I have raised CPTED concerns regarding the location, length and alignment of the underpass and compared the given base infrastructure outcomes with the overall project objectives and mandates¹ and found them to be inconsistent and problematic. These CPTED concerns were the subject of my earlier memo B2B_CPTED 01 of 22 February 2019, which resulted in a workshop [Jacobs, Beca, Align] on 28 February when these matters were discussed and it was agreed to ascertain the extent to which those concerns could be addressed. These CPTED concerns were principally around the detour distance of the underpass from the at-grade crossing, the length of the underpass, lack of daylighting to reduce perceptions of length, width, flaring and vehicular access [for supervision and maintenance only]. Without these modifications I assessed the all-user safety and success of the underpass as achieving a nominal score of about 5/10 out of a possible 10 - where 8/10 would be reasonable expected practice for a new underpass and 10/10 would be exemplary design.

Response to initial CPTED concerns

- In respect of the above mentioned initial CPTED concerns I note the following from the 50% Design drawings:

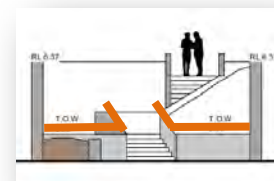
a.	excessive detour distance of underpass from at grade crossing:	Fundamental and principal concern not changed.
b.	width:	Understood to have been increased from 4.5m to 5m [check if new width has been shown on the 50% drawings]
c.	daylighting;	Request to daylight in order to convey underpass as a series of short tunnels rather than one long tunnel is still only shown as small unsatisfactory "potential light wells", rather than daylighting of significance.

¹ NZTA's reference documents, Tauranga City Council's IDP, the Jacobs Design Philosophy Report, and UDLMP, MOJ CPTED guidelines, etc.

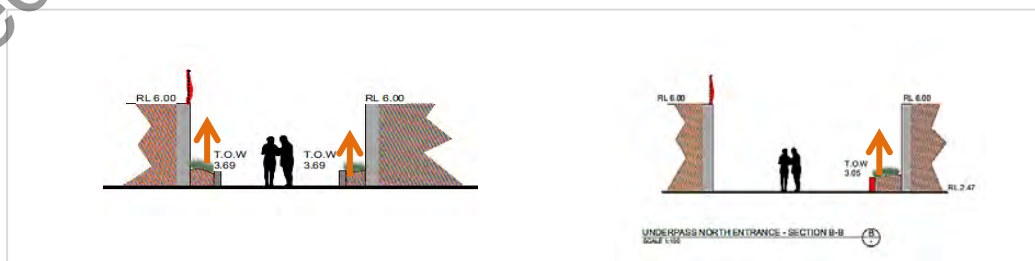
d.	flaring:	Minor flaring of just 5m rather than the 15m requested has been incorporated. Minor flaring provides minor improvements in sightlines around entry corners and minor improvements in perceptions of length.
e.	vehicular access for supervision and maintenance:	It now appears possible for a sweeper, maintenance vehicle to access. And for a police car or community crime prevention vehicle to drive to the entrance [allowing the occupants to look through without leaving their vehicle], turn around, and exit.
f.	length and perceptions thereof:	Length remains very long at 60m which is longer than the existing underpass. Perceptions of distance are exacerbated by heavy concrete brow supporting the pathway above the entry portal at the eastern end the pathway [mitigatable]; insufficient flaring; and lack of intermediate daylighting which cannot be served as well, if at all with artificial lighting.

Detailed CPTED review of 50% Design

5. Location plan: it might be useful to have a location plan to remind us of road names and surrounding context – p.5? Also, for this site, there is potential confusion regarding approximation of compass points such that it might be useful to have a reference north as well as a true north?
 6. Western [south] end:
 - ✓ noted addition of a 'threshold' with identifiable coloured concrete paving off Matapihi Road, which provides visual cues and consistency with paving at the underpass entry portal. This could carry inside at say the one quarter points;
 - ✓ noted that the two pathways to the bus stop and the underpass respectively are separated [plan and grade] and have different paving textures which gives good clarity of direction for different users and clarity of purpose.
 - ✓ noted that the bus stop and the underpass entrance remain at a suitable distance from each other for clarity of purpose of users. Good to demonstrate bus stop and underpass are part of the same family with similar quality materials.
 - ✓ noted simple landscaping [grass and low planting] around bus stop, clear sightlines to and from bus stop and Matapihi Street and underpass.
 - I assume the lower cross-section on Sheet 420 is 'D-D'; and
- R recommend raising the height of the north/south walls each side of the lower flight of stairs and for the lower flight of stairs itself as well, 900 to 1000mm⁺. Or treat the top of the wall in a non-aggressive manner to discourage sitting on it or loitering here.
- ✓ stairs to bus stop are away from retaining walls;



- ✓ walls at flared side of entry portal are kept low to provide better sightlines into and out of the underpass.
 - ? query finish and treatment of walls to stairs for graffiti protection.
 - R recommend knitting the materiality and finishes of the portal entry walls and the underpass together so as to blur the boundaries between the underpass tunnel and the pathway approaches. The portal junctions provide an excellent opportunity to integrate the two elements and also provide an indication of turning the corner with suitable colours, graphics, and relief panels. There are some exciting low cost aesthetic design possibilities here that could be realised.
 - ? confirm vehicle turning ability at south entry portal;
 - R recommend considering the most practical form of bollard that can be quickly accessed by Police and Community Crime Prevention patrols – such as a drive-over flexible bollard, or IP Bullyboy that can be lowered remotely.
7. Eastern [north] end:
- ✓ coloured paving thresholds noted.
 - ? query ability to cross pavement at roundabout for vehicle access to ramp and underpass [Jacobs]?
 - R see recommendation above regarding type of bollard at road entry.
 - ✓ noted that light coloured graffiti resistant coatings are intended for the walls;
 - ✓ low planting to preserve sightlines noted;
 - R recommend removing the landing to remove pause/loitering point near portal and in view of approach ramp. Perhaps replace landing with steps slightly curved if necessary to retain plan shape shown;
 - ✓ noted garden bed beside steps shown as *Dianella nigra turutu*; however
 - R at this point and particularly near the portals, consider using a creeper to assist with graffiti control and soften appearances.
 - ✓ noted how the stepped walls on the approaches to the underpass as shown in the sections help to lower the sense of height and ‘canyoning’, and how planting will help soften the edges as well, however
 - R recommend raising or non-aggressively treating the lower inner planter walls to deter informal seating and loitering and thus avoid a ‘running the gauntlet’ situation.



- ? query type of stair nosing [S08] and where they might be luminescent or reflective.
- R recommend replacing the heavy concrete brow of the foot bridge over the portal with open slatted (~20mm) hardwood decking bridge to make this appear a different and lighter element

from underneath, minimise shading, remove the sense of the heavy brow which serves to unnecessarily lengthen an already too long underpass, convey a sense of occupancy of people above or below, and some aesthetic relief like the coloured handrail provides;

- ✓ noted open bridge balustrading and open fencing of benefit to provide vision through them. Red provides interest. Black palisade fencing is easy to see through, becomes somewhat invisible and allows the landscape to show through; however
- R 50mm x 4mm steel slats used for the bridge fence will be susceptible to 'scribble marker' tagging which could be eliminated with a slimmer palisade profile, Gridmesh™ or Locker Group stainless steel mesh, or the like.
- ? confirm vehicle turning circle at east entry portal;
- R confirm the likely connection between the in-scope works and the link to the designated link to the Bay Fair shopping centre as this could have a significant effect on safety and security in the car park. This will also help optimise placement of the shopping centre sign.

8. Underpass;

- ✓ light coloured [white] wall surfaces in the underpass noted. This will assist with perceptions of spaciousness, light, and cleanliness; and
- ✓ noted inset panels at entrance;
- ? query roof finish which needs to be light, sealed and easily cleaned (cigarette lighter sort tagging) and ideally provide some acoustic control to minimise reverberation; and
- R see recommendation above regarding integrating wall treatment, decoration, relief panels to assist with the transition between the underpass and the approaches and also to help break the very long underpass tunnel into shorter sections.
- R matters beneficial to safety and security to develop in greater detail in the next stages are recommended to include:
 - drainage plan
 - lighting details
 - daylighting
 - tunnel wall and ceiling treatments, and ground surface lane markings in detail
 - signage and wayfinding suite;
 - three dimensional views to gain a better sense of scale and integration of the principal elements amongst themselves and within the adjoining host environment.

9. Lighting

- ✓ Initial concept lighting plan noted.
- R This remains to be developed in detail including suitability of in-ground fittings, vandalism resistance, using light to create a sense of progress through the underpass, prevention of glare for observer surveillance and optimal use of CCTV, etc.

10. Check against CPTED criteria² at 50% design.

CPTED principle	Assessment
<p>a. Informal and formal surveillance.</p> <ul style="list-style-type: none"> pedestrian sightlines – see and be seen, active (occupied) edges. 	<ul style="list-style-type: none"> ✓ reasonable outside of the underpass. ! poor inside the underpass the entrances and inside of which are completely out of view.
<ul style="list-style-type: none"> appropriate lighting. 	<ul style="list-style-type: none"> ▪ Allowed for. TBC with further design detail.
<ul style="list-style-type: none"> minimisation of concealment opportunities 	<ul style="list-style-type: none"> ✓ good outside of the underpass. ! poor inside the underpass as a whole.
<p>b1. Safe movement and connections [immediate area]:</p> <ul style="list-style-type: none"> avoidance of entrapment spaces and cul-de-sacs. 	<ul style="list-style-type: none"> ✓ good outside of the underpass. ! poor inside the underpass as a whole.
<ul style="list-style-type: none"> elimination of long pedestrian movement predictors without frequent exit choices 	<ul style="list-style-type: none"> ✓ good outside of the underpass. Exit choices provided at key nodes outside of the underpass on both sides, plus the alternative of crossing at grade [which is both a CPTED benefit, and a weakness by deactivating the underpass]. ! poor inside the underpass as a whole which is one very long movement predictor without exit opportunities.
<p>b.2 Safe movement and connections [wider area]</p>	<ul style="list-style-type: none"> ✓ good outside of the underpass. Route choices available.
<p>c. Clear and logical layout – legible and uncluttered space for pedestrians (enhancing perception of safety)</p>	<ul style="list-style-type: none"> ✓ mostly good. R could be improved by use of colour, materiality and integration techniques to make portal entrances on both sides more visible from approaches and decision points on Matapihi Road and Girven Ave.
<ul style="list-style-type: none"> logical and obvious entrances and exits with easy way-finding. 	<p>See above.</p> <ul style="list-style-type: none"> ▪ It is expected that wayfinding signs will be provided as a matter of course.
<ul style="list-style-type: none"> clarity of purpose between adjoining spaces with different intended uses. 	<ul style="list-style-type: none"> ✓ achieved. R clarify relationship and connectivity with Bay Fair Shopping Centre.

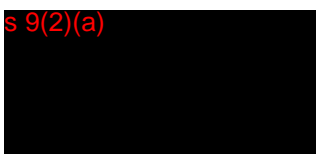
² Ministry of Justice National Guidelines for Crime Prevention through Environmental Design in New Zealand. Part 1: Seven Qualities of Safer Places. 2005. NZTA Pedestrian Planning Guide. 2008.

<p>d. Activity mix, 'eyes on the street' – good use of public spaces and a mix of compatible uses appropriate to the location with extended hours of activity to maximise natural supervision and sense of safety in numbers;</p>	<p>! Poor. This underpass is convenient for commuter and other cyclists who will activate it but mainly during commuting times. Out of equity, they and the underpass must not discourage other users.</p> <p>The detour due to the significant offset will discourage other users and tend to deactivate the underpass compared with a more convenient more direct route. Activation is an important substitute for natural surveillance which is unavailable due to the length, isolation and below-grade nature of the underpass. For many people who are relied upon for providing natural surveillance by occupancy, 60m is not a momentary risk to necessarily take willingly and without thought.</p>
<p>e. Sense of ownership - showing spaces are cared for [through clear indications of what is public, communal, semi-private or private space, plus expressions of key stakeholder involvement];</p>	<ul style="list-style-type: none"> ▪ TBA. It is understood that local cultural identification will be manifest in some of the surface treatments and decorative elements. This is recommended and endorsed to encourage community ownership, identity, stewardship and intolerance of antisocial behaviour.
<p>f. Quality environments - well designed, managed and maintained. [necessary to sustain high standards of presentation and minimise vandalism and graffiti which engender a sense of risk; provision of a 'quality' environment designed for management and maintenance.</p>	<ul style="list-style-type: none"> ✓ pending further design development it is likely that materials and finishes will have good appearance retention qualities, be easy to maintain [including removal of inevitable graffiti] imbue respect to minimise damage. Graffiti management in the underpass in particular is vital for not engendering a sense of risk.
<p>g. Physical protection – use of basic, active security measures such as access control and security lighting.</p>	<ul style="list-style-type: none"> Ⓜ TCC may extend CCTV coverage into the underpass and approaches as it has done for the existing underpass. ✓ lighting plan to be prepared in detail. ✓ vehicular access controllable via bollards.

11. Further to the assessment of the nominal CPTED score from para 3 on p.1, and subject to the recommendations made above, I believe there is the potential to achieve a 7/10 – the limitation being due to the unresolved base infrastructure concerns mentioned in para 3 which are unable to be further mitigated and/or difficult to compensate for with the LA and UD works exterior to the underpass.

Stoks Limited

s 9(2)(a)



Director.



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

ISSUED FOR INFORMATION

Project No: IZ089300

Date: MARCH, 2019

Released under the Official Information Act 1982

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FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
INDEX & LAYOUT				
B2B-DRG-AD01-8001	A	COVER SHEET		
B2B-DRG-AD01-8002	A	UNDERPASS UPGRADE	DRAWING INDEX SHEET	
ROAD PLANS				
B2B-DRG-AL01-8051	A	UNDERPASS UPGRADE	PLAN	SHEET 1
B2B-DRG-AL01-8052	A	UNDERPASS UPGRADE	BAYFAIR RAMP PLAN	SHEET 2
B2B-DRG-AL01-8053	A	UNDERPASS UPGRADE	MATAPIHI 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 DETAILS	
B2B-DRG-SL01-8226	A	UNDERPASS UPGRADE	SIGN DETAILS	REGULATORY & WARNING
PAVEMENT MARKINGS				
B2B-DRG-SL01-8240	A	UNDERPASS UPGRADE	PAVEMENT MARKINGS	LEGEND
B2B-DRG-SL01-8245	A	UNDERPASS UPGRADE	PAVEMENT MARKINGS	

DATE: 14/03/2019 11:03:11 PM LOCAL NAME: KAMINSKA_GBRACE LOCATION: C:\users\gamin\appdata\local\projects\jacob\anz_04\0145598\B2B-DRG-AD01-8002.dwg

<table border="1"> <tr> <td>No</td> <td>DATE</td> <td>DRG CHECK</td> <td>DESIGN REVIEW</td> <td>APPD D.MGR</td> <td>50% ISSUE</td> </tr> <tr> <td>A</td> <td>15/03/19</td> <td>GK</td> <td>LW</td> <td>LW</td> <td></td> </tr> </table>		No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	50% ISSUE	A	15/03/19	GK	LW	LW		 <p>NZ TRANSPORT AGENCY WAKA KOTAHĪ</p>	 <p>CPB CONTRACTORS</p>	   <p>JACOBS Align Tonkin+Taylor</p>	<p>SCALE: N.T.S.</p> <p>STATUS: 50% ISSUE</p> <p>PROJECT NUMBER: 2/09-024/603</p>	<p>CLIENT: NZ TRANSPORT AGENCY</p> <p>PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)</p> <table border="1"> <tr> <td>DRAWN GK</td> <td>DRAWING CHECK GK</td> <td>APPROVED LW</td> </tr> <tr> <td>DESIGNED LW</td> <td>DESIGN REVIEW LW</td> <td></td> </tr> </table>	DRAWN GK	DRAWING CHECK GK	APPROVED LW	DESIGNED LW	DESIGN REVIEW LW		<p>TITLE: UNDERPASS UPGRADE DRAWING INDEX SHEET</p> <p>DRAWING No: B2B-DRG-AD01-8002</p> <p>REV: A</p>
No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	50% ISSUE																				
A	15/03/19	GK	LW	LW																					
DRAWN GK	DRAWING CHECK GK	APPROVED LW																							
DESIGNED LW	DESIGN REVIEW LW																								

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FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
LIGHTINGS				
B2B-DRG-AD01-8003	A	UNDERPASS UPGRADE	DRAWING INDEX SHEET	ITS, LIGHTING & ELECTRICAL
B2B-DRG-LV01-8401	A	UNDERPASS UPGRADE	LIGHTING	SCHEDULE & NOTES
B2B-DRG-LV01-8402	A	UNDERPASS UPGRADE	ELECTRICAL	DETAILS
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
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No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	50% ISSUE																		
A	15/03/19	GK	LW	LW																			

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FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
DRAINAGE				
B2B-DRG-AD01-8404	A	UNDERPASS UPGRADE	DRAWING INDEX SHEET	DRAINAGE
B2B-DRG-DR01-8401	A	UNDERPASS UPGRADE	DRAINAGE GROUNDWATER	MONITORING INFORMATION
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 DETAILS	
B2B-DRG-DR01-8431	A	UNDERPASS UPGRADE	MATAPIHI PUMP STATION	DETAILS

DATE: 16/03/2019 11:12:18 PM LOCATION: NAME: KAMINSKI, GRACE
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No	DATE	DRG CHECK	DESIGN REVIEW	APPO D.MGR	50% ISSUE
A	15/03/19	GK	LW	LW	50% ISSUE

REVISIONS & ISSUES



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 INDEX SHEET DRAINAGE	
DRAWING No	B2B-DRG-AD01-8404	REV A

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FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
DRAINAGE				
B2B-DRG-AD01-8405	A	UNDERPASS UPGRADE	DRAWING INDEX SHEET	UTILITIES
B2B-DRG-UT01-8020	A	UNDERPASS UPGRADE	POTHOLE LOCATIONS	
B2B-DRG-UT01-8025	A	UNDERPASS UPGRADE	ALTERNATIVE ALIGNMENTS	

DATE: 18/03/2019 09:57:24 AM LOCATION: NAME: KAMINSKI, GRACE
 LOCATION: C:\user\gamin\local\pdp\pdp\local\project\hse\jacobs\amz_01\0115598\B2B-DRG-AD01-8405.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APPD MGR	50% ISSUE
A	15/03/19	GK	LW	LW	50% ISSUE

REVISIONS & ISSUES



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

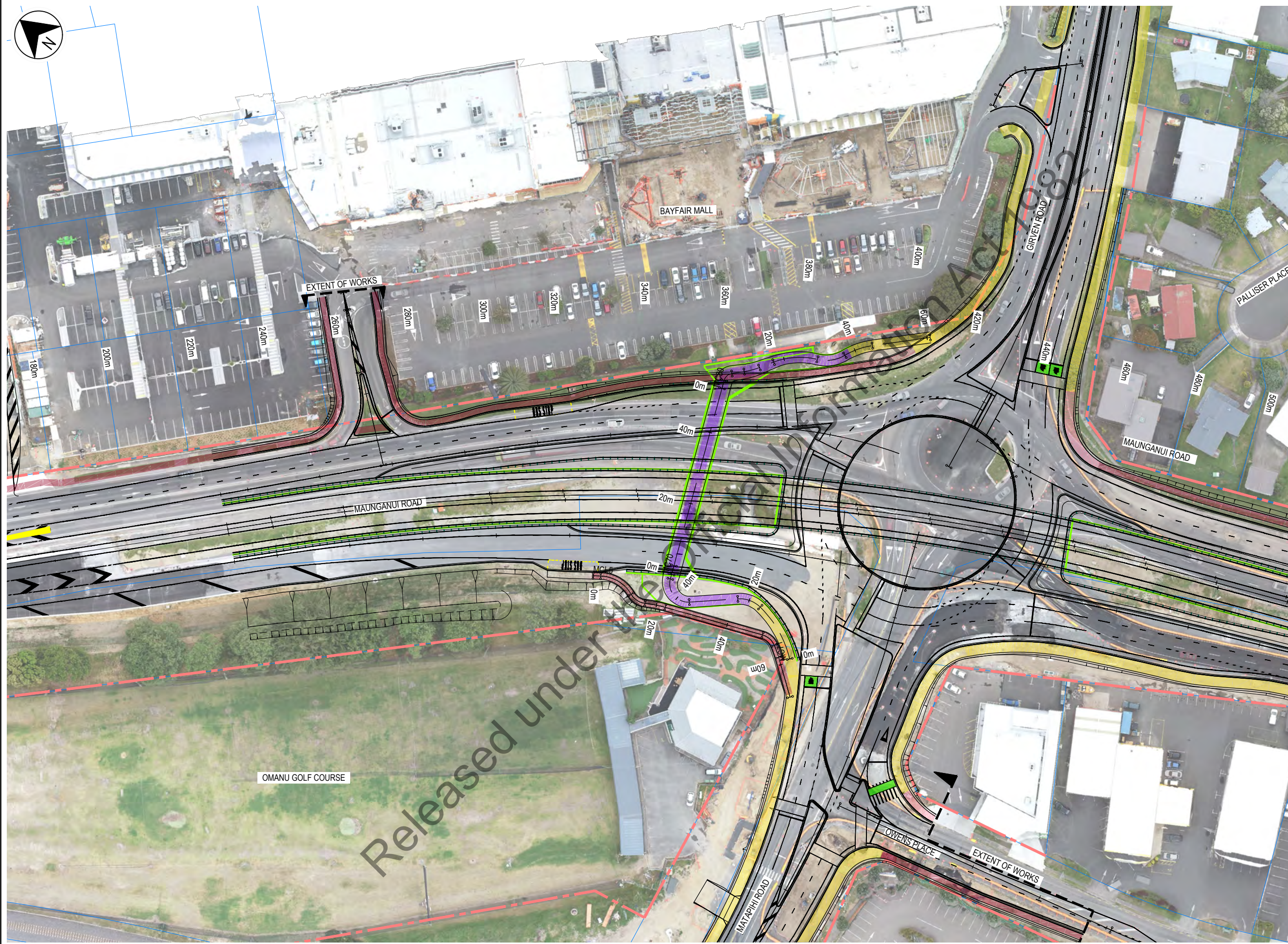
CLIENT	NZ TRANSPORT AGENCY		
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)		
DRAWN	DRAWING CHECK	APPROVED	
GK	GK	LW	
DESIGNED	DESIGN REVIEW		
AC	LW		

TITLE	UNDERPASS UPGRADE DRAWING INDEX SHEET UTILITIES		
DRAWING No	B2B-DRG-AD01-8405		REV A



LEGEND

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



DATE: 14/09/2019 1:49:35 PM LOCATION NAME: KAMINSKI, GRACE
 LOCATION: C:\users\g\amin\appdata\local\projects\baylink\proj\cadd\al01-8051.dwg

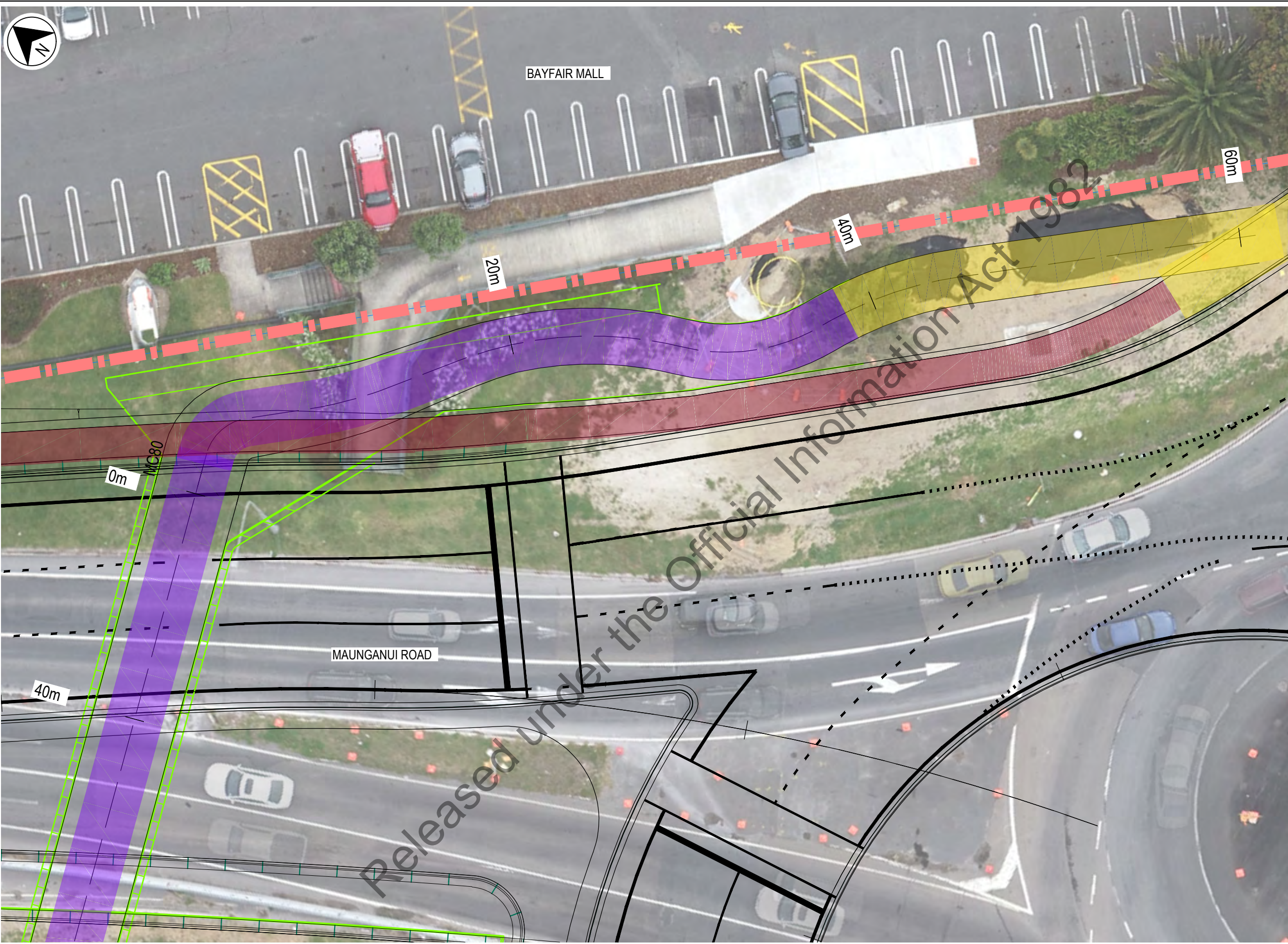
No.	DATE	CHK	DESIGN REVIEW	APPD	50% ISSUE
A	15/03/19	GK	LG	LW	
REVISIONS & ISSUES					
1:500@A1					
1:1000@A3					



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
DESIGNED	KR
DRAWING CHECK	GK
DESIGN REVIEW	LG
APPROVED	LW

TITLE	UNDERPASS UPGRADE PLAN SHEET 1
DRAWING No	B2B-DRG-AL01-8051
REV	A



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

DATE: 14/03/2019 14:50:03 PH1 LOC IN NAME: KAMINSKI, GRACE
 LOCATION: C:\users\gamin\appdata\local\projects\hse\jacobs_anz_0601455982B-DRG-AL01-8052.dwg

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

REVISIONS & ISSUES

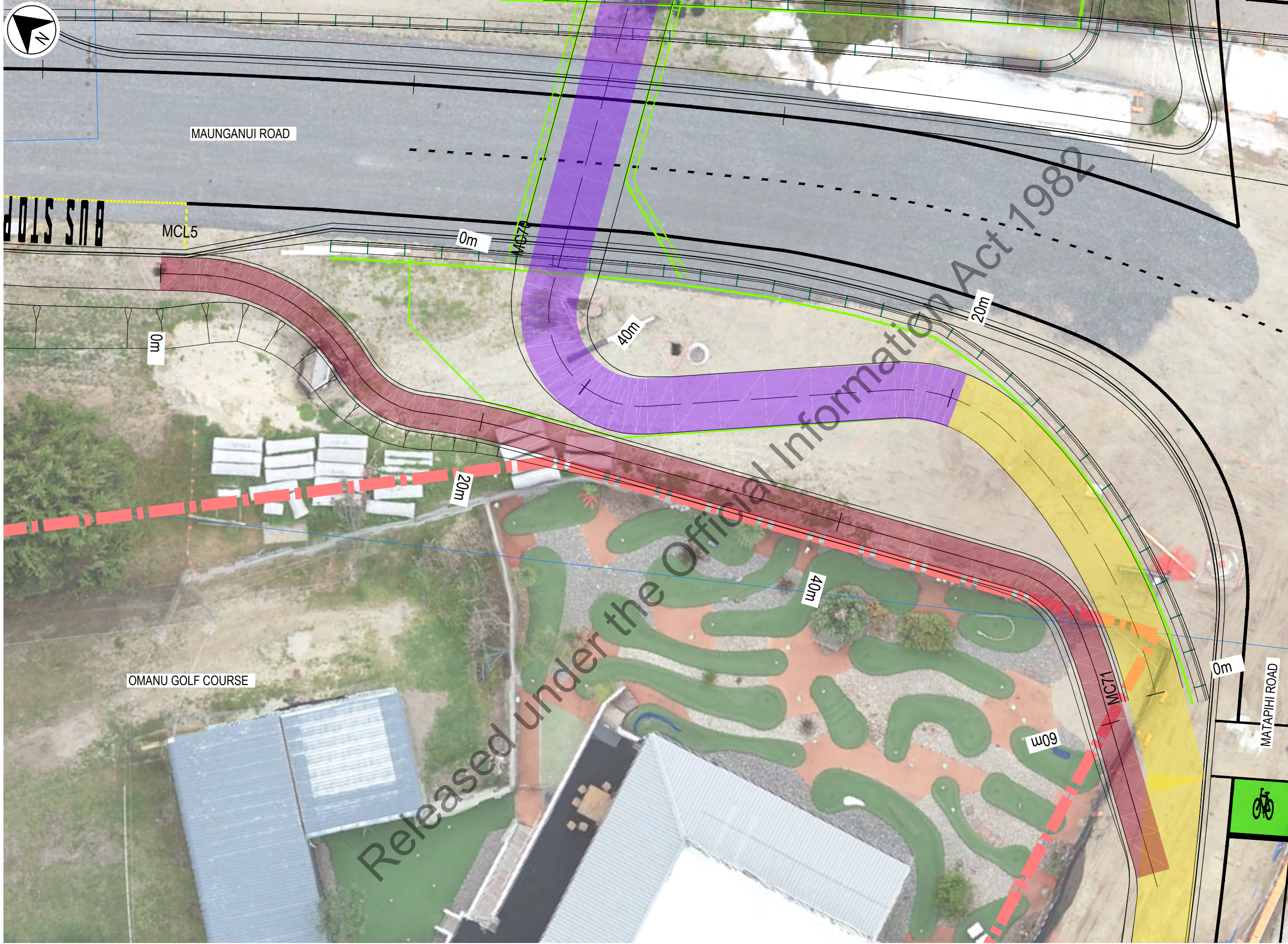
1:100@ A1	0	1	2	3	4	5	6	7	8	9	10	m
1:200@ A3												



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
 DESIGNER: KR
 DRAWING CHECK: GK
 DESIGN REVIEW: LG
 APPROVED: LW

TITLE: UNDERPASS UPGRADE BAYFAIR RAMP PLAN SHEET 2
 DRAWING No: B2B-DRG-AL01-8052
 REV: A



LEGEND

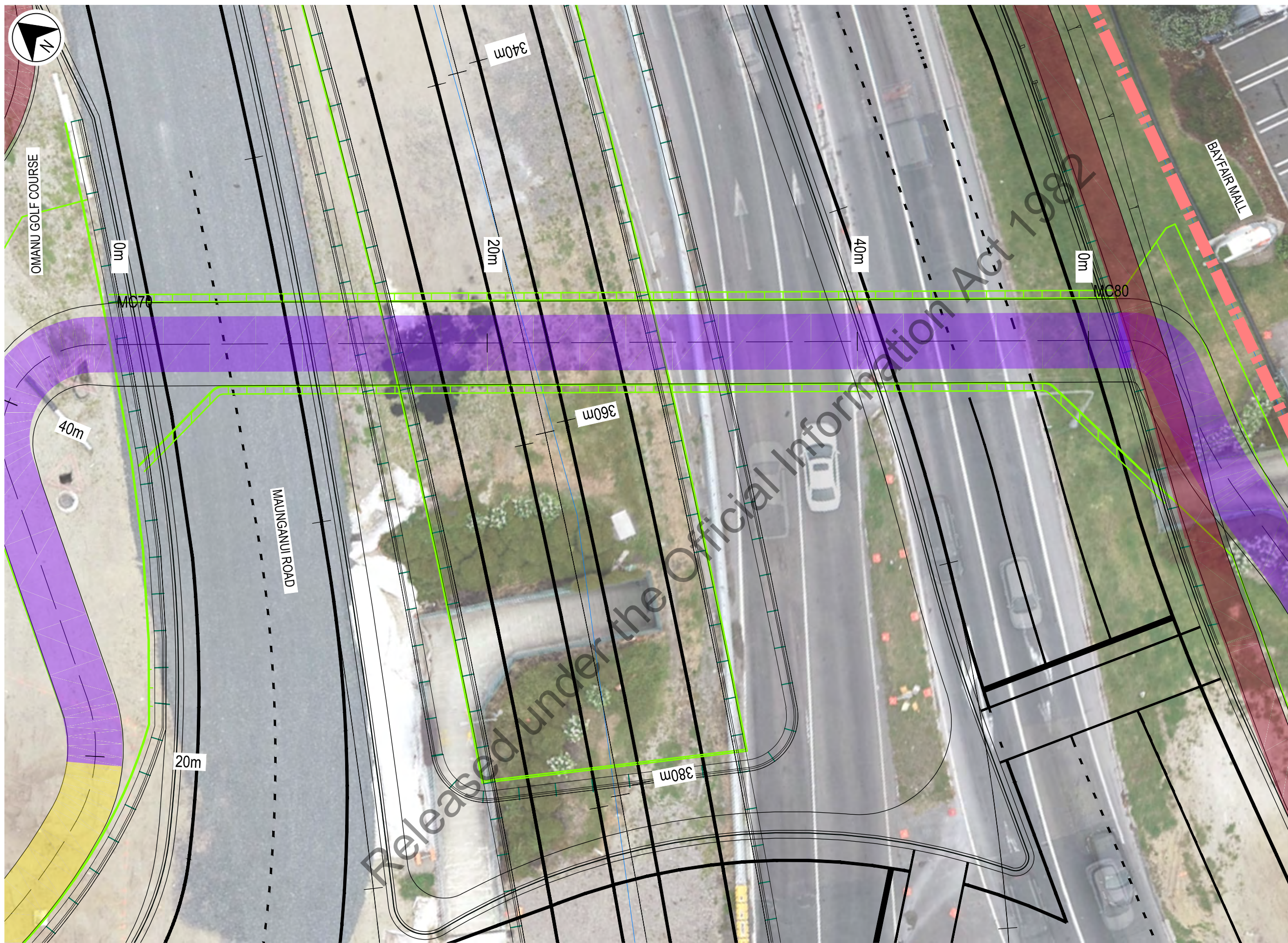
- EXISTING CADASTRAL
- DESIGNATION BOUNDARY
- SHOULDER / VERGE
- RETAINING WALL
- SHARED PATH CONSTRUCTION
- SHARED PATH ON SLAB

DATE: 14/02/2019 14:35:00 LOCATION: NAME: KAMINSKI, GRACE
 LOCATION: C:\user\grace\projects\B2B-DRG-AL01-8053.dwg

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No	DATE	CHK	DESIGN REVIEW	APPRO D.MGR	ISSUE
A	15/03/19	GK	KR	LW	50% ISSUE
REVISIONS & ISSUES					
1:100@ A1	[Scale Bar]				
1:200@ A3	[Scale Bar]				

 NZ TRANSPORT AGENCY WAKA KOTAHU	 CPB CONTRACTORS	 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, DESIGNED: KR, DRAWING CHECK: GK, DESIGN REVIEW: LG, APPROVED: LW	TITLE UNDERPASS UPGRADE MATAPIHI RAMP PLAN SHEET 3 DRAWING No B2B-DRG-AL01-8053 REV A
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LEGEND

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

DATE: 14/03/2019 14:15:50 PULOCATION: NAME: KAMINSKI, GRACE
 LOCATION: C:\users\gamin\appdata\local\temp\project\jacobz_arz_0401455982B-DRG-AL01-8054.dwg

Released under the Official Information Act 1982

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

REVISIONS & ISSUES

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

STATUS: 50% ISSUE

PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY

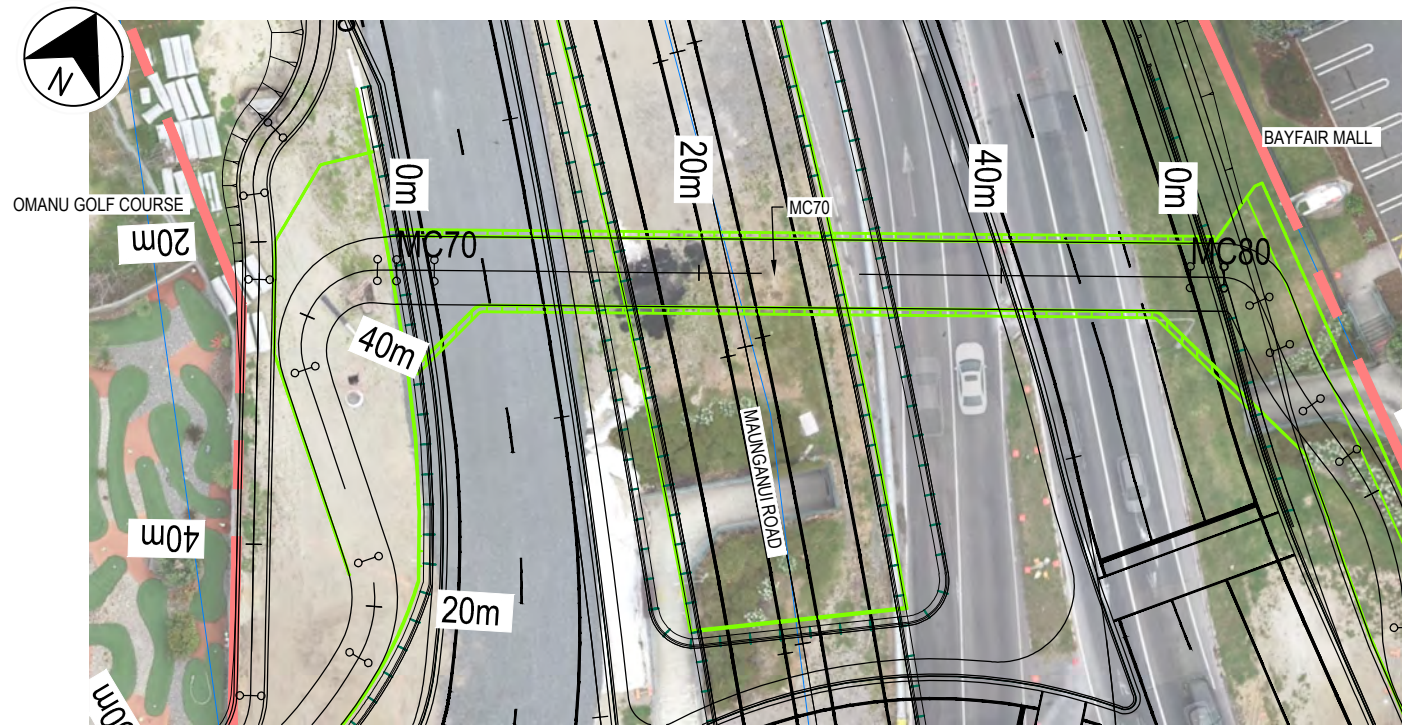
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)

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

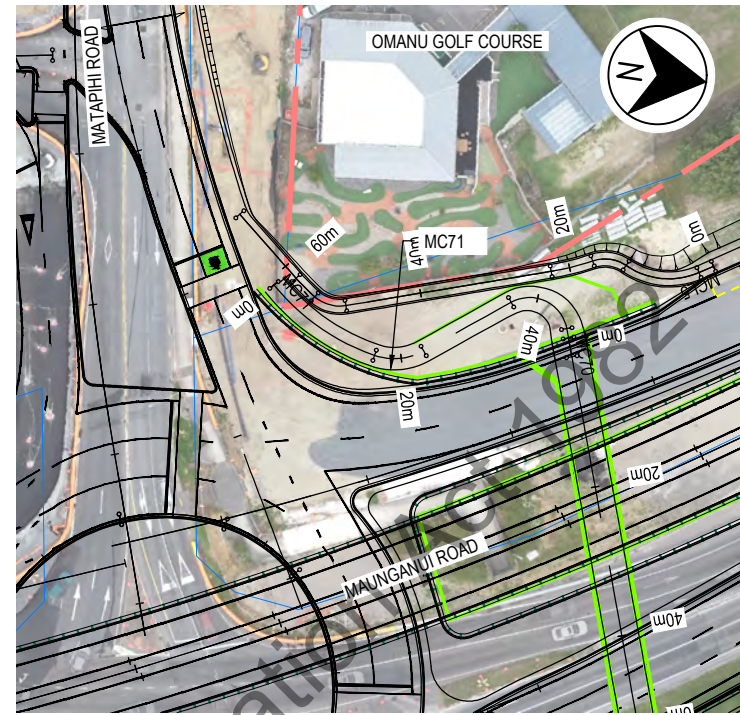
TITLE: UNDERPASS UPGRADE UNDERPASS PLAN SHEET 4

DRAWING No: B2B-DRG-AL01-8054

REV: A



PLAN
SCALE 1:500 (A3)

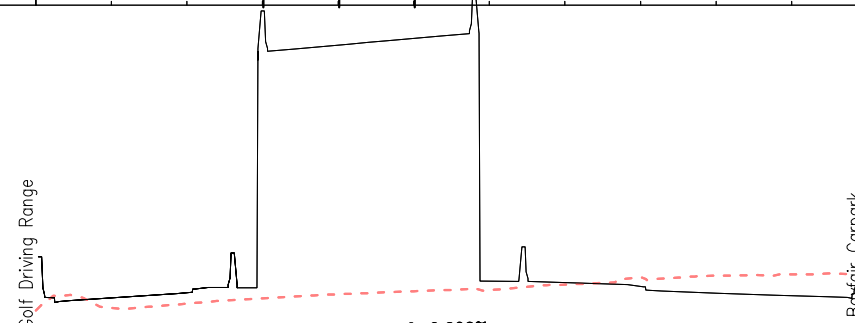


PLAN
SCALE 1:1000 (A3)

LEGEND

- EXISTING CADASTRAL
- DESIGNATION BOUNDARY
- SHOULDER / VERGE
- RETAINING WALL

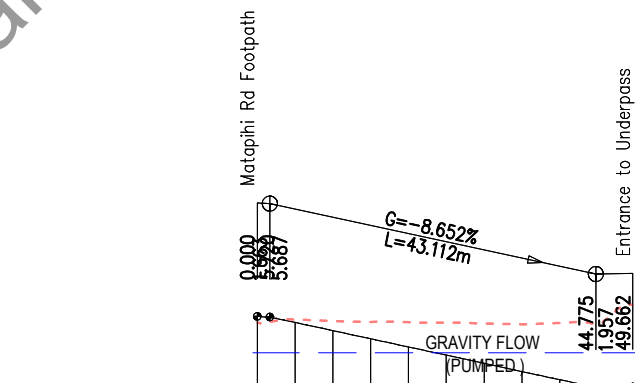
UPASS_TO_ROAD	-4.257	-4.362	11.785	10.853	11.000	-4.553	-4.481	-4.351	-4.141	-4.043
---------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------



	GRAVITY FLOW (PUMPED) G=0.600% L=54.745m											
DATUM = -1.000	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	50.000	54.745
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	6.805	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



	GRAVITY FLOW (PUMPED) G=-8.652% L=43.112m										
DATUM = -1.000	0.000	5.000	10.000	15.000	20.000	25.000	30.000	35.000	40.000	45.000	49.662
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		P
VERTICAL DATA	P=-8.652% L=39.136										

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

DATE: 14/03/2019 1:54:56 PM LOGIN NAME: KAMINSKA_GBRACE
LOCATION: C:\users\gaminina\appdata\local\temp\jacobson\jacobson\2B-DRG-AL01-8101.dwg

No	DATE	CHK	DESIGN REVIEW	APPR	D.MGR	50% ISSUE
A	15/03/19	GK	KR	LW		



CONTRACTOR



DESIGNER



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

DESIGNED

KR

DRAWING CHECK

GK

DESIGN REVIEW

LG

APPROVED

LW

TITLE

UNDERPASS UPGRADE
PLAN & LONG SECTIONS
UNDERPASS MC70 & RAMP MC71

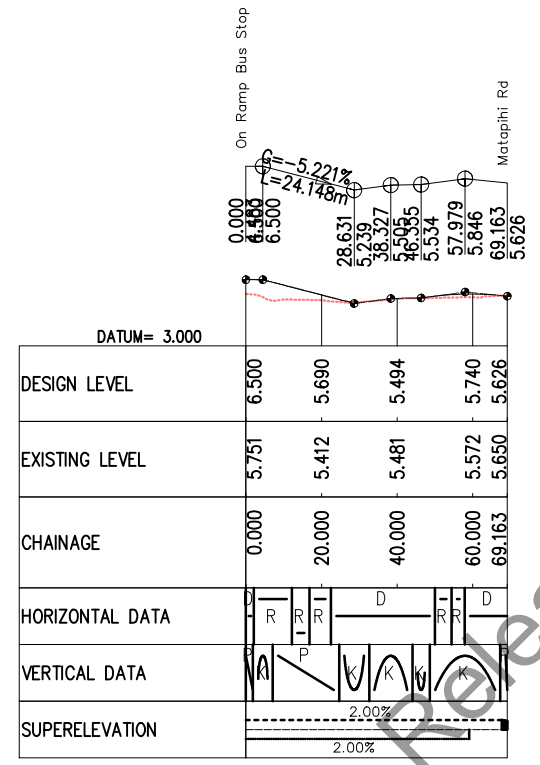
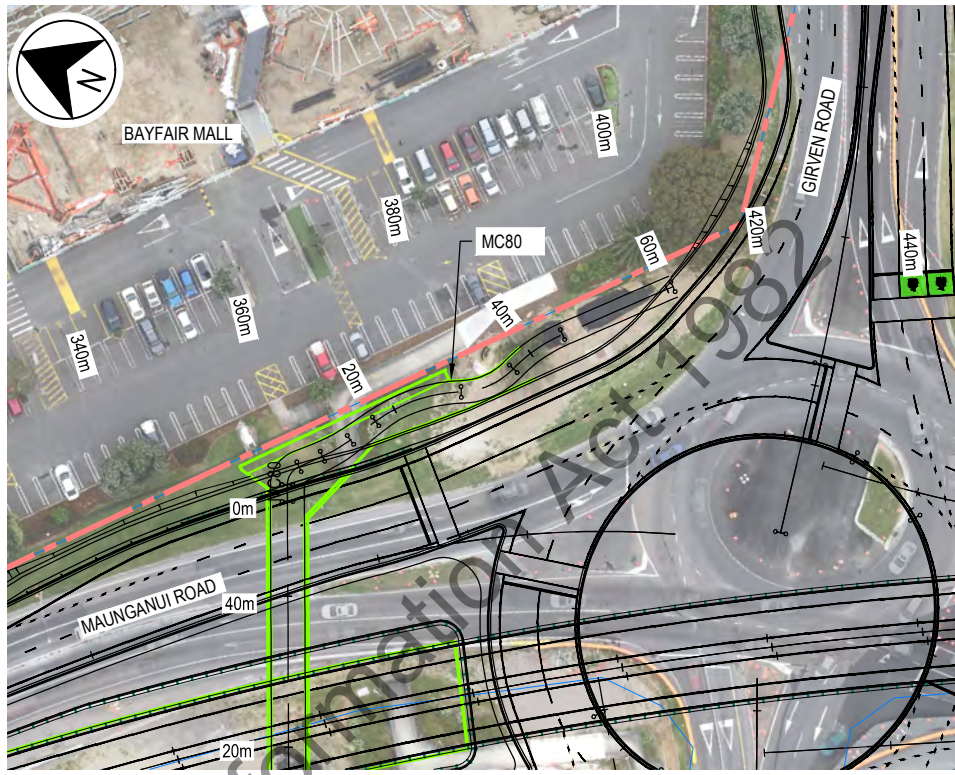
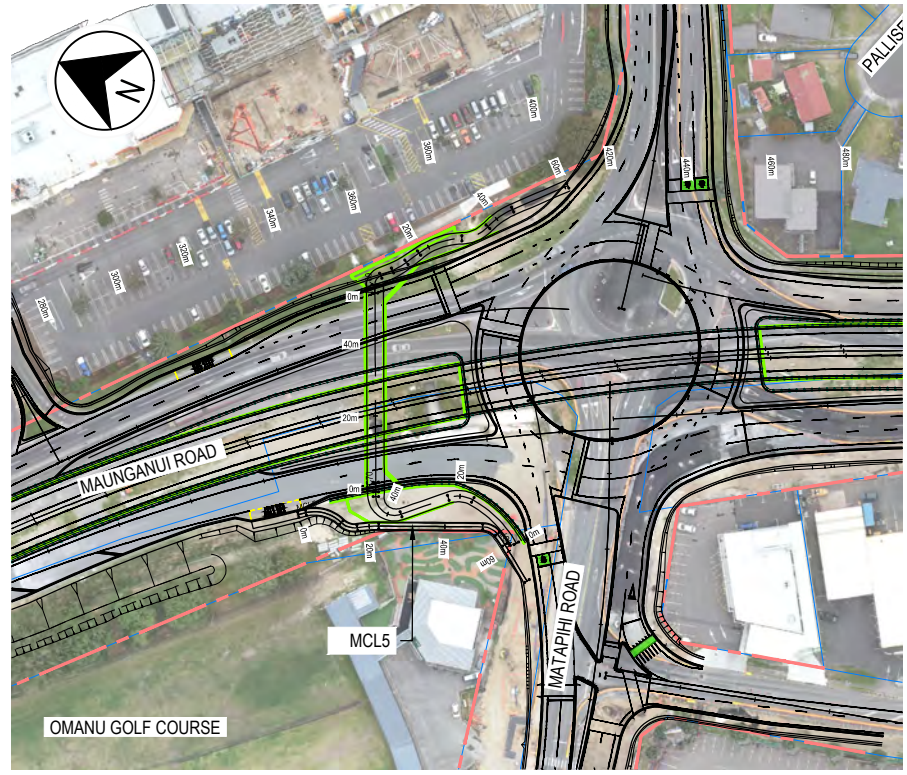
DRAWING No

B2B-DRG-AL01-8101

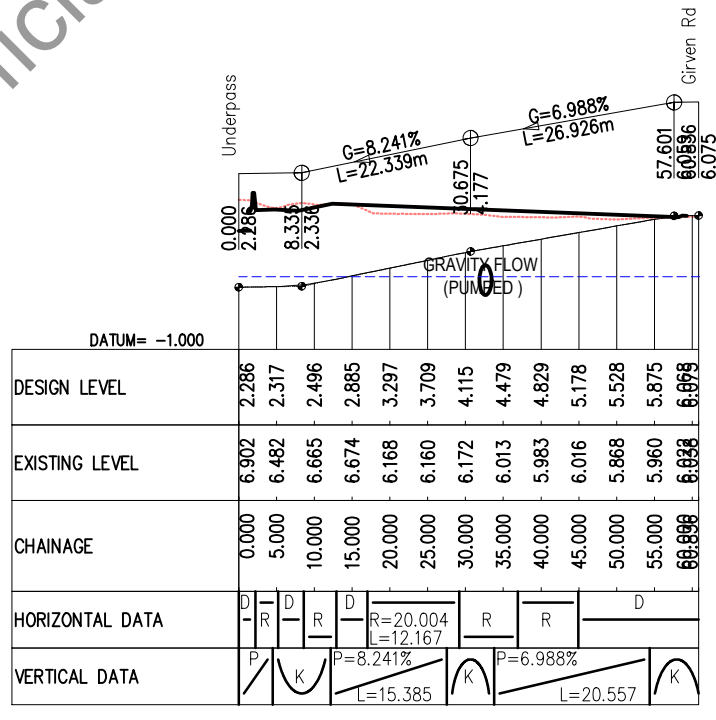
REV

A

- LEGEND**
- EXISTING CADASTRAL
 - - - DESIGNATION BOUNDARY
 - SHOULDER / VERGE
 - RETAINING WALL



LONGITUDINAL SECTION
 HORIZONTAL SCALE 1:1000
 VERTICAL SCALE 1:200



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

DATE: 14/03/2019 1:57:35 PM LOGIN NAME: KAMINSKA, GRACE LOCATION: C:\users\gaminis\appdata\local\temp\proj\jacob\jacob\mz_0e0014559828-B-DRG-AL01-8102.dwg

No	DATE	CHK	DESIGN	APPR	50% ISSUE
A	15/03/19	GK	KR	LW	50% ISSUE

REVISIONS & ISSUES

1:1000@ A1
1:2000@ A3



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
 DESIGNER: KR
 DRAWING CHECK: GK
 DESIGN REVIEW: LG
 APPROVED: LW

TITLE: UNDERPASS UPGRADE PLAN & LONG SECTIONS BUS STOP MCL5 & RAMP ACCESS MC80
 DRAWING No: B2B-DRG-AL01-8102
 REV: A

GENERAL NOTES

- G1 ALL DIMENSIONS RELEVANT TO SETTING OUT AND OFF-SITE WORK SHALL BE VERIFIED BY THE CONSTRUCTOR BEFORE CONSTRUCTION AND FABRICATION IS COMMENCED. THE DESIGNER'S DRAWINGS SHALL NOT BE SCALED.
- G2 WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH THE SPECIFICATIONS, CURRENT NEW ZEALAND CODES INCLUDING ALL AMENDMENTS, NEW ZEALAND CODES OF PRACTICE, AND THE REQUIREMENTS OF ANY OTHER RELEVANT STATUTORY AUTHORITIES, EXCEPT WHERE STATED OTHERWISE.
- G3 ANY PROPOSED SUBSTITUTIONS SHALL BE DISCUSSED AND AGREED WITH THE DESIGNER.
- G4 UNLESS NOTED OTHERWISE -
ALL DIMENSIONS ARE IN MILLIMETRES
ALL CHAINAGES ARE IN METRES
ALL CO-ORDINATES ARE TO B.O.P.2000
ALL LEVELS ARE IN METRES TO MOTURIKI DATUM
- G5 ATTENTION AND CARE SHALL BE USED BY THE CONSTRUCTOR REGARDING THE CARRYING OUT OF CONSTRUCTION ACTIVITIES IN AREAS CONTAINING EXISTING SERVICES. PRIOR TO ANY EXCAVATION, DRILLING OR PILE DRIVING, THE CONSTRUCTOR SHALL OBTAIN ALL NECESSARY PERMITS, UNDERTAKE INVESTIGATION TO DETERMINE THE LOCATION OF ALL EXISTING SERVICES RELEVANT TO THE WORKS. THE CONSTRUCTOR SHALL NOTIFY THE DESIGNER OF SERVICES THAT AFFECT THE APPROVED DESIGN.
- G6 NOT ALL SERVICES ARE IDENTIFIED ON THE DRAWINGS AND THE LOCATIONS ARE INDICATIVE ONLY. THE CONSTRUCTOR SHALL IDENTIFY THE LOCATION OF ALL SERVICES THAT MAY BE AFFECTED BY THE WORKS.
- G7 THE CONSTRUCTOR IS RESPONSIBLE FOR ENSURING THAT ALL APPROVALS ARE IN PLACE BEFORE COMMENCING CONSTRUCTION WORKS.
- G8 'FOR CONSTRUCTION' DRAWINGS ARE THE ONLY DRAWINGS THAT SHOULD BE USED FOR CONSTRUCTION WORK. ANY OTHER DRAWINGS USED FOR CONSTRUCTION WORK IS AT THE CONSTRUCTOR'S RISK.
- G9 RELEVANT DISCREPANCIES SHALL BE REFERRED TO THE DESIGNER FOR RESOLUTION BEFORE PROCEEDING WITH THE WORKS.
- G10 THE STRUCTURAL DRAWINGS DO NOT SHOW ALL DETAILS OF FIXTURES, INSERTS, SLEEVES, OPENINGS, ETC. REQUIRED FOR CONSTRUCTION. SUCH DETAILS, INCLUDING RECESSES AND CHASES, MUST BE ADVISED TO THE DESIGNER BEFORE PROCEEDING WITH CONSTRUCTION.
- G11 THE CONSTRUCTOR SHALL UNDERTAKE APPROPRIATE INSPECTIONS OF THE WORKS DURING CONSTRUCTION IRRESPECTIVE OF ANY INSPECTIONS CARRIED OUT BY THE DESIGNER.
- G12 THE DESIGN, CERTIFICATION, CONSTRUCTION AND PERFORMANCE OF FORMWORK AND FALSE WORK SHALL BE THE RESPONSIBILITY OF THE CONSTRUCTOR, AND SHALL BE CARRIED OUT IN ACCORDANCE WITH THE RELEVANT CODES.
- G13 THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR THE CONSTRUCTION PROCEDURE AND ALL LOADS DURING CONSTRUCTION. SHOULD THE CONSTRUCTOR SUBMITS ITS SUGGESTED CONSTRUCTION PROCEDURE TO THE DESIGNER FOR REVIEW, THE ACCEPTANCE OF THE PROCEDURE BY THE DESIGNER SHALL NOT ABSOLVE THE CONSTRUCTOR FROM ITS RESPONSIBILITY FOR THE PROCEDURE OR FROM ANY CONSEQUENCES WHICH MAY OCCUR DURING CONSTRUCTION.
- G14 DURING CONSTRUCTION THE CONSTRUCTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE STRUCTURE IN A STABLE CONDITION AND ENSURING NO PART SHALL BE OVERSTRESSED UNDER CONSTRUCTION ACTIVITIES. THE CONSTRUCTOR SHALL DESIGN AND INSTALL TEMPORARY BRACING AS REQUIRED. ALL BEAMS SHALL BE SECURED SO AS TO MAINTAIN THEIR CORRECT POSITION, PRIOR TO AND DURING PLACING OF THE CONCRETE FOR THE DIAPHRAGM AND DECK SLAB. ANY SUCH TEMPORARY BRACING SHALL NOT BE REMOVED UNTIL THE CONCRETE OF THE DECK SLAB HAS REACHED A COMPRESSIVE STRENGTH OF AT LEAST 15MPa. WHEN REQUESTED, BY THE DESIGNER, THE CONSTRUCTOR SHALL PROVIDE CALCULATIONS TO JUSTIFY THE ADEQUACY OF THE STRUCTURE TO SAFELY WITHSTAND THE INTENDED IMPOSED LOADS AND/OR CONSTRUCTION PROCEDURE.
- G15 FOR VARIATIONS TO THE SCOPE OR METHOD OF WORKS OR MATERIALS USED THE CONSTRUCTOR SHALL SUBMIT FULL DETAILS OF THE PROPOSAL TO THE DESIGNER FOR DESIGN REVIEW.
- G16 ALL PROPRIETARY PRODUCTS SHALL BE INSTALLED STRICTLY IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

DESIGN REQUIREMENTS

- D1 THE STRUCTURAL ELEMENTS SHOWN ON THESE DRAWINGS HAVE BEEN DESIGNED IN ACCORDANCE WITH THE NZTA BRIDGE MANUAL VERSION 3 (2013) AMDT. 1 AND THE PRINCIPAL'S REQUIREMENTS
- D2 THE STRUCTURES HAVE BEEN DESIGNED TO RESIST :

SEISMIC LOADING TO HAIRINI LINK UPGRADE STAGE IV SSSHA	SOIL CLASSIFICATION	RETURN PERIOD FACTOR R	HAZARD FACTOR Z
BR-01 MGI OVERPASS	D	1.66	0.19
BR-02 SH29A UNDERPASS	D	1.66	0.19
BR-03 ECMT RAIL OVERPASS	D	1.66	0.19

SEISMIC ACCELERATIONS HAVE BEEN MODIFIED FROM THE CODIFIED VALUES DUE TO SITE-SPECIFIC HAZARD STUDIES INDICATING A SEISMIC DEMAND WITHIN 30% OF CODIFIED VALUES

WIND LOADING TO AS/NZS 1170.2		
REGION		A7
ULTIMATE REGIONAL WIND SPEED	V ₅₀₀	45 m/s
	V ₂₅₀₀	48 m/s
SERVICEABILITY REGIONAL WIND SPEED	V ₂₅	37 m/s

DESIGN LOADING CRITERIA FOR NEW STRUCTURAL ELEMENTS ON BRIDGES	
DESIGN TRAFFIC LOADS	HN-HO-72 IN ACCORDANCE WITH NZTA BRIDGE MANUAL. LANE REDUCTION FACTORS HAVE BEEN APPLIED AS PER THE PRINCIPAL'S REQUIREMENTS
SURFACING	30mm AVERAGE LEVELLING COURSE THICKNESS, PLUS 40mm SMA THICKNESS
SUPERIMPOSED DEAD LOADS	FUTURE SURFACING ALLOWANCE, kPa 1.50 FUTURE SERVICES ALLOWANCE, kPa 0.25 (ON TOTAL DECK AREA)
CONSTRUCTION LIVE LOAD, kPa	1.50

DESIGN CRITERIA	BR01 MGI OVERPASS	BR02 SH29A UNDERPASS	BR03 ECMT RAIL OVERPASS
No. OF LOAD LANES	4	5	6
DESIGN SPEED (km / h)	80	60	60
COLLISION LOAD ON PIERS (kN)	1300	N/A	N/A

- D3 BRIDGE BARRIERS AND WHERE APPLICABLE, RETAINING WALL BARRIERS, ARE DESIGNED TO WITHSTAND AN ULTIMATE TRANSVERSE LOAD AS SPECIFIED IN NZTA NEW ZEALAND BRIDGE MANUAL UNLESS NOTED OTHERWISE
- D4 WHERE BRIDGES INCORPORATE SHEAR KEY DETAILS, THE AMOUNT OF ANY FUTURE VERTICAL JACKING UP OF THE BRIDGE FOR THE PURPOSE OF RE-LEVELLING SHALL NOT EXCEED 300 mm.
- D5 THE FOLLOWING BRIDGES HAVE BEEN CHECKED FOR A SINGLE 40 T ADT VEHICLE TRAVELLING AT 10 km/h DOWN A MARKED LANE AT THE CENTRE OF EACH BRIDGE BASED ON A MINIMUM CONCRETE COMPRESSIVE STRENGTH OF 30 MPa:
- BR01 MGI OVERPASS
- BR02 SH29A UNDERPASS
- BR03 ECMT RAIL OVERPASS

STANDARD ABBREVIATIONS

ABUT - ABUTMENT	N/A - NOT APPLICABLE
ALT - ALTERNATE	N.F - NEAR FACE
AS - AUSTRALIAN STANDARD	No. - NUMBER
@ - AT	NOM - NOMINAL
B - BOTTOM	NTS - NOT TO SCALE
CL - CENTRE LINE	NZS - NEW ZEALAND STANDARD
C/C - CENTRE TO CENTRE	NZTA - NEW ZEALAND TRANSPORT AGENCY
C.J - CONSTRUCTION JOINT	O/A - OVER ALL
C - CENTRAL	OD - OUTSIDE DIAMETER
CH - CHAINAGE	OPP - OPPOSITE
COL - COLUMN	PC - PRECAST
CONC. - CONCRETE	PCD - PITCH CIRCLE DIAMETER
C.O.S - CHECK ON SITE	PL - PLATE
CRS - CENTRES	RAD - RADIUS
CVR - COVER	RADS - RADIAN
DIA Ø - DIAMETER	RB - REIDBAR
DIM - DIMENSION	RC - REINFORCED CONCRETE
DWG - DRAWING	REF - REFER
E.F - EACH FACE	REQD. - REQUIRED
E.J - EXPANSION JOINT	R.L - REDUCED LEVEL
EQ. - EQUAL	SHLD - SHOULDER
E.W - EACH WAY	SIM - SIMILAR
EXTG - EXISTING	SOP - SETTING OUT POINT
FHWA - U.S. FEDERAL HIGHWAY ADMINISTRATION	SQ - SQUARE
F.F - FAR FACE	S/S - STAINLESS STEEL
FSL - FINISHED SURFACE LEVEL	SSL - STRUCTURAL SLAB LEVEL
FPATH - FOOT PATH	STD - STANDARD
FW - FILLET WELD	STG - STAGGERED
FWAR - FILLET WELD ALL ROUND	STIR - STIRRUP
GALV. - GALVANIZED	SYM - SYMMETRICAL
GL - GROUND LEVEL	T - TOP
H.D. - HOT DIPPED (EG. GALVANIZED)	TFC - TAPERED FLANGE CHANNEL
H.D. - HOLDING DOWN (EG. BOLTS)	THK - THICK
IP - INTERSECTION POINT	TL - TEST LEVEL
LG - LONG	TOC - TOP OF CONCRETE
LP - LIGHT POLE	TOS - TOP OF STEEL
MAX. - MAXIMUM	TYP. - TYPICAL
MIN. - MINIMUM	U/S - UNDER SIDE
MS - MILD STEEL	U.N.O. - UNLESS NOTED OTHERWISE
MSE - MECHANICALLY STABILISED EARTH	VERT - VERTICAL
	WCB - WHOLE CIRCLE BEARING

IF ABBREVIATIONS OTHER THAN THOSE IN ACCORDANCE WITH STANDARD ABBREVIATIONS LISTED ABOVE ARE USED AND THEIR MEANING IS NOT EXPLICITLY SHOWN ON DRAWINGS, REFER TO THE DESIGNER FOR CLARIFICATION PRIOR TO PROCEEDING.

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								SCALE N.T.S STATUS 95% ISSUE PROJECT NUMBER 2/09-024/603		CLIENT NZ TRANSPORT AGENCY PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK) DRAWN DCC DESIGNED CS/FL DRAWING CHECK GKK DESIGN REVIEW SKK APPROVED LW JAN 2019		TITLE GENERAL NOTES SHEET 1 DRAWING No B2B-DRG-BG01-5001 REV F	
REVISIONS & ISSUES F 18/01/19 GKK SKK LW 95% ISSUE (REV 2)													

REINFORCEMENT

- R1 REINFORCEMENT SHOWN ON THE DRAWINGS IS REPRESENTED DIAGRAMMATICALLY AND NOT NECESSARILY SHOWN IN TRUE PROJECTION.
- R2 SPLICES IN REINFORCEMENT SHALL BE MADE ONLY TO DEFORMED BARS IN THE POSITION SHOWN ON THE DRAWINGS OR AS OTHERWISE APPROVED BY THE DESIGNER. WHERE THE LAP LENGTH IS NOT SHOWN IT SHALL BE SUFFICIENT TO DEVELOP THE FULL STRENGTH OF THE REINFORCEMENT. BAR LAPS ARE TO BE AS SHOWN BELOW UNLESS SHOWN OTHERWISE.

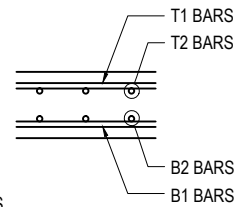
		BAR DIAMETER					
		10	12	16	20	25	32
CONCRETE - 30 MPa	TOP BAR FACTOR = 1.3 #	360	430	570	715	895	1140
STEEL GRADE - 300 MPa	BAR FACTOR = 1.0	300	330	440	550	685	880
CONCRETE - 40 MPa	TOP BAR FACTOR = 1.3 #	310	370	495	620	775	990
STEEL GRADE - 300 MPa	BAR FACTOR = 1.0	300	300	380	475	595	760
CONCRETE - 50 MPa	TOP BAR FACTOR = 1.3 #	300	335	445	555	690	885
STEEL GRADE - 300 MPa	BAR FACTOR = 1.0	300	300	340	425	535	680
CONCRETE - 30 MPa	TOP BAR FACTOR = 1.3 #	595	715	950	1190	1485	1900
STEEL GRADE - 500 MPa	BAR FACTOR = 1.0	460	550	735	915	1145	1465
CONCRETE - 40 MPa	TOP BAR FACTOR = 1.3 #	515	620	825	1030	1285	1645
STEEL GRADE - 500 MPa	BAR FACTOR = 1.0	400	475	635	795	990	1265
CONCRETE - 50 MPa	TOP BAR FACTOR = 1.3 #	460	555	740	920	1150	1475
STEEL GRADE - 500 MPa	BAR FACTOR = 1.0	355	425	570	710	885	1135

- WHERE MORE THAN 300mm OF CONCRETE IS TO BE PLACED BELOW A HORIZONTAL BAR

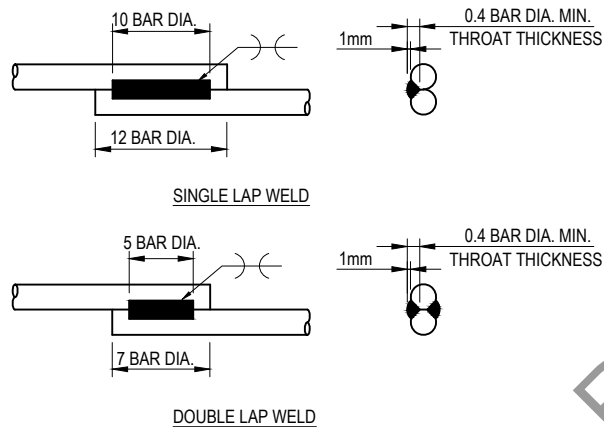
- R3 ALL REINFORCING BAR SHALL BE MANUFACTURED USING A MICRO ALLOY PROCESS.
- R4 REINFORCEMENT SYMBOLS:
 YD SEISMIC GRADE 500 DEFORMED REINFORCING BARS, DUCTILITY CLASS E TO AS/NZS 4671
 YR SEISMIC GRADE 500 PLAIN REINFORCING BARS, DUCTILITY CLASS E TO AS/NZS 4671
 RB REIDBAR GRADE 500 DEFORMED REINFORCING BARS, DUCTILITY CLASS E TO AS/NZS 4671

R5 REINFORCEMENT ABBREVIATIONS:

- ABR ALTERNATE BARS REVERSED
- EF EACH FACE
- NF NEAR FACE
- FF FAR FACE
- EW EACH WAY
- T TOP
- B or BTM BOTTOM
- C CENTRAL
- CP CENTRALLY PLACED
- LV LENGTH VARIES
- ALT or AP ALTERNATELY PLACED BARS

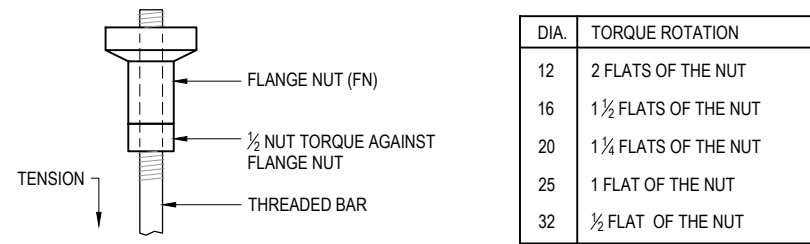


- R6 WELDED SPLICES WHERE APPROVED BY THE DESIGNER, SHALL BE CONSTRUCTED TO AS/NZS 1554.3 AS FOLLOWS:



REINFORCEMENT (cont.)

- R7 FLANGE NUTS USED FOR ANCHORAGE SHALL COMPLY WITH NZTA BRIDGE MANUAL, cl 4.2.1 (f) AS AMENDED BY THE NZTA TECHNICAL ADVISE NOTE # 17-14 WHEN A FLANGE NUT IS REQUIRED TO BE ANCHORED WITH MINIMUM SLIP, BOTH OF THE FOLLOWING METHODS SHALL BE USED (U.N.O. BY THE MANUFACTURER):
 a. TORQUE BY ROTATION BEYOND HAND TIGHT AS GIVEN IN THE TABLE

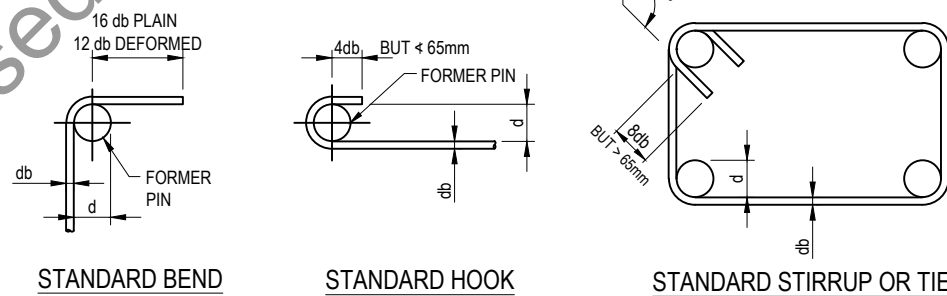


DIA.	TORQUE ROTATION
12	2 FLATS OF THE NUT
16	1 1/2 FLATS OF THE NUT
20	1 1/4 FLATS OF THE NUT
25	1 FLAT OF THE NUT
32	1/2 FLAT OF THE NUT

- FOR REID STEEL FLANGE NUTS, HALF NUT TO BE TIGHTENED TO SNUG TIGHT. TORQUEING SHALL NOT EXCEED SNUG TIGHT.
- b. FLANGE NUT TO BE EPOXIED TO BAR USING RAMSET EPCON C8 EXTREME EPOXY OR OTHER SIMILAR APPROVED EPOXY.

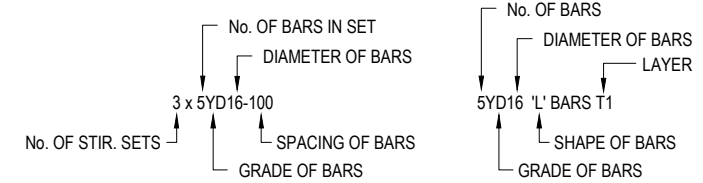
- R8 WELDING OF REINFORCEMENT SHALL NOT BE UNDERTAKEN UNLESS SHOWN ON THE DRAWINGS OR APPROVED BY THE DESIGNER.
- R9 ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON CONCRETE CHAIRS AT NOT GREATER THAN 1000mm CENTRES BOTH WAYS. ALL REINFORCEMENT SHALL BE SECURELY TIED WITH WIRE TIES AND ALL THE ENDS SHALL BE TURNED INTO THE MEMBER CLEAR OF THE COVER ZONE. MESH SHALL BE SUPPORTED ON CONCRETE CHAIRS AT 800mm MAXIMUM CENTRES.
- R10 MINIMUM LAPS IN MESH SHALL BE THE LARGER SPACING OF TRANSVERSE WIRES UNLESS SHOWN OTHERWISE ON THE DRAWINGS.
- R11 MESH SHALL NOT BE LAID ON THE GROUND AND PULLED INTO POSITION THROUGH THE CONCRETE.
- R12 REINFORCEMENT DEVELOPMENT LENGTHS SHALL EQUAL LAP LENGTHS.
- R13 ALL RE-ENTRANT CORNERS OF PENETRATIONS THROUGH WALLS AND SLABS SHALL BE TRIMMED USING MINIMUM 2-YD16 DIAGONAL CORNER BARS x 1500mm LONG ON EACH FACE OF WALL OR SLAB, UNLESS SHOWN OTHERWISE ON THE DRAWINGS.
- R14 AT SLAB EDGES INCLUDING CONSTRUCTION AND OTHER JOINTS, AT LEAST ONE REINFORCING BAR OR FABRIC WIRE SHALL BE LOCATED PARALLEL TO AND WITHIN 75mm OF THE SLAB EDGE.
- R15 AT PENETRATIONS WITH DIMENSIONS LESS THAN 300mm, REINFORCEMENT SHALL NOT BE CUT, RATHER GATHER REINFORCEMENT TO EACH SIDE OF PENETRATION U.N.O. ON THE DRAWINGS.
- R16 REINFORCEMENT SHALL NOT BE CUT, BENT OR RE-BENT ON SITE UNLESS APPROVED BY THE DESIGNER. ALL REINFORCEMENT SHALL BE BENT IN ACCORDANCE WITH NZS 3109:1997 AND AS INDICATED AS FOLLOWS U.N.O.

	BAR TYPE	BAR DIA. (db)	MINIMUM BEND DIAMETER (d)	
			PLAIN BARS	DEFORMED BARS
GRADE 500	STIRRUPS AND TIES	6-20	2db	4db
		25	3db	6db
	ALL OTHER BARS	6-20	5db	5db
		25-40	6db	6db



REINFORCEMENT (cont.)

- R17 REINFORCEMENT CALL UP ON STRUCTURAL DRAWINGS IS DENOTED AS FOLLOWS:



- R18 CONCRETE SHALL NOT BE DELIVERED UNTIL FINAL REINFORCEMENT INSPECTION HAS BEEN COMPLETED.
- R19 SPLICES SHALL BE STAGGERED SO THAT NO MORE THAN 50% OCCUR AT ANY LOCATION UNLESS NOTED OTHERWISE ON THE DRAWINGS.
- R20 THE TOLERANCE ON BENDING & FIXING OF REINFORCEMENT SHALL BE AS NOTED IN NZS 3109:1997 CLAUSE 3.9 (AS REPRODUCED BELOW)

A BENDING TOLERANCES:		
1. CRANKS STIRRUPS AND TIES WHERE MEMBER DEPTH IS LESS THAN 200mm		+0, -5mm
MEMBER DEPTH IS 200mm OR MORE		+0, -10mm
2. OTHER STEEL		+0, -15mm
3. LENGTH OF STRAIGHT BARS		+0, -15mm
4. LENGTH OF STRAIGHT BARS WHERE FITMENT IS NOT CRITICAL		+20mm
B. TOLERANCES ON BAR SPACING/POSITION:		
1. SPACING OF MAIN BARS IN BEAMS AND COLUMNS		±10mm
2. DISTANCE BETWEEN LAYERS OF MAIN STEEL (NOT TO BE LESS THAN 25mm)		±5mm
3. DISTANCE BETWEEN BARS ALONG THE FACE OF WALLS OR SLABS		±20mm
4. SPACING OF STIRRUPS OR TIES IN BEAMS AND COLUMNS		±20mm
5. LONGITUDINAL POSITION OF SPLICE		±30mm

- R21 SPACING OF REINFORCEMENT SHALL BE TAKEN AS EQUAL UNLESS NOTED OTHERWISE.

- R22 REINFORCING BAR COUPLERS SHALL DEVELOP AT LEAST THE FULL BREAKING STRENGTH OF THE JOINED BARS AS PER NZS 3101:2006 CONCRETE STRUCTURES STANDARD AND SHALL IN ACCORDANCE WITH THE BRIDGE MANUAL CLAUSE 4.2.1 (f), AS AMENDED BY THE NZTA TECHNICAL ADVISE NOTE # 17-14.

PRE-STRESSING

- PS1 MATERIAL SPECIFICATION AND MAXIMUM STRESSES IN THE STRANDS:

STRAND TYPE TO BE 7-WIRE STRESS RELIEVED RELAX 2 SUPER GRADE IN ACCORDANCE WITH AS/NZS 4672 PART 1:2007. MAXIMUM STRESSES IN PRESTRESSED STRUCTURAL ELEMENTS SHALL COMPLY WITH NZS 3101:PART 1: 2006.

15.2mm NOMINAL DIAMETER STRAND
 NOMINAL AREA - 143mm²
 MINIMUM BREAKING FORCE - 250kN
 MINIMUM YIELD STRENGTH - 212.5kN
 MAXIMUM JACKING FORCE IN THE STRANDS - THE LESSER OF 199.7kN OR THE MAXIMUM VALUE RECOMMENDED BY THE MANUFACTURER OF THE PRESTRESSING STRANDS OR ANCHORAGES
 MAXIMUM STRAND FORCE IMMEDIATELY AFTER PRESTRESS TRANSFER - 185.0kN
 MODULUS OF ELASTICITY - 195000MPa ±10000MPa

- PS2 DEBONDING OF TENDONS SHALL NOT BE ACHIEVED BY THE USE OF GREASE.
- PS3 REFER TO INDIVIDUAL STRUCTURE DRAWINGS FOR REQUIRED JACKING FORCE FOR EACH STRUCTURE.
- PS4 ELEVATED TEMPERATURE CURING SHALL NOT BE USED FOR PRE-TENSIONED PRESTRESSED STRUCTURAL ELEMENTS WITHOUT PRIOR APPROVAL BY THE DESIGNER. CURING TEMPERATURES TO BE LIMITED TO A MAXIMUM OF 70°.

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					CONTRACTOR CPB CONTRACTORS	DESIGNER JACOBS Align Tonkin+Taylor	SCALE N.T.S.	CLIENT NZ TRANSPORT AGENCY	TITLE GENERAL NOTES SHEET 3				
F 18/01/19 GKK SKK LW 95% ISSUE (REV 2)					PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)		STATUS 95% ISSUE	PROJECT NUMBER 2/09-024/603	DRAWN DCC	DRAWING CHECK GKK	APPROVED LW JAN 2019	DRAWING No B2B-DRG-BG01-5003	REV F
REVISIONS & ISSUES													

STEELWORK

- S1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH RELEVANT NEW ZEALAND STANDARDS.
- S2 STEEL COMPONENTS SHALL CONFORM TO THE FOLLOWING TABLE U.N.O :

COMPONENT	AS/NZS	GRADE
PLATE	3678	250
HOT ROLLED SECTIONS	3679	300
CHS > 80mm DIA.	AS 1163	C350
CHS < 80mm DIA.	AS 1163	C250
RHS & SHS	AS 1163	C350
WELDED BEAMS & COLUMNS	3679	300
FLAT BARS & RODS	3679	250

- S3 UNLESS NOTED OTHERWISE:
 - ALL WELDS TO BE 6mm CONTINUOUS FILLET FROM E48XX ELECTRODES, OR EQUIVALENT.
 - ALL WELDS TO BE CATEGORY SP.
 - ALL BOLTS TO BE MINIMUM M20 GRADE 8.8/S GALVANISED IN 22mm DIAMETER HOLES.
 - ALL HOLDING DOWN BOLTS TO BE MINIMUM M20 GRADE 4.6/S, GALVANISED.
 - ALL CLEAT PLATES AND STIFFENERS TO BE MINIMUM 10mm THICK.
 - ALL BUTT WELDS SHALL BE COMPLETE PENETRATION BUTT WELDS (U.N.O.)
- S4 WELD TYPES ARE DESIGNATED AS FOLLOWS:
 - CFW - CONTINUOUS FILLET WELD
 - CPBW - COMPLETE PENETRATION BUTT WELD
 - PPBW - PARTIAL PENETRATION BUTT WELD
 - FSBW - FULL STRENGTH BUTT WELD
- S5 WELDS SHALL CONFORM TO AS/NZS 1554 AND WELDING ELECTRODES TO AS/NZS 1553. WELDING SHALL BE PERFORMED BY AN EXPERIENCED OPERATOR. THE INSPECTION/TESTING OF ALL WELDS SHALL BE CARRIED OUT BY QUALIFIED PERSONNEL IN ACCORDANCE WITH AS 2214 AND NOTES ON THE DRAWINGS.
- S6 THE BOLTING PROCEDURE IS DESIGNATED AS FOLLOWS:
 - 8.8/S - REFERS TO HIGH STRENGTH BOLTS OF STRENGTH GRADE 8.8 TO AS/NZS 1252, TIGHTENED USING A STANDARD WRENCH TO A SNUG TIGHT CONDITION.
 - 8.8/TF - REFERS TO HIGH STRENGTH BOLTS OF STRENGTH GRADE 8.8 TO AS/NZS 1252, FULLY TENSIONED TO AS 4100, DESIGNED AS A FRICTION TYPE JOINT.
 - 8.8/TB - REFERS TO HIGH STRENGTH BOLTS OF STRENGTH GRADE 8.8 TO AS/NZS 1252, FULLY TENSIONED TO AS 4100, DESIGNED AS A BEARING TYPE JOINT.
- S7 UNLESS NOTED OTHERWISE CONNECTIONS BETWEEN 2 STRUCTURAL STEEL MEMBERS SHALL HAVE MINIMUM 2M20 8.8/S GALVANISED BOLTS IN 22mm DIA HOLES. HOLE DIAMETER SHALL BE 2mm LARGER THAN THE BOLT DIA. FOR BOLTS UP TO M24 AND NOT MORE THAN 3mm LARGER FOR A BOLT OF LARGER DIAMETER.
- S8 ALL BOLTS SHALL BE OF SUCH LENGTH THAT AT LEAST ONE FULL THREAD IS EXPOSED BEYOND THE NUT AFTER THE NUT HAS BEEN TIGHTENED. A MINIMUM OF ONE WASHER SHALL BE USED UNDER THE NUT IN ALL SITUATIONS. IF TIGHTENING IS CARRIED OUT AT THE HEAD, AN ADDITIONAL WASHER SHALL BE USED UNDER THE HEAD. FOR SLOTTED HOLES, HARDENED WASHERS SHALL BE USED UNDER THE NUT AND BOLT HEAD. FLAT ROUND WASHERS AND SQUARE TAPERED WASHERS SHALL COMPLY WITH AS/NZS 1252
- S9 PROTECTION OF STRUCTURAL STEELWORK SHALL BE IN ACCORDANCE WITH NZTA 'PROTECTIVE COATINGS FOR STEEL BRIDGES : 2014'
- S10 FAYING SURFACES OF TF CONNECTIONS SHALL BE LEFT UNPAINTED AND FREE OF SCALE U.N.O. BOLTS IN THE TF AND TB CONNECTION SHALL BE TIGHTENED USING THE PART TURN METHOD OR LOAD INDICATING WASHERS. CALIBRATED TORQUE WRENCHES SHALL NOT BE USED. A HARDENED WASHER SHALL BE USED UNDER THE BOLT HEAD OR NUT, WHICHEVER IS ROTATED. THE RE-USE OF FULLY TENSIONED BOLTS IS PROHIBITED.
- S11 STRUCTURAL STEELWORK THAT IS TO BE GALVANISED, SHALL HAVE THE FOLLOWING SURFACE FINISH IN ACCORDANCE WITH AS/NZS 2312.1 : 2014 U.N.O.

ELEMENT	LOCATION	SURFACE FINISH
EXPOSED TO WEATHER INCLUDING ALL STIFFENERS, FASTENERS AND ALL BOLTS	ACCESSIBLE FOR MAINTENANCE	HDG 600
	INACCESSIBLE FOR MAINTENANCE	HDG 900

LOCATIONS REGARDED AS INACCESSIBLE FOR MAINTENANCE INCLUDE ANY LOCATIONS BENEATH THE BRIDGE DECK, ABOVE A ROADWAY OR WATERWAY, OR GREATER THAN 2m ABOVE THE GROUND / ADJACENT SURFACE.

STEELWORK (cont.)

- S12 COATINGS DAMAGED DURING TRANSPORT AND ERECTION OR BY WELDING SHALL BE MADE GOOD AFTER BEING WIRE-BRUSHED CLEANED, PREPARED AND RE-COATED IN ACCORDANCE WITH AS/NZS 2312 FOR THE SPECIFIC COATING SYSTEM.
- S13 ALL STEEL BELOW GROUND SHALL BE ENCASED BY 75mm OF CONCRETE.
- S14 HOT DIP GALVANIZING SHALL BE IN ACCORDANCE WITH RELEVANT STANDARDS AS/NZS 1559, AS/NZS 4680, AS/NZS 4791 & AS/NZS 4792 REPAINTING/REPAIR OF DAMAGED GALVANIZED SURFACES (E.G: SITE WELDS) SHALL BE CARRIED OUT WITH 2 COATS OF APPROVED ZINC RICH PAINT.
- S15 THE ENDS OF ALL TUBULAR MEMBERS SHALL BE SEALED WITH 3mm THICK PLATES AND CONTINUOUS FILLET WELDED U.N.O. THE FABRICATOR SHALL DISCUSS WITH THE DESIGNER, AND INDICATE ON SHOP DRAWINGS, ALL REQUIRED VENT HOLES ETC, IN SEALED GALVANIZED MEMBERS.
- S16 PARTS OF THE STRUCTURE WHICH MIGHT COLLECT WATER DURING CONSTRUCTION SHALL HAVE DRAINAGE HOLES IN LOCATIONS APPROVED BY THE DESIGNER.
- S17 THE CONSTRUCTOR SHALL PROVIDE AND LEAVE IN PLACE UNTIL PERMANENT BRACING ELEMENTS ARE CONSTRUCTED SUCH TEMPORARY BRACING AS IS NECESSARY TO STABILIZE THE STRUCTURE DURING ERECTION.
- S18 ALL STAINLESS STEEL SHALL BE GRADE 316 OR GRADE 316 L.

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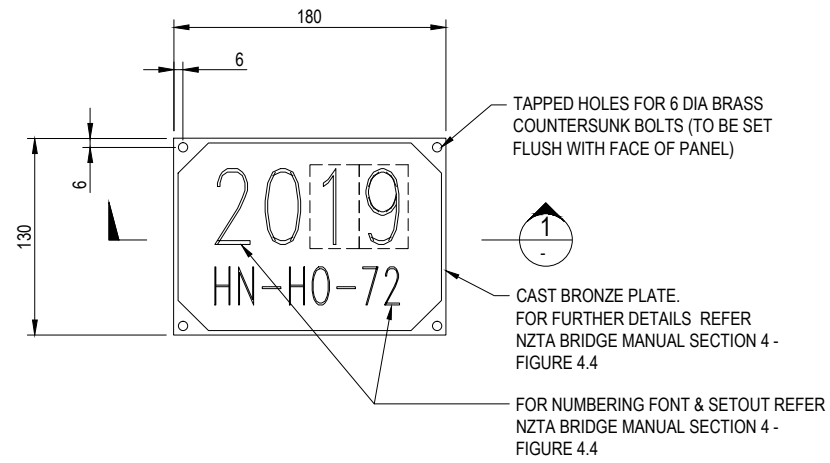
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			 	SCALE N.T.S.	CLIENT NZ TRANSPORT AGENCY	TITLE GENERAL NOTES SHEET 4
				STATUS 95% ISSUE	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	
				PROJECT NUMBER 2/09-024/603	DRAWN DCC	DESIGNED CS/FL
					DRAWING CHECK GKK	DESIGN REVIEW SKK
					APPROVED LW JAN 2019	DRAWING No B2B-DRG-BG01-5004
						REV F

No	DATE	DRG CHECK	DESIGN REVIEW	APPD MGR	REVISIONS & ISSUES
F	18/01/19	GKK	SKK	LW	95% ISSUE (REV 2)

DATE & LOADING PLATE

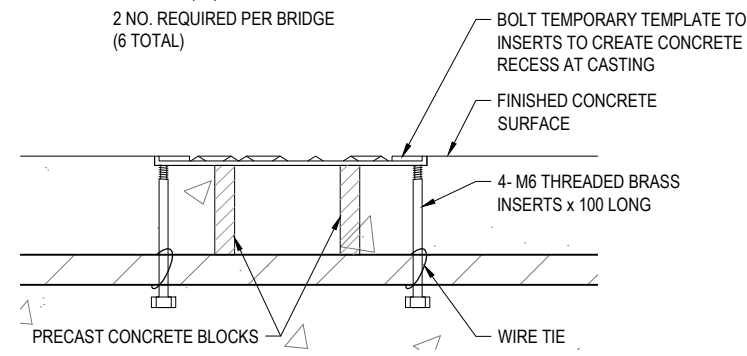
DL1 DATE & LOADING PANELS SHALL CONFORM TO NZTA BRIDGE MANUAL CLAUSE 4.12.6 AS FOLLOWS :



DATE & LOADING PANEL ELEVATION

SCALE 1:5 (A3)

2 NO. REQUIRED PER BRIDGE (6 TOTAL)



DETAIL

SCALE 1:5 (A3)



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No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
F	18/01/19	GKK	SKK	LW	95% ISSUE (REV 2)



SCALE	AS SHOWN
STATUS	95% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY		
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)		
DRAWN	DCC	DRAWING CHECK	GKK
DESIGNED	CS/FL	DESIGN REVIEW	SKK
APPROVED	LW JAN 2019		

TITLE	GENERAL NOTES SHEET 5	
DRAWING No	B2B-DRG-BG01-5005	REV F

DRAWING NUMBER	REVISION	TITLE 1	TITLE 2	TITLE 3
B2B-DRG-BR05-8500	A	BR05 - PEDESTRIAN UNDERPASS	DRAWING LIST	
B2B-DRG-BR05-8501	A	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - UNDERPASS
B2B-DRG-BR05-8502	A	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - MATAPIHI RAMP
B2B-DRG-BR05-8503	A	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - BAYFAIR RAMP
B2B-DRG-BR05-8511	A	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS & DETAILS	SHEET 1
B2B-DRG-BR05-8512	A	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS & DETAILS	SHEET 2
B2B-DRG-BR05-8513	A	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS & DETAILS	SHEET 3
B2B-DRG-BR05-8521	A	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	TYPE BR05-PB1
B2B-DRG-BR05-8522	A	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	TYPE BR05-PB1
B2B-DRG-BR05-8523	A	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	STEEL RAIL ELEVATIONS
B2B-DRG-BR05-8524	A	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	STEEL RAIL DETAILS

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DATE: 03/03/2019 5:24:54 PM. LOGIN NAME: COMMON, DAVID C
 LOCATION: C:\users\common\appdata\local\temp\caweb\jacobsonz_ie\014559622-DRG-BR05-8500.dwg

<table border="1"> <tr> <td>No</td> <td>DATE</td> <td>DRG CHECK</td> <td>DESIGN REVIEW</td> <td>APP'D D.MGR</td> <td>REVISIONS & ISSUES</td> </tr> <tr> <td>A</td> <td>08/03/19</td> <td>GKK</td> <td>PNO</td> <td>LW</td> <td>50% ISSUE</td> </tr> </table>		No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES	A	08/03/19	GKK	PNO	LW	50% ISSUE		CONTRACTOR 	DESIGNER   	SCALE N.T.S. STATUS FOR INFORMATION PROJECT NUMBER 2/09-024/603	CLIENT NZ TRANSPORT AGENCY PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK) <table border="1"> <tr> <td>DRAWN DCC</td> <td>DRAWING CHECK GKK</td> <td>APPROVED LW</td> </tr> <tr> <td>DESIGNED PNO</td> <td>DESIGN REVIEW SKK</td> <td>FEB 2019</td> </tr> </table>	DRAWN DCC	DRAWING CHECK GKK	APPROVED LW	DESIGNED PNO	DESIGN REVIEW SKK	FEB 2019	TITLE BR05 - PEDESTRIAN UNDERPASS DRAWING LIST DRAWING No B2B-DRG-BR05-8500 REV A
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES																				
A	08/03/19	GKK	PNO	LW	50% ISSUE																				
DRAWN DCC	DRAWING CHECK GKK	APPROVED LW																							
DESIGNED PNO	DESIGN REVIEW SKK	FEB 2019																							

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 - MATAPIHI RAMP
B2B-DRG-BR05-8503	B	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - BAYFAIR 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 BARRIERS	TYPE BR05-PB1
B2B-DRG-BR05-8522	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	TYPE BR05-PB1
B2B-DRG-BR05-8523	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	STEEL RAIL ELEVATIONS
B2B-DRG-BR05-8524	B	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	STEEL RAIL DETAILS

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DATE: 15/03/2019 4:30:09 PM LOGIN NAME: CONNOR, DAVID C
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No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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A	08/03/19	GKK	TKF	LW	PRELIMINARY - FOR PRICING



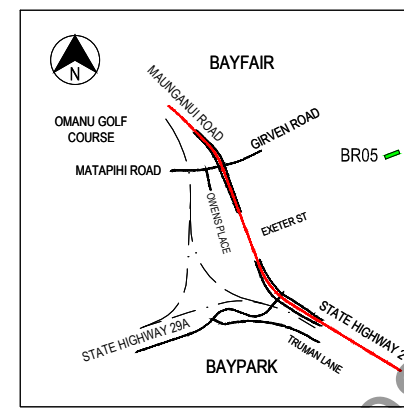
SCALE: N.T.S.
 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

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

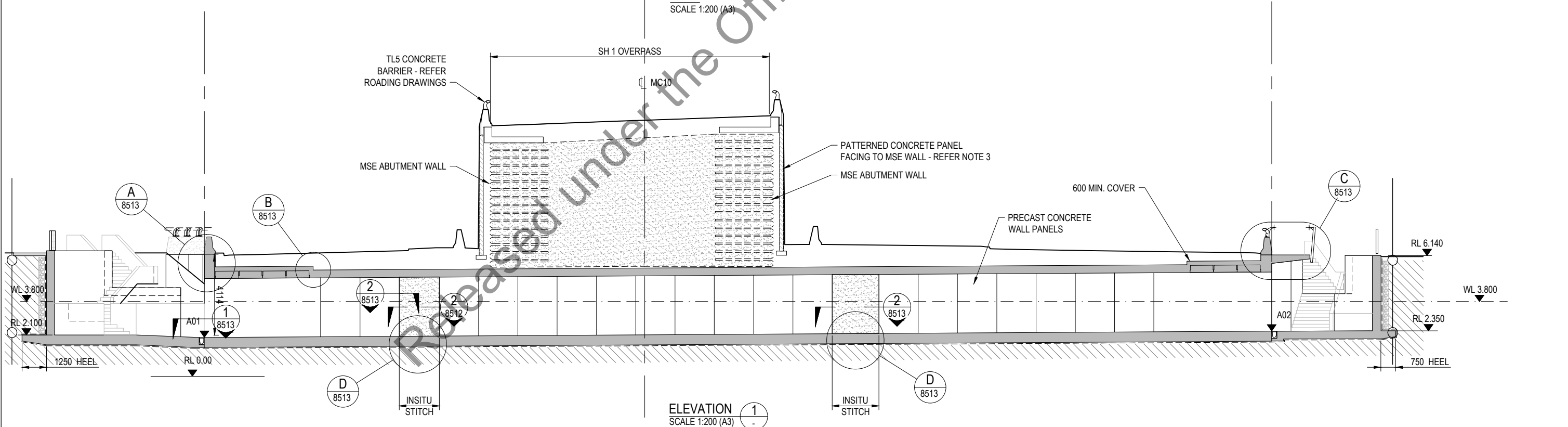
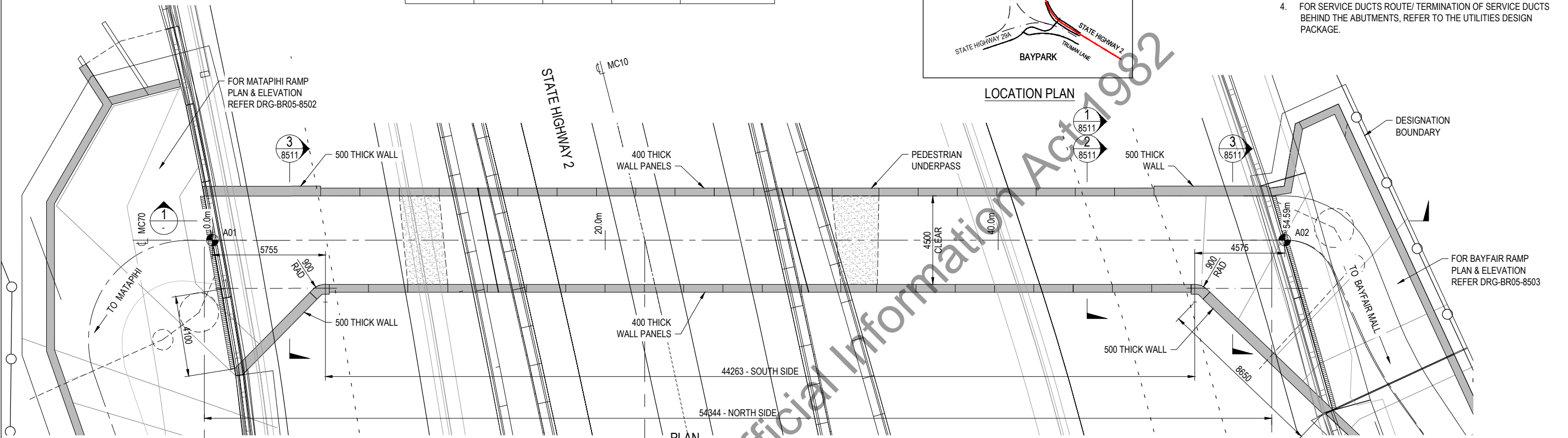


BR05 - PEDESTRIAN UNDERPASS				
SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
A01	378438.244	809430.359	1.980	
A02	378489.436	809449.319	2.300	



NOTES

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



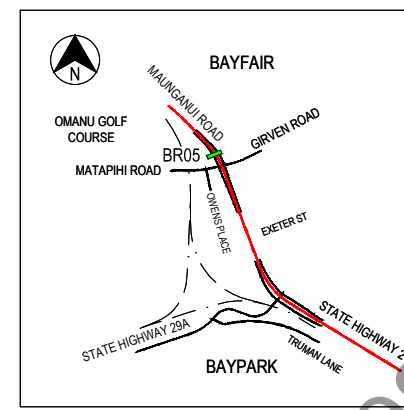
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No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	08/03/19	GKK	PWC	LW	PRELIMINARY
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

 NZ TRANSPORT AGENCY WAKA KOTAHĪ	 CPB CONTRACTORS	 JACOBS	 Tonkin+Taylor	SCALE 1:400 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT UNDERPASS - PLAN & ELEVATION
				STATUS FOR INFORMATION			

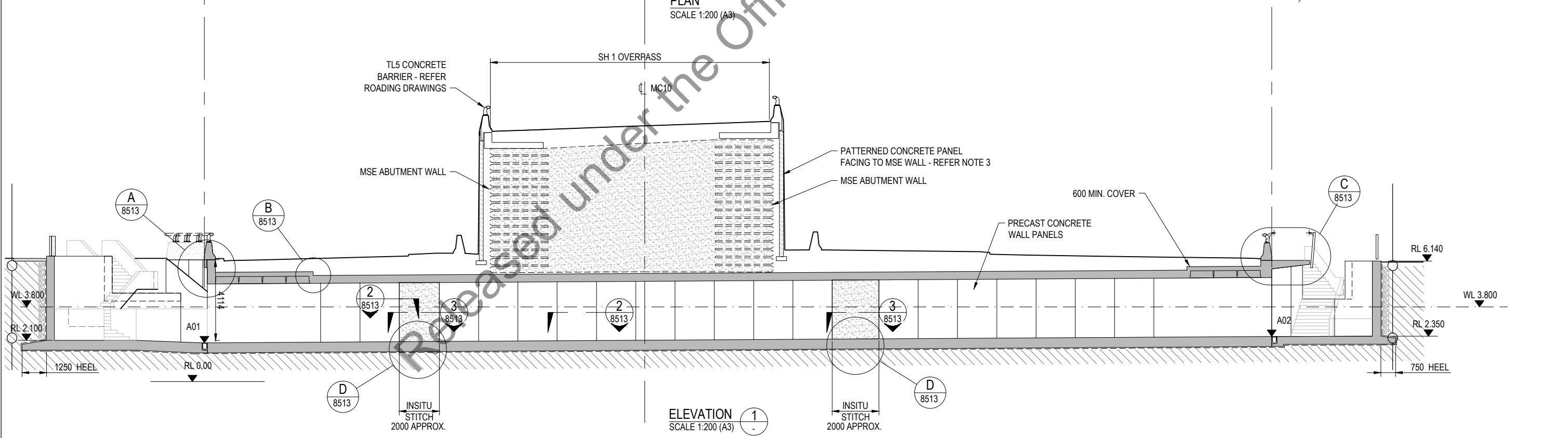
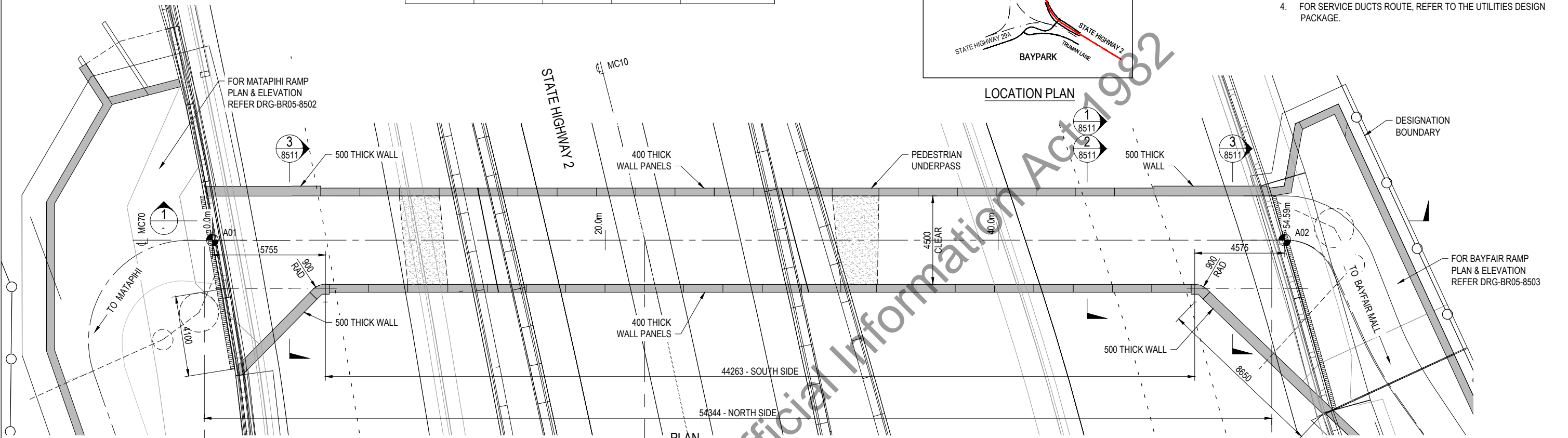


BR05 - PEDESTRIAN UNDERPASS				
SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
A01	378438.244	809430.359	1.980	
A02	378489.436	809449.319	2.300	



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.



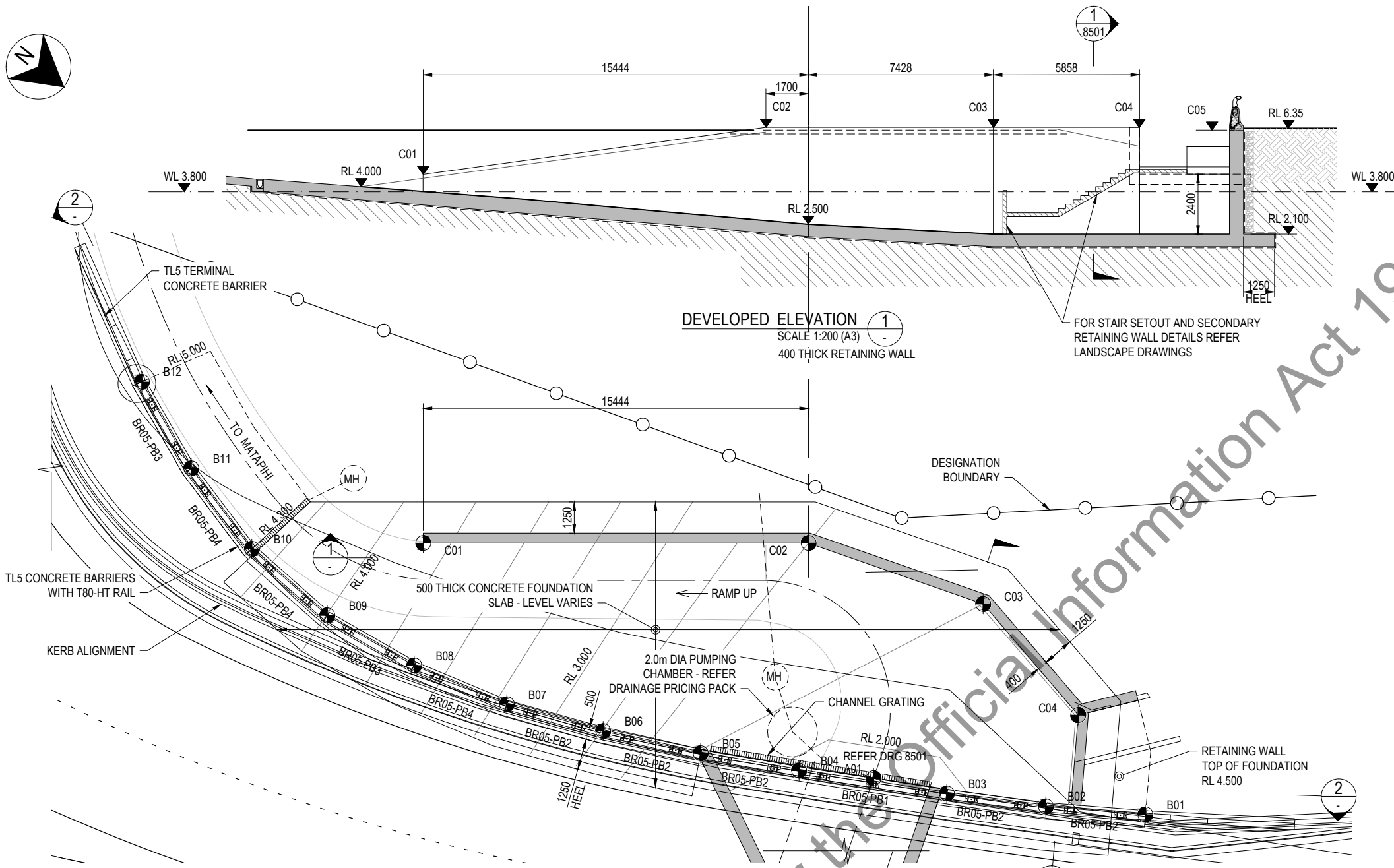
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B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING

 NZ TRANSPORT AGENCY WAKA KOTAHĪ	 CPB CONTRACTORS	 JACOBS	 Tonkin+Taylor	SCALE 1:200 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT UNDERPASS - PLAN & ELEVATION
				STATUS 50% ISSUE			

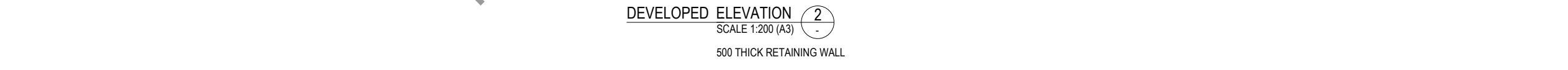
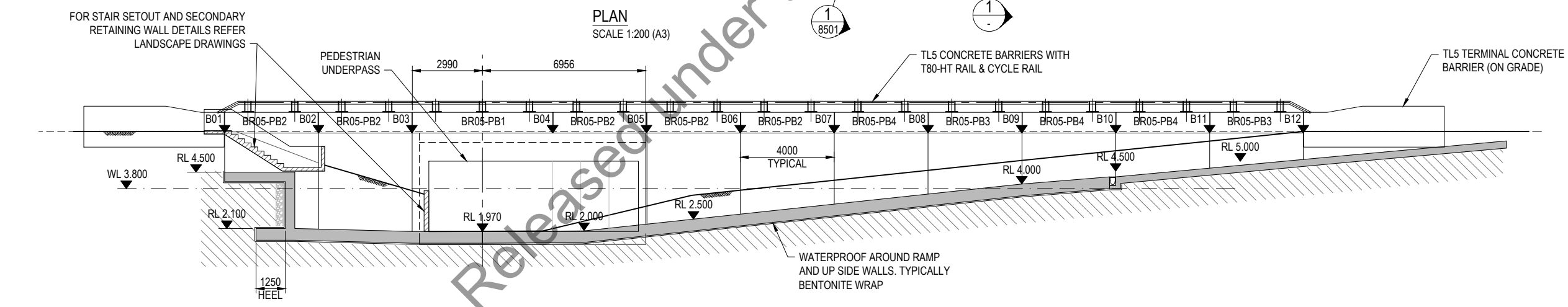


- NOTES**
- FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
 - FOR OFF-BRIDGE ROAD SAFETY BARRIERS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
 - FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
 - FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS BEHIND THE ABUTMENTS, REFER TO THE UTILITIES DESIGN PACKAGE.



BR05 - PEDESTRIAN UNDERPASS

SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
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	



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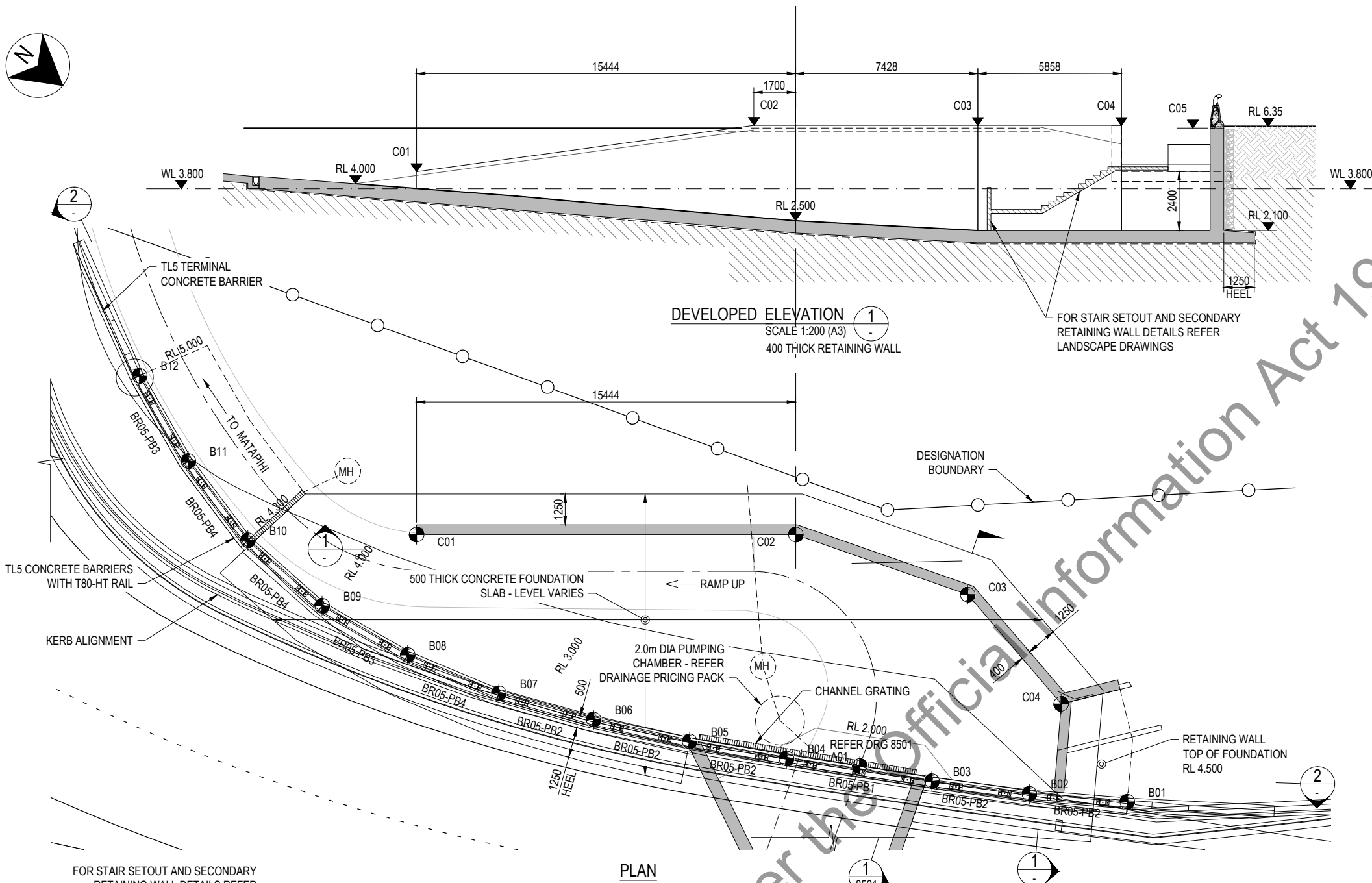
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3					
4					
5					
6					
7					
8					
9					
10					

				SCALE	1:400 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - MATAPIHI RAMP	
				STATUS	FOR INFORMATION				DRAWN
				PROJECT NUMBER	2/09-024/603			DRAWING No	B2B-DRG-BR05-8502
								REV	A



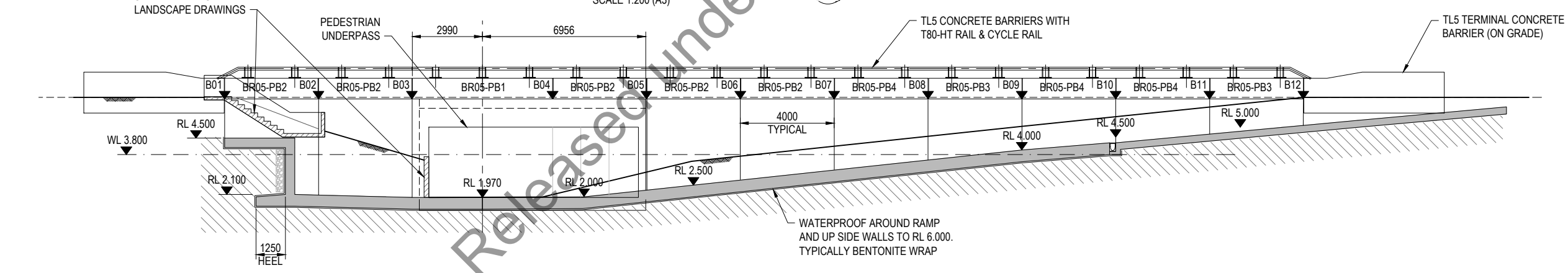
NOTES

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 (TOP OF WALL)
	E	N		
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	



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

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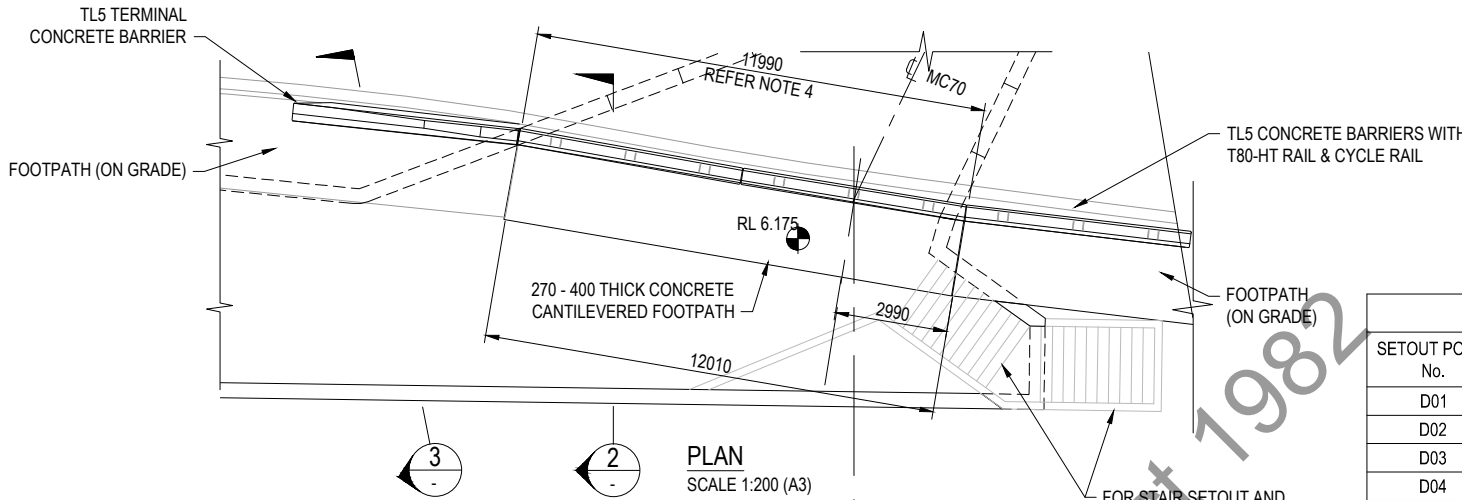
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A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING



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

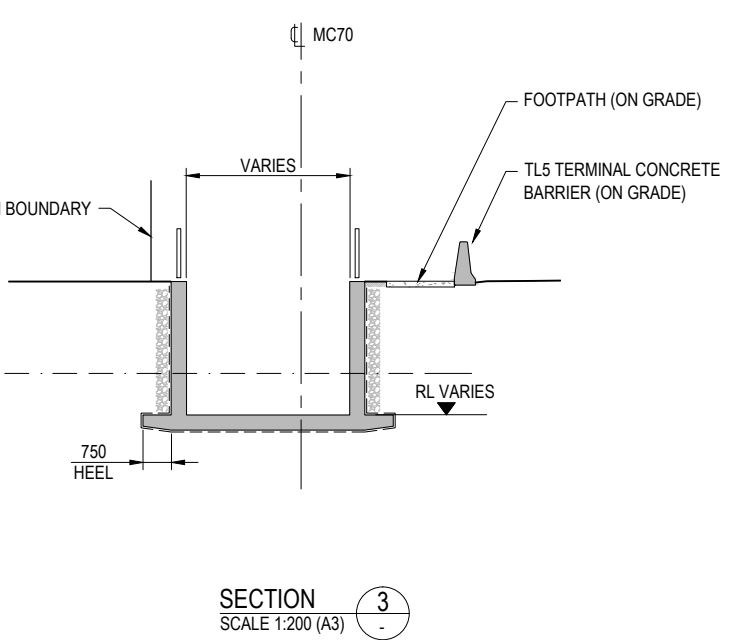
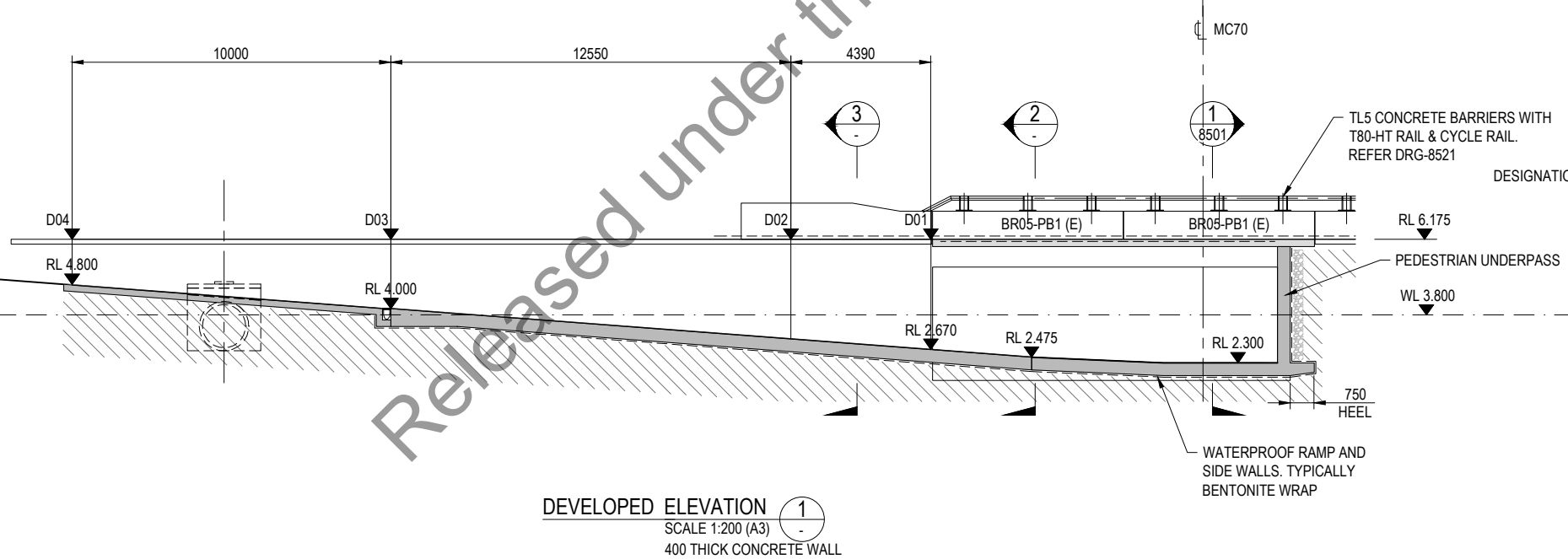
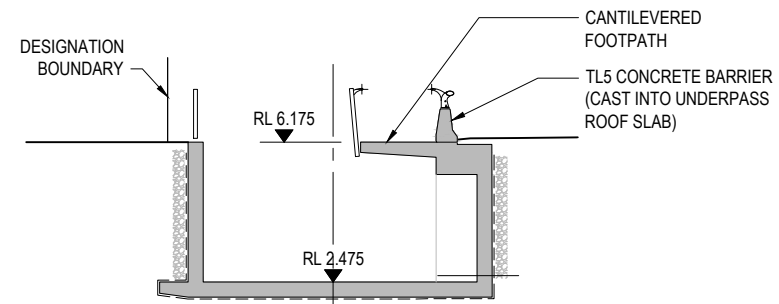
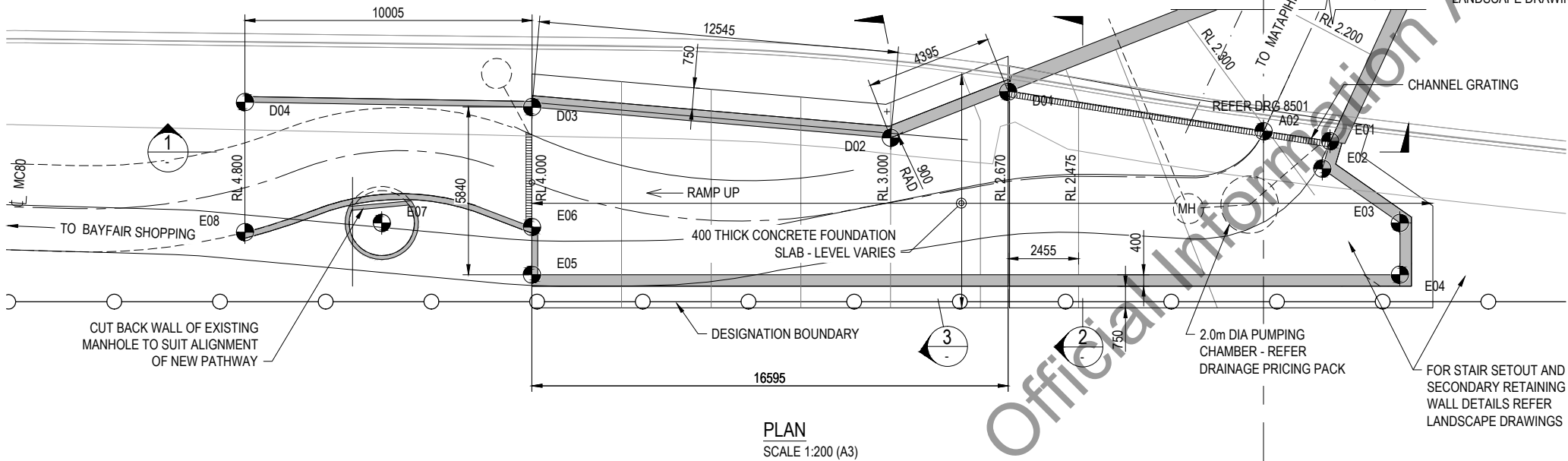
TITLE: BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - MATAPIHI RAMP
DRAWING No: B2B-DRG-BR05-8502
REV: B



- 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 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)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
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	



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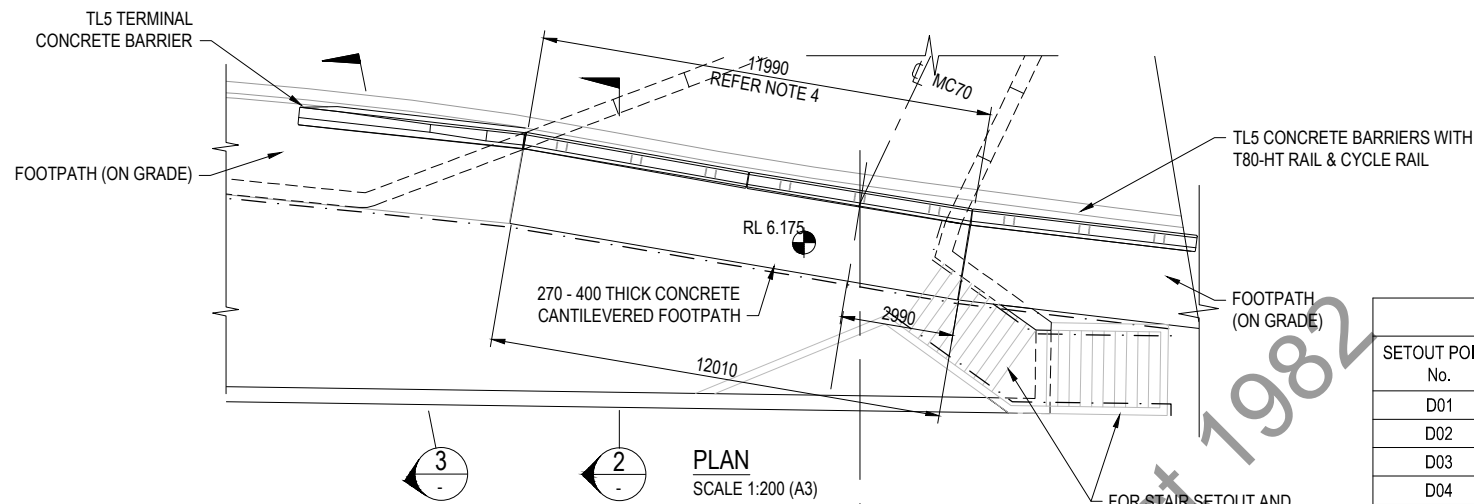
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No	DATE	DRG CHECK	DESIGN REVIEW	APP'D DMGR	REVISIONS & ISSUES
1	08/03/19	GKK	PWC	LW	PRELIMINARY

CONTRACTOR CPB CONTRACTORS
DESIGNER JACOBS
 SCALE 1:400 (A3)
 STATUS FOR INFORMATION
 PROJECT NUMBER 2/09-024/603

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

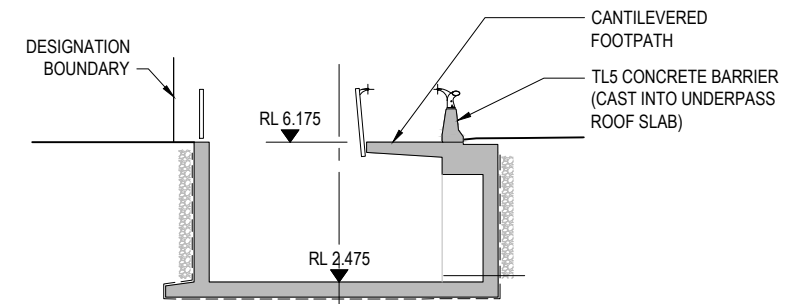
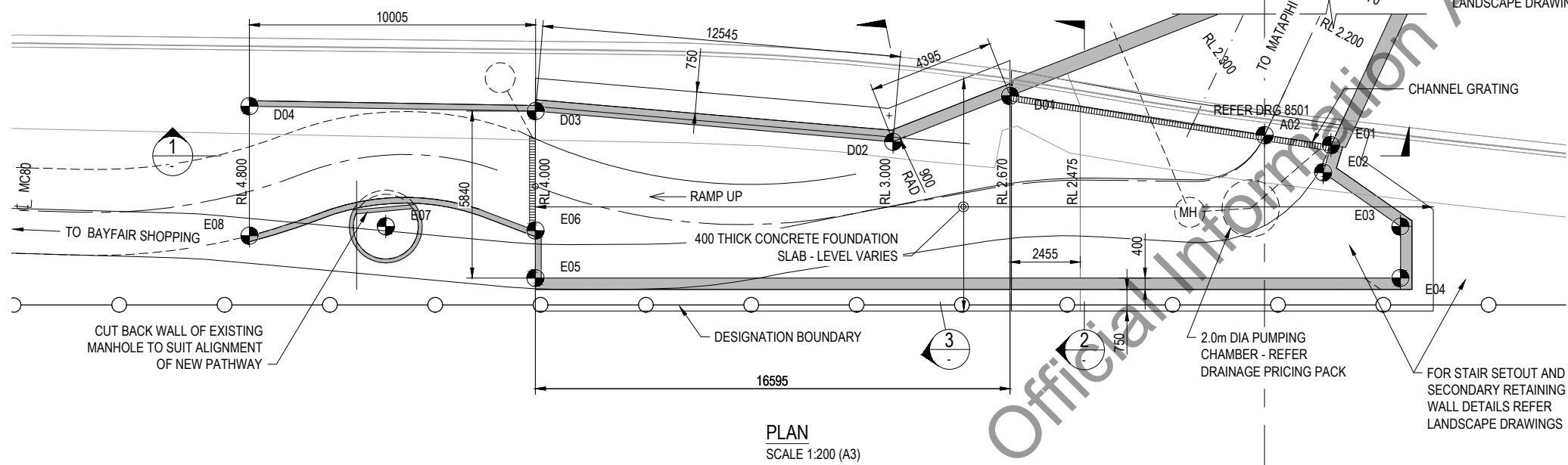
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GENERAL ARRANGEMENT
PLAN & ELEVATION - BAYFAIR RAMP
DRAWING No B2B-DRG-BR05-8503
REV A



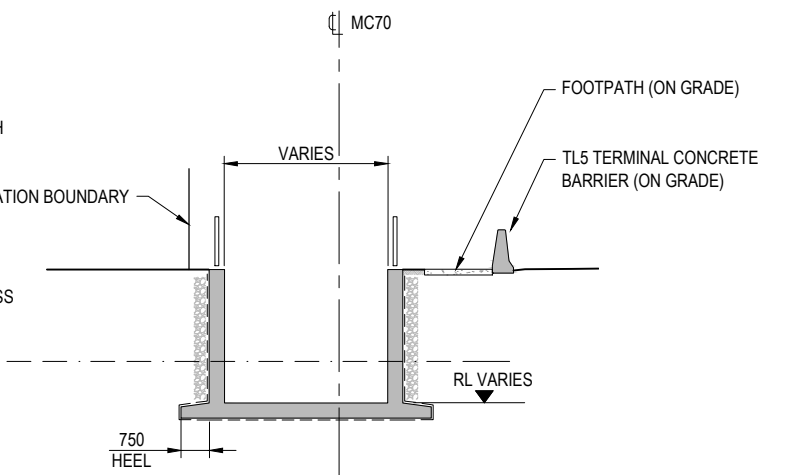
NOTES

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)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
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	



SECTION 2
SCALE 1:200 (A3)



SECTION 3
SCALE 1:200 (A3)

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

DATE: 15/03/2019 5:10:10 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\work\jacobsonz_jr\1014559822-DRG-BR05-8503.dwg

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



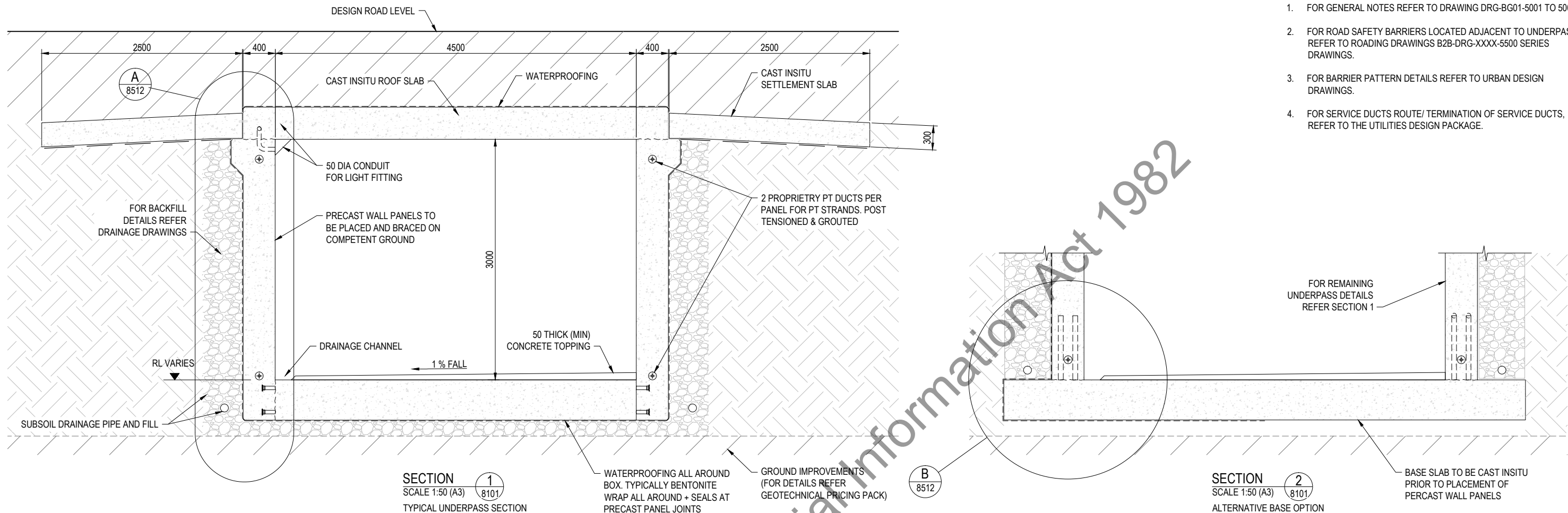
SCALE 1:200 (A3)
STATUS 50% ISSUE
PROJECT NUMBER 2/09-024/603

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

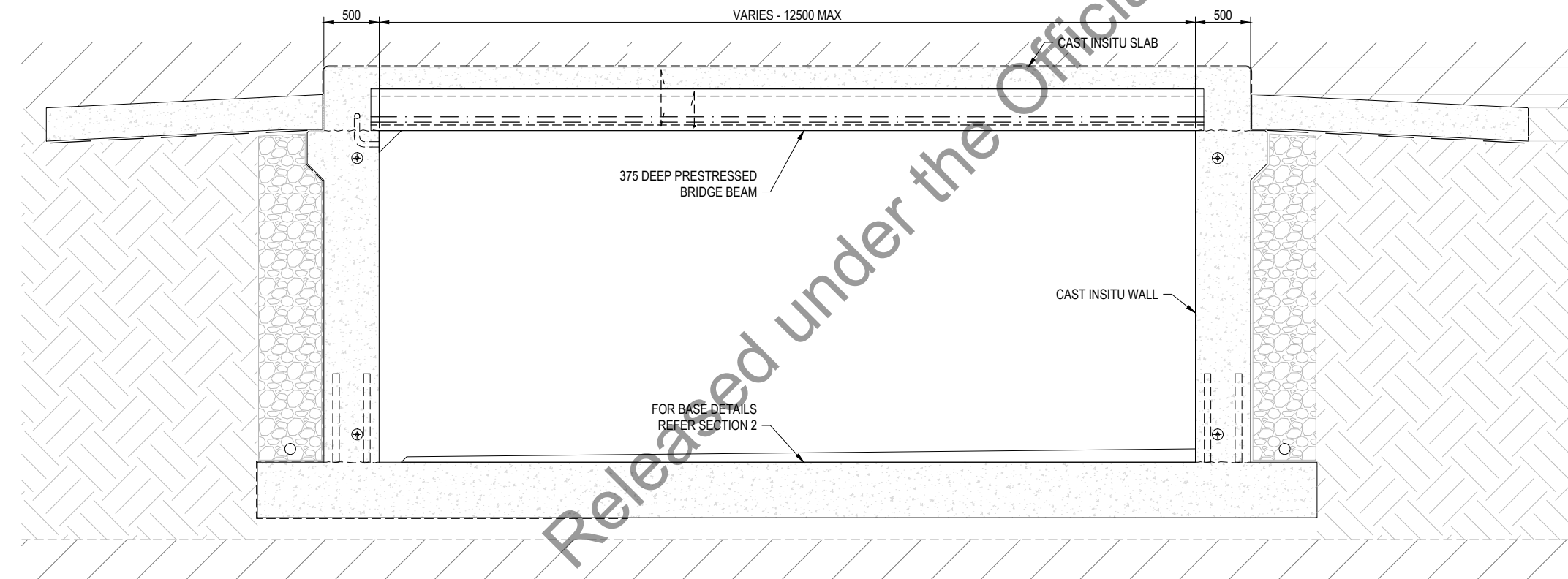
NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS LOCATED ADJACENT TO UNDERPASS REFER TO ROADING DRAWINGS B2B-DRG-XXXX-5500 SERIES DRAWINGS.
3. FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS, REFER TO THE UTILITIES DESIGN PACKAGE.



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

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



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

DATE: 03/03/2019 4:20:10 PM. LOGIN NAME: CONNOR, DAVID C. LOCATION: C:\users\connor\appdata\local\temp\work\jacobson_je\014559822-DRG-BR05-8511.dwg

E					
D					
C					
B					
A	08/03/19	GKK	PWC	LW	PRELIMINARY
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:25 @ A1					
1:50 @ A3					



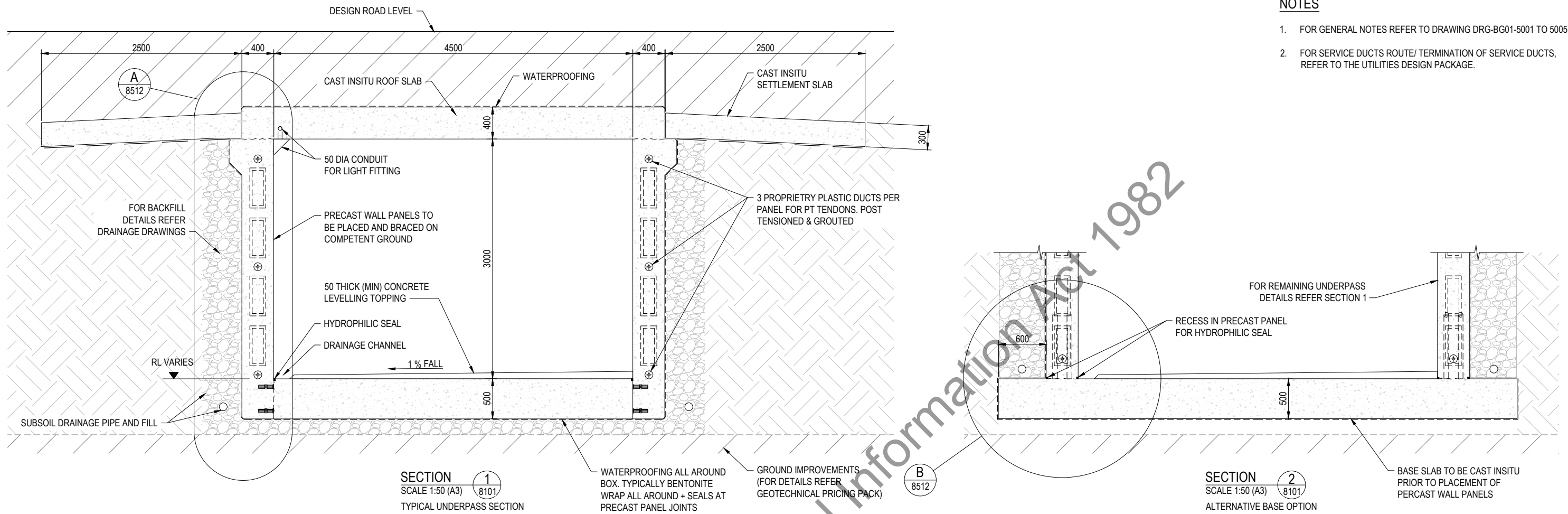
SCALE: 1:400 (A3)
STATUS: FOR INFORMATION
PROJECT NUMBER: 2/09-024/603

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

TITLE: BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS
DRAWING No: B2B-DRG-BR05-8511
REV: A

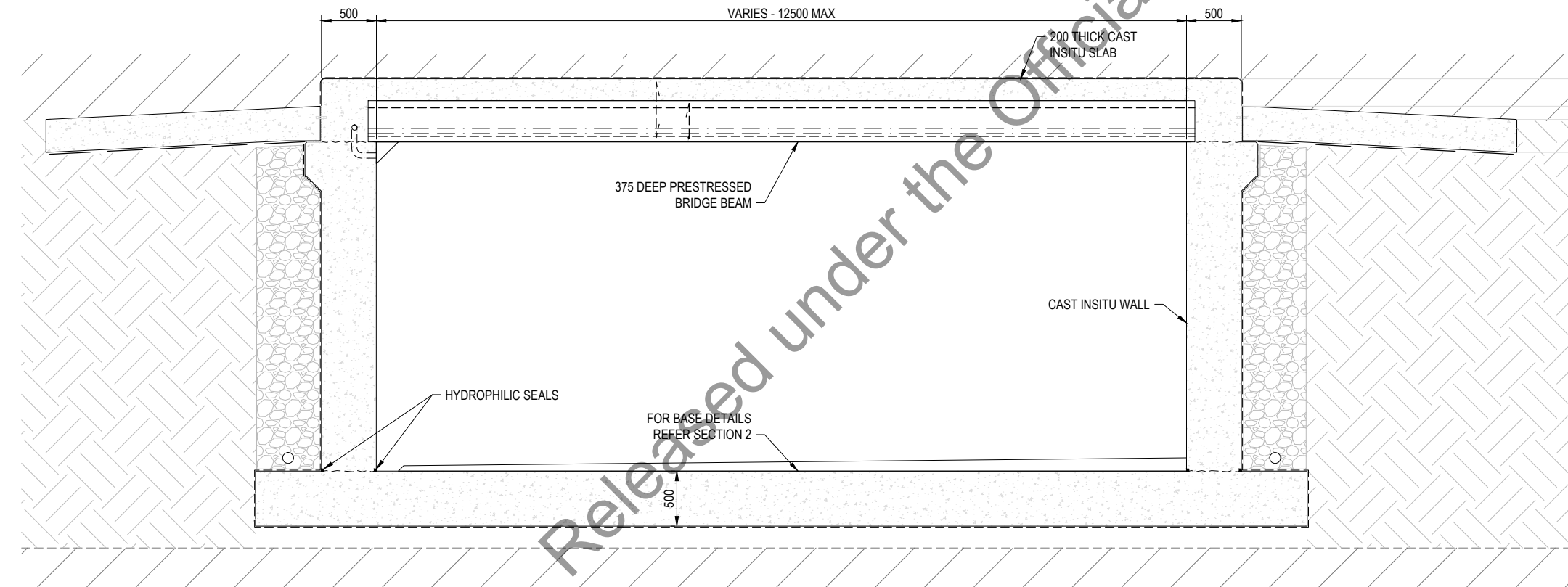
NOTES

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.



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

DATE: 15/03/2019 5:14:26 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\workspace\jacobsonz\el014559822-DRG-BR05-8511.dwg

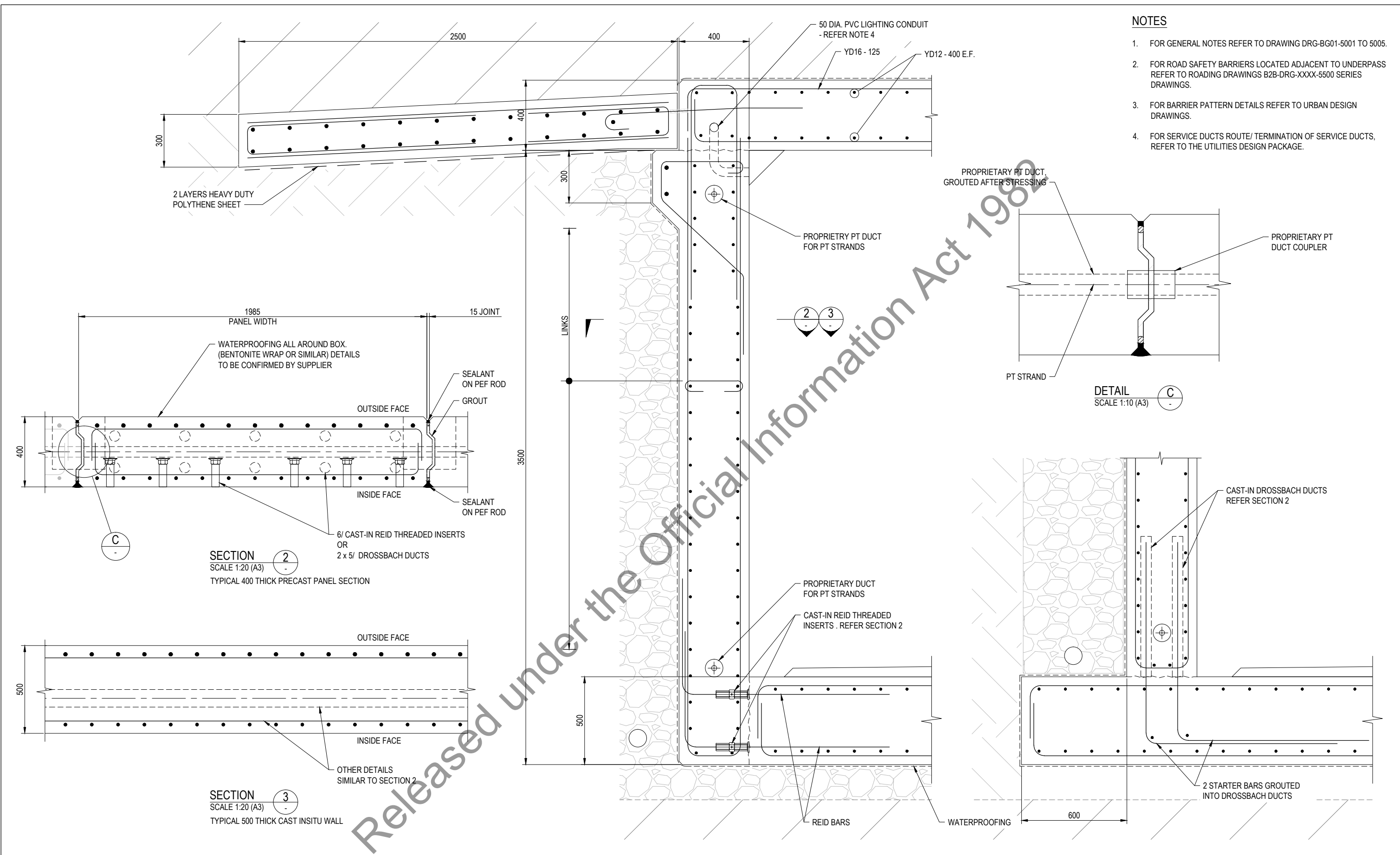
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING



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

TITLE: BR05 - PEDESTRIAN UNDERPASS TYPICAL SECTIONS
DRAWING No: B2B-DRG-BR05-8511
REV: B







NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS LOCATED ADJACENT TO UNDERPASS REFER TO ROADING DRAWINGS B2B-DRG-XXXX-5500 SERIES DRAWINGS.
3. FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS, REFER TO THE UTILITIES DESIGN PACKAGE.

DATE: 08/03/19 5:03:35 PM. LOGIN NAME: CONNON, DAVID C. LOCATION: C:\users\connon\appdata\local\temp\proj\dwg\br05-8512.dwg

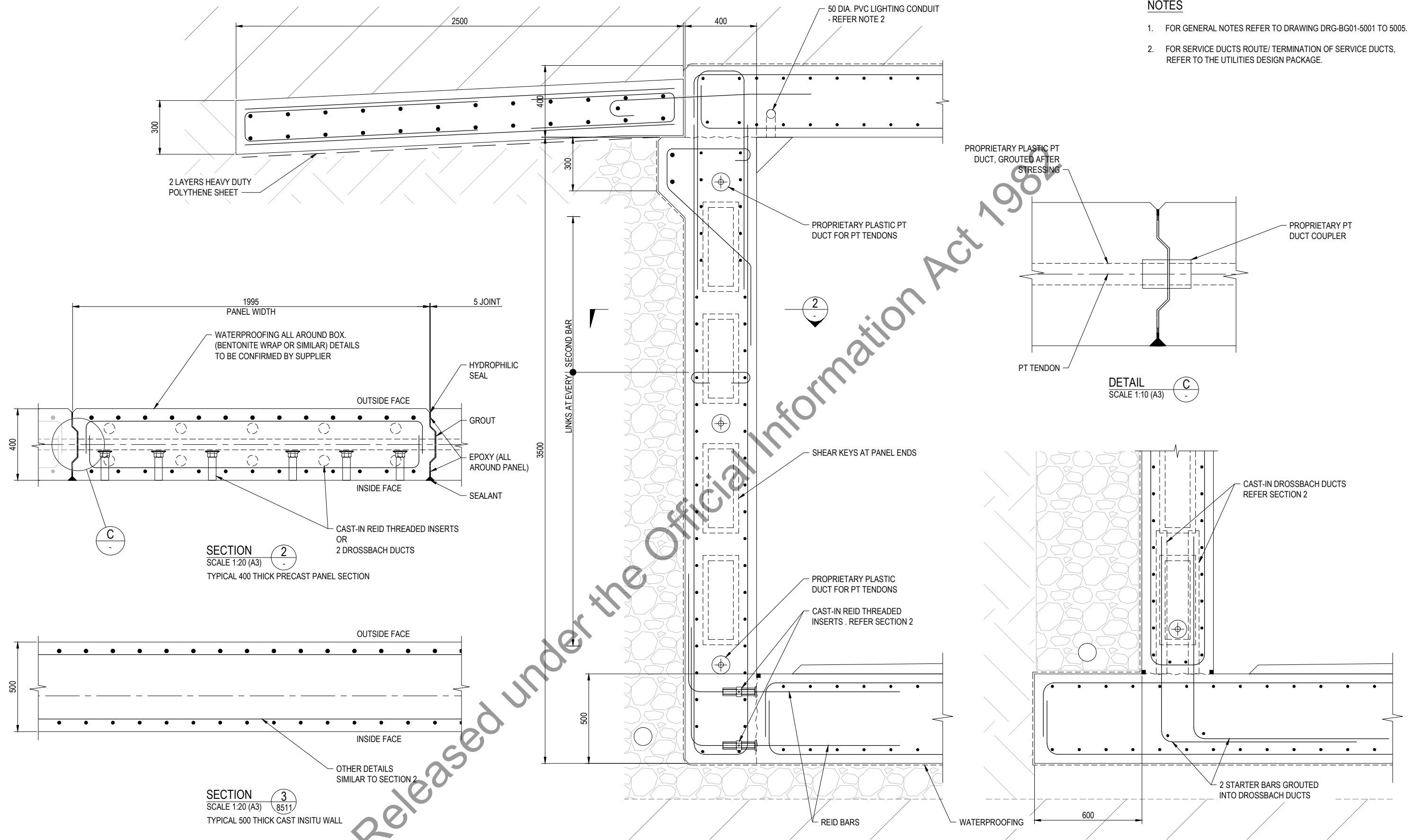
E					
D					
C					
B					
A	08/03/19	GKK	PWC	LW	PRELIMINARY
REVISIONS & ISSUES					
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	
1:10 @ A1					
1:20 @ A3					

1:10 @ A1
1:20 @ A3

 <p>NZ TRANSPORT AGENCY WAKA KOTAHĪ</p>	 <p>CPB CONTRACTORS</p>	 <p>JACOBS</p> <p>Align  Tonkin+Taylor</p>	SCALE 1:400 (A3)	CLIENT NZ TRANSPORT AGENCY	TITLE BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS		
			STATUS FOR INFORMATION	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	DRAWN DCC	DRAWING CHECK GKK	APPROVED LW JAN 2019
			PROJECT NUMBER 2/09-024/603		DESIGNED SKK	DESIGN REVIEW PWC	DRAWING No B2B-DRG-BR05-8512
					REV A		

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.



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

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

DETAIL A
SCALE 1:20 (A3)
REIDBAR OPTION

DETAIL B
SCALE 1:20 (A3)
DROSSBACH OPTION

DATE: 15/03/2019 7:16:08 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\proj\waka\jacobsonz\14014559822-DRG-BR05-8512.dwg

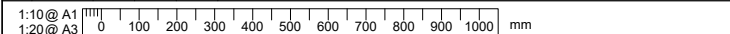
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D	D.MGR	REVISIONS & ISSUES
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A	08/03/19	GKK	SKK	LW		PRELIMINARY - FOR PRICING



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

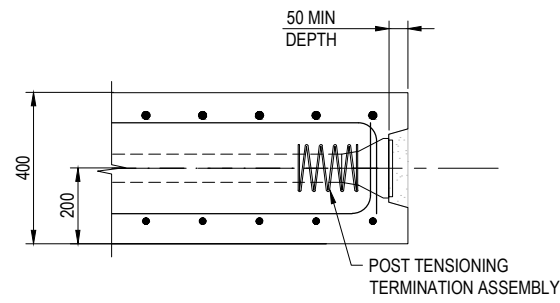
CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: DCC
DESIGNED: TKF
DRAWING CHECK: GKK
DESIGN REVIEW: SKK
APPROVED: LW
MAR 2019

TITLE: BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS SHEET 1
DRAWING No: B2B-DRG-BR05-8512
REV: B

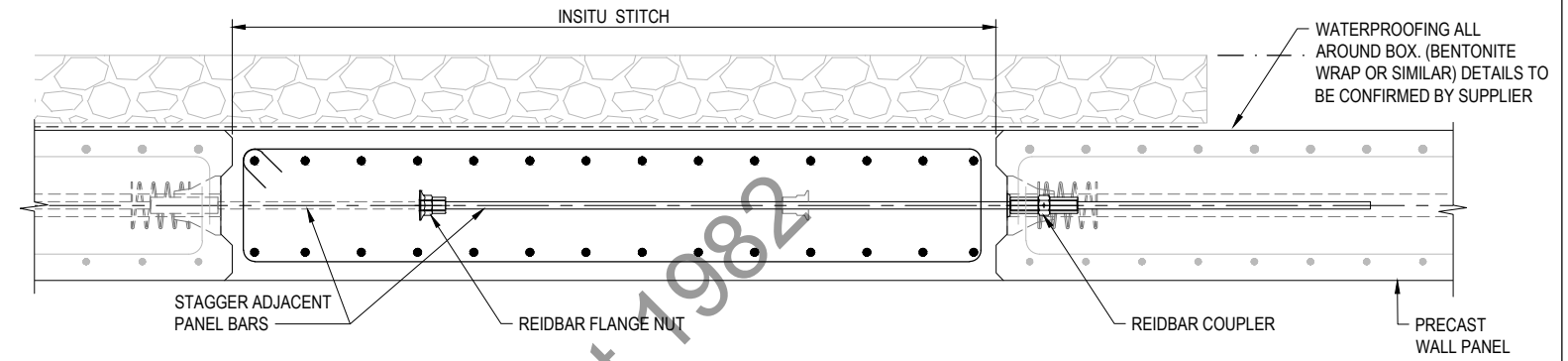


NOTES

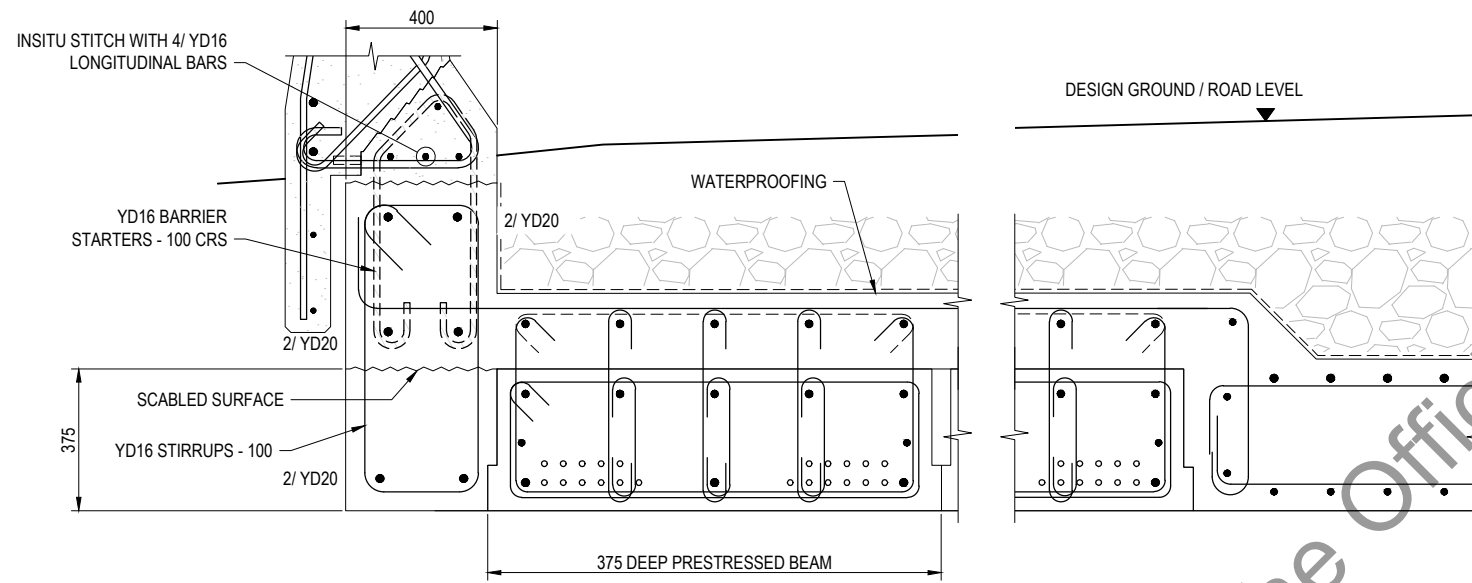
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.



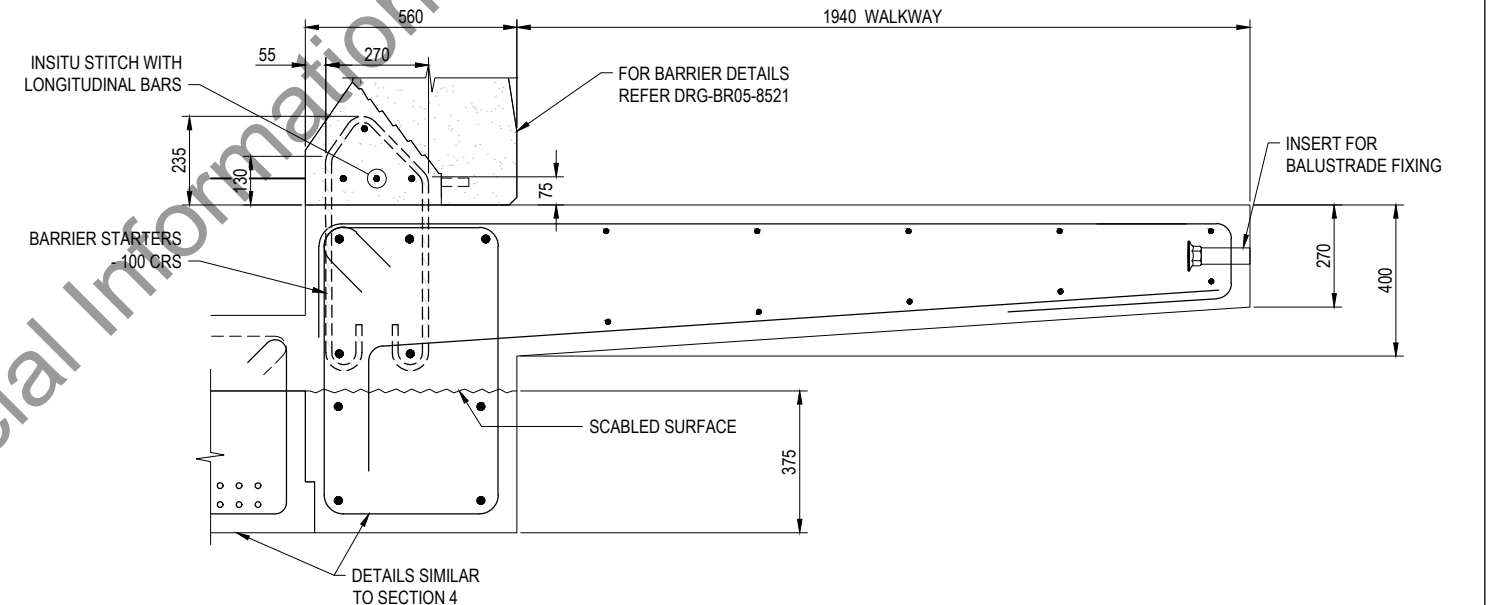
SECTION 2
SCALE 1:20 (A3) 8501
POST TENSIONING TERMINATION
AT STITCH PANEL & END PANEL



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

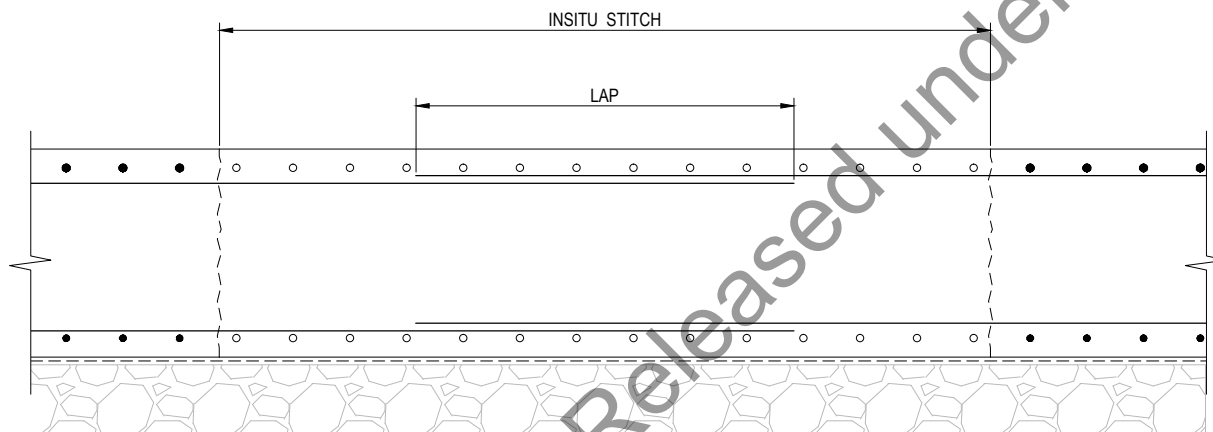


DETAIL 4
SCALE 1:20 (A3) 8501



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

DETAIL 6
SCALE 1:20 (A3) 8501



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

DATE: 08/03/19 5:00:24 PM. LOGIN NAME: CONNOR, DAVID C. LOCATION: C:\users\connor\appdata\local\temp\pwworkspace\proj_je10145598\2B-DRG-BR05-8513.dwg

E					
D					
C					
B					
A	08/03/19	GKK	PWC	LW	PRELIMINARY
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:10 @ A1	0	100	200	300	400
1:20 @ A3	0	100	200	300	400



SCALE 1:400 (A3)
STATUS FOR INFORMATION
PROJECT NUMBER 2/09-024/603

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

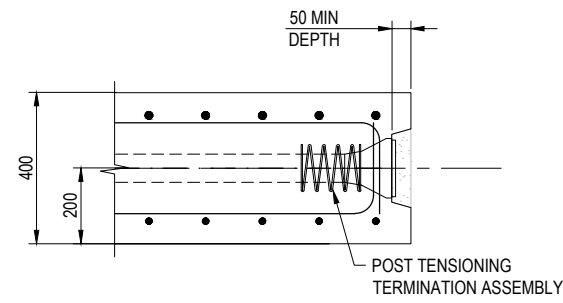
TITLE BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS

DRAWING No B2B-DRG-BR05-8513

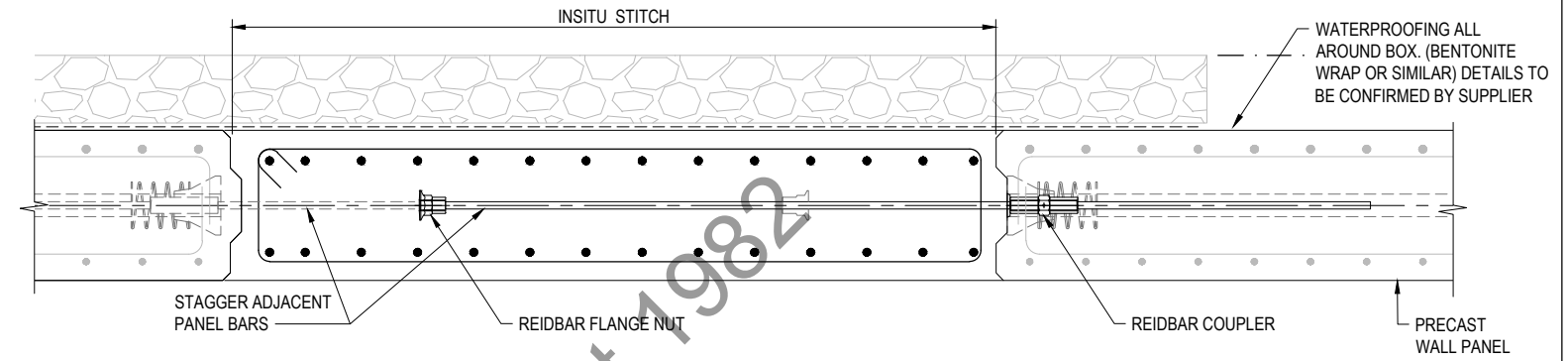
REV A

NOTES

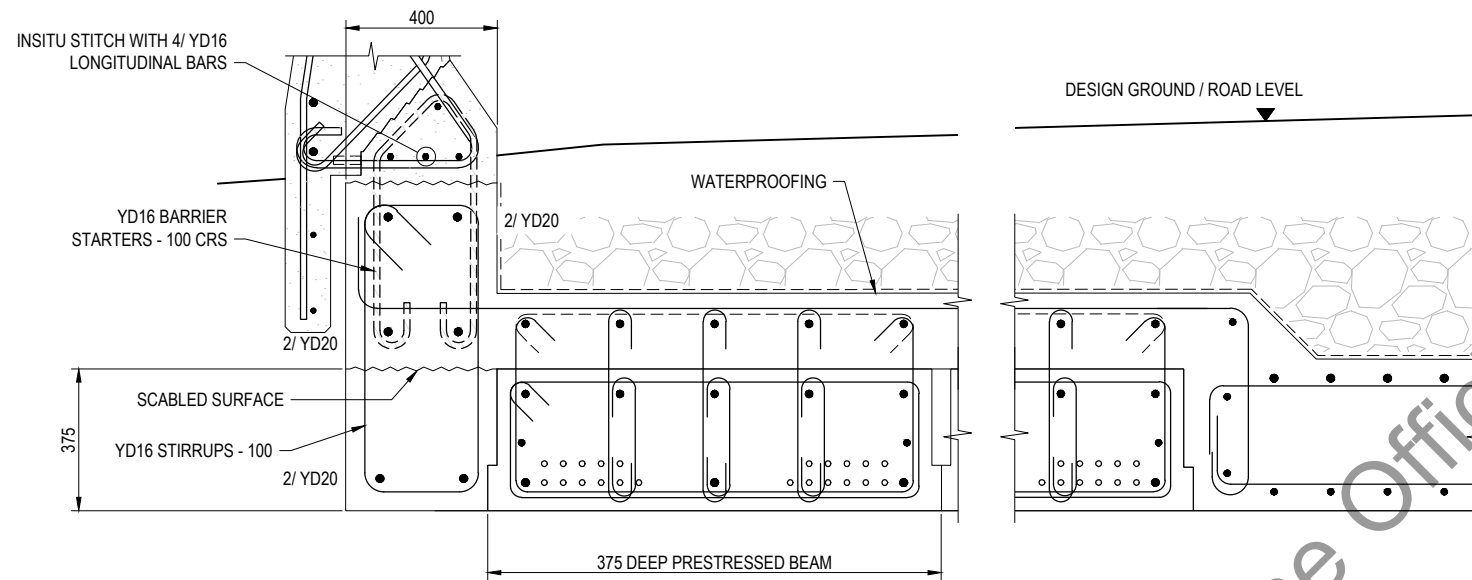
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.



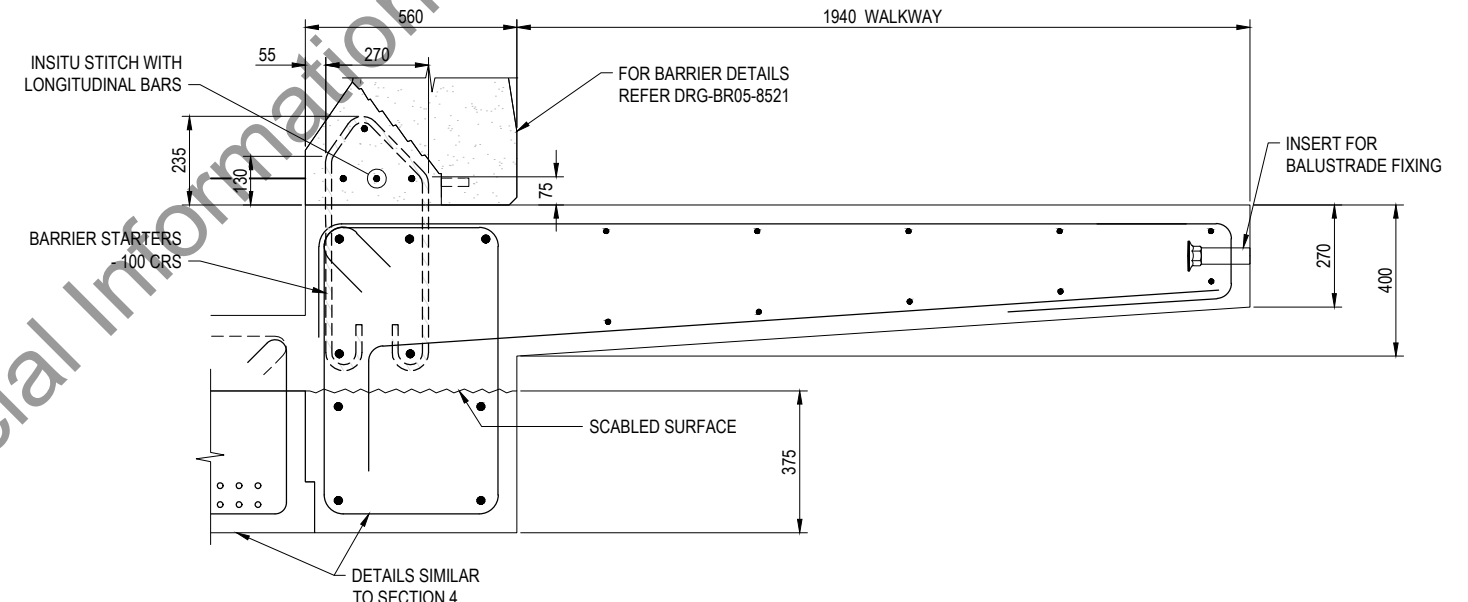
SECTION 2
SCALE 1:20 (A3) 8501
POST TENSIONING TERMINATION
AT STITCH PANEL & END PANEL



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

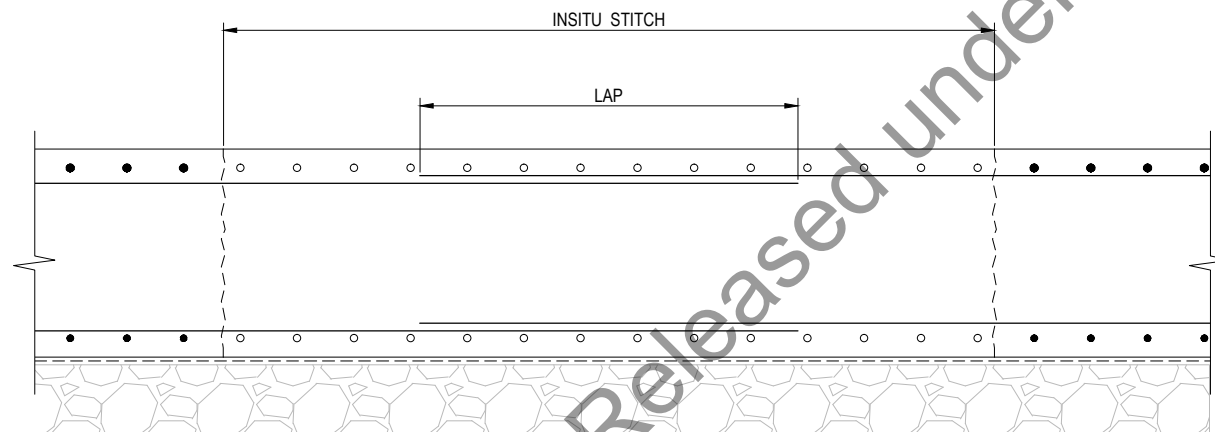


DETAIL 4
SCALE 1:20 (A3) 8501



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

DETAIL 6
SCALE 1:20 (A3) 8501



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

DATE: 15/03/2019 7:22:37 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\paw\jacobsonz_jel014559822-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



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

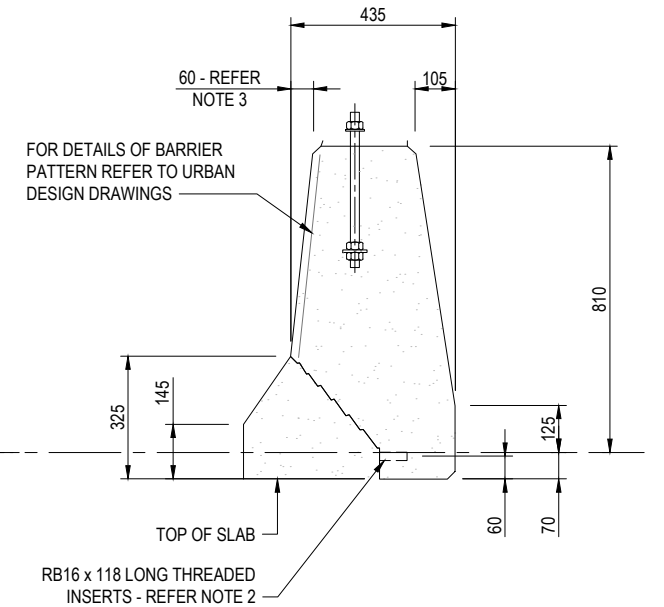
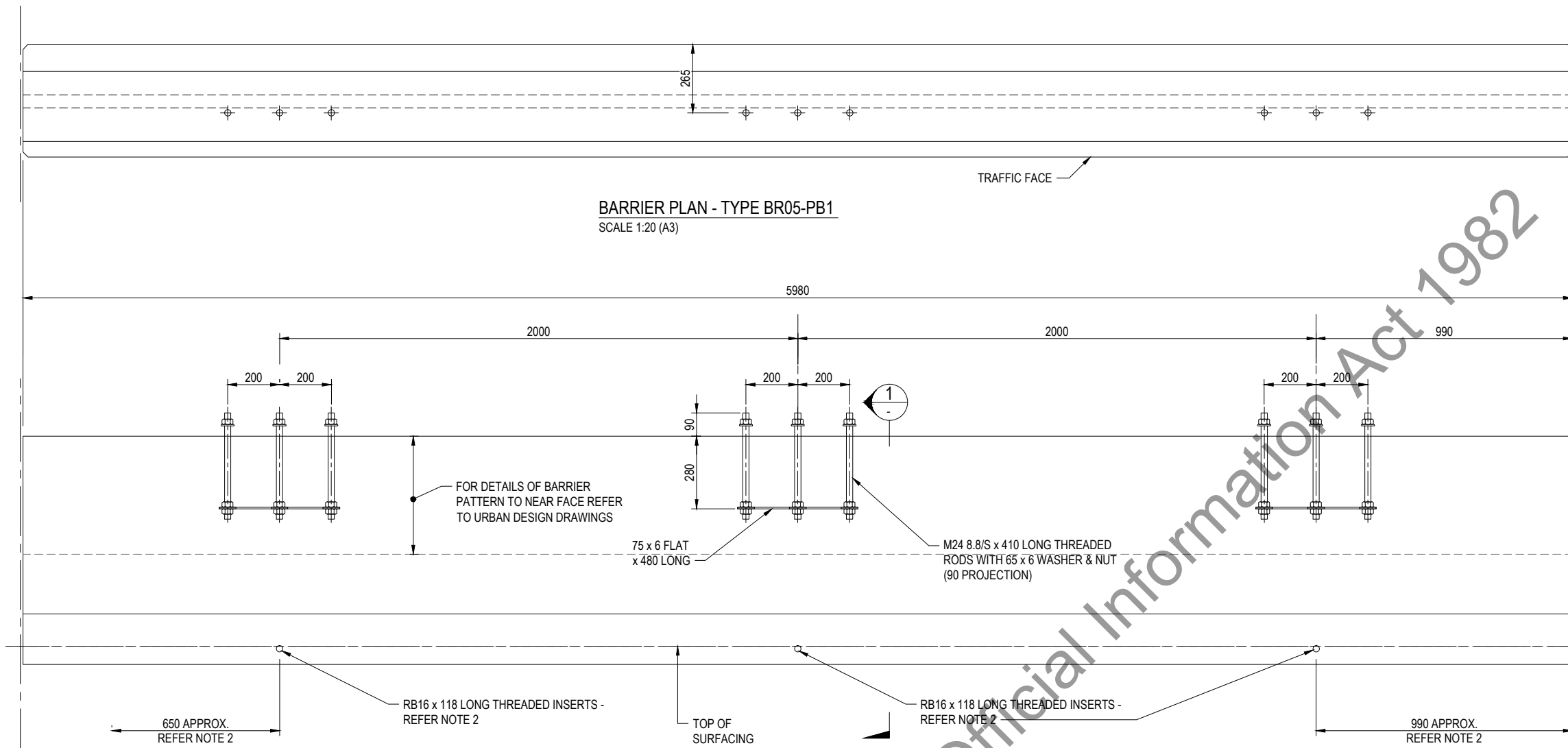
TITLE BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS SHEET 2

DRAWING No B2B-DRG-BR05-8513 REV B

NOTES

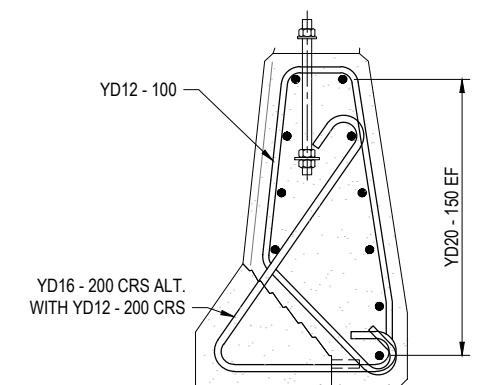
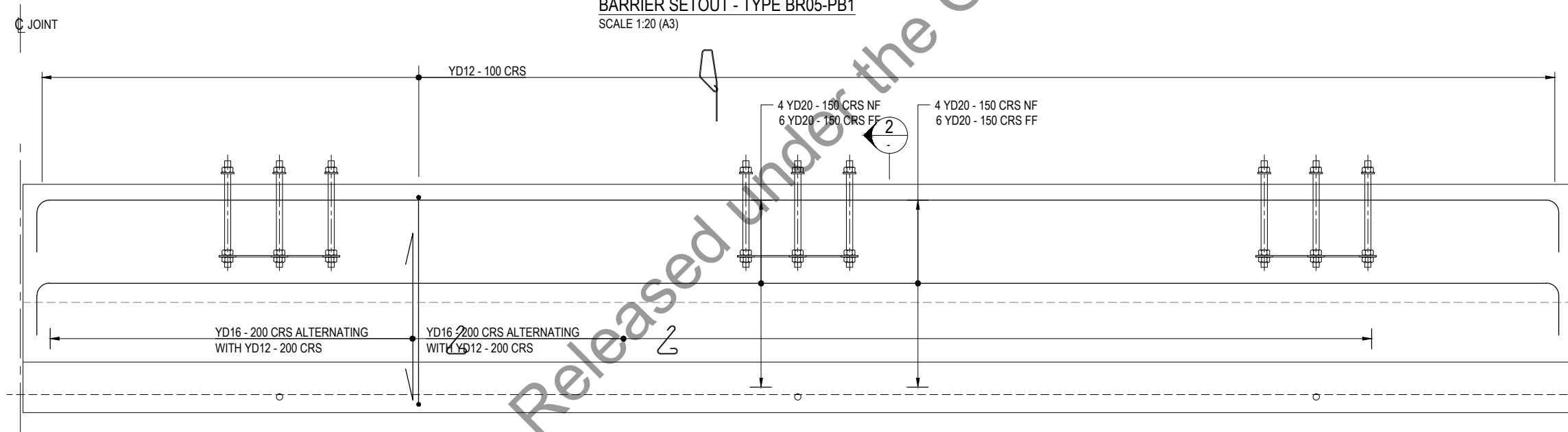
1. FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
2. PROVIDE RB16 x 118 LONG THREADED INSERTS (PART No. RBA16T1) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS IF REQUIRED.
3. FOR BARRIER INTERIOR PATTERN 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)

BARRIER PLAN - TYPE BR05-PB1
SCALE 1:20 (A3)



SECTION 1
SCALE 1:20 (A3)

BARRIER SETOUT - TYPE BR05-PB1
SCALE 1:20 (A3)



SECTION 2
SCALE 1:20 (A3)

BARRIER REINFORCEMENT - TYPE BR05-PB1
SCALE 1:20 (A3)

DATE: 03/03/2019 5:35:41 PM, LOGIN NAME: CONNOR, DAVID C, LOCATION: C:\users\connor\appdata\local\temp\pwworkspace\proj\2019\20190303\B2B-DRG-BR05-8521.dwg

E					
D					
C					
B					
A	08/03/19	GKK	PWC	LW	PRELIMINARY
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:5 @ A1					
1:10 @ A3					

				SCALE	1:20 (A3)	CLIENT NZ TRANSPORT AGENCY	TITLE BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB1
				STATUS	FOR INFORMATION		
				PROJECT NUMBER	2/09-024/603	DRAWN	DCC
						DRAWING CHECK	GKK
						DESIGNED	SKK
						APPROVED	LW
							FEB 2019
						DRAWING No.	B2B-DRG-BR05-8521
						REV	A

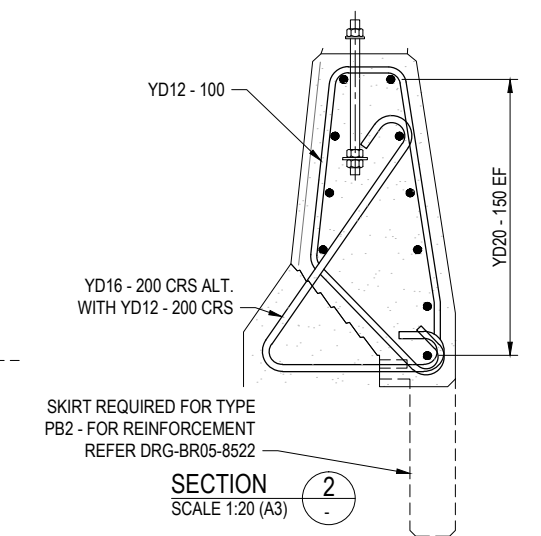
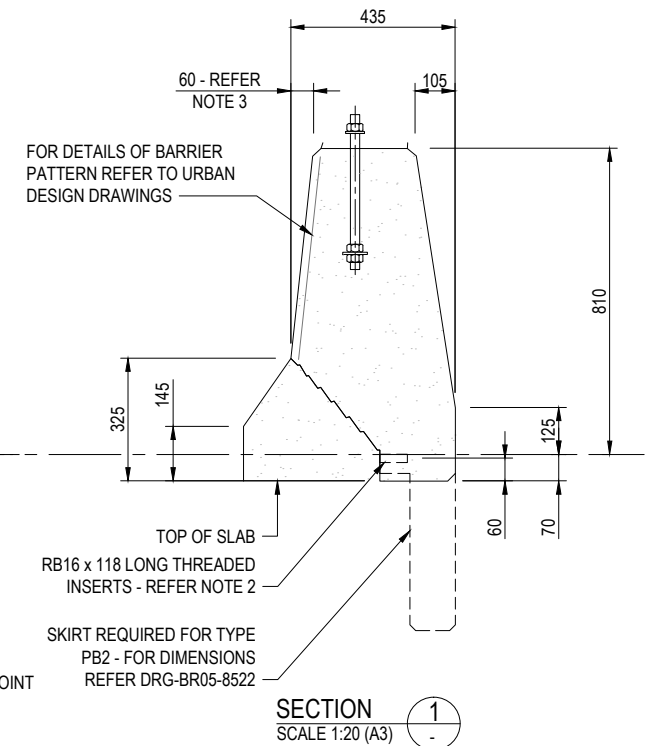
NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
- PROVIDE RB16 x 118 LONG THREADED INSERTS (PART No. RBA16T1) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS IF REQUIRED.
- FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
- ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)

BARRIER PLAN - TYPE BR05-PB1 (5 No. REQD - AS DRAWN)
SCALE 1:20 (A3) **BR05-PB2** (1 NO. REQD - AS NOTED)

BARRIER SETOUT - TYPE BR05-PB1 & PB2
SCALE 1:20 (A3)

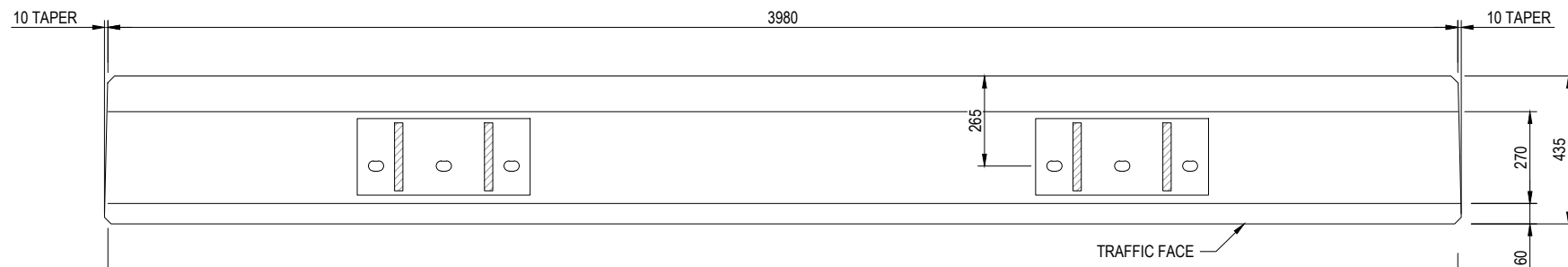
BARRIER REINFORCEMENT - TYPE BR05-PB1 & PB2
SCALE 1:20 (A3)



DATE: 15/03/2019 7:28:23 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\work\jacobsonz_ie0014598922-DRG-BR05-8521.dwg

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A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D DMGR	REVISIONS & ISSUES
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1:10 @ A3					

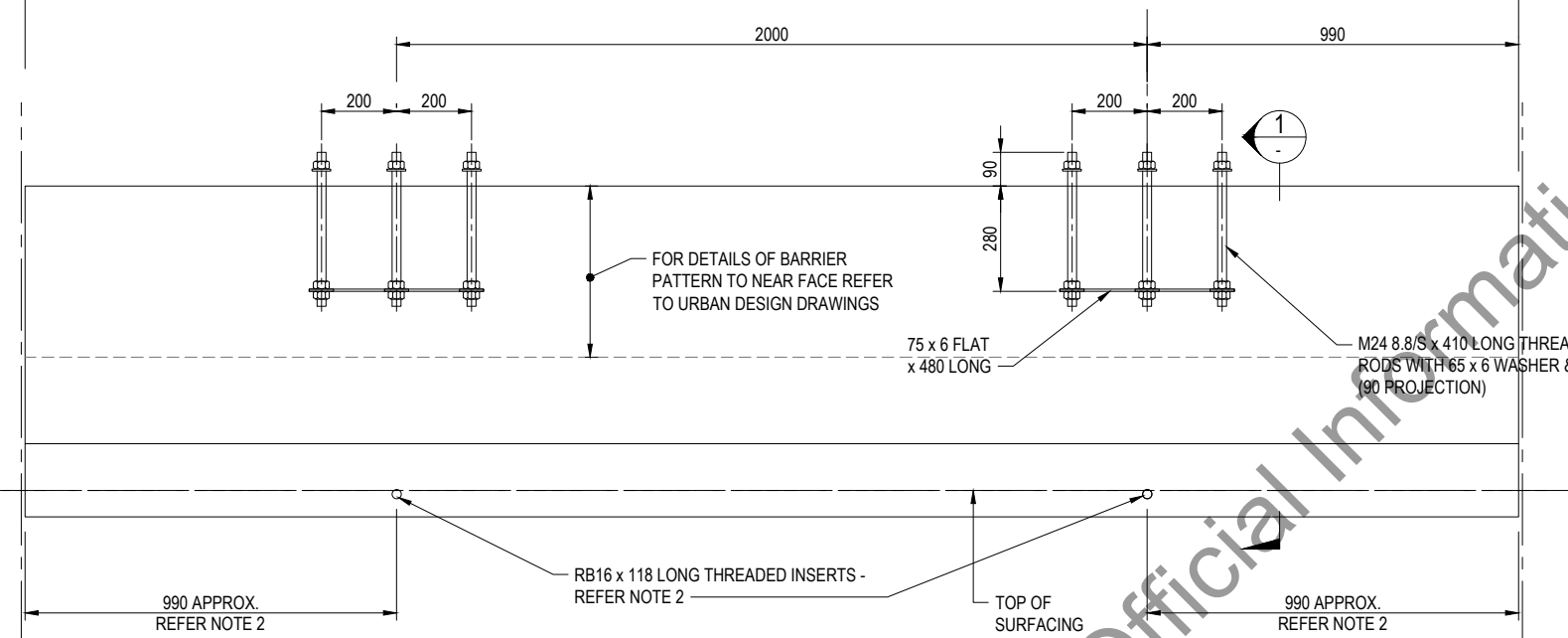
<p>NZ TRANSPORT AGENCY WAKA KOTAHAI</p>	<p>CPB CONTRACTORS</p>	<p>JACOBS</p>	<p>Align Tonkin+Taylor</p>	SCALE	1:20 (A3)	CLIENT	NZ TRANSPORT AGENCY		TITLE	BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB1 & PB2					
				STATUS	50% ISSUE		PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)		DRAWN	DCC	DRAWING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



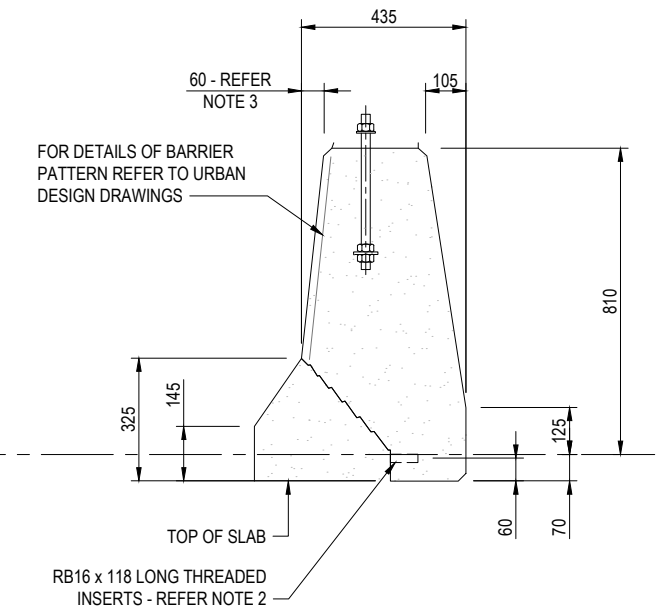
BARRIER PLAN - TYPE BR05-PB2
SCALE 1:20 (A3)

NOTES

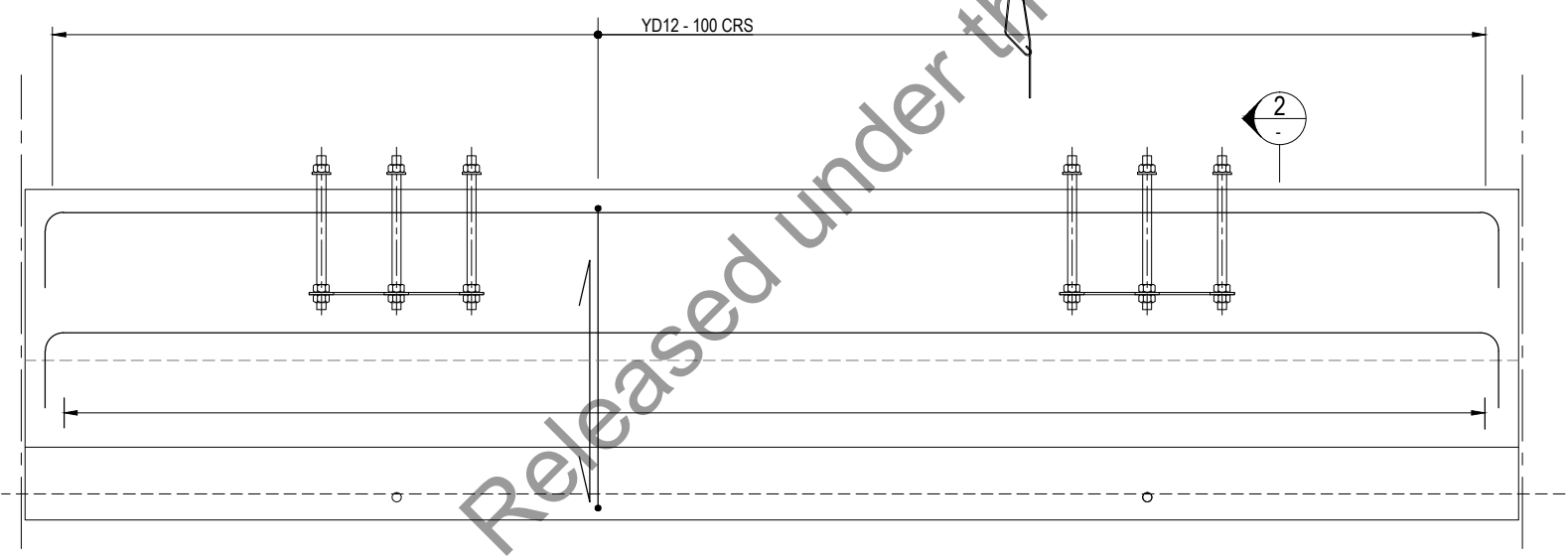
- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
- PROVIDE RB16 x 118 LONG THREADED INSERTS (PART No. RBA16TI) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS IF REQUIRED.
- FOR BARRIER INTERIOR PATTERN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



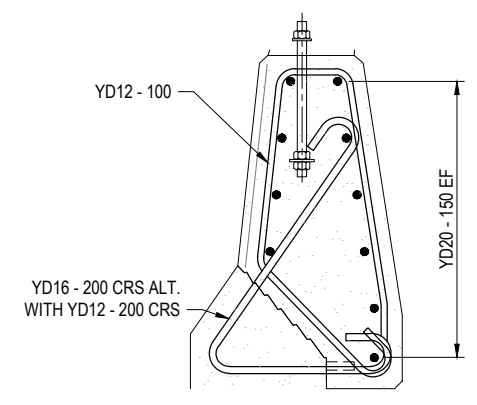
BARRIER SETOUT - TYPE BR05-PB2
SCALE 1:20 (A3)



SECTION 1
SCALE 1:20 (A3)



BARRIER REINFORCEMENT - TYPE BR05-PB2
SCALE 1:20 (A3)



SECTION 2
SCALE 1:20 (A3)

DATE: 08/03/19 5:33:40 PM. LOGIN NAME: CONNOR, DAVID C. LOCATION: C:\users\connor\appdata\local\temp\pwworkspace\jacobsonz\1410145598\B2B-DRG-BR05-8521.dwg

E					
D					
C					
B					
A	08/03/19	GKK	PWC	LW	PRELIMINARY
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:5 @ A1					
1:10 @ A3					

				SCALE	1:20 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB2, PB3 & PB4	
				STATUS	FOR INFORMATION				DRAWN
				PROJECT NUMBER	2/09-024/603			DRAWING No	B2B-DRG-BR05-8522
								REV	A

10 TAPER (PB3)
44 TAPER (PB4)
44 TAPER (PB5)

3980

10 TAPER (PB3)
10 TAPER (PB4)
44 TAPER (PB5)

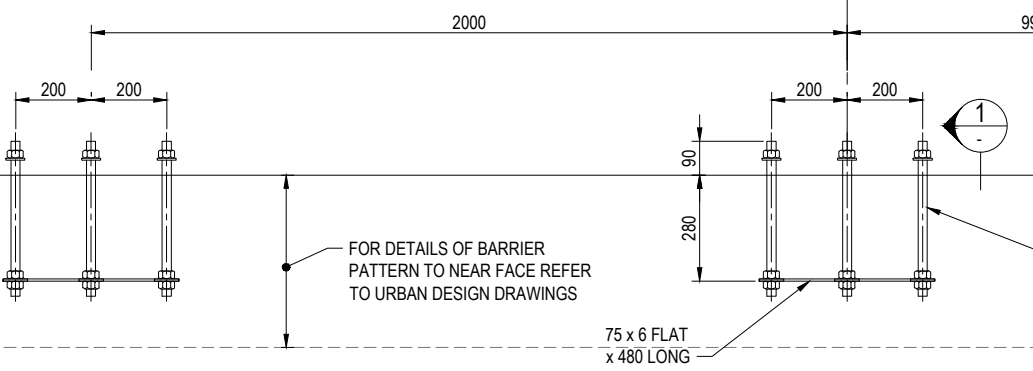
265

270
435
60

TRAFFIC FACE

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

TAPER (REFER ABOVE)



TAPER (REFER ABOVE)

M24 8.8/S x 410 LONG THREADED RODS WITH 65 x 6 WASHER & NUT (90 PROJECTION)

FOR DETAILS OF BARRIER PATTERN TO NEAR FACE REFER TO URBAN DESIGN DRAWINGS

75 x 6 FLAT x 480 LONG

990 APPROX. REFER NOTE 2

RB16 x 118 LONG THREADED INSERTS - REFER NOTE 2

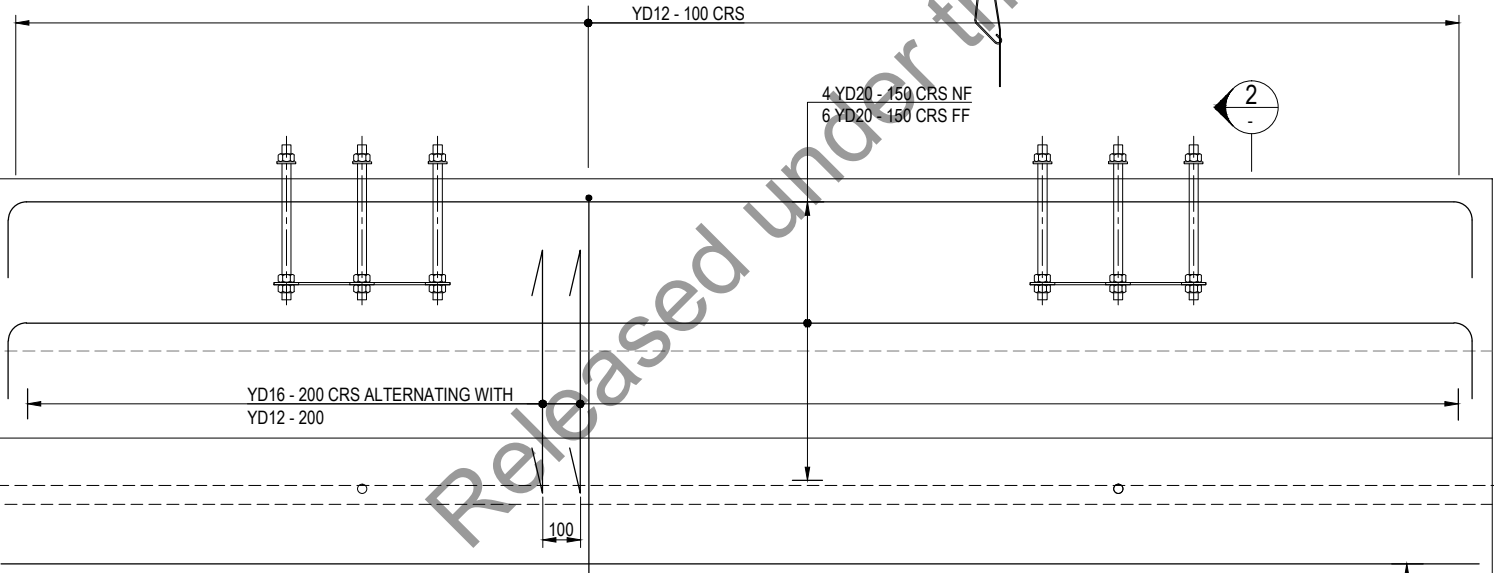
990 APPROX. REFER NOTE 2

TOP OF SURFACING

JOINT

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

JOINT

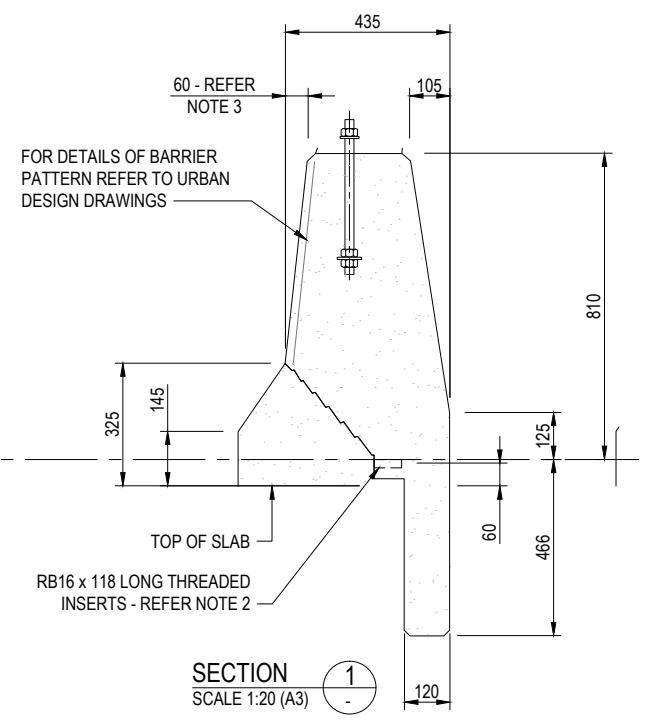


BARRIER REINFORCEMENT - TYPE PB03, PB04 & PB05
SCALE 1:20 (A3)

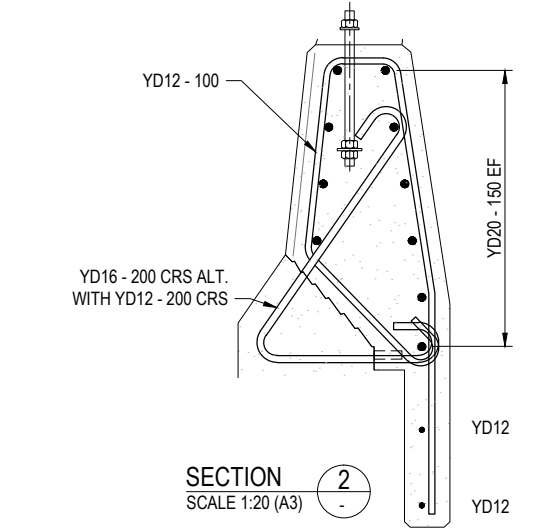
2 YD12 - 200 CRS

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
- 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.
- FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
- ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)



SECTION 1
SCALE 1:20 (A3)



SECTION 2
SCALE 1:20 (A3)

DATE: 15/03/2019 7:32:51 PM LOGIN NAME: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\jacobson\jacobson_je\01455982\DRG-BR05-8522.dwg

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A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:5 @ A1	0	50	100	150	200
1:10 @ A3	0	50	100	150	200



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

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

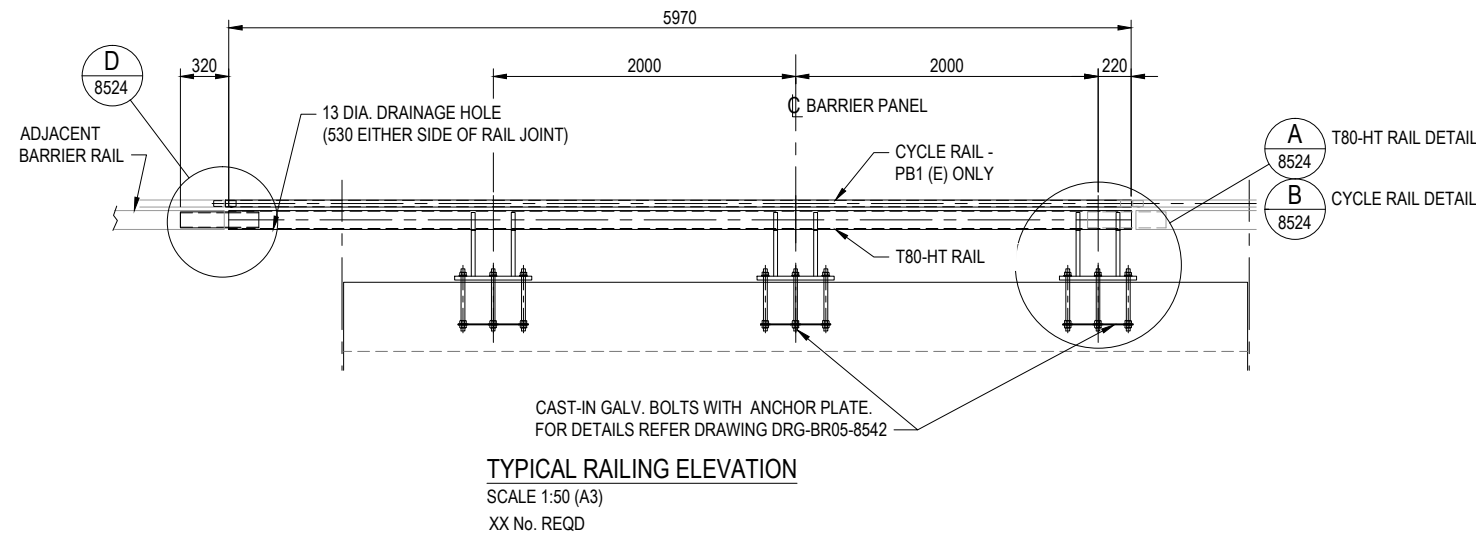
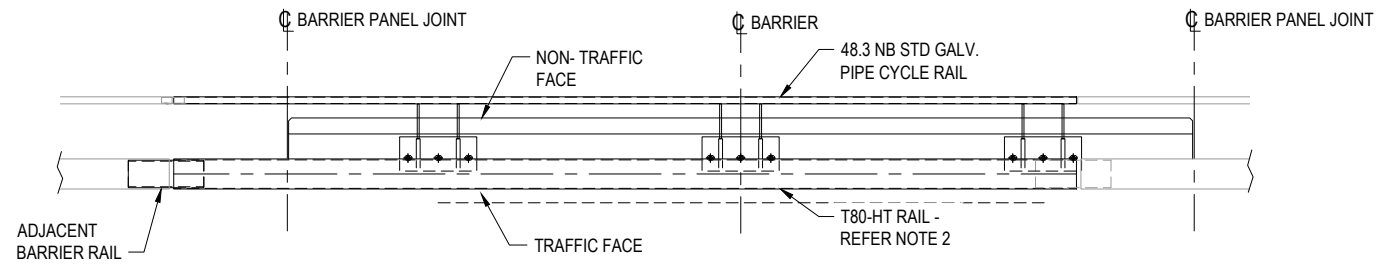
DRAWN DCC
DESIGNED TKF
DRAWING CHECK GKK
DESIGN REVIEW SKK
APPROVED LW
MAR 2019

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

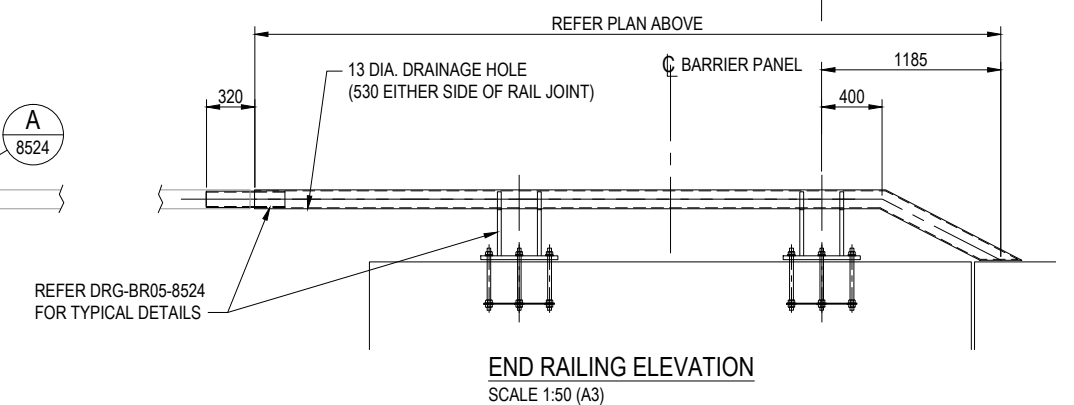
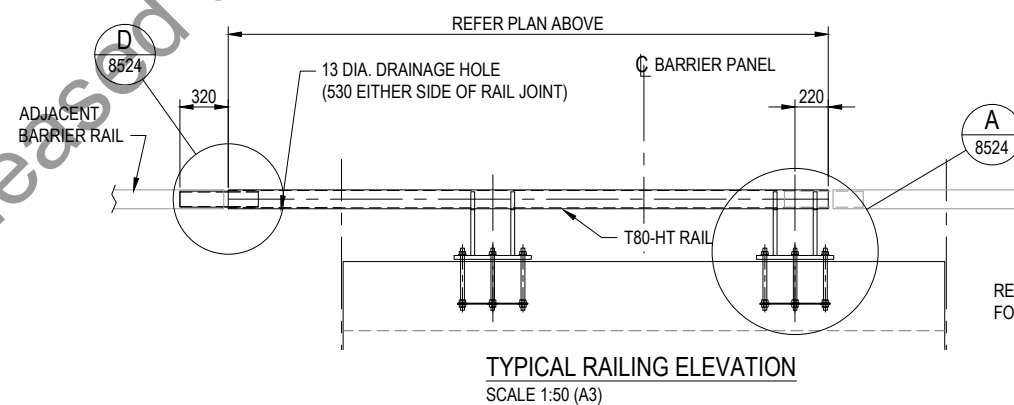
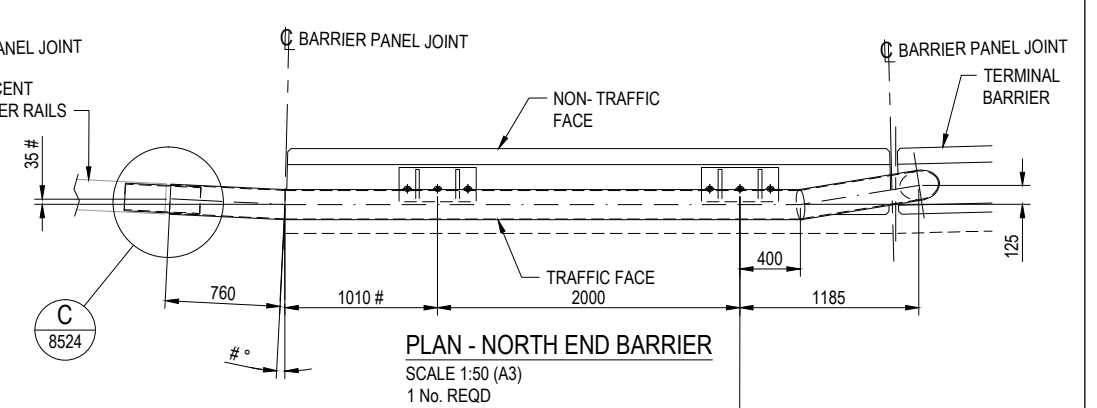
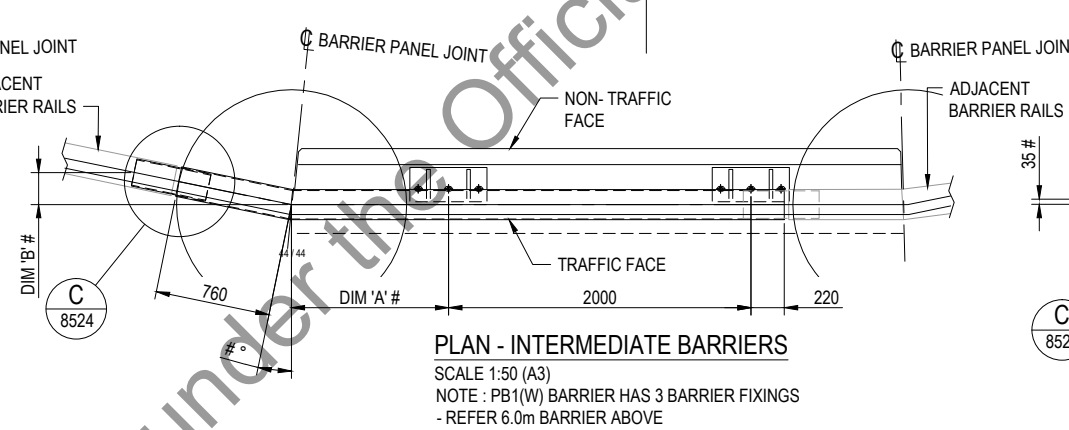
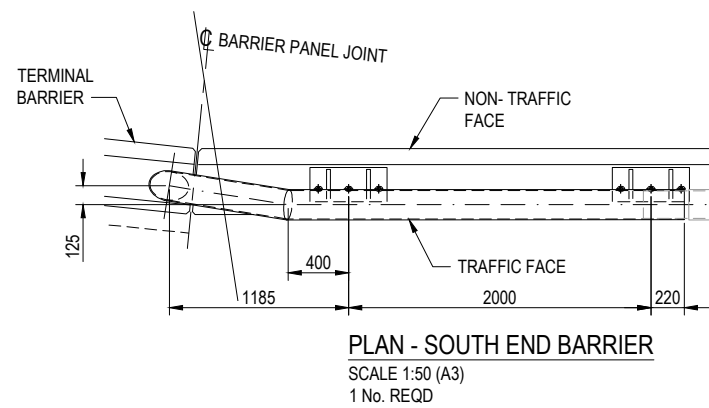
DRAWING No B2B-DRG-BR05-8522
REV B

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
- 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.
- # - DENOTES DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL



RAIL SCHEDULE		
BARRIER TYPE	DIM 'A'	DIM 'B'
PB2	REFER NORTH END PLAN BELOW	
PB2	1010	18
PB1 (W)	1000	18
PB2	1010	37
PB2	1010	37
PB2	1005	95
PB4	1040	95
PB3	1040	152
PB4	1040	152
PB4	1040	95
PB3	REFER SOUTH END PLAN BELOW	



DATE: 08/03/19 5:42:25 PM, LOGIN NAME: CONNOR, DAVID C, LOCATION: C:\users\connor\appdata\local\temp\jacobson\proj\br05-8523.dwg

E					
D					
C					
B					
A	08/03/19	GKK	PWC	LW	PRELIMINARY
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:25 @ A1					
1:50 @ A3					



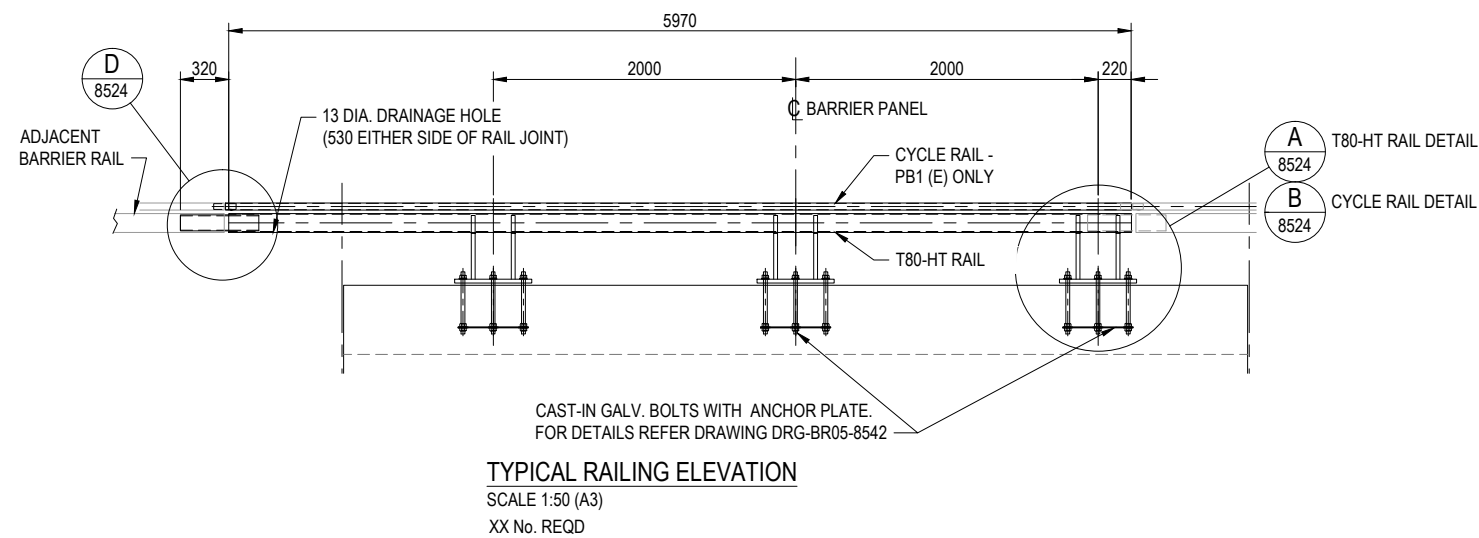
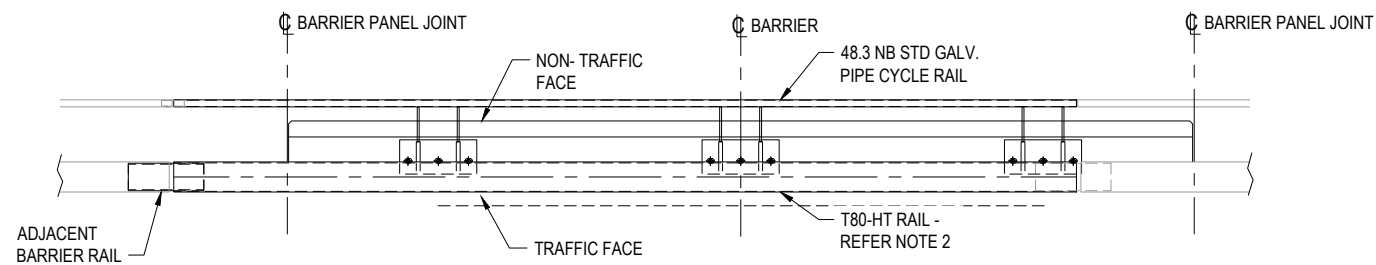
SCALE: 1:20 (A3)
STATUS: FOR INFORMATION
PROJECT NUMBER: 2/09-024/603

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

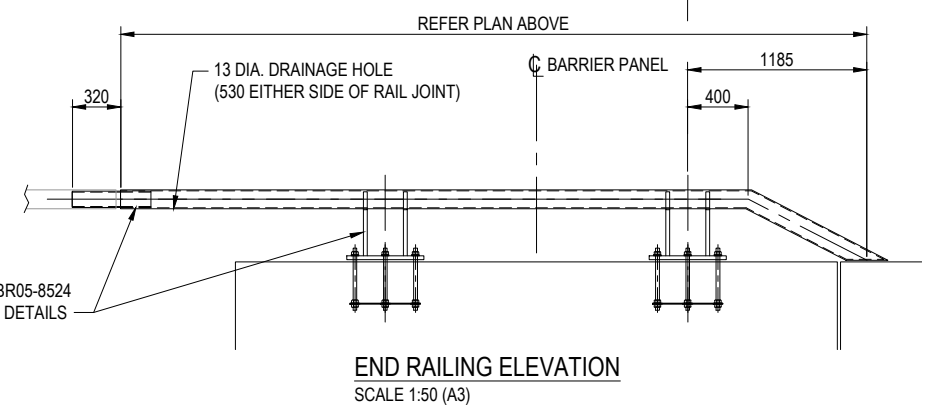
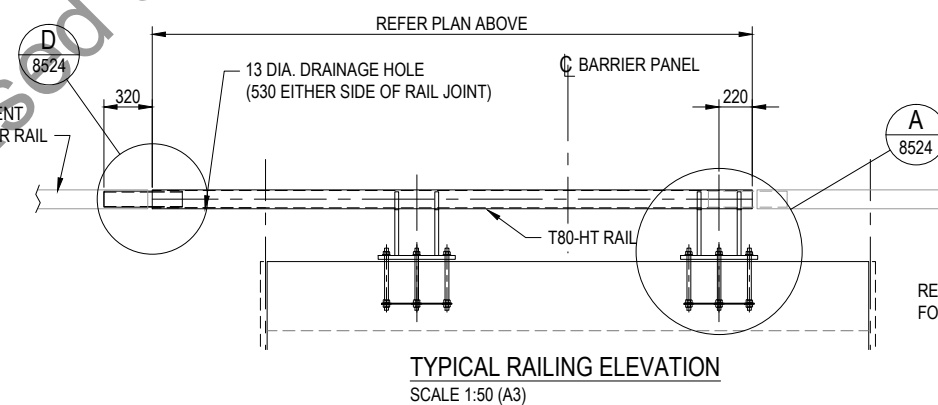
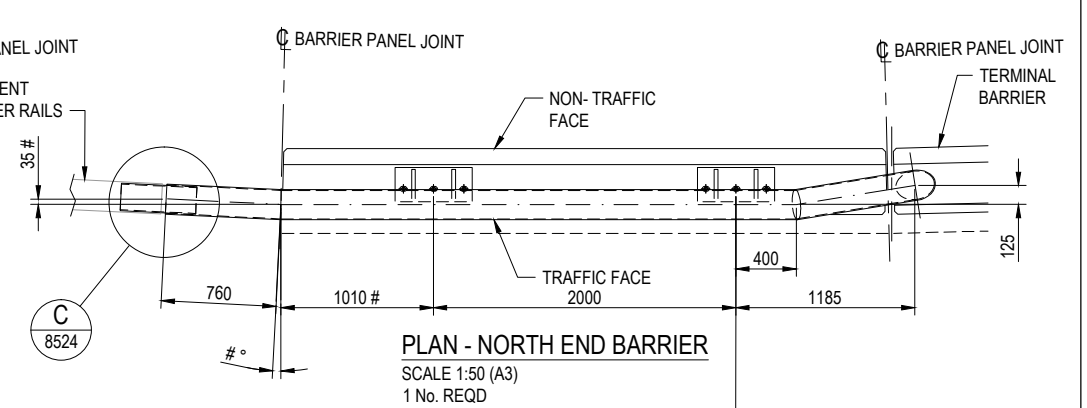
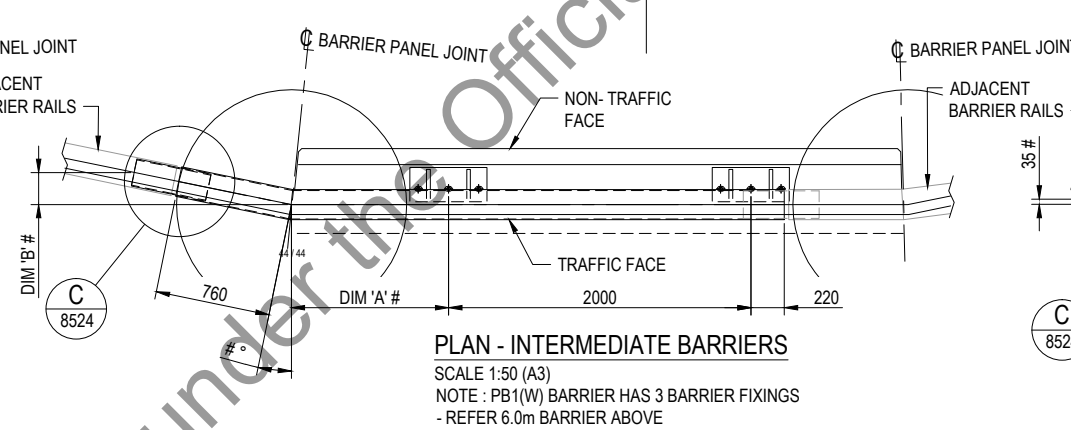
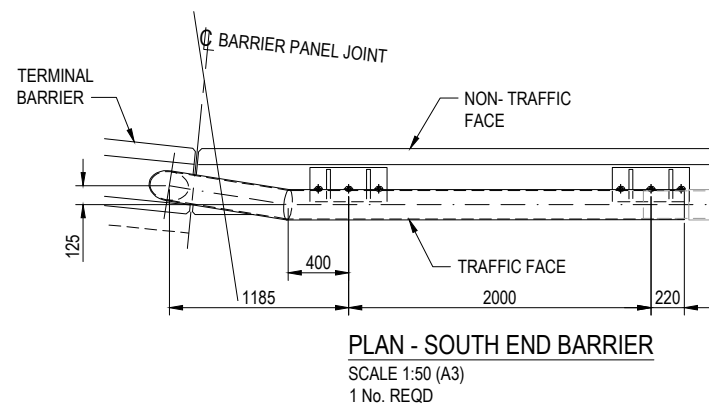
TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 1
DRAWING No: B2B-DRG-BR05-8523
REV: A

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
- 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.
- # - 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	



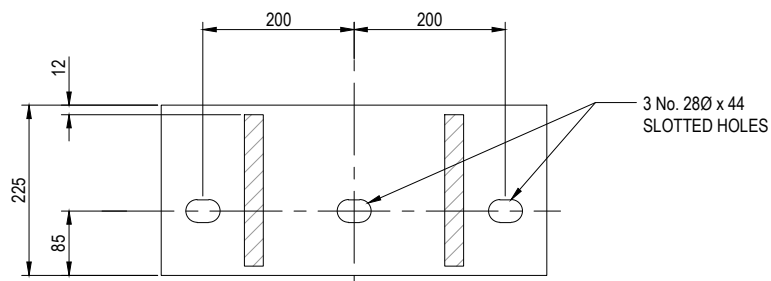
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No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D	D.MGR.	REVISIONS & ISSUES
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A	08/03/19	GKK	SKK	LW		PRELIMINARY - FOR PRICING

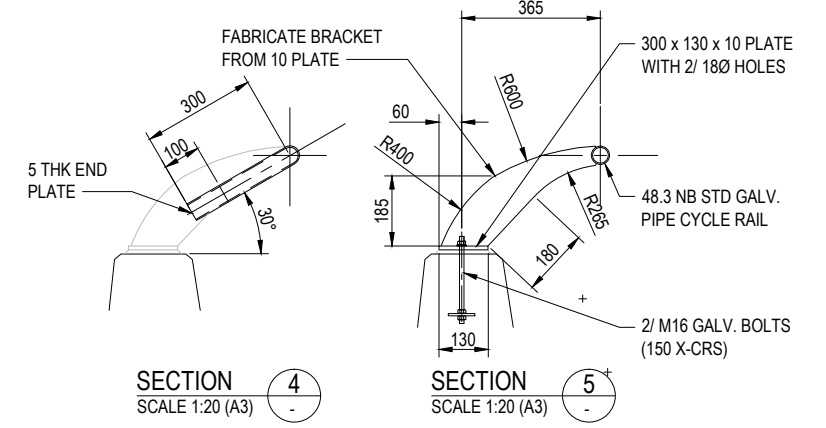
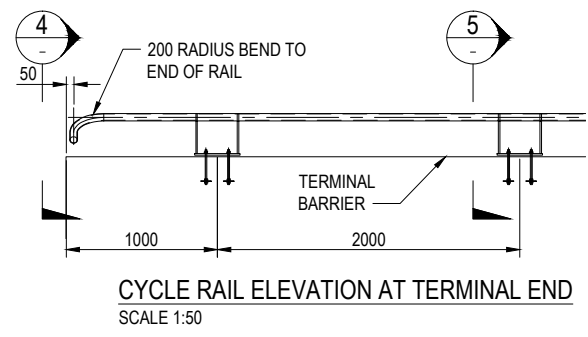
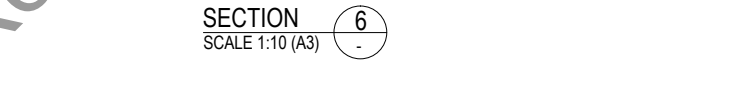
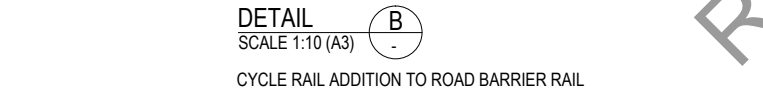
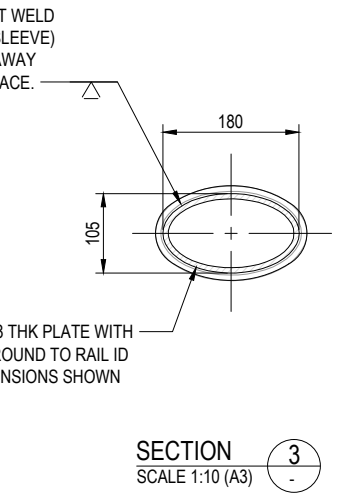
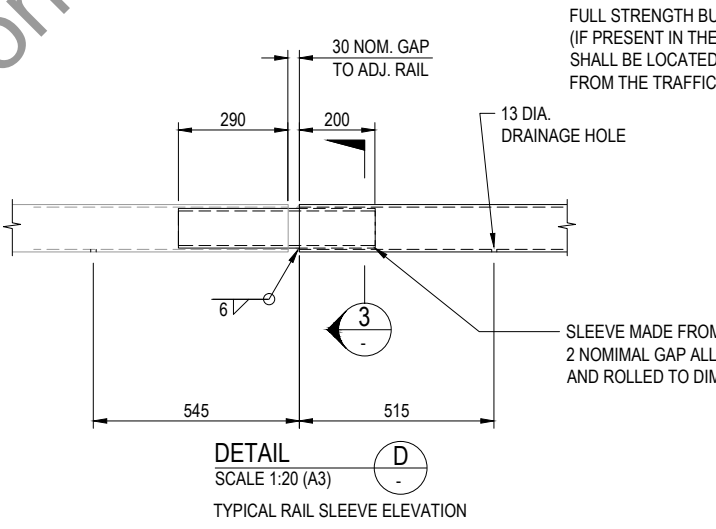
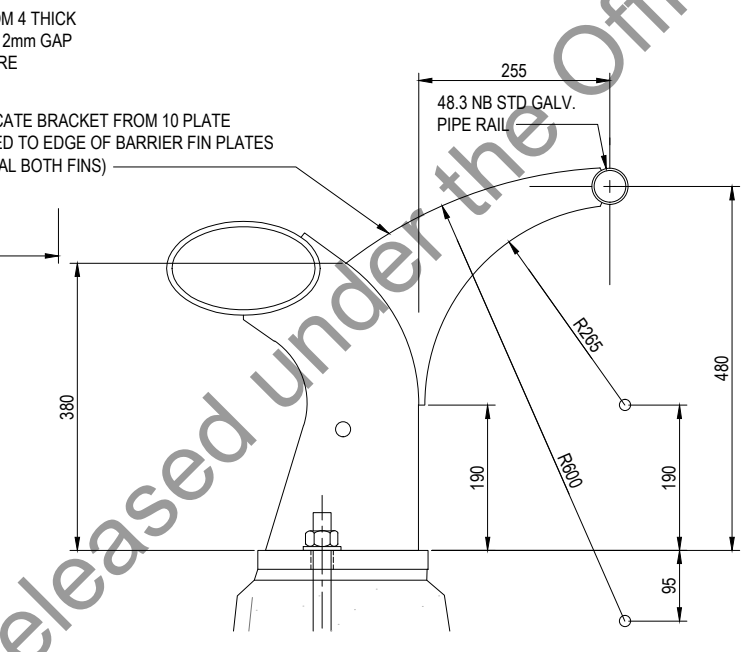
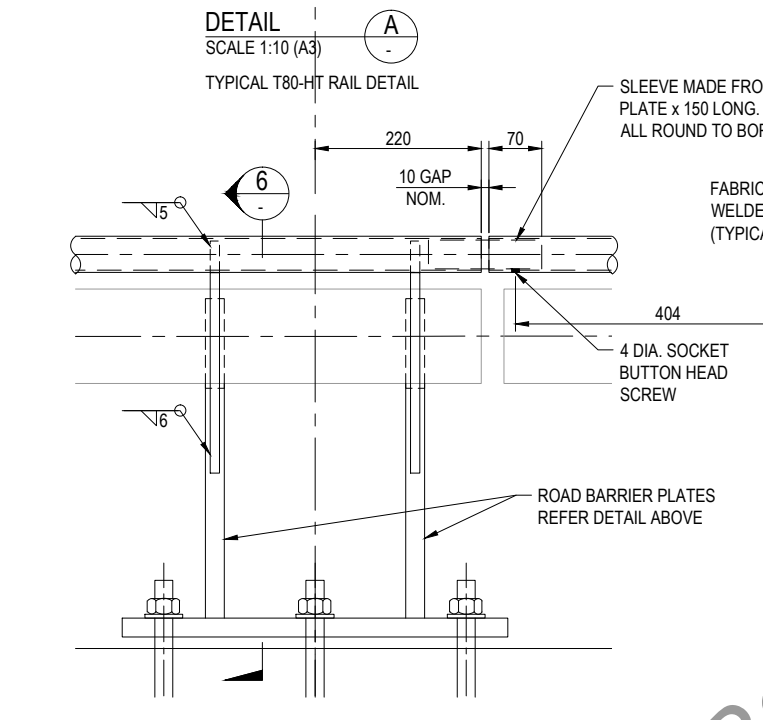
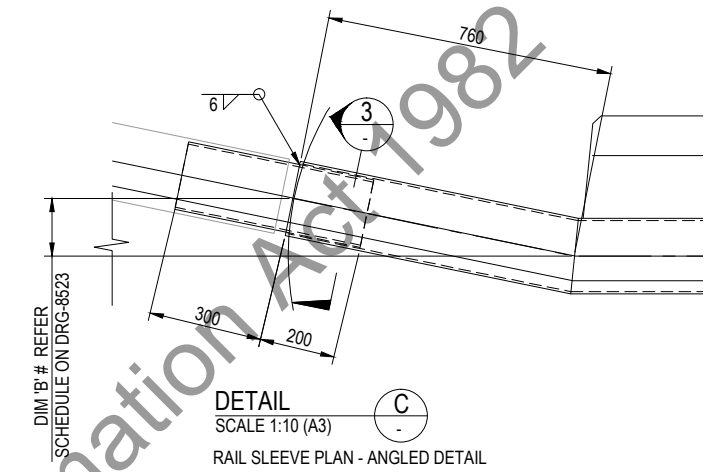
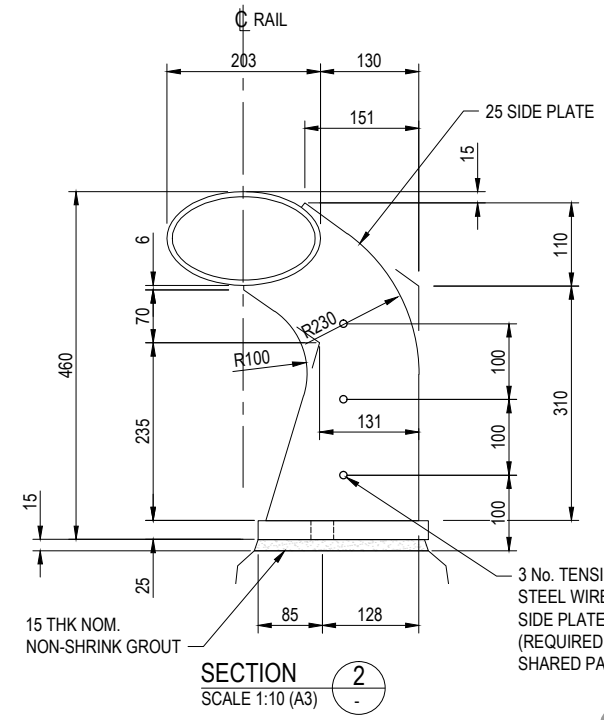
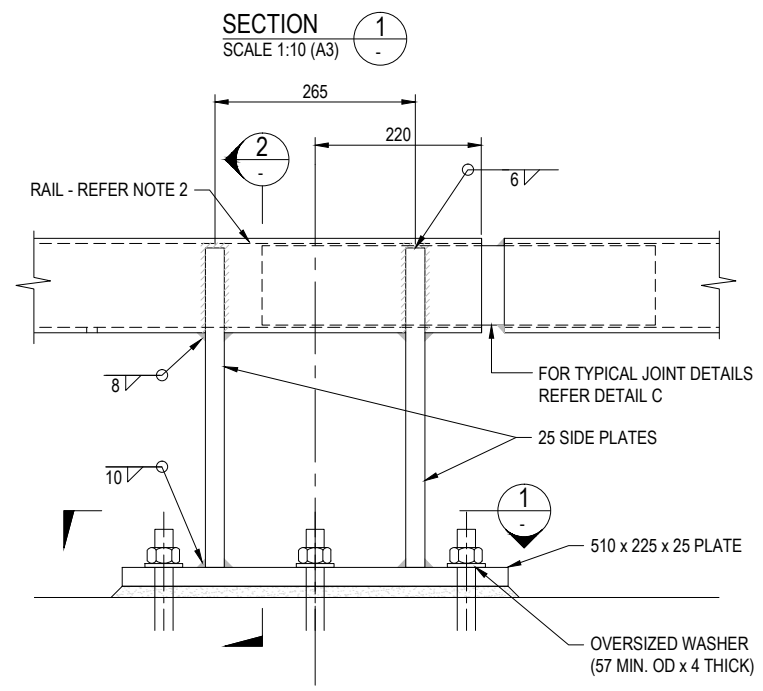
1:25 @ A1
1:50 @ A3

<p>NZ TRANSPORT AGENCY WAKA KOTAHĪ</p>	<p>CPB CONTRACTORS</p>	<p>JACOBS</p>	<p>Tonkin+Taylor</p>	SCALE 1:20 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 1
				STATUS 50% ISSUE			
				PROJECT NUMBER 2/09-024/603	DRAWN DCC	DESIGN REVIEW SKK	DRAWING No. B2B-DRG-BR05-8523

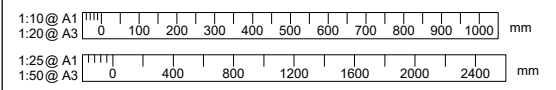
REV B



- NOTES**
- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
 - 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.
 - # - DENOTES DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL

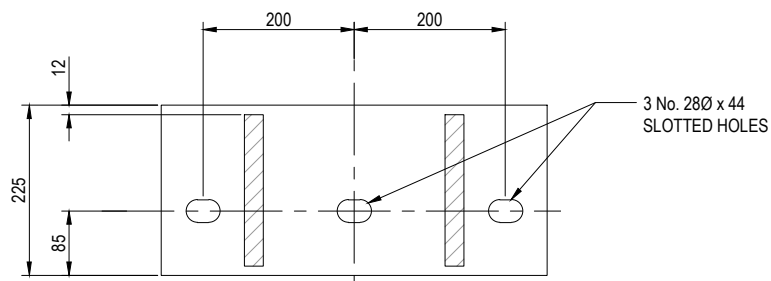


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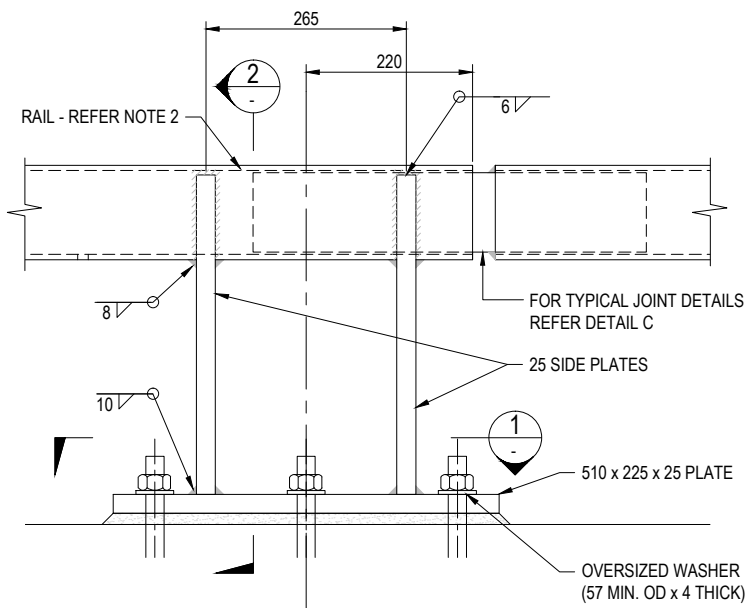
E					
D					
C					
B					
A	08/03/19	GKK	PWC	LW	PRELIMINARY
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:5 @ A1					
1:10 @ A3					

			SCALE	1:20 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 2
			STATUS	FOR INFORMATION			
			PROJECT NUMBER	2/09-024/603	DESIGNED SKK	DESIGN REVIEW PWC	DRAWING No B2B-DRG-BR05-8524
							REV A

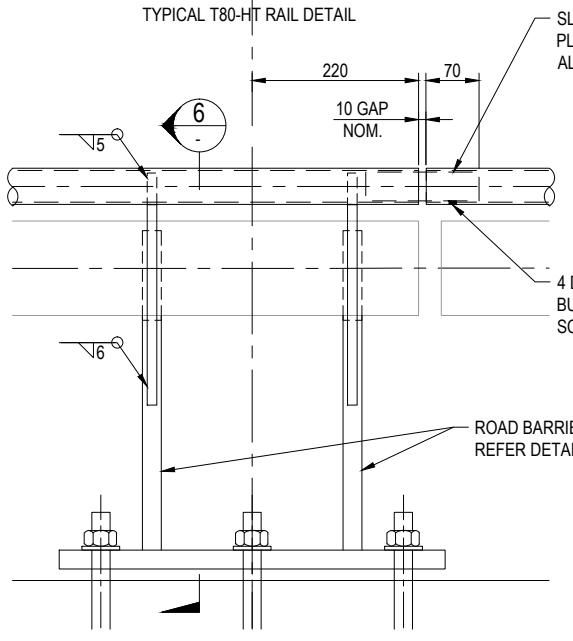


3 No. 28Ø x 44
SLOTTED HOLES

SECTION 1
SCALE 1:10 (A3)

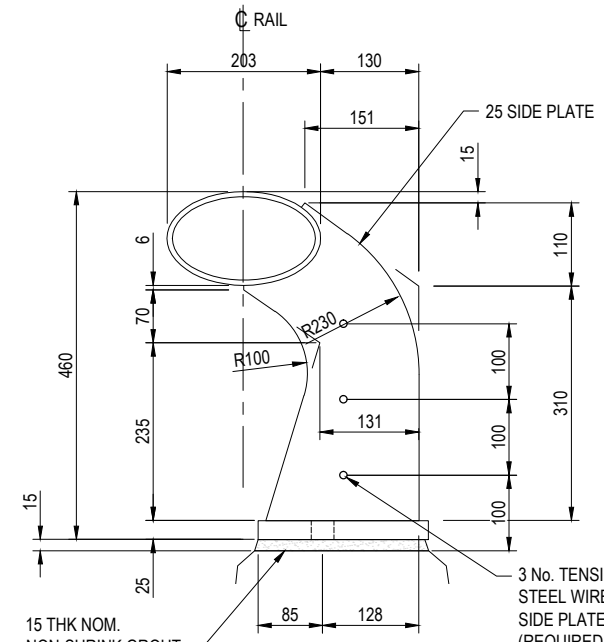


DETAIL A
SCALE 1:10 (A3)

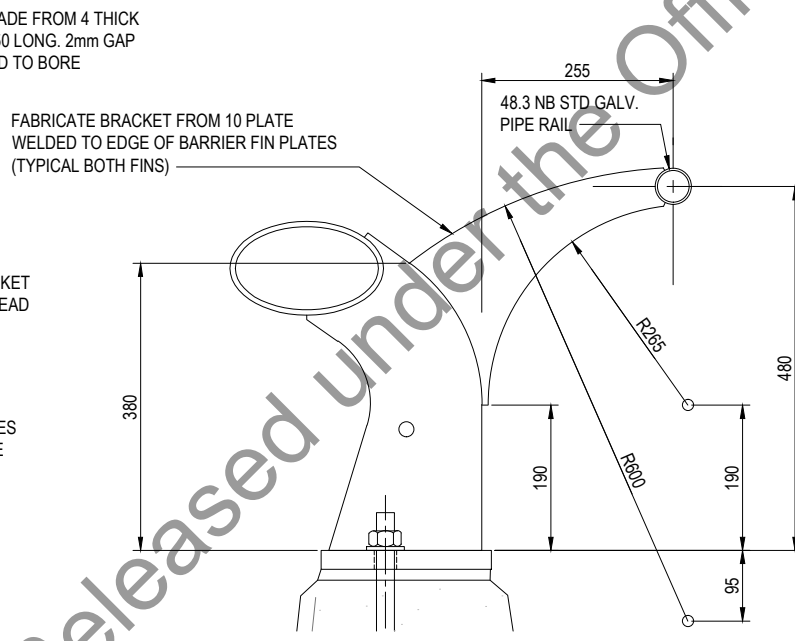


DETAIL B
SCALE 1:10 (A3)

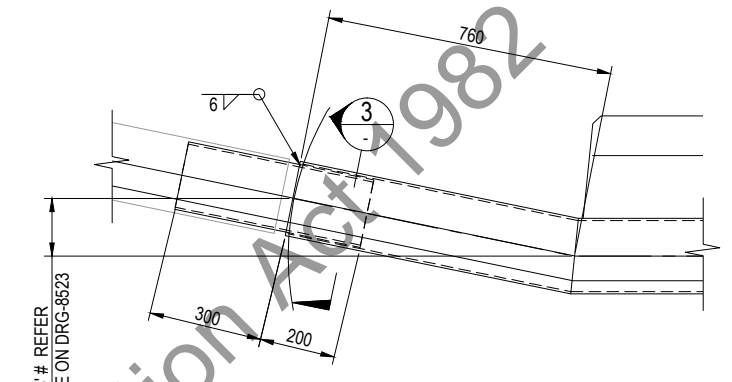
CYCLE RAIL ADDITION TO ROAD BARRIER RAIL



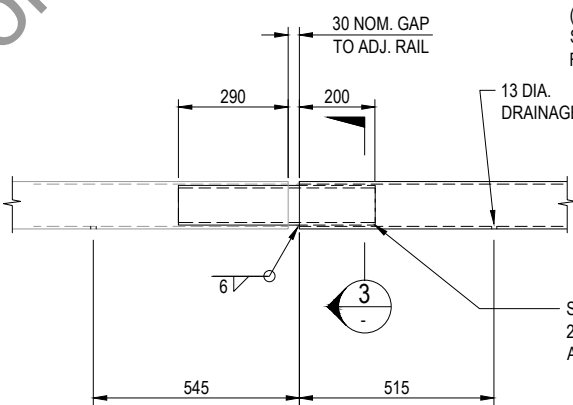
SECTION 2
SCALE 1:10 (A3)



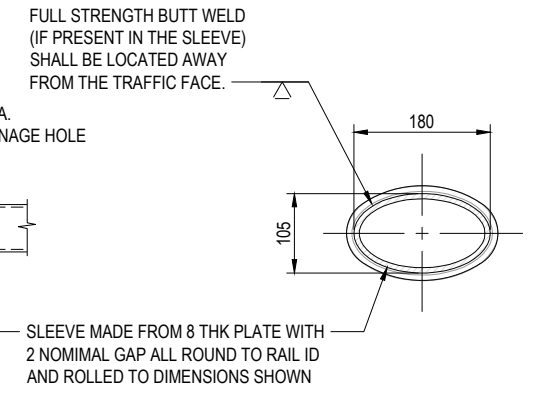
SECTION 6
SCALE 1:10 (A3)



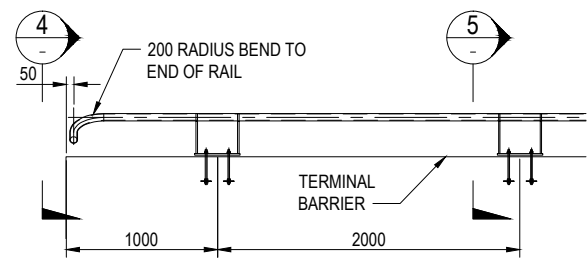
DETAIL C
SCALE 1:10 (A3)
RAIL SLEEVE PLAN - ANGLED DETAIL



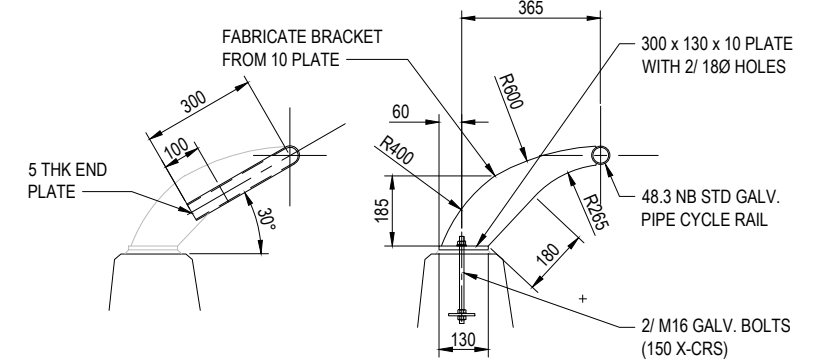
DETAIL D
SCALE 1:20 (A3)
TYPICAL RAIL SLEEVE ELEVATION



SECTION 3
SCALE 1:10 (A3)



CYCLE RAIL ELEVATION AT TERMINAL END
SCALE 1:50



SECTION 5
SCALE 1:20 (A3)

SECTION 4
SCALE 1:20 (A3)

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
- 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.
- # - DENOTES DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL

Released under the Official Information Act 1982

1:10 @ A1	0	100	200	300	400	500	600	700	800	900	1000
1:20 @ A3	0	400	800	1200	1600	2000	2400				

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

B	15/03/19	GKK	SKK	LW	50% ISSUE
A	08/03/19	GKK	SKK	LW	PRELIMINARY - FOR PRICING
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:5 @ A1					
1:10 @ A3					



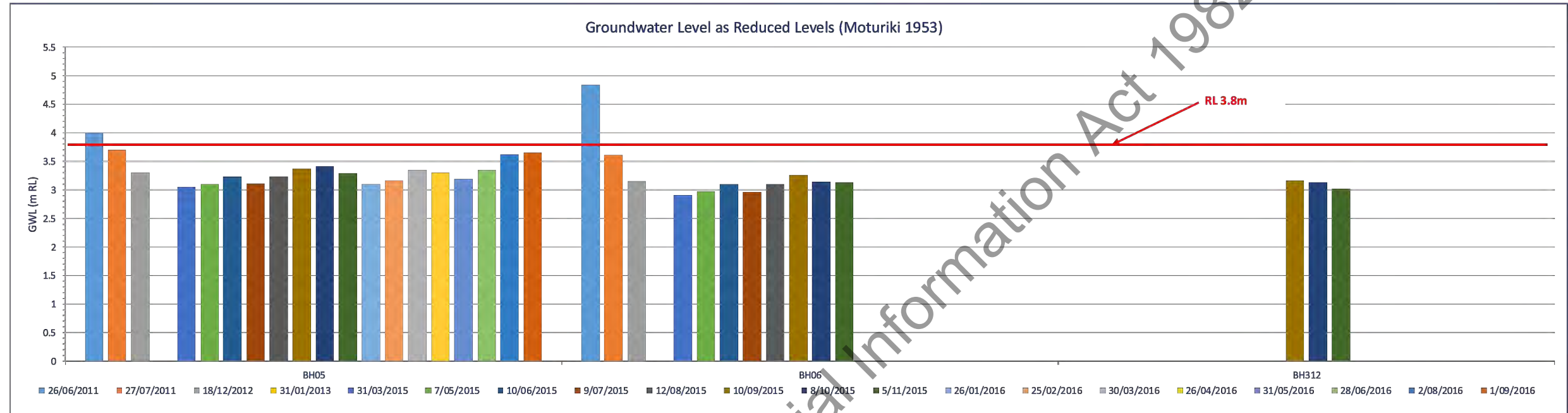
SCALE 1:20 (A3)
STATUS 50% ISSUE
PROJECT NUMBER 2/09-024/603

CLIENT NZ TRANSPORT AGENCY
PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN DCC
DESIGNED TKF

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: CONNOR, DAVID C LOCATION: C:\users\connor\appdata\local\temp\workspace\proj\br05-8524.dwg

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								



Released under the Official Information Act 1982

DATE: 15/03/2019 09:55:11 AM; LOCATION: KAMINSKI, GRACE
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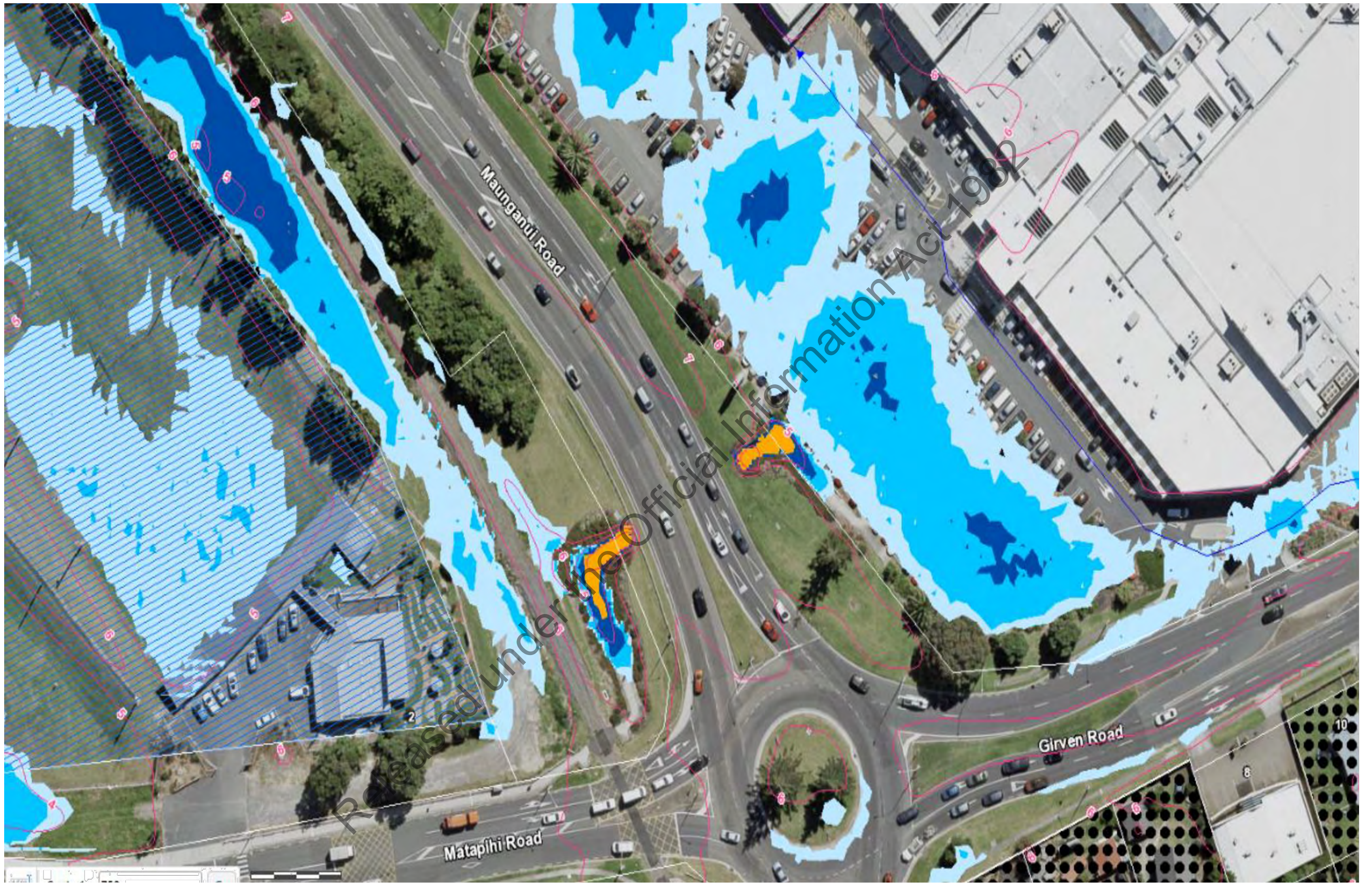
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A	15/03/19	GK	YA	LW	50% ISSUE



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

TITLE: UNDERPASS UPGRADE DRAINAGE GROUNDWATER MONITORING INFORMATION
 DRAWING No: B2B-DRG-DR01-8410
 REV: A



DATE: 15/03/2019 9:55:51 AM; LOC: NAME: KAMINSKI, GRACE
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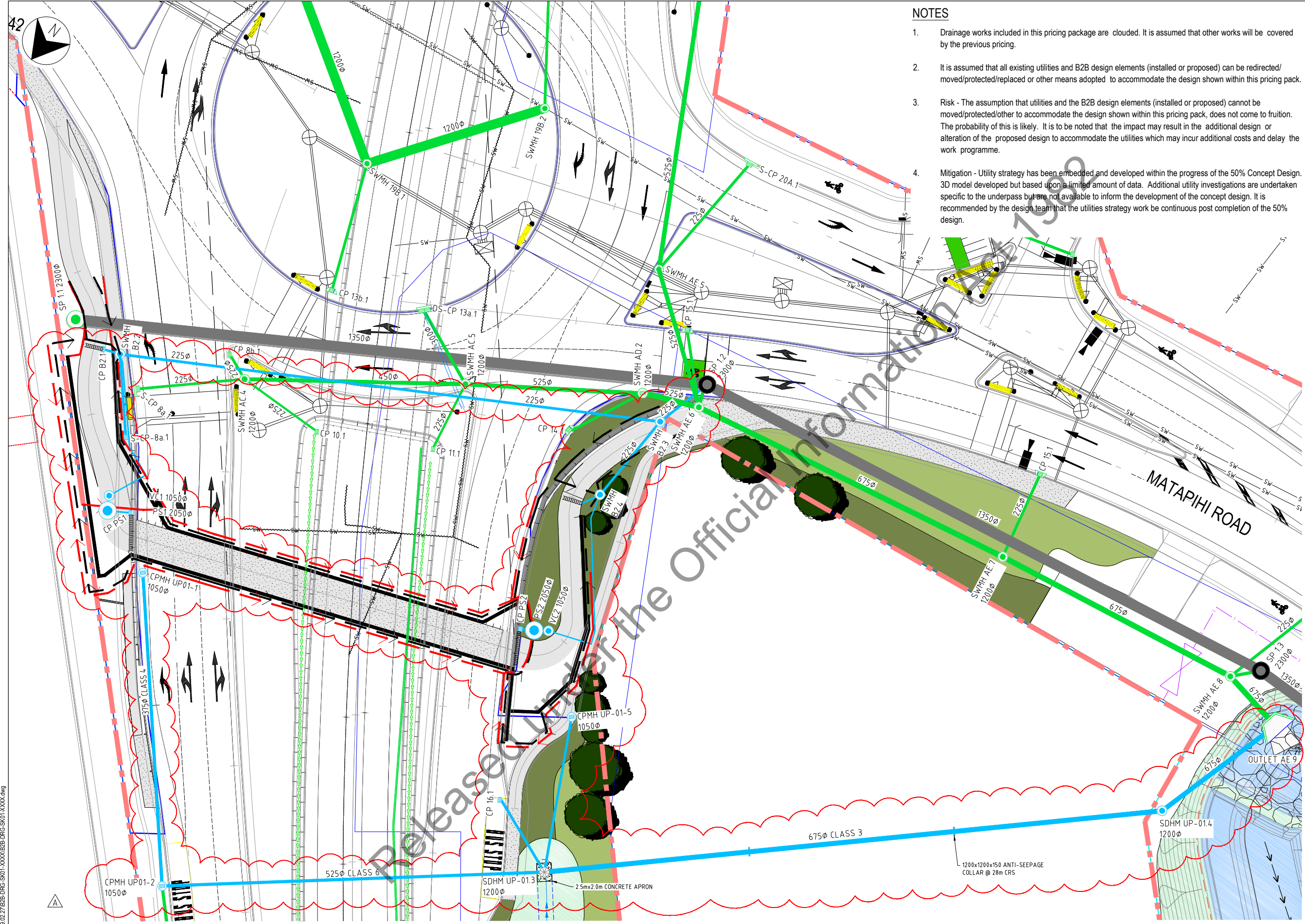
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A	15/03/19	GK	YA	LW	50% ISSUE



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	DRAWING CHECK	APPROVED
GK	GK	LW
DESIGNED	DESIGN REVIEW	
YA	LW	

TITLE	UNDERPASS UPGRADE DRAINAGE TCC FLOOD MAP
DRAWING No	B2B-DRG-DR01-8411
REV	A



NOTES

1. Drainage works included in this pricing package 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 shown within this pricing pack.
3. Risk - The assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the design shown within this pricing pack, 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.

SHEET KEY

EXISTING:

- SW - STORMWATER PIPE
- - CATCHPITS/MANHOLES/ CATCHPIT MANHOLES
- - CREEK/STREAM
- - CULVERT
- - SUPERSTRADE RESEED
- - ITS
- P — - POWER OVERHEAD
- P — - POWER UNDERGROUND
- FO — - POWER UNDERGROUND
- T — - TELECOM
- TELSTRA — - TELSTRA
- G — - GAS
- SS — - SEWER
- SW — - STORMWATER
- W — - WATER

PROPOSED:

- - PERMANENT DESIGNATION
- - TEMPORARY DESIGNATION
- - STORMWATER (FOR ROAD CONSTRUCTION EXCLUDED)
- - STORMWATER UNDER PASS (INCLUDED IN THIS PRICING)
- SW — - EXISTING SW PIPE/MH/CP TO BE ABANDONED REFER NOTE 18 ON DWG 2012 OR DWG 2013
- - STORMWATER MANHOLE
- - SCRUFFY DOME MANHOLE
- - CATCH PIT MANHOLE
- - CATCH PIT MANHOLE with 1x1m MEA[®] DRAIN OR SIMILAR
- - CATCH PIT MANHOLE with 2x1m MEA[®] DRAIN OR SIMILAR
- - CATCHPIT / BRIDGE INLET
- - DOUBLE CATCHPIT
- - SW INLET/OUTLET
- - BICYCLE FRIENDLY CATCHPIT
- - RIP RAP
- - OPEN CHANNELS
- - 1100 ϕ DRAINCOIL (WRAPPED WITH FILTER SOCK) LAID > 3.8m RL
- - 1100 ϕ DRAINCOIL (WRAPPED WITH FILTER SOCK) LAID < 3.8m RL
- - SUP CONVEYANCE CHANNEL
- - RETAINING WALL
- - WASTE WATER NETWORK
- - ITS
- - VEC - VECTOR COMMS
- - MV - VECTOR MEDIUM VOLTAGE
- - LV - VECTOR LOW VOLTAGE
- - HV - VECTOR HIGH VOLTAGE
- - G - VECTOR GAS
- - C - CHORUS
- - SS - WASTEWATER
- - VO - VODAFONE
- - W - WATER
- - FX - FX NETWORK

PLAN SCALE 1:500 (A3)

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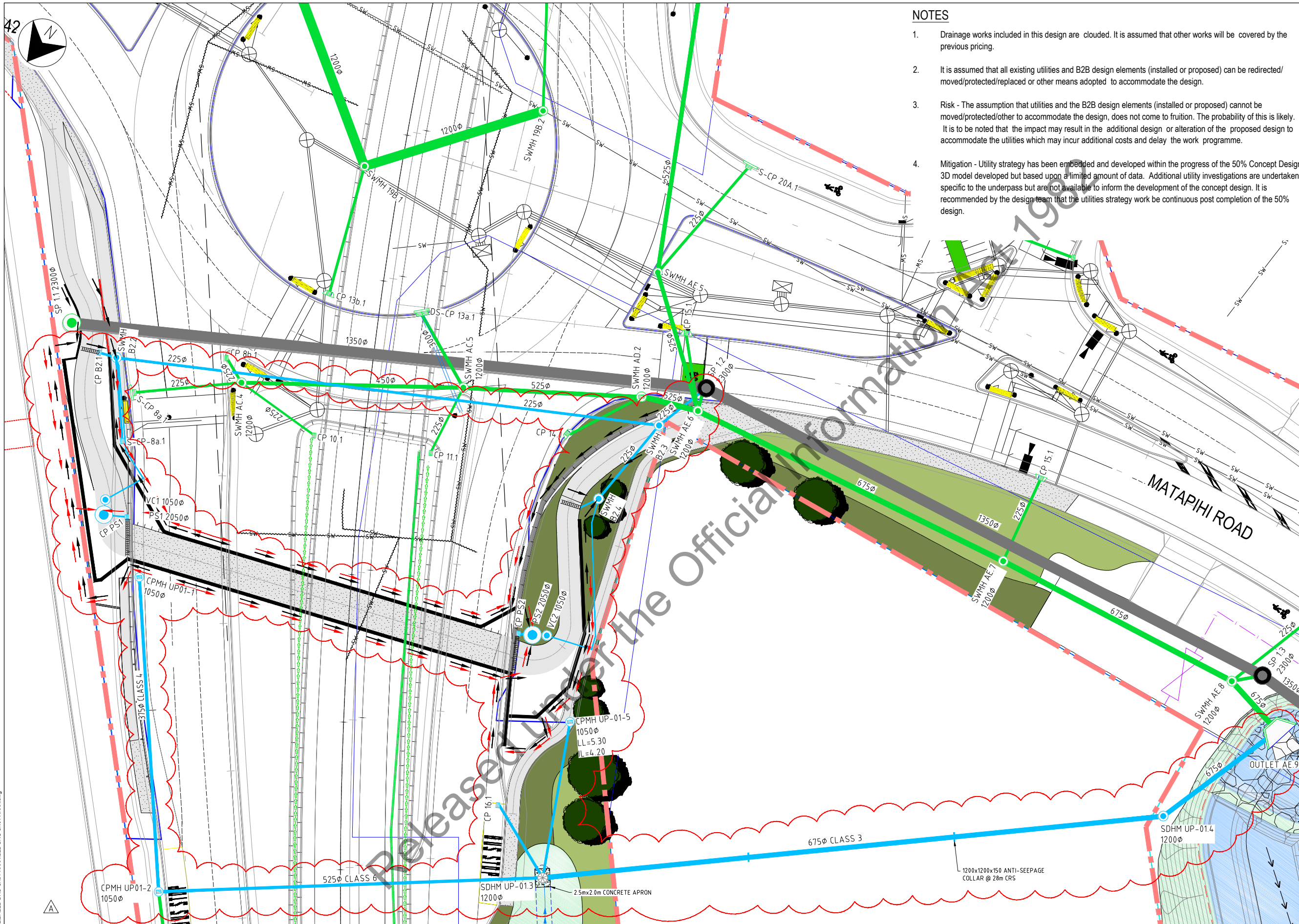
No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	ISSUED FOR INFORMATION	REVISIONS & ISSUES
A						

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1:2000 @ A3



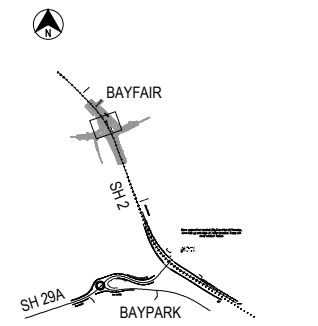
CONTRACTOR	DESIGNER	SCALE	CLIENT
CPB CONTRACTORS	JACOBS	AS SHOWN	NZ TRANSPORT AGENCY
	Align	STATUS	PROJECT
	Tonkin+Taylor	FOR INFORMATION	BAYPARK TO BAYFAIR LINK (BAY LINK)
		PROJECT NUMBER	DRAWN
		2/09-024/603	CTC
			DESIGNED
			YA
			DRAWING CHECK
			DESIGN REVIEW
			APPROVED

TITLE	DRAWING No	REV
UNDEERPASS UPGRADE GENERAL ARRANGEMENT DRAINAGE LAYOUT - OVERALL	B2B-DRG-DRG-8421	A



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.



SHEET KEY

- EXISTING:**
- SW - STORMWATER PIPE
 - - CATCHPITS/MANHOLES/ CATCHPIT MANHOLES
 - - CREEK/STREAM
 - - CULVERT
 - - SUPERSTRADE REISED ITS
 - - ITS
 - P - POWER OVERHEAD
 - P - POWER UNDERGROUND
 - FO - POWER UNDERGROUND
 - T - TELECOM
 - TELSTRA - TELSTRA
 - G - GAS
 - SS - SEWER
 - SW - STORMWATER
 - W - WATER
- PROPOSED:**
- - PERMANENT DESIGNATION
 - - STORMWATER (FOR ROAD CONSTRUCTION EXCLUDED)
 - - STORMWATER UNDER PASS (INCLUDED IN THIS DESIGN)
 - SW - EXISTING SW PIPE/MH/CP TO BE ABANDONED
 - - STORMWATER MANHOLE
 - - SCRUFFY DOME MANHOLE
 - - CATCH PIT MANHOLE
 - - BICYCLE FRIENDLY CATCHPIT
 - - RIP RAP
 - - 1100 DRAINCOIL (WRAPPED WITH FILTER SOCK) LAID > 3.8m RL
 - - 1100 DRAINCOIL (WRAPPED WITH FILTER SOCK) LAID < 3.8m RL
 - - RETAINING WALL

PLAN
SCALE 1:500 (A3)

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\B2B-DRG-SK01-XXXX.dwg

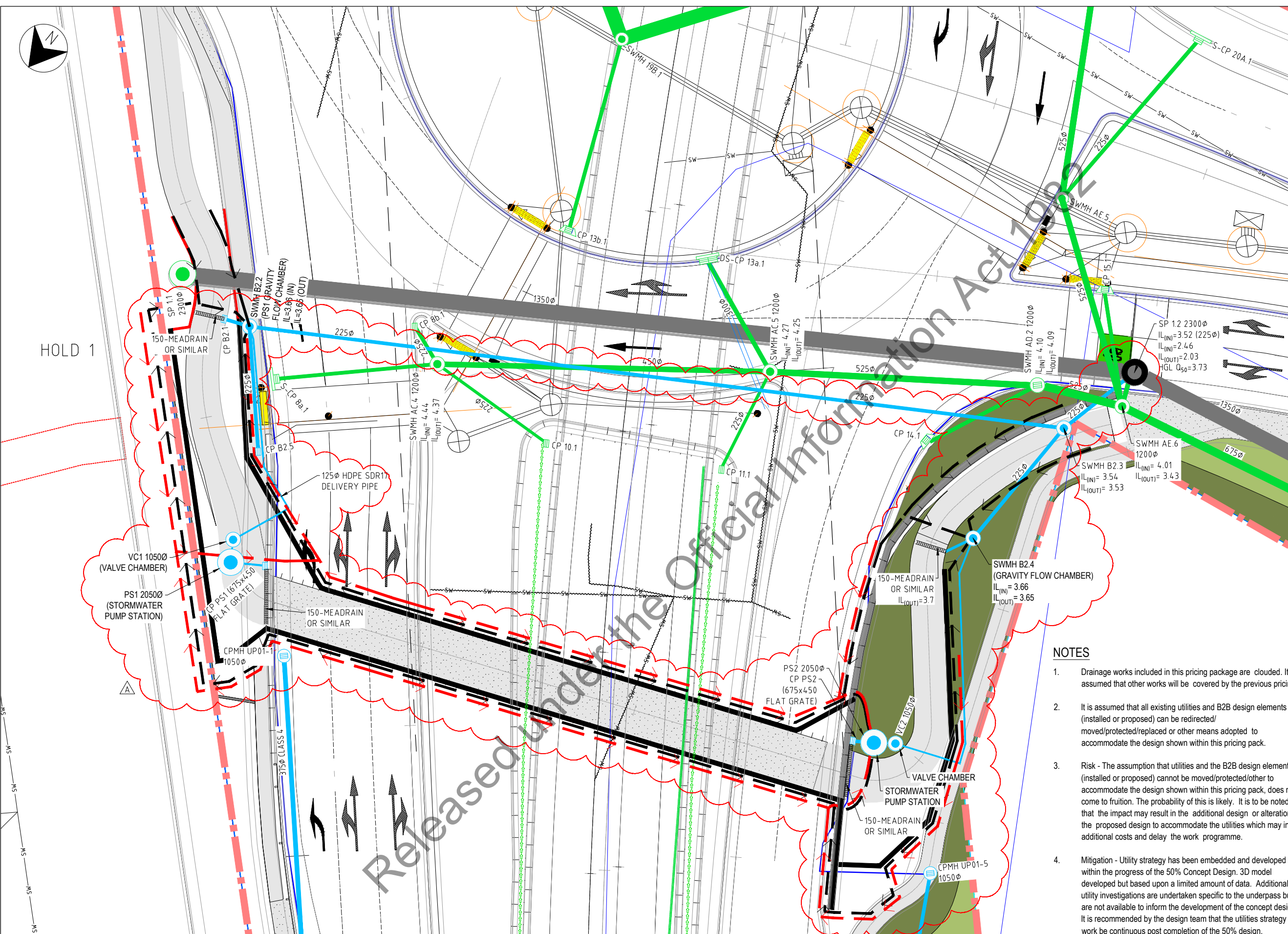
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A	15/03/19	CTC	YA		50% ISSUE



CONTRACTOR	DESIGNER	SCALE	CLIENT
CPB CONTRACTORS	JACOBS Align Tonkin+Taylor	AS SHOWN	NZ TRANSPORT AGENCY
		STATUS	PROJECT
		50% ISSUE	BAYPARK TO BAYFAIR LINK (BAY LINK)
		PROJECT NUMBER	TITLE
		2/09-024/603	UNDERPASS UPGRADE GENERAL ARRANGEMENT DRAINAGE LAYOUT - OVERALL

DRAWN	DRAWING CHECK	APPROVED
CTC	DESIGN REVIEW	
DESIGNED		
YA		

DRAWING No	REV
B2B-DRG-DRG-8421	A



BAYFAIR
SH 2
BAYPARK
SH 29A

SHEET KEY

EXISTING:

- SW — STORMWATER PIPE
- CATCHPITS/MANHOLES/ CATCHPIT MANHOLES
- CREEK/STREAM
- CULVERT
- ITS — ITS
- P — POWER OVERHEAD
- P — POWER UNDERGROUND
- FO — POWER UNDERGROUND
- T — TELECOM
- TELSTRA — TELSTRA
- G — GAS
- SS — SEWER
- SW — STORMWATER
- W — WATER

PROPOSED:

- PERMANENT DESIGNATION
- TEMPORARY DESIGNATION
- STORMWATER (FOR ROAD CONSTRUCTION EXCLUDED)
- STORMWATER UNDER PASS (INCLUDED IN THIS PRICING)

— SW — EXISTING SW PIPE/MH/CP TO BE ABANDONED REFER NOTE 18 ON DWG 2012 OR DWG 2013

- STORMWATER MANHOLE
- SCRUFFY DOME MANHOLE
- CATCH PIT MANHOLE
- CATCH PIT MANHOLE with 1x1m MEA[®] DRAIN OR SIMILAR
- CATCH PIT MANHOLE with 2x1m MEA[®] DRAIN OR SIMILAR
- CATCHPIT / BRIDGE INLET
- DOUBLE CATCHPIT
- SW INLET/OUTLET
- BICYCLE FRIENDLY CATCHPIT
- RIP RAP
- OPEN CHANNELS
- 1100 DRAINCOIL (WRAPPED WITH FILTER SOCK) LAID > 3.8m RL
- 1100 DRAINCOIL (WRAPPED WITH FILTER SOCK) LAID < 3.8m RL
- SUP CONVEYANCE CHANNEL
- RETAINING WALL
- WASTE WATER NETWORK
- ITS — ITS
- VC — VECTOR COMMS
- MV — VECTOR MEDIUM VOLTAGE
- LV — VECTOR LOW VOLTAGE
- HV — VECTOR HIGH VOLTAGE
- G — VECTOR GAS
- C — CHORUS
- SS — WASTEWATER
- VO — VODAFONE
- W — WATER
- FX — FX NETWORK

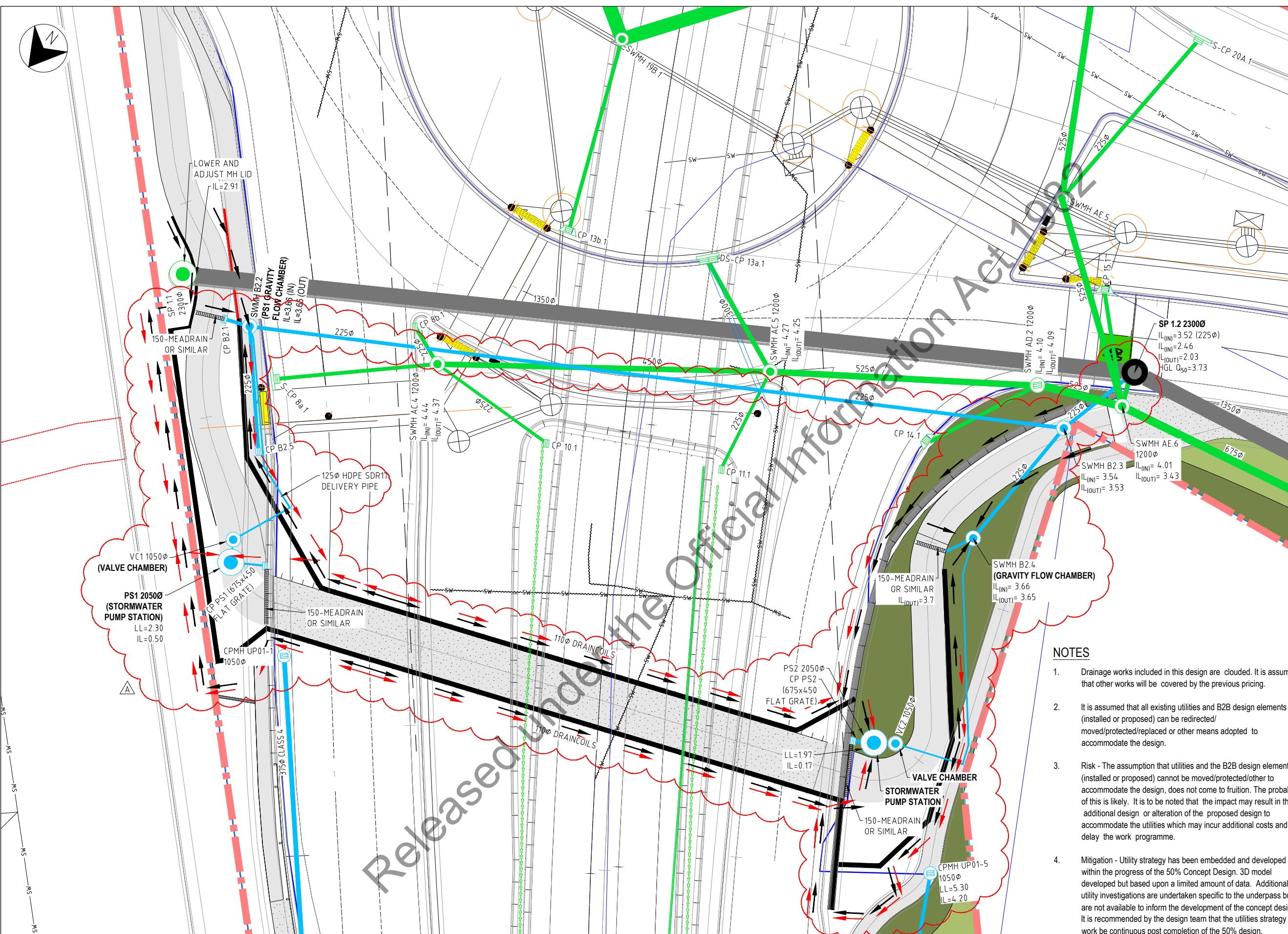
- NOTES**
- Drainage works included in this pricing package are clouded. It is assumed that other works will be covered by the previous pricing.
 - It is assumed that all existing utilities and B2B design elements (installed or proposed) can be redirected/moved/protected/replaced or other means adopted to accommodate the design shown within this pricing pack.
 - Risk - The assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the design shown within this pricing pack, 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.
 - 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)

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No	DATE	CHK	DESIGN	APPD	REVISIONS & ISSUES
A		CTC	YA		ISSUED FOR INFORMATION

<p>NZ TRANSPORT AGENCY WAKA KOTAHU</p>	<p>CPB CONTRACTORS</p>	<p>JACOBS</p>	<p>Align Tonkin+Taylor</p>	<p>SCALE: AS SHOWN</p> <p>STATUS: FOR INFORMATION</p> <p>PROJECT NUMBER: 2/09-024/603</p>	<p>CLIENT: NZ TRANSPORT AGENCY</p> <p>PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)</p> <p>DRAWN: CTC DESIGNED: YA</p> <p>DRAWING CHECK: DESIGN REVIEW</p> <p>APPROVED:</p>	<p>TITLE: UNDEERPASS UPGRADE GENERAL ARRANGEMENT UNDERPASS AREA</p> <p>DRAWING No: B2B-DRG-DRG-8422</p> <p>REV: A</p>
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SHEET KEY

EXISTING:

- SW - STORMWATER PIPE
- - CATCHPITS/MANHOLES/ CATCHPIT MANHOLES
- - CREEK/STREAM
- - CULVERT
- - SUPERSTRADE/RECESSED ITS
- - ITS
- P — - POWER OVERHEAD
- P — - POWER UNDERGROUND
- FO — - POWER UNDERGROUND
- T — - TELECOM
- TELSTRA — - TELSTRA
- G — - GAS
- SS — - SEWER
- SW — - STORMWATER
- W — - WATER

PROPOSED:

- - PERMANENT DESIGNATION
- - STORMWATER (FOR ROAD CONSTRUCTION EXCLUDED)
- - STORMWATER UNDER PASS (INCLUDED IN THIS DESIGN)
- SW — - EXISTING SW PIPE/MH/CP TO BE ABANDONED
- - STORMWATER MANHOLE
- - SCRUFFY DOME MANHOLE
- - CATCH PIT MANHOLE
- - BICYCLE FRIENDLY CATCHPIT
- - RIP RAP
- - 110φ DRAINCOIL (WRAPPED WITH FILTER SOCK) LAID > 3.8m RL
- - 110φ DRAINCOIL (WRAPPED WITH FILTER SOCK) LAID < 3.8m RL
- - RETAINING WALL

- 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.
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PLAN
SCALE 1:333 (A3)

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A	15/03/19	CTC	YA		50% ISSUE

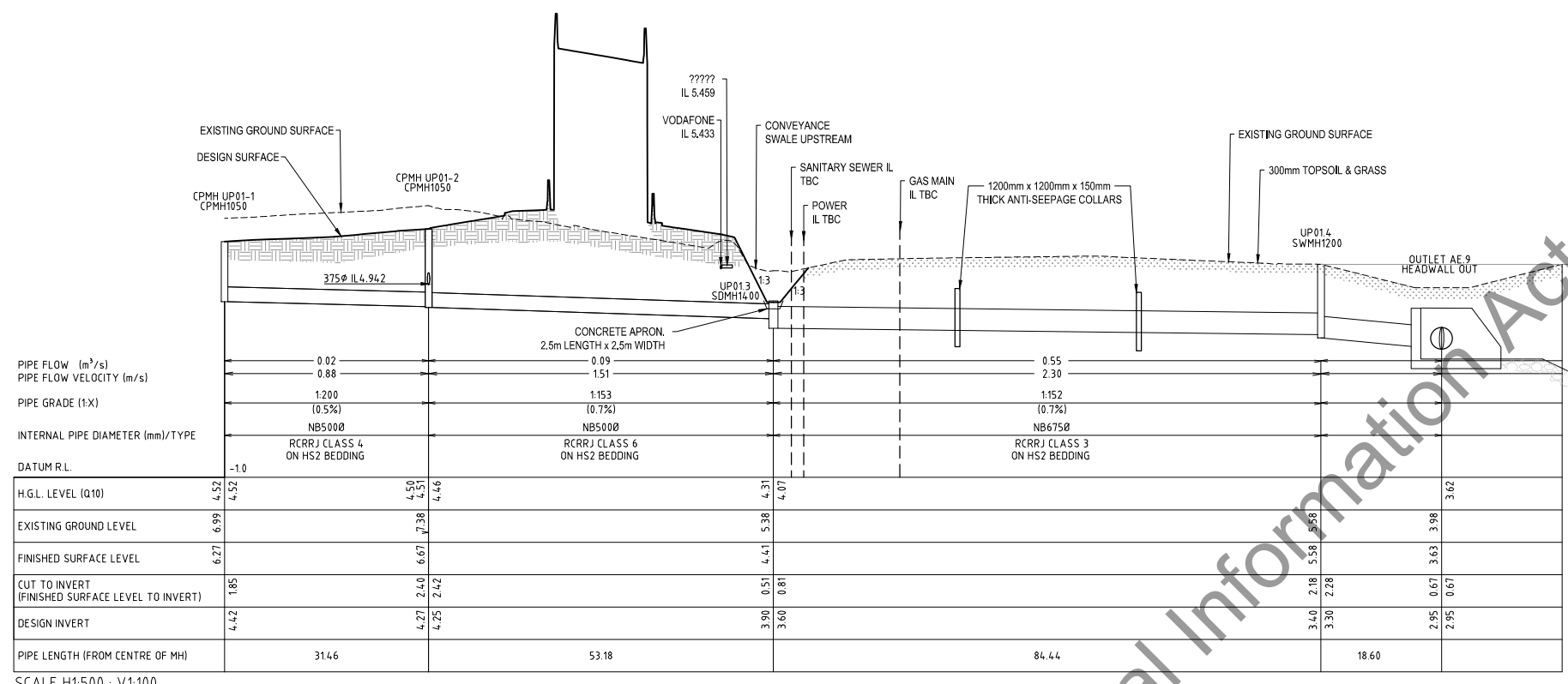
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1:2000@A3



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

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

TITLE: UNDERPASS UPGRADE GENERAL ARRANGEMENT UNDERPASS AREA
DRAWING No: B2B-DRG-DRG-8422
REV: A



SCALE H1:500 : V1:100

SW LINE - UP01

SW LINE - UP01

Released under the Official Information Act 1982

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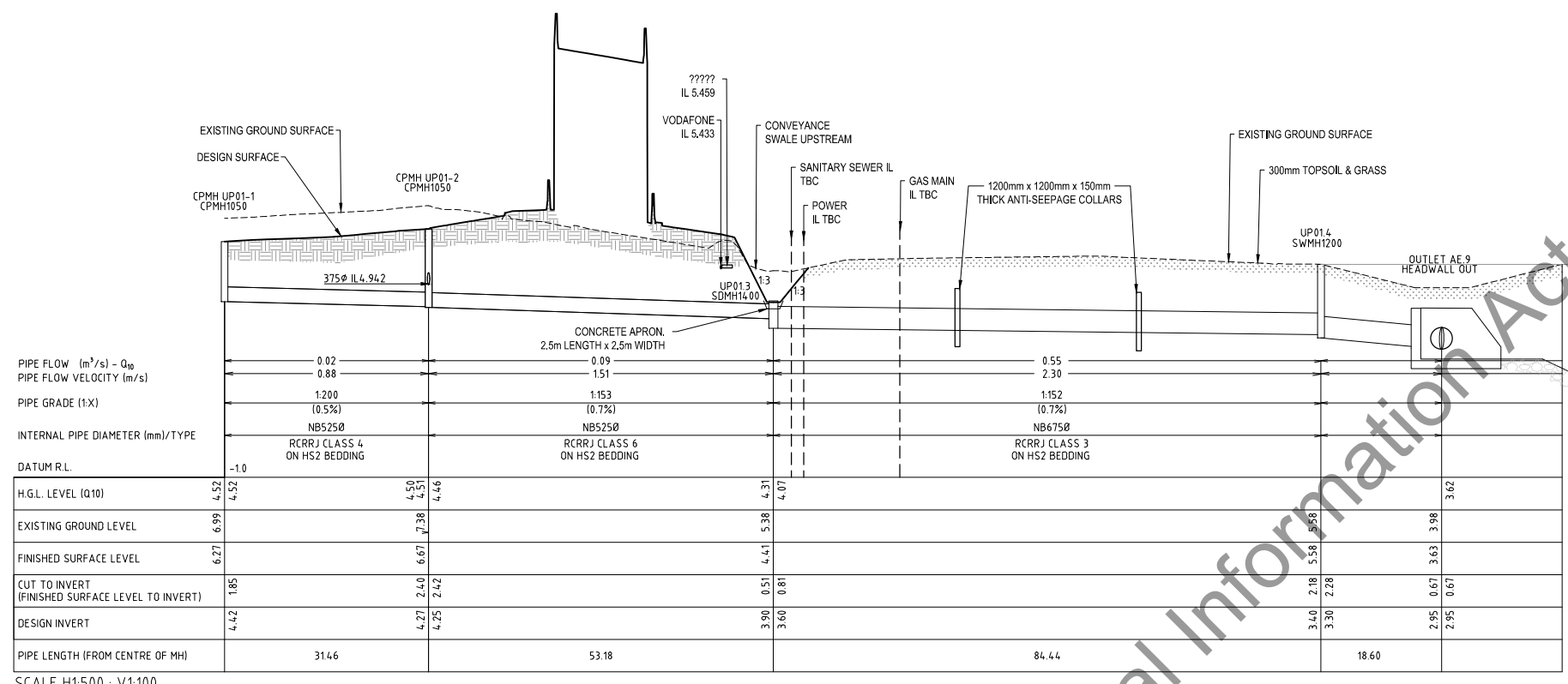
ISSUED FOR INFORMATION			
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SCALE: 1:250 (A3)
STATUS: FOR INFORMATION
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: CTC
DESIGNED: YA

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



Released under the Official Information Act 1982

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50% ISSUE				
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR
1	15/03/19	CTC	YA	

REVISIONS & ISSUES

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1:2000@A3

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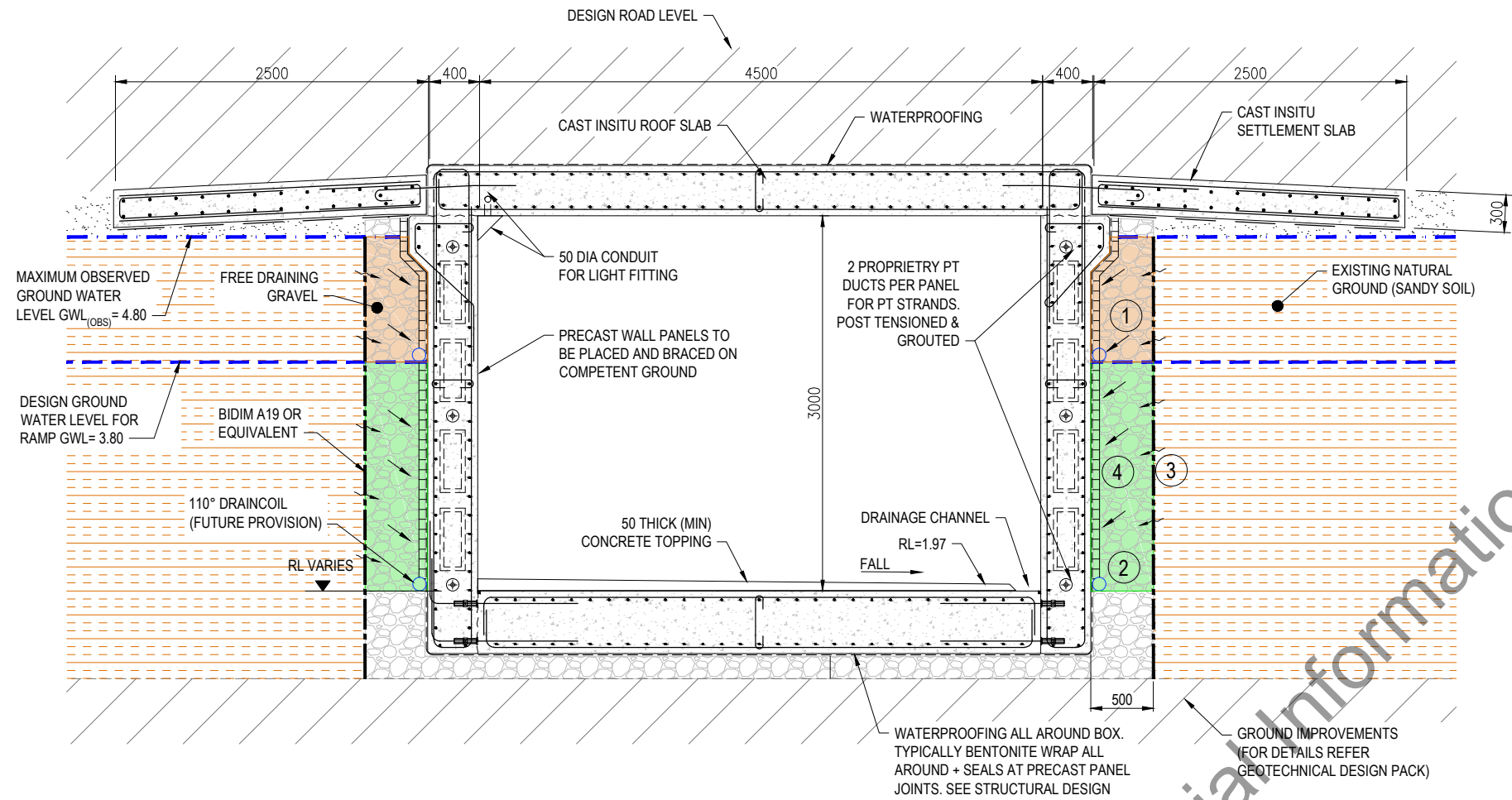
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			STATUS	50% ISSUE			
CONTRACTOR 			PROJECT NUMBER	2/09-024/603	DRAWN CTC	DRAWING CHECK DESIGN REVIEW	APPROVED
						DRAWING No	B2B-DRG-DRG-8423
						REV	A

NOTES

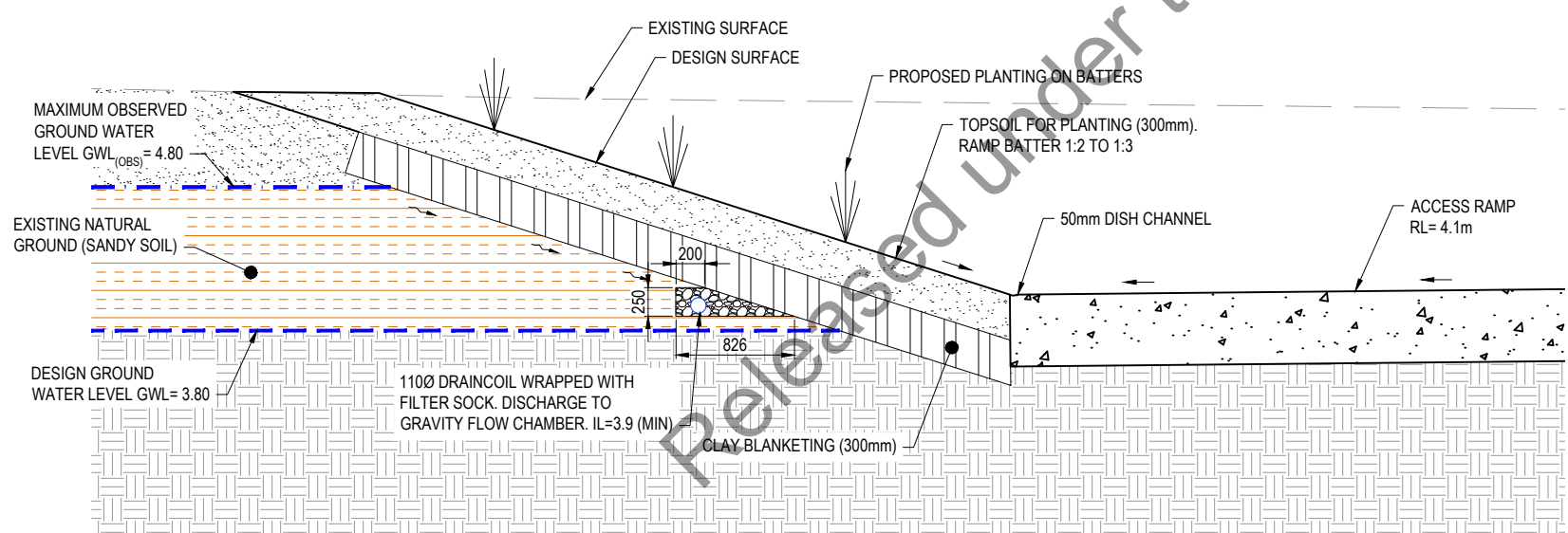
1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE.
2. THE UNDERPASS IS SEALED FROM EXTERNAL WATER PRESSURE UP TO A MAXIMUM LEVEL OF RL=6.0m.
3. GROUND WATER IS GENERALLY AT OR BELOW RL=3.8m. IT HAS RISEN TO RL=4.8m DURING RARE EVENTS.
4. IT IS NOT PROPOSED TO PUMP GROUNDWATER BELOW RL=3.8m BUT PROVISION IS MADE TO DRAIN FREELY FLOWING GROUNDWATER (FOR FUTURE). DRAINCOILS AT SUMP WELLS ARE ENDCAPPED.
5. RETAINING WALLS AND ACCESS RAMPS ARE SEALED FOR GROUNDWATER UP TO RL=3.8m.
6. VERTICAL STRIP DRAINS (ATLANTIS DRAIN OR SIMILAR) ARE INSTALLED BEHIND RETAINING WALLS TO INTERCEPT FREELY DRAINING GROUNDWATER (RL=3.8m TO RL=4.8m). THE INTERCEPTED GROUNDWATER IS PUMPED TO GRAVITY FLOW CHAMBER FROM WHERE IT DISCHARGES TO MH SP1.2 BY GRAVITY.

KEY - DRAINAGE

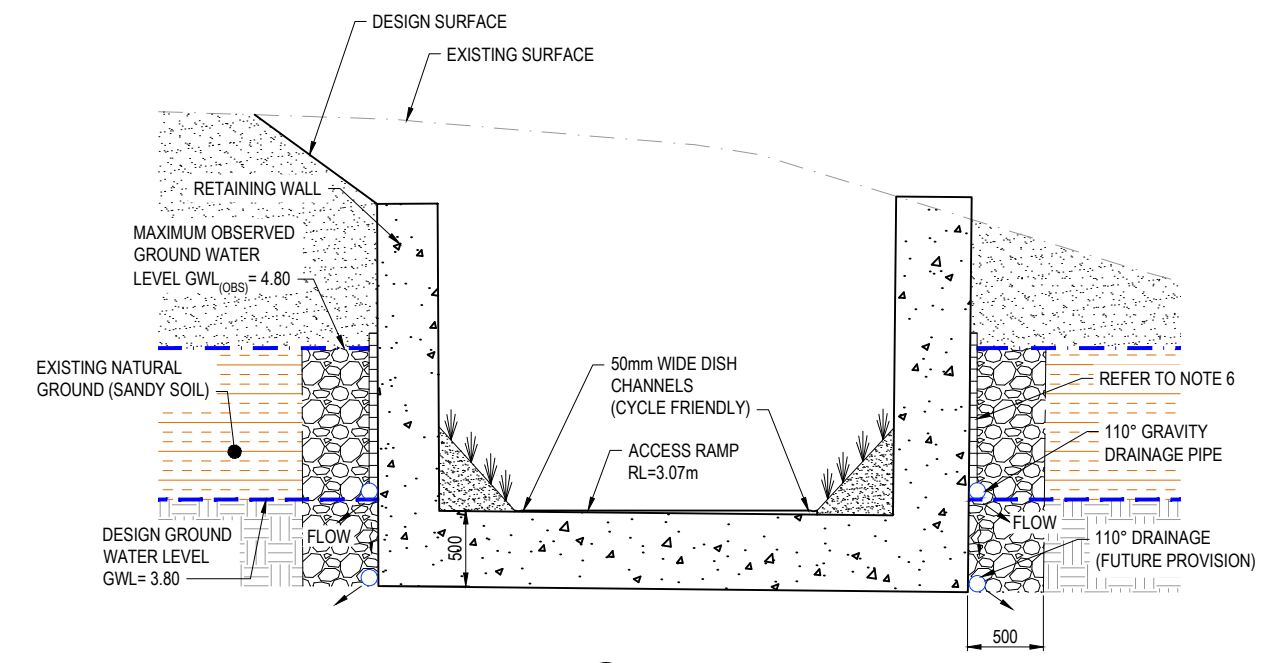
- ① 110Ø DRAINCOIL WRAPPED WITH FILTER SOCK AT RL= 3.8m.
- ② 110Ø DRAINCOIL WRAPPED WITH FILTER SOCK AT RL=2.0m.
- ③ GEOTEXTILE (A29 OR SIMILAR).
- ④ VERTICAL STRIP DRAINAGE CELLS WRAPPED WITH GEOTEXTILE.



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



SECTION 1 BATTER DRAINAGE
SCALE 1:50 (A3)



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

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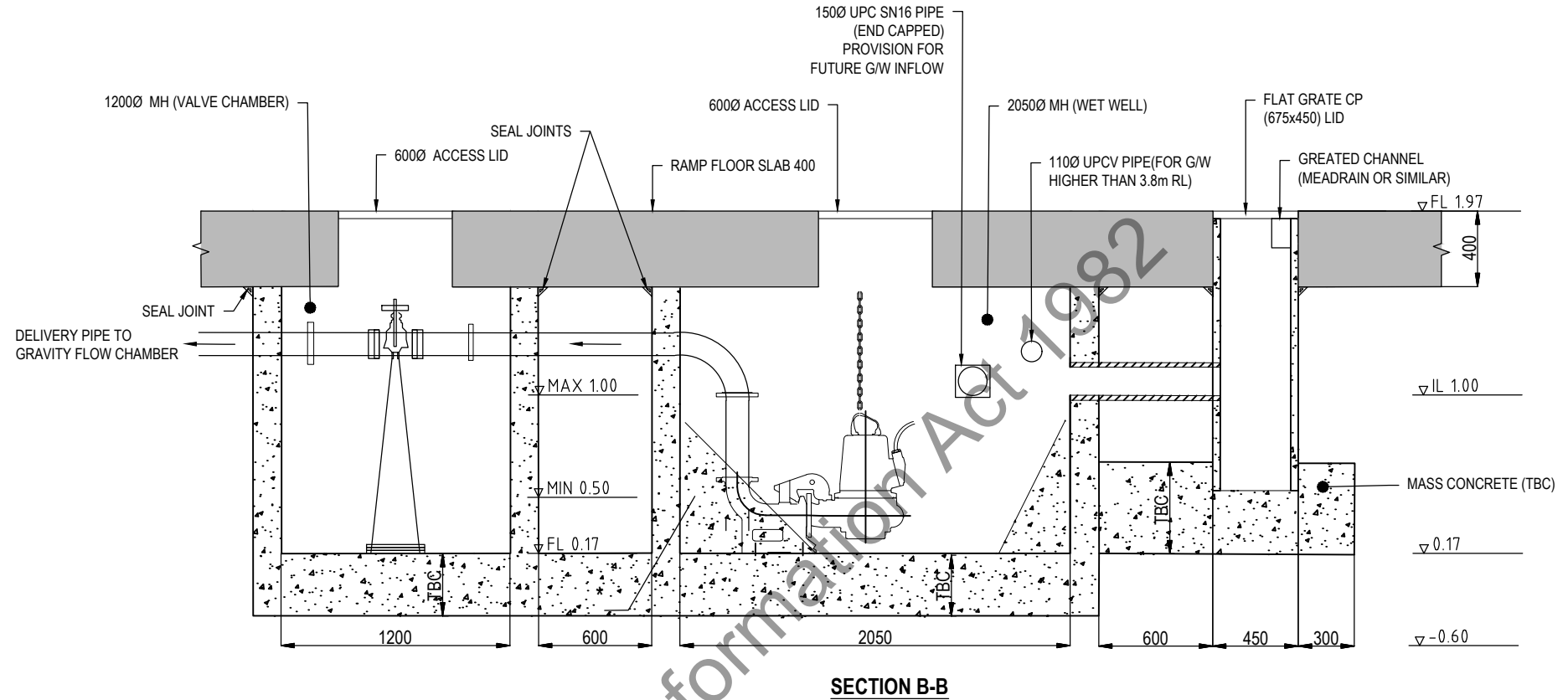
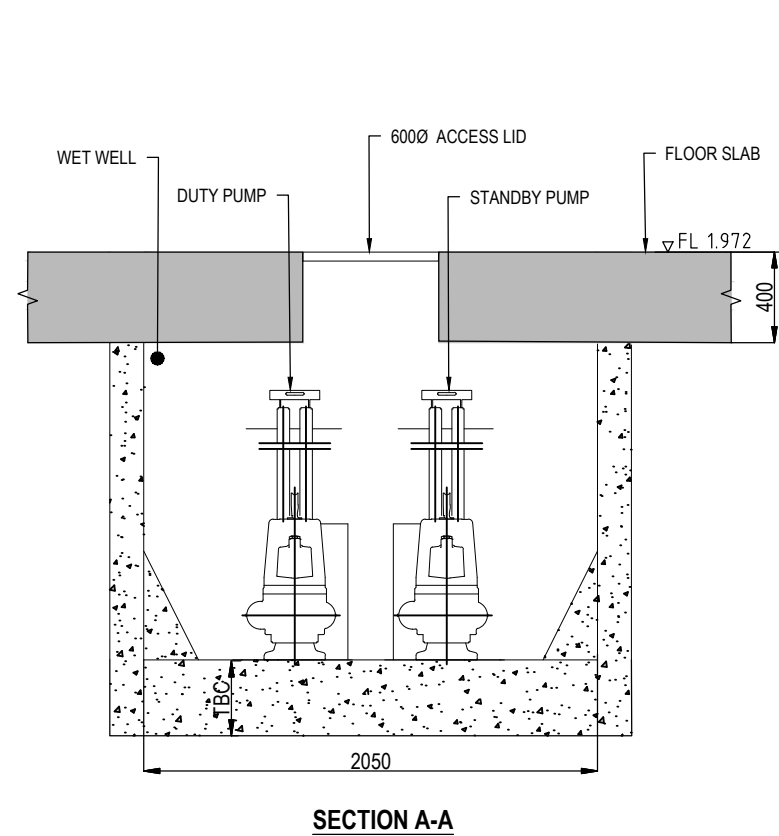
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
A	15/03/19	CTC	YA		50% ISSUE



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
DESIGNED: YA

TITLE: UNDERPASS UPGRADE DRAINAGE TYPICAL DETAILS
DRAWING No: B2B-DRG-DRG-8424
REV: A



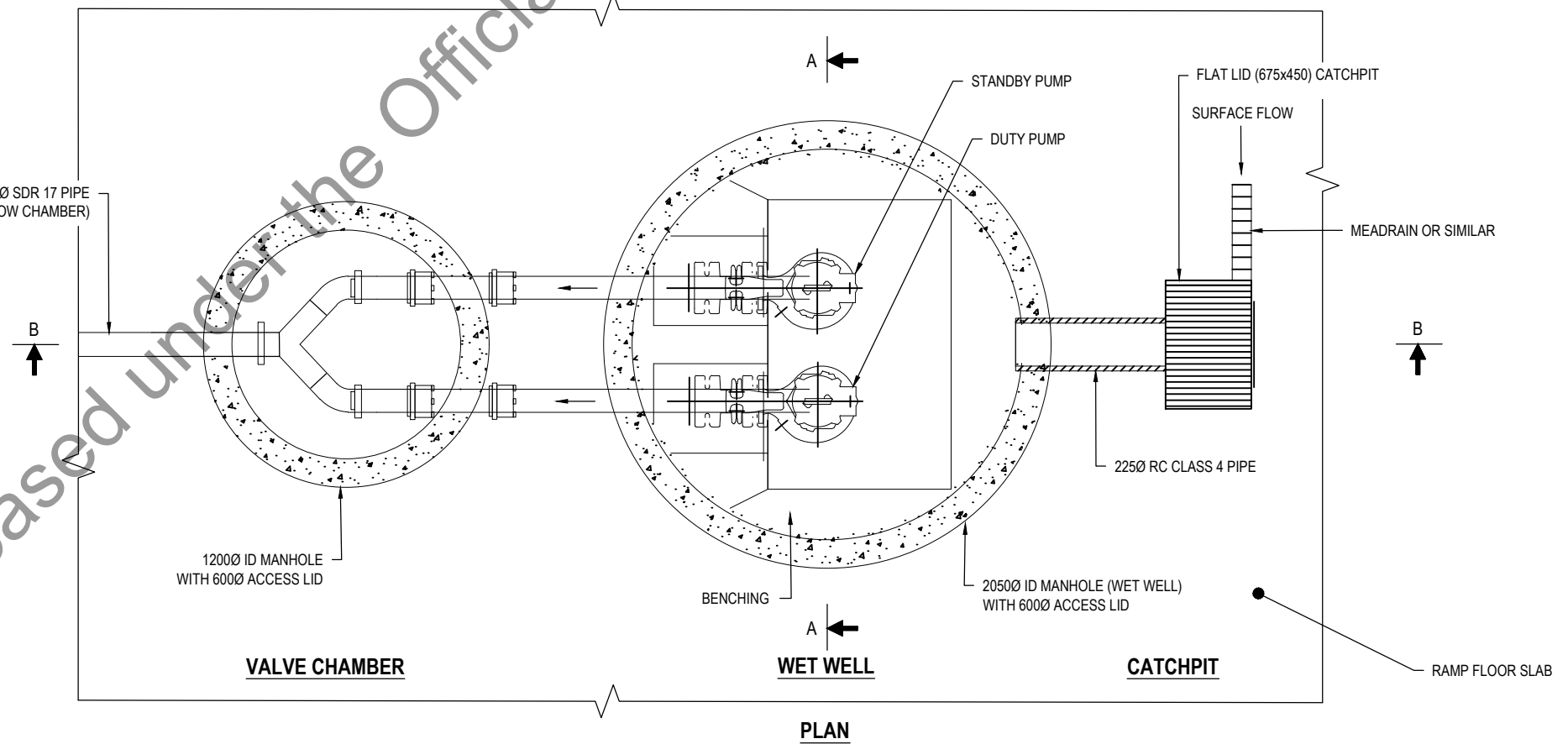
SECTION A-A

SECTION B-B

NOTES

1. THE UNDERPASS STRUCTURE IS COMPLETELY SEALED. RETAINING 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 MAXIMUM 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 BLANKETING IS PROVIDED ON THE FACES OF THE RAMP BATTERS ABOVE 3.80M RL TO INTERCEPT GROUND WATER ABOVE 3.80M RL. THE INTERCEPTED GROUND WATER IS DISCHARGED TO THE GRAVITY FLOW CHAMBERS.
5. GROUND WATER BELOW 3.80M RL WILL NOT BE PUMPED. HOWEVER, PERFORATED PIPES LEADING TO THE SUMP WELLS ARE LAID AT LOWER LEVELS. THESE PIPES ARE END-CAPPED FOR THE CURRENT DESIGN WHICH MAY BE OPENED IN THE FUTURE IF GROUND WATER PUMPING 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.

DELIVERY PIPE 1250 SDR 17 PIPE
(TO GRAVITY FLOW CHAMBER)



PLAN

DATE: 15/03/2019 1:07:41 P.M. LOCAL NAME: KAMINSKA, GRACE
LOCATION: C:\users\grace\appdata\local\temp\922b-drg-dr01-8431.dwg

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



CONTRACTOR



DESIGNER



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

DESIGNED

YA

DRAWING CHECK

GK

DESIGN REVIEW

LW

APPROVED

LW

TITLE

UNDERPASS UPGRADE
MATAPIHI PUMP STATION
DETAILS









DRAWING No

B2B-DRG-DR01-8431





REV

A

LUMINAIRE SCHEDULE

-  M1 117W POLE MOUNTED (SIDE ENTRY) IP66 RATED LED LUMINAIRE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUMINIUM AND GLASS OPTICS, MEDIUM WIDTH ASYMMETRICAL STREETLIGHTING DISTRIBUTION, 12,520 LUMEN OUTPUT, 4000K, CRI>70, IK09, GRAPHITE GREY FINISH, AEC ITALO 2 STU-S 4.7 - 6M OR APPROVED EQUIVALENT.
-  M2 152W POLE MOUNTED (SIDE ENTRY) IP66 RATED LED LUMINAIRE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUMINIUM AND GLASS OPTICS, MEDIUM WIDTH ASYMMETRICAL STREETLIGHTING DISTRIBUTION, 16,240 LUMEN OUTPUT, 4000K, CRI>70, IK09, GRAPHITE GREY FINISH, AEC ITALO 2 STU-S 4.7 - 8M OR APPROVED EQUIVALENT.
-  P1 27.5W POLE TOP MOUNTED IP66 RATED LED LUMINAIRE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUMINIUM AND GLASS OPTICS, ASYMMETRICAL PATHWAY DISTRIBUTION, 2,790 LUMEN OUTPUT, 4000K, CRI>70, IK09, GRAPHITE GREY FINISH, AEC ITALO 1 STA 4.5 - 2M OR APPROVED EQUIVALENT.
-  P2 14.5W POLE TOP MOUNTED IP66 RATED LED LUMINAIRE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUMINIUM AND GLASS OPTICS, ASYMMETRICAL PATHWAY DISTRIBUTION, 1,520 LUMEN OUTPUT, 4000K, CRI>70, IK09, GRAPHITE GREY FINISH, AEC ITALO 1 SV 4.5 - 1M OR APPROVED EQUIVALENT.
-  U1 78W SURFACE MOUNTED IP66 RATED LED LUMINAIRE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUMINIUM AND GLASS OPTICS, WIDE ASYMMETRICAL STREETLIGHTING DISTRIBUTION, 8,990 LUMEN OUTPUT, 4000K, CRI>70, IK09, GRAPHITE GREY FINISH, AEC GALILEO STW 4.5 - 4M OR APPROVED EQUIVALENT.
-  W1 148W POLE MOUNTED (SIDE ENTRY) IP66 RATED LED LUMINAIRE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUMINIUM 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 DIECAST ALUMINIUM WITH ALUMINIUM 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 IP66 RATED LED LUMINAIRE, HIGH PRESSURE DIECAST ALUMINIUM WITH ALUMINIUM AND GLASS OPTICS, MEDIUM WIDTH ASYMMETRICAL STREETLIGHTING 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 DIECAST ALUMINIUM, ALUMINIUM AND GLASS OPTICS, ASYMMETRICAL PATHWAY DISTRIBUTION, 1,520 LUMENS, 4000K, CRI>70, IK09, GRAPHITE GREY FINISH, INSTALLED ON 4M LIGHT COLUMN WITH SPIGOT TO SUIT LUMINAIRE.
LUMINAIRE PRODUCT NUMBER: AEC ITALO 1 SV 4.5-1M
POLE SPECIFICATION: WINDSOR URBAN, 4m 'STEPPED' POLE, 60mm DIA SPIGOT TOP, GRAPHITE GREY FINISH
-  U2 21W IP54 SURFACE MOUNTED LINEAR LUMINAIRE, STEEL BODY, POLYCARBONATE DIFFUSER, 2167 LUMENS, 4000K, CRI80, 1250MM LONG, INSTALLED INTO 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 INSTALLED IN POSITION AND THEN CONCRETE IS POURED AROUND IT, ENSURE PRODUCT IS INSTALLED AS PER MANUFACTURERS INSTRUCTIONS
LUMINAIRE PRODUCT NUMBER: SIMES
GHOST SQUARE
C8026W
-  S2 INGROUND UPLIGHT (TO BE CONFIRMED)

INSTALLATION AND COLUMN TYPE			
TYPE	LOCATION OF INSTALLATION	OUTREACH ARM	MOUNTING HEIGHT (m)
B	INSTALLED VIA BRACKET TO REAR OF BARRIER	POLE TOP (NO OUTREACH)	7
BM	INSTALLED VIA BRACKET TO REAR OF BARRIER	POLE TOP (NO OUTREACH)	8.5
BT	INSTALLED VIA BRACKET TO REAR OF BARRIER	POLE TOP (NO OUTREACH)	10
BL	INSTALLED 1.5m BEHIND BARRIER	4m OUTREACH	12
BP	INSTALLED 1.5m BEHIND BARRIER	2m OUTREACH	12
C	INSTALLED WITHIN CONCRETE BARRIER	2m OUTREACH	12
CL	INSTALLED WITHIN CONCRETE BARRIER	4m OUTREACH	12
CP	INSTALLED 0.5m BEHIND CONCRETE BARRIER	2m OUTREACH	12
CE	INSTALLED 0.5m BEHIND CONCRETE BARRIER	4m OUTREACH	12
CB	INSTALLED VIA BRACKET TO REAR OF BARRIER. (NOTE 11)	3m OUTREACH	12
F	INSTALLED 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 BRIDGE UNDERSIDE	-	HEIGHT OF BRIDGE
XL	INSTALLED 1.5m BEHIND BARRIER	4m OUTREACH (SUPPORT LARGER ITALO 3)	12
XP	INSTALLED 0.5m BEHIND BARRIER	4m OUTREACH (SUPPORT LARGER ITALO 3)	12
LL	INSTALLED 1.0m BEHIND ROAD SHOULDER	4m OUTREACH	12
L	INSTALLED 1.0m BEHIND ROAD SHOULDER	2m OUTREACH	12
T	PATHWAY EDGE	POLE TOP (NO OUTREACH)	4

GENERAL NOTES

- ALL WORKS SHALL COMPLY WITH THE CURRENT NZTA M30 SPECIFICATION AND GUIDELINES FOR ROAD LIGHTING DESIGN, AS/NZS 1158 - LIGHTING FOR ROAD AND PUBLIC SPACES AND AS/NZS 3000 WIRING REGULATIONS.
- ERECT LIGHTING COLUMNS WITH ACCESS DOOR ORIENTATED TOWARDS THE ROADWAY
- ALL DISTANCES ARE IN METRES UNLESS OTHERWISE NOTED.
- ENSURE THAT NZTA ASSET DATABASE IS UPDATED FOR EACH NEW OR MODIFIED ROAD LIGHT LOCATION
- EXISTING LUMINAIRES, 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
- LIGHTING COLUMNS TO BE COMPLIANT WITH NZTA M26:2012 ROAD LIGHTING COLUMN SPECIFICATION.
- LUMINAIRE TILT SHALL BE 0 DEGREES TO THE HORIZONTAL FOR ALL NEW LUMINAIRES.
- MONTROSE BOXES TO BE PROVIDED AS PER THE PRINCIPLE REQUIREMENTS APPENDIX A SECTION A13.5 AND NZTA SPECIFICATION FOR ROADSIDE CABINETS ITS-02-04.
- LUMINAIRES SHALL BE COMPLETE WITH INTERNAL SURGE PROTECTION DEVICE AS STANDARD INCLUSION
- ALL WIRING SHALL BE CONCEALED THROUGHOUT. INCLUDE IN TENDER ALL NECESSARY WIRING DUCTS, CONDUITS etc. FOR THIS PURPOSE WHETHER INDICATED IN DETAIL OR NOT ON THE DRAWINGS.
- REFER DRAWING B2B-DRG-BR01-5145 FOR DETAIL CORRESPONDING TO POLE TYPE "CB"
- LIGHT COLUMNS SHALL HAVE CURVED OUTREACH ARMS
- LIGHTING COLUMN SETBACK BEHIND CONCRETE BARRIER (0.5M) CAN BE REDUCED WHERE THE COLUMN FOUNDATIONS ARE EXTENDING BEYOND HINGE POINT AND INTO THE BATTER
- ALL LUMINAIRES PROVIDED FOR ROAD LIGHTING SHALL BE FITTED WITH 7 CONTACT NEMA SOCKET WITH SHORTING CAP
- ELECTRICAL CONDUITS SHALL BE HEAVY DUTY RIGID ORANGE UPVC. DIAMETER AS NOTED ON THE LAYOUTS
- REFER DRAWING B2B-DRG-AD01-8003 FOR LIGHTING ELECTRICAL & ITS DRAWING INDEX FOR UNDERPASS UPGRADE PROJECT

INSTALLATION AND COLUMN TYPE ADD ON	COLUMN CONSTRUCTION
-S	SLIP BASE TYPE
-I	IMPACT ABSORBING TYPE
NO EXTRA TAG	RIGID TYPE

TYPICAL COLUMN DESIGNATION



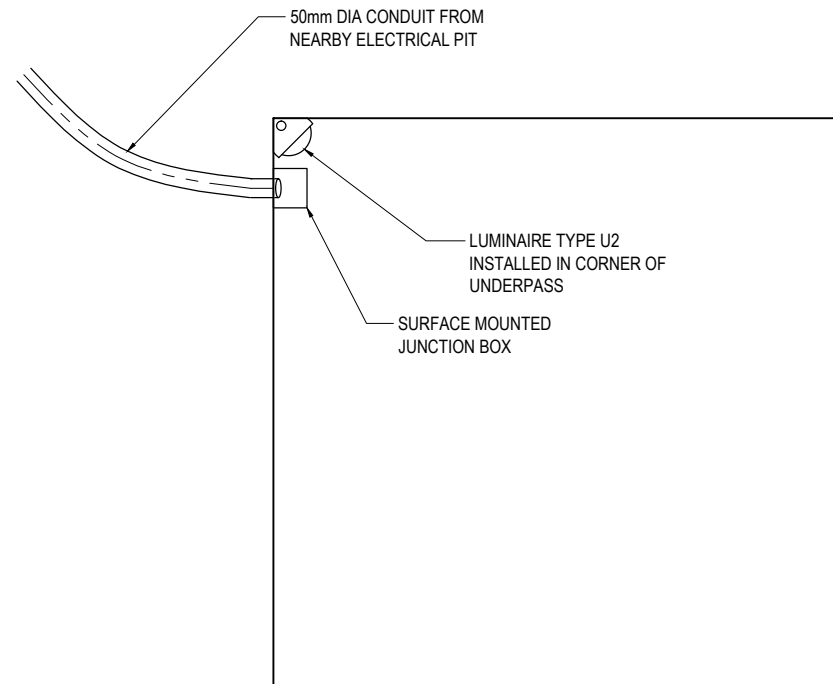
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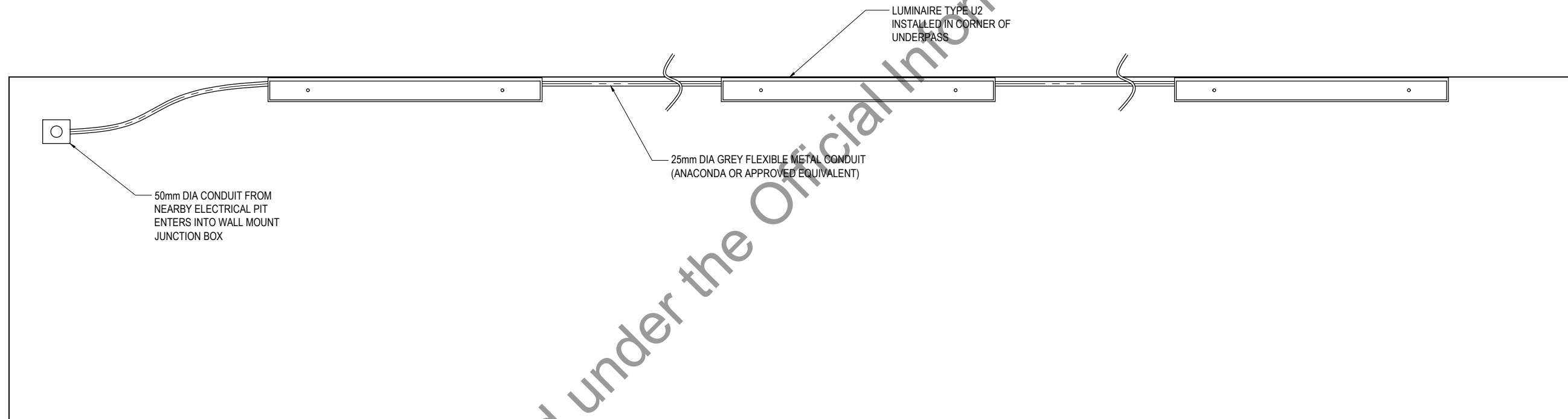
	 WAKA KOTAHI	 CONTRACTOR	 DESIGNER	SCALE N.T.S.	CLIENT NZ TRANSPORT AGENCY	
15/03/19 No DATE DRG CHECK DESIGN REVIEW APPD D.MGR	50% ISSUE REVISIONS & ISSUES	STATUS 50% ISSUE	PROJECT NUMBER 2/09-024/603	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE UNDERPASS UPGRADE LIGHTING SCHEDULES & NOTES	REV A
				DRAWN AK DESIGNED JW	DRAWING CHECK GK DESIGN REVIEW AT	APPROVED LW
					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.

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DATE: 15/03/2019 3:46:41 PM LOCATION: KAMINSKI, GRACE
LOCATION: C:\users\gaminis\appdata\local\project\jacob\binz_0a\01455982B-DRG-LV01-8402.dwg

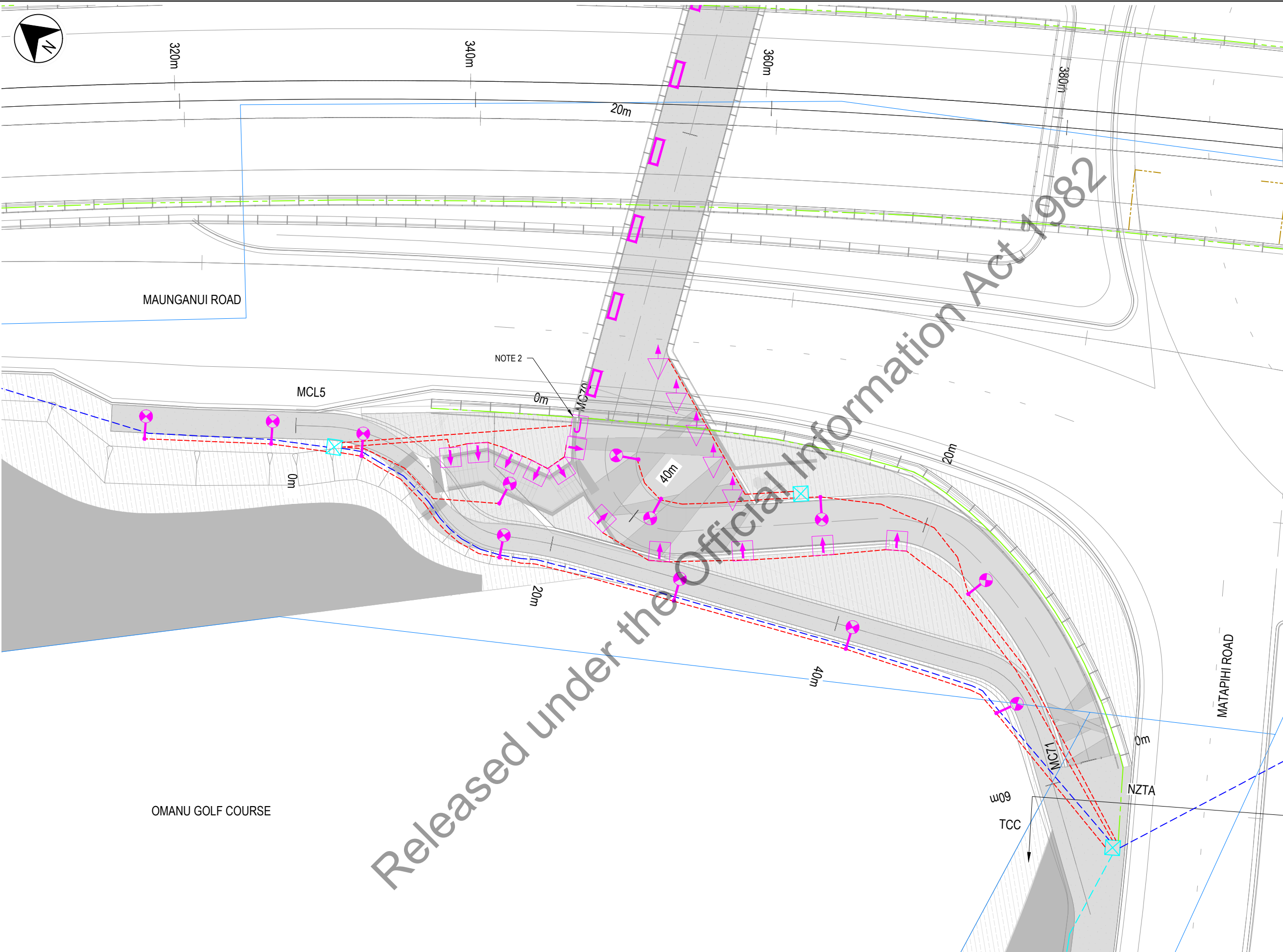
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D MGR	REVISIONS & ISSUES
A	15/03/19	GK	CH	LW	50% ISSUE



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	DRAWING CHECK	APPROVED
AK	GK	LW
DESIGNED	DESIGN REVIEW	
AS	CH	

TITLE	UNDERPASS UPGRADE ELECTRICAL DETAILS	
DRAWING No	B2B-DRG-LV01-8402	
REV	A	



LEGEND

	POLE TOP LUMINAIRE TYPE P3
	LINEAR LED LUMINAIRE TYPE U2
	WALL RECESSED LIGHT TYPE S1
	INGROUND 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**
- REFER DRAWING B2B-DRG-LV01-8401 FOR LUMINAIRE SCHEDULE & GENERAL NOTES
 - REFER DRAWING B2B-DRG-LV01-8402 FOR DETAIL ON RETICULATION TO UNDERPASS LIGHTING

DATE: 15/03/2019 2:26:58 PM LOGIN NAME: KAMINSKA, GRACE
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No	DATE	DRG CHECK	DESIGN REVIEW	APPD DMGR	50% ISSUE
A	15/03/19	GK	AT	LW	50% ISSUE

REVISIONS & ISSUES

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

NZ TRANSPORT AGENCY
WAKA KOTAHĪ

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
DESIGNED: JW

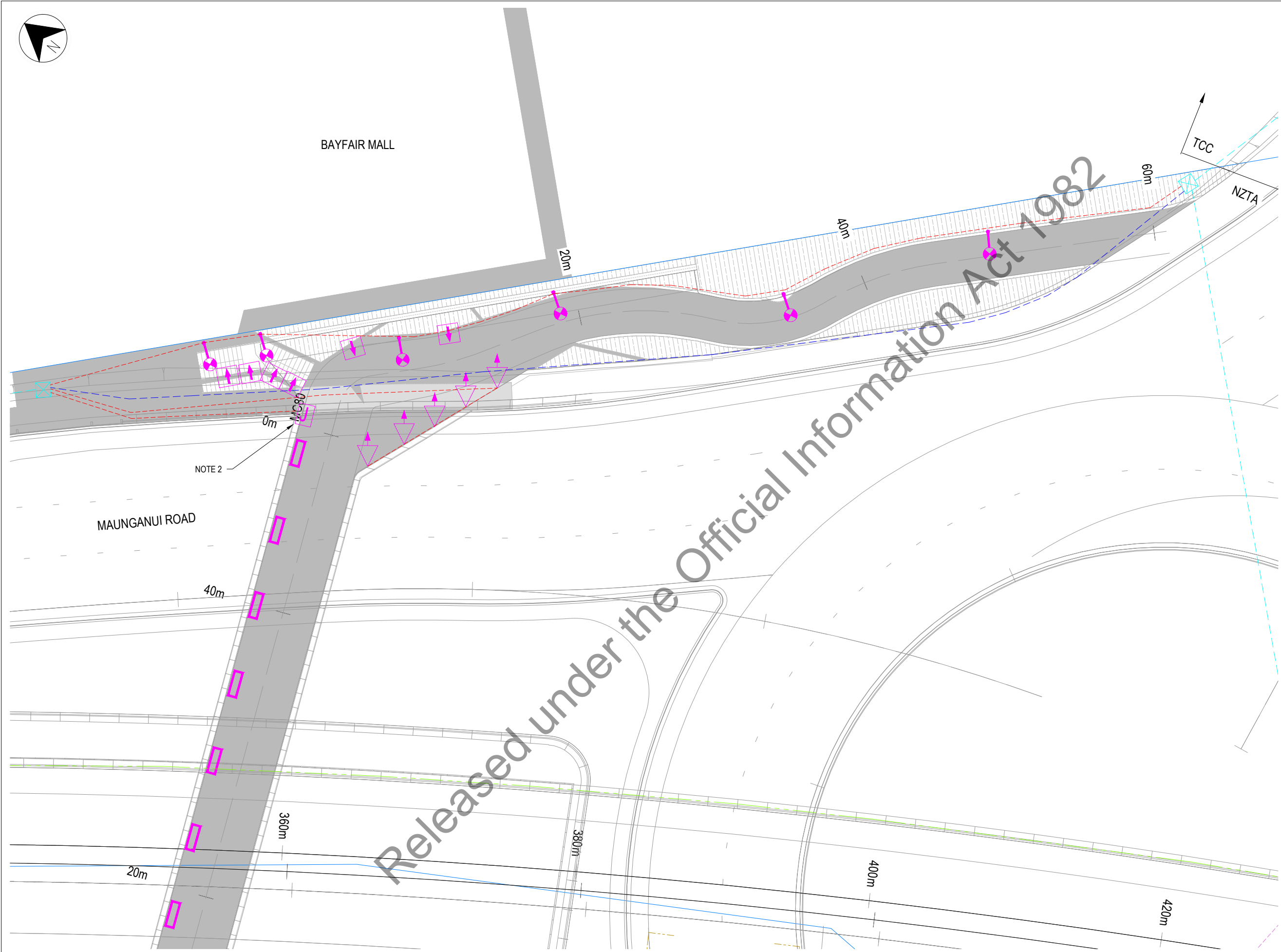
DRAWING CHECK: GK
DESIGN REVIEW: AT

APPROVED: LW

TITLE: UNDERPASS UPGRADE LIGHTING LAYOUT MATAPIHI RAMP

DRAWING No: B2B-DRG-LV01-8411

REV: A



LEGEND	
	POLE TOP LUMINAIRE TYPE P3
	LINEAR LED LUMINAIRE TYPE U2
	WALL RECESSED LIGHT TYPE S1
	INGROUND 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**
- REFER DRAWING B2B-DRG-LV01-8401 FOR LUMINAIRE SCHEDULE & GENERAL NOTES
 - CONDUIT TO PENETRATE THROUGH UNDERPASS WALL TO ENTER WALL MOUNT JUNCTION BOX. REFER TO DRAWING B2B-DRG-LV01-8402 FOR DETAIL

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DATE: 15/03/2019 2:38:34 PM LOGIN NAME: KAMINSKA, GRACE LOCATION: C:\users\gkaminsk\appdata\local\projectwise\jacobs_anz_001016558\B2B-DRG-LV01-8412.dwg

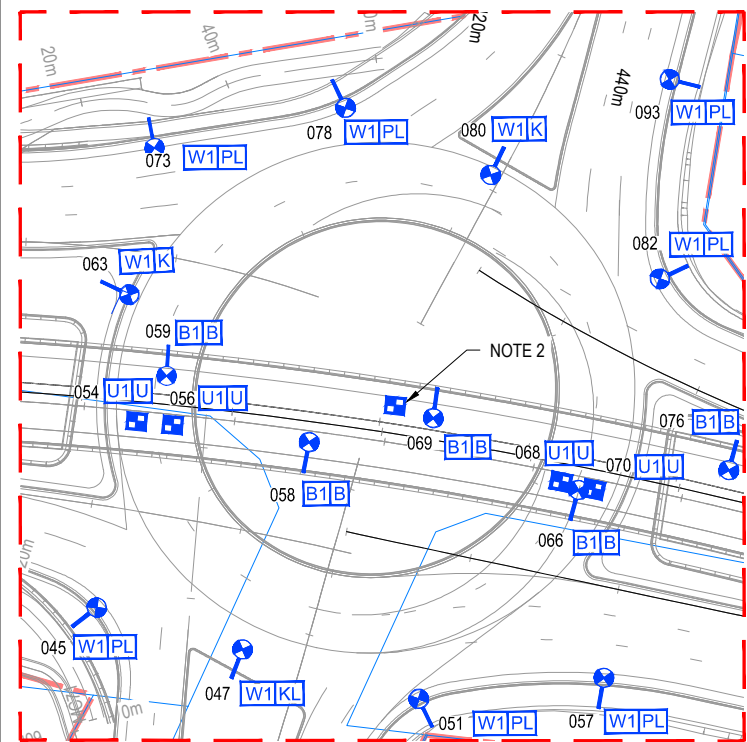
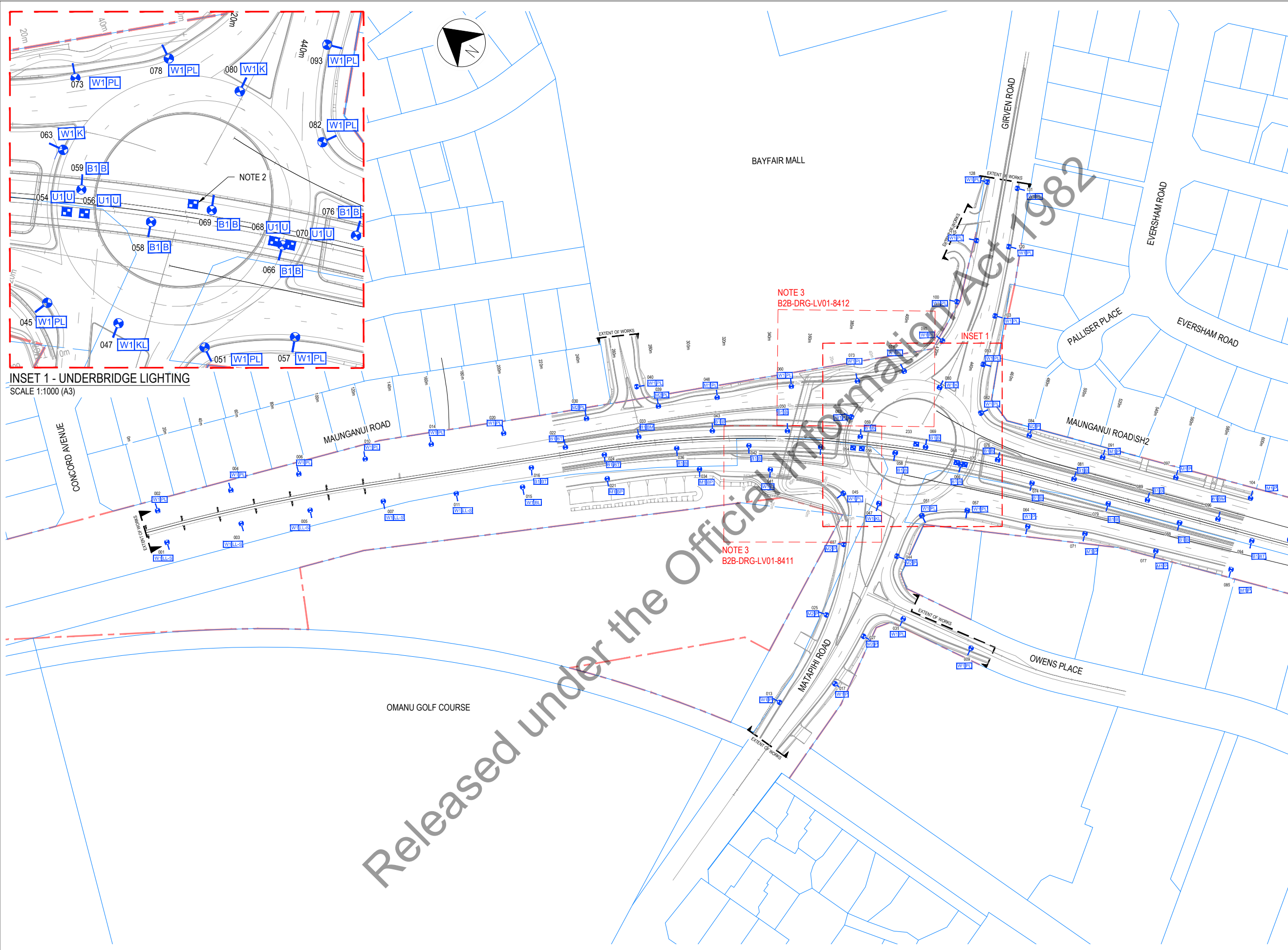
REVISIONS & ISSUES					
No	DATE	DRG CHECK	DESIGN REVIEW	APPD DMGR	50% ISSUE
A	15/03/19	GK	AT	LW	50% ISSUE



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
 DESIGNED: JW
 DRAWING CHECK: GK
 DESIGN REVIEW: AT
 APPROVED: LW

TITLE: UNDERPASS UPGRADE LIGHTING LAYOUT BAYFAIR RAMP
 DRAWING No: B2B-DRG-LV01-8412
 REV: A



INSET 1 - UNDERBRIDGE LIGHTING
SCALE 1:1000 (A3)

LEGEND

W1 PL	COLUMN DESIGNATION
233	COLUMN NUMBER
	LIGHTING COLUMN
	UNDERBRIDGE LUMINAIRE
---	DESIGNATION

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

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DATE: 15/03/2019 2:51:45 PM LOGIN NAME: KAMINSKA, GRACE LOCATION: C:\users\gaminna\appdata\local\projects\jacobson_rnz_e\0145598\B2B-DRG-LV01-8420.dwg

No	DATE	CHK	DESIGN REVIEW	APPROV D.MGR	REVISIONS & ISSUES
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1:1000@A1
1:2000@A3

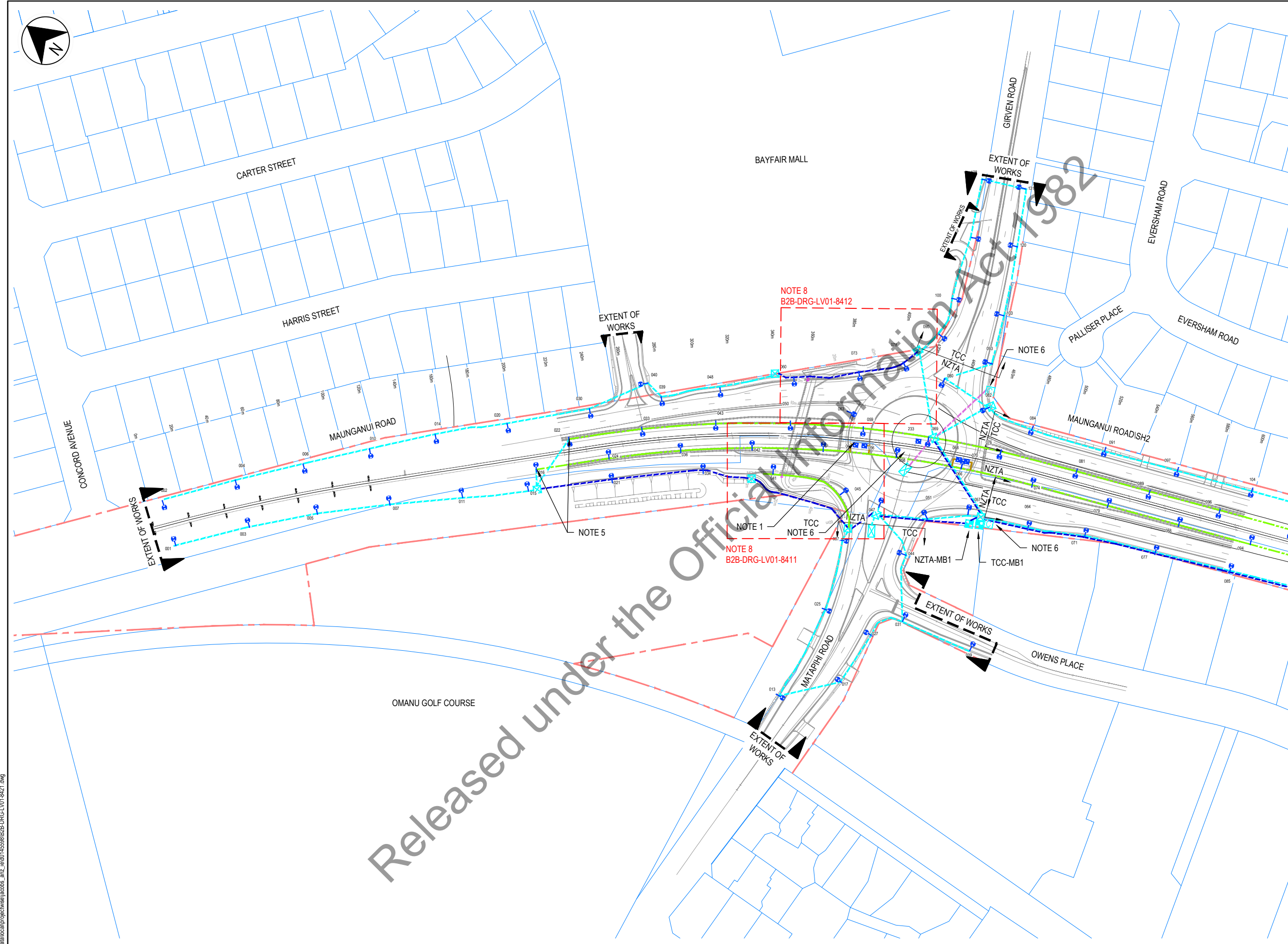
 NZ TRANSPORT AGENCY WAKA KOTAHĪ	 CPB CONTRACTORS	 JACOBS	 Align Tonkin+Taylor	SCALE 1:2000 (A3) STATUS 50% ISSUE PROJECT NUMBER 2/09-024/603	CLIENT NZ TRANSPORT AGENCY PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK) DRAWN AK DESIGNED JW	TITLE UNDERPASS UPGRADE LIGHTING LAYOUT INTERFACE WITH B2B DRAWING No B2B-DRG-LV01-8420	APPROVED LW REV A
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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 MIN. ELECTRICAL CONDUIT INSTALLED IN BARRIER
	SERVICE CABLE TRAY
	DESIGNATION

- NOTES**
- 1x63mm ELECTRICAL CONDUIT IN SERVICE TRAYS CONNECTED TO BARRIER CONDUITS FOR UNDERBRIDGE LIGHTING
 - MONTROSE BOX LOCATIONS SUBJECT TO CHANGE DEPENDENT ON LOCATION OF UTILITY POWER CONNECTION & DIVISION OF ASSETS BETWEEN NZTA & TCC
 - SIZE AND QUANTITY OF ELECTRICAL CONDUITS TO BE CONFIRMED ONCE LOCATION OF UTILITY POWER CONNECTIONS HAVE BEEN CONFIRMED
 - PITS PROVIDED AT EACH LIGHT POLE
 - INGROUND CONDUIT TO TRANSITION INTO BARRIER
 - ROAD SIDE CABINET LOCATION TO BE CONFIRMED
 - SH29A LIGHTING CIRCUITS PROVIDED BY NZTA-MB2. SH2 LIGHTING CIRCUIT PROVIDED BY NZTA-MB3
 - REFER DRAWING B2B-DRG-LV01-8411, B2B-DRG-LV01-8412 FOR DETAIL ON UNDERPASS UPGRADE ELECTRICAL RETICULATION



DATE: 15/03/2019 2:50:04 PM LOGIN NAME: KAMINSKA, GRACE
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REVISIONS & ISSUES				
No	DATE	CHK	DESIGN REVIEW	APPROVED
A	15/03/19	GK	CH	LW
50% ISSUE				
1:1000 @ A1				
1:2000 @ A3				



SCALE: 1:2000 (A3)
 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

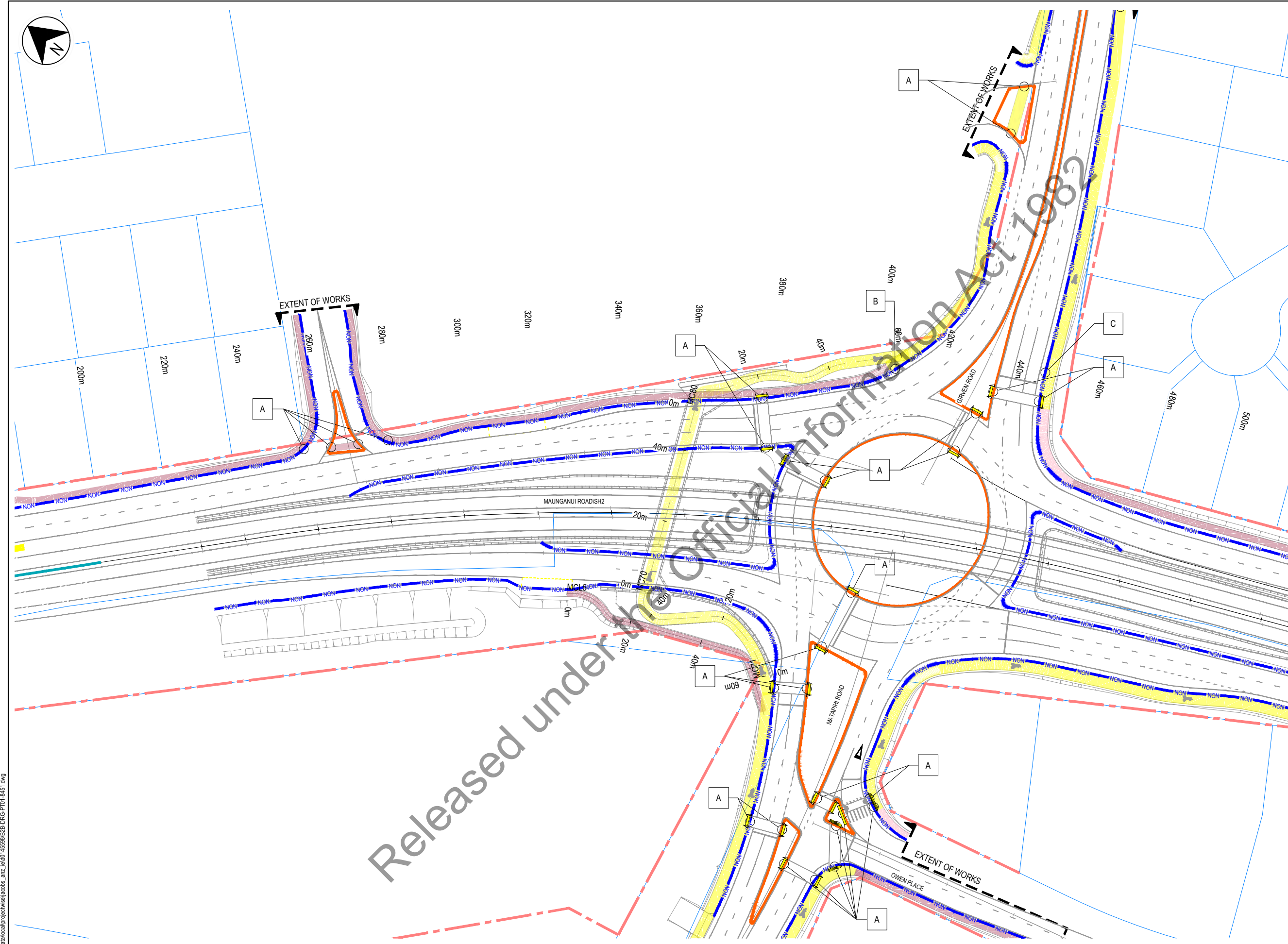
CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: GK
 DESIGNED: AS
 DRAWING CHECK: GK
 DESIGN REVIEW: CH
 APPROVED: LW

TITLE: UNDEPASS UPGRADE POWER LAYOUT INTERFACE WITH B2B
 DRAWING No: B2B-DRG-LV01-8421
 REV: A

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- LEGEND**
- DESIGNATION
 - EXISTING CADASTRAL BOUNDARY
- KERB AND CHANNEL LEGEND**
- TCC KERB FOR TRAFFIC ISLAND (T422)
 - TCC NON-MOUNTABLE KERB AND CHANNEL (T421)
 - TCC CHANNEL (T424)
- PATH LEGEND**
- FOOTPATH (1.8m WIDE)
 - SHARED PATH (3.0m WIDE)
 - FOOTPATH (3.0m WIDE)
- LEGEND**
- A TCC T440 STANDARD INCLUDING TGS1
 - B RAMP UP B2B-DRG-PT01-3460
 - C RAMP DOWN B2B-DRG-PT01-3460



DATE: 14/09/2019 2:28:49 PM | LOCATION: NAME: KAMINSKI, GRACE
 LOCATION: C:\users\gamin\appdata\local\temp\project\jacobz_anz_0401145598\B2B-DRG-PT01-8451.dwg

No	DATE	CHK	DESIGN	APPD	50% ISSUE
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REVISIONS & ISSUES

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



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

TITLE: UNDERPASS UPGRADE KERBS, FOOTPATH AND CYCLEWAYS
 DRAWING No: B2B-DRG-PT01-8451
 REV: A



BARRIER NOTES

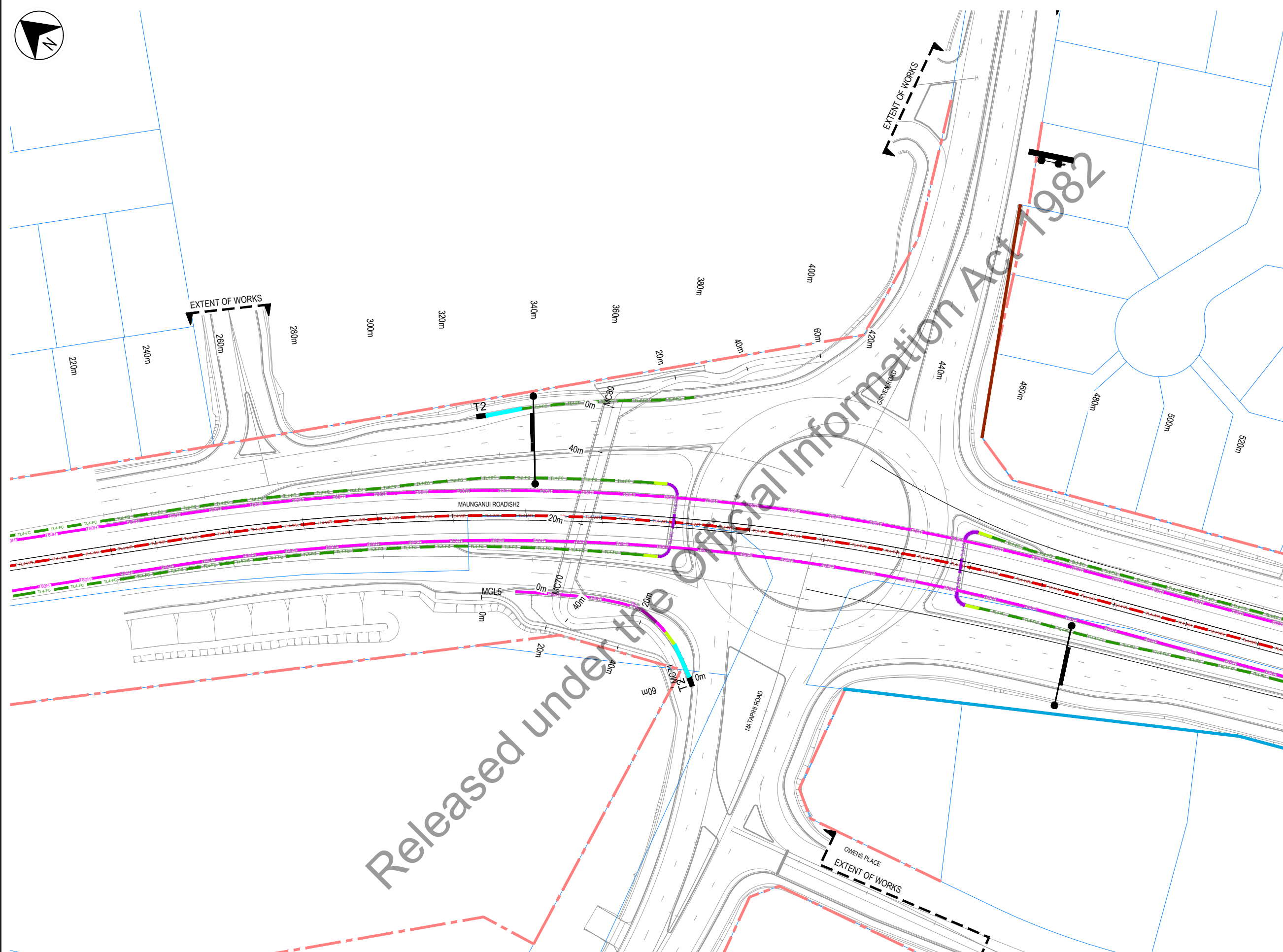
1. REFER TO CSP PACIFIC DRAWINGS FOR TL4 "NU-GUARD" W-SECTION GUARD RAIL DETAILS AND TERMINALS (TERMINAL TYPE 2 AND TERMINAL TYPE 3)
2. REFER TO DRAWING NZTA RSB 5 FOR TRANSITION FROM W-SECTION TO CONCRETE (THREE BEAM TRANSITION)
3. REFER TO URBAN DESIGN DRAWINGS FOR PEDESTRIAN/CYCLIST FENCES

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



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DATE: 15/03/2019 10:00:17 AM
LOCATION: C:\users\gemma\appdata\local\temp\proj\maunganui\jacob_tnz_0601455982B-DRG-RF01-8271.dwg

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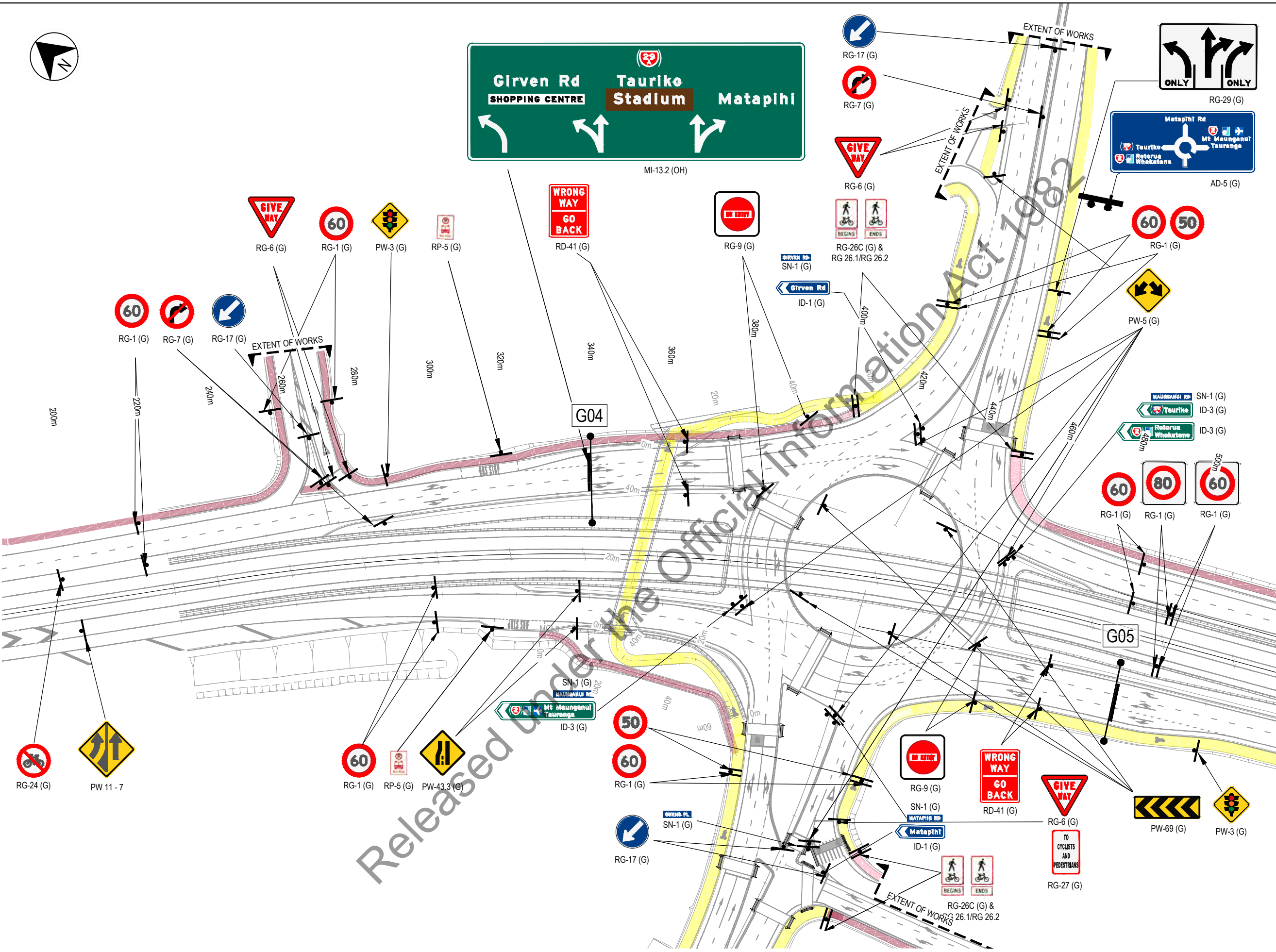
REVISIONS & ISSUES



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

TITLE: UNDERPASS UPGRADE BARRIERS
DRAWING No: B2B-DRG-RF01-8271
REV: A



NOTES

1. ALL SIGNS TO BE IN ACCORDANCE WITH TRAFFIC CONTROL DEVICES (TCD) MANUAL AND MANUAL OF TRAFFIC SIGNS AND MARKINGS (MOTSAM).
2. SIGN LOCATIONS SHOWN ARE INDICATIVE ONLY. LOCATION TO BE IN ACCORDANCE WITH TCD MANUAL & MOTSAM.
3. ALL SIGN NUMBERS ARE IN 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 WIDE)

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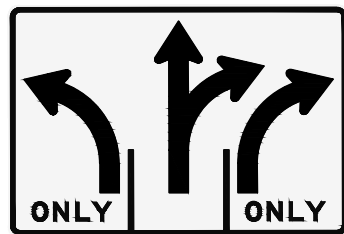
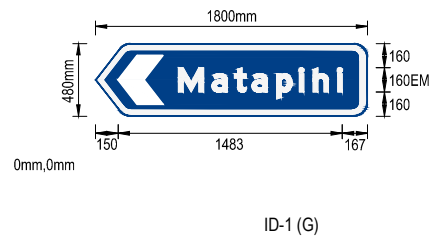
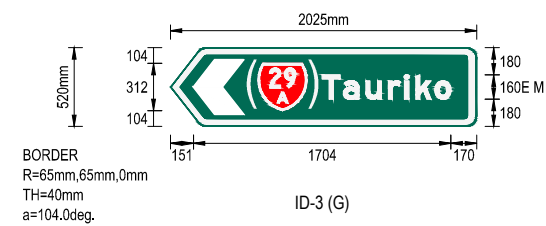
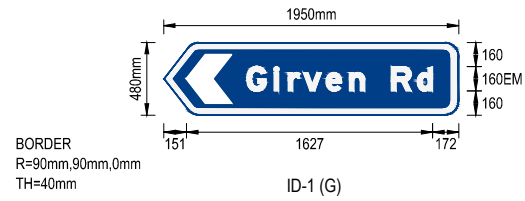
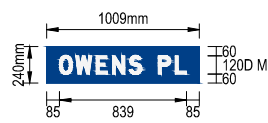
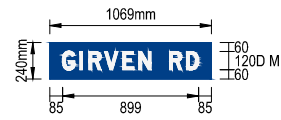
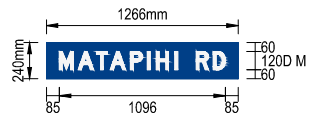
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REVISIONS & ISSUES					
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1:1000 @ A3					



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

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

TITLE: UNDERPASS UPGRADE SIGNAGE
DRAWING No: B2B-DRG-SL01-8211
REV: A

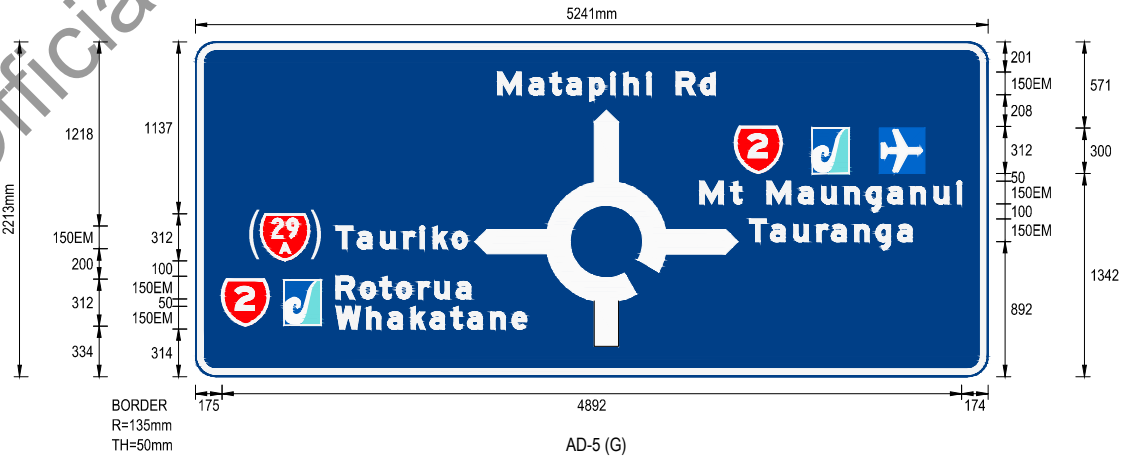


RG-29 (G)



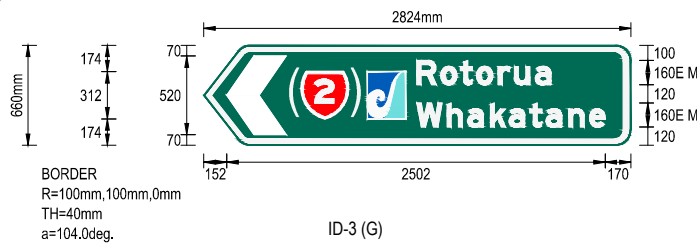
BORDER
R=150mm
TH=50mm
IN=38mm

MI-13.2 (OH)

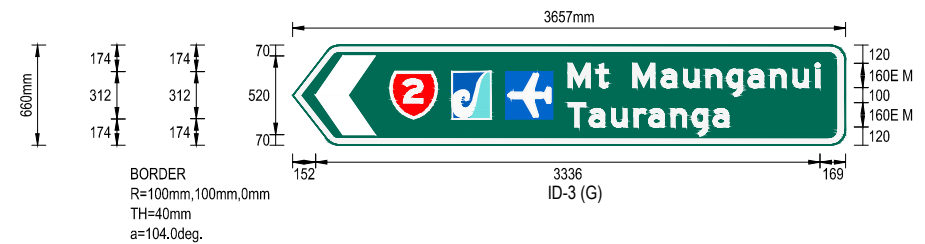


BORDER
R=135mm
TH=50mm

AD-5 (G)



ID-3 (G)



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

ID-3 (G)

DATE: 14/03/2019 2:54:16 PM LOGIN NAME: KAMINSKA, GRACE LOCATION: C:\users\kaminska\appdata\local\projectwise\jacob..._anz_e\01-65598\B2B-DRG-SL01-8222.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APPRO D.MGR	REVISIONS & ISSUES
1	15/03/19	GK	LG	LW	50% ISSUE
1:25 @ A1					
1:50 @ A3					



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

TITLE: UNDERPASS UPGRADE GUIDE SIGN DETAILS
DRAWING No: B2B-DRG-SL01-8222
REV: A



RG-1
SPEED LIMIT



RG-1
SPEED LIMIT



RG-1
SPEED LIMIT



RG-24
NO CYCLING



BEGINS



ENDS

RG 26C - COMBINED CYCLE / FOOTPATH
RG 26.1/RG 26.2 - CYCLE / FOOTPATH BEGINS/ENDS



RP-5
NO PARKING
BUS STOP STANDARD



RG-1
SPEED LIMIT WITH
BACKING BOARD



RG-9
NO ENTRY WITH
BACKING 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



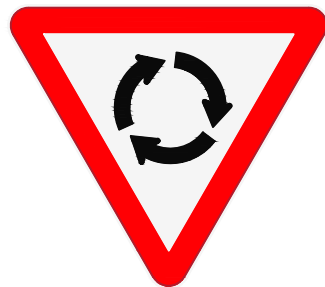
PW-5
DIVERGE



RG-1
SPEED LIMIT WITH
BACKING BOARD



RG 27



RG-6R - PRIORITY GIVE WAY
ROUNDABOUT

DATE: 14/03/2019 2:55:43 PM LOGIN NAME: KAMINSKA, GRACE
LOCATION: C:\users\graminika\appdata\local\temp\proj\sl01-8226.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES
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1:10 @ A1					
1:20 @ A3					
0 100 200 300 400 500 600 700 800 900 1000 mm					



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

TITLE: UNDERPASS UPGRADE SIGN DETAILS REGULATORY & WARNING
DRAWING No: B2B-DRG-SL01-8226
REV: A

LEGEND	PAVEMENT MARKINGS	SYMBOL	SPECIFICATION	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 TACTILE PROFILE BLOCKS 250 CENTRES	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B1	LANE LINE SH29A		HPLL 100mm WIDE INTERMITTED, 3m LONG, 7m GAP, AUDIO TACTILE PROFILE BLOCKS 250 CENTRES, 1 WHITE MONO-DIRECTIONAL RRP M AT START OF LINE, 0.1m GAP FROM RRP M END	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B2	LANE LINE - ROUNDABOUTS		HPLL 100mm WIDE INTERMITTED, 3m LONG, 7m GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B3	LANE LINE		HPLL 100mm WIDE INTERMITTED, 3m LONG, 7m GAP, 1 WHITE MONO-DIRECTIONAL RRP M AT START OF LINE, 0.1m GAP FROM RRP M END	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B4	CENTER LINE		HPLL 100mm WIDE CONTINUOUS, AUDIO TACTILE PROFILE BLOCKS 250 CENTRES	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B5	CENTER LINE (TRACKING)		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 - COMBINED 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 - COMBINED 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, CONTINUOUS	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
I	FLUSH MEDIAN (URBAN)		POSITION INDICATED ON LAYOUT PLANS, HPLL 600mm WIDE DIAGONAL BAR, 100mm WIDE, CONTINUOUS	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
J1	CONTINUITY LINE (POSTED SPEED < 80kph)		HPLL 150mm WIDE, 1m STRIPE, 3m GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
J2	CONTINUITY LINE (POSTED SPEED > 80kph)		HPLL 200mm WIDE, 1m STRIPE, 3m GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
J3	CONTINUITY LINE (LANE DROP)		HPLL 200mm, 3m STRIPE, 7m GAP, WHITE RRPMS CENTRALLY LOCATED IN EVERY SECOND GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20

LEGEND	PAVEMENT MARKINGS	SYMBOL	SPECIFICATION	MATERIALS
K	SHOULDER MARKING		HPLL 300mm WIDE, SLOPE 1:2 AT 25m SPACING	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
L	VEHICLE LIMIT LINE		HPLL 300mm WIDE, CONTINUOUS LINE	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
M1	BORDER LINE		HPLL 200mm WIDE, CONTINUOUS	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
M2	BORDER LINE (ATP)		HPLL 200mm WIDE, CONTINUOUS AUDIO TACTILE PROFILE BLOCKS 250mm CENTRES	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
N	PEDESTRIAN CROSS WALK LINES		HPLL 100mm WIDE, CONTINUOUS 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 WIDE 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 SPACING, FINAL DETAIL 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

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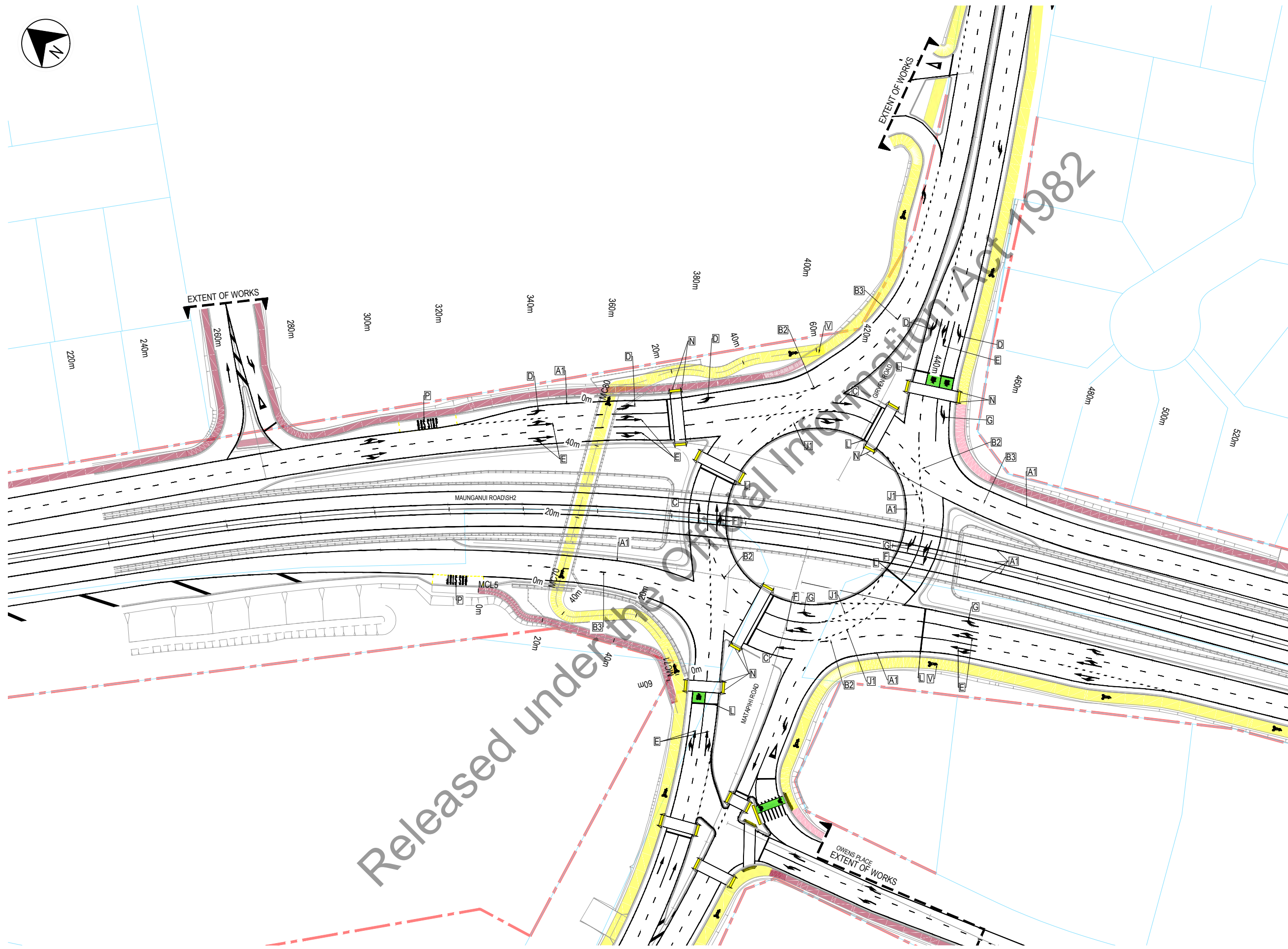
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PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: GK
DESIGNED: LG
DRAWING CHECK: GK
DESIGN REVIEW: LG
APPROVED: LW

TITLE: UNDERPASS UPGRADE PAVEMENT MARKINGS LEGEND
DRAWING No: B2B-DRG-SL01-8240
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PATH LEGEND

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



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REVISIONS & ISSUES

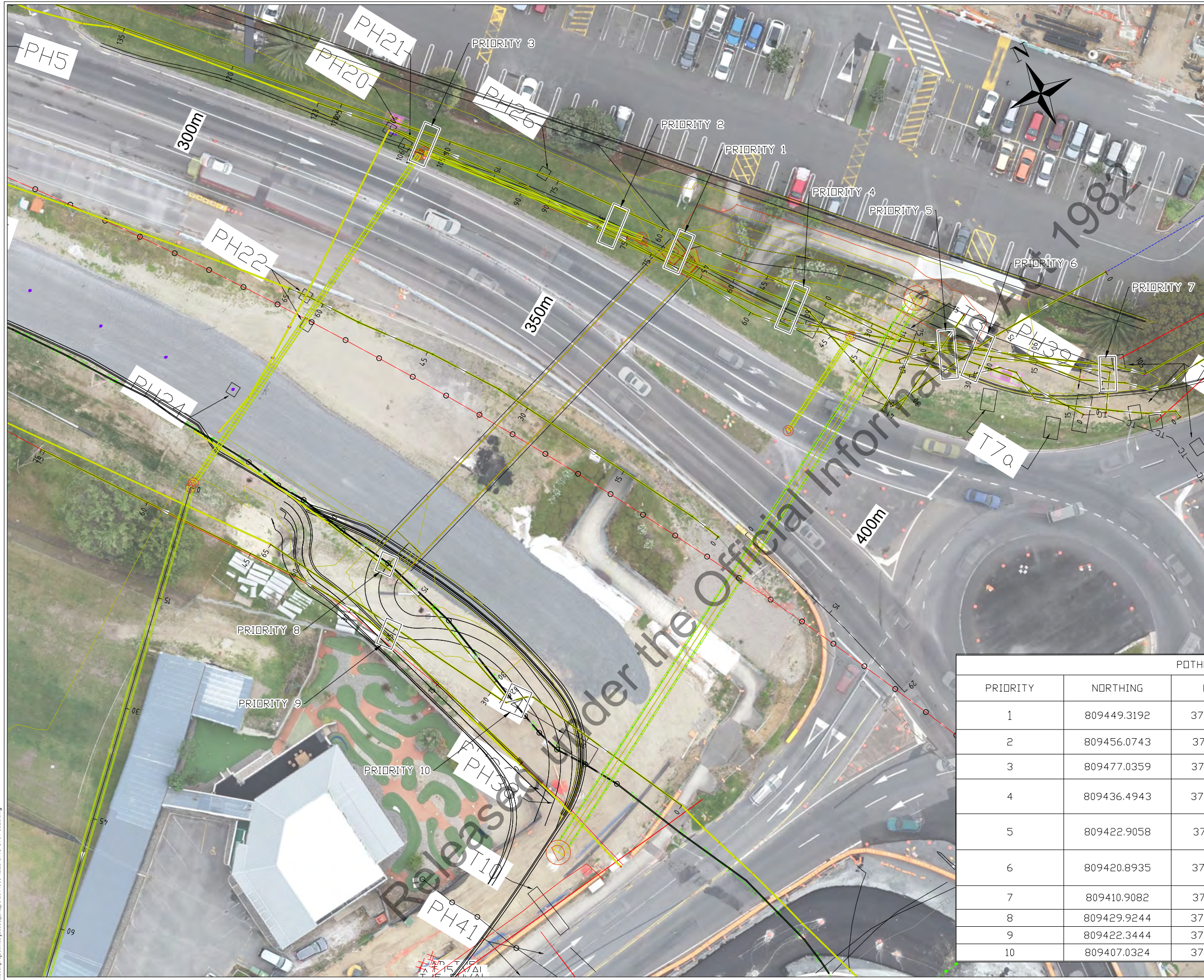
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 DESIGNED: KR
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 3. SUGGESTED HYDROVACING SEQUENCING IS BY PRIORITY.

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

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	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

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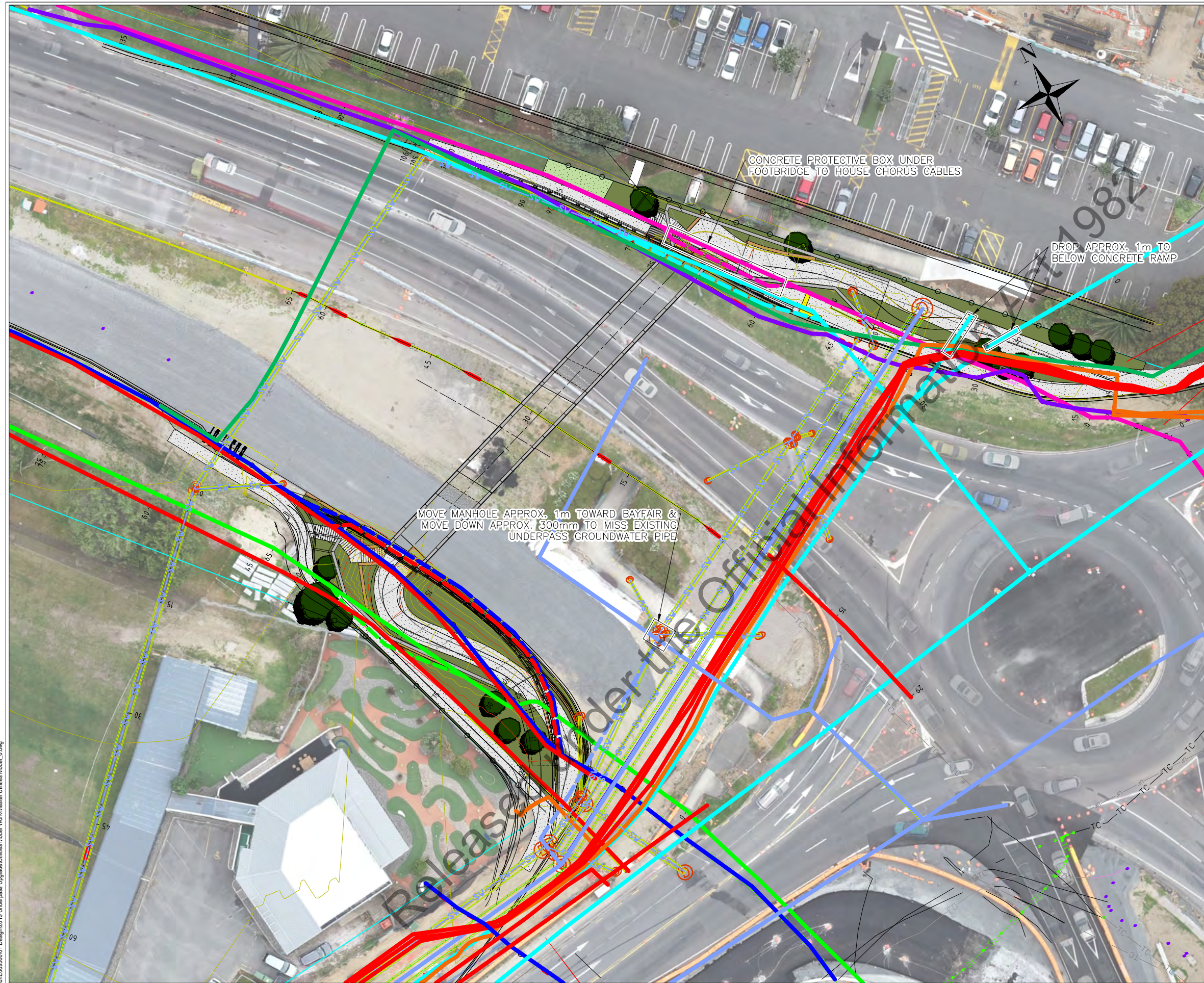
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 ALTERNATIVE ALIGNMENTS
 PAGE 1 OF 1
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	PROPOSED TCC METRO FIBER ALIGNMENT
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	EXISTING GAS ALIGNMENT
	PROPOSED GAS ALIGNMENT
	EXISTING STORMWATER ALIGNMENT
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 STATUS: DRAFT
 PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR (B2B)
 SURVEYED HR: AC
 SURVEY CHECK: GK
 APPROVED: LW

TITLE: UTILITIES PLAN ALTERNATIVE ALIGNMENTS PAGE 1 OF 1
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Baypark to Bayfair Link
Upgrade

Geotechnical Design Report for the
MGI Underpass (B2B-G-RP-6400)

Prepared for
NZ Transport Agency

Prepared by
Tonkin & Taylor Ltd

Date
March 2019

Job Number
852094.0010.vC

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Document Control

Title: Baypark to Bayfair Link Upgrade – Geotechnical Design Report for the BR01 MGI Overpass (B2B-G-RP-6303-C)					
Date	Version	Description	Prepared by:	Reviewed by:	Authorised by:
5 March 2019	A	50% Design Issue	s 9(2)(a)		

Distribution:

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Appendix C :	Newmark Block Slide Displacement Calculations

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1 Introduction

1.1 Purpose of this report

This report presents the geotechnical design parameters and considerations for the proposed Maunganui-Girven Intersection (MGI) Underpass (Underpass) of the Baypark to Bayfair Link Upgrade. It summarises the assessed ground conditions at the proposed MGI Underpass, the stability analysis, 50% design of Ground Improvement, and the static and seismic ground displacement assessments.

This report references back to the criteria, philosophies and geotechnical design parameters presented in the MGI Underpass Design Philosophy Statement (DPS) [ref 34], the Geotechnical Interpretative Report (GIR) [ref 2] and subsequent GIR Addendum [ref 3].

The Underpass provides shared path passage for pedestrians and cyclists between the eastern (Bayfair) side and western (Matapihi) side of State Highway 2 (SH2) approach ramp to BR01. It is an approximately 65m long 4.5m wide x 3m high concrete box structure with approximately 600mm cover to the Bayfair off ramp and Matapihi on ramps and approximately 8m cover to the BR01 Approach ramp.

This report provides the 50% Design Issue of the geotechnical assessments for the Underpass and associated ramps retaining walls, to support the 50% Design Issue of the Underpass structural design. The structural design for the Underpass is presented in a separate Underpass Structural Design Report (UDR).

1.2 Site description

The existing topography along the Underpass is generally gently sloping from west (Matapihi side at approx. 6.7 m RL) to the east (Bayfair side at approx. 6.0m RL). An existing pedestrian underpass structure underneath and aligned perpendicular to SH2 is located approximately 5m to 13m to the south of proposed Underpass. The Underpass is supported by reinforced concrete retaining walls and has a current minimum level of approximately 4 m below existing ground level (RL 2.0 to 2.2 m). The existing underpass structure will be removed and backfilled as part of the proposed works.

1.3 Scope of design work

The scope of geotechnical design advice provided in this report is limited to the following geotechnical elements of BR01:

- Summary of the assessed subsurface conditions;
- A general description of the Underpass;
- Provision of design parameters for the Underpass structural design;
- The extent and form of any ground improvement required for liquefaction mitigation around the Underpass and associated ramps retaining walls;
- Static and seismic stability of the soil structures at the Underpass and associated retaining walls location, including liquefaction induced settlements analyses, and their compliances with the Principal's Requirements;
- Static and seismic settlement analyses for the Underpass, and their compliance with the Principal's Requirements (PR);
- A discussion on construction opportunity and risk.

2 Subsurface conditions

2.1 Geotechnical investigations

Extensive investigations were undertaken across the site by Beca between 2011 and the end of the Tender Design phase in 2016. Supplementary shallow investigations have been also been undertaken by CPB during the detailed design phase. These are summarised in the GIR [ref 2] and GIR Addendum [ref 3].

2.2 Geotechnical model

2.2.1 Soil profile

The Underpass extends between MC10 chainages 346 and 370m (Refer to drawing B2B-DRG-GT01-6210). The soil profile along the Underpass is presented in the geological long-section drawing B2B-DRG-GT01-6006 and geological cross section (B2B-DRG-GT01-6620) attached in Appendix A. In summary, the geological profile underlying the Underpass generally comprises:

- Unit 0a (existing granular fill); overlying
- Unit 0b (existing weak cohesive fill/buried topsoil); overlying
- Unit 2a (Holocene dune deposits); overlying
- Unit 4a (Matua Subgroup); overlying
- Interbedded layers of units 4b1, 4b2 and 4c (Matua Subgroup).

Detailed descriptions of each geotechnical unit are provided in the GIR and the GIR Addendum. Geological long sections illustrating the extents, elevations and thicknesses of the various geotechnical units are provided in the GIR Addendum.

The geotechnical design parameters adopted for the analyses are presented in Table 3.1 of the GIR Addendum. [Ref 2].

For the Underpass and associated ramps from the liquefaction assessments outlined in Clause A3.6.5 of the PR, the following units were identified to be susceptible to liquefaction or cyclic softening in seismic events:

- 1 In a minor earthquake event (1/100 annual probability of exceedance):
 - a No applicable zones
- 2 In a ULS earthquake event (1/2500 annual probability of exceedance):
 - a Unit 2a is susceptible to liquefaction between 0 to -6.0 m RL from CH0 to 400
- 3 In a major earthquake event (maximum credible earthquake or MCE as per PR Table A3.5.2):
 - a Unit 2a is susceptible to liquefaction for its full thickness (to RL-6m)
 - b Unit 4a is susceptible to liquefaction for its full thickness; and
 - c Unit 4b1 is susceptible to liquefaction between -7.0 and -9.5 m RL.

2.2.2 Design groundwater level

Groundwater measurements from standpipe piezometers in the vicinity of the MGI Underpass are presented in Table 2.1 below and as shown in Figure 2.1.

Table 2.1: Summary of standpipe piezometer data in the vicinity of MGI Underpass

Piezo ID	Location	Ground Level (mRL)	Geological Unit	Screen Range (mbgl)	Number of Readings Undertaken	Maximum Water Level (mRL)	Minimum Water Level (mRL)	Average Water Level (mRL)
BH05	BR01	5.40	2a	2.2 to 4.6	20	4.03	3.05	3.3
BH06	BR01	6.70	2a	1.5 to 4.5	11	4.83	2.91	3.29
BH312	BR01	6.30	2a	5 to 8	3	3.16	3.02	3.10

Based on the groundwater measurements presented above, the groundwater level (gwl) ranges between 2.9 and 4.8 m RL in the vicinity of the Underpass. Refer to the GIR for further details on the groundwater assessments.

It is intended that the retaining walls associated with the Underpass will be sealed to RL3.8m. As indicated in the Underpass DPS [ref 34], the gwl for general design of the Underpass is at RL 3.8m. Design groundwater levels of 3 mRL and 3.8 mRL have been assumed for the purpose of slope stability analysis for the Underpass and retaining walls design respectively. The design groundwater level for assessment of buoyancy is assumed to be at 50 year ARI which indicates a residual flooding of approximately 6.0 m RL. The design includes installation of a gravity drain at RL 3.8m to the stormwater. (Refer to Stormwater Design Report for Underpass).

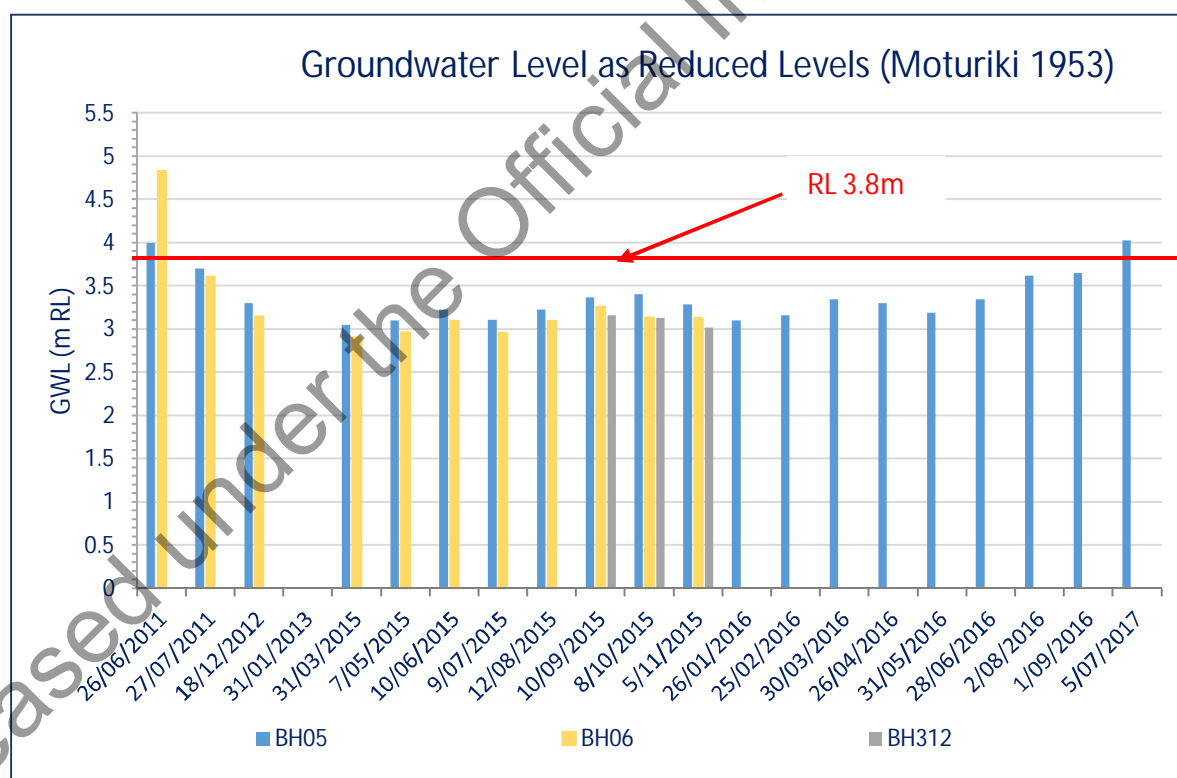


Figure 2.1: Groundwater level monitoring results

3 Seismic assessment

The following sections present the design criteria, philosophy and subsurface model for the seismic assessments of the proposed soil structures supporting the MGI Underpass and associated retaining walls.

3.1 Subsoil classifications and seismic design acceleration

The site subsoil class adopted for the project is Class D (Deep Soil Site) as assessed in the site specific seismic hazard assessment [ref 12]. The seismic design PGAs and magnitudes for seismic assessment of the MGI Underpass and associated retaining walls ramps have been characterised in accordance with clause A3.5 of the PR [ref 10] and the Groundworks Design Criteria and Philosophy Statement [ref 1] and the Underpass Design Philosophy Statement [ref 34]. These are summarised in Table 3.1.

Table 3.1: Design peak ground accelerations and corresponding magnitudes

	Importance Level	Design seismic event	Annual probability of exceedance (APE)	PGA (g)	Magnitude
Underpass	3	SLS	1/100	0.15	5.9
		ULS	1/2500	0.42	5.7
		MCE	N/A	0.46	6.9
Retaining structures supporting the State Highway	3	SLS	1/100	0.15	5.9
		ULS	1/2500	0.42	5.7
Retaining walls and supporting ramps and private property (50 year design life)	2	SLS	1/50	0.11	5.9
		ULS	1/1000	0.33	5.7

3.2 Liquefaction and cyclic softening susceptibility

In accordance with the results of liquefaction assessments outlined in Groundworks Design Criteria and Philosophy Statement, the liquefaction and cyclic softening extents provided in Clause A3.6.5 of the PR have been applied in the geotechnical analyses.

Table 3.2 provides summaries of various geotechnical units identified to be susceptible to liquefaction or cyclic softening in various seismic events at the locations of the Underpass and associated retaining walls.

Table 3.2: Liquefaction extents

Design seismic event	APE earthquake event	Geotechnical Unit	Elevation (m RL)	Liquefaction (L) or cyclic softening (CS)	Residual shear strength ratio (s_u/σ_v')	FoS for Liquefaction or Cyclic Softening
SLS	1/100		None			
ULS	1/2500	2a	0.0 to -6.0	L	0.12	0.5
MCE	N/A	2a	+3.0 to -6.0	L	0.11	0.4
		4a	-6.0 to -7.0	L	0.08	0.3
		4b	-7.0 to -9.5	L	0.15	0.5

4 Underpass structure and retaining walls

4.1 General

The Underpass provides shared path passage for pedestrians and cyclists between the eastern (Bayfair) side and western (Matapihi) side of SH2. It is an approximately 65m long x 4.5m wide x 3m high concrete box structure.

4.2 Assumed geometry of the Underpass and retaining walls

The Underpass will be constructed with approximately 600mm cover of engineered fill to the Bayfair off ramp and Matapihi on ramp pavement, and approximately 8m cover to the BR01 Northern Approach ramp pavement. At both ends, gently sloping ramps and a series of steps lead into the Underpass portals.

Retaining walls up to approximately 4.5m at the eastern (Bayfair) end and 4.2m at the western (Matapihi) end create landing areas for the Underpass and retain the ground of the neighbouring shopping centre carpark and golf course and State Highway on and off ramps. It is proposed that the Underpass and retaining walls will be constructed from precast and cast in situ concrete in 'L' or 'U' gravity walls with the concrete foundation slabs extending the full width of the area between the walls (refer to structural retaining wall details). It is proposed that the retaining walls will be constructed as effectively sealed to a minimum of RL 3.8m and be designed for groundwater pressure to this RL.

The Underpass will be subjected to differential settlement due to the loading on the BR01 ramp and accordingly will be constructed in three sections with joints at either side of the ramp embankment. After all Underpass sections have been completed and the approach ramp embankment has been constructed, the Underpass sections will be stitched together. This methodology avoids the full length of the Underpass being affected by the immediate settlement caused by the ramp construction and leaves only the relatively small post construction and the seismic settlements to be accommodated by the stitched together Underpass structure. Refer to Section 7 for further details.

4.3 Underpass design

The Underpass and retaining walls will be excavated into a 1.5m to 2m crust of existing fill over Unit 2a sands. The Underpass and most of the retaining walls will be supported on ground improvements installed to mitigate the effects of liquefaction.

It is understood that the design of the Underpass and retaining walls are being completed by Jacobs based on soil parameters as provided in the GIR.

For the purposes of estimating design pressures and stresses on the Underpass the following geotechnical parameters were provided as requested by the Jacobs in accordance with "Seismic Design of Bridges RRU 1981 Section 9":

- Poissons ratio μ 0.3
- Wave velocity C_d 200 to 500 m/s

5 Ground improvement design

5.1 General

The Underpass, and associated retaining walls and ramps are underlain by approximately to 1.5m to 2m of existing granular (Unit 0a) and weak cohesive fill/buried topsoil (Unit 0b). In addition to this, there is an existing underpass with reinforced concrete retaining walls beneath the northern approach ramp to the south of the proposed Underpass. All existing retaining walls and fill material within the zone of influence of the northern BR01 approach ramp will need to be removed/undercut and replaced with engineered fill (site-won sand fill or equivalent) compacted in accordance with the project Earthworks Specification. The base of any undercuts should be inspected by a suitably qualified geotechnical engineer prior to backfilling.

As reported in section 3.2 above, the Underpass and retaining wall locations are underlain by soils which are susceptible to liquefaction and cyclic softening during earthquake events. Ground improvements are required to mitigate the effects of seismic settlements beneath the Underpass and retaining walls.

The proposed ground improvement design discussed in this section is aimed to mitigate liquefaction (i.e. only for materials that are subject to liquefaction in a seismic event). Materials that are subject to cyclic softening will still be assumed to experience cyclic softening.

The deep ground improvement design for the Underpass and retaining walls has been developed so that the earthworks design of embankments associated with the Underpass and retaining walls meet the seismic design criteria presented in Tables A3.6.3 and A3.6.4 of the PR [ref 10] and the BM [ref 9]. Refer to sections 6.4 and 8.1.4 of this report for horizontal and vertical seismic displacement estimates respectively associated with design seismic events.

5.2 Deep ground improvement extents

Based on the global stability analysis outlined in Section 6.4 of this report, it has been assessed that deep ground improvements will be required to approximately -8 m RL below the Underpass and retaining walls to mitigate liquefaction. The proposed extents of the ground improvements at the Underpass and retaining walls are shown on drawing B2B-DRG-GT-01-6210 in Appendix A. Typical sections and plans of each ground improvement location are presented on B2B-DGR-GT01-6211 and 6212.

In accordance with PR clause A3.11, as a minimum, the ground improved blocks will extend at least 5 m beyond the footprints of the Underpass and retaining walls except along the eastern and western boundaries where due to insufficient space within the designation boundary. To confine the ground improved block along the eastern and western boundaries, in-ground cut-off structures have been proposed (in accordance with Section 5.3 of the Earthquake Geotechnical Practice Module 5 [ref 29]). Departure DR011 has been submitted and accepted by NZTA (CI No 0418 dated 29 May 2018) to permit the use of such a cut-off wall.

5.3 Deep ground improvement design

This section presents an overview of the ground improvement design for the Underpass and associated retaining walls.

5.3.1 Proposed ground improvement method

The preferred ground improvement type for liquefaction mitigation at the Underpass and associated retaining walls is densification by installation of stone columns to the vertical extents presented in Section 5.2. The stone columns are proposed to be installed using a Vibroflot probe and will be filled

with appropriate aggregate in accordance with the specification set out in the Bay Link Technical Specification for Stone Columns [ref 13].

5.3.2 Design basis and assumptions

No allowance will be made for liquefaction mitigation by enhanced drainage (through stone columns) or stress concentrations within the stone columns. Therefore, a target cone resistance (CPT q_c) profile will be derived to mitigate the liquefaction of granular soils by densification only. The preliminary stone column design will be designed to achieve the target cone resistance profile using the method proposed by Baez (1995) [ref 15]. The suitability of the preliminary stone column design will be confirmed by pre-construction field trials (refer to Section 5.3.4 for further details).

The purpose of the stone columns is liquefaction mitigation by densification of the soil matrix. The stone columns will not be designed as rigid elements providing support to the soil structure. Therefore, load transfer platforms are not required to distribute embankment loads evenly across the stone columns. However a 500mm thick layer of drainage aggregate will be laid above the stone columns below the underpass structure. The purpose of this layer is to provide both a uniform foundation layer below the structure as well as a drainage layer that can accommodate excess groundwater that may flow up the stone columns during a seismic event. Twin 160mm diameter perforated drainage pipes will also be laid within the drainage layer to provide for rapid disposal of the groundwater flow during an earthquake. Refer to drawing B2B-DRG-GT-01-6211 in Appendix A.

It is assumed that the ground treatment will be carried out by bottom-fed Vibroflot construction techniques, and shall comply with Module 5A of the MBIE guideline. It also is assumed that the stone column aggregate will comply with the aggregate broken face content, crushing and weathering resistance and grading envelope presented in the Bay Link Technical Specification for Stone Columns [ref 13].

Where deep ground improvement is required for the mitigation of liquefaction effects, stone column treatment will extend at least 5 m outside the footprint of the soil structure and shallow pad foundations in accordance with PR Clause A3.11 unless protected by a cut-off wall as described in Section 5.2. It is understood that this ground improvement 'buffer zone' is based on the theory that elevated pore-water pressures developed during earthquake shaking outside the ground improved block can reduce the strength and stiffness of soil within it. The width of the ground improvement block that should be ignored due to 'softening' can be calculated using the recommendations of Lai et al (1991) [ref 18]. In addition to this, the 'buffer zone' contributes to the seismic performance of the ground support to the structure.

5.3.3 Ground improvement design detail

5.3.3.1 Target post-treatment ground conditions

The target post-treatment ground conditions have been assessed to mitigate liquefaction in soils susceptible to liquefaction within the ground improved block for ULS for both the Underpass and retaining walls, and MCE earthquake events for the Underpass. Given the high silt content of Unit 4a, it is assumed that this material will not be densified (i.e. liquefaction mitigated) by installation of stone columns through this material. Therefore no post-treatment criteria is specified for ground improvements that extend through Unit 4a.

An indicative simplified post-treatment CPT q_c trace has been derived to ensure a minimum factor of safety against liquefaction of 1.0 for an MCE earthquake event. The post-treatment cyclic resistance ratio (CRR) for the indicative simplified post-treatment CPT q_c trace was calculated using the methods proposed by Boulanger & Idriss (2014) [ref 16]. The post-treatment CPT q_c trace was developed using the in situ data and a representative CPT test at approximately CH470 on the SH2 alignment (CPT332).

The indicative simplified post-treatment CPT qc trace is presented in Figure 5.1 below. This target CPT qc trace is also presented on B2B-DRG-GT01-6142 in Appendix A.

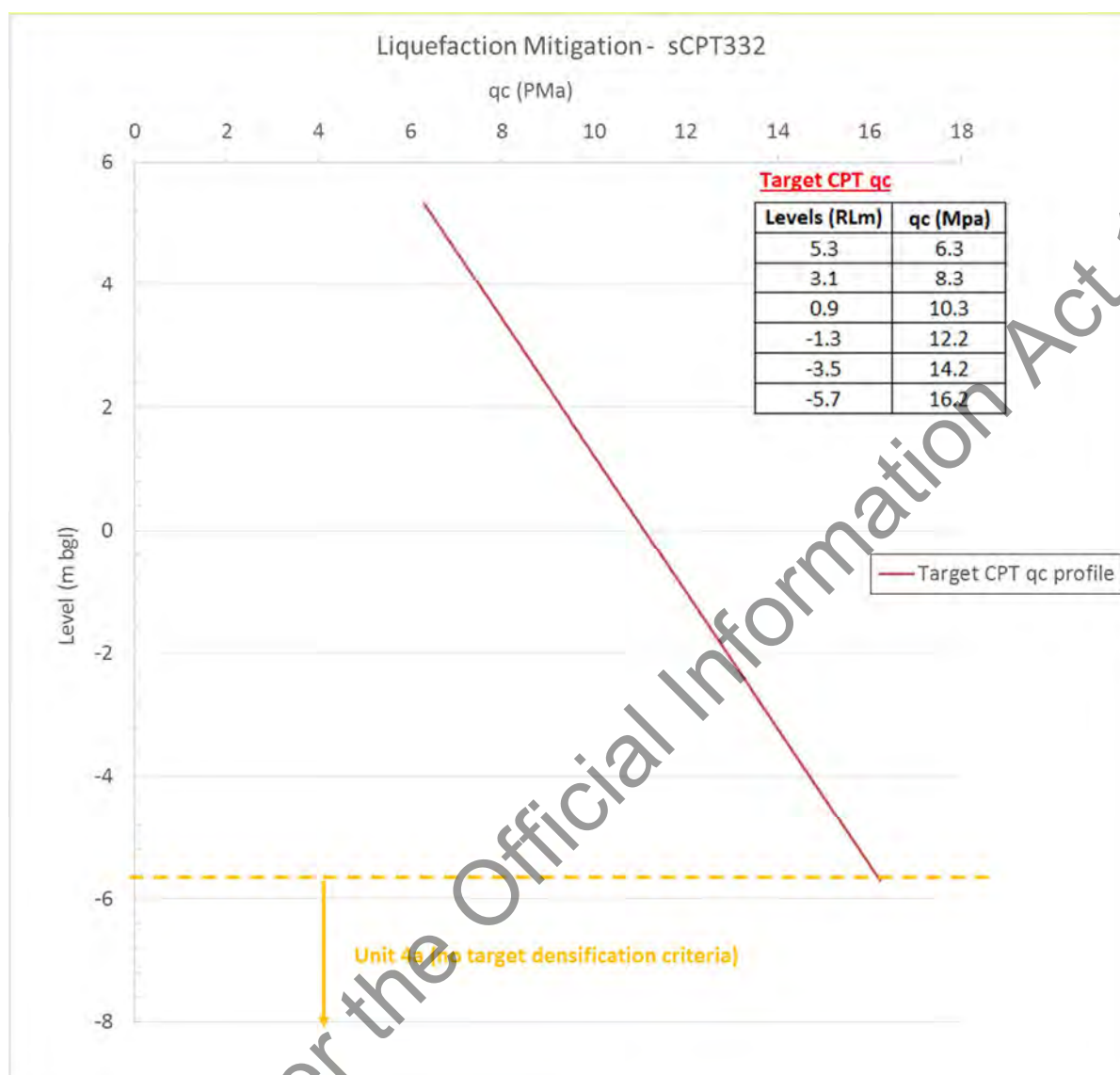


Figure 5.1: The indicative simplified post-treatment CPT qc trace for BR01

The pre-treatment and post-treatment factors of safety against liquefaction for the ULS and MCE design event for CPT332 are presented in Figure 5.2 below.

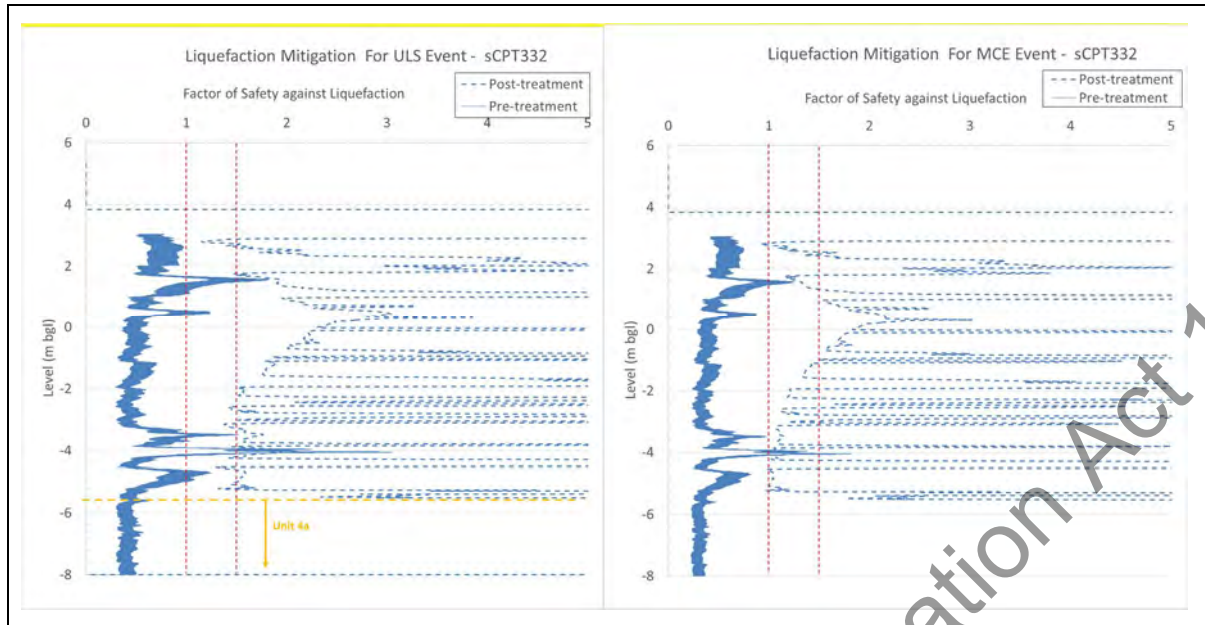


Figure 5.2: Pre and Post-treatment factor of safety against liquefaction

5.3.3.2 Design of stone columns to achieve the target ground improvement

The Area Replacement Ratio (ARR) required to achieve adequate densification to mitigate the risk of liquefaction within the ground improvement zone, has been assessed using CPT based correlations developed by Baez [ref 15]. Our assessment suggests that a minimum ARR of 8.2% is required in subsurface Unit 2a, to densify and mitigate liquefaction within the layer.

Assuming a stone column diameter of 800 mm, for ARR of 8.2%, a stone column spacing of 2.6 m in a triangular grid would be required.

A summary of the preliminary ground improvement design beneath the Underpass and retaining walls is given in Table 5.1 below. (Refer to drawing B2B-DRG-GT01-6210 for a plan showing proposed extents of ground improvements).

Table 5.1: Summary of Underpass preliminary ground improvement design

Location	Stone column size	Stone column spacing (in triangular grid)
Underpass and retaining walls	800 mm diameter from ground surface to -8 m RL	2.6 m
Transition Zone MC 10 Ch. 337 to 347m	800 mm diameter from ground surface to -2.5 m RL	2.6 m

The preliminary ground improvement design presented above is subject to re-evaluation following review of the stone column trial post-ground improvement in situ strength data. Refer to the Bay Link Technical Specification for Stone Columns [ref 13] for further information on the proposed stone column trials.

5.3.3.3 Effective stress parameters for improved ground

For 'sand-like' soils the effective stress strength parameters for the ground improved block has been calculated using a weighted average of the effective stress parameters of the non-liquefied matrix soil strength and the stone columns.

Where the proposed ground improvements are required to penetrate Unit 4a soils prone to liquefaction (under the MCE earthquake case), this soil unit is modelled with a composite soil strength. The composite soil strength is calculated using a weighted average (by area) of the S_u/σ'_v ratio of the liquefied ground and the stone column.

5.3.4 Construction verification

Degree of improvement Cone Penetration Testing (CPT) (or other equivalent tests as agreed with the Designer) is to be carried out during production to demonstrate sufficient improvement of ground has been achieved. The CPTs will be positioned at the centre of the triangular grid and be undertaken at a minimum frequency of 1/50 m² of the treated ground, or as otherwise specified by the Designer. All CPTs will extend to a minimum depth of 1.0 m below the base of the surrounding stone columns (unless refusal conditions are encountered).

If the q_c criteria is not met in Unit 2a, the post-improvement CPT information of this zone will be analysed for liquefaction potential. The analysis will adopt the same method used to develop the post-treatment target q_c profile and will take into account any correction required for fines content. If liquefaction (greater than 200 mm thick) is predicted for a specific layer, then additional CPT tests will be carried out within the 50 m² area of the 'q_c criteria not met' to further assess the extent of the non-conformance. The additional CPTs will also undergo liquefaction potential assessments as per the Boulanger & Idriss (2014) [ref 16] method. Mitigation of the non-conformance zone will likely comprise installation of additional stone columns.

In summary, CPTs will be used to measure the degree of improvement of the ground during the field trial as well as during the production stone column installation. Liquefaction triggering assessments will be carried out from the CPT results using the triggering method by Boulanger & Idriss (2014) [ref 16] to verify that sufficient densification has been achieved. The preliminary target CPT cone penetration values (q_c) of the improved ground are provided in Section 5.3.3.1 above. It is not envisaged that a separate trial would be undertaken for the Underpass, rather that the trial used for BR01 and MGI Ground Improvements would be applicable for the Underpass.

An 8.2% area replacement ration (ARR) from the ground surface to RL -8m will be adopted for the design of ground improvement at the Underpass and associated retaining walls. A 10m wide transition zone of ground improvement with stone columns will be installed to RL-2.5 m to the north of the Underpass ground improvements to smooth the seismic settlements. The extents of deep ground improvement are shown on drawings DRG-GT01-6210 in Appendix A.

6 Static and seismic stability

The following sections present the static and seismic slope stability analysis for the Underpass.

6.1 Seismic design

Section 3 presents the seismic design parameters and philosophy that will be adopted for the design of soil structures underlying and overlying the Underpass and is summarised below.

6.1.1 Subsoil classification and seismic design acceleration

The site subsoil class adopted for the project shall be Class D (Deep Soil Site). The seismic design accelerations for the Underpass geotechnical analysis are summarised in Table 3.1

6.1.2 Liquefaction

The Underpass alignment is underlain by soils which are susceptible to liquefaction or cyclic softening during earthquake loading. The geotechnical design for the Underpass has been completed using the relevant liquefied extents and residual shear strengths presented in the PR Clause A3.6.5 and summarised in Table 3.2.

6.2 Slope stability criteria Underpass

The stability analyses of the Underpass have been carried out in accordance with Clause 5.1.2 of the BM [ref 9] and Clause A3.6.4 of the PR [ref 10]. The slope stability criteria for the Underpass soil structures are presented in Table 6.1 below.

Table 6.1: Slope stability criteria for Underpass

Case	Minimum Factor of Safety/ Displacement Criteria	Comments
Static		
1: Short-term during construction	≥1.2	
2: Long-term	≥1.5	
3: Long-term over-excavation	≥1.4	N/A Refer Note 1
Seismic		
4: ULS PGA prior to liquefaction	≥1.0 and the seismic performance for structures as specified the BM are met.	Non-liquefied and drained soil strength with full ULS PGA and bridge structural inertia.
5: SLS PGA with liquefaction	Refer BM Table 5.1 for qualitative criteria.	SLS residual soil strength, with SLS PGA.
6: ULS PGA with liquefaction	≥1.0 or <1.0 with permanent lateral displacement less than 100 mm (refer Table A3.6.4 in the PRs).	ULS residual soil strength, with ULS PGA.
7: MCE PGA with liquefaction	Refer BM Table 5.1 for qualitative criteria.	MCE residual soil strength, with MCE PGA
8: MCE post seismic stability (immediate)	≥1.1	MCE Liquefied soil strength with no PGA.

Note 1: The requirement for analysis for a 0.5 m deep accidental over-excavation in front of the Underpass is not expected as a solid concrete slab will form the landing areas at either end of the Underpass.

Where the factor of safety against slope instability or lateral displacement are not satisfactory, the soil structure and ground improvements have been designed in accordance with the BM Clause 6.3.4 "so that all the requirements of the Bridge Manual (Serviceability, Design Level and Major/MCE) as modified by the Principal Requirements are achieved".

6.3 Stability performance criteria retaining walls for ramps associated with the Underpass

The seismic stability analyses of the proposed soil structures supporting the retaining walls associated with the Underpass have been carried out in accordance with the Groundworks Design Criteria and Philosophy Statement [ref 1] and Clause A3.6.4.2 and A3.6.4.3 of the PR [ref 10].

The stability requirements for the proposed soil structures not affecting the Underpass are presented in Table 6.2.

Table 6.2: Seismic stability criteria for the retaining walls not affecting the Underpass

Stability Case		Required Min. Factor of Safety (FOS)	Comments
5	SLS/Operational Continuity seismic embankment stability in liquefied condition	≥ 1.0 or < 1.0 with displacement criteria	SLS liquefied/cyclically softened soil residual strengths and design SLS PGA to be used. Permanent lateral displacements less than 5 mm when FOS < 1.0 (to ensure compliance with the qualitative criteria presented in the Bridge Manual Section 6.2.6.d)
6	ULS seismic embankment stability in liquefied condition	≥ 1.0 or < 1.0 with displacement criteria	ULS liquefied/cyclically softened soil residual strengths and design ULS PGA to be used. Permanent lateral displacements less than 250 mm when FOS < 1.0 (refer Table A3.6.3 in the PR).
8a	Post-seismic stability (immediate)	> 1.1	ULS liquefied/cyclically softened soil residual strengths and zero PGA.

Note: ^a Generally the critical design case

6.4 Global stability analysis of the Underpass and associated retaining walls

The global slope stability analysis has been carried out using GeoStudio 2016 Limit Equilibrium SLOPE/W software [ref 17] using the methodology presented in the Groundworks Design Criteria and Philosophy Statement [ref 1].

As discussed in Section 5 the ground improvement block extends to approximately -8 m RL at the Underpass and associated ramp walls to mitigate the effects of liquefaction. As discussed in Section 5.2 deep ground improvements are designed to extend at least 5 m beyond the footprints of the Underpass and associated ramp walls. However, for the purposes of the global stability analysis, the ground improvements have generally been modelled to terminate at the Underpass. This conservative simplifying assumption has been made to account for the potential strength loss at the edges of the ground improved blocks due to pore-water pressure migration from adjacent liquefied soils in seismic events. Where the SLOPE/W results indicated that this simplifying assumption was too conservative, the zone of softening in the ground improved block due to pore-water pressure migration was calculated using the method proposed by Lai et al. (1991) [ref 18] and modelled accordingly. This was completed to provide a more realistic estimate of the lateral displacement, particularly during an MCE event.

The stability analysis assumes that all weak existing fill within the footprint of any soil structures be undercut and re-compacted (where suitable) or replaced (in the case of unsuitables containing organic or cohesive material) in accordance with the Earthworks Design Report [ref 30] and Earthworks Specification [ref 4]. Zones which are likely to require undercut of weak existing fill material are presented on earthworks plans attached to the Earthworks Design Report.

The following sections demonstrate that the proposed ground improvement is sufficient to satisfy the seismic permanent displacement criteria defined in the PRs. The results of the stability analysis are summarised in Table 6.3 and Table 6.4 below. Where multiple failure mechanisms (circular and non-circular) have been checked, the critical factor of safety and associated lateral displacements estimates have been presented. The results presented in Table 6.3 and Table 6.4 have been estimated based on the ground improvement blocks being present beneath the Underpass and retaining walls.

The seismic lateral displacement estimates are required by the Underpass structural Designer for assessment of the Underpass performance during a SLS, ULS and MCE earthquake events in accordance with the seismic performance criteria specified by the Bridge Manual Table 6.3 presents seismic displacements for Cases 6 and 7 for this purpose. The seismic lateral displacement due to an SLS earthquake event is negligible.

Selected SLOPE/W outputs are included in Appendix B of this report. The Newmark block slide calculations are provided in Appendix C.

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Table 6.3: Summary of slope stability analysis results for the underpass and walls protecting landing area, and walls protecting the State Highway

Design Case ⁽²⁾ : (see notes)	Static Slope Stability			Seismic and Liquefaction Slope Stability (Including Permanent Slope Displacement Assessment)															
	Short Term	Long Term		SLS Seismic Event (100 year) ⁽¹⁾ PGA = 0.15 g, M = 5.9	ULS Seismic Event (2500 year) ⁽¹⁾ PGA = 0.42 g, M = 5.7							MCE Seismic Event ⁽¹⁾ PGA = 0.46 g, M = 6.9							
		1	2	3	5	4	6				8	7							
	Calculated stability FOS	Calculated stability FOS	Calculated stability FOS	Calculated stability FOS	Calculated stability FOS	Calculated stability FOS	Yield PGA	Estimated displacement (mm)				Two consecutive ULS events (50% exceedance) (mm)	Calculated stability FOS	Calculated stability FOS	Yield PGA	Estimated displacement (mm)			
								(a)	(b)	(c)	Estimated range (mm)					(a)	(b)	(c)	Estimated range (mm)
Design Requirements	1.2	1.5	1.4	> 1.0 (NZTA BM CI 6.2.6)	> 1.0 (NZTA BM CI 6.4.1)	NZTA BM CI 6.4.1		Displacement ≤ 100 mm (PR Table A3.6.4)				PR CI A3.6.4.3	> 1.1 (PR Table A3.6.4)	NZTA BM CI 6.4.1					
Underpass Trans.	2.50	2.50	2.50	1.87	1.08	1.08	N/A	<5	<5	<5	<5	<5	2.04	< 1.0	0.18 (0.23)	25 (10)	35 (20)	40 (20)	25 to 40 (10 to 15) ⁽³⁾
RW01 – Section 1 - 4.2m (protecting landing area)	-	-	-	-	-	< 1.0	0.27	5	10	10	5 to 10	5 to 10	1.34	< 1.0	0.08	140	175	190	140 to 190
RW01 – Section 2- 4.0m (protecting motorway)	-	-	-	-	-	< 1.0	0.2	10	20	40	10 to 40	10 to 40	-	-	-	-	-	-	-
RW01 – Section 3- 3.0m (protecting motorway)	-	-	-	-	-	< 1.0	0.17	20	35	65	20 to 65	15 to 65	-	-	-	-	-	-	-
RW01 – Section 4 - 2.0m (protecting motorway)	-	-	-	-	-	< 1.0	0.22	10	15	30	10 to 30	5 to 30	-	-	-	-	-	-	-
RW02 – Section 1 – 3.9m (protecting landing area)	-	-	-	-	-	< 1.0	0.21	10	20	35	10 to 35	10 to 35	1.34	< 1.0	0.04	495	460	430	430 to 495
RW02 – Section 2- 3.9m (protecting landing area)	-	-	-	-	-	< 1.0	0.16	20	40	80	20 to 80	15 to 80	1.17	< 1.0	0.07	185	215	225	185 to 225
RW02 – Section 4 - 2.5m (protecting motorway)	-	-	-	-	-	< 1.0	0.135	25	35	55	25 to 55	15 to 55	-	-	-	-	-	-	-
RW04 – Section 1 - 4.0m (protecting landing area)	-	-	-	-	-	< 1.0	0.18	15	30	55	15 to 55	10 to 55	1.33	< 1.0	0.11	75	105	115	75 to 115
RW04 – Section 2- 3.5m (protecting motorway)	-	-	-	-	-	< 1.0	0.145	30	50	100	30 to 100	20 to 100	-	-	-	-	-	-	-
RW05 – Section 1–3.9m (protecting landing area) ⁽⁴⁾	-	-	-	-	-	< 1.0	0.15	25	45	90	25 to 90	20 to 90	0.99	< 1.0	<0.1	> 500	> 500	> 500	> 500
<p>Case 1: Short-term Case 2: Long-term Case 3: Long-term over-excavation Case 4: ULS PGA prior to liquefaction Case 5: SLS PGA Case 6: ULS PGA with liquefaction Case 7: MCE PGA with liquefaction Case 8: MCE post seismic stability (immediate)</p> <p>Non-liquefied and drained soil strength with short term loads (i.e. construction load – assumed to be 20 kPa). No seismic load. Non-liquefied and drained soil strength with long term loads. No seismic load. Non-liquefied and drained soil strength with long term loads allowing for 0.5 m deep accidental over-excavation in front of the ramp. No seismic load. Non-liquefied and drained soil strength with full ULS PGA (where displacement occurs, the maximum displacement calculated from Jibson, Ambraseys & Srbulov and Martin & Qiu is shown in bracket). SLS EQ Non-liquefied and drained soil strength, with SLS PGA. ULS EQ residual soil strength, with ULS PGA. MCE EQ residual soil strength, with MCE PGA. MCE Liquefied soil strength with no PGA.</p> <p>(a) Lateral slope displacement (Newmark block slide) calculated using Jibson (2007) with magnitude correction. ULS displacement is based on 16% probability of exceedance. MCE displacement is based on 50% probability of exceedance. (b) Lateral slope displacement (Newmark block slide) calculated using Ambraseys & Srbulov (1995) with magnitude correction. ULS displacement is based on 16% probability of exceedance. MCE displacement is based on 50% probability of exceedance. (c) Lateral slope displacement (Newmark block slide) calculated using Martin & Qiu (2008). ULS displacement is based on 16% probability of exceedance. MCE displacement is based on 50% probability of exceedance.</p> <p>⁽¹⁾ The slope stability analysis results shown in this table are based on unweighted PGAs with liquefaction extents and residual shear strengths presented in PR Clauses A3.5.2 and A3.6.5. ⁽²⁾ For global stability of the retaining walls, cases 1 to 5 will be assessed at 85% design stage. These cases are either unlikely to be critical for the design. (3) Displacements in brackets are for displacements that affect part of Underpass only. (4) MCE case not required for RW05 Refer Section 6.5</p>																			

Table 6.4: Summary of slope stability analysis results for walls and slopes supporting residential properties

	Static Slope Stability			Seismic and Liquefaction Slope Stability (Including Permanent Slope Displacement Assessment)															
	Short Term	Long Term		SLS Seismic Event (100 year) ⁽¹⁾ PGA = 0.11 g, M = 5.9	ULS Seismic Event (2500 year) ⁽¹⁾ PGA = 0.33 g, M = 5.7							MCE Seismic Event Not applicable							
Design Case ⁽¹⁾ : (see notes)	1	2	3	5	4	6							8	7					
	Calculated stability FOS	Calculated stability FOS	Calculated stability FOS	Calculated stability FOS	Calculated stability FOS	Calculated stability FOS	Yield PGA	Estimated displacement (mm)					Calculated stability FOS	Calculated stability FOS	Yield PGA	Estimated displacement (mm)			
								(a)	(b)	(c)	Estimated range (mm)	Estimated displacement of two consecutive ULS events (50% exceedance) (mm)				(a)	(b)	(c)	Estimated range (mm)
Design Requirements	1.2	1.5	1.4	> 1.0 (NZTA BM Cl 6.2.6)	> 1.0 (NZTA BM Cl 6.4.1)	NZTA BM Cl 6.4.1		Displacement ≤ 100 mm (PR Table A3.6.4)					PR Cl A3.6.4.3	> 1.1 (PR Table A3.6.4)	NZTA BM Cl 6.4.1				
RW02 – Section 3- 3.2m (protecting ramp)	-	-	-	-	-	< 1.0	0.105	35	60	100	35 to 100	25 to 100	-	-	-	-	-	-	
RW05 – Section 2- 3.5m (protecting ramp)	-	-	-	-	-	< 1.0	0.15	15	25	40	15 to 40	10 to 40	-	-	-	-	-	-	
RW05 – Section 2- 3.2m (protecting ramp)	-	-	-	-	-	< 1.0	0.13	20	35	60	20 to 60	15 to 60	-	-	-	-	-	-	
2 to 1 slope adjacent to the south end of RW02	1.5	-	-	-	1.21	< 1.0	0.22	10	15	25	10 to 25	10 to 25	-	-	-	-	-	-	
Case 1: Short-term Case 2: Long-term Case 3: Long-term over-excavation Case 4: ULS PGA prior to liquefaction Case 5: SLS PGA Case 6: ULS PGA with liquefaction Case 7: MCE PGA with liquefaction Case 8: MCE post seismic stability (immediate)				Non-liquefied and drained soil strength with short term loads (i.e. construction load – assumed to be 20 kPa). No seismic load. Non-liquefied and drained soil strength with long term loads. No seismic load. Non-liquefied and drained soil strength with long term loads allowing for 0.5 m deep accidental over-excavation in front of the ramp. No seismic load. Non-liquefied and drained soil strength with full ULS PGA (where displacement occurs, the maximum displacement calculated from Jibson, Ambraseys & Srbulov and Martin & Qiu is shown in bracket). SLS EQ Non-liquefied and drained soil strength, with SLS PGA. ULS EQ residual soil strength, with ULS PGA. MCE EQ residual soil strength, with MCE PGA. MCE Liquefied soil strength with no PGA.															
				(a) Lateral slope displacement (Newmark block slide) calculated using Jibson (2007) with magnitude correction. ULS displacement is based on 16% probability of exceedance. MCE displacement is based on 50% probability of exceedance. (b) Lateral slope displacement (Newmark block slide) calculated using Ambraseys & Srbulov (1995) with magnitude correction. ULS displacement is based on 16% probability of exceedance. MCE displacement is based on 50% probability of exceedance. (c) Lateral slope displacement (Newmark block slide) calculated using Martin & Qiu (2008). ULS displacement is based on 16% probability of exceedance. MCE displacement is based on 50% probability of exceedance.															
				⁽¹⁾ For global stability of the retaining walls, cases 1 to 5 will be assessed at 85% Design stage. These cases are either unlikely to be critical for the design.															

6.5 Discussion of the slope stability results

The results provided in Table 6.3 and Table 6.4 indicate that the design complies with the design requirements where a quantitative criteria is provided in the PR or Bridge Manual (i.e. Cases 1, 2, 3, 4, 6 and 8). For the cases where the criteria is qualitative (Case 5, Case 7 and two consecutive ULS events), the lateral displacements are provided to enable a qualitative assessment by the Structural Underpass Designer in accordance with the Bridge Manual .

The intent of the design of the ground improvement for the Underpass and retaining walls associated with the Underpass was to provide the following:

- Stability and acceptable settlement for the Underpass with criteria as indicated in Table 6.2 including MCE criteria.
 - This has been achieved.
- Stability and acceptable settlement for Retaining walls RW01, RW03 and RW04 supporting the state highway ramps.
 - This has been achieved and the ground improvement and cut-off wall required to achieve this is shown on Figure 1 in Appendix A.
- Stability and acceptable settlement criteria for the walls surrounding the landing areas (excluding those associated with the state highway and those within 5m of the Underpass) based on criteria provided in Table 6.3, i.e. retaining walls not affecting the Underpass.
 - This was achieved. However from a Safety in Design perspective it would be preferable that the landing areas at either end of the Underpass were designed to be similar to the Underpass, including no collapse at MCE. While preliminary design indicates that this can be achieved for the walls supporting the state highway, the walls supporting the adjacent property at the 'landing areas' at the ends of the Underpass i.e. RW02 and RW05 will have significant displacement in an MCE event.

7 Static settlement

7.1 General

The Underpass underlain by soil deposits which are susceptible to elastic and primary consolidation settlement under static gravity loads. The surcharge loads associated with the construction of the BR01 approach ramp, are likely to trigger each of these settlement components. As none of the soils strata encountered at the Underpass contain significant organic contents, settlement due to secondary compression is considered to be negligible. The following sections present the settlement analysis for the Underpass. The settlement analysis was undertaken following the methodology presented in the Geotechnical Design Criteria Philosophy and Philosophy Statement [ref 1]. In addition to the Settle3D analysis, we have completed a secondary check on the predicted settlement magnitudes using CPT data directly in the CPT interpretation software CPeT-IT [ref 7].

7.2 Static settlement criteria

There are several settlement criteria set by the Bridge Manual (BM) [ref 9] and the Principal's Requirements (PR) [ref 10] each with the objective of controlling post-construction settlement-related damage to pavements, road barriers, and facing panels. The following sections present these criteria.

7.2.1 Construction stage settlement criteria

Clause A3.6.3.1 of the PR requires that the average construction stage consolidation settlement is at least 95% complete two months prior to pavement/barrier construction/facing panel erection.

Departure Request No. 10 was submitted to NZTA to depart from the above PR construction stage settlement criteria at BR01 and the northern approach embankment of the MGI Overpass. The Underpass is below the northern approach embankment to the MGI Overpass. This departure requested approval to remove the 95% average construction stage consolidation settlement requirement and replace it with a target residual primary consolidation settlement of less than 10 mm at a point 2 months prior to pavement/barrier construction and/or facing panel erection.

Following Contract Instruction No 0082 (issued 21 August 2017), Departure Request No. 10 was approved with the following conditions:

CBP Contractors shall:

- Demonstrate in the design statements that the residual settlement will be limited to less than 10mm between CH 200 and 470.
- Identify and outline how you will mitigate any effects the proposed DR 010 has on the MSE external facing panels, barriers, kerbs, drainage runs and other sensitive elements.

Note the criteria listed in the Principal's Requirements - Appendix A Table A3.8.1 will still need to be satisfied with regards to the facing panels.

- Identify proposed contingency actions should residual settlement exceed the predicted 10mm.

7.2.2 Post construction settlement criteria

Clause A3.6.3.2 of the PR require that all soil structures be designed to meet the following criteria for settlement due to static loading within 25 years of completion of pavement construction:

- a Less than 0.5% transverse change in grade with no ponding;
- b Minimum design crossfalls shall be maintained;
- c Less than 0.5% longitudinal change in grade with no ponding;

- d 0.25 % longitudinal change in grade within a distance of 12 m behind all bridges and major culverts;
- e 0 mm abrupt differential movement affecting pavements, barriers and retaining structures supporting carriageways, including facing panels; and
- f Less than 5 mm of abrupt differential movement affecting other elements, acceptable only where the movement will not cause damage, require maintenance or increase safety risks to road users.

7.3 Construction sequence for the Underpass

The following construction sequence for the Underpass is proposed:

The construction sequence assumed for the structure to build up design loads is as follows. This may change at Detailed Design. Constructor is to agree methodology for TTM/ Environmental Controls/ Heavy Lifts/Access Roads/ Etc.

- 1) Identify/relocate/protect utilities;
- 2) Introduce TTM and traffic staging as required (throughout construction process)
- 3) Install Ground improvement stone columns below western and central sections of Underpass;
- 4) Excavate to design depth (under Underpass Box Segments 1 (western) and 2 (central) Segments with temporary support and dewatering as required
- 5) Construct Box Segments 1 and 2 but unconnected:
 - a) This stage includes waterproofing and construction of settlement slab and backfilling while protecting 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) Install settlement monitoring instrumentation;
- 8) Construct the BR01 north approach ramp MSE walls and embankment above Box Segment 2;
- 9) Allow central zone (Segment 2) of box-section to settle with BR01 northern approach ramp embankment
- 10) When settlement reaches 90% primary consolidation (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;
- 11) Construct ancillary elements such as, footbridge, approach ramps, barriers, drainage etc., Install lighting;
- 12) Lay surfacing overlay

Further details are provided in the Structural Section of the Underpass Design Report.

7.4 Static settlement estimates and settlement durations

The estimated static settlements for the Underpass below the northern approach ramp are presented in Table 7.1 below. A range of $\pm 25\%$ should be considered for all settlement estimates provided due to the inherent uncertainty relating of selecting representative geotechnical profiles and compressibility parameters.

Table 7.1: Static Settlement below Underpass beneath Northern Approach ramp

Location	Immediate Settlement (mm)	Total Static Settlement at 100 years (mm)	Estimated Post Construction settlements (mm)		
			0 to 1 month	1 month to 3 months	3 months to 100 years
Centreline of approach ramp	56	73	8	5	4
Edge of approach ramp	42	57	8	4	3

A settlement vs Underpass distance graph for both static and seismic settlement of the soils below the Underpass is presented in Figure 8.2 in Section 8.1.4.

As indicated in Table 7.1 about 75% of the settlement is immediate due to the sandy layers underlying the Underpass, and over 90% of the total static settlement is expected to occur in the first three months post construction. The sections of the Underpass below the Northern approach ramp will not be stitched together until settlement monitoring indicates that the residual settlement can be structurally accommodated by the Underpass and stitched joints between sections.

A secondary check on the Settle3D results was undertaken using CPT333 near the centreline of the northern approach ramp at the Underpass location. This was completed using the static settlement analysis function in the CPT interpretation software CPeT-IT. The results of this CPeT-IT analysis indicate total elastic and primary consolidation settlement of approximately 15 mm. This indicates that the 53 mm estimated using Settle 3D is likely conservative.

7.5 Differential static settlement below the Underpass and associated embankment

7.5.1 Transverse (to State Highway alignment) differential settlement

The geological section shown on B2B-DRG-GT01-6220 shows that the local stratigraphy (transverse to the SH2 alignment) is generally horizontal at the Underpass. As indicated in Table 7.1, the post construction differential settlement across the ramp (which is predominantly due to settlement in units 4a and 4b) is expected to be <5mm and meets the transverse change in grade and minimum crossfall requirements in Table 7.2 below for pavement.

Any differential settlement that could affect the Underpass structure would be due to primary consolidation settlements in Unit 4a and 4b following stitching of the sections of the Underpass together). As indicated in Section 7.4 the differential settlement is expected to be <5mm and accordingly acceptable.

7.5.2 Longitudinal (to State Highway alignment) differential settlement

The Underpass ground improvements extend to a depth of -8mRL which is a similar depth to those below BR01 Bridge. A transition zone of ground improvement with stone columns installed to RL-2.5m is proposed to the south of the Underpass ground improvements which is similar to that previously designed for BR01. The geological profile below the Underpass is similar to that below BR01 and the height of the northern approach ramp is less at the Underpass than at BR01. Accordingly the longitudinal change in grade will to be less along the State Highway above the Underpass than that reported in the BR01 MGI Overpass Design Report (B2B-G-RP-6303-C) which meets the longitudinal differential settlement criteria as indicated in Table 7.2 below and further analysis is not required.

7.6 Compliance with static settlement design criteria

A summary of the maximum settlement results, based on settlement analysis results presented in Table 7.1, and associated settlement criteria are presented in Table 7.2.

Table 7.2: Compliance with the post-construction static settlement criteria

Timeline	Settlement criteria	Maximum settlement	Comment
Within 25 years after completion of pavement construction	Less than 0.5% transverse change in grade with no ponding.	0.025%	Satisfied
	Minimum design crossfalls shall be maintained.	0.025%	Satisfied
	Less than 0.5% longitudinal change in grade with no ponding.	0.02%	Satisfied
	0.25 % longitudinal change in grade within a distance of 12 m behind all bridges and major culverts.	0.02%	Satisfied
	0 mm abrupt differential movement affecting pavements, barriers and retaining structures supporting carriageways, including facing panels	0 mm (no rigid deep foundation elements such as piles)	Satisfied
	Less than 5 mm of abrupt differential movement affecting other elements, acceptable only where the movement will not cause damage, require maintenance or increase safety risks to road users	0 mm (no rigid deep foundation elements such as piles)	Satisfied
After stitching together the Underpass until the end of the Underpass design life (100 years)	A total tolerance of ± 25 mm from the specified design levels for the substructure	<5 mm	Satisfied
	Span/1000 from the specified design vertical alignment for the superstructure (0.1%)	0.02 %	N/A

Based on the data provided above, the post-construction differential settlement for the proposed Underpass complies with the criteria presented in Section 7.2.2.

As discussed with the Structural Underpass Designer, the structural design of the Underpass will incorporate considerations to accommodate the long-term total settlements and the associated differential settlements presented in Table 7.1 such that the effect of those assessed settlements can be considered negligible to the overall Underpass performance. Refer to structural Design Report for the Underpass.

8 Seismic settlement

8.1.1 General

Seismic settlement assessments have been undertaken for the Underpass and associated retaining walls in accordance with Clause A3.6.4 of the PRs [ref 10]. The seismic settlement has been assessed for minor (1/100 APE), ULS (1/2500 APE), and for the Underpass major earthquake events (MCE).

The following sections summarise the seismic performance criteria, the analysis methodology and the results for the proposed soil structure seismic settlement assessments.

8.1.2 Seismic settlement design criteria

The seismic settlement design criteria are given in Table A3.6.4 of the PR and are summarised in Table 8.1 below. However, it is noted that additional qualitative assessments will be required for the SLS, ULS and MCE earthquake events for the Underpass in accordance with the Bridge Manual Table 5.1. Therefore, this section also provides seismic settlement estimates for the SLS and MCE earthquake events to allow a qualitative assessment to be undertaken by the structural Underpass Engineer.

Table 8.1: Seismic settlement criteria in the PR.

Event	Soil structure category	Vertical settlement limit
SLS / operational continuity	Soil structures supporting Underpass	As per Bridge Manual
ULS / design level earthquake		Up to 300 mm total vertical settlement).
MCE		To enable Underpass to perform as per Bridge Manual Table 5.1
SLS / operational continuity	Soil structures supporting retaining walls (not supporting Underpass)	As per Bridge Manual
ULS / design level earthquake		Up to 300 mm of differential settlement between the soil structure and the surrounding ground in the ULS seismic event.

8.1.3 Seismic settlement analysis approach

Assessments of seismic settlements of the Underpass and associated ramp retaining walls have been assessed based on the following phenomena in line with Clause A3.6.4.1 of the PR.

- 1 Liquefaction-induced settlement due to volumetric deformation of liquefied layers within and below the ground improved block (where applicable), S_v

Liquefaction-induced volumetric settlement of Holocene materials that liquefy under the design seismic acceleration (e.g. Unit 2a) can be calculated using CPT data and the post-liquefaction re-consolidation settlement method proposed by Zhang, Robertson and Brachman [ref 20].

The Pleistocene deposits such as Unit 4b1, as outlined in the Groundworks Design Criteria and Philosophy Statement [ref 1], were assessed to be not susceptible to liquefaction under the ULS design earthquake event. However, although liquefaction is not predicted ($FoS > 1$), minor volumetric settlement may still occur when the $FoS < 2$ (Ishihara & Yoshimine, 1992, and Zhang, Robertson and Brachman, 2002) [ref 22 and 20].

The liquefaction-induced volumetric settlement in Unit 4b1 has been calculated using shear wave velocity data. It is generally considered that the conventional CPT method underestimates the resistance of soils containing pumiceous clasts, such as Unit 4b1, i.e. the CPT q_c values tend

to be unrealistically low due to crushing of pumice. Therefore, volumetric strain estimates using the shear wave velocity method are considered to predict the behaviour of early-middle Pleistocene deposits (beneath the site more accurately than conventional CPT methods. Using project sCPT (CPT332 and 333) data from the MGI intersection area as input to CLiq software [ref 7] the factor of safety against liquefaction (FS_{liq}) has been assessed according to Kayen et al. (2013) [ref 31]. The results predict:

- Unit 4b1 in CPT332 (which is on the south side of MGI), $FS_{liq} \sim 1.2$
- Unit 4b1 in CPT333 (which is on the north side of MGI and at the Underpass location), $FS_{liq} > 2.0$

The FS_{liq} and average $(V_{s1})_{cs}$ have been used to calculate the expected post-liquefaction volumetric strain on the plot provided in Yi (2010) [ref 32]

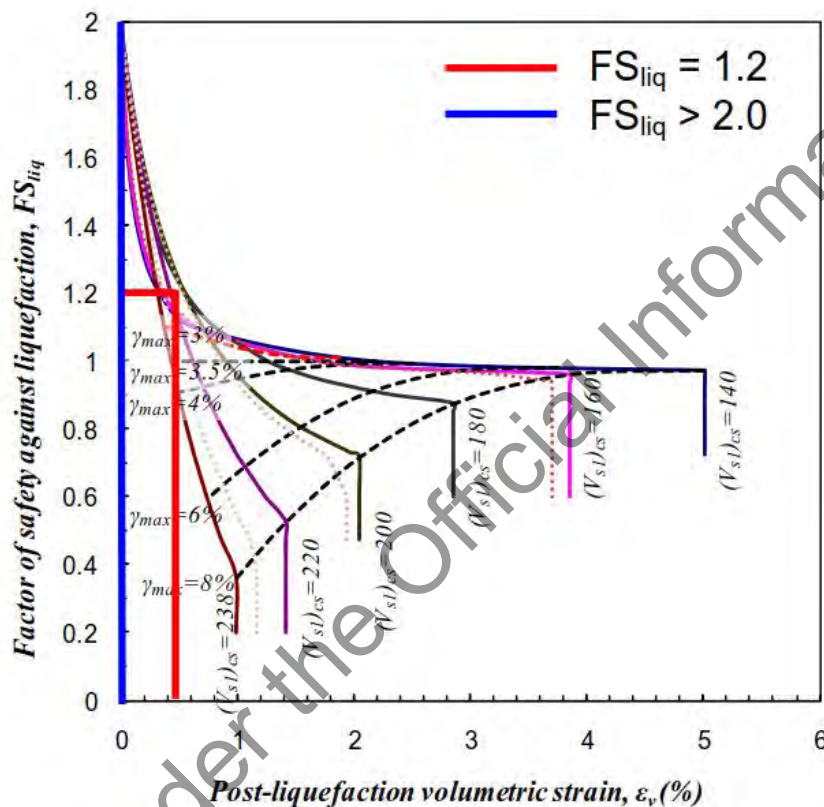


Figure 8.1: Estimation of post-liquefaction volumetric strain. Annotated extract from Yi (2010) [ref 32]

The estimated post-liquefaction volumetric strain within the top 5m of Unit 4b1 is:

- In CPT332, south side of MGI, $\epsilon_v \sim 0.5\%$
- In CPT333, below Underpass, $\epsilon_v = 0\%$

The volumetric settlement estimates from Unit 2a, 3b and 4b1 are added together to provide the total volumetric settlement estimate which contributes to the total seismic settlement estimate presented in Section 8.3.2.

The ground improvements have been designed so that the factor of safety against liquefaction will be greater than 1.5 for SLS/Operational Continuity and ULS/Design earthquake events. The volumetric settlement within the ground improved block is expected to be negligible for these events. For the MCE event, the factor of safety against liquefaction is likely to be closer to 1.0 which may induce some volumetric strains even though liquefaction is not triggered. The

volumetric strain within the ground improved block after an MCE event has been estimated using the method proposed by Zhang, Robertson and Brachman [ref 20] based on the post-improvement normalised CPT tip resistance and an assumed factor of safety of 1.0.

- 2 Seismic settlement due to shear deformation of liquefied/cyclic softened subsurface materials (left in place beneath soil structures) due to static embankment gravity loads, S_s
- This has been assessed using the finite element program PLAXIS 2D [ref 22]. In the PLAXIS 2D analysis, the following stages have been modelled:
- i Initial stage – to establish the ground in situ stress prior to construction
 - ii Embankment stage – to establish the ground stress following the bridge construction
 - iii Liquefaction stage – to model the liquefied ground condition

Liquefied/cyclically softened subsoil strengths were modelled in the analysis, where appropriate, in a static condition (i.e. no PGA). The liquefied soil has been modelled using a reduced secant modulus of 10% of that used for non-liquefied soil i.e. $E/10$ with an increased Poisson's ratio of 0.499 (i.e. a high bulk modulus has been assumed to only model the static shear deformation).

Where applicable we have considered softening around the edges of the densified blocks due to pore pressure migration from the adjacent liquefied ground. This is in line with the recommendation provided in the Geotechnical Earthquake Engineering Practice Module 5 [ref 13], Section 5.3, and Fig 2.

Analysis using PLAXIS 2D was undertaken to assess this phenomena and presented in the MGI Ground Improvement Report (B2B-G-RP-6304-D). Similar results are expected for the Underpass and the analysis will be updated during detailed design.

- 3 Seismic settlement due to rocking and ratcheting soil-structure interaction (SSI) effects of the soil structure during earthquake shaking, S_r
- The proposed MGI approach ramps that overlie the Underpass generally have a relatively wide base with the maximum height to base width ratio (H/B) of about 0.6 and are not considered to be significantly affected by rocking and ratcheting SSI. This has been discussed in detail in the MGI Ground Improvement Design Report (B2B-G-RP-6304-D) [ref 35]

- 4 Vertical deformation associated with anticipated seismic induced-horizontal displacement, S_d

Slope stability assessments have been undertaken at for the Underpass and associated retaining walls to assess the factor of safety against slope instability and are presented in Section 6 above. As prescribed in the PR [ref 10] and outlined in Table 6.2 above, for inertial loading a displacement criteria exists where the factor of safety is assessed as less than 1.0 for the design shaking event. The slope stability and horizontal displacement methodology is outlined in Section 6 and subsequent sections therein where the ground conditions modelled are outlined with respect to seismic criteria in Table 6.2. For clarity, the seismic acceleration (SLS or ULS PGA) is applied to the soil structure mass and underlying ground in the stability model concurrently with the liquefied ground conditions (SLS or ULS).

Where factor of safety is less than unity at full PGA and permanent horizontal displacement occurs, there is an associated vertical deformation. The inertial-load induced vertical deformation has been estimated to be 50% of the horizontal displacement where slope stability assessment has been undertaken.

5 Seismic settlement as a result of material loss from ejecta, S_e

The potential for ejecta along the proposed soil structures in the MGI intersection has been assessed using the method outlined by Ishihara (1985) [ref 33]. This has been discussed in detail in the MGI Ground Improvement Design Report (B2B-G-RP-6304-D). Where stone columns are present beneath soil structures as is the case for the Underpass and associated retaining walls, the effect of ejecta in the ULS earthquake has been assessed as negligible.

8.1.4 Summary of seismic settlement analysis results

A summary of the seismic settlement analysis results are presented in Table 8. below.

Table 8.2 Summary of seismic settlements for the MGI Underpass and retaining walls

Earthquake event	Settlement limit (mm)	Underneath the ramp (ground improvement to -8 m RL)			
		S_v (mm)	S_s (mm)	S_d (mm)	S_t (mm)
SLS (100 year APE)	N/A	<1	<1	0	<2
ULS (2500 year APE)	300	<5	<10	<5	<20
MCE	N/A	<60	<15	<20	<95

S_v Estimated liquefaction-induced volumetric settlement of the liquefied ground below the abutment MSE structures (15% probability of exceedance).

S_s Estimated shear deformation induced settlement of the liquefied/cyclic softened ground below the abutment MSE structures due to deviatoric stresses under static gravity loads.

S_d Estimated vertical component of the lateral displacement.

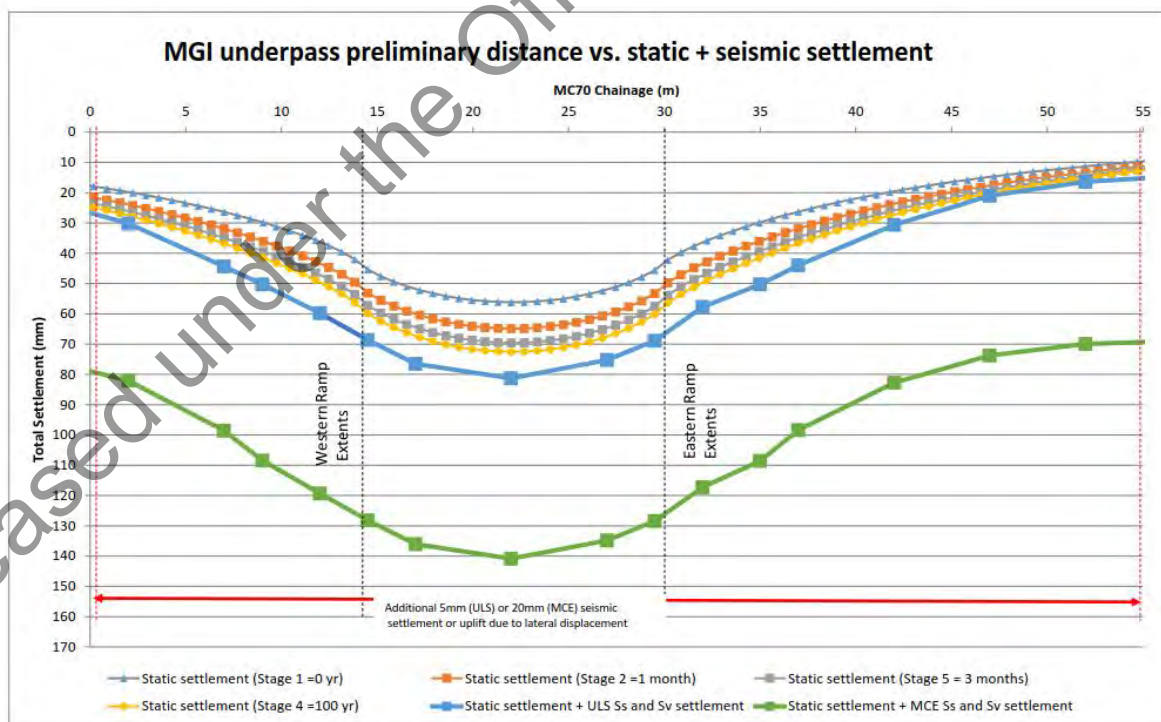
S_t Estimated total seismic settlements.

Table 8.3: Summary of differential seismic settlements between the approach ramps and surrounding ground

Chainage	GI depth	Estimated total settlement under MGI soil structures (mm)		Estimated total settlement in the free field (mm)		Difference between soil structure and surrounding ground	
		SLS/ Operational Continuity (1/100)	ULS/ Design level (1/2500)	SLS/ Operational Continuity (1/100)	ULS/ Design level (1/2500)	SLS/ Operational Continuity (1/100)	ULS/ Design level (1/2500)
CH320	No GI	30	285	30	140	0	145
CH345	GI to RL - 2.5	20	140	30	140	-10	0
CH350 (underpass)	GI to RL - 8.0	2	20	1	10	1	10

A graphical representation of estimated total settlement including static and seismic settlements of the soils below the Underpass is presented in Figure 8.2. Note that the Underpass will be stitched together following construction of the Northern approach ramp and accordingly the structure will not experience differential settlement due to immediate settlement.

Figure 8.2 Static and seismic settlement of ground below the Underpass



8.1.5 Compliance with the seismic settlement criteria

The total seismic settlement results are presented Table 8.2. The ULS earthquake event all satisfy the maximum vertical settlement criteria presented in Section 8.1.2. Please refer to the structural Underpass Design Report for the qualitative assessment of the SLS, ULS and MCE seismic settlement estimates in accordance with the Bridge Manual and Underpass Design Report

8.1.5.1 Differential seismic settlements between the approach ramps and surrounding ground

The results of the seismic settlement assessments are presented in the following tables which outline the estimated total seismic settlement for critical sections and the estimated longitudinal differential settlements.

A number of assumptions have been made during the assessment of the seismic settlements as follows:

- All analyses are based on the 50% geometrics design.
- The volumetric settlement within the Pleistocene soils is assessed as uniform across the areas assessed.
- The ground improvement will successfully densify Unit 2a, however, may not successfully densify the lower Unit 3b.

Table 8.2 below summarises the calculated total settlement for the ground under the Underpass, and also the surrounding ground/free field to assess the PR requirement that the maximum ULS differential settlement is less than 300mm between the soil structure and the surrounding area [ref 10]. The presented total seismic settlement estimates are calculated by adding together the settlement estimates from phenomena 1 to 5 in Section 8.1.3 above.

Table 8.2: Summary of differential seismic settlements between the approach ramps and surrounding ground

Chainage	GI depth	Estimated total settlement under MGI soil structures (mm)		Estimated total settlement in the free field (mm)		Difference between soil structure and surrounding ground	
		SLS/ Operational Continuity (1/100)	ULS/ Design level (1/2500)	SLS/ Operational Continuity (1/100)	ULS/ Design level (1/2500)	SLS/ Operational Continuity (1/100)	ULS/ Design level (1/2500)
CH320	No GI	30	285	30	140	0	145
CH340	GI to RL -2.5	20	140	30	140	-10	0
CH350 (Underpass)	GI to RL -8.0	2	20	1	16	1	4

Based on the seismic settlement results presented in Table 8.2, differential settlement of the approach ramps, relative to the surrounding ground, will range from approximately <5mm to +150 mm during/after a ULS/Design level earthquake (1/2500 APE) and -10 to +5 mm during/after as SLS/Operational Continuity level earthquake (1/100 APE). Both of these seismic settlement ranges comply with the differential settlement limits presented in Table 8.1.

8.1.5.2 Longitudinal differential seismic settlement of approach ramps

The ground improvement below the Underpass (to -RL8m) and transition zone (to RL-2.5m) are expected to experience similar (but slightly less) settlement to the ground improvement zones below the BR01 and the MGI Northern Approach ramp which meet the longitudinal differential settlement criteria as reported in the MGI Ground Improvement Design Report (B2B-G-RP-6304-D). Accordingly the longitudinal differential settlement across and to the north of the Underpass as the ground improvement reduces in depth is assessed to also meet the longitudinal differential settlement criteria. This will be confirmed during detailed design.

8.1.5.3 Transverse differential seismic settlement of SH2 Northern approach ramp

8.1.5.3.1 General

Differing shear deformation and ejecta settlement profiles across the embankment have the potential to cause transverse differential settlement across the approach ramps. We have assessed the potential magnitude of the transverse differential settlement components using the methods described in Section 8.1.3.

8.1.5.3.2 Results

Table 8.3 provides a summary of the maximum transverse differential settlement along the approach ramps to BR01. The settlement analysis assumes that the ground improvement design presented in drawing B2B-DRG-GT01-6120 is fully implemented.

Table 8.3: Summary of transverse differential settlements for the approach ramps overlying the Underpass

Location	Maximum transverse differential settlement (%)	
	SLS/Operational Continuity (1/100)	ULS/Design (1/2500)
Underpass	Negligible	Negligible

8.1.6 Summary and discussion of seismic settlement results

The differential seismic settlement results presented in Section 8.1.4 and Table 8.2 indicate that the differential settlement after a SLS or ULS Design level (1/2500) earthquake event would be approximately:

- In the ULS case:
 - Differential settlement between MGI soil structures and the surrounding ground will range from <5mm to +150 mm, meeting the PR requirement of ± 300 mm.
 - Longitudinal differential settlement will be typically $\leq 1.5\%$.
 - Transverse differential settlement will be typically 0.1-0.3%, with potential for isolated areas up to 3.0% where the ramp transitions out of the ground improvement area.
- In the SLS/Operational Continuity case:
 - Differential settlement between MGI soil structures and the surrounding ground will range from -10 to +<5 mm.
 - Longitudinal differential settlement will be typically $\leq 0.3\%$.
 - Transverse differential settlement will be typically $\leq 0.1\%$.

The differential settlement magnitudes expected in the SLS/Operational Continuity case are small. These magnitude settlements could cause slight damage to the pavement/panels. However, the operational continuity of the route would not be significantly impeded, and this level of damage is expected to comply with the seismic performance criteria presented in Clause 6.2.6.d Bridge Manual.

For the ULS design event, the PR limit of 300 mm differential settlement of the soil structure relative to the surrounding ground is met for all sections analysed. The differential settlement magnitudes estimated in the ULS case are expected to cause some damage to the pavements and facing panels which may require temporary repair. However, this level of damage is expected to comply with the seismic performance criteria presented in Table 5.1 of the Bridge Manual.

The Designer of the pavement, wall facing panels and barriers will need to consider the effect of the settlements outlined above such that the requirements of the BM [ref 9] and PR [ref 10] are met. We also recommend that the designers to undertake a sensitivity check for potential variation in the seismic settlement estimates presented above. Due to the conservative nature of modelling undertaken, we consider that the presented settlement estimates are upper bound. Therefore, a differential settlement check should also be undertaken whereby the settlements in one area may be 100% of the predicted values but only 50% of the predicted values in adjacent areas.

As discussed with the Structural Underpass Designer, the structural design of the Underpass will incorporate considerations to accommodate the seismic settlements to meet the required seismic performance of the Underpass. Refer to structural Design Report for the Underpass.

9 Construction opportunity and risk

A number of construction opportunities and risks have been identified in relation to the proposed ground improvement design for the Underpass and associate retaining walls as follows:

Opportunities

- There are possible opportunities to reduce the ground improvement extent at detailed design if additional stabilising measures can be mobilised in the structural design of retaining walls and footpath slab U shaped structure.
- There is an opportunity to reduce the design requirements for retaining walls including waterproofing/tanking if the groundwater can be maintained at about the Underpass invert level (RL2m) by pumping for typical groundwater levels and by permitting flooding in extreme rainfall events. A similar result could be achieved if the Underpass invert was able to be raised to about the level of the existing underpass (at about RL3m). This would likely have consenting implications.
- Ground improvement could possibly be reduced if geometric design of ramps allow ramp re-alignment and size to achieve greater stabilising effects (e.g. narrower open areas) for retaining walls. (This has a low likelihood due to CPTED requirements)

Risks

- Stone column construction generates vibrations. The vibration must be considered regarding potential damage to neighbouring properties. It is recommended that pre-construction condition assessments are undertaken on the surrounding properties.
- Clause A3.12.2 of the PR [ref 10] states that "*The contractor shall manage construction vibration in accordance with their Construction Noise and Vibration Management Plan (CNVMP) required by Condition 3(f) of the Notice of Requirement*". This is consistent with the Tauranga City Council specific conditions within resource consent no. RC24410. NZTA state highway construction and maintenance noise and vibration guide [ref 25] provides some information around construction vibration management.
- In order to construct the Underpass, temporary cut batters up to approximately 4 m high will be required into the existing fill (Units 0a and 0b) which predominantly comprises loose to medium dense sand and weak cohesive fill, and Unit 2a which comprises Holocene loose sand. Excavation will also be below groundwater level. These undercuts will also remove the top 4 m of the recently installed stone columns comprising gravel aggregate. The temporary batter slopes should be subject to design by a suitably qualified geotechnical engineer. Where a safe batter slope cannot be constructed due to site constraints, temporary retention and dewatering may be required. Refer to the Earthworks Design Report for more information on the design of temporary cut batter slopes.
- There is a risk that post-construction settlements exceed the estimated settlements). During construction, the risk will be managed by reviewing the settlement monitoring data (profilometer and settlement plates) collected during and post construction of the northern approach ramp over the Underpass. If the settlement monitoring data suggests that consolidation settlements will be larger than presented in the 95% Underpass GDR, stitching together of the Underpass sections can be delayed.
- In demolishing and removing the existing reinforced concrete pedestrian underpass beneath the Northern Approach Ramp, there is a risk of leaving some part of the structure or concrete rubble in place. Any concrete left in place is likely to impede penetration by the stone column vibroflot. This risk should be carefully managed to ensure that no part of the structure or rubble is left within any deep ground improvement zone.

10 Safety in design

A Safety in Design register has been maintained by the design team throughout the design process. Additionally the design team has taken part in Safety in Design workshops to ensure key issues including cross-discipline issues have been identified. Safety in Design issues relevant to the for the Underpass ground improvements are presented in Table 10.1.

Table 10.1: Safety in Design register for the MGI Approach Ramps

Issue	Risk	Proposed Mitigation Measure
Airport approach path - height of construction equipment.	The airport approach path for flights is through the work site. There is the risk of planes taking off/landing in an area where cranes are in use, particularly during bridge construction and stone column installation	Consultation with the airport is required to better understand this issue. A detailed construction methodology will be required if tall cranes are an issue.
Excavation in loose sands below groundwater	Collapse of temporary trench	Use temporary support and dewatering
Long-term settlement of barriers	Distortion/damage of barriers - compromised performance of barriers for extreme cases	Ensure Settlement criteria set in PR Clauses A3.6.1 and A3.6.2 are satisfied.
Settlement of services	Damage to existing services, particularly gravity fed sanitary and stormwater services causing public health risk, ground loss into stormwater pipes cause instability of adjacent MSE Walls	Wherever, existing services are likely to be affected by static settlements due to embankment construction we will complete a service-specific assessment of the likely differential settlements and ensure that the likely settlement is within the tolerance of that service. Where it is not, services will be relocated or specific settlement mitigation measures will be undertaken to maintain long-term serviceability of that asset. Where there is a residual risk of settlement, a monitoring & contingency plan will be developed and survey monitoring undertaken to mitigate this risk.
Embankment failure from vehicle impact or earthquake	Embankment collapse, fatalities	All soil structures will be designed in accordance to the Bridge Manual and Principal Requirements, have been specifically developed to mitigate risk to the public from embankment failure due to vehicle impact and earthquake loads. The stability design is generally governed by the earthquake loading.
Earthquake risk resulting in settlement, liquefaction, and other issues	Access for emergency vehicles compromised, embankment/bridge deck collapse causing fatalities	All soil structures will be designed in accordance to the Bridge Manual and Principal Requirements, have been specifically developed to mitigate risk to the public from excessive settlement due to liquefaction and embankment failure liquefaction and earthquake loading.
High Slopes and Trenches	There is a risk of collapse of temporary cut slopes.	Minimise number of slopes, design batters.

<p>Land Settlement</p>	<p>Ground settlement can affect services and neighbouring properties, with a risk that services will be damaged/disrupted and properties damaged. Settlement can result in additional or reduced surcharge on existing utilities (concrete sewer/water etc.) Differential settlement can create trip hazards for shared path users and allow ingress of water into the road pavement to create potholes.</p>	<p>We have developed a geotechnical instrumentation and monitoring specification [ref 28] which will monitor ground settlement at key locations across the project. This monitoring data will be reviewed weekly and compared to set Trigger Levels. The corrective action to be undertaken if Trigger Levels are exceeded will be presented in the Construction Management Plan.</p>
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11 Applicability

This report has been prepared by Tonkin & Taylor Limited (*T+T*) for CPB Contractors Pty Limited (*CPB*) pursuant to the Services Contract (*Contract*) between T+T and CPB in relation to the upgrade of the Bayfair to Baypark Link project (*Project*). T+T agrees this report may also be used by the NZ Transport Agency (*NZTA*) for the purposes for which T+T grants to NZTA a licence to use this report pursuant to the Contract, on the basis that the aggregate liability of T+T to CPB and NZTA in respect of any such use or reliance is subject to the limitations and exclusions of liability set out in the Contract. This report may not be relied upon in other contexts or for any other purpose, or by any person other than CPB or NZ Transport Agency, without T+T's prior written agreement.

Tonkin & Taylor Ltd

Report prepared by:

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Report reviewed by:

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Senior Geotechnical Engineer

s 9(2)(a)

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[Redacted]

s 9(2)(a)

Project Director

t:\tauranga\projects\852094\852094.0010\4000 detailed design\workingmaterial\48 - underpass\reporting\50% design report\b2b-g-rp-6303- underpass draft 20190315.docx

12 References

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Appendix A: Drawings

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FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
INDEX & LAYOUT				
B2B-DRG-GT01-6209	A	MGI SHARED PATH UNDERPASS	GROUND IMPROVEMENT	DRAWING INDEX SHEET
PLAN				
B2B-DRG-GT01-6210	A	MGI SHARED PATH UNDERPASS	GROUND IMPROVEMENT	PLAN
DETAILS				
B2B-DRG-GT01-6211	A	MGI SHARED PATH UNDERPASS	GROUND IMPROVEMENT	TYPICAL DETAILS (SHEET 1)
B2B-DRG-GT01-6212	A	MGI SHARED PATH UNDERPASS	GROUND IMPROVEMENT	TYPICAL DETAILS (SHEET 2)
GEOLOGICAL SECTION				
B2B-DRG-GT01-6220	A	MGI SHARED PATH UNDERPASS	GEOLOGICAL SECTION	AT UNDERPASS CENTRELINE
RELATED SKETCHES & DRAWINGS (FROM OTHER PACKAGES)				
B2B-SKT-GT01-6002	A	MGI SHARED PATH UNDERPASS	SITE INVESTIGATION PLAN	
B2B-SKT-GT01-6620	A	MGI INTERSECTION	MSE RETAINING WALL RW1	LONG SECTION (UNDERPASS SHOWN)
B2B-SKT-GT01-6641	A	MGI INTERSECTION	MSE RETAINING WALL RW2	LONG SECTION (UNDERPASS SHOWN)
B2B-DRG-GT01-6006	B	DETAILED DESIGN	LONGSECTION MC10 - CH 100 TO 700m	
B2B-DRG-GT01-6142	B	BR01 - MGI OVERPASS AND APPROACH RAMPS	STONE COLUMN NOTES AND TARGET POST-	GROUND IMPROVEMENT IN-SITU STRENGTH

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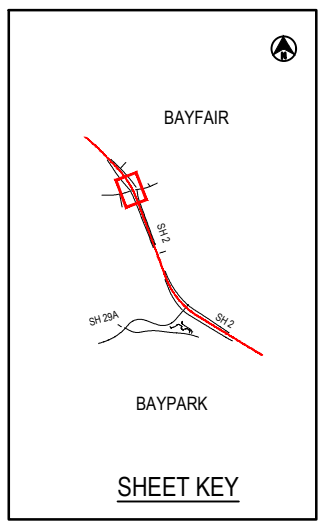
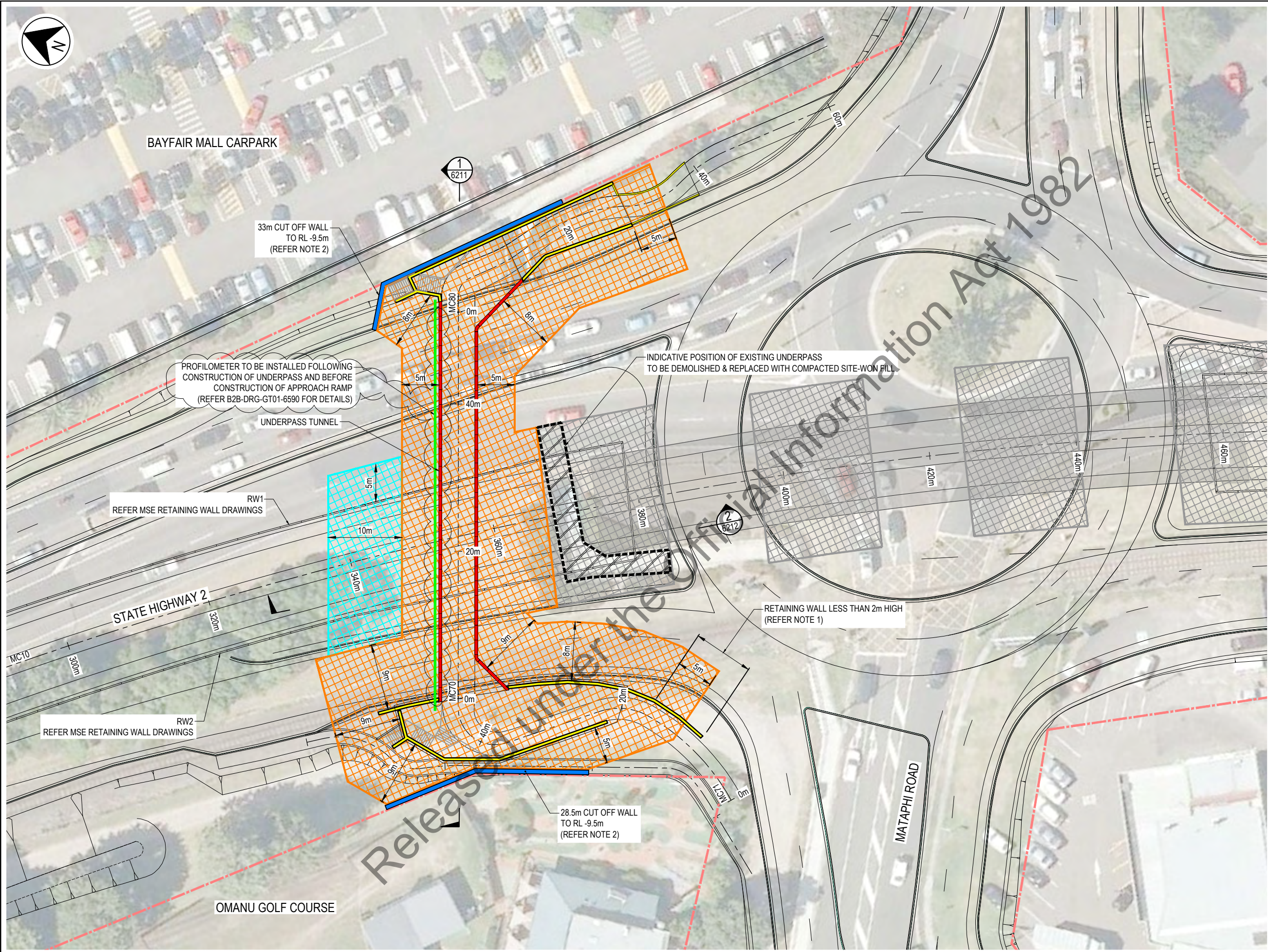
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STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY		
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)		
DRAWN ME	DRAWING CHECK AMM	APPROVED CJB	
DESIGNED YFT	DESIGN REVIEW DMMM		

TITLE	MGI SHARED PATH UNDERPASS GROUND IMPROVEMENT DRAWING INDEX SHEET		
DRAWING No	B2B-DRG-GT01-6209	REV	A



- LEGEND**
- DESIGNATION BOUNDARY
 - [Cyan Grid] STONE COLUMNS EXTENDING TO RL -2.5m (MIN. ARR 8.2%)
 - [Orange Grid] STONE COLUMNS EXTENDING TO RL -8m (MIN. ARR 8.2%)
 - [Grey Grid] GROUND WORKS IN BR01 PACKAGE. REFER DRAWING B2B-DRG-GT01-6180
 - [Red Line] UNDERPASS TUNNEL
 - [Yellow Line] UNDERPASS RAMP
 - [Blue Line] CUT OFF WALL (REFER NOTE 2)
 - [Green Line] PROFILOMETER

- NOTE:**
- FOR DETAILS OF THE UNDERPASS AND ASSOCIATED RETAINING WALLS REFER TO DRAWINGS B2B-DRG-BR05-8500 TO 8510.
 - CUT OFF WALL TO BE SECANT 600mm DIA CFA PILES (10MPa CONCRETE STRENGTH) AT 1m, OR SHEET PILES AZ32 750W x 511H x 12mmT.

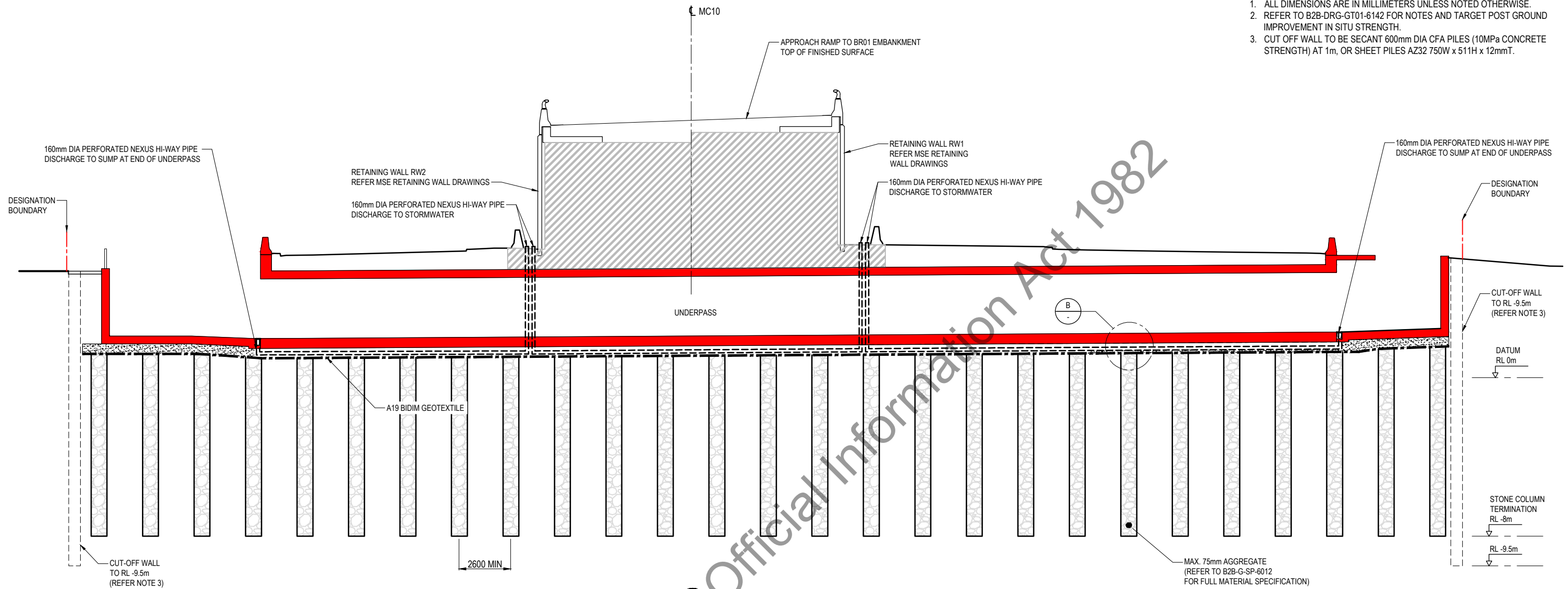
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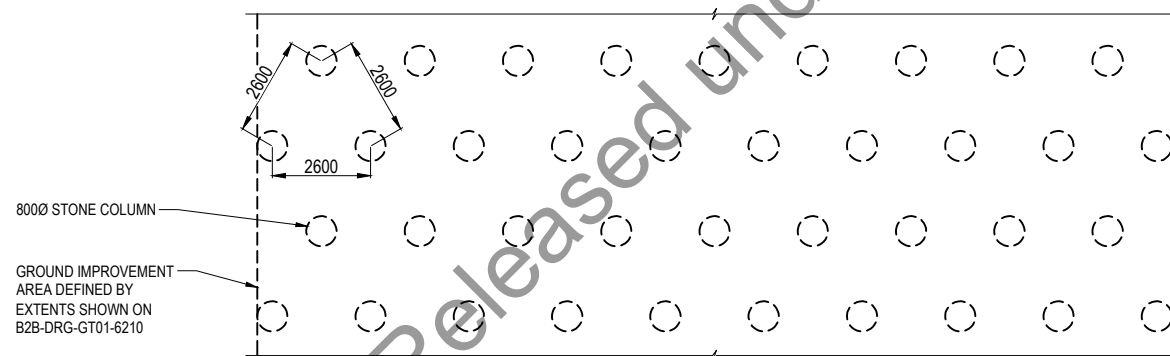
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				PROJECT NUMBER	2/09-024/603	DESIGNED YFT	DESIGN REVIEW DMMM	REV	B

NOTES:

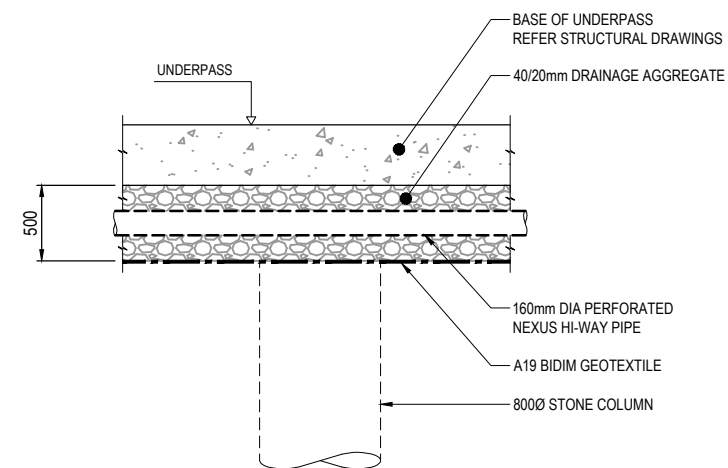
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2. REFER TO B2B-DRG-GT01-6142 FOR NOTES AND TARGET POST GROUND IMPROVEMENT IN SITU STRENGTH.
3. CUT OFF WALL TO BE SECANT 600mm DIA CFA PILES (10MPa CONCRETE STRENGTH) AT 1m, OR SHEET PILES AZ32 750W x 511H x 12mmT.



1 UNDERPASS LONG SECTION
1:200 (A3)



A TYPICAL UNDERPASS STONE COLUMN PLAN
1:200 (A3)



B DETAIL
1:50 (A3)

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REVISIONS & ISSUES

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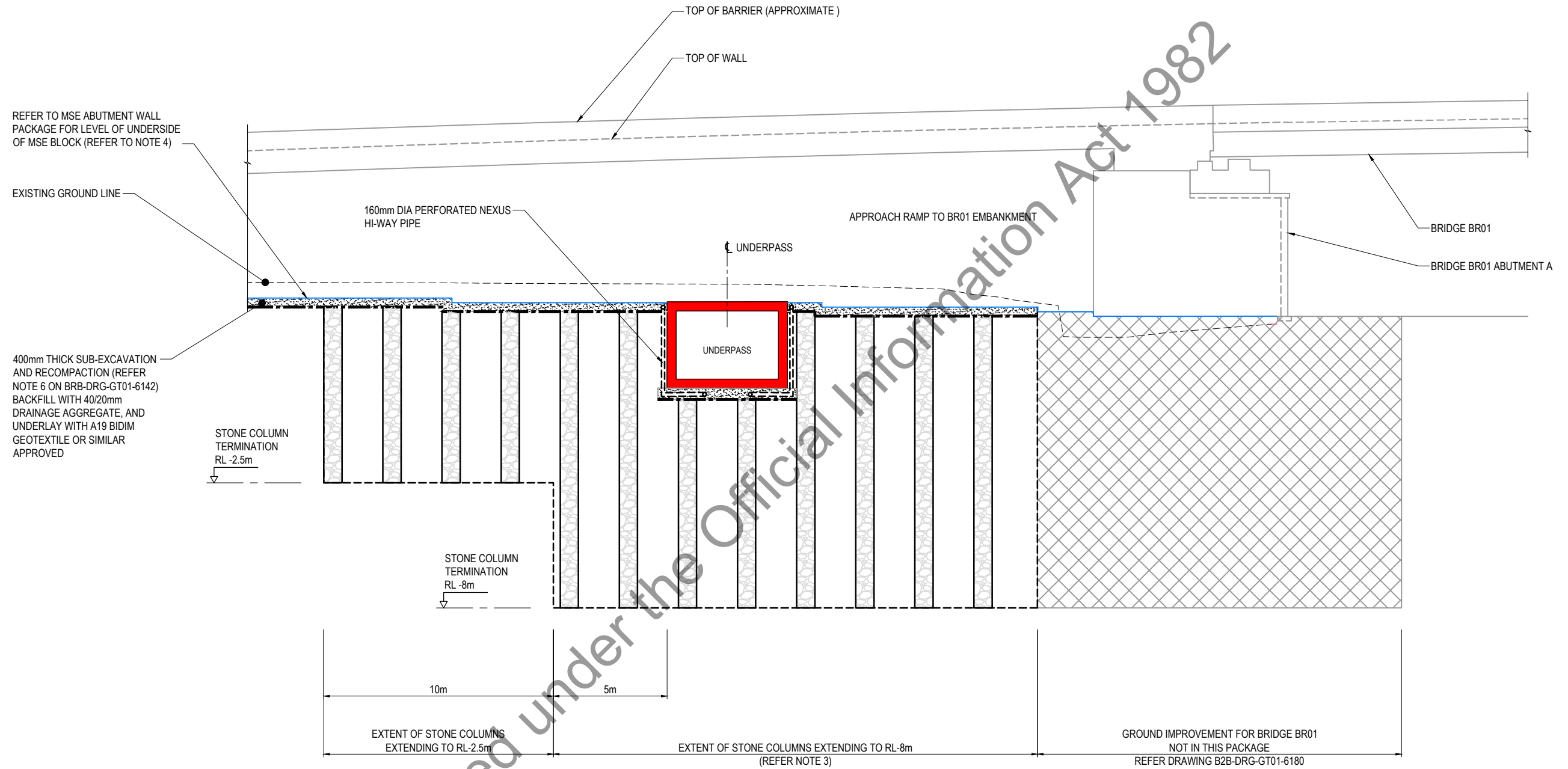


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PROJECT NUMBER: 2/09-024/603

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PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: ME
DESIGNED: YFT
DRAWING CHECK: AMM
DESIGN REVIEW: DMMM
APPROVED: CJB

TITLE: MGI SHARED PATH UNDERPASS GROUND IMPROVEMENT TYPICAL DETAILS (SHEET 1)
DRAWING No: B2B-DRG-GT01-6211
REV: A

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
 2. REFER TO B2B-DRG-GT01-6142 FOR NOTES AND TARGET POST GROUND IMPROVEMENT IN SITU STRENGTH.
 3. REFER TO B2B-DRG-GT01-6310 FOR EXTENTS OF GROUND IMPROVEMENT.
 4. REFER TO B2B-DRG-GT01-6600 FOR MSE RETAINING WALLS DETAILS.



2 UNDERPASS CROSS SECTION
6210 1:200 (A3)

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REVISIONS & ISSUES

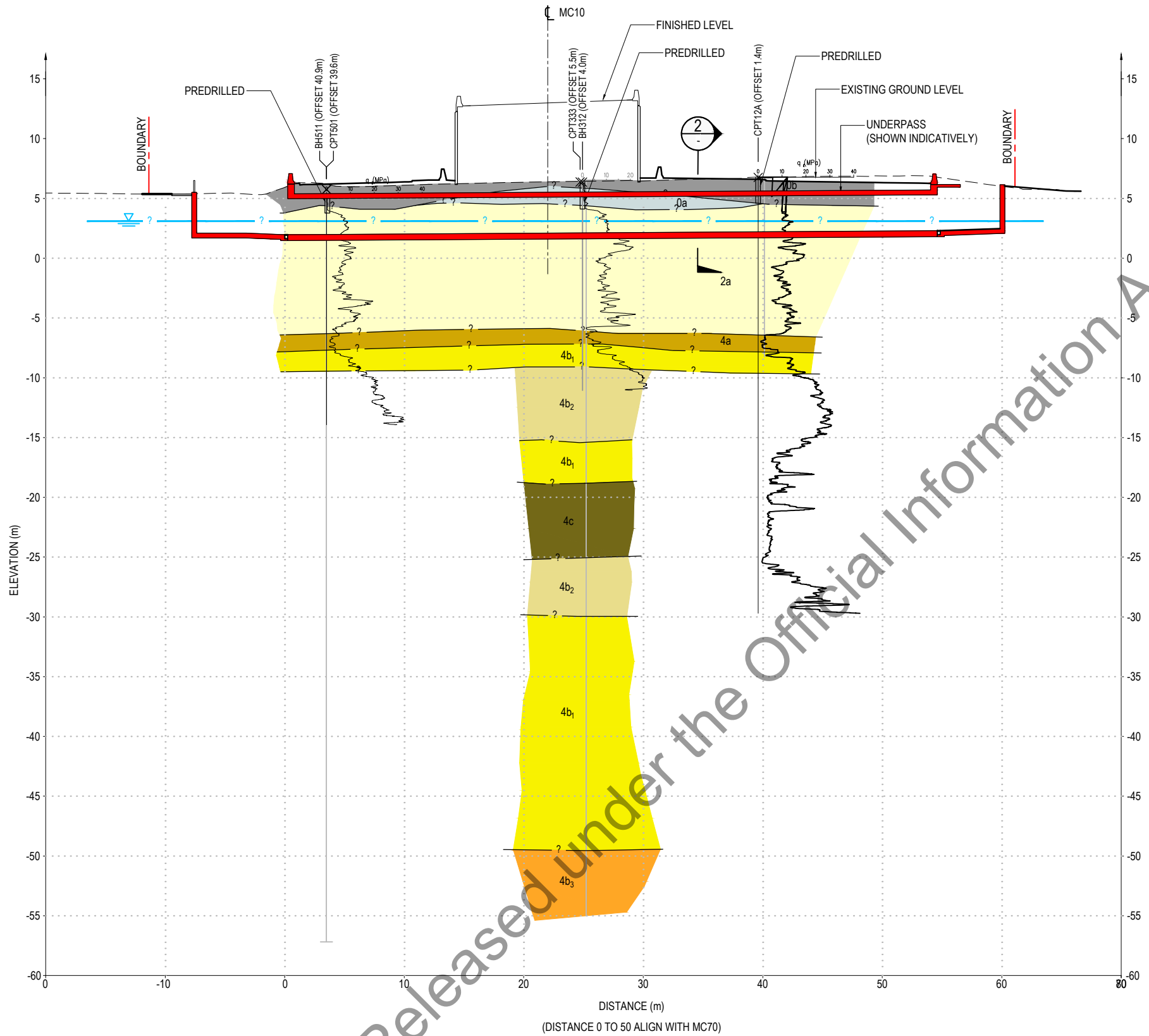
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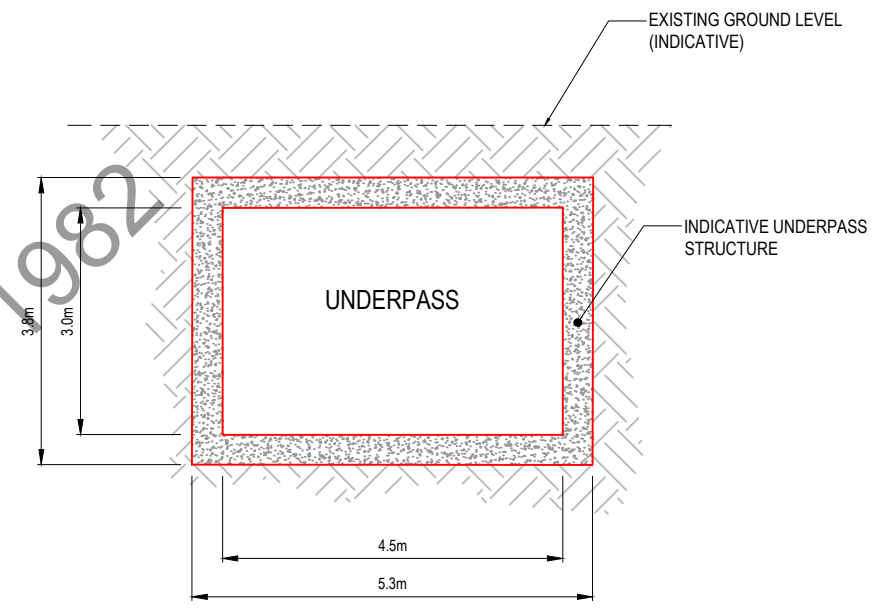
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DESIGNED: YFT
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DESIGN REVIEW: DMMM
APPROVED: CJB

TITLE: MGI SHARED PATH UNDERPASS GROUND IMPROVEMENT TYPICAL DETAILS (SHEET 2)
DRAWING No: B2B-DRG-GT01-6212
REV: A



1 SECTION THROUGH MGI SHARED PATH UNDERPASS
6002 1:400 (A3)



2 TYPICAL SECTION OF UNDERPASS
1:100 (A3)

LEGEND	
---	EXISTING GROUND LEVEL
—	PROPOSED GROUND LEVEL
— ? —	INFERRED GEOLOGICAL BOUNDARY
— ? —	INFERRED GROUNDWATER LEVEL
0a	LOOSE, LOCALLY DENSE GRANULAR FILL
0b	SOFT TO FIRM ORGANIC COHESIVE FILL
1	SOFT TO FIRM ORGANIC SILT
2a	LOOSE TO MEDIUM DENSE HOLOCENE SAND
2b	DENSE TO VERY DENSE GRAVELLY HOLOCENE SAND
3a	SOFT TO FIRM HOLOCENE CLAY
3b	LOOSE TO MEDIUM DENSE HOLOCENE SAND
4a	LOOSE TO MEDIUM DENSE UPPER PLEISTOCENE SILT
4b1	LOOSE TO MEDIUM DENSE SLIGHTLY PUMICEOUS PLEISTOCENE SAND
4b2	DENSE TO VERY DENSE SLIGHTLY PUMICEOUS PLEISTOCENE SAND
4b3	VERY DENSE SLIGHTLY PUMICEOUS PLEISTOCENE SAND
4c	STIFF TO VERY STIFF PLEISTOCENE SANDY SILT

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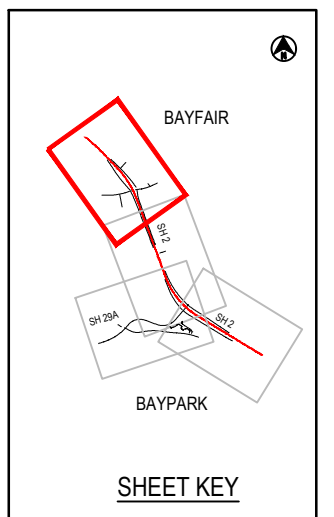
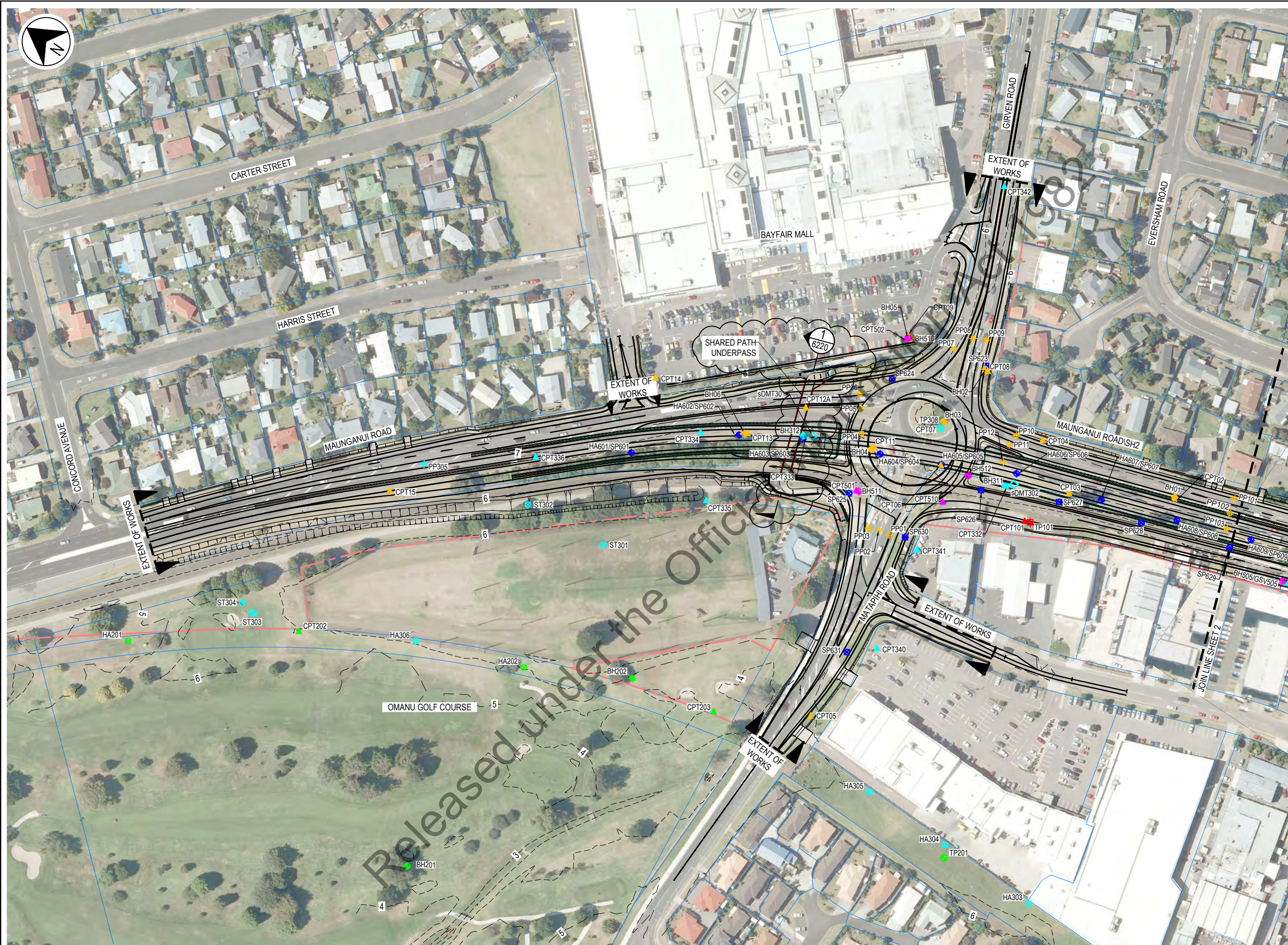
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PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)	
DRAWN ME	DRAWING CHECK AMM	APPROVED CJB
DESIGNED YFT	DESIGN REVIEW DMMM	

TITLE	MGI SHARED PATH UNDERPASS SECTION AT UNDERPASS CENTRELINE	
DRAWING No	B2B-DRG-GT01-6220	
REV	A	



- LEGEND**
- EXISTING CADASTRAL
 - - - DESIGNATION BOUNDARY
 - 5 — EXISTING CONTOUR (5m INTERVAL)
 - - 1 - - EXISTING CONTOUR (1m INTERVAL)
- T+T INVESTIGATIONS**
- HA606 HAND AUGER LOCATIONS 2017
 - SP626 SCALA LOCATIONS 2017
 - HA01 CONTAMINATED LAND HAND AUGER LOCATIONS 2017
- BECA INVESTIGATIONS**
- BH511 BOREHOLE LOCATIONS AUG 2016
 - CPT501 CPT LOCATIONS AUG 2016
 - TP502 TEST PIT LOCATIONS AUG 2016
 - sCPT404 sCPT LOCATIONS MAY 2016
 - sDMT403 sDMT LOCATIONS MAY 2016
 - BH302 BOREHOLE LOCATIONS NOV 2015
 - CPT309 CPT LOCATIONS JUL 2015
 - HA305 HAND AUGER LOCATIONS 2015
 - PP308 PAVEMENT PITS LOCATIONS JUL 2015
 - sDMT304 sDMT LOCATIONS 2015
 - ST301 SOAKAGE TESTING LOCATIONS OCT 2015
 - TP308 TEST PIT LOCATIONS JUL 2015
 - BH201 BOREHOLE LOCATIONS JUN 2013
 - CPT202 CPT LOCATIONS MAY 2013
 - HA201 HAND AUGER LOCATIONS MAY 2013
 - TP201 TEST PIT LOCATIONS AUG 2013
 - BH103 BOREHOLE LOCATIONS DEC 2012
 - CPT106 CPT LOCATIONS DEC 2012
 - TP101 TEST PIT LOCATIONS DEC 2012
 - PP107 PAVEMENT PITS LOCATIONS DEC 2012
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 - PP12 PAVEMENT PITS LOCATIONS JUL 2011

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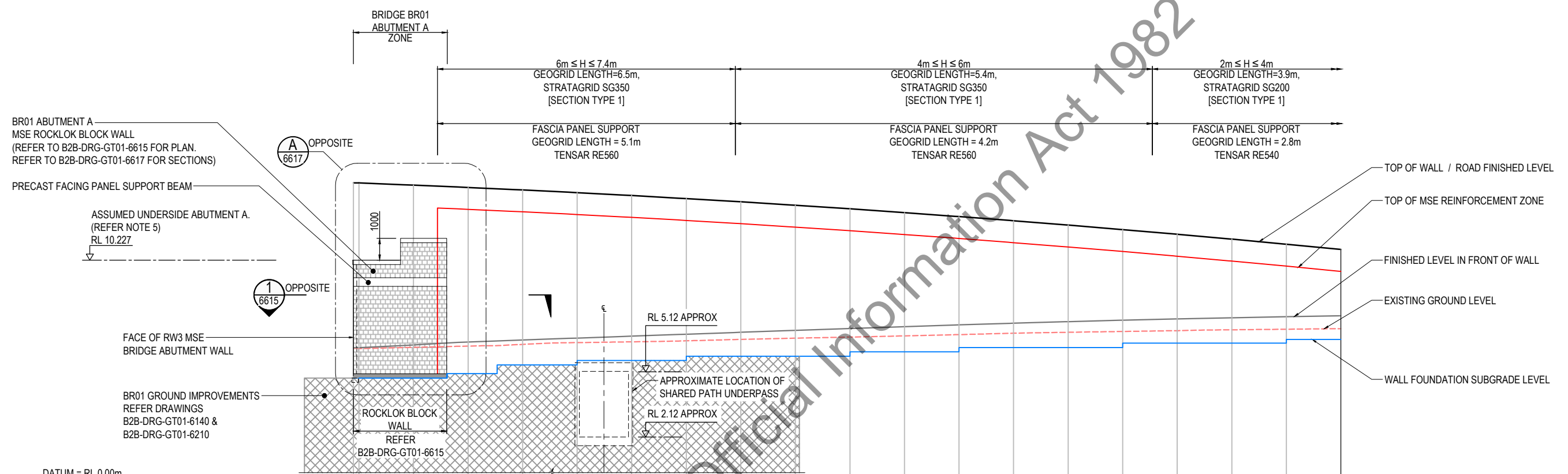
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 DESIGNER: JACOBS, Align, Tonkin+Taylor

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CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN BY: ME
 DESIGN CHECK: AMM
 APPROVED: CJB

TITLE: MGI SHARED PATH UNDERPATH SITE INVESTIGATION PLAN
 DRAWING No: B2B-SKT-GT01-6002
 REV: A

NOTES:
1. REFER TO DRAWING B2B-DRG-GT01-6620.



DATUM = RL 0.00m

TOP OF WALL / ROAD FINISHED LEVEL (m)	13.76	13.67	13.56	13.44	13.32	13.19	13.05	12.90	12.74	12.58	12.41	12.22	12.04	11.84	11.63	11.42	11.19	10.96	10.72				
FINISHED LEVEL IN FRONT OF WALL (m)	6.22	6.35	6.48	6.57	6.66	6.75	6.84	6.93	7.01	7.10	7.18	7.26	7.34	7.42	7.48	7.54	7.59	7.64	7.68				
WALL FOUNDATION SUBGRADE LEVEL (m)	-4.827	-4.827	-5.03	-5.43	-5.43	-5.63	-5.63	-5.83	-5.83	-5.83	-6.03	-6.03	-6.23	-6.23	-6.23	-6.43	-6.43	-6.43	-6.60				
EXISTING GROUND (m)	-6.22	-6.24	-6.29	-6.37	-6.45	-6.49	-6.54	-6.60	-6.66	-6.71	-6.76	-6.82	-6.88	-6.93	-6.96	-7.00	-7.04	-7.07	-7.09				
EXPOSED WALL HEIGHT (m)	7.54	7.32	7.08	6.87	6.66	6.44	6.21	6.00	5.98	5.73	5.48	5.23	4.96	4.69	4.42	4.15	4.00	3.88	3.60	3.32	3.04		
DISTANCE (m)	-0.5	0.0	5.0	10.0	15.0	20.0	22.4	25.0	30.0	35.5	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	77.3	75.0	80.0	85.0	90.0
MAINLINE CHAINAGE		375.0	370.0	365.0	360.0	355.0	350.0	345.0	340.0	335.0	330.0	325.0	320.0	315.0	310.0	305.0	300.0	295.0	290.0				

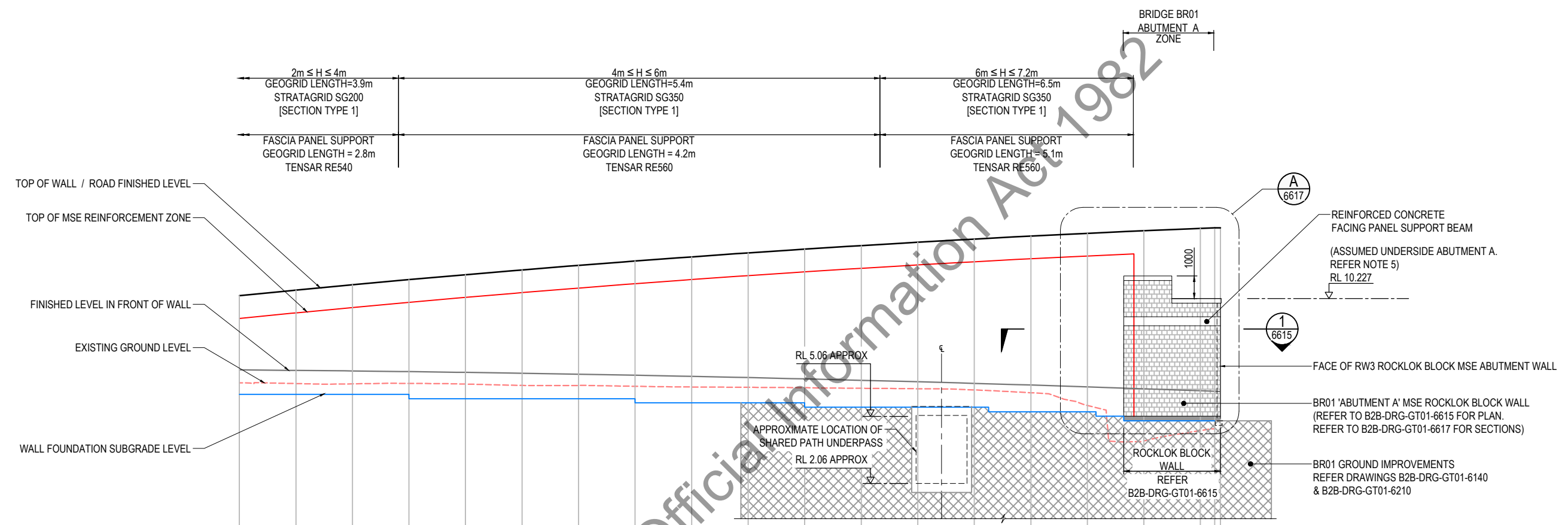
LONGITUDINAL SECTION - RW01 - WALL ELEVATION (SHEET 1 OF 2)
1:400H 1:200V (A3)

DATE: 03/03/2019 1:56:07 PM, LOCIN: NAME: MARK ENNION, LOCATION: L:\36204\B2B-SKT-GT01-6620.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APPROV D.MGR	REVISIONS & ISSUES
A	08.03.19	AMM	DMMM	CJB	TO ACCOMPANY MGI UNDERPASS 50% ISSUE
1:200@ A1					
1:400@ A3					

				SCALE	AS SHOWN (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE MGI INTERSECTION MSE RETAINING WALL RW1 LONG SECTION (UNDERPASS SHOWN)	
				STATUS	FOR INFORMATION				PROJECT NUMBER
				DRAWN	ME	DRAWING CHECK	AMM	APPROVED	CJB
				DESIGNED	YFT	DESIGN REVIEW	DMMM	REV	A
								DRAWING No	B2B-SKT-GT01-6620

NOTES:
1. REFER TO DRAWING B2B-DRG-GT01-6641



DATUM = RL 0.00m

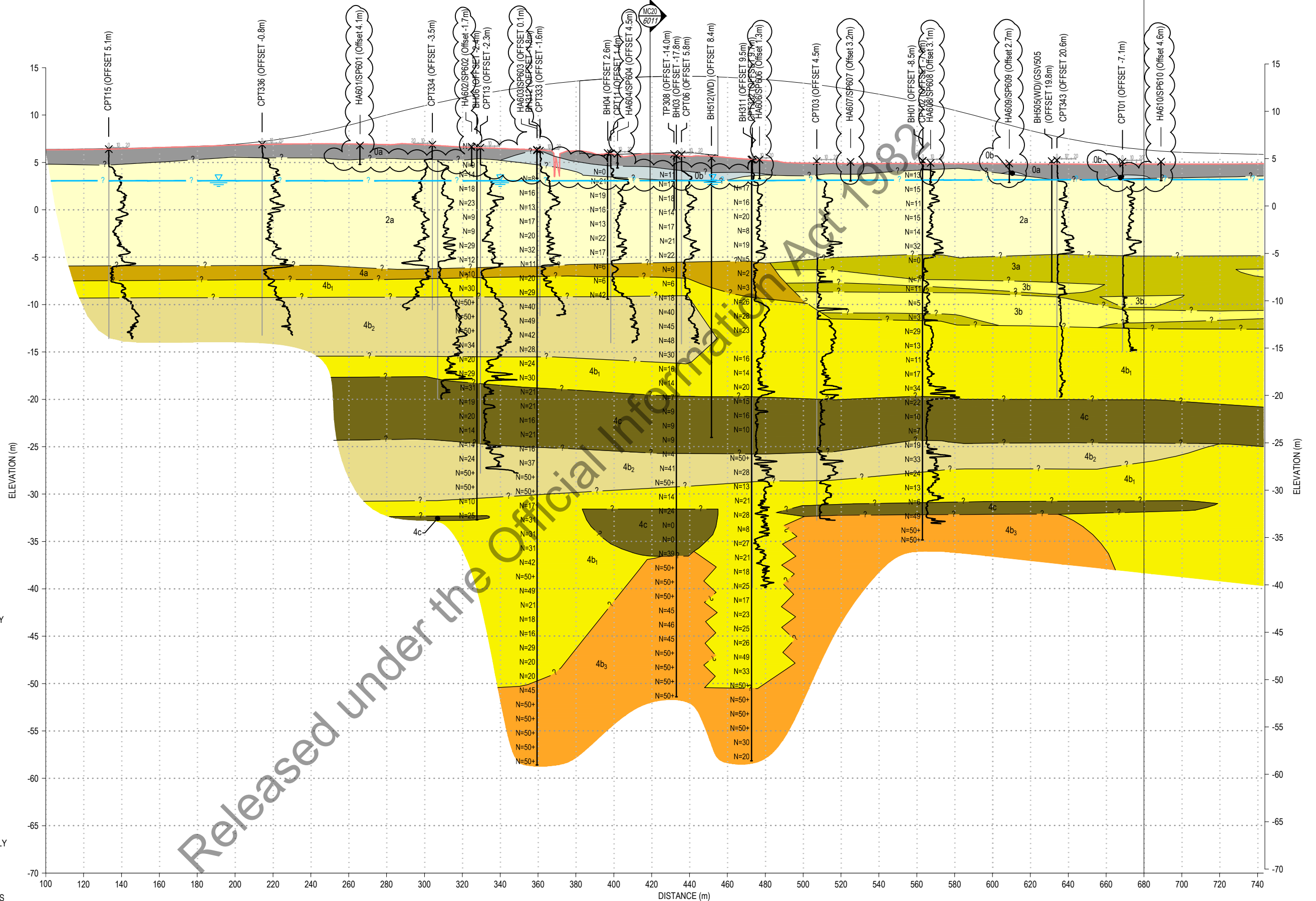
TOP OF WALL / ROAD FINISHED LEVEL (m)	10.36	10.60	10.84	11.06	11.28	11.49	11.69	11.89	12.07	12.25	12.41	12.57	12.72	12.86	12.99	13.11	13.23	13.33	13.36	
FINISHED LEVEL IN FRONT OF WALL (m)	7.08	7.06	7.03	7.00	6.97	6.93	6.89	6.84	6.79	6.74	6.68	6.62	6.55	6.48	6.41	6.33	6.24	6.15	6.13	
WALL FOUNDATION SUBGRADE LEVEL (m)	6.00	6.00	6.00	5.80	5.80	5.80	5.80	5.80	5.63	5.63	5.43	5.43	5.43	5.43	5.23	5.23	4.828	4.829	4.830	
EXISTING GROUND (m)	6.51	6.47	6.46	6.48	6.45	6.39	6.39	6.35	6.32	6.31	6.29	6.26	6.25	6.19	6.07	5.51	3.94	4.40	4.47	
EXPOSED WALL HEIGHT (m)	3.28	3.55	3.81	4.06	4.82	4.56	4.81	5.05	5.28	5.51	5.73	5.95	6.17	6.38	6.68	6.78	6.98	7.18	7.22	
DISTANCE (m)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0	135.0	140.0	145.0	150.0	152.1	155.0	160.0	165.0	170.0	175.0	176.2
MAINLINE CHAINAGE		295.0	300.0	305.0	310.0	315.0	320.0	325.0	330.0	335.0	340.0	345.0	350.0	355.0	360.0	365.0	370.0	375.0	377.9	

LONGITUDINAL SECTION - RW02 - WALL ELEVATION (SHEET 1 OF 2)
1:400H 1:200V (A3)

DATE: 03/03/2019 1:56:36 PM, LOCIN: NAME: MARK KENNION, LOCATION: L:\B2B\09\B2B-SKT-GT01-6641.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APPRO D.MGR	REVISIONS & ISSUES
A	08.03.19	AMM	DMMM	CJB	TO ACCOMPANY MGI UNDERPASS 50% ISSUE
1:200@A1	0	2	4	6	8
1:400@A3	0	2	4	6	8

					SCALE	CLIENT	TITLE
					AS SHOWN (A3)	NZ TRANSPORT AGENCY	MGI INTERSECTION
					STATUS	PROJECT	MSE RETAINING WALL RW2
					FOR INFORMATION	BAYPARK TO BAYFAIR LINK	LONG SECTION (UNDERPASS SHOWN)
					PROJECT NUMBER	APPROVED	DRAWING No
					2/09-024/603	CJB	B2B-SKT-GT01-6641
					DESIGNED	DESIGN REVIEW	REV
					YFT	DMMM	A



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- LEGEND**
- EXISTING GROUND LEVEL
 - PROPOSED GROUND LEVEL
 - - - INFERRED GEOLOGICAL BOUNDARY
 - INFERRED GROUNDWATER LEVEL
 - 0a LOOSE, LOCALLY DENSE HOLOCENE SAND
 - 0b SOFT TO FIRM ORGANIC HOLOCENE COHESIVE FILL
 - 2a LOOSE TO MEDIUM DENSE HOLOCENE SAND
 - 2b DENSE TO VERY DENSE GRAVELLY HOLOCENE SAND
 - 3a SOFT TO FIRM HOLOCENE CLAY
 - 3b LOOSE TO MEDIUM DENSE HOLOCENE SAND
 - 4a LOOSE TO MEDIUM DENSE UPPER PLEISTOCENE SILT
 - 4b₁ LOOSE TO MEDIUM DENSE SLIGHTLY PUMICEOUS PLEISTOCENE SAND
 - 4b₂ DENSE TO VERY DENSE SLIGHTLY PUMICEOUS PLEISTOCENE SAND
 - 4b₃ VERY DENSE SLIGHTLY PUMICEOUS PLEISTOCENE SAND
 - 4c STIFF TO VERY STIFF PLEISTOCENE SAND

MC10 LONGITUDINAL SECTION HORIZONTAL SCALE 1:2000 VERTICAL SCALE 1:400

DATE: 5/10/2017 9:56:09 AM, LOCAL NAME: JONALD CASTRO, LOCATION: K:\D... \A Design\001 - Jacobs\DE Design\02 Deliverables\02 Drawings\06 - Geotechnical\B2B-DRG-GT01-6006_6008.dwg

No	DATE	CHK	DESIGN	APPRO	REVISIONS & ISSUES
B	5/10/17	GK	STT	RPH	RECENT INVESTIGATION ADDED
A	25/08/17	GK	STT	CJB	FOR INFORMATION
1:1000@ A1					
1:2000@ A3					



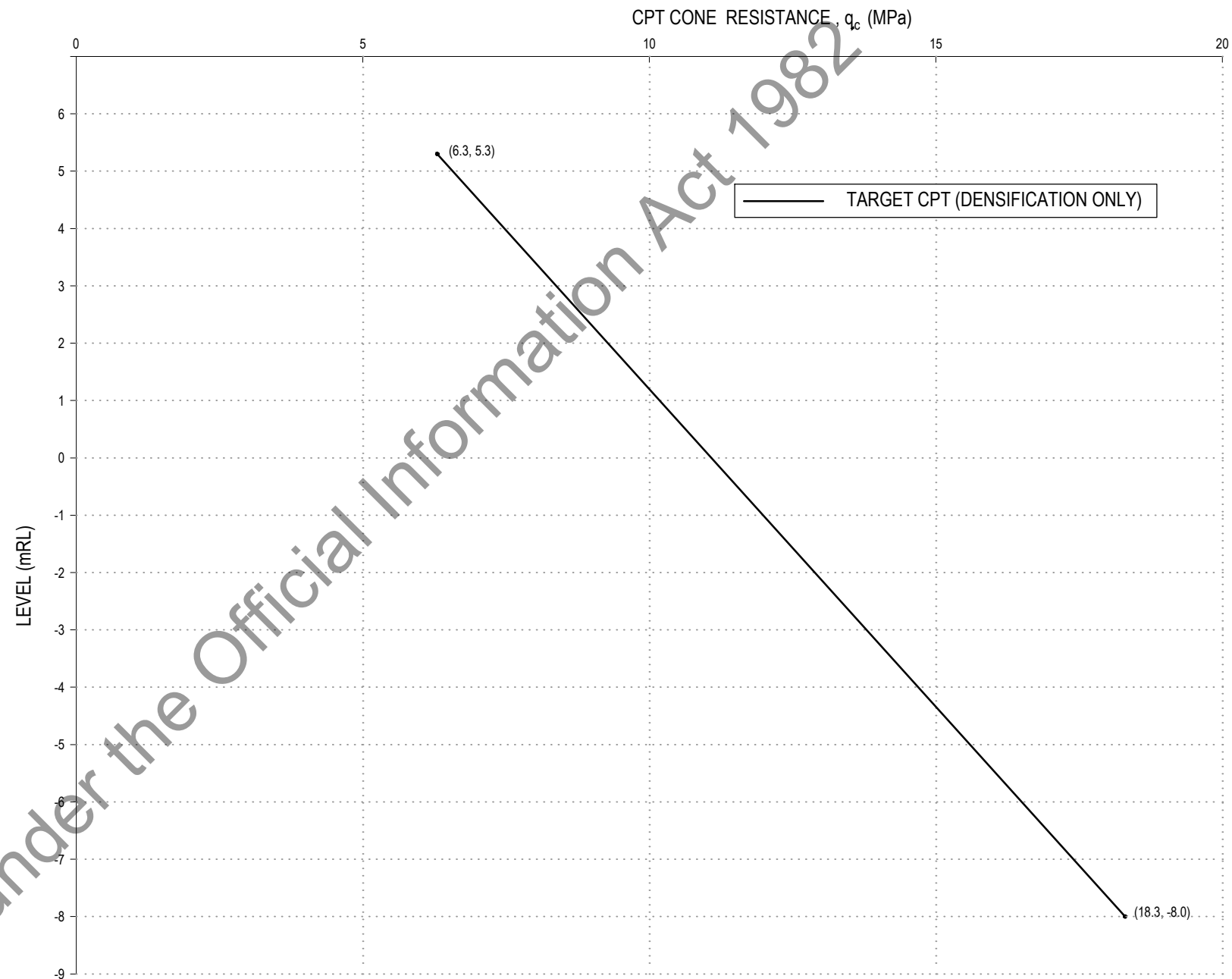
SCALE	1:2000 (A3)
STATUS	FOR INFORMATION
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY
PROJECT	BAYPARK TO BAYFAIR (B2B)
DRAWN	JC
DESIGNED	DMMM
DRAWING CHECK	GK
DESIGN REVIEW	STT
APPROVED	RPH

TITLE	DETAILED DESIGN LONGSECTION MC10 - CH 100 TO 700m SHEET 1
DRAWING No	B2B-DRG-GT01-6006
REV	B

NOTES:

1. STONE COLUMNS TO BE INSTALLED BY BOTTOM-FED VIBROFLOT CONSTRUCTION TECHNIQUES
2. REFER TO TABLE 4.1 IN THE STONE COLUMN SPECIFICATION (B2B-G-SP-6012) FOR STONE COLUMN INSPECTION AND HOLD POINTS AND MATERIAL SPECIFICATION
3. RECORDING AND REPORTING:
 - i. EQUIPMENT USED AND KEY CONSTRUCTION PERSONNEL INVOLVED;
 - ii. START AND FINISH TIME AND DATE OF THE STONE COLUMN CONSTRUCTION;
 - iii. DIMENSIONS AND SPACING OF THE STONE COLUMN INSTALLED;
 - iv. RESULTS AND LOCATIONS OF DEGREE OF IMPROVEMENT TESTING (E.G. CPT ETC.) COMPLETED ON STONE COLUMNS;
 - v. THE VOLUME OF COMPACTED GRAVEL INTRODUCED TO THE GROUND COMPARED WITH VOLUMES DELIVERED TO SITE AS MEASURED FROM THE TRUCK DELIVERY DOCKETS. GRAVEL SPREAD OR SPILT ON THE GROUND SURFACE SHALL NOT BE INCLUDED IN THE VOLUME AND AN APPROPRIATE ALLOWANCE FOR CONSTRUCTION LOSSES SHALL BE INCLUDED IN THE CALCULATION;
 - vi. A PLAN CLEARLY SHOWING THE LOCATION OF EACH INDIVIDUAL STONE COLUMN;
 - vii. FOR EACH COLUMN, THE FOLLOWING DATA SHALL BE RECORDED:
 - UNIQUE COLUMN IDENTIFIER;
 - LOCATION OF THE COLUMN, MEASURED FROM A PRE-DEFINED POINT TO 0.1 M ACCURACY;
 - DATE AND TIME OF INSTALLATION;
 - VIBRATOR POWER CONSUMPTION (AMPERAGE OR HYDRAULIC PRESSURE) WITH TIME AND DEPTH;
 - VOLUME OR WEIGHT OF MATERIAL INTRODUCED TO THE GROUND AND DEPTH OF TIP OF TREMIE PIPE FOR EACH BATCH OF MATERIAL ADDED;
 - DEPTH OF COLUMN.
4. SETOUT TOLERANCE FOR STONE COLUMNS:
 - HORIZONTAL LOCATION: $\pm 100\text{mm}$
 - VERTICAL EXTENT (DEPTH): $\pm 200\text{mm}$
 - VERTICALITY: MAXIMUM 1:20 DEVIATION FROM VERTICAL
5. DEGREE OF IMPROVEMENT CPT TESTING SHOULD BE COMPLETED NOT LESS THAN THREE WEEKS AFTER COMPLETING STONE COLUMN CONSTRUCTION. THESE SHOULD BE UNDERTAKEN AT A MINIMUM FREQUENCY OF $1/50\text{m}^2$ OF TREATED GROUND UNLESS OTHERWISE SPECIFIED BY THE DESIGNER.
6. AFTER VERIFYING THAT THE TARGET IMPROVEMENT HAS BEEN ACHIEVED, THE ENTIRE IMPROVEMENT AREA IS TO BE SUB-EXCAVATED TO A DEPTH OF 400mm (OR TO THE BASE OF ANY DISTURBED MATERIALS AS DETERMINED BY THE DESIGNER, BUT NO LESS THAN 300mm) AND RE-COMPACTED AS PER THE EARTHWORKS SPECIFICATION TO WITHIN 100mm OF THE FINAL GROUND SURFACE (OR UNDERSIDE OF STRUCTURAL FOUNDATION/MSE BLOCK).



INDICATIVE SIMPLIFIED TARGET CPT q_c PROFILE FOR STONE COLUMN AT BR01 AND MGI APPROACH RAMPS
NTS

Released under the Official Information Act 1982

DATE: 09/02/2018 11:51:24 AM; LOCALN: MARK ENNION; LOCATION: K:\D\A\Design\01 - Jacobs\02 Design\02 Deliverables\02 Drawings\06 - Geotechnical\B2B-DRG-GT01-6142-6142.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APPROVED	REVISIONS & ISSUES
B	06/04/18	WC	DMMM	CJB	95% ISSUE
A	09/02/18	WC	ACL	CJB	85% ISSUE

1:20 @ A1
1:40 @ A3

0 200 400 600 800 1000 1200 1400 1600 1800 2000 mm



SCALE	NTS
STATUS	95% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY	
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)	
DRAWN	DRAWING CHECK	APPROVED
JC	WC	CJB
DESIGNED	DESIGN REVIEW	
PCM	DMMM	

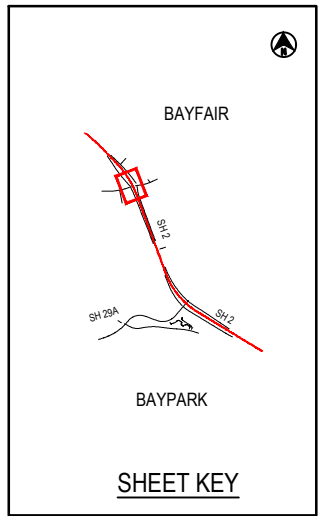
TITLE	BR01 - MGI OVERPASS AND APPROACH RAMPS STONE COLUMN NOTES AND TARGET POST-GROUND IMPROVEMENT IN SITU STRENGTH	
DRAWING No	B2B-DRG-GT01-6142	REV B

Appendix B: Selected SLOPE/W Analysis Outputs

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Note: All dimensions, lengths and locations are indicative only



LEGEND

- DESIGNATION BOUNDARY
- STONE COLUMNS EXTENDING TO RL -2.5m (MIN. ARR 8.2%)
- STONE COLUMNS EXTENDING TO RL -8m (MIN. ARR 8.2%)
- GROUND WORKS IN BR01 PACKAGE. REFER DRAWING B2B-DRG-GT01-6180
- UNDERPASS TUNNEL
- UNDERPASS RAMP RETAINING WALL
- CUT OFF WALL (REFER NOTE 2)

- NOTE:
- FOR DETAILS OF THE UNDERPASS AND ASSOCIATED RETAINING WALLS REFER TO DRAWINGS B2B-DRG-BR05-8500 TO 8510.
 - CUT OFF WALL TO BE SECANT 600mm DIA CFA PILES (10MPa CONCRETE STRENGTH) AT 1m, OR SHEET PILES AZ32 750W x 511H x 12mmT.

Cut off wall extent required for RW03 and 04 supporting the State Highway

33m CUT OFF WALL TO RL -9.5m (REFER NOTE 2)

GI required for RW03 to support the State Highway

GI required for RW04 to support the State Highway

GI required for RW01 to support the State Highway

Cut off wall required for RW01 to support the State Highway

28.5m CUT OFF WALL TO RL -9.5m

BAYFAIR MALL CARPARK

REFER MSE RETAINING WALL DRAWINGS RW1

REFER MSE RETAINING WALL DRAWINGS RW2

OMANU GOLF COURSE

RW02 section 2

DATE: 8/03/2019 1:53:32 PM, LOCN NAME: MARK KENNION, LOCATION: L:\B2B\B2B-DRG-GT01-6210.dwg

REVISIONS & ISSUES

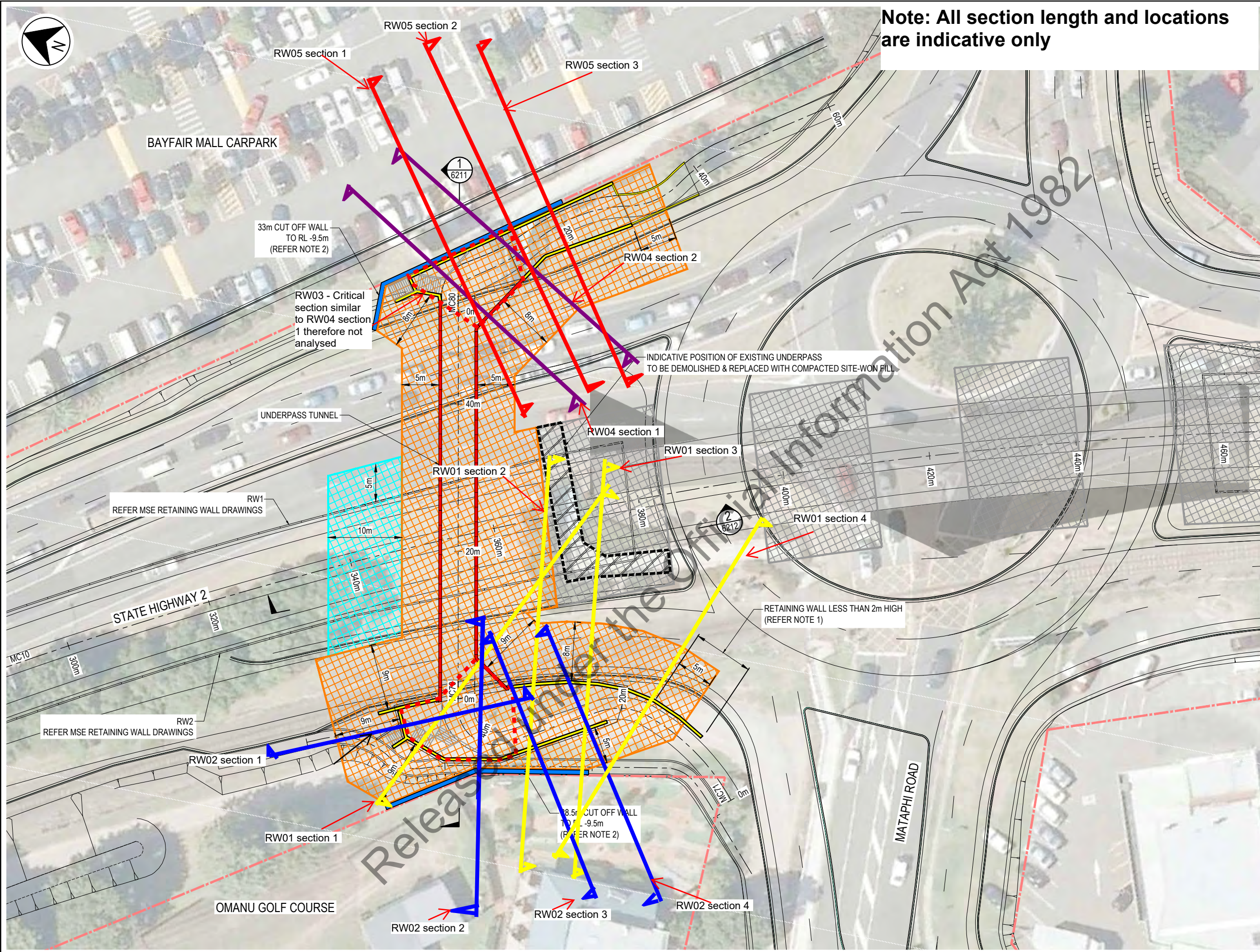


SCALE: 1:500 (A3)
 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

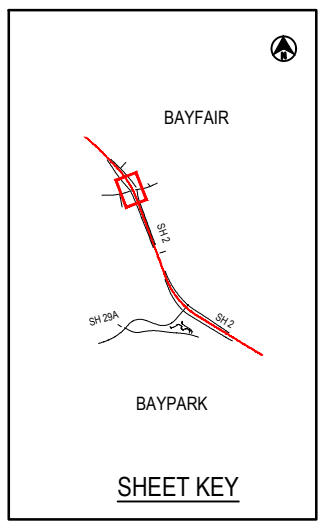
CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN ME, DESIGNED YFT, DRAWING CHECK AMM, DESIGN REVIEW DMMM, APPROVED CJB

TITLE: GROUND IMPROVEMENT REQUIRED TO SUPPORT THE MOTORWAY AND LANDING AREA

DRAWING No: Figure 1, REV: A



Note: All section length and locations are indicative only



- LEGEND**
- DESIGNATION BOUNDARY
 - ▨ STONE COLUMNS EXTENDING TO RL -2.5m (MIN. ARR 8.2%)
 - ▨ STONE COLUMNS EXTENDING TO RL -8m (MIN. ARR 8.2%)
 - ▨ GROUND WORKS IN BR01 PACKAGE. REFER DRAWING B2B-DRG-GT01-6180
 - UNDERPASS TUNNEL
 - UNDERPASS RAMP
 - RETAINING WALL
 - CUT OFF WALL (REFER NOTE 2)

- NOTE:**
1. FOR DETAILS OF THE UNDERPASS AND ASSOCIATED RETAINING WALLS REFER TO DRAWINGS B2B-DRG-BR05-8500 TO 8510.
 2. CUT OFF WALL TO BE SECANT 600mm DIA CFA PILES (10MPa CONCRETE STRENGTH) AT 1m, OR SHEET PILES AZ32 750W x 511H x 12mmT.

- Selected RW01 sections
- Selected RW02 sections
- Selected RW04 sections
- Selected RW05 sections

DATE: 8/03/2019 1:53:32 PM, LOCN: NAME: MARK EMMISON, LOCATION: L:\85204\85204_001\022_Drawing\06_CrossSection\B2B-DRG-GT01-6210.dwg

NO.	REVISIONS & ISSUES

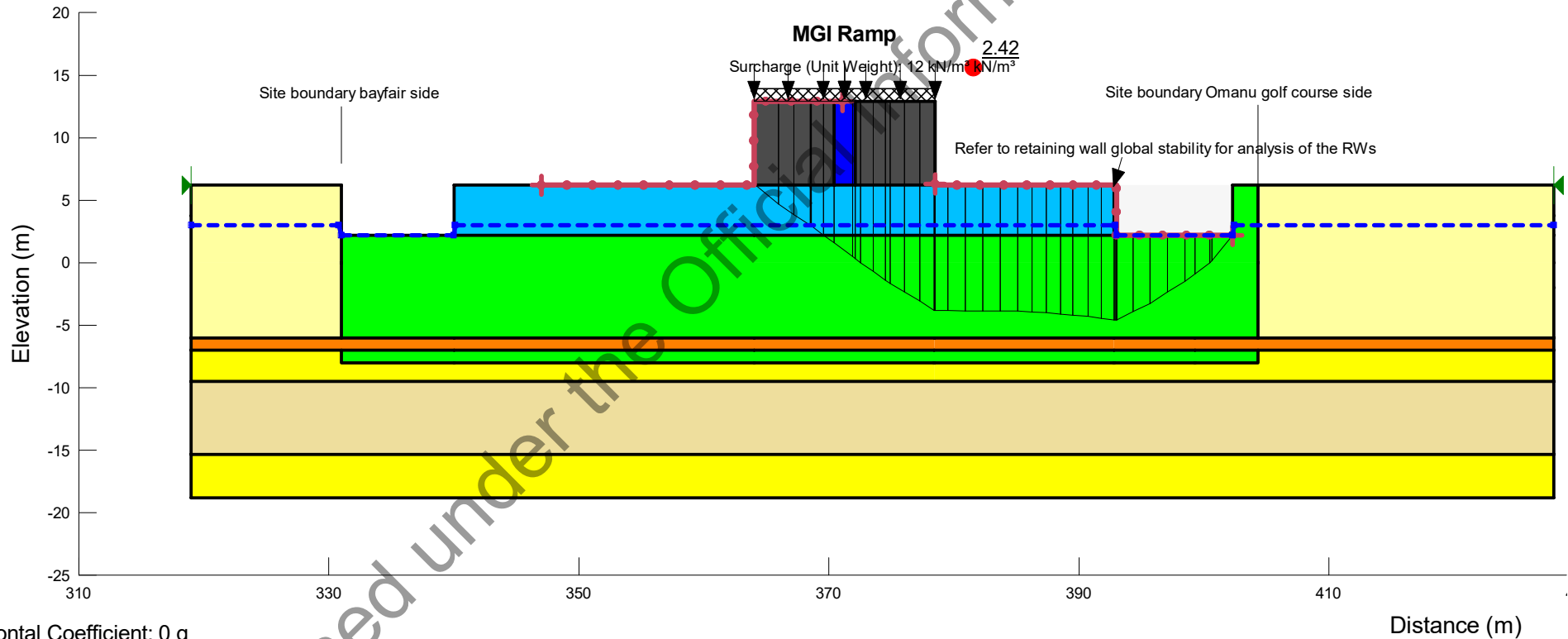
			SCALE	1:500 (A3)		TITLE	SELECTED CROSS SECTIONS FOR SLOPE STABILITY ANALYSIS	
			STATUS	50% ISSUE				CLIENT
			PROJECT NUMBER	2/09-024/603	PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)	DRAWING No	Figure 2
			DESIGNER	Align	DRAWN	ME	DRAWING CHECK	AMM
			CONTRACTOR	CPB CONTRACTORS	DESIGNED	YFT	DESIGN REVIEW	DMMM
					APPROVED	CJB		
							REV	A

Analysis Notes:



1. Name: Case 1 - (Static) - Short Term
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (°)	Phi-B (°)	Piezometric Line
Light Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17	0	35	0	1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16	2	27	0	1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17	0	32	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19	0	36	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15	10	38	0	1
Green	GI BLOCK	Mohr-Coulomb	18	0	36	0	1
Grey	MSE Block	High-Strength	15				1
Light Blue	Site-work sand fill	Mohr-Coulomb	19	0	35	0	1



Horizontal Coefficient: 0 g

 Tonkin+Taylor	 CPB CONTRACTORS	Title: MGI_underpass_Trans_v3.gsz		Date Analysed: 15/03/2019
		Analysis: Case 1 - (Static) - Short Term		Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4	Checked by: STT

Analysis Notes:

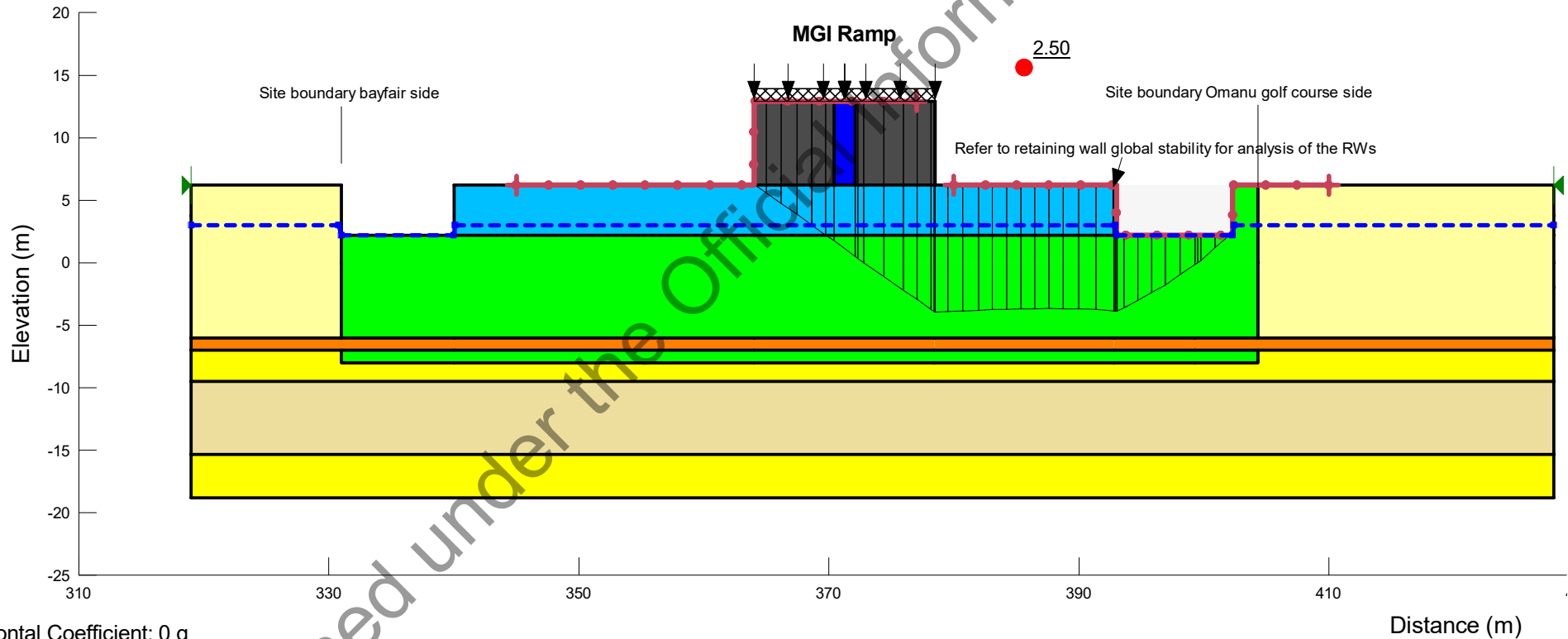
1. Name: Case 2 - (Static) - Long term
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0

Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (°)	Phi-B (°)	Piezometric Line
Light Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17	0	35	0	1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16	2	27	0	1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17	0	32	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19	0	36	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15	10	38	0	1
Green	GI BLOCK	Mohr-Coulomb	18	0	36	0	1
Grey	MSE Block	High Strength	15				1
Light Blue	Site-work sand fill	Mohr-Coulomb	19	0	35	0	1



Horizontal Coefficient: 0 g

Distance (m)



Title: MGI_underpass_Trans_v3.gsz

Date Analysed: 15/03/2019

Analysis: Case 2 - (Static) - Long term

Analysed by: CCHE

Comments:

Scale: 1:500 @ A4

Checked by: STT

Analysis Notes:

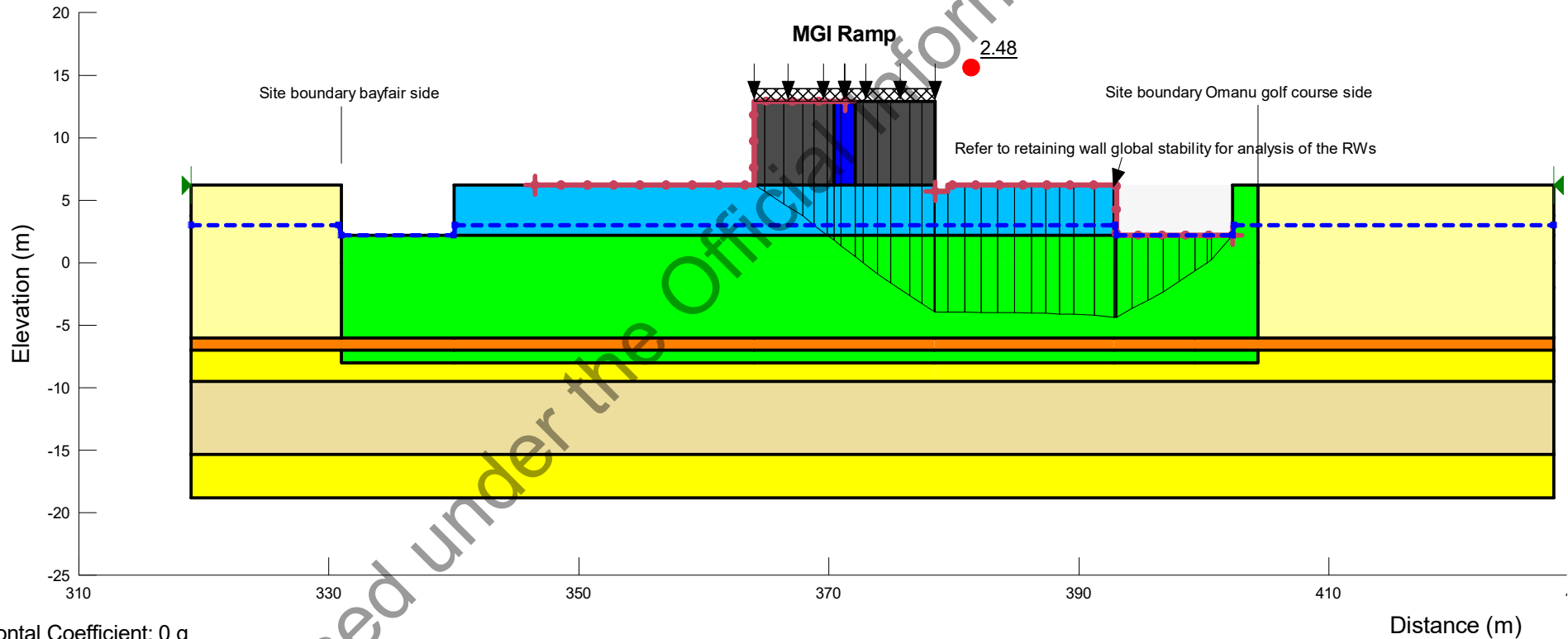
1. Name: Case 3 - (Static) - Long term Overexcavation
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0

Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (°)	Phi-B (°)	Piezometric Line
Light Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17	0	35	0	1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16	2	27	0	1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17	0	32	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19	0	36	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15	10	38	0	1
Green	GI BLOCK	Mohr-Coulomb	18	0	36	0	1
Grey	MSE Block	High-Strength	15				1
Light Blue	Site-work sand fill	Mohr-Coulomb	19	0	35	0	1



Horizontal Coefficient: 0 g

Distance (m)



Title: MGI_underpass_Trans_v3.gsz

Date Analysed: 15/03/2019

Analysis: Case 3 - (Static) - Long term Overexcavation

Analysed by: CCHE

Comments:

Scale: 1:500 @ A4

Checked by: STT

Analysis Notes:

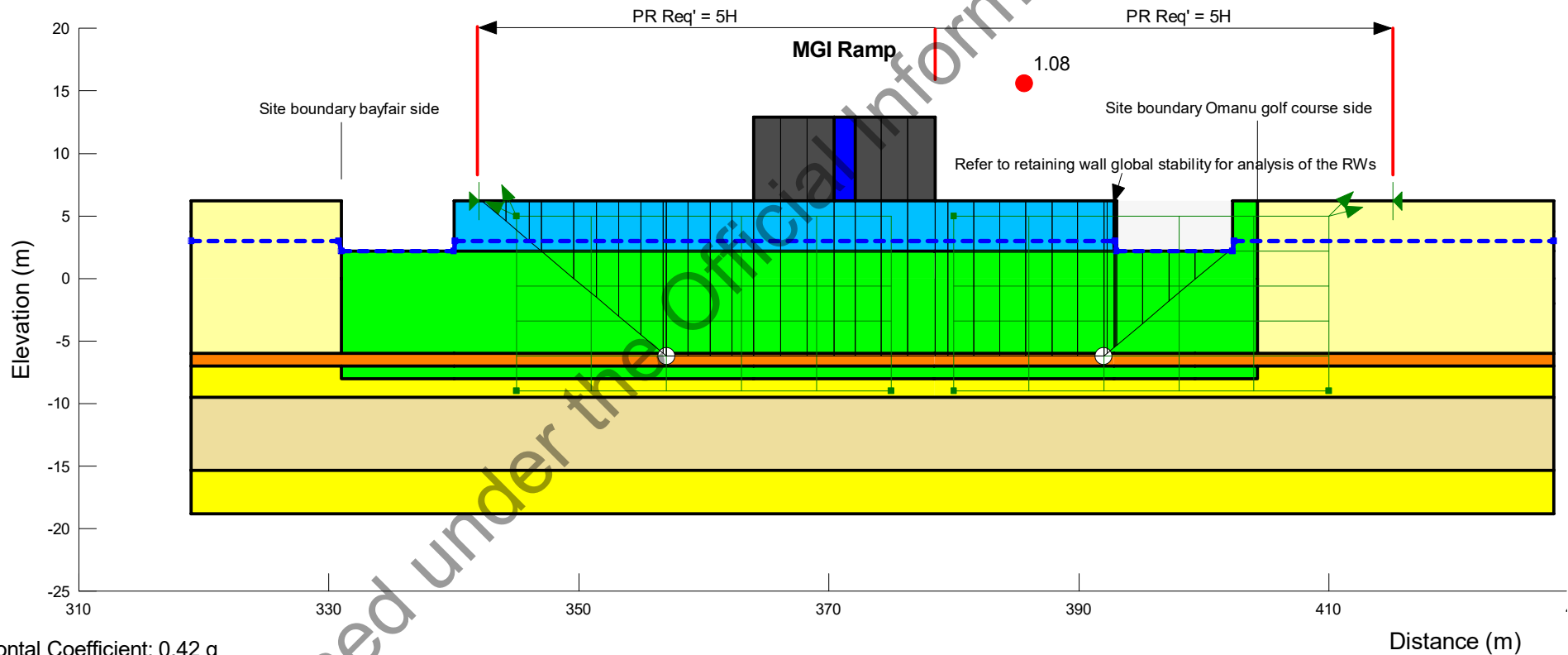
1. Name: Case 4 - ULS PGA prior to liquefaction (Block)
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.42

Unit Weight of Water: 9.807 kN/m³



Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Light Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17	0	35	0	0	0	1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16	2	27	0	0	0	1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17	0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19	0	36	0	0	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15	10	38	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18	0	36	0	0	0	1
Grey	MSE Block	High-Strength	15						1
Light Blue	Site-work sand fill	Mohr-Coulomb	19	0	35	0	0	0	1



Horizontal Coefficient: 0.42 g

		Title: MGI_underpass_Trans_v3.gsz		Date Analysed: 15/03/2019
		Analysis: Case 4 - ULS PGA prior to liquefaction (Block)		Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4	Checked by: STT

Analysis Notes:

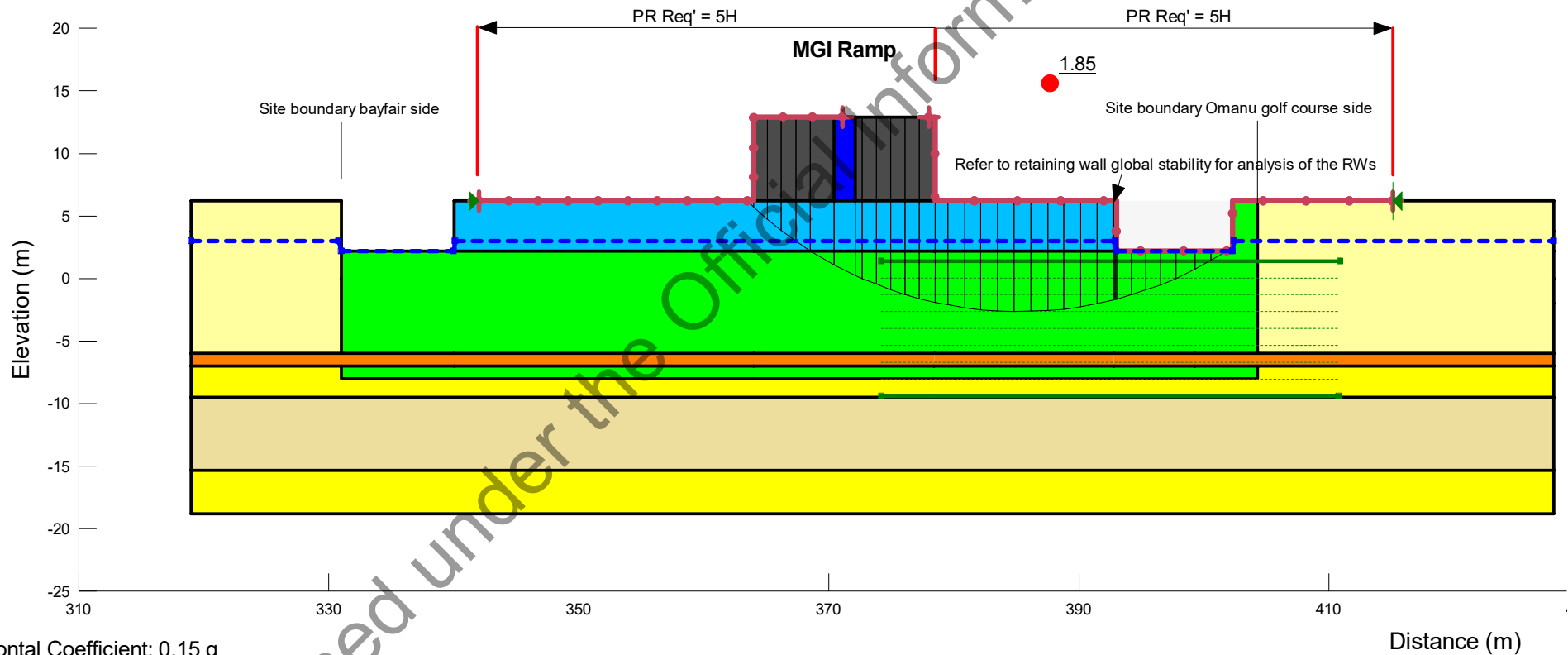
1. Name: Case 5 - SLS (E & E)
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.15

Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Light Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17	0	35	0	0	0	1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16	2	27	0	0	0	1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17	0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19	0	36	0	0	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15	10	38	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18	0	36	0	0	0	1
Grey	MSE Block	High-Strength	15						1
Light Blue	Site-work sand fill	Mohr-Coulomb	19	0	35	0	0	0	1



Horizontal Coefficient: 0.15 g

Distance (m)



Title: MGI_underpass_Trans_v3.gsz

Date Analysed: 15/03/2019

Analysis: Case 5 - SLS (E & E)

Analysed by: CCHE

Comments:

Scale: 1:500 @ A4

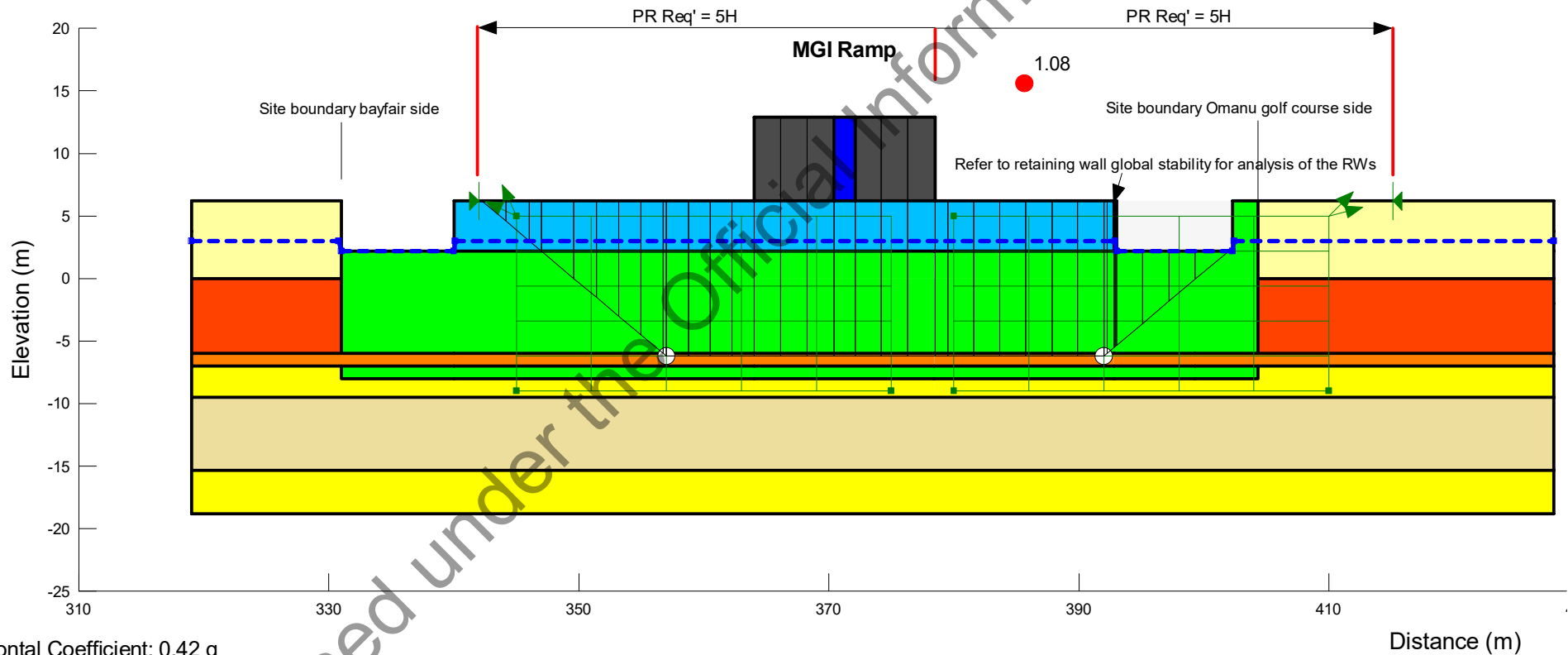
Checked by: STT

Analysis Notes:



1. Name: Case 6 - ULS (Block)
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.42

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17			0	35	0	0	0	1
Red	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17	0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16			2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17			0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19			0	36	0	0	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15			10	38	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18			0	36	0	0	0	1
Grey	MSE Block	High Strength	15								1
Light Blue	Site-work sand fill	Mohr-Coulomb	19			0	35	0	0	0	1



Horizontal Coefficient: 0.42 g

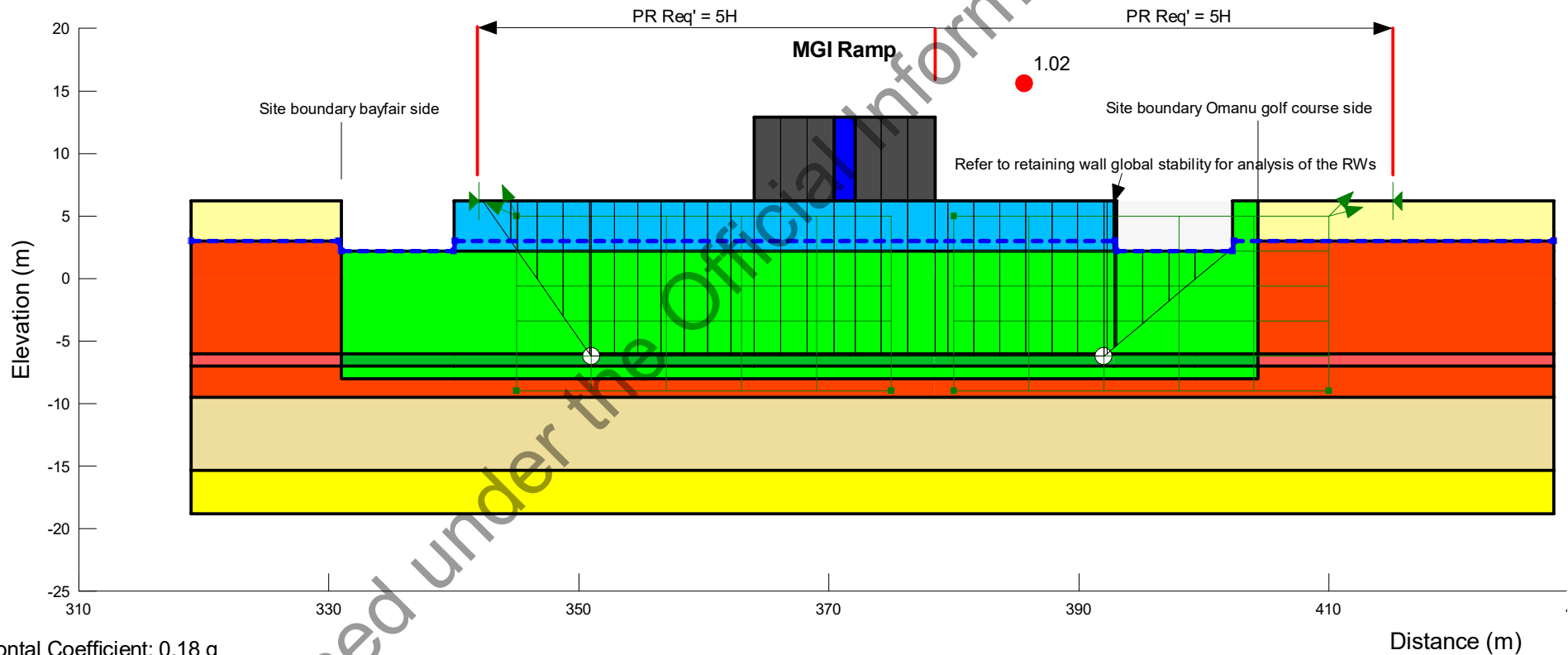
		Title: MGI_underpass_Trans_v3.gsz		Date Analysed: 15/03/2019
		Analysis: Case 6 - ULS (Block)		Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4	Checked by: STT

Analysis Notes:

1. Name: Case 7 - MCE (Block)_Yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.18

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17			0	35	0	0	0	1
Red	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17	0	0.11						1
Light Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16	0	0.08						1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16	0	0.1333						1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17			0	32	0	0	0	1
Red	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17	0	0.15						1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19			0	36	0	0	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15			10	38	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18			0	36	0	0	0	1
Grey	MSE Block	High Strength	15								1
Light Blue	Site-work sand fill	Mohr-Coulomb	19			0	35	0	0	0	1



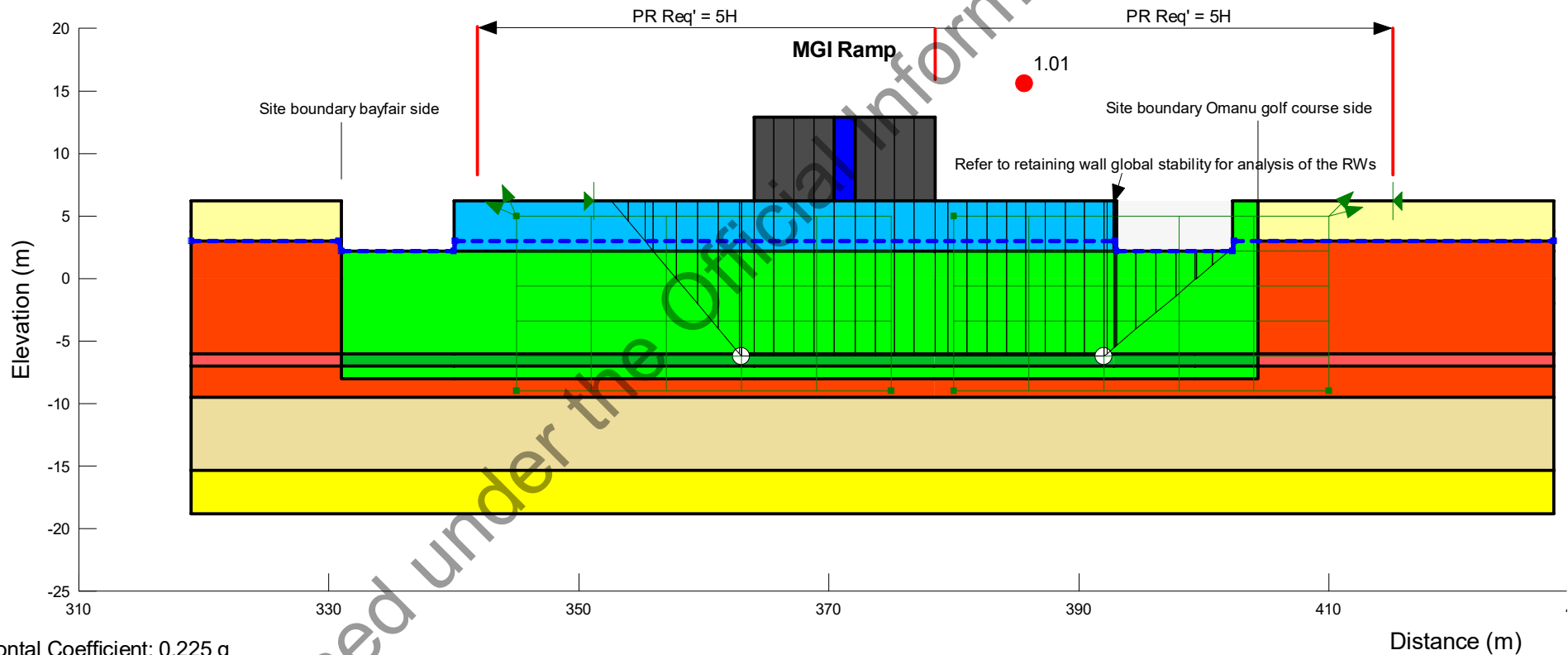
Horizontal Coefficient: 0.18 g

		Title: MGI_underpass_Trans_v3.gsz	Date Analysed: 15/03/2019
		Analysis: Case 7 - MCE (Block)_Yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4



- Analysis Notes:
1. Name: Case 7 - MCE (Block)_Yield differential
 2. Method: Morgenstern-Price
 3. Direction of movement: Left to Right
 4. Slip Surface Option: Block
 5. PWP Conditions Source: Piezometric Line
 6. Tension Crack Option: (none)
 7. F of S Calculation Option: Constant
 8. Horz Seismic Load: 0.225

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17			0	35	0	0	0	1
Red	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17	0	0.11						1
Light Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16	0	0.08						1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16	0	0.1333						1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17			0	32	0	0	0	1
Red	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17	0	0.15						1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19			0	36	0	0	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15			10	38	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18			0	36	0	0	0	1
Grey	MSE Block	High Strength	15								1
Light Blue	Site-work sand fill	Mohr-Coulomb	19			0	35	0	0	0	1



Horizontal Coefficient: 0.225 g

		Title: MGI_underpass_Trans_v3.gsz	Date Analysed: 15/03/2019
		Analysis: Case 7 - MCE (Block)_Yield differential	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

Analysis Notes:

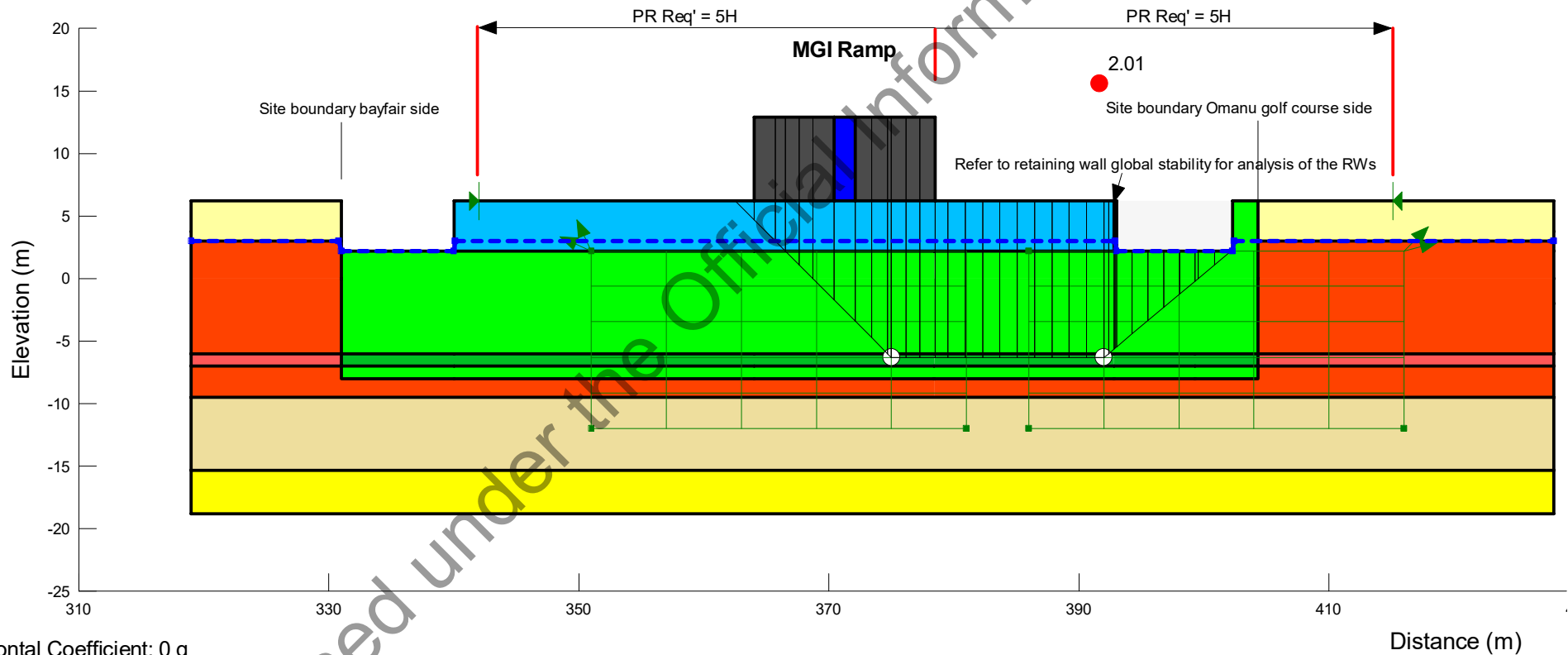
1. Name: Case 8 - MCE Immediate Post Seismic Stability (Block)
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0

Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17			0	35	0	1
Red	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17	0	0.11				1
Pink	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16	0	0.08				1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16	0	0.1333				1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17			0	32	0	1
Red	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17	0	0.15				1
Light Blue	4b-2 - SAND (D - VD)	Mohr-Coulomb	19			0	36	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15			10	38	0	1
Light Green	GI BLOCK	Mohr-Coulomb	18			0	36	0	1
Grey	MSE Block	High Strength	15						1
Light Blue	Site-work sand fill	Mohr-Coulomb	19			0	35	0	1



Horizontal Coefficient: 0 g

Distance (m)



Title: MGI_underpass_Trans_v3.gsz

Date Analysed: 15/03/2019

Analysis: Case 8 - MCE Immediate Post Seismic Stability (Block)

Analysed by: CCHE

Comments:

Scale: 1:500 @ A4

Checked by: STT

Analysis Notes:

1. Name: RW01 4.2m Section 1 Case 6 ULS E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.27

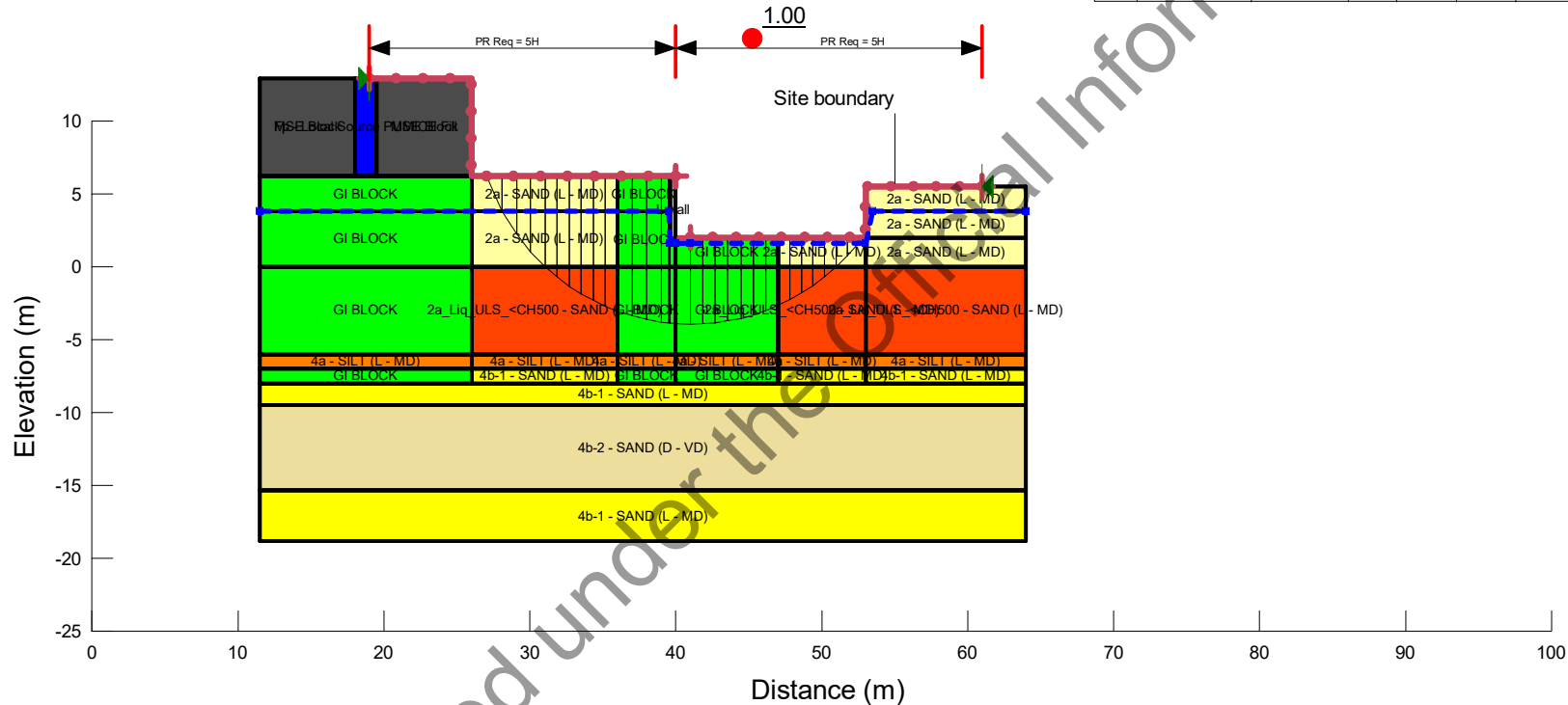
Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4



Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a_Liq_ULS <CH500 - SAND (L - MD)	SHANSEP	17	0	0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15				10	38	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1
Dark Grey	MSE Block	High Strength	15									1

Ground improvement extent: 4 m behind & 7 m in front of wall (excl. buffer zones) to depth of - 8 m RL



Horizontal Coefficient: 0.27 g

		Title: MGI_RW01_4.2m Section 1 v2.gsz	Date Analysed: 13/03/2019
		Analysis: RW01 4.2m Section 1 Case 6 ULS E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

Analysis Notes:

1. Name: RW01 4.2m Section 1 Case 7 MCE E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.08

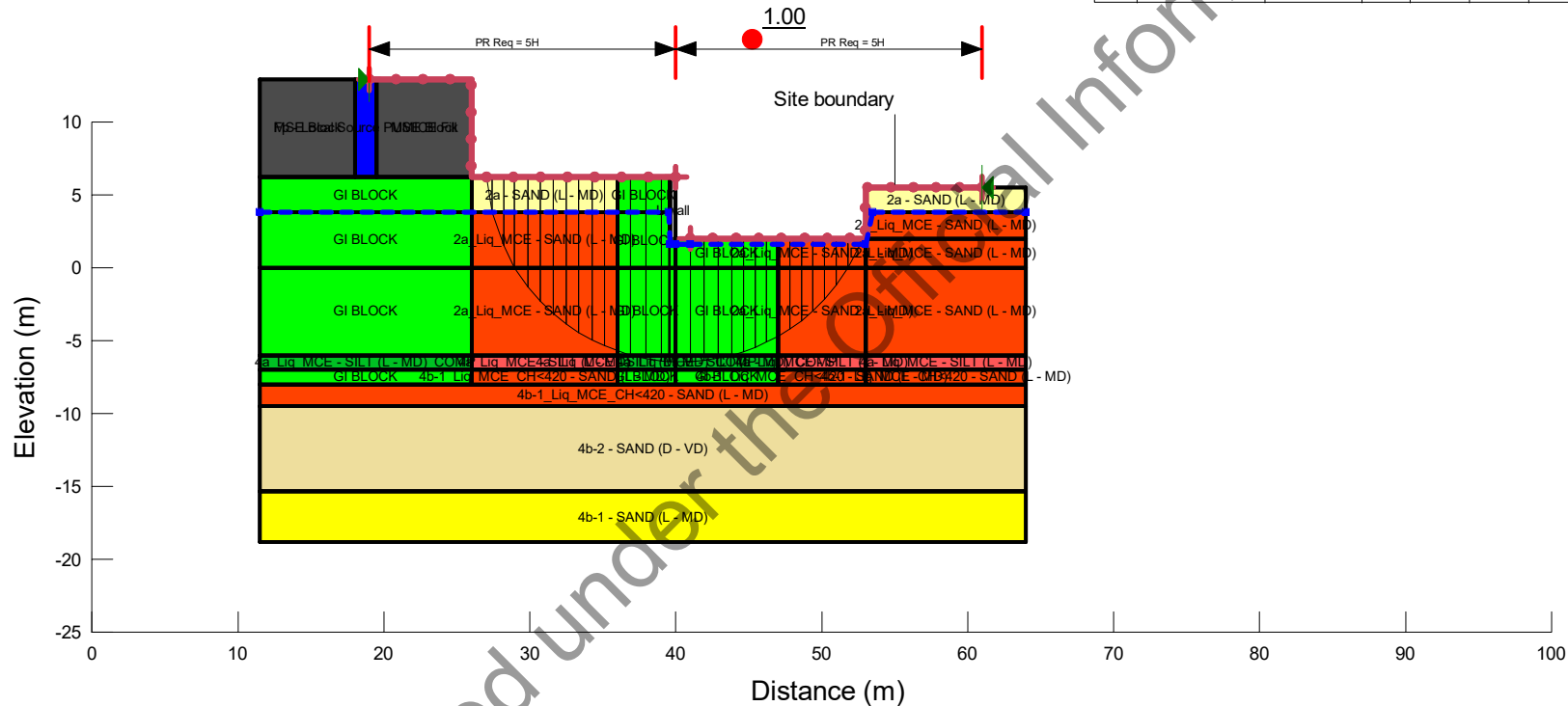
Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Ground improvement extent: 4 m behind & 7 m in front of wall (excl. buffer zones) to depth of - 8 m RL

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Orange	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17	0		0.11						1
Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16	0		0.08						1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16	0		0.1333						1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Orange	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17	0		0.15						1
Light Yellow	4b-2 - SAND (D - VD)	Mohr-Coulomb	18				0	36	0	0	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15				10	38	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1
Black	MSE Block	High Strength	15									1



Horizontal Coefficient: 0.08 g

		Title: MGI_RW01_4.2m Section 1 v2.gsz	Date Analysed: 13/03/2019
		Analysis: RW01 4.2m Section 1 Case 7 MCE E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

Analysis Notes:

1. Name: RW01 4.2m Section 1 Case 8 MCE E-E post liq
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0

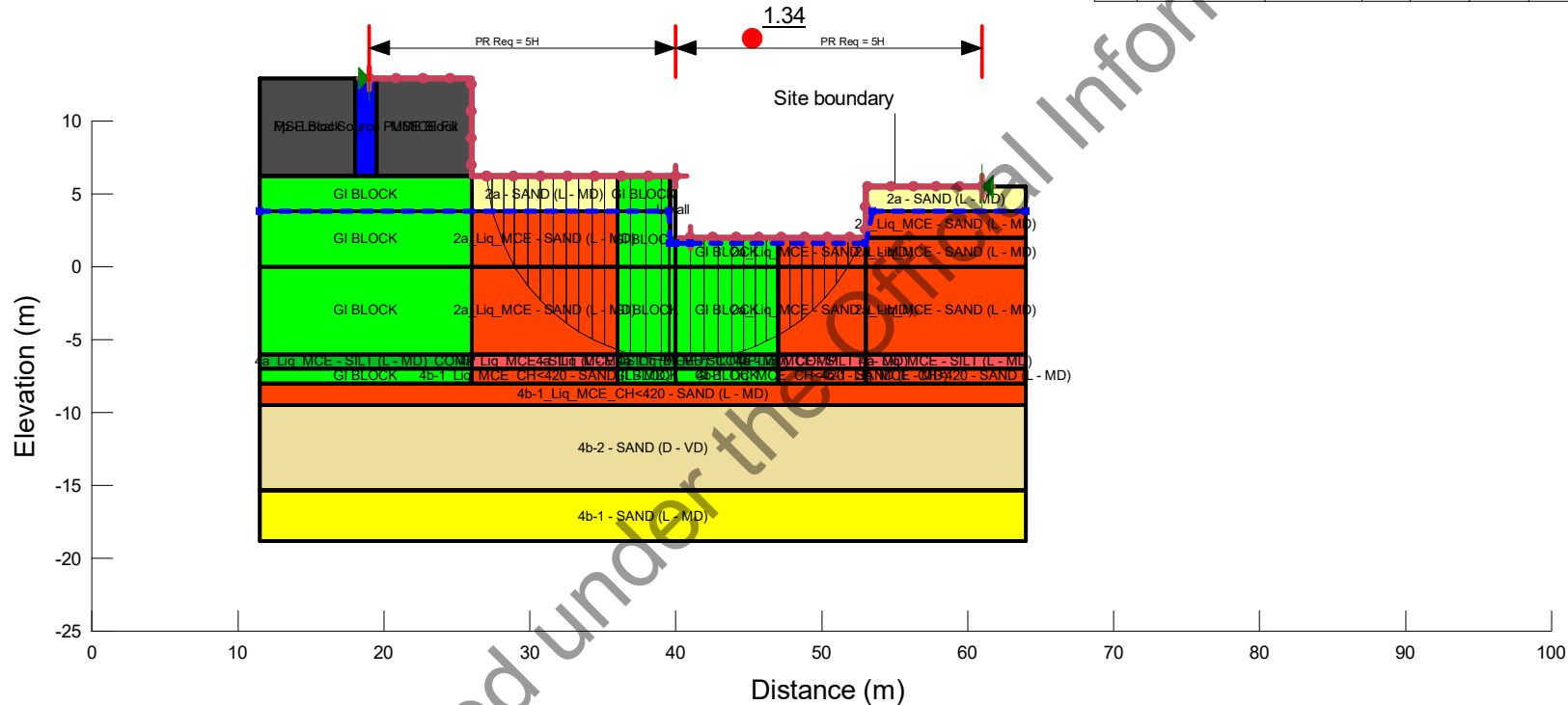
Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi ¹ (°)	Phi-B (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	1
Orange	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17	0		0.11				1
Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16	0		0.08				1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16	0		0.1333				1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	1
Orange	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17	0		0.15				1
Light Yellow	4b-2 - SAND (D - VD)	Mohr-Coulomb	18				0	36	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15				10	38	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000						1
Black	MSE Block	High Strength	15							1

Ground improvement extent: 4 m behind & 7 m in front of wall (excl. buffer zones) to depth of - 8 m RL



Horizontal Coefficient: 0 g

		Title: MGI_RW01_4.2m Section 1 v2.gsz	Date Analysed: 13/03/2019
		Analysis: RW01 4.2m Section 1 Case 8 MCE E-E post liq	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

Analysis Notes:

1. Name: RW01 4.0m Section 2 Case 6 ULS E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.2

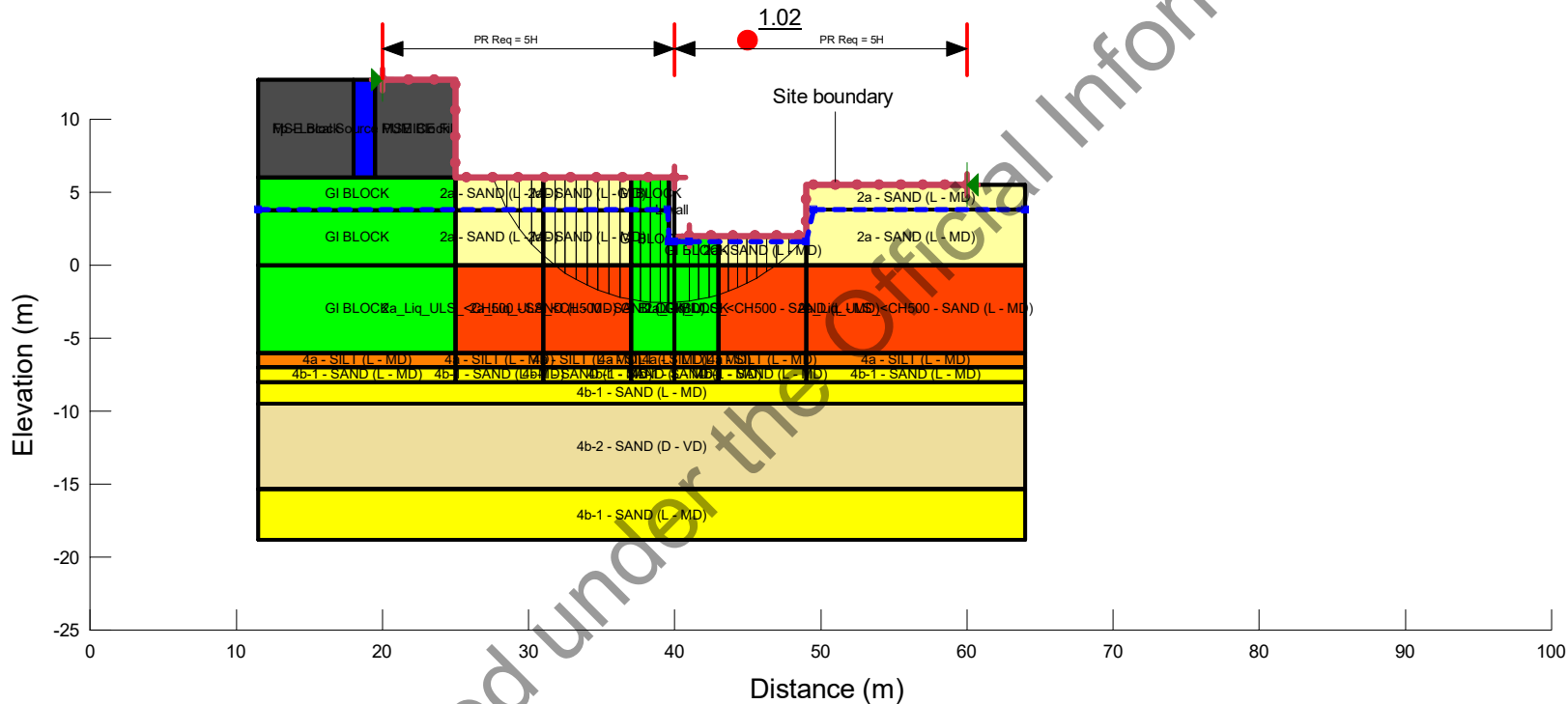
Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Ground improvement extent: 3 m behind and 3 m in front of wall (excl. buffer zones) to depth of - 6 m RL

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a_Liq_ULS <CH500 - SAND (L - MD)	SHANSEP	17		0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15				10	38	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1
Dark Grey	MSE Block	High Strength	15									1



Horizontal Coefficient: 0.2 g

		Title: MGI_RW01_4.0m section 2 v2.gsz	Date Analysed: 13/03/2019
		Analysis: RW01 4.0m Section 2 Case 6 ULS E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

Analysis Notes:

1. Name: RW01 3.0m section 3 Case 6 ULS E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.17

Unit Weight of Water: 9.807 kN/m³

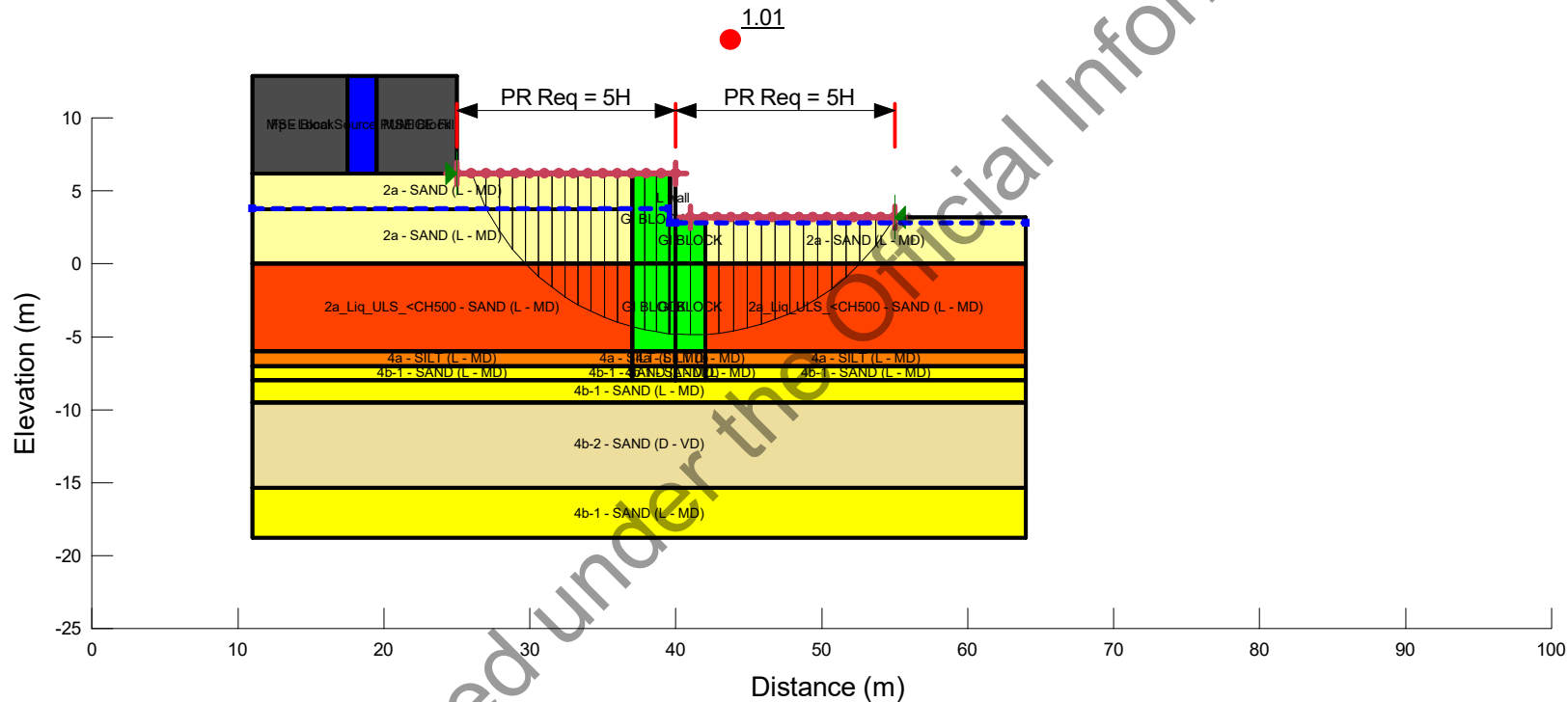
Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4



Note: Section conservatively ignores opposing RW02

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17		0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Blue	Fp - Local Source PUMICE FILL	Mohr-Coulomb	15				10	38	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1
Dark Grey	MSE Block	High Strength	15									1

Ground improvement extent: 3 m behind and 2 m in front of wall (excl. buffer zones) to depth of -6 m RL



Horizontal Coefficient: 0.17 g

		Title: MGI_RW01_3.0m section 3 v2.gsz	Date Analysed: 13/03/2019
		Analysis: RW01 3.0m section 3 Case 6 ULS E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

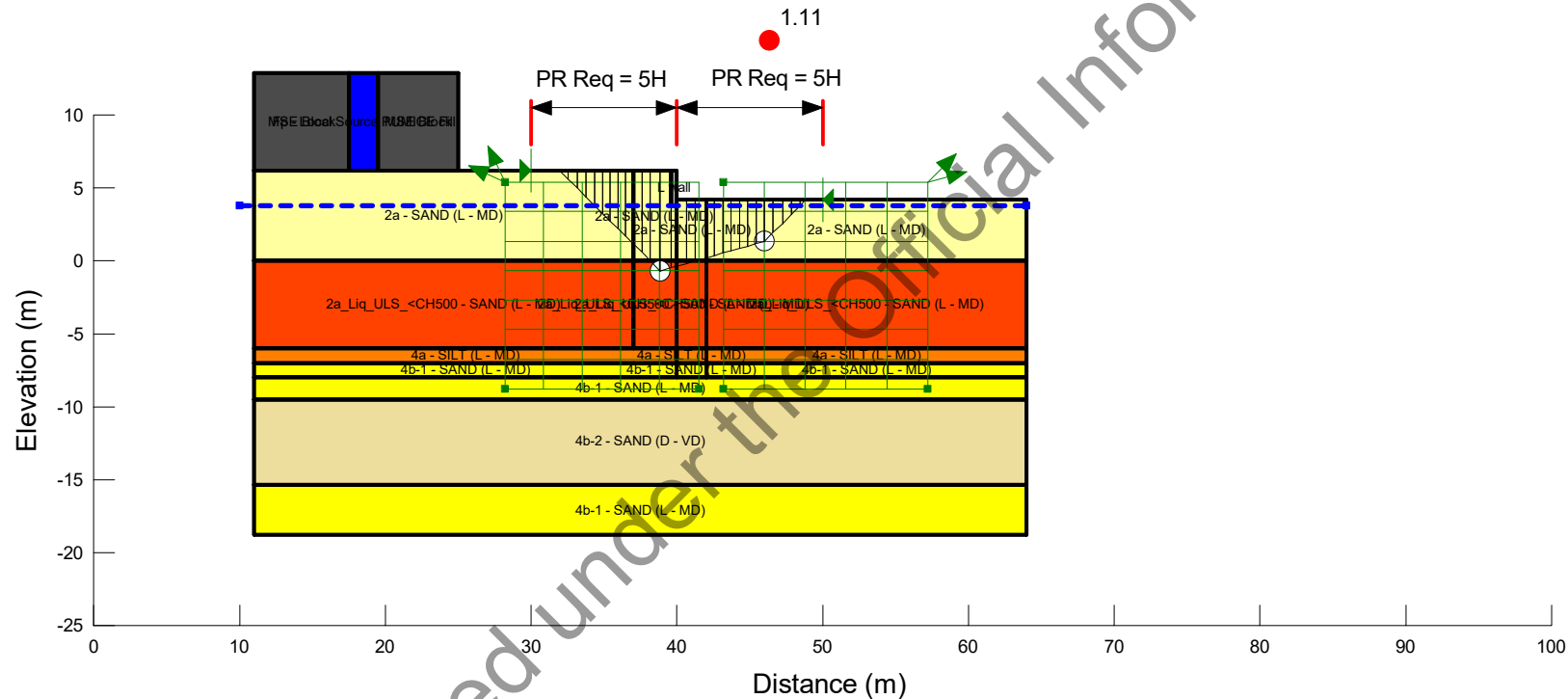
Analysis Notes:

1. Name: RW01 2.0m section 4 Case 6 ULS BLOCK
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.42

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17		0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15				10	38	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1
Dark Grey	MSE Block	High Strength	15									1

No ground improvement required



Horizontal Coefficient: 0.42 g

		Title: MGI_RW01_2.0m section 4 v2.gsz	Date Analysed: 13/03/2019
		Analysis: RW01 2.0m section 4 Case 6 ULS BLOCK	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

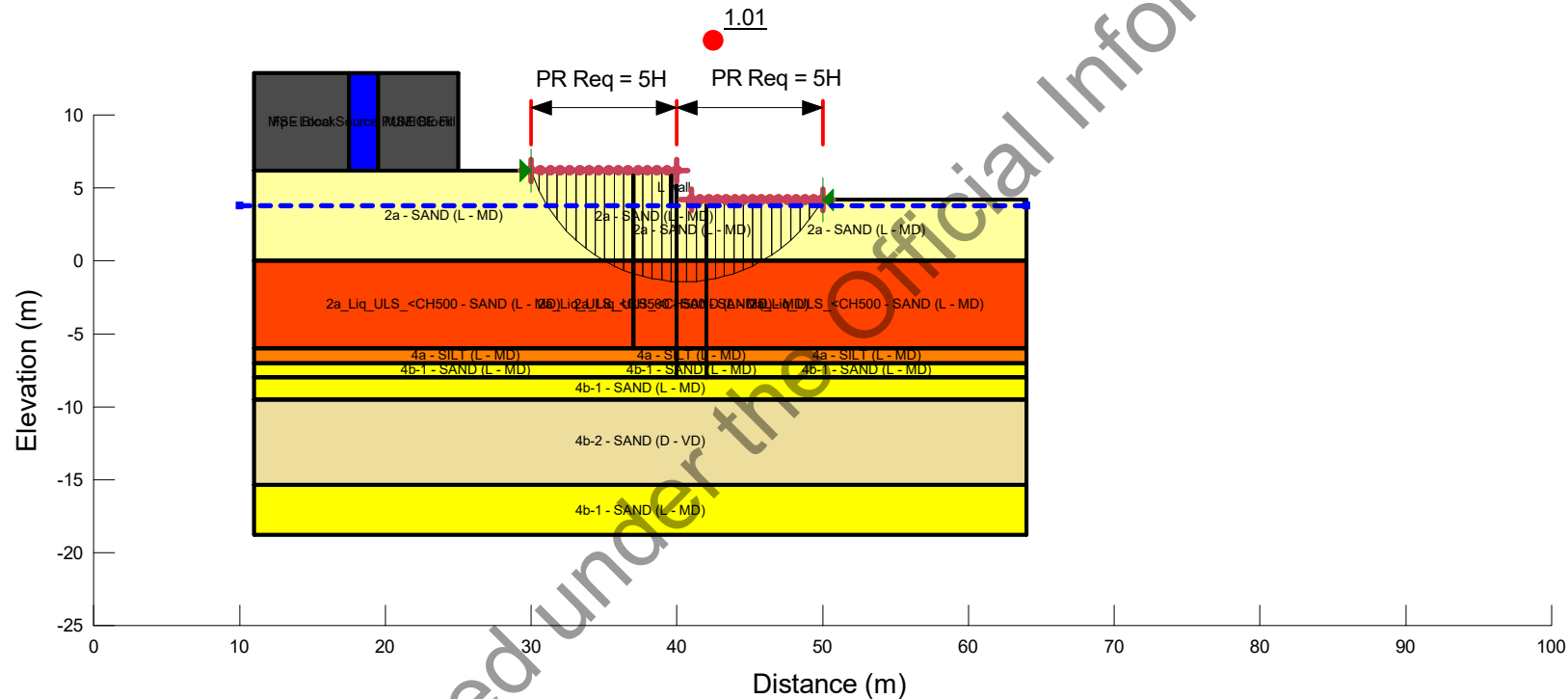
Analysis Notes:

1. Name: RW01 2.0m section 4 Case 6 ULS E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.22

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Orange	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17		0	0.12						1
Light Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Blue	Fp - Local Source PUMICE Fill	Mohr-Coulomb	15				10	38	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1
Dark Grey	MSE Block	High Strength	15									1

No ground improvement required



Horizontal Coefficient: 0.22 g

		Title: MGI_RW01_2.0m section 4 v2.gsz	Date Analysed: 13/03/2019
		Analysis: RW01 2.0m section 4 Case 6 ULS E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

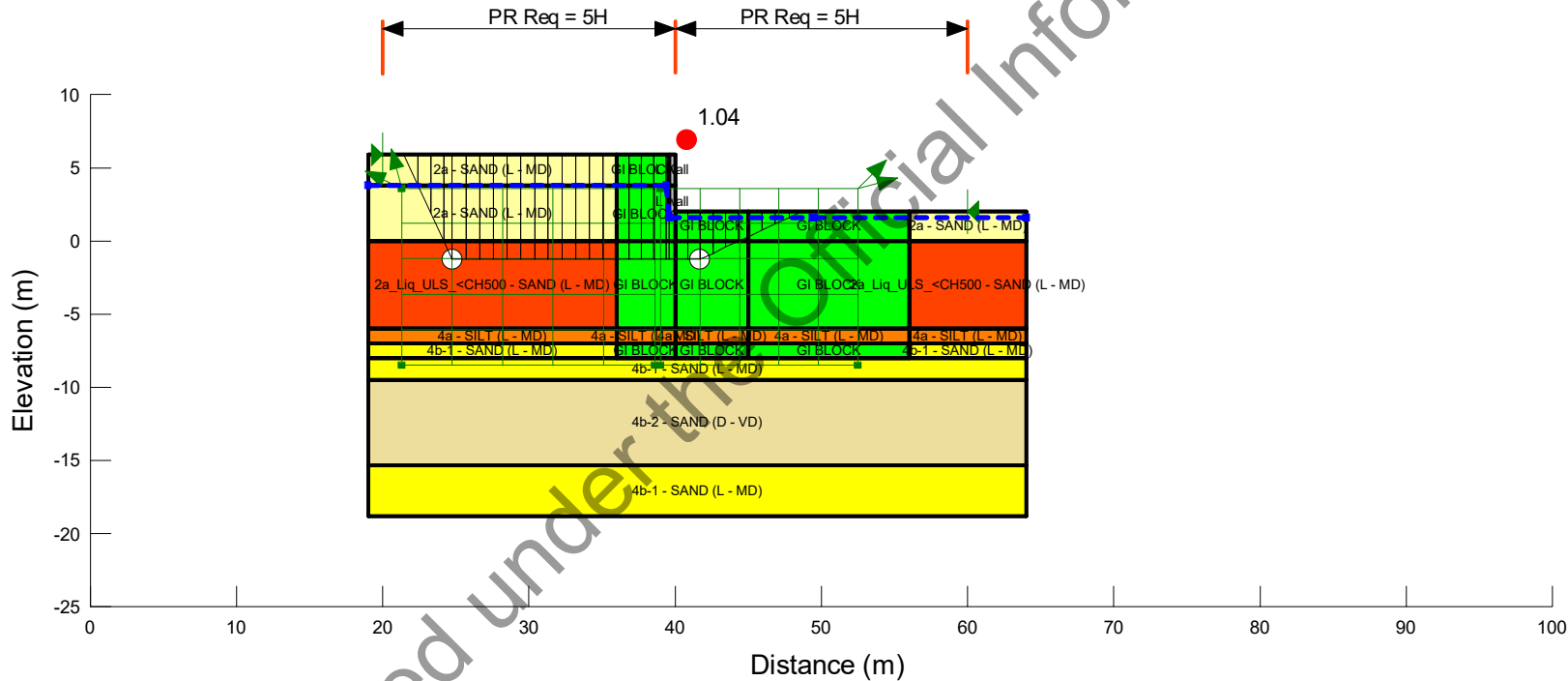
Analysis Notes:

1. Name: RW02 3.9m Section 1 Case 6 ULS BLOCK yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.21

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Light Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17		0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1

Ground improvement extent: 4 m behind and beneath the full landing area in front of wall (excl. buffer zones) to depth of - 8 m RL



Horizontal Coefficient: 0.21 g

		Title: MGI_RW02_3.9m section 1 v2.gsz	Date Analysed: 13/03/2019
		Analysis: RW02 3.9m Section 1 Case 6 ULS BLOCK yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4
		Checked by: BJFR (13/03/2019)	

Analysis Notes:

1. Name: RW02 3.9m section 1 Case 7 MCE BLOCK yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.04

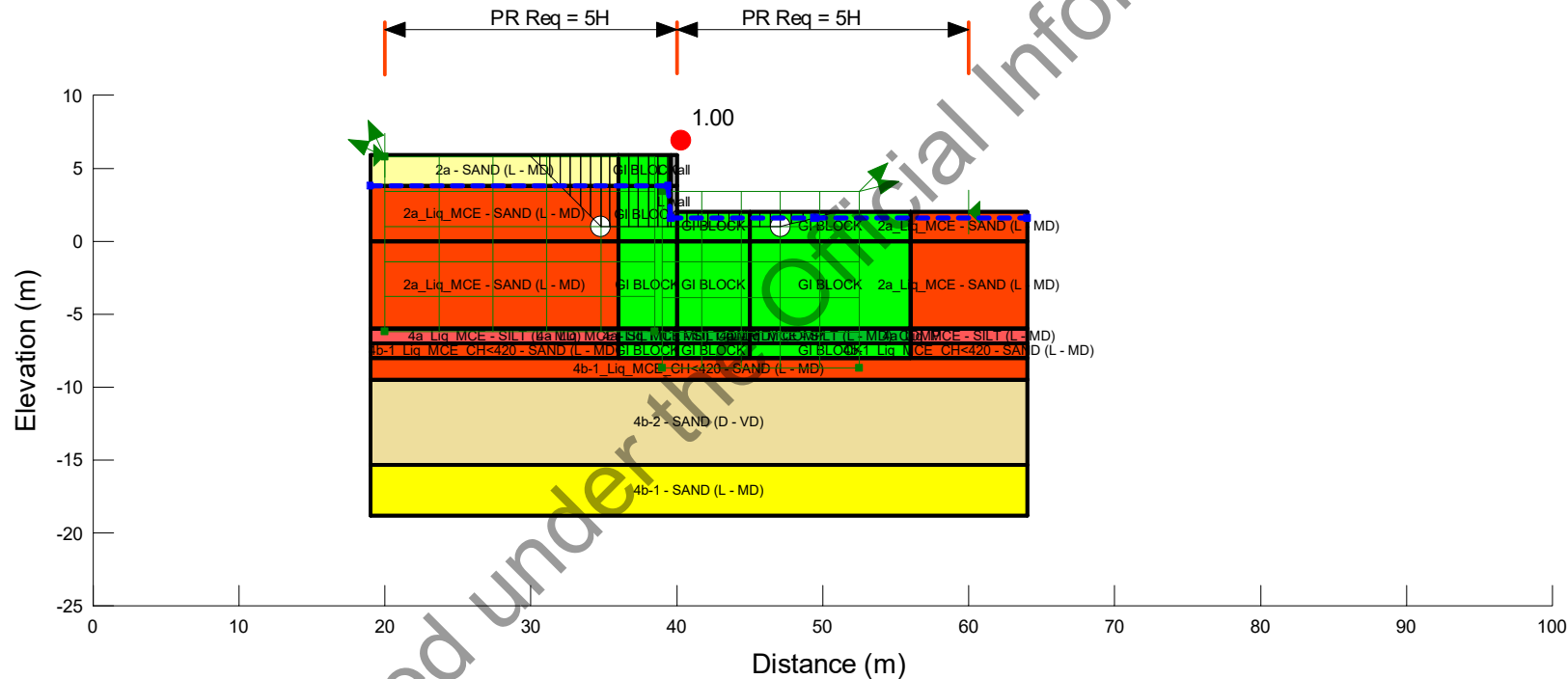
Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Orange	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17		0	0.11						1
Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16		0	0.08						1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16		0	0.1333						1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Orange	4b-1_Liq_MCE_CH=420 - SAND (L - MD)	SHANSEP	17		0	0.15						1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1

Ground improvement extent: 4 m behind and beneath the full landing area in front of wall (excl. buffer zones) to depth of - 8 m RL



Horizontal Coefficient: 0.04 g

		Title: MGI_RW02_3.9m section 1 v2.gsz	Date Analysed: 13/03/2019
		Analysis: RW02 3.9m section 1 Case 7 MCE BLOCK yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

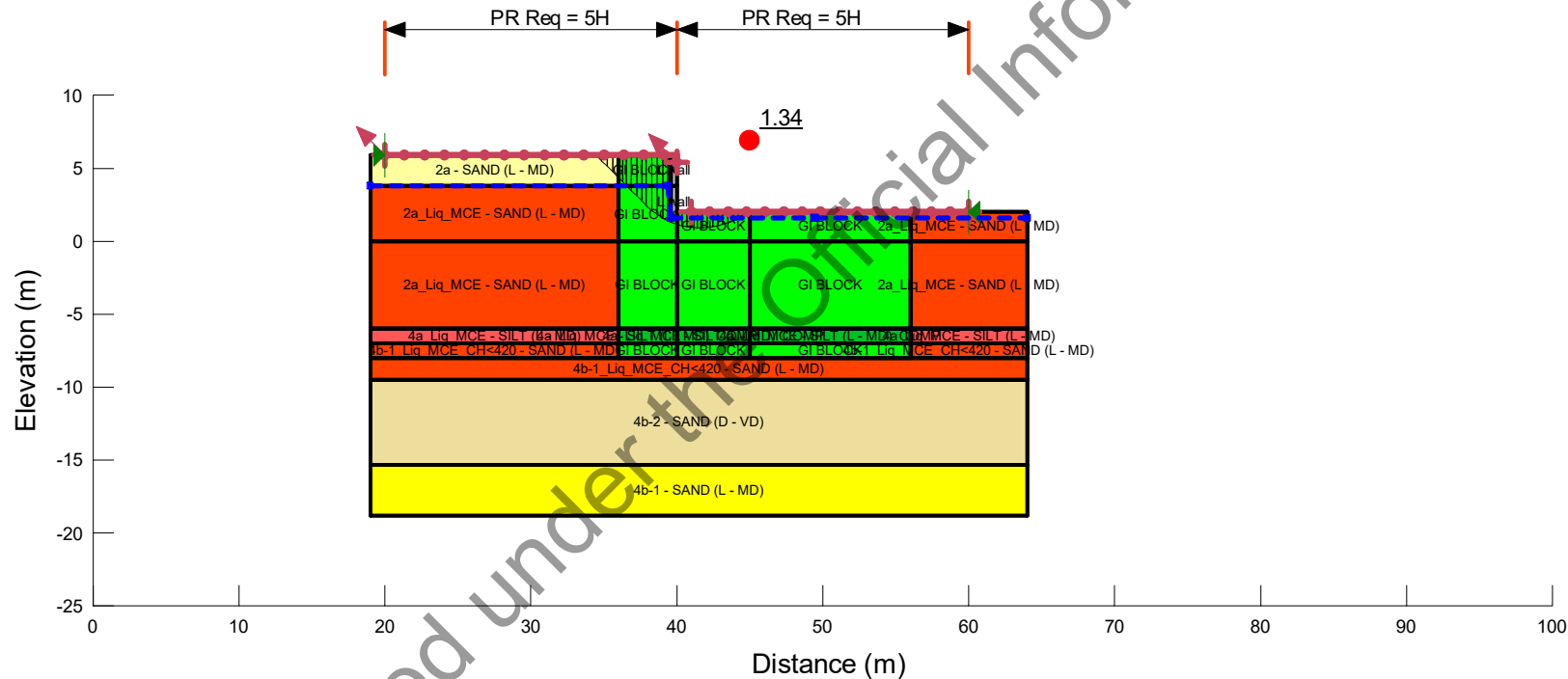
Analysis Notes:

1. Name: RW02 3.9m section 1 Case 8 MCE E-E post liq
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion* (kPa)	Phi* (°)	Phi-B (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	1
Orange	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17		0	0.11				1
Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16		0	0.08				1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16		0	0.1333				1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	1
Orange	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17		0	0.15				1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000						1

Ground improvement extent: 4 m behind and beneath the full landing area in front of wall (excl. buffer zones) to depth of - 8 m RL



Horizontal Coefficient: 0 g

		Title: MGI_RW02_3.9m section 1 v2.gsz		Date Analysed: 13/03/2019
		Analysis: RW02 3.9m section 1 Case 8 MCE E-E post liq		Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4	Checked by: BJFR (13/03/2019)

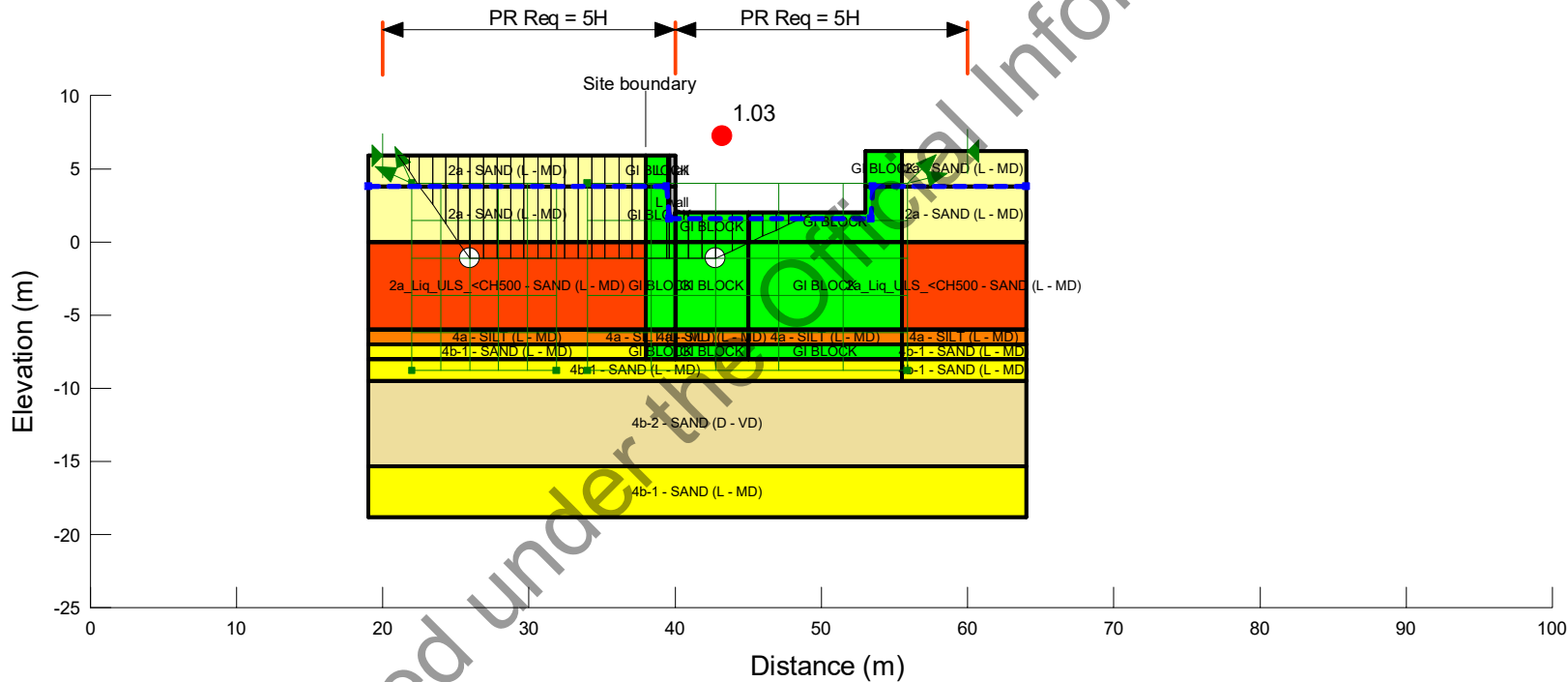
Analysis Notes:

1. Name: RW02 3.9m section 2 Case 6 ULS BLOCK yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.16

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Light Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a_Liq ULS <CH500 - SAND (L - MD)	SHANSEP	17	0	0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5000								1

Ground improvement extent: 2 m behind and beneath the full landing area in front of the wall (excl. buffer zones) to depth of - 8 m RL



Horizontal Coefficient: 0.16 g

		Title: MGI_RW02_3.9m section 2 v2.gsz		Date Analysed: 7/03/2019
		Analysis: RW02 3.9m section 2 Case 6 ULS BLOCK yield		Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4	Checked by: BJFR (13/03/2019)

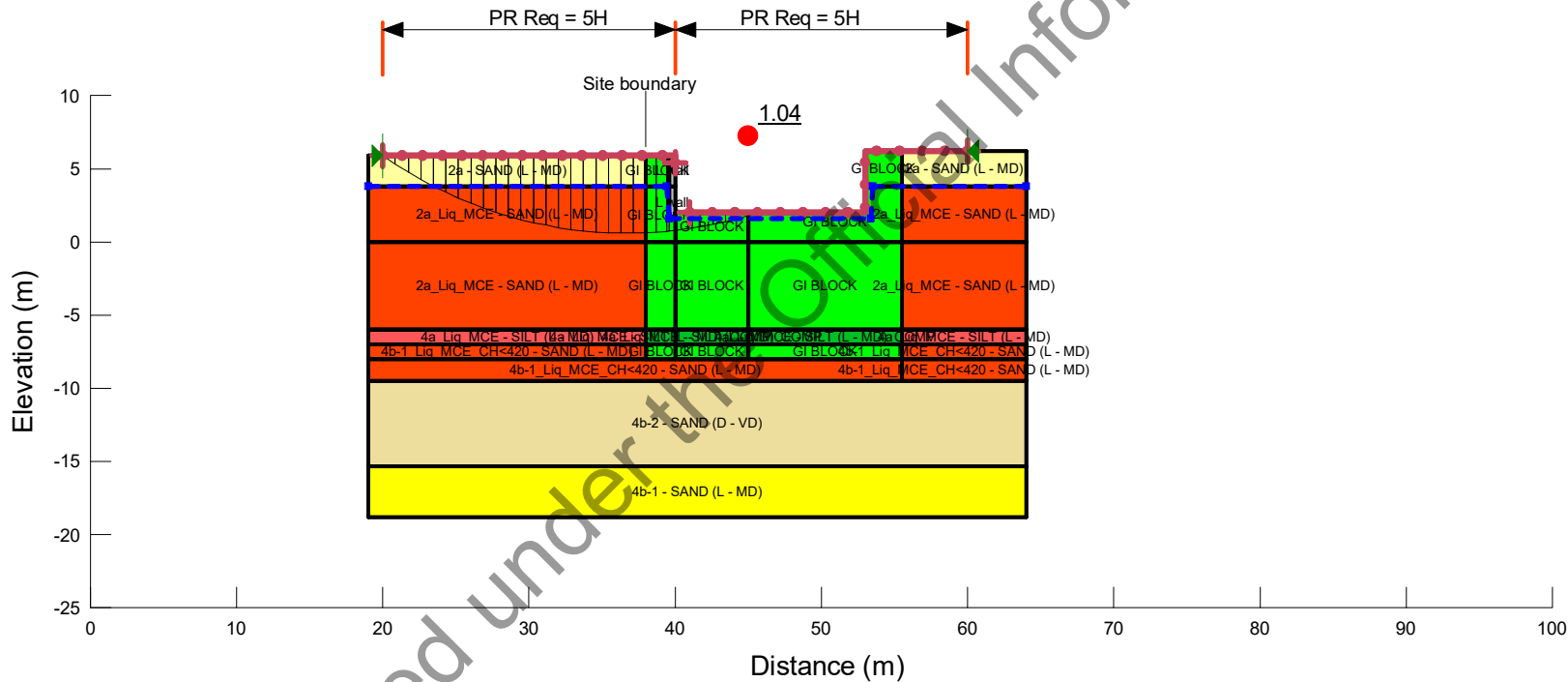
Analysis Notes:

1. Name: RW02 3.9m section 2 Case 7 MCE E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.07

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Orange	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17	0		0.11						1
Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16	0		0.08						1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16	0		0.1333						1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Orange	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17	0		0.15						1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1

Ground improvement extent: 2 m behind and beneath the full landing area in front of the wall (excl. buffer zones) to depth of - 8 m RL



Horizontal Coefficient: 0.07 g

		Title: MGI_RW02_3.9m section 2 v2.gsz	Date Analysed: 7/03/2019
		Analysis: RW02 3.9m section 2 Case 7 MCE E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

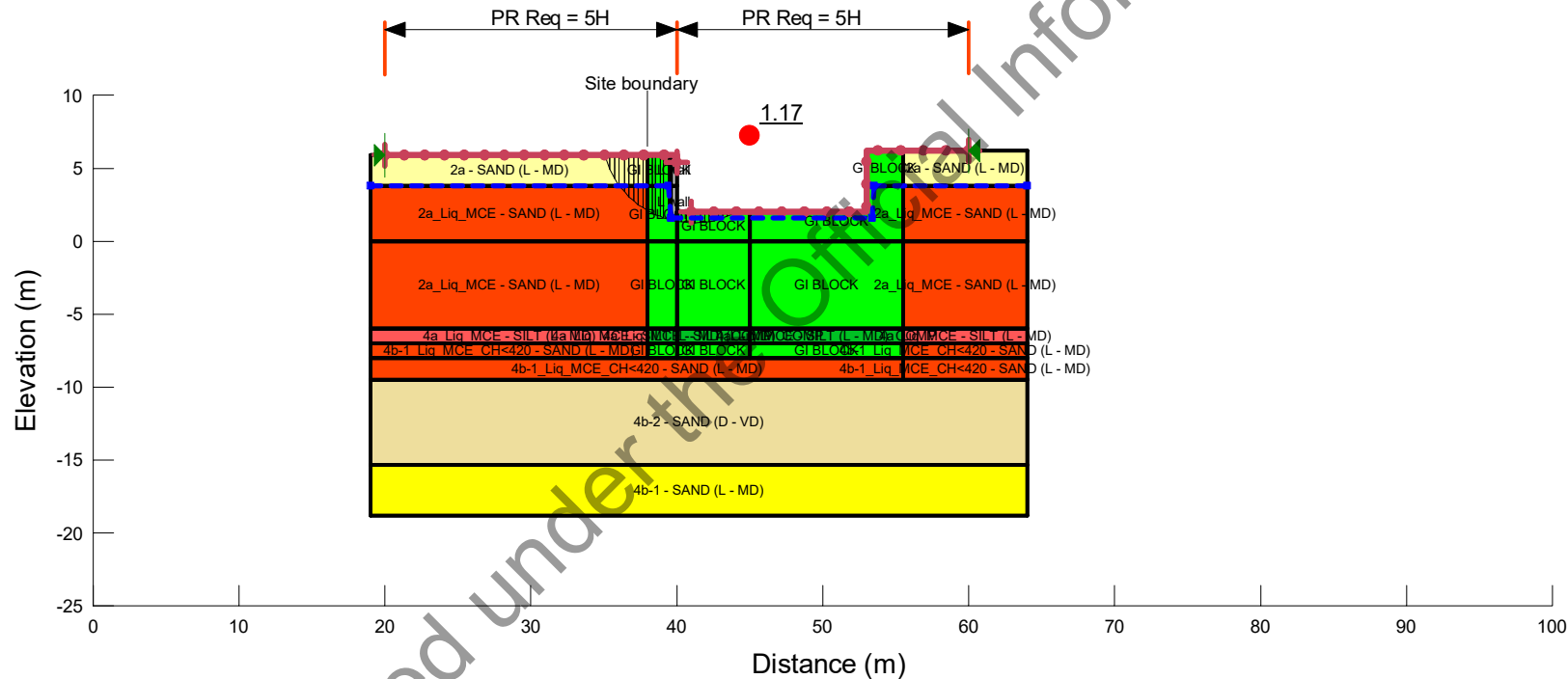
Analysis Notes:

1. Name: RW02 3.9m section 2 Case 8 MCE E-E post liq
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	1
Orange	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17	0		0.11				1
Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16	0		0.08				1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16	0		0.1333				1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	1
Orange	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17	0		0.15				1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000						1

Ground improvement extent: 2 m behind and beneath the full landing area in front of the wall (excl. buffer zones) to depth of - 8 m RL



Horizontal Coefficient: 0 g

		Title: MGI_RW02_3.9m section 2 v2.gsz		Date Analysed: 7/03/2019
		Analysis: RW02 3.9m section 2 Case 8 MCE E-E post liq		Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4	Checked by: BJFR (13/03/2019)

Analysis Notes:

1. Name: RW02 3.2m section 3 Case 6 ULS E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.105

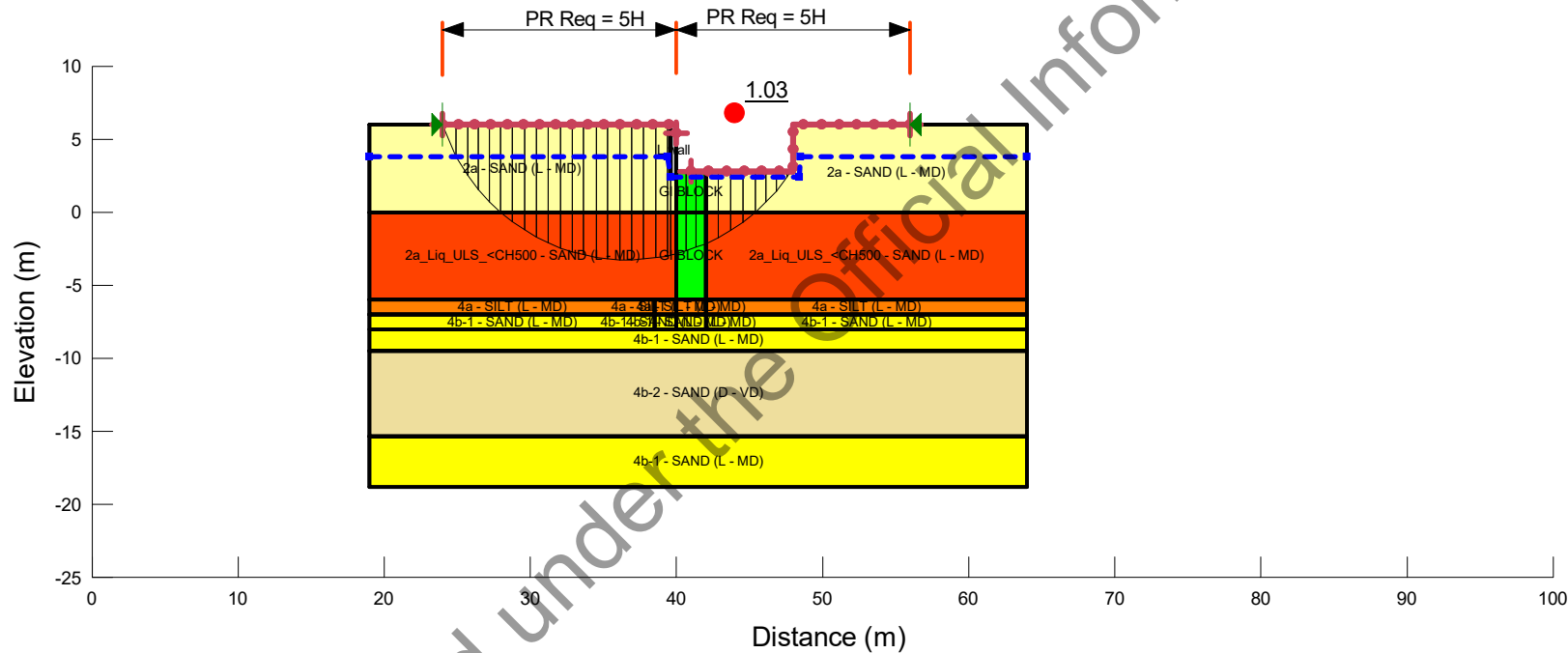
Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17	0			0	35	0	0	0	1
Red	2a Liq ULS <CH500 - SAND (L - MD)	SHANSEP	17	0	0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16	2			2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17	0			0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19	0			0	36	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18	0			0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1

Ground improvement extent: 2 m in front of wall (excl. buffer zones) to depth of - 6 m RL



Horizontal Coefficient: 0.105 g

		Title: MGI_RW02_3.2m section 3 v2.gsz	Date Analysed: 7/03/2019
		Analysis: RW02 3.2m section 3 Case 6 ULS E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

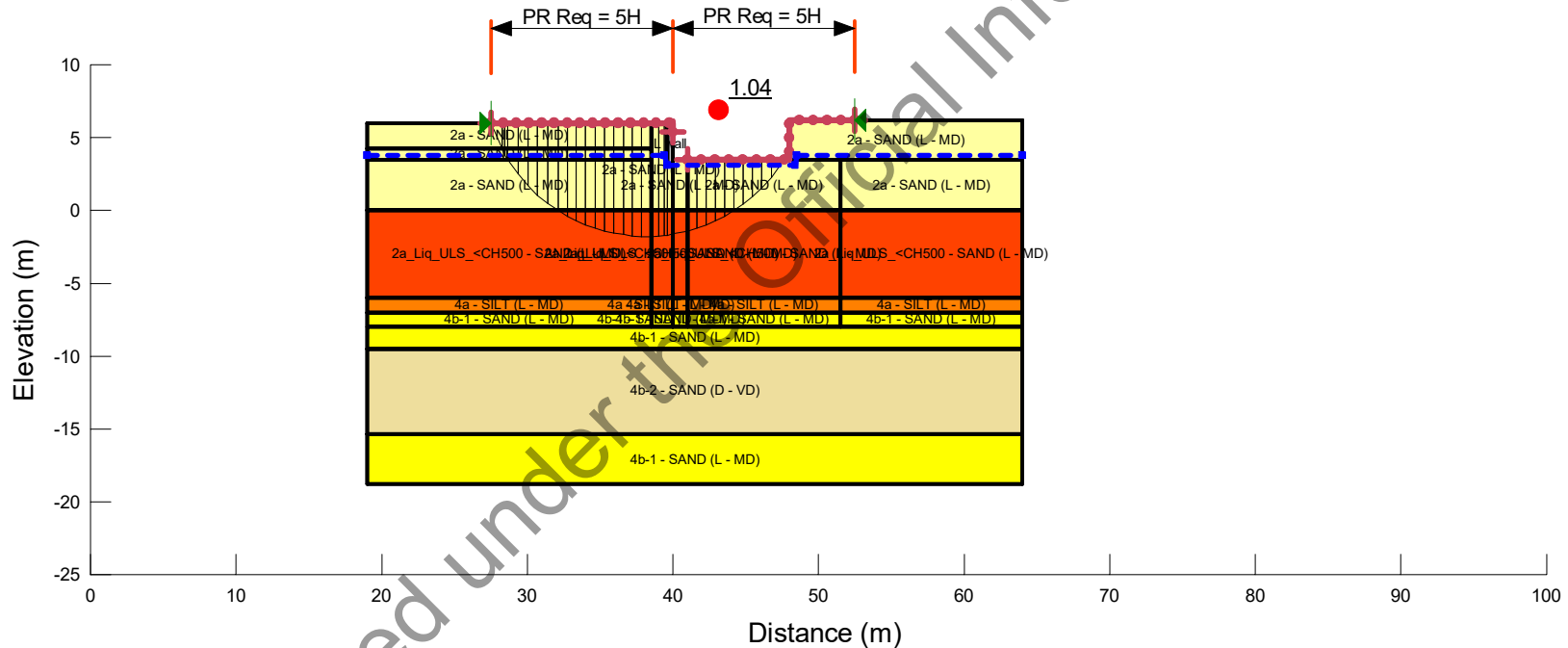
Analysis Notes:

1. Name: RW02 2.5m section 4 Case 6 ULS E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.135

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17		0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L.wall	Undrained (Phi=0)	24	5,000								1

No ground improvement required



Horizontal Coefficient: 0.135 g

		Title: MGI_RW02_2.5m section 4 v2.gsz	Date Analysed: 7/03/2019
		Analysis: RW02 2.5m section 4 Case 6 ULS E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

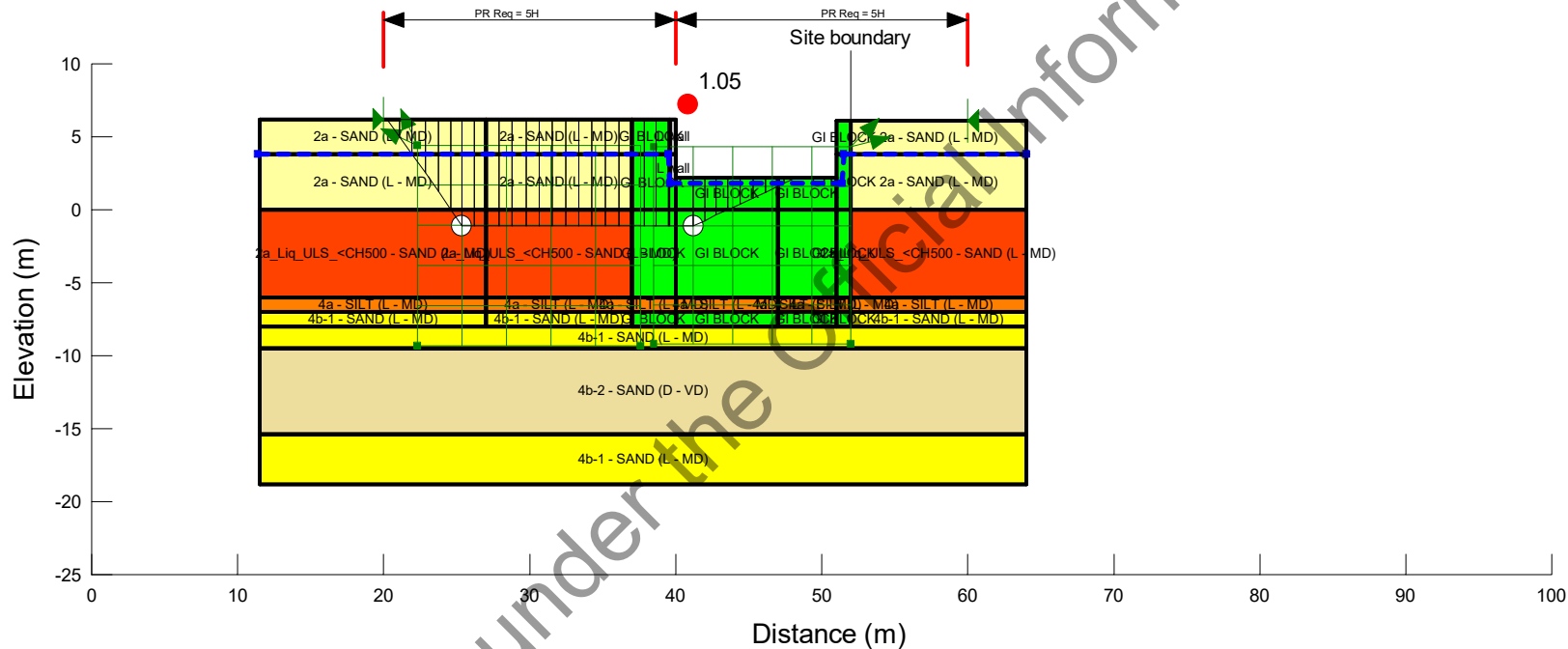
Analysis Notes:

1. Name: RW04 4.0m Section 1 Case 6 ULS BLOCK yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.18



Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Light Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17		0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1

Ground improvement extent: 3m behind and beneath the full landing area in front of the wal (excl. buffer zones) to depth of ~ 8 m RL



Horizontal Coefficient: 0.18 g

		Title: MGI_RW04_4.0m section 1 v2.gsz		Date Analysed: 13/03/2019
		Analysis: RW04 4.0m Section 1 Case 6 ULS BLOCK yield		Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4	Checked by: BJFR (13/03/2019)

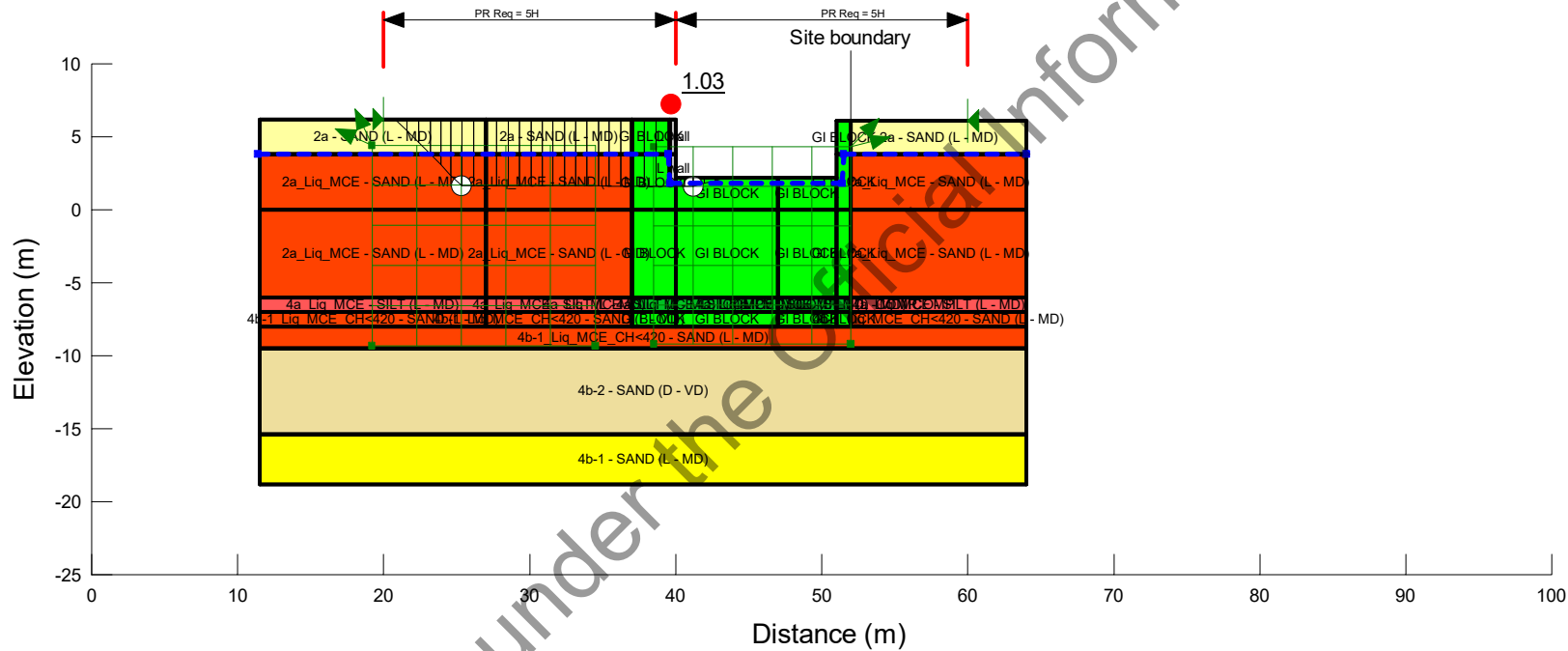
Analysis Notes:

1. Name: RW04 4.0m Section 1 Case 7 MCE BLOCK yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.11

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Orange	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17		0	0.11						1
Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16		0	0.08						1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16		0	0.1333						1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Orange	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17		0	0.15						1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1

Ground improvement extent: 3m behind and beneath the full landing area in front of the wal (excl. buffer zones) to depth of - 8 m RL



Horizontal Coefficient: 0.11 g

		Title: MGI_RW04_4.0m section 1 v2.gsz	Date Analysed: 13/03/2019
		Analysis: RW04 4.0m Section 1 Case 7 MCE BLOCK yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

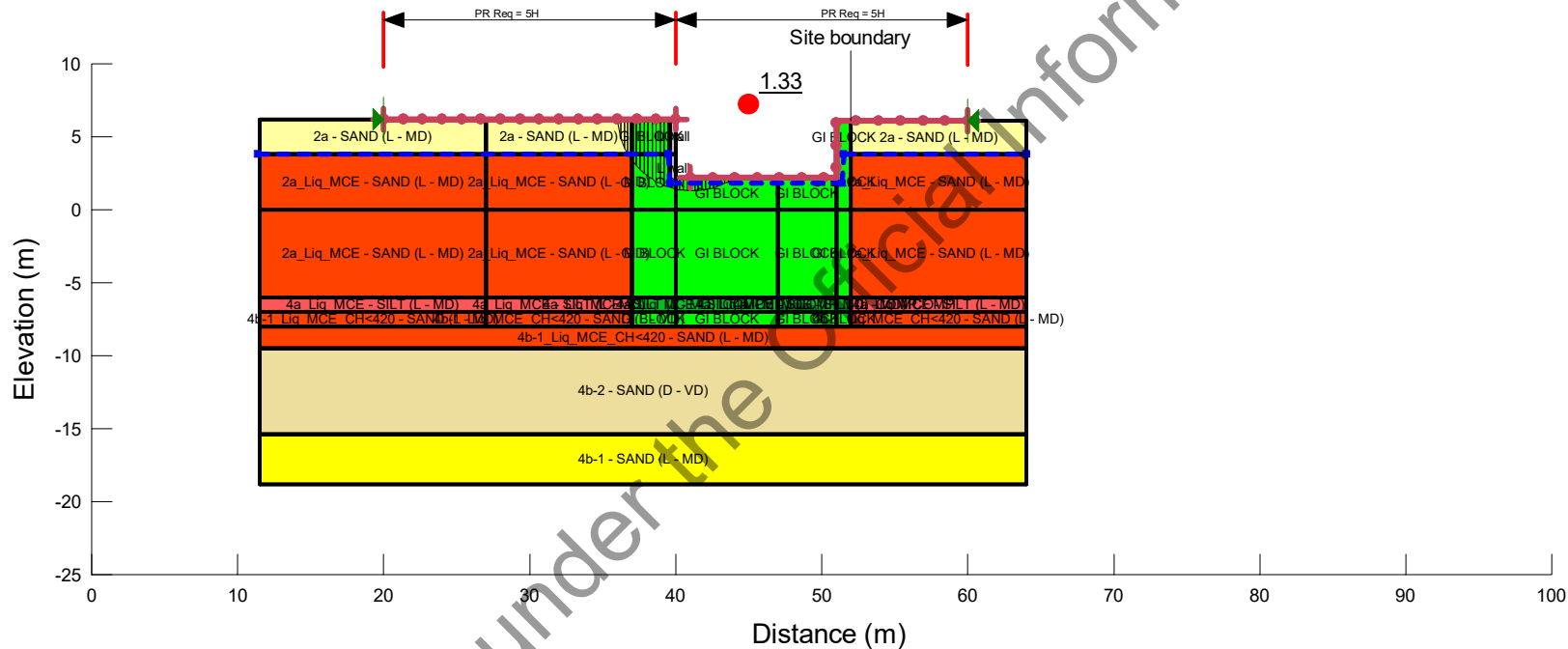
Analysis Notes:

1. Name: RW04 4.0m Section 1 Case 8 MCE E-E post liq
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	1
Orange	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17	0	0	0.11				1
Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16	0	0	0.08				1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16	0	0	0.1333				1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	1
Orange	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17	0	0	0.15				1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000						1

Ground improvement extent: 3m behind and beneath the full landing area in front of the wal (excl. buffer zones) to depth of ~ 8 m RL



Horizontal Coefficient: 0 g

		Title: MGI_RW04_4.0m section 1 v2.gsz		Date Analysed: 13/03/2019
		Analysis: RW04 4.0m Section 1 Case 8 MCE E-E post liq		Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4	Checked by: BJFR (13/03/2019)

Analysis Notes:

1. Name: RW04 - 3.5m Section 2 Case 6 ULS BLOCK yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.145

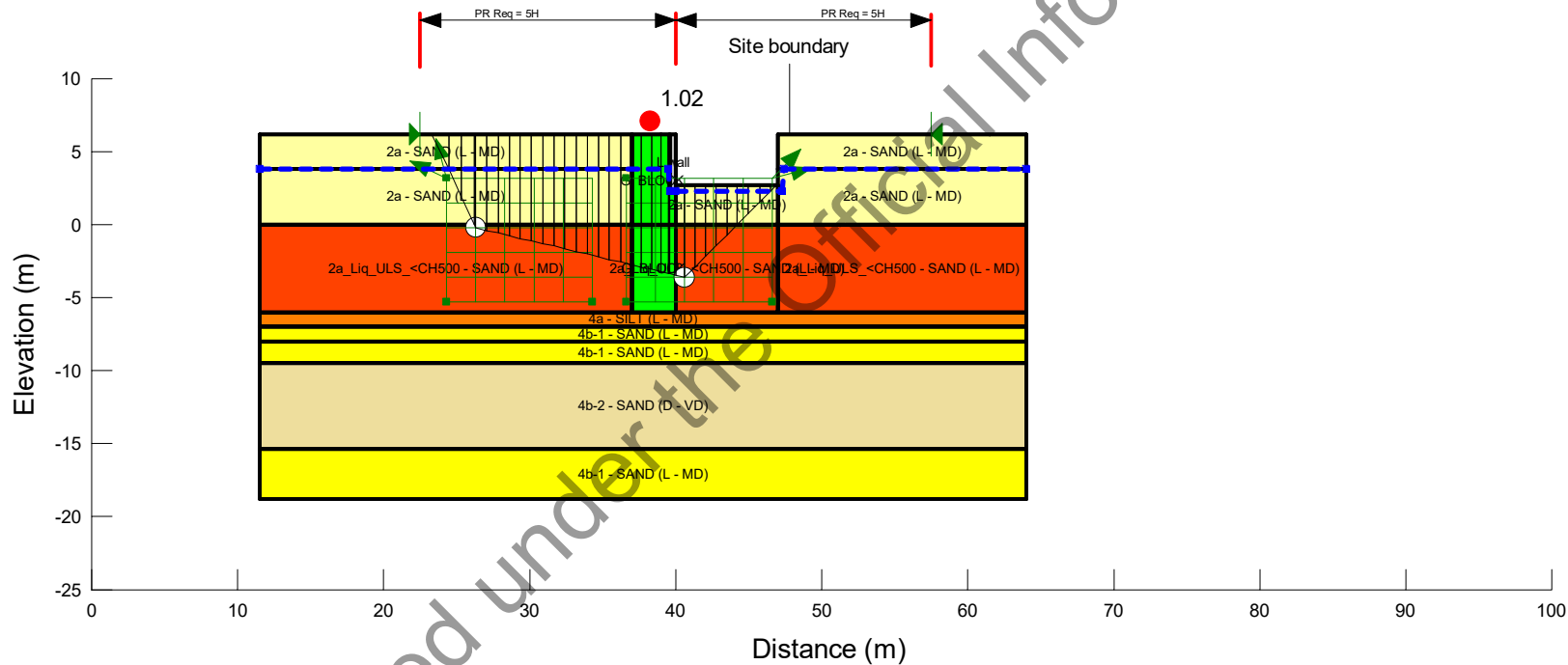
Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17		0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D + VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1

Ground improvement extent: 3 m behind the wall (excl. buffer zones)



Horizontal Coefficient: 0.145 g



Title: MGI_RW04 3.5m section 2 v2.gsz

Date Analysed: 13/03/2019

Analysis: RW04 - 3.5m Section 2 Case 6 ULS BLOCK yield

Analysed by: CCHE

Comments:

Scale: 1:500 @ A4

Checked by: BJFR (13/03/2019)

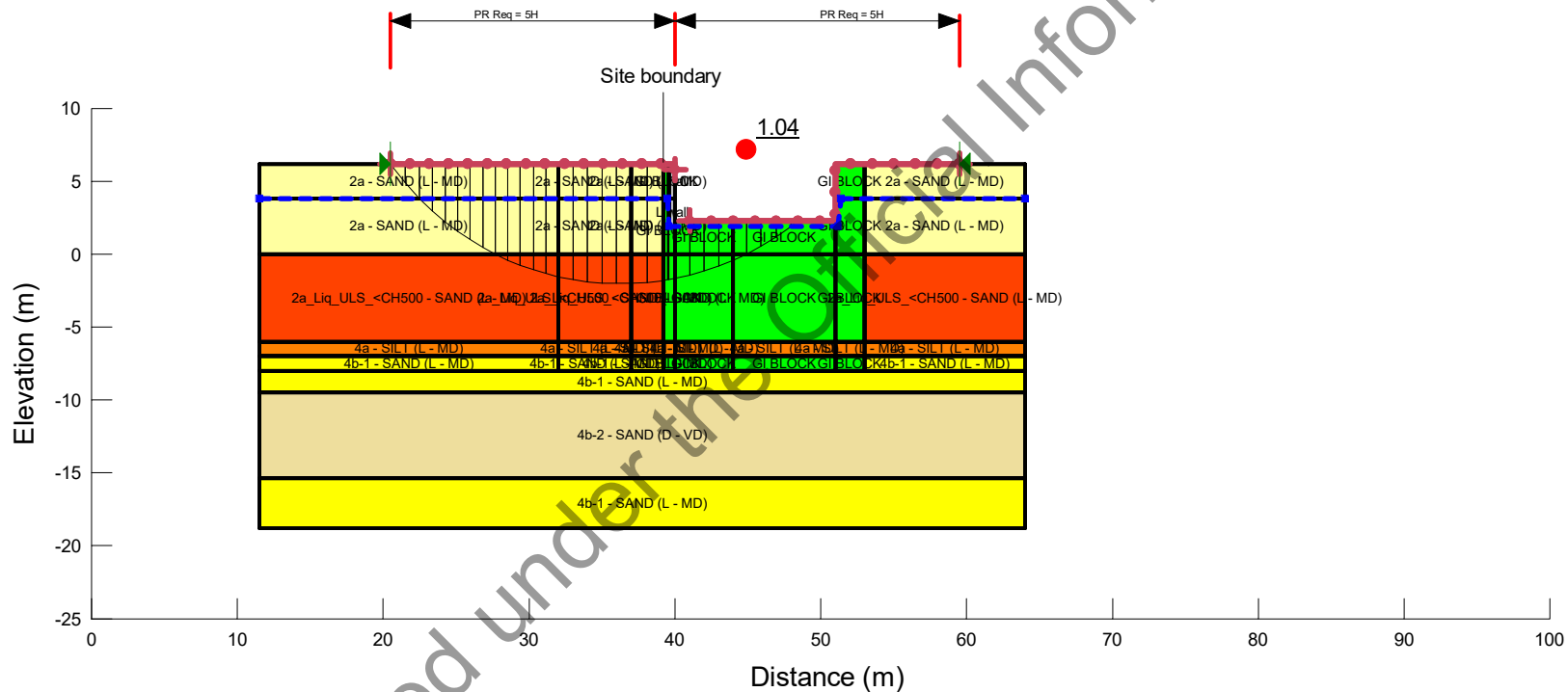
Analysis Notes:

1. Name: RW05 3.9m Section 1 Case 6 ULS E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.15

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Orange	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17	0		0.12						1
Light Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5000								1

Ground improvement extent: 0.8 m behind and beneath the full landing area in front of the wall (excl. buffer zones) to depth of -8 m RL



Horizontal Coefficient: 0.15 g

		Title: MGI_RW05_3.9m Section 1 v2.gsz	Date Analysed: 7/03/2019
		Analysis: RW05 3.9m Section 1 Case 6 ULS E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

Analysis Notes:

1. Name: RW05 3.9m Section 1 Case 7 MCE E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.01

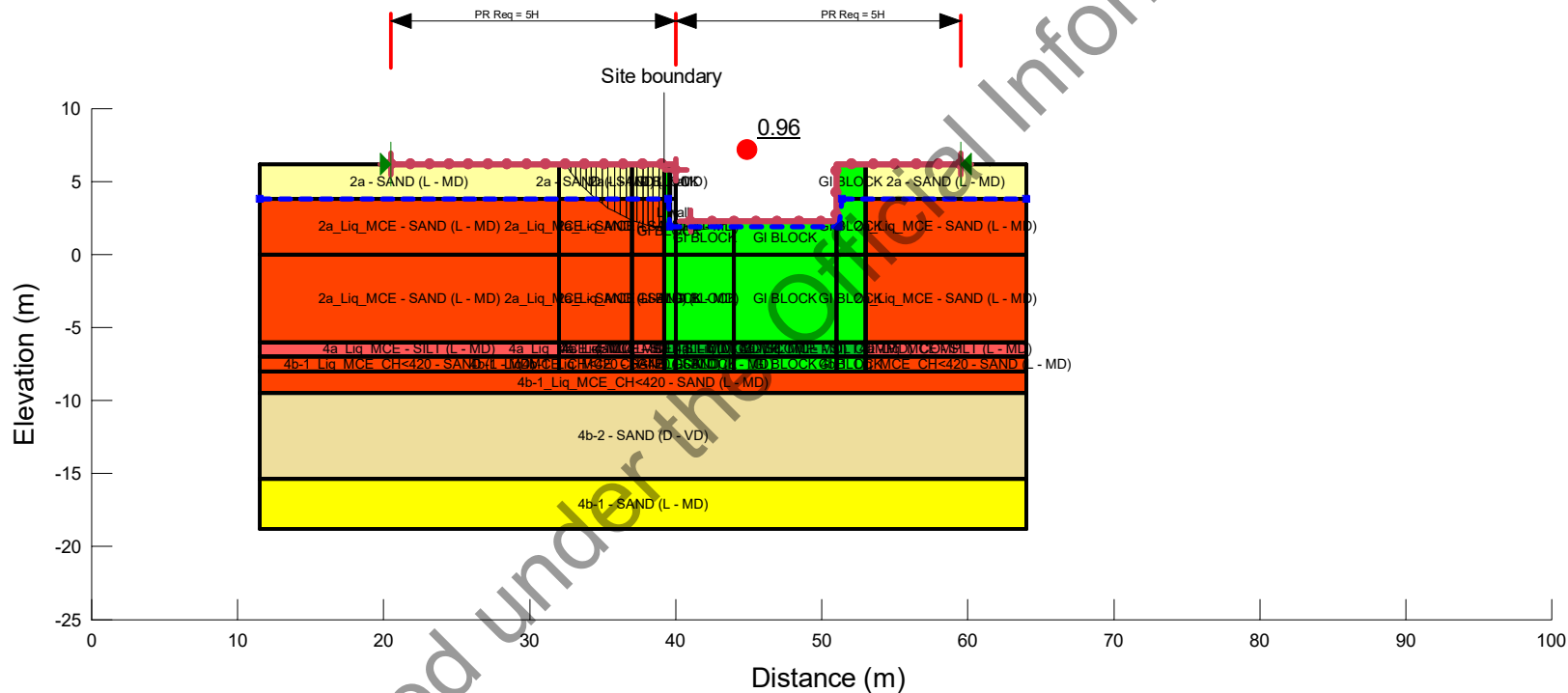
Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Orange	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17		0	0.11						1
Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16		0	0.08						1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16		0	0.1333						1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Orange	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17		0	0.15						1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1

Ground improvement extent: 0.8 m behind and beneath the full landing area in front of the wall (excl. buffer zones) to depth of -8 m RL



Horizontal Coefficient: 0.01 g

		Title: MGI_RW05_3.9m Section 1 v2.gsz	Date Analysed: 7/03/2019
		Analysis: RW05 3.9m Section 1 Case 7 MCE E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

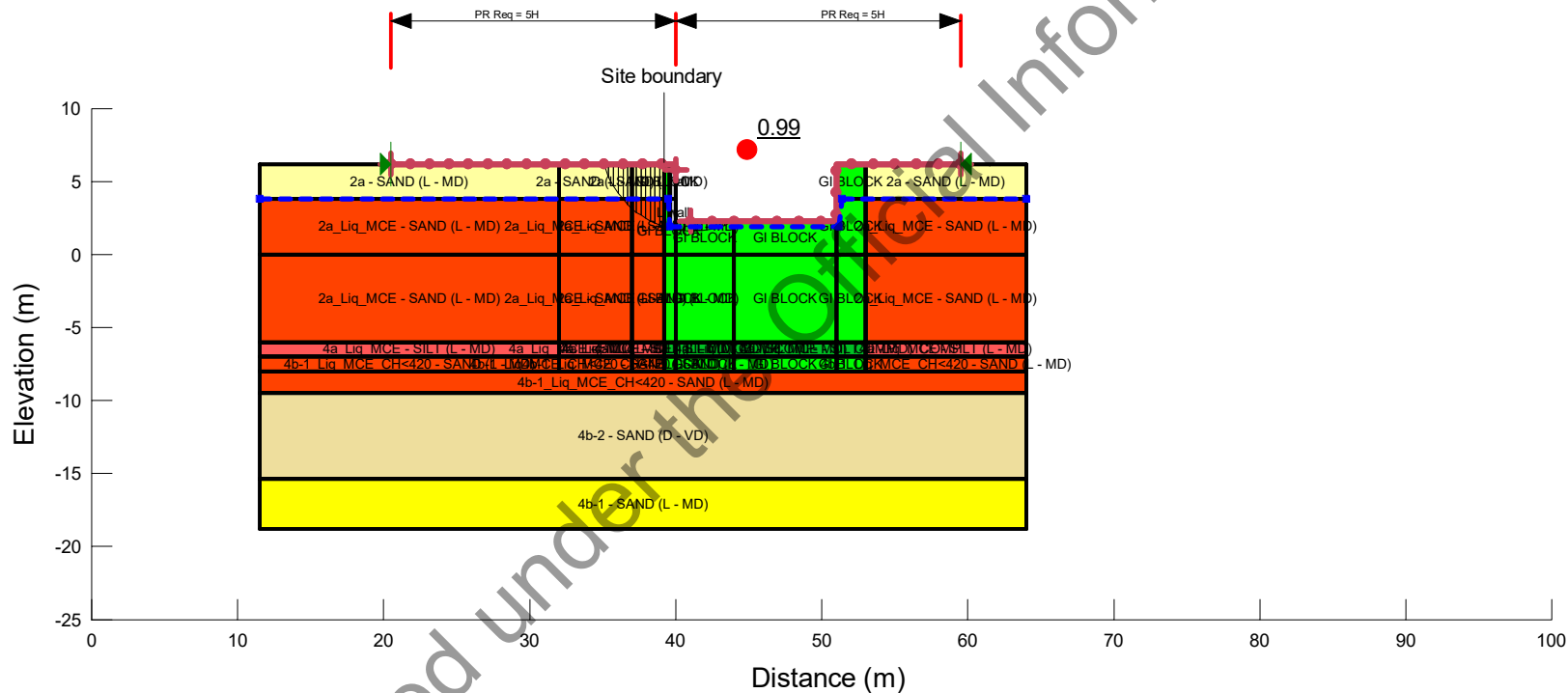
Analysis Notes:

1. Name: RW05 3.9m Section 1 Case 8 MCE E-E post liq
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi (°)	Phi-B (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	1
Orange	2a_Liq_MCE - SAND (L - MD)	SHANSEP	17		0	0.11				1
Red	4a_Liq_MCE - SILT (L - MD)	SHANSEP	16		0	0.05				1
Green	4a_Liq_MCE - SILT (L - MD)_COMP	SHANSEP	16		0	0.1333				1
Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	1
Orange	4b-1_Liq_MCE_CH<420 - SAND (L - MD)	SHANSEP	17		0	0.15				1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	1
Green	GI BLOCK	Mohr-Coulomb	18				0	36	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000						1

Ground improvement extent: 0.8 m behind and beneath the full landing area in front of the wall (excl. buffer zones) to depth of -8 m RL



Horizontal Coefficient: 0 g

		Title: MGI_RW05_3.9m Section 1 v2.gsz	Date Analysed: 7/03/2019
		Analysis: RW05 3.9m Section 1 Case 8 MCE E-E post liq	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

Analysis Notes:

1. Name: RW02 3.5m section 2 Case 6 ULS BLOCK yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Block
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.15

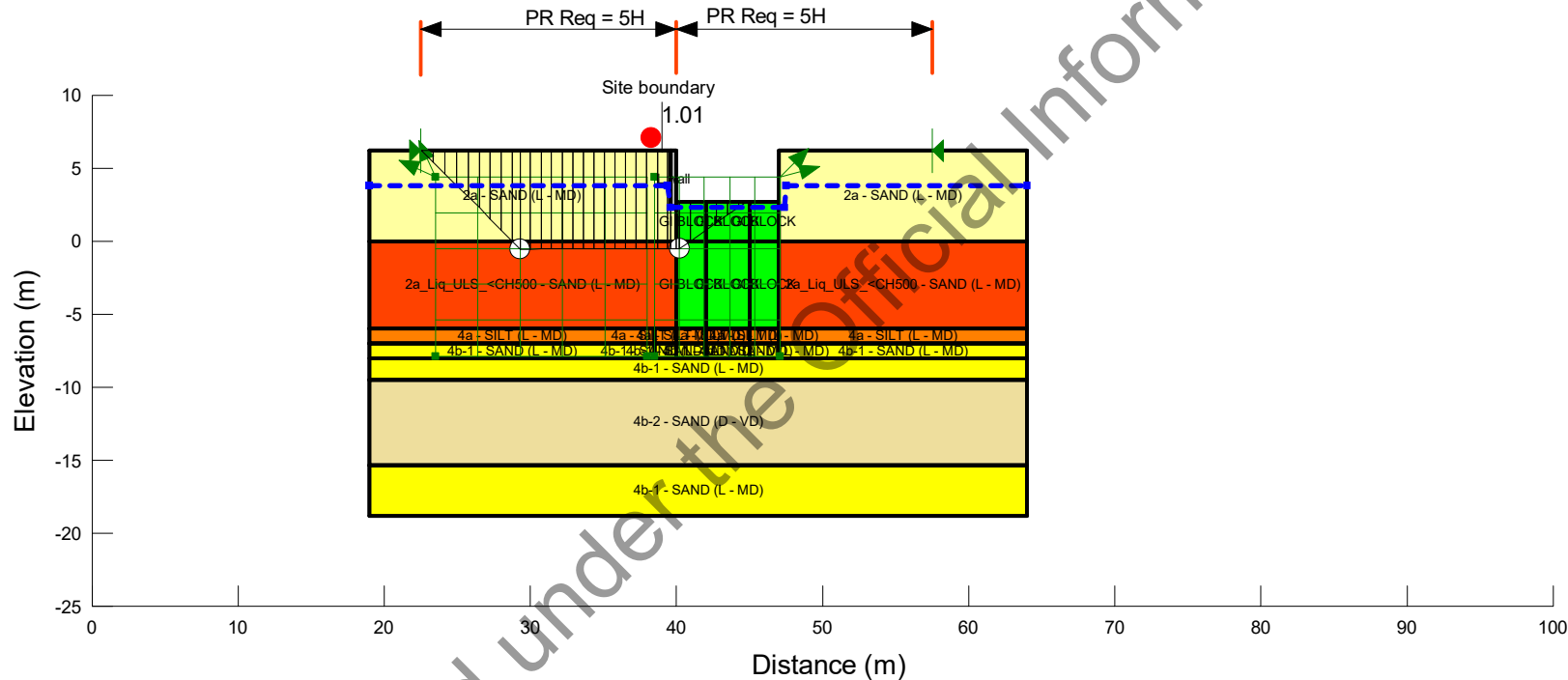
Unit Weight of Water: 9.807 kN/m³

Horizontal Scale: 1:500 @ A4

Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17		0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Green	GIBLOCK	Mohr-Coulomb	18				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1

Ground improvement extent: Beneath area between opposing walls (excl. buffer zones) to depth of - 6 m RL



Horizontal Coefficient: 0.15 g



Title: MGI_RW05 3.5m section 2 v2.gsz

Date Analysed: 7/03/2019

Analysis: RW05 3.5m section 2 Case 6 ULS BLOCK yield

Analysed by: CCHE

Comments:

Scale: 1:500 @ A4

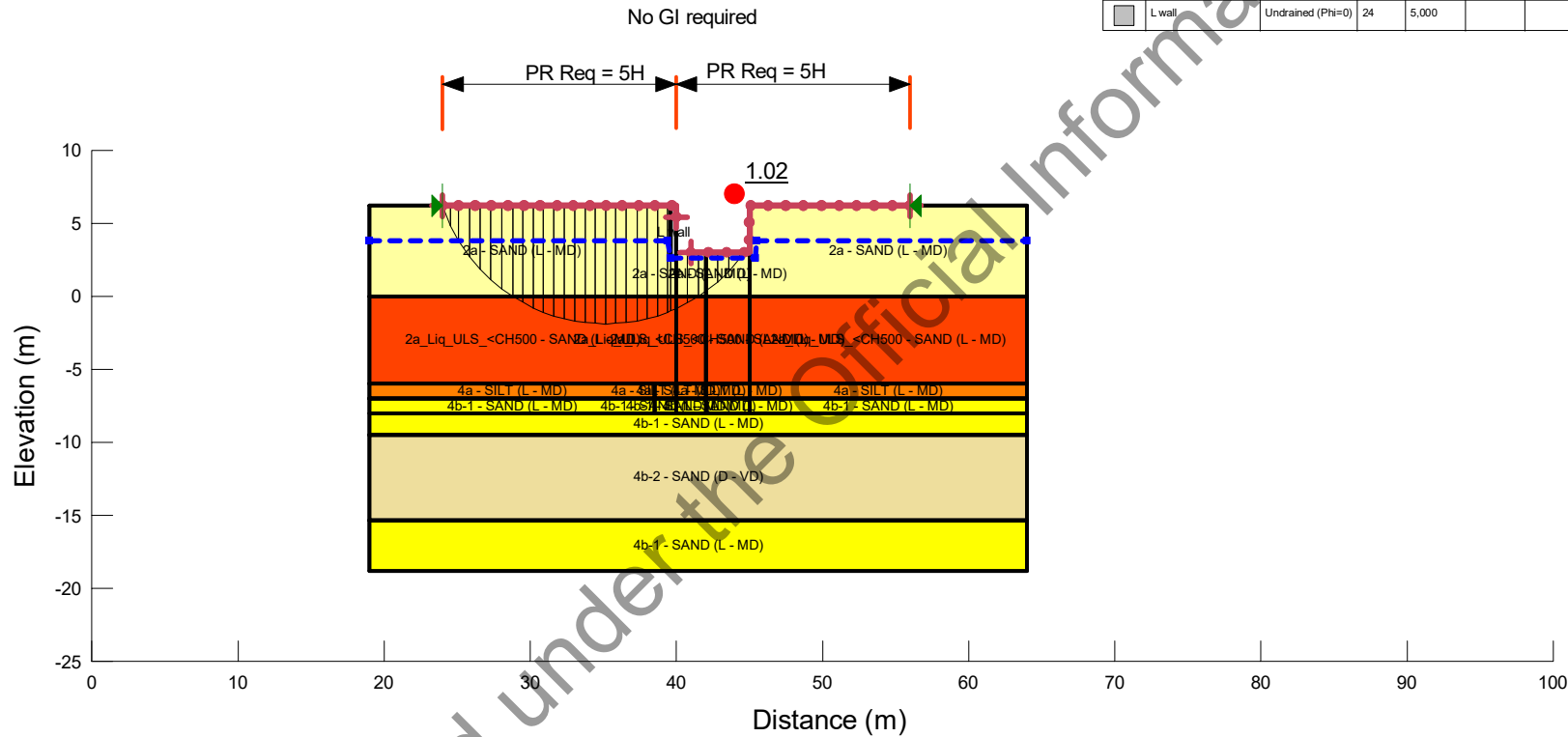
Checked by: BJFR (14/03/2019)

Analysis Notes:

1. Name: RW05 3.2m section 3 Case 6 ULS E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.13

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:500 @ A4
 Vertical Scale: 1:500 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion' (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17				0	35	0	0	0	1
Red	2a Liq. ULS <CH500 - SAND (L - MD)	SHANSEP	17		0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16				2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17				0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19				0	36	0	0	0	1
Grey	L wall	Undrained (Phi=0)	24	5,000								1



Horizontal Coefficient: 0.13 g

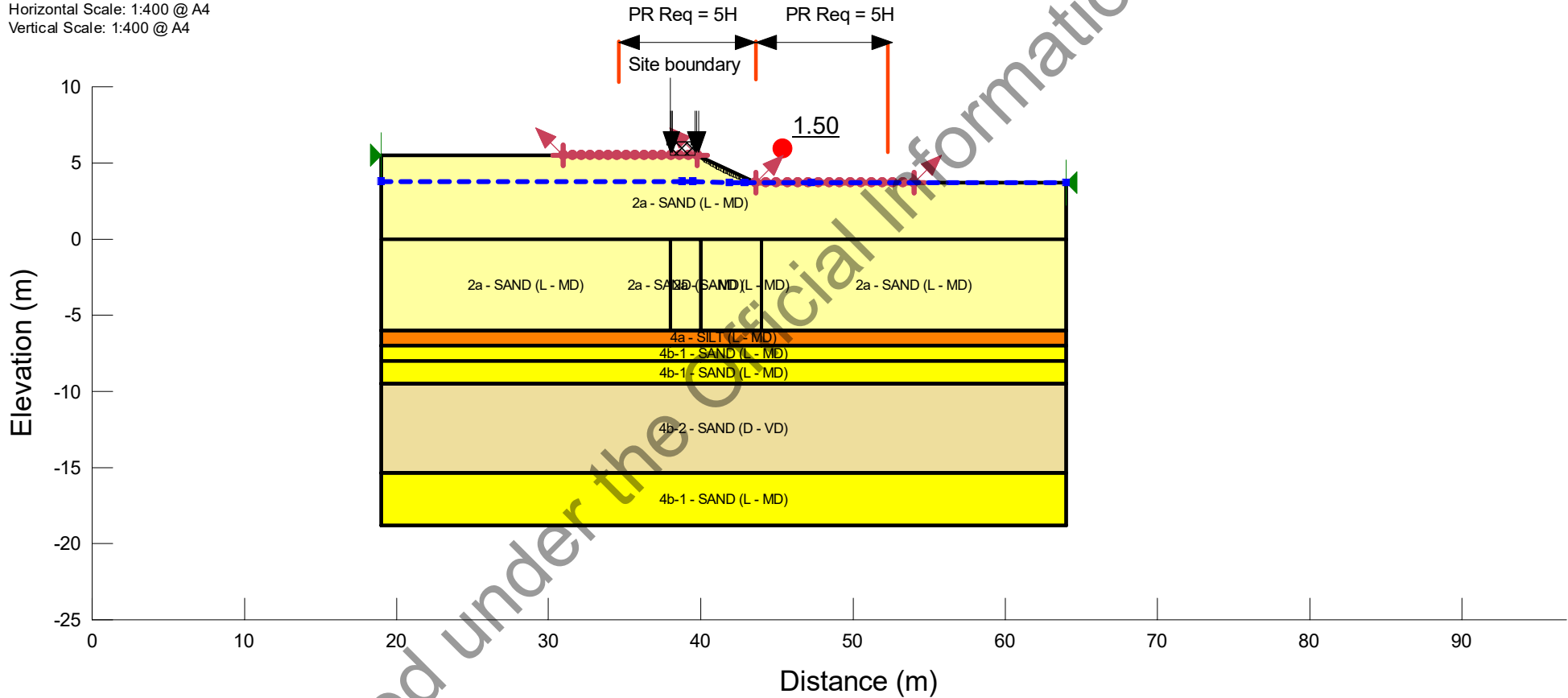
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		Analysis: RW05 3.2m section 3 Case 6 ULS E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:500 @ A4

Analysis Notes:

1. Name: 2:1 Slope 1.8m Case 2 Static Long term
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:400 @ A4
 Vertical Scale: 1:400 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi' (°)	Phi-B (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17	0	35	0	1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16	2	27	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17	0	32	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19	0	36	0	1



Horizontal Coefficient: 0 g



Title: MGI_underpass_slope 1.8m 2 to 1_v1.gsz

Date Analysed: 15/03/2019

Analysis: 2:1 Slope 1.8m Case 2 Static Long term

Analysed by: CCHE

Comments:

Scale: 1:400 @ A4

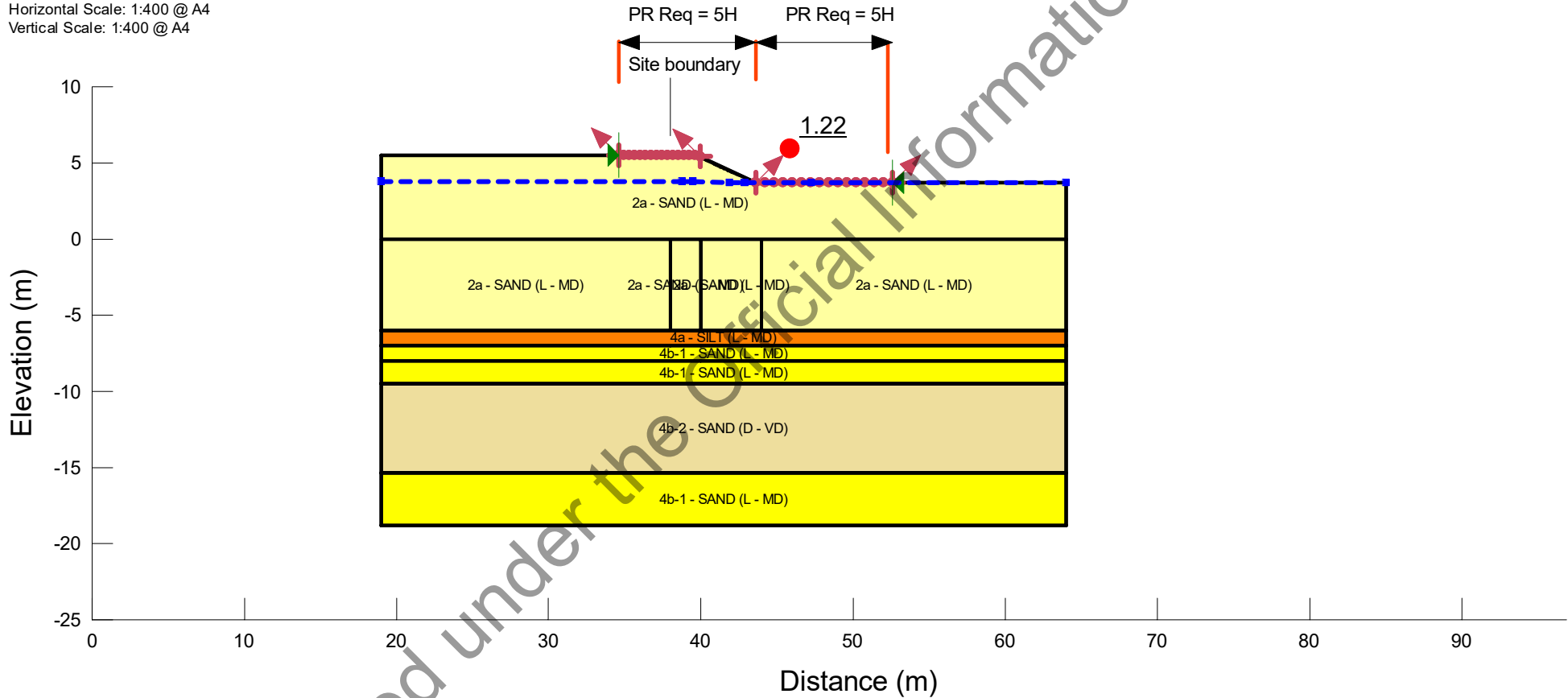
Checked by: BJFR (15/03/2019)

Analysis Notes:



1. Name: 2:1 Slope 1.8m Case 5 SLS E-E
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.11

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:400 @ A4
 Vertical Scale: 1:400 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Cohesion (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17	0	35	0	0	0	1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16	2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17	0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19	0	36	0	0	0	1



Horizontal Coefficient: 0.11 g

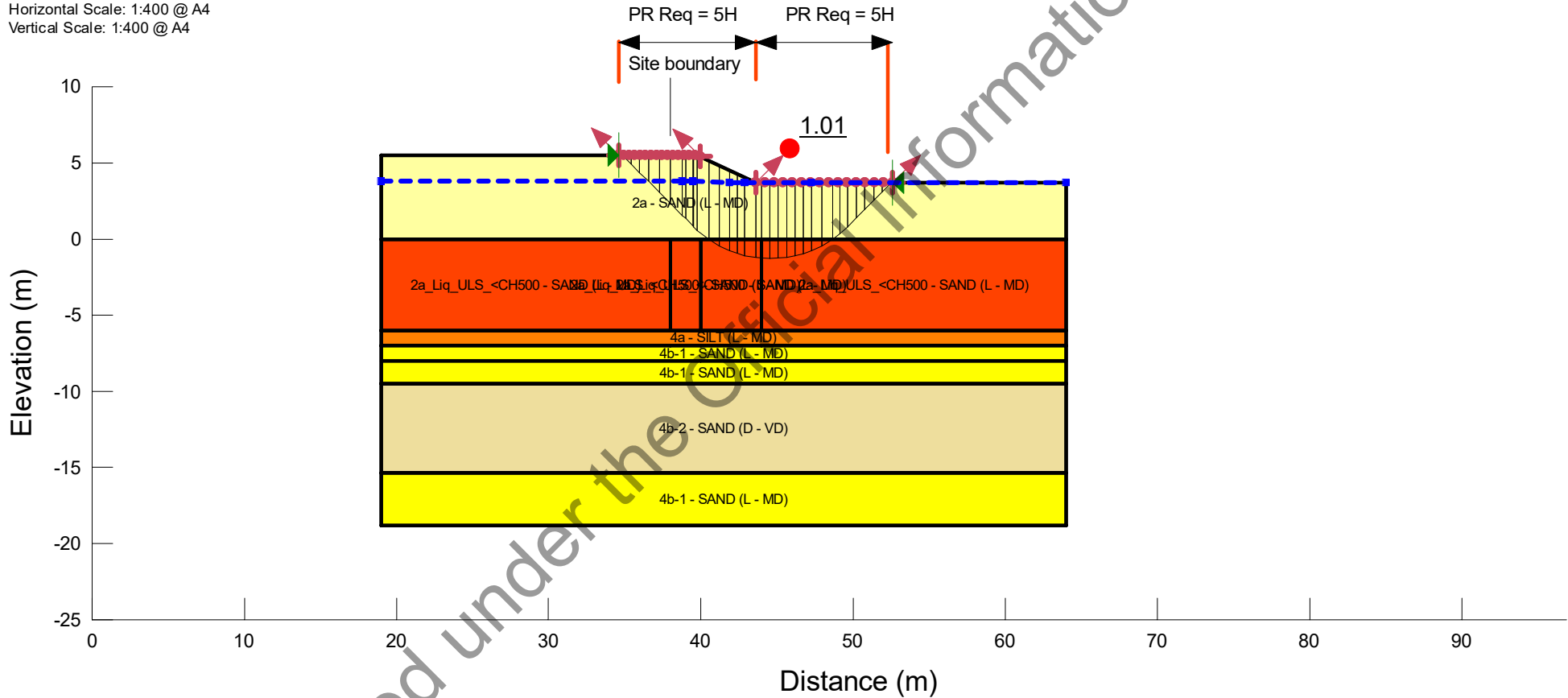
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		Analysis: 2:1 Slope 1.8m Case 5 SLS E-E	Analysed by: CCHE
		Comments:	Scale: 1:400 @ A4

Analysis Notes:



1. Name: 2:1 Slope 1.8m Case 6 ULS E-E yield
2. Method: Morgenstern-Price
3. Direction of movement: Left to Right
4. Slip Surface Option: Entry and Exit
5. PWP Conditions Source: Piezometric Line
6. Tension Crack Option: (none)
7. F of S Calculation Option: Constant
8. Horz Seismic Load: 0.22

Unit Weight of Water: 9.807 kN/m³
 Horizontal Scale: 1:400 @ A4
 Vertical Scale: 1:400 @ A4

Color	Name	Model	Unit Weight (kN/m ³)	Minimum Strength (kPa)	Tau/Sigma Ratio	Cohesion (kPa)	Phi' (°)	Phi-B (°)	Cohesion R (kPa)	Phi R (°)	Piezometric Line
Yellow	2a - SAND (L - MD)	Mohr-Coulomb	17			0	35	0	0	0	1
Red	2a_Liq_ULS_<CH500 - SAND (L - MD)	SHANSEP	17	0	0.12						1
Orange	4a - SILT (L - MD)	Mohr-Coulomb	16			2	27	0	0	0	1
Light Yellow	4b-1 - SAND (L - MD)	Mohr-Coulomb	17			0	32	0	0	0	1
Light Brown	4b-2 - SAND (D - VD)	Mohr-Coulomb	19			0	36	0	0	0	1



Horizontal Coefficient: 0.22 g

		Title: MGI_underpass_slope 1.8m 2 to 1_v1.gsz	Date Analysed: 15/03/2019
		Analysis: 2:1 Slope 1.8m Case 6 ULS E-E yield	Analysed by: CCHE
		Comments:	Scale: 1:400 @ A4

Appendix C: Newmark Block Slide Displacement
Calculations

Released under the Official Information Act 1982

Project: **B2B - underpass**
 Job No: **852094.0010**

Date: 11/03/2019

Computed: CCHE
 Checked: STT

MGI Ramp underpass - Transverse - Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.42		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	0.46	g	Peak ground acceleration (g)
kmax	0.46		Design acceleration coefficient
kc	0.18		Yield acceleration coefficient
M	6.9		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	N/A	25.0	N/A
	Ambraseys & Srbulov (1995)	N/A	35.0	N/A
	Martin & Qiu (NCHRP Report 2008)	N/A	40.0	N/A
	Average	N/A	35.0	N/A

PGV/PGA = 30

Released under the Official Information Act 1982

Project: **B2B - underpass**
 Job No: **852094.0010**

Date: 15/03/2019

Computed: CCHE
 Checked: STT

MGI Ramp underpass - Transverse - Differential displacement

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.42		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	0.46	g	Peak ground acceleration (g)
kmax	0.46		Design acceleration coefficient
kc	0.225		Yield acceleration coefficient
M	6.9		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	N/A	10.0	N/A
	Ambraseys & Srbulov (1995)	N/A	20.0	N/A
	Martin & Qiu (NCHRP Report 2008)	N/A	20.0	N/A
	Average	N/A	20.0	N/A

PGV/PGA = 30

Released under the Official Information Act 1982

Project: B2B - Detailed Design - underpass
 Job No: 852094.0010

Date: 7/03/2019

Computed: CCHE
 Checked: BJFR (13/13/2019)

RW01 Section 1 4.2m- Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.27		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	0.46	g	Peak ground acceleration (g)
kmax	0.46		Design acceleration coefficient
kc	0.08		Yield acceleration coefficient
M	6.9		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	5.0	140.0	5.0
	Ambraseys & Srbulov (1995)	10.0	175.0	5.0
	Martin & Qiu (NCHRP Report 2008)	10.0	190.0	10.0
	Average	10.0	170.0	10.0

PGV/PGA = 30

Released under the Official Information Act 1982

Project: B2B - Detailed Design - underpass
 Job No: 852094.0010

Date: 7/03/2019

Computed: CCHE
 Checked: BJFR (13/03/2019)

RW01 Section 2 4.0m - Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.2		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	N/A	g	Peak ground acceleration (g)
kmax	N/A		Design acceleration coefficient
kc	N/A		Yield acceleration coefficient
M	N/A		Magnitude
R	N/A	km	Radius to event
PGV	N/A	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	10.0	N/A	10.0
	Ambraseys & Srbulov (1995)	20.0	N/A	15.0
	Martin & Qiu (NCHRP Report 2008)	40.0	N/A	40.0
	Average	25.0	N/A	25.0

PGV/PGA = 30

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Project: B2B - Detailed Design - underpass
 Job No: 852094.0010

Date: 7/03/2019

Computed: CCHE
 Checked: BJFR (13/03/2019)

RW01 Section 3 3.0m - Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.17		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	N/A	g	Peak ground acceleration (g)
kmax	N/A		Design acceleration coefficient
kc	N/A		Yield acceleration coefficient
M	N/A		Magnitude
R	N/A	km	Radius to event
PGV	N/A	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	20.0	N/A	15.0
	Ambraseys & Srbulov (1995)	35.0	N/A	20.0
	Martin & Qiu (NCHRP Report 2008)	65.0	N/A	65.0
	Average	40.0	N/A	35.0

PGV/PGA = 30

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Project: B2B - Detailed Design - underpass
 Job No: 852094.0010

Date: 8/03/2019

Computed: CCHE
 Checked: BJFR (13/03/2019)

RW01 Section 4 2.0m - Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.22		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	N/A	g	Peak ground acceleration (g)
kmax	N/A		Design acceleration coefficient
kc	N/A		Yield acceleration coefficient
M	N/A		Magnitude
R	N/A	km	Radius to event
PGV	N/A	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	10.0	N/A	5.0
	Ambraseys & Srbulov (1995)	15.0	N/A	10.0
	Martin & Qiu (NCHRP Report 2008)	30.0	N/A	30.0
	Average	20.0	N/A	15.0

PGV/PGA = 30

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Project: B2B - underpass
 Job No: 852094.0010

Date: 12/03/2019

Computed: CCHE
 Checked: BJFR (13/03/2019)

RW02 Section 1 3.9m- Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.21		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	0.46	g	Peak ground acceleration (g)
kmax	0.46		Design acceleration coefficient
kc	0.04		Yield acceleration coefficient
M	6.9		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	10.0	495.0	10.0
	Ambraseys & Srbulov (1995)	20.0	460.0	10.0
	Martin & Qiu (NCHRP Report 2008)	35.0	430.0	35.0
	Average	25.0	465.0	20.0

PGV/PGA = 30

Released under the Official Information Act 1982

Project: B2B - underpass
 Job No: 852094.0010

Date: 7/03/2019

Computed: CCHE
 Checked: BJFR (13/03/2019)

RW02 Section 2 3.9m- Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.16		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	0.46	g	Peak ground acceleration (g)
kmax	0.46		Design acceleration coefficient
kc	0.07		Yield acceleration coefficient
M	6.9		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions Confidence Level		Displacements		
		Case 6 (ULS) 16% (mm)	Case 7 (MCE) 50% (mm)	2x ULS Events 50% (mm)
Methods	Jibson (2007)	20.0	185.0	15.0
	Ambraseys & Srbulov (1995)	40.0	215.0	20.0
	Martin & Qiu (NCHRP Report 2008)	80.0	225.0	80.0
	Average	50.0	210.0	40.0

PGV/PGA = 30

Released under the Official Information Act 1982

Project: B2B - underpass
 Job No: 852094.0010

Date: 5/03/2019

Computed: CCHE
 Checked: BJFR (13/03/2019)

RW02 Section 3 3.2m - Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.33	g	Peak ground acceleration (g)
kmax	0.33		Design acceleration coefficient
kc	0.105		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	N/A	g	Peak ground acceleration (g)
kmax	N/A		Design acceleration coefficient
kc	N/A		Yield acceleration coefficient
M	N/A		Magnitude
R	N/A	km	Radius to event
PGV	N/A	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	35.0	N/A	25.0
	Ambraseys & Srbulov (1995)	60.0	N/A	35.0
	Martin & Qiu (NCHRP Report 2008)	100.0	N/A	100.0
	Average	65.0	N/A	55.0

PGV/PGA = 30

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Project: B2B - underpass
 Job No: 852094.0010

Date: 5/03/2019

Computed: CCHE
 Checked: BJFR (13/03/2019)

RW02 Section 4 2.5m - Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.33	g	Peak ground acceleration (g)
kmax	0.33		Design acceleration coefficient
kc	0.135		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	N/A	g	Peak ground acceleration (g)
kmax	N/A		Design acceleration coefficient
kc	N/A		Yield acceleration coefficient
M	N/A		Magnitude
R	N/A	km	Radius to event
PGV	N/A	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	20.0	N/A	15.0
	Ambraseys & Srbulov (1995)	35.0	N/A	20.0
	Martin & Qiu (NCHRP Report 2008)	55.0	N/A	55.0
	Average	40.0	N/A	30.0

PGV/PGA = 30

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Project: B2B - underpass
 Job No: 852094.0010

Date: 8/03/2019

Computed: CCHE
 Checked: BJFR (13/03/2019)

RW04 Section 1 4.0m- Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.18		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	0.46	g	Peak ground acceleration (g)
kmax	0.46		Design acceleration coefficient
kc	0.11		Yield acceleration coefficient
M	6.9		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	15.0	75.0	10.0
	Ambraseys & Srbulov (1995)	30.0	105.0	15.0
	Martin & Qiu (NCHRP Report 2008)	55.0	115.0	55.0
	Average	35.0	100.0	30.0

PGV/PGA = 30

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Project: B2B - underpass
 Job No: 852094.0010

Date: 8/03/2019

Computed: CCHE
 Checked: BJFR (13/03/2019)

RW04 Section 2 3.5m - Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.145		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	N/A	g	Peak ground acceleration (g)
kmax	N/A		Design acceleration coefficient
kc	N/A		Yield acceleration coefficient
M	N/A		Magnitude
R	N/A	km	Radius to event
PGV	N/A	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS)	Case 7 (MCE)	2x ULS Events
Confidence Level		16%	50%	50%
		(mm)	(mm)	(mm)
Methods	Jibson (2007)	30.0	N/A	20.0
	Ambraseys & Srubulov (1995)	50.0	N/A	30.0
	Martin & Qiu (NCHRP Report 2008)	100.0	N/A	100.0
	Average	60.0	N/A	50.0

PGV/PGA = 30

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Project: B2B - Detailed Design - underpass
 Job No: 852094.0010

Date: 7/03/2019

Computed: CCHE
 Checked: BJFR (14/03/2019)

RW05 Section 1 3.9m- Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.42	g	Peak ground acceleration (g)
kmax	0.42		Design acceleration coefficient
kc	0.15		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	0.46	g	Peak ground acceleration (g)
kmax	0.46		Design acceleration coefficient
kc	< 0.01		Yield acceleration coefficient
M	6.9		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions Confidence Level		Displacements		
		Case 6 (ULS) 16% (mm)	Case 7 (MCE) 50% (mm)	2x ULS Events 50% (mm)
Methods	Jibson (2007)	25.0	> 500	20.0
	Ambraseys & Srbulov (1995)	45.0	> 500	25.0
	Martin & Qiu (NCHRP Report 2008)	90.0	> 500	90.0
	Average	55.0	> 500	45.0

PGV/PGA = 30

Released under the Official Information Act 1982

Project: B2B - underpass
 Job No: 852094.0010

Date: 7/03/2019

Computed: CCHE
 Checked: BJFR (14/03/2019)

RW05 Section 2 3.5m - Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.33	g	Peak ground acceleration (g)
kmax	0.33		Design acceleration coefficient
kc	0.15		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	N/A	g	Peak ground acceleration (g)
kmax	N/A		Design acceleration coefficient
kc	N/A		Yield acceleration coefficient
M	N/A		Magnitude
R	N/A	km	Radius to event
PGV	N/A	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions		Displacements		
		Case 6 (ULS) 16% (mm)	Case 7 (MCE) 50% (mm)	2x ULS Events 50% (mm)
Methods	Jibson (2007)	15.0	N/A	10.0
	Ambraseys & Srbulov (1995)	25.0	N/A	15.0
	Martin & Qiu (NCHRP Report 2008)	40.0	N/A	40.0
	Average	30.0	N/A	25.0

PGV/PGA = 30

Released under the Official Information Act 1982

Project: B2B - underpass
 Job No: 852094.0010

Date: 7/03/2019

Computed: CCHE
 Checked: BJFR (14/03/2019)

RW05 Section 3 3.2m - Multi Stage Pseudo-static Analysis

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case 6 (ULS Shaking Event)

PGA	0.33	g	Peak ground acceleration (g)
kmax	0.33		Design acceleration coefficient
kc	0.13		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	N/A	g	Peak ground acceleration (g)
kmax	N/A		Design acceleration coefficient
kc	N/A		Yield acceleration coefficient
M	N/A		Magnitude
R	N/A	km	Radius to event
PGV	N/A	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions Confidence Level		Displacements		
		Case 6 (ULS) 16% (mm)	Case 7 (MCE) 50% (mm)	2x ULS Events 50% (mm)
Methods	Jibson (2007)	20.0	N/A	15.0
	Ambraseys & Srbulov (1995)	35.0	N/A	20.0
	Martin & Qiu (NCHRP Report 2008)	60.0	N/A	60.0
	Average	40.0	N/A	35.0

PGV/PGA = 30

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Project: B2B - Detailed Design - underpass
 Job No: 852094.0010

Date: 12/03/2019

2 to 1 Slope adjacent to RW02

Computed: CCHE
 Checked: BJFR (15/03/2019)

Determine seismic and liquefaction induced lateral displacements using three methods

Purpose

BM3 Section 6.3.2 - assessment of slope or land stability in earthquakes, requires using at least three different commonly accepted methods for the assessment of displacements. This spreadsheet presents the calculations of 3 displacement methods

Displacement methods:

- 1) Ambraseys & Srbulov (1995)
- 2) Jibson (2007)
- 3) Martin & Qiu (NCHRP report 611)

Input for Case6 (ULS Shaking Event)

PGA	0.33	g	Peak ground acceleration (g)
kmax	0.33		Design acceleration coefficient
kc	0.22		Yield acceleration coefficient
M	5.7		Magnitude
R	15	km	Radius to event
PGV	30	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Input for Case 7 (MCE Shaking Event)

PGA	N/A	g	Peak ground acceleration (g)
kmax	N/A		Design acceleration coefficient
kc	N/A		Yield acceleration coefficient
M	N/A		Magnitude
R	N/A	km	Radius to event
PGV	N/A	xPGA	(30 for distant fault, 60 for near fault - Based on NCHRP 472)

Displacement Summary

Design conditions Confidence Level		Displacements		
		Case 6 (ULS) 16% (mm)	Case 7 (MCE) 50% (mm)	2x ULS Events 50% (mm)
Methods	Jibson (2007)	5.0	N/A	5.0
	Ambraseys & Srbulov (1995)	5.0	N/A	5.0
	Martin & Qiu (NCHRP Report 2008)	10.0	N/A	10.0
	Average	10.0	N/A	10.0

PGV/PGA = 30

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Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	BR05 MGI Underpass Structural Elements	Page:	1 of 17
Package Ref No.:	B2B-PP-BR05-01	Prepared By:	s 9(2)(a) (Jacobs)
Date:	8th March 2019	Reviewed By:	s 9(2)(a) (Jacobs)
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	MGI Underpass Pricing Pack		

The following is provided for the purposes of estimating the pricing package for the MGI Underpass

Package Inclusions / Exclusions

This package covers the following project elements:

General

This package covers Bridge 05 – MGI Underpass, carrying the proposed shared user path under the Maunganui Road/Girven Road Intersection (MGI) and BR01 – MGI Overpass Northern approach embankment. The structure is located at a chainage of approximately 355m on the main alignment MC10. The preliminary design general arrangement is shown in the attached drawing B2B-BRG-BR05-8501. The structure consists of a hybrid precast/in-situ cast concrete box with general internal dimensions of 4.5m wide by 3m high with a total closed box length of 54.6m long. Approach ramps at either end of the box consist of in-situ U-shaped concrete structures of varying width and length (refer drawings) to suit the local geometry and urban design requirements. A footbridge is cantilevered off the headwall of the underpass at the Bayfair end, carrying the footpath along Manganui Road where it spans over the underpass opening.

Shared User Path Cross Section

The shared user path through the concrete box is at least 4.50m wide as per client requirements and additionally splayed at each end to provide enhanced sightlines, to provide crime prevention through environmental design (CPTED). Along the approach ramps at each end, the minimum shared user path width requirement is met, however the width varies along the length of the ramps to suit local geometry and urban design requirements.

Structural Aperture

The box-structure has a vertical clearance of approximately 3.0m above the shared user path surface before the application of a 50mm min. thickness floor overlay which takes out 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.

No permanent structural elements such as potential approach ramp or footbridge lighting features, or signage can encroach into the Tauranga Airport take-off climb surface which is 19.9m above mean sea level (AMSL) at the structure location. During construction, it is possible for construction equipment to encroach into the take-off climb surface; however, all equipment must remain below the airport approach obstacle limitation surface (OLS) of 28.9m AMSL at the structure location. For further

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	BR05 MGI Underpass Structural Elements	Page:	2 of 17
Package Ref No.:	B2B-PP-BR05-01	Prepared By:	s 9(2)(a) [redacted] (Jacobs)
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information, including the consultation with affected parties required, to allow encroachment into the take-off climb surface during construction, refer to Items 13 and 14 of Clause 1.22.2 of the IFT.

Main Box-Structure

The BR05 – MGI Underpass 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 Box at Underpass Ends

Due to visibility and CPTED factors, the internal box width splays out at the ends, opening up 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.

Pedestrian Footbridge

A 1800mm wide concrete footbridge 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 shall comply with Clause F4 of the NZ Building Code.

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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.

Edge Protection

The new pedestrian underpass alignment results 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 are located on top of ramp walls where the alignment provides a direct risk to underpass users. Refer to the Roading Design Pricing Package, for further information on traffic barrier requirements.

The top edges of the approach ramps are accessible by members of the public, thus fall restraint for 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.

Refer to the Urban Design Pricing Package for aesthetic treatments of the edge and median protection elements.

Ground Water / Waterproofing / Drainage

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.

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 shall consist of bentonite membrane. In addition, the joints between precast wall panels shall be sealed

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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.

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 pricing package for further drainage details.

Permanent Graffiti Protection

All exposed surfaces of the box-structure and approach ramps are considered 'accessible' as per PR Clauses A4.12.6, A5.11.2, A5.11.3, A8.4 and A11.3.8, as well as Clause 4.12.9 of the Bridge Manual. Therefore, permanent graffiti protection is to be provided to all exposed surfaces in accordance with these clauses. The floor of the underpass and ramps will not have anti-graffiti coatings due to slip resistance requirements.

Refer to the Urban Design pricing pack for any aesthetic treatment to be incorporated with the anti-graffiti treatment.

Corrosion Protection

The structure is generally of reinforced concrete construction with cover specified to achieve a 100-year design life without corrosion maintenance or replacement.

Ancillary steel items on the structure include:

- Edge barrier top rail and support fixings;
- Approach ramp, footbridge and stairwell handrails;
- Light fittings and their support fixings.

Corrosion protection for the above elements on accessible surfaces are to be HDG600 hot dipped galvanised. Inaccessible areas such as internal surfaces of the same elements are to have HDG900 hot dipped galvanization. Alternatively, pigmented paint coatings complying with 'Protective coatings for steel bridges' by NZTA may be used.

Corrosion protection for the post-tensioned tendons shall consist of the following multi-layered system:

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1. Grout to CIA Z3 *Grouting of prestressing ducts*
2. Sealed proprietary plastic ducts
3. Proprietary duct couplers between precast segments
4. Full epoxy coating of segment joints (i.e. between adjacent precast elements)
5. Waterproofing already applied to the box

Steel Densities:

Steel densities are based on the final reinforcing rates calculated from previous detailed and tender design work for structures of a similar form as well as preliminary sectional analysis undertaken to date. **These are typical only.**

- Prestressed beams 200kg/m3
- Deck over prestressed beams 210kg/m3
- Precast or cast in-situ underpass walls 270kg/m3
- Cast in-situ underpass roof slab 300kg/m3
- Cast in-situ underpass floor slab 300kg/m3
- Cantilever Footbridge 200kg/m3
- Wingwalls 220kg/m3
- Settlement Slabs 200kg/m3
- Approach Ramp Slabs (Within 1.5m of Wall) 250kg/m3
- Approach Ramp Slabs (Elsewhere) 200kg/m3
- Approach Ramp Walls (Lower Half) 250kg/m3
- Approach Ramp Walls (Upper Half) 200kg/m3
- L-Shaped Retaining/Barrier Walls 250kg/m3
- Post-tensioning tendons 30kg/m3 of precast wall panel

Lighting:

Artificial lighting will be provided at regular distances along one side of the underpass. The potential for natural lightwells will be investigated during detailed design. For full details of the lighting design, refer to the lighting pricing package and the urban design pricing pack.

Services:

It is not envisaged for the underpass to carry any services except for 50mm dia. conduits for the artificial underpass lighting.

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There is existing 400mm dia. Bundled cabling proposed to span beneath the footbridge at the Bayfair end opening.

Refer to the utilities pricing package for full details on the utilities strategy.

Not included in this package:

- Urban design, landscaping and Planting – refer to the Urban Design Pricing Package
- The geotechnical design and ground Improvements – refer to the Geotechnical Pricing Packages
- Drainage – refer to the Drainage Pricing Package
- Utilities – refer to Utilities Pricing Package

Compliance with the Principal's Requirements

This package has been prepared in accordance with the following sections of the PR's and the Design Philosophy Statement.

- The design has been prepared generally in accordance with Principal's Requirements (PRs) Appendix A4 'Structures';
- Supplementary Principal's Requirements (via Contract Instruction No. 0701);
- Chapter 6 of the Design Philosophy Statement (dated 21/12/2018)
- NZ Building Code Clauses B1 and F4
- NZTA Bridge Manual (3rd Ed, Amend. 1);
- NZTA Highway Structures Design Guide (1st Ed, Amend. 0) Section 5.4

Attachments

Drawings:

B2B-BRG-BR05-5001, B2B-BRG-BR05-5002, B2B-BRG-BR05-5003, B2B-BRG-BR05-5004, B2B-BRG-BR05-5005, B2B-BRG-BR05-8501, B2B-BRG-BR05-8502, B2B-BRG-BR05-8503, B2B-BRG-BR05-8511, B2B-BRG-BR05-8512

Sketches:

N/A

Other Documents:

N/A

Specification Details

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- Refer to the attached General Notes Drawings B2B-BRG-BR05-5001, B2B-BRG-BR05-5002, B2B-BRG-BR05-5003, B2B-BRG-BR05-5004, B2B-BRG-BR05-5005, and relevant notes in structure specific drawings
- B2B-S-SP-5600 Specification for Structural Concrete;
- B2B-S-SP-5650 Specification for Structural Steelwork;

Completeness of Design For Pricing

The following elements of the structure have been developed to preliminary pricing design stage for costing. These have been designed using preliminary information and may change at Detailed Design:

The following items are required to be taken into account prior to pricing:

- Box section, footbridge and approach ramps have been assessed as simple line models with a simplified approach to foundation stiffness and structural loading.
- Miscellaneous structural elements such as the settlement slab and barriers are based on previous detailed design and have not assessed for correctness.

Qualifications / Assumptions / Departures / Awaiting information

In preparing this price package the following assumptions have been made:

- Structural concrete weight taken as 2600kg/m³. Soil weights have been taken as per Table 3.1 of the Geotechnical Interpretive Report – Addendum (B2B-G-RP-6002-A);
- For the box segment under the at-grade road (shallow section), seismic effects have been considered based on RRU84's seismic increment method as a 'rigid' structure. For the box segment under the BR01 ramp (deep section), seismic effects have been considered based on the orthogonal stressed at infinity method as defined in 'Seismic Design of Bridges' (NZSEE, 1980);
- Groundwater and buoyancy effects have been considered during the following three scenarios: 2m RL (sensitivity test), 3.8m RL and 6m RL;
- HN-HO-72 traffic loading on the shallow box section has been applied with applicable load spread allowances as defined in Clause 4.10.2 of the NZTA Bridge Manual. Due to the large overburden of the deep box section, HN and HO traffic loading have been applied as common surcharges as defined in Clause 3.4.12 of the NZTA Bridge Manual;

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- Soil spring stiffness, soil resistance capacities and soil capacity reduction factors have been preliminarily based on those used for the BR01 MGI Overpass pier design (Ref. B2B-G-RP-6303-C) as advised by the Geotechnical Designers. This will be confirmed at detailed design.
- Preliminary design suggests that the structure is sufficient to support and resist the design level permanent forces and seismic forces/displacements imposed on the structure the structure – particularly the expected seismic slope movements. No specific assessment has been completed for geotechnical slope movements at this design stage. It is expected that the box section will hinge in the MCE event at the location of the in-situ joints, and that this could be accommodated in the detailed design.
- Tsunami/Debris Loads on structural elements have not been assessed. Structural elements that withstand these forces are assumed to be adequate. This may change at Detailed Design.
- Wind/Snow/Fatigue/Horizontal Traffic/Creep-Shrinkage/Temperature/Ponding/Vibration and Locked-In Loads/Forces have been assumed to be non-critical. These may become critical loads at Detailed Design.
- Construction loading on the structure will not exceed 1.5kPa until the concrete strength of the deck reaches 20MPa.
- It is assumed that all existing utilities and B2B design elements (installed or proposed) can be moved/protected/other to accommodate the design shown within this pricing pack. Contractor's utility designer to consider utility locations to avoid clashing with the structure.
- Barriers and associated connections to the box-section and approach ramps have not been assessed. Refer to 'Steel Densities' for generic reinforcement rates of these elements.
- Section sizes and reinforcing requirements of the **L-walls** at the end of the Matapihi Ramp have been determined from previous structural tender and detailed designs. No specific sectional design has been completed for this tender with the exception of the design tasks noted elsewhere.
- The above **L-Wall** assessment has not been reviewed by Geotechnical Designers;
- Preliminary design suggests that the **L-Shaped** Retaining/Barrier Walls are sufficient to support and resist the design level permanent, overturning and seismic forces from the structure but this may change at detailed design.
- Vehicle impact forces on structural elements have only been assessed to preliminary design level. Structural elements that withstand these forces are assumed to be adequate. This may change at detailed design.
- No allowance has been made for any temporary works, construction techniques or tolerances unless specifically noted otherwise.

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- The dead load of the services hanging underneath the footbridge were not quantified, therefore have not been included in the sizing of the footbridge slab.

The following departures have been accepted by the Principal:

N/A

The following departures have been applied for and declined by the Principal:

N/A

The following departures will need to be applied for and accepted by the Principal:

N/A

Designer needs to complete the following actions to verify the tender advice:

- Normal design development undertaken during detailed design

Supplementary investigation or further information required:

- Normal design development undertaken during detailed design

Other relevant comments including Safety-in-Design / Maintenance-in-Design Constructability / O&M:

Safety-in-Design

- CPTED workshop feedback comments such as splayed openings and urban design have been incorporated into the design – to be led by the Urban Designers;
- Pedestrian barriers complying with Clause F4 of the NZ Building Code have been incorporated to mitigate fall hazards;

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- Should CPTED future feedback require the underpass span to be increased to 5.0m clear, it is unlikely to require larger section sizes. Steel density is likely to remain the same.

Constructability

- 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 crane restrictions under the Tauranga Airport flight path;
- The three box segments have been selected to match the traffic switch strategy;
- The central box is set at a higher initial level to allow it to settle along with the ramp prior to being stitched;
- The overlay provides an even surface should the three segments not line up perfectly prior to stitching

Construction Sequence

The construction sequence assumed for the structure to build up design loads is as follows. This may change at Detailed Design. Constructor is to agree methodology for TTM/ Environmental Controls/ Heavy Lifts/ Access Roads/ Etc.

- 1) Identify/relocate/protect utilities
- 2) Introduce TTM 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;

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- 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

Post-tensioning procedures

In reference to construction step 5b) above the following steps are envisaged. This procedure shall be finalised by the post-tensioning design/subcontractor:

- 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 install and stressing operations;
- 7) Tendons are stressed and anchors locked up;
- 8) Connecting in-situ concrete elements are installed;
- 9) Hydrophilic seals are installed;

Operations and Maintenance

- Major structural elements are of reinforced and post-tensioned concrete construction. Appropriate cover has been provided to achieve a 100-year design life without ongoing corrosion protection maintenance or replacement;

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<ul style="list-style-type: none"> The post-tensioning system shall be protected with an appropriate combined ducting, grouting and sealing system to allow a 100-year design life; Steel elements such as lighting fixtures and pedestrian barriers are easily accessible for inspection and maintenance. Coatings have been specified to achieve time to first maintenance requirements; The underpass and approach ramps have been waterproofed as 'tanked' structures such that a groundwater pump is not required to prevent water ingress into the underpass and ramps; Anti-graffiti coatings have been specified to allow straight forward remediation of graffiti damage 		
Innovations & WOL considerations:		
<ul style="list-style-type: none"> As noted above 		
Overview of RISKS and Design Unknowns (to be considered in Pricing) <i>(Note: This list may not be exhaustive. There may be other risks associated with this advice not listed below):</i>		
Risk Description	Likely Impact	Suggested Mitigation
Fill material behind the box or ramp structures may not meet settlement requirements and the settlement slab may need to be extended.	Medium: Larger settlement slabs required.	Constructor to allow for in risk register.
No sectional design work has been completed on elements such as shear keys between the box section and approach ramps, shear keys between precast panels, headwalls and wingwalls etc. Initial sizing has been based on preliminary design work and compared to similar structures used on previous detailed designs.	Medium: Increase in section size and/or reinforcing steel content.	Constructor to allow for in risk register.

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Slope displacement effects on the structure have not been assessed for the 50% Concept Design stage – these may become critical design elements.	High: Increase in section size and/or reinforcing steel content in hinge regions (likely the in-situ joint zones and wall/slab connections).	Constructor to allow for in Risk Register and to allocate a contingency for reinforcement quantities in this zone. Construction to make allowances for additional structural and geotechnical design analysis time.
Wind/Snow/etc effects may be determined at Detailed Design to be critical.	Low: Increased steel densities – particularly in joints between top/bottom slabs and walls.	Constructor to allow for in risk register.
Details provided in the attached sketches are typical only. These may not be applicable in all situations.	Medium: Design and quantity changes.	Constructor to provide contingency in pricing for minor changes in detailing at Detailed Design phase.
Reinforcement rates are provided based on previous tender/Detailed Design work. They are typical and may not be suitable for this situation.	Low: Design and quantity changes.	Constructor to provide contingency for additional pricing.
The assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the design shown within this pricing pack, does not come to fruition.	High: Additional design required to accommodate or relocation of the utilities, additional costs and delay to programme.	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 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

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		work be continuous post completion of the 50% design.
Loads other than Earth Pressures/Seismic/Vehicle Loads may be determined at Detailed Design to be critical.	Low: Increased steel densities – particularly in the wall/footing connection.	Constructor to allow for in risk register.
Post Submission Value Engineering decisions result in changes to alignment/structures that are not able to be fully assessed and/or have aspects that are not captured in the Pricing Package. Details are missed due to the last-minute nature of the work	Medium: Design and quantity changes.	Constructor to allow for in risk register.
The review of the impact of structures and their construction to in-ground services may not have captured/considered all existing services / existing services may not have been identified by TCC/NZTA	Medium: Design and quantity changes.	Constructor to allow for in risk register.
Global analysis of L-walls have only been competed to preliminary design. No geotechnical review has been completed	Medium: Design and quality changes	Constructor to allow for in risk register
Ground anchors are required to hold down the approach ramps from buoyancy effects	Medium: Requirement for ground anchors	Constructor to allow for in risk register

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CPTED future feedback require the underpass span to be increased to 5.0m clear from 4.5m clear	Low: Requirement for additional material (concrete and reinforcing)	Constructor to allow for in risk register
Footbridge is unable to accommodate the dead load of the 400 dia. Bundled cables proposed to be hung below the footbridge slab	High: Increase sizing of footbridge	Constructor to allow for in risk register
Insufficient headroom underneath the footbridge to accommodate the 400 dia. bundled cables	High: Relocate service	Constructor to allow for in risk register
Bayfair end retaining wall has heel that extends beyond designation	High: Refinement of structural analysis during detailed design	Constructor to allow for in risk register
Natural lightwells, should they be required, cannot be accommodated by the structure	Medium: Additional collaboration between urban design and structural design required. May result in small lightwells to fit structural design.	Constructor to allow for in risk register
Movement demands at the movement joints between underpass opening and approach wall could lead to this area not being watertight	Medium: Quantify movement and adequateness of waterproofing during detailed design	Constructor to allow for in risk register
Post-tensioning stresses exceeds the anchoring capacities of the to anchors per panel.	Medium: Additional ducts and anchors are needed	Constructor to allow for in risk register

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Design Element:	BR05 MGI Underpass Structural Elements	Page:	16 of 17
Package Ref No.:	B2B-PP-BR05-01	Prepared By:	s 9(2)(a) [redacted] (Jacobs)
Date:	8th March 2019	Reviewed By:	s 9(2)(a) [redacted] (Jacobs)
Issued to:	s 9(2)(a) [redacted] CPB	WBS Ref:	
Reference:	MGI Underpass Pricing Pack		

Opportunities for further cost / time / WOL savings (e.g. challenges to the PR's, standards, etc.):

The following opportunities can be visited as part of value engineering exercises:

- Resize structural ramp elements from refined design development;
- Traffic barrier potentially reducing from TL5 T80HT barriers to TL4 concrete barriers based on further traffic assessments;
- The use of entire precast boxes if craneage limits and ground settlement situation is further investigated;
- The use of post-tensioning to stress the entire length of the box (included across the stitches) to economise box-section sizes;
- The use of complete in-situ concrete construction to minimise construction methods and consolidate waterproofing requirements;
- Refinement in structural section sizes based on refined analysis and design;
- Refinement in geotechnical settlement modelling from inclusion of box structural stiffness;
- Use of groundwater pumping to decrease ground water level with corresponding reduction of buoyancy effects and waterproofing requirements;
- Refined hydrological modelling could result in more favourable design groundwater conditions. Refer to drainage pricing package.
- Staircase, currently independently supported could be integrated with the ramp structures by extending the ground slab

Design Manager:

s 9(2)(a) [redacted]

Date:

8-3-19

Design Team Leader:

s 9(2)(a) [redacted]

Date:

8-3-19

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Design Element:	BR05 MGI Underpass Structural Elements	Page:	17 of 17
Package Ref No.:	B2B-PP-BR05-01	Prepared By:	s 9(2)(a) [redacted] (Jacobs)
Date:	8th March 2019	Reviewed By:	s 9(2)(a) [redacted] (Jacobs)
Issued to:	s 9(2)(a) [redacted] CPB	WBS Ref:	
Reference:	MGI Underpass Pricing Pack		

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Released under the Official Information Act 1982

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Design Element:	Drainage	Page:	1 of 11
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Date:	08 March 2019	Reviewed By:	s 9(2)(a)
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	Drainage Pricing Pack		

The following is provided for the purposes of estimating the drainage pricing package for the MGI Underpass construction.

Package Inclusions / Exclusions

This pricing package covers the following project elements prepared based on the 50% design and consists of the following:

- A brief description of the proposed drainage system consisting of the surface as well as ground water drainage. The sizes of the proposed drainage elements are preliminary which will be refined at the detailed design. These are adequate for the pricing. Further details will be provided as the design progresses.
- A drainage layout showing piped stormwater systems.
- A drainage layout for the ramps showing gravity flows and pumped systems.
- A preliminary design of the pumping station Matapihi Ramp, similar design applies for the Girven Road ramp.
- The plan and L-section of the 675 mm dia pipe that runs through the golf-course.
- A CAD drawing with the manhole invert levels shown.
- Standard drawings and sketches for use in pricing of the drainage works.
- Approximate locations and the types of existing services for the site have been shown. Their exact locations should be determined by the construction team by pot-holing. The need for the diversion or relocation of these services to construct drainage infrastructure have not been identified in this pricing advice.

Not included in this package:

The following elements are not included in this advice:

- The detailed design and longitudinal profiles of the proposed drainage pipes. This will be developed in the detailed design.

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Package Ref No.:	B2B-PP-UD-01	Prepared By:	§ 9(2)(a)
Date:	08 March 2019	Reviewed By:	§ 9(2)(a)
Issued to:	§ 9(2)(a) on CPB	WBS Ref:	
Reference:	Drainage Pricing Pack		

- Detailed design and drawings for the pumping stations.
- Detailed specifications for the pumps and associated works.
- Materials to be used for drainage pipes (Concrete, PE or PVC) are to be specified based on the construction methodology (open cut or trenchless method). No specific details are provided in this package. These materials are to be in accordance with the MRs and Tauranga City Councils specifications.
- Kerb and Channel drainage, subsoil drainage, bridge drainages, retaining wall drainages and other structural drainages (Relevant geometric/structural /geotechnical pricing packages should be referred for the details).
- The locations shown for the sumps, wet wells and valve chambers are indicative for pricing purpose. The cost associated with structural design (mass concrete to balance groundwater uplift) and sealing of the joints should be obtained from structural designs of these structures. Structural assessments of proposed manholes specially of the wet wells and valve chambers which are subjected to groundwater effects. The proposed mass concrete to counterbalance GW uplift are indicative only.
- Exact locations of existing/new services are not determined, the need to divert or replace them is not identified. It is assumed that a separate provision has been made for pricing the locations, diversions, replacements and alignments of the utility services by potholing. The costs and risks associated with utility services are not included in this advice.

Compliance with the Principal's Requirements

- This package has been prepared in accordance with the PR's and the Design Philosophy Statement.
- No departure has been identified for the drainage works. A departure will be applied for any elements not meeting the PR's.

Summary of the Drainage Design

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 new works only associated with the construction of the proposed underpass are reported in this package. The

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Reference:	Drainage Pricing Pack		

works outside of this package will form part of the original tender. The proposed drainage works consists of the following elements:

1.0 Line connecting CPMHUP01-1; CPMHUP01-2; SDMHUP01-3; SWMHUP01-4 and Outlet Structure AE-9 :

This line goes under the motorway and passes through the golf course. A consultation has been carried out with TCC and the owners of the Golf course and has been agreed in principle to construct a 675 mm dia RCRRJ Class 3 pipeline through the golf course. Due to sandy nature of the soils at the golf course, two anti-seepage collars (1200 mm x 1200 mm x150mm thick) are provided within the golf course (approximately 28 m apart) in order to prevent 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 675 mm dia pipeline should be laid in night shifts, the work schedule should be agreed with the land owners .

2.0 Line CPMHUP01-02 to SDMHUP01-3

This line passes through high embankment. The settlement under this embankment in estimated to be 72 mm approximately. A 450 mm dia pipe would be enough to convey the 50 year ARI flow but to allow for potential settlement in the pipe, a 525 mm dia Class 6 is proposed under the embankment. The swale at SDMHUP01-3 should be re-shaped to accommodate a 2.5 m long x 1.5 m wide x 150 mm thick concrete apron and a 1200 mm dia Scruffy Dome manhole. A 225 mm dia pipe is extended from this Scruffy Dome manhole to capture runoff from the access track.

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

The design approach adopted for drainage works associated with the underpass and the access ramps is described below:

- The B2B Project hydraulic modelling results for the 50-year ARI indicate a residual flooding of approximately 6.0 m RL at the Bayfair carpark. Also, the TCC flood hazard maps outside of the underpass entrances show a flood level of approximately 6.0m RL. These flood levels have been taken into consideration for the design of the underpass structure.

The groundwater levels monitored for the period between 2011 and 2016 near the underpass site show a range between 2.91 m RL and 3.70 m RL. Only one reading at BH- 06 reached a

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Reference:	Drainage Pricing Pack		

maximum of 4.83 m RL which is considered to be an isolated value. A representative groundwater level of 3.80m RL is adopted for the design. This 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. The main underpass is inaccessible for repair if it fails compared to the ramps. The main underpass structure is designed to withstand a water head from the catchment flooding of 6.0m RL. The underpass structure is completely sealed from ground water intrusion. Other infrastructures associated with the access ramps are sealed to prevent groundwater intrusion upto 3.80m RL.

- Surface runoff from access ramps above 3.80m RL are collected in the Gravity Flow chambers via grated channels and discharged to manhole SP1.2 by gravity. The maximum HGL at manhole SP1.2 at a 50-year ARI of 3.73 m RL is considered as the tail water.
- Surface runoff from access ramps below 3.80m RL which cannot be discharged to manhole SP1.2 by gravity is collected in the sumps via grated channels and pumped to the Gravity Flow Chambers from where it is allowed to flow 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 approx. (allows climate change effects for 2055 AD as per TCC COP). A conservative design has been adopted to pump 25 L/s to allow potential climate change effects after 2055 AD and for any free-flowing groundwater drainage from above 3.80m RL that may enter the Sump Wells. This also allows provision for the free-flowing groundwater from below 3.80m RL to be pumped in the future if that was required.

Ground water pumping below 3.80m RL is not considered for this design. However, future provision for pumping has been made by installing drain coils at lower levels that lead to the wet wells (See sketch no 1). These drain coils discharge to a mini-sump before discharging to the sump well via a 150 mm dia UPVC pipe. These uPVC pipes are end-capped at the wet wells which may be opened in the future if ground water pumping from below 3.80m RL was necessary. The structures are sealed for groundwater upto 3.80m RL, groundwater pumping is not considered necessary. Future provision is to allow pumping if groundwater rose above the currently observed levels and there was leakage through the walls. Not pumping groundwater now minimises energy consumption and is a more environmentally friendly approach.

- Clay blanketing is provided on the faces of the ramp batters (3.80m RL to 4.80m RL, the maximum observed ground water level in the area) to intercept ground water above 3.80m RL (refer sketch No 3). The intercepted ground water is discharged to the gravity flow chambers from where it is discharged to manhole SP1.2 by gravity.
- The Wet wells, Valve chambers and Gravity Flow Chambers should be sealed to prevent ground water intrusion, their design is a part of the structural design.
- 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

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discharge capacity of 25 L/s with a power of 6 KW (Approx.). The delivery from the Pump Stations is to the Gravity Flow chambers from where flows take place by gravity to manhole Sp1.2.

- A duty pump and a standby pump are required for both pumping stations.
- The existing pump was in operation for three hours on 25th December 2018. An investigation on the longer operation of the pumps and further discussions with the TCC Drainage Operation Engineer (Phil Bourke) concluded that this longer operation was a direct effect of the highest 1-day- rainfall of 115 mm recorded on 24th December 2018 at Whakatane (90 km east of Tauranga).
The proposed pump design is for a 50-year ARI, 10 minute- duration storm which would produce a higher peak rate for pumping compared to the longer duration storms. Instances of heavy downpour in isolated areas have been observed in the past. For such situations or for the storms exceeding a 50-year ARI, a mechanism should be developed for both pumps to operate together to prevent flooding of the underpass. This allowance to develop this mechanism should be included in the pricing pack (contact Xylem to discuss this mechanism).
- The SCADA (Supervisory Control and data Acquisition) operation system should be allowed in the pricing.
- A Pump Station control panel board should be installed for each pump station operation.
- Drainage works included in this pricing package are clouded. It is assumed that other works will be covered by the previous pricing.

Utility Services

Please note following comments 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 design shown within this pricing pack.
- Risk – The assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the design shown within this pricing pack, 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 – 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.

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Reference:	Drainage Pricing Pack		

<p>Attachments</p> <p>Drawings:</p> <ul style="list-style-type: none"> Drawings Overall drainage plan for the underpass site showing the collection of surface and groundwater Plan and sections of the stormwater pump station (Matapihi side). Same applies to the Bayfair side. Plan and Long section for pipeline running through the Golf Course. <p>Sketches:</p> <ul style="list-style-type: none"> Sketches (sketches 1,2 and 3) for groundwater drainage Preliminary calculation for pump sizes. <p>Other Documents:</p> <ul style="list-style-type: none"> Graphical presentation of the groundwater Monitoring data for the site: GWL Rev -A <p>Specification Details</p> <p>There are several products and pump suppliers in the market. The currently used FLYGT model is acceptable to TCC. The Preliminary information obtained from Xylem, who is the supplier of the FLYGT pump model is provided below. Other similar products may be considered for pricing.</p> <ul style="list-style-type: none"> Pump Specification Ref: FLYGT Model supplied by Xylem Model No : NP3127MT3-Adapvive 438 with 5.9KW power 125 mm OD HDPE SDR 17 delivery pipe. Contact: Anton Ruster, External Sales Engineer Xylem Ltd. , 9 Tawa Drive, Albany Office : 9 415 8687 Mobile:021 355 913 Email: anton.ruster @xyleminc.com Grated Channels: There are several grated channels and suppliers in the market. MEADRAINS are acceptable to NZTA (used in the NCI project). MEADRAINS -Grated channels supplied by Hydro

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Date:	08 March 2019	Reviewed By:	s 9(2)(a) Williams
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	Drainage Pricing Pack		

Construction Products may be used. The capacities of the grated channels should be 15 L/s (approx.)
 150 mm wide MEADRAIN grated channel may be used.
 Contact Tim Yandall (0800- 493 766). Mob: 027 5308830.

Completeness of Design for Pricing

The following matters require further work and refinement.

- Confirmation of 3.80m RL as the design ground water level to seal underpass and associated infrastructure
- Groundwater collection and discharge from areas above 3.80m RL;
- Confirmation of the provision for future collection and pumping (if required) of groundwater. A confirmation of the decision not to pump groundwater now.
- Pump capacities for both ramps require refining based on the groundwater management decisions.

Qualifications / Assumptions / Departures / Awaiting information

In preparing this price package the following assumptions have been made:

- This pricing package is based on the 50% drainage design. Any changes to the 50 % design as a result of the changes in other disciplines will need to be incorporated and the design updated accordingly.
- It is assumed that the ramp surface runoff above 3.80m RL can be discharged to manhole SP1.2 by gravity.
- Assumed that the ramp surface runoff below 3.80m RL will be collected in the sumps and pumped to gravity flow chambers from where it will be discharged to manhole SP1.2 by gravity.
- Assumed that the groundwater from ramp batters above 3.80 m RL upto 4.80m RL will be collected behind clay blankets and discharged to the gravity flow chambers and finally to manhole SP1.2 by gravity .

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- Ground water pumping below 3.80m RL is not considered for this design. However, future provision has been made by installing drain coils at lower levels (above underpass inverts) that lead to the sump wells.
- No allowance has been made for any temporary works, construction techniques or tolerances unless specifically noted otherwise. Please note that construction methodology and groundwater pumping are significant elements to be considered for the pricing.
- It is assumed that a separate provision has been made for pricing the locations, diversions, replacements and alignments of the utility services by potholing. The costs and risks associated with utility services are not included in this advice.
- The locations shown for the sumps , wet wells and valve chambers are indicative for pricing purpose. The cost associated with structural design (mass concrete to balance groundwater uplift) and sealing of the joints should be obtained from structural designs of these structures.

The following departures have been accepted by the Principal:

- None.

The following departures have been applied for and declined by the Principal:

None .

The following departures will need to be applied for and accepted by the Principal:

None identified at this stage .

Designer needs to complete the following actions to verify the tender advice:

- None , the design will be refined as it progresses into the next stage.

Supplementary investigation or further information required:

Exact locations of existing services should be determined from potholing. Locations of any services diverted or replaced.

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Other relevant comments including Safety-in-Design / Maintenance-in-Design Constructability / O&M:

A safety in design workshop will be required in the next stage to determine and resolve Sid/MiD risks. The following risks are identified at this stage.

- Flooding risks associated with working in and close to culvert SP-1 at rain events. This is more relevant to the work required to connect new pipe to manhole SP-1.2;
- Confined spaces within pipelines/manholes/trenches: This is more relevant to the lowering of manhole lid (SP-1.1);
- Working in the 675 mm die pipe that goes through the golf course. Night shift works will be required for construction/maintenance;
- Exposed cut batters at the ramps and road side batters
- Machinery operation on steep slopes (ramps).
- Temporary traffic management (vehicle and pedestrian traffic management);
- Public contact with contaminated water (exposure to contaminated ground water);

Innovations & WOL considerations:

- The proposed collection of surface runoff and groundwater discharge above 3.80m RL by gravity significantly reduces the quantity of pumping and is a more sustainable approach compared to collecting all water in the sumps and discharging by pumping.

Overview of RISKS and Design Unknowns (to be considered in Pricing) (Note: This list may not be exhaustive. There may be other risks associated with this advice not listed below):

Risk Description	Likely Impact	Suggested Mitigation
The proposed surface water and groundwater management may not work as designed. The underpass and lower	Medium	The proposed drainage system has been designed to collect and discharge surface runoff for a 50-year ARI (as per TCC COP). Adequate

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portions of the ramps may be flooded		pumping capacity (with the provisions of standby pumps) has been designed to pump surface runoff which cannot be discharged by gravity. The underpass is completely sealed, and the ramps are sealed from Groundwater upto 3.80m RL .
The occurrence of the extreme storm events greater than 50-year ARI and the pumps not able to cope with the runoff resulting in flooding of the underpass	Medium	The extreme events are rare. A mechanism has been proposed for both pumps to operate together in extreme storm events.
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 shown within this pricing pack. The assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the design shown within this pricing pack, does not come to fruition. 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.	Medium, likely	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.

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Date:	08 March 2019	Reviewed By:	s 9(2)(a)
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	Drainage Pricing Pack		

Clay blanketing on the ramps and groundwater drainage above 3.80 m RL may not be effective as designed resulting in the ramp batters being wet	Medium	Clay blanketing and vegetation on the batters will control groundwater seepage. Minor seepage from the batters will be collected in the dish channels constructed at toes of the batters and discharged to the gravity flow chambers.

Opportunities for further cost / time / WOL savings (e.g. challenges to the PR's, standards, etc.):

The opportunities for further time/WoL cost savings and SiD will be identified and incorporated as the design progresses.

Design Manager: s 9(2)(a)	Date: 8/3/2019
Design Team Leader: s 9(2)(a)	Date: 8/3/2019

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Design Element:	Geotechnical Ground Improvement	Page:	1 of 7
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Date:	07 March 2019	Reviewed By:	s 9(2)(a)
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	GEO Pricing Pack		

The following is provided for the purposes of estimating the pricing package for the MGI Underpass

Package Inclusions / Exclusions

This package covers the following project elements:

- Ground improvements for the MGI Underpass and Underpass ramps.

Compliance with the Principal's Requirements

This package has been prepared in accordance with the following sections of the PR's and the Geotechnical and Underpass Design Philosophy Statements.

- The design has been prepared generally in accordance with Principal's Requirements (PRs) Appendix A.
- Departure for the reduction of 5m additional ground improvement at designation boundary may need to be applied for.

Attachments

Drawings:

- B2B-DRG-GT01-6209 MGI SHARED PATH UNDERPASS - GROUND IMPROVEMENT - DRAWING INDEX SHEET
- B2B-DRG-GT01-6210 MGI SHARED PATH UNDERPASS - GROUND IMPROVEMENT – PLAN
- B2B-DRG-GT01-6211 MGI SHARED PATH UNDERPASS - GROUND IMPROVEMENT - TYPICAL DETAILS (SHEET 1)
- B2B-DRG-GT01-6212 MGI SHARED PATH UNDERPASS - GROUND IMPROVEMENT - TYPICAL DETAILS (SHEET 2)
- B2B-DRG-GT01-6220 MGI SHARED PATH UNDERPASS - GEOLOGICAL SECTION - AT UNDERPASS CENTRELINE
- B2B-DRG-GT01-6006 DETAILED DESIGN - LONGSECTION MC10 - CH 100 TO 700m –
- B2B-DRG-GT01-6142 BR01 - MGI OVERPASS AND APPROACH RAMPS - STONE COLUMN NOTES AND TARGET POST-GROUND IMPROVEMENT IN-SITU STRENGTH

Sketches:

- B2B-SKT-GT01-6002 DETAILED DESIGN - SITE INVESTIGATION PLAN - SECTION AT UNDERPASS CENTRELINE
- B2B-SKT-GT01-6620 MGI INTERSECTION - MSE RETAINING WALL RW1 (WITH UNDERPASS SHOWN) - LONG SECTION (SHEET 1)

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<ul style="list-style-type: none"> B2B-SKT-GT01-6641 MGI INTERSECTION - MSE RETAINING WALL RW2 (WITH UNDERPASS SHOWN) - LONG SECTION (SHEET 2)
<p><u>Specification Details</u></p> <ul style="list-style-type: none"> Ref #1 B2B-G-SP-6012-1 Stone Column Construction Specification Ref #2 B2B-G-SP-6010 D Earthworks Specification
<p><u>Completeness of Design For Pricing</u></p> <p>The following items are required to be taken into account prior to pricing:</p> <ul style="list-style-type: none"> #1 Underpass geometrics are 50% only and extent of ground improvement is very sensitive to geometry of retaining walls. Refer to overview of risks
<p><u>Qualifications / Assumptions / Departures / Awaiting information</u></p> <p><u>In preparing this price package the following assumptions have been made:</u></p> <ul style="list-style-type: none"> Design of the ground improvement has been based on the assumptions adopted in the design of the BR01 MGI Overpass and MGI Ground Improvement Design with amendments as indicated in the Underpass Design Philosophy Statement It is assumed that displacement criteria for the retaining walls surrounding the egress area of the Underpass will be that for ramps supporting the Motorway and not the more onerous criteria for the Underpass. It is assumed that all existing utilities and B2B design elements (installed or proposed) can be moved/protected/other to accommodate the design shown within this pricing pack including ground improvement installation. No allowance has been made for any temporary works, construction techniques or tolerances unless specifically noted otherwise. Departures required for this Underpass design will be granted by the Agency <p><u>The following departures have been accepted by the Principal:</u></p> <ul style="list-style-type: none"> None to date.

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Geotechnical Ground Improvement	Page:	3 of 7
Package Ref No.:	B2B-PP-GEO-01	Prepared By:	s 9(2)(a)
Date:	07 March 2019	Reviewed By:	s 9(2)(a)
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	GEO Pricing Pack		

The following departures have been applied for and declined by the Principal:

- None to date

The following departures will need to be applied for and accepted by the Principal:

- Possible departure required to permit reduction/removal of 5m of ground improvement buffer beyond the extent of the underpass entries due to designation constraints.

Designer needs to complete the following actions to verify the tender advice:

- Detailed design of settlement and stability analysis
- Detailed assessment of interaction of underpass and MSE walls for MGI ramp
- Design of cut off walls at Designation Boundary

Supplementary investigation or further information required:

Further hand auger ground investigation already requested

Other relevant comments including Safety-in-Design / Maintenance-in-Design Constructability / O&M:

- Excavation below the groundwater in loose sands will be required and temporary excavation and dewatering is likely to be needed

Innovations & WOL considerations:

- The element has been made integrated with the other elements to aid construction
- The use of wide Z sheets for cut off wall

Overview of RISKS and Design Unknowns (to be considered in Pricing) (Note: This list may not be exhaustive. There may be other risks associated with this advice not listed below)::

Risk Description	Likely Impact	Suggested Mitigation
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Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Geotechnical Ground Improvement	Page:	4 of 7
Package Ref No.:	B2B-PP-GEO-01	Prepared By:	s 9(2)(a)
Date:	07 March 2019	Reviewed By:	s 9(2)(a)
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	GEO Pricing Pack		

Ground improvement extent increases at detailed design as design and geometry is only at 50%, or if groundwater design level changes	Medium	Allow contingency for additional ground improvement
Cut off wall is preliminary design and may change at detailed design	Medium	Allow contingency for cut off wall pricing
Settlement is greater than predicted and releveling of pavements or footpaths over ground improved areas may be required	Medium	Review settlement monitoring results from early construction in other parts of the site and monitor settlement during construction.
Dewatering required for underpass construction is high volume resulting in consenting issues, settlement and construction delays. Excavation will be below the groundwater table in loose sand	High	Allow for staged construction and temporary support. Check with planning team for consent requirements
The assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the Underpass design shown within this pricing pack, does not come to fruition. Additional design required to accommodate the	High	Utility strategy has been embedded and developed within the progress of the 50% Concept Design. 3D model developed but based upon a limited data. Additional utility investigations undertaken specific to the underpass but are not available to inform the development of the concept design. It is recommended by

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Geotechnical Ground Improvement	Page:	5 of 7
Package Ref No.:	B2B-PP-GEO-01	Prepared By:	s 9(2)(a)
Date:	07 March 2019	Reviewed By:	s 9(2)(a)
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	GEO Pricing Pack		

utilities, additional costs and delay to programme		the design team that the utilities strategy work be continuous post completion of the 50% design
Installation of cut off wall along boundary results in risk of vibration and damage to adjacent properties	Medium	Monitor vibration if driven sheet piles are used for cut off wall. Allow for contingency for remediation of adjacent property. Undertake vibration assessment during construction works and/or install a test pile at a remote location within the site
<p>Opportunities for further cost / time / WOL savings (e.g. challenges to the PR's, standards, etc.):</p> <p>The following opportunities:</p> <ul style="list-style-type: none"> There are possible opportunities to reduce the ground improvement extent at detailed design if additional stabilising measures can be mobilised in the structural design of retaining walls and footpath slab Ground improvement could possibly be reduced if geometric design of ramps allow ramp re-alignment and size with greater stabilising effects for retaining walls (low likelihood due to CPTED requirements) 		
Design Manager:		Date:
DMMM		08/03/2019
Design Team Leader:		Date:
YFT		08/03/2019

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Geotechnical Ground Improvement	Page:	6 of 7
Package Ref No.:	B2B-PP-GEO-01	Prepared By:	s 9(2)(a)
Date:	07 March 2019	Reviewed By:	s 9(2)(a)
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	GEO Pricing Pack		

Appendix A Drawings

DRAWING NUMBER	REV	TITLE
INDEX & LAYOUT		
B2B-DRG-GT01-6209	A	MGI SHARED PATH UNDERPASS - GROUND IMPROVEMENT - DRAWING INDEX SHEET
PLAN		
B2B-DRG-GT01-6210	A	MGI SHARED PATH UNDERPASS - GROUND IMPROVEMENT - PLAN
DETAILS		
B2B-DRG-GT01-6211	A	MGI SHARED PATH UNDERPASS - GROUND IMPROVEMENT - TYPICAL DETAILS (SHEET 1)
B2B-DRG-GT01-6212	A	MGI SHARED PATH UNDERPASS - GROUND IMPROVEMENT - TYPICAL DETAILS (SHEET 2)
GEOLOGICAL SECTION		
B2B-DRG-GT01-6220	A	MGI SHARED PATH UNDERPASS - GEOLOGICAL SECTION - AT UNDERPASS CENTRELINE
RELATED SKETCHES & DRAWINGS (FROM OTHER PACKAGES)		
B2B-SKT-GT01-6002	A	MGI SHARED PATH UNDERPASS - SITE INVESTIGATION PLAN -
B2B-SKT-GT01-6620	A	MGI INTERSECTION - MSE RETAINING WALL RW1 - LONG SECTION (UNDERPASS SHOWN)
B2B-SKT-GT01-6641	A	MGI INTERSECTION - MSE RETAINING WALL RW2LONG SECTION (UNDERPASS SHOWN)
B2B-DRG-GT01-6006	B	DETAILED DESIGN - LONGSECTION MC10 - CH 100 TO 700m -

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Geotechnical Ground Improvement	Page:	7 of 7
Package Ref No.:	B2B-PP-GEO-01	Prepared By:	s 9(2)(a)
Date:	07 March 2019	Reviewed By:	s 9(2)(a)
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	GEO Pricing Pack		

B2B-DRG-GT01-6142	B	BR01 - MGI OVERPASS AND APPROACH RAMPS - STONE COLUMN NOTES AND TARGET POST- GROUND IMPROVEMENT IN-SITU STRENGTH
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FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
INDEX & LAYOUT				
B2B-DRG-GT01-6209	A	MGI SHARED PATH UNDERPASS	GROUND IMPROVEMENT	DRAWING INDEX SHEET
PLAN				
B2B-DRG-GT01-6210	A	MGI SHARED PATH UNDERPASS	GROUND IMPROVEMENT	PLAN
DETAILS				
B2B-DRG-GT01-6211	A	MGI SHARED PATH UNDERPASS	GROUND IMPROVEMENT	TYPICAL DETAILS (SHEET 1)
B2B-DRG-GT01-6212	A	MGI SHARED PATH UNDERPASS	GROUND IMPROVEMENT	TYPICAL DETAILS (SHEET 2)
GEOLOGICAL SECTION				
B2B-DRG-GT01-6220	A	MGI SHARED PATH UNDERPASS	GEOLOGICAL SECTION	AT UNDERPASS CENTRELINE
RELATED SKETCHES & DRAWINGS (FROM OTHER PACKAGES)				
B2B-SKT-GT01-6002	A	MGI SHARED PATH UNDERPASS	SITE INVESTIGATION PLAN	
B2B-SKT-GT01-6620	A	MGI INTERSECTION	MSE RETAINING WALL RW1	LONG SECTION (UNDERPASS SHOWN)
B2B-SKT-GT01-6641	A	MGI INTERSECTION	MSE RETAINING WALL RW2	LONG SECTION (UNDERPASS SHOWN)
B2B-DRG-GT01-6006	B	DETAILED DESIGN	LONGSECTION MC10 - CH 100 TO 700m	
B2B-DRG-GT01-6142	B	BR01 - MGI OVERPASS AND APPROACH RAMPS	STONE COLUMN NOTES AND TARGET POST-	GROUND IMPROVEMENT IN-SITU STRENGTH

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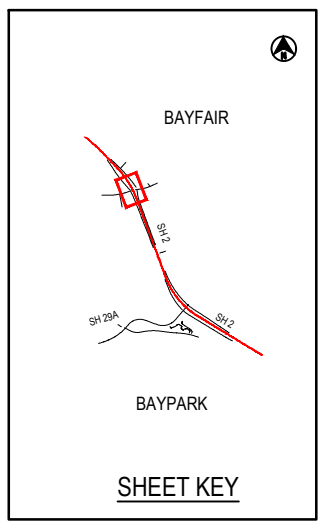
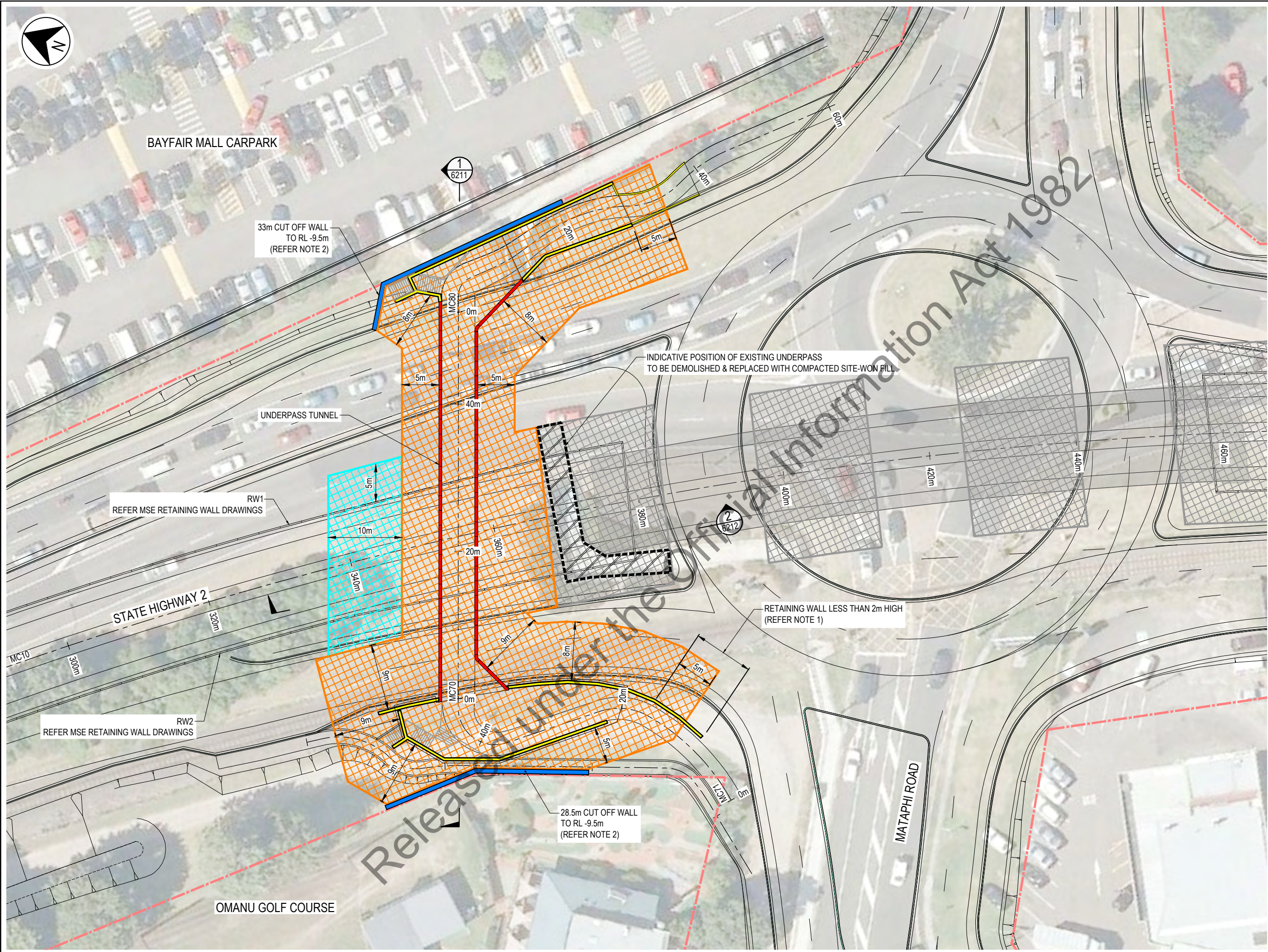
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A	08.03.19	AMM	DMMM	CJB	50% ISSUE



SCALE	NTS
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY		
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)		
DRAWN ME	DRAWING CHECK AMM	APPROVED CJB	
DESIGNED YFT	DESIGN REVIEW DMMM		

TITLE	MGI SHARED PATH UNDERPASS GROUND IMPROVEMENT DRAWING INDEX SHEET		
DRAWING No	B2B-DRG-GT01-6209		REV A



- LEGEND**
- DESIGNATION BOUNDARY
 - STONE COLUMNS EXTENDING TO RL -2.5m (MIN. ARR 8.2%)
 - STONE COLUMNS EXTENDING TO RL -8m (MIN. ARR 8.2%)
 - GROUND WORKS IN BR01 PACKAGE. REFER DRAWING B2B-DRG-GT01-6180
 - UNDERPASS TUNNEL
 - UNDERPASS RAMP
 - CUT OFF WALL (REFER NOTE 2)

- NOTE:**
1. FOR DETAILS OF THE UNDERPASS AND ASSOCIATED RETAINING WALLS REFER TO DRAWINGS B2B-DRG-BR05-8500 TO 8510.
 2. CUT OFF WALL TO BE SECANT 600mm DIA CFA PILES (10MPa CONCRETE STRENGTH) AT 1m, OR SHEET PILES AZ32 750W x 511H x 12mmT.

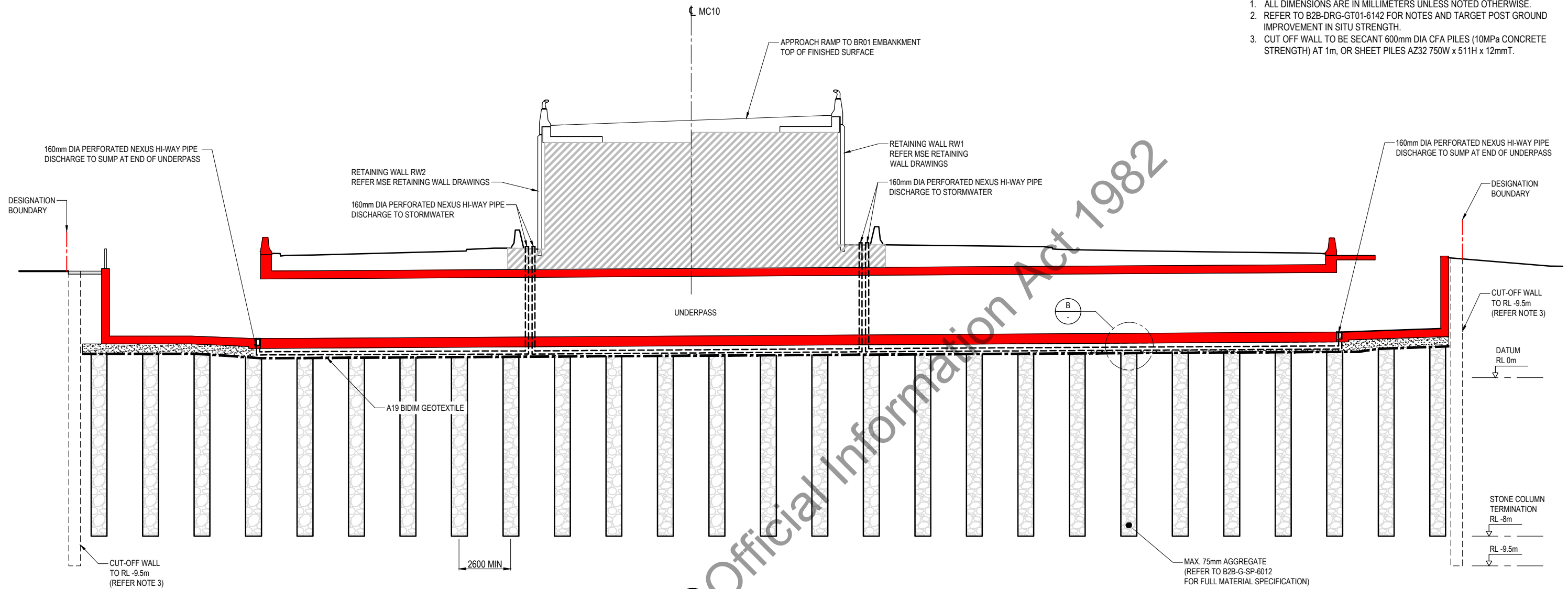
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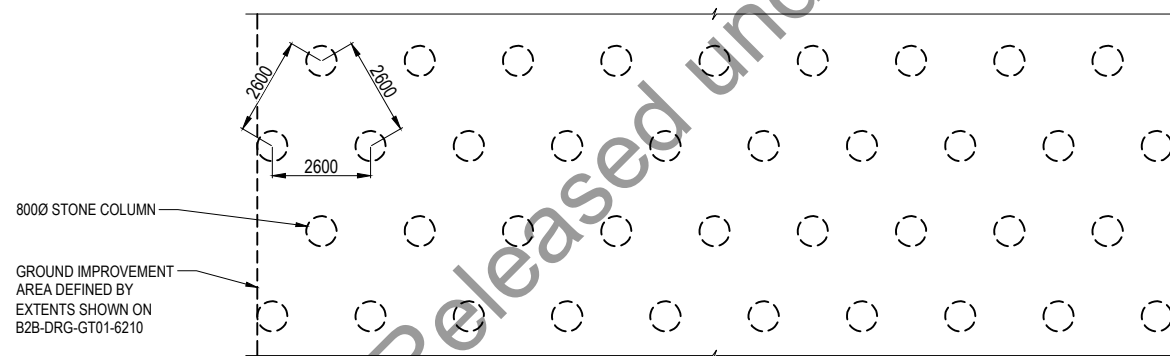
<p>NZ TRANSPORT AGENCY WAKA KOTAHĪ</p>	<p>CPB CONTRACTORS</p>	<p>JACOBS</p>	<p>Align Tonkin+Taylor</p>	SCALE: 1:500 (A3) STATUS: 50% ISSUE PROJECT NUMBER: 2/09-024/603	CLIENT: NZ TRANSPORT AGENCY PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK) DRAWN ME DESIGNED YFT DRAWING CHECK AMM DESIGN REVIEW DMM APPROVED CJB	TITLE: MGI SHARED PATH UNDERPASS GROUND IMPROVEMENT PLAN DRAWING No: B2B-DRG-GT01-6210 REV: A
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NOTES:

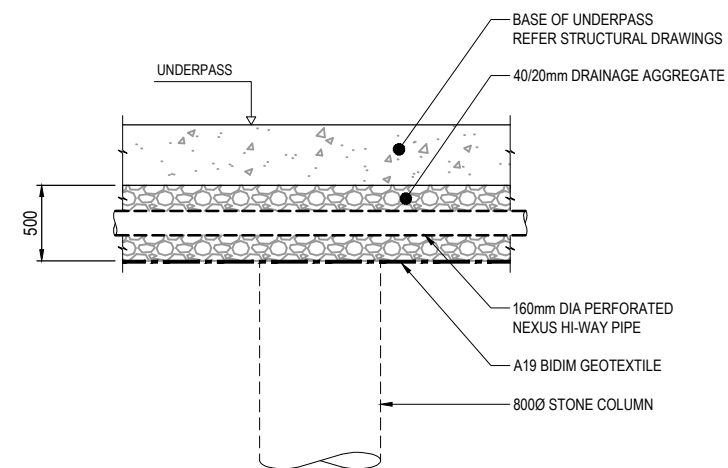
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
2. REFER TO B2B-DRG-GT01-6142 FOR NOTES AND TARGET POST GROUND IMPROVEMENT IN SITU STRENGTH.
3. CUT OFF WALL TO BE SECANT 600mm DIA CFA PILES (10MPa CONCRETE STRENGTH) AT 1m, OR SHEET PILES AZ32 750W x 511H x 12mmT.



1 UNDERPASS LONG SECTION
1:200 (A3)



A TYPICAL UNDERPASS STONE COLUMN PLAN
1:200 (A3)



B DETAIL
1:50 (A3)

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No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	50% ISSUE
A	08.03.19	AMM	DMMM	CJB	50% ISSUE

REVISIONS & ISSUES

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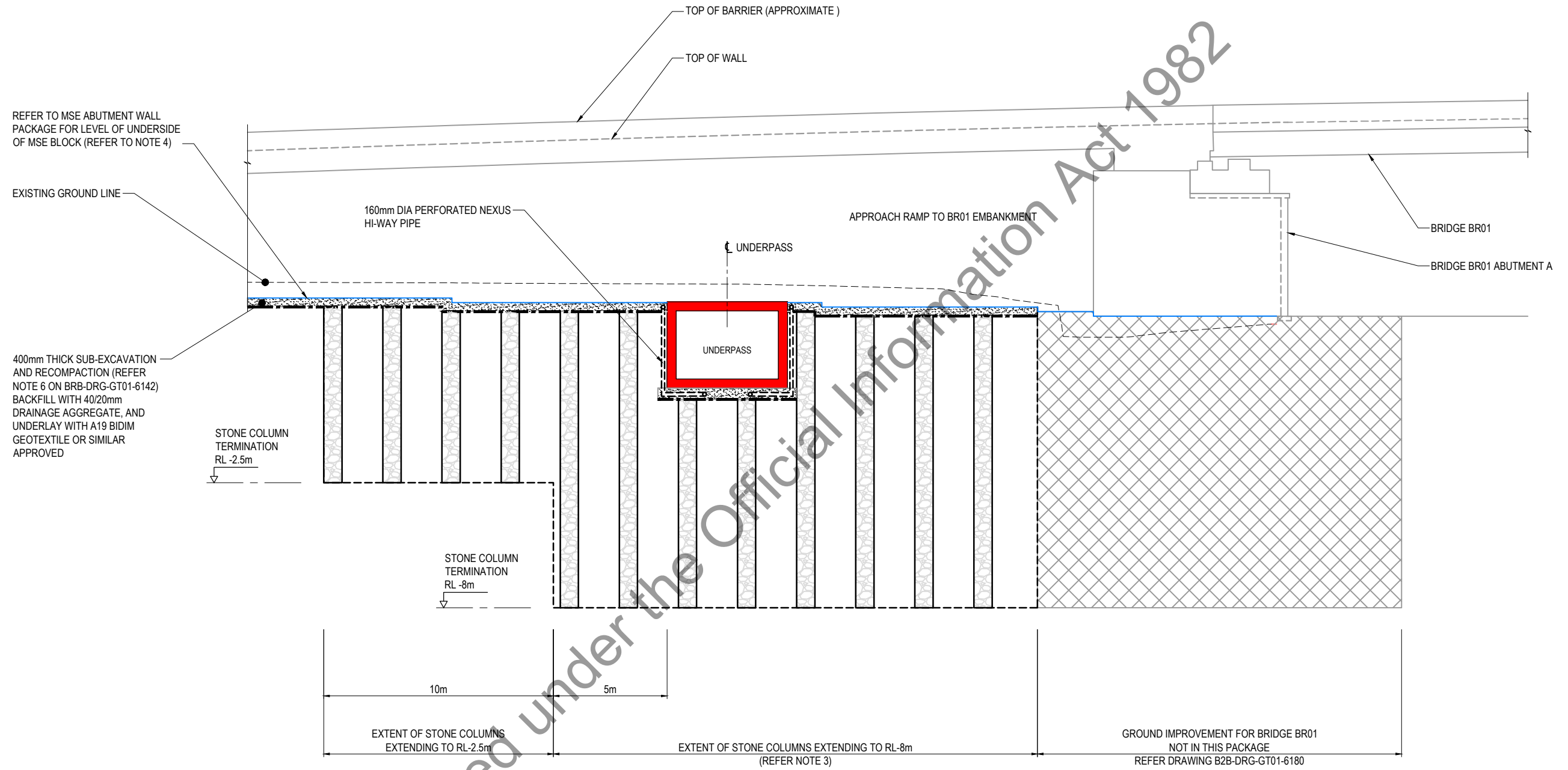


SCALE: 1:200 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: ME
DESIGNED: YFT
DRAWING CHECK: AMM
DESIGN REVIEW: DMMM
APPROVED: CJB

TITLE: MGI SHARED PATH UNDERPASS GROUND IMPROVEMENT TYPICAL DETAILS (SHEET 1)
DRAWING No: B2B-DRG-GT01-6211
REV: A

- NOTES:**
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS NOTED OTHERWISE.
 2. REFER TO B2B-DRG-GT01-6142 FOR NOTES AND TARGET POST GROUND IMPROVEMENT IN SITU STRENGTH.
 3. REFER TO B2B-DRG-GT01-6310 FOR EXTENTS OF GROUND IMPROVEMENT.
 4. REFER TO B2B-DRG-GT01-6600 FOR MSE RETAINING WALLS DETAILS.



2 UNDERPASS CROSS SECTION
6210 1:200 (A3)

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REVISIONS & ISSUES

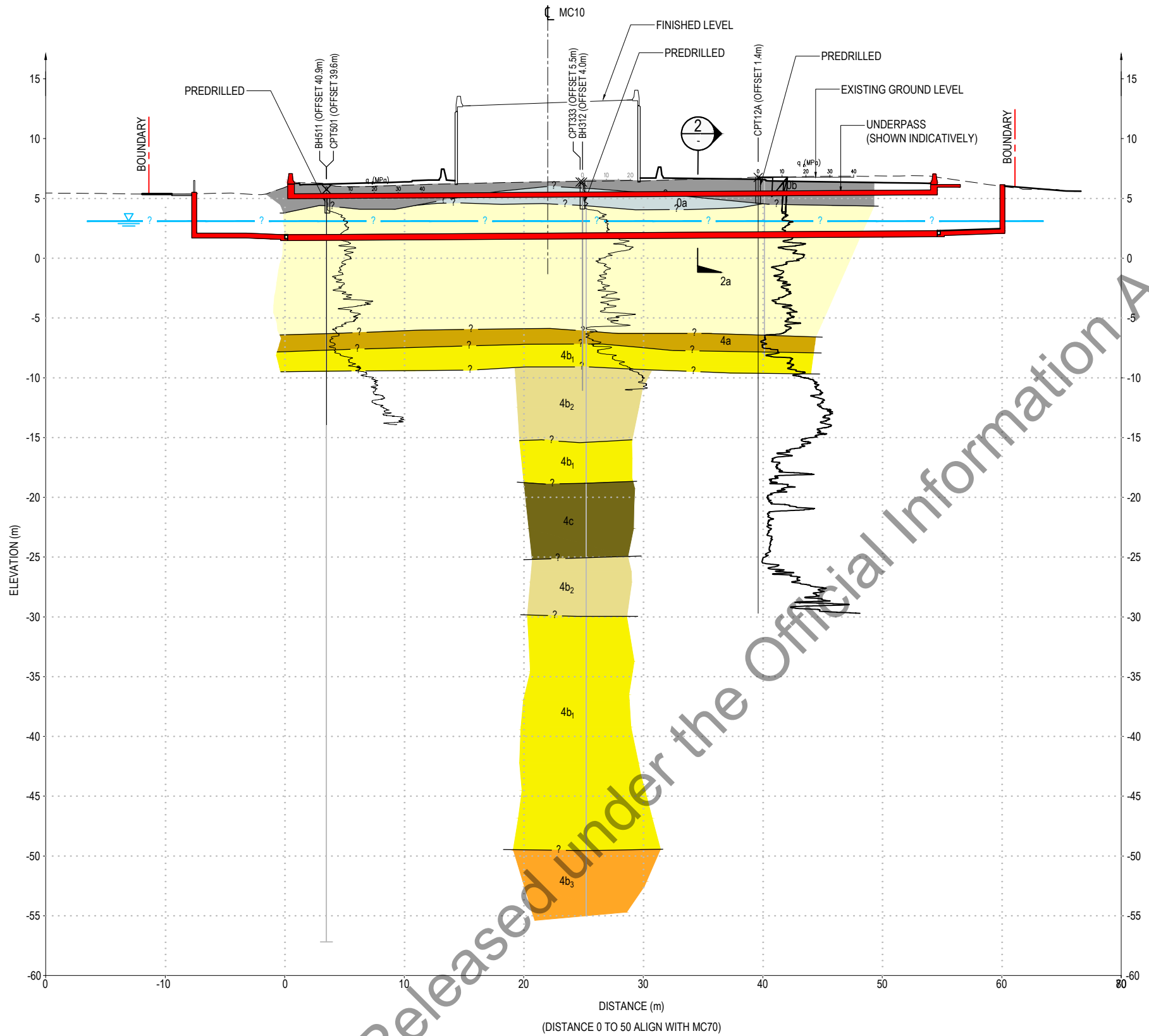
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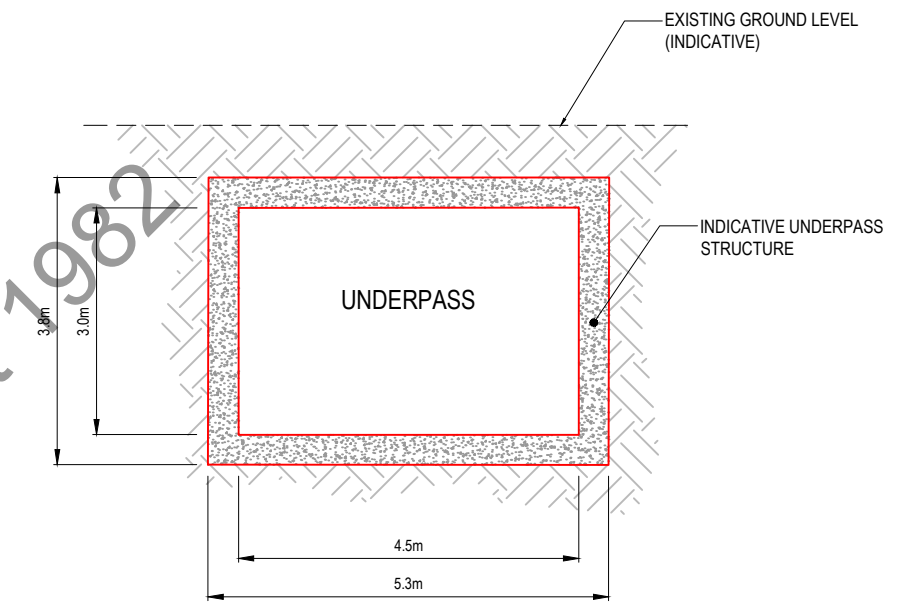
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STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: ME
DESIGNED: YFT
DRAWING CHECK: AMM
DESIGN REVIEW: DMMM
APPROVED: CJB

TITLE: MGI SHARED PATH UNDERPASS GROUND IMPROVEMENT TYPICAL DETAILS (SHEET 2)
DRAWING No: B2B-DRG-GT01-6212
REV: A



1 SECTION THROUGH MGI SHARED PATH UNDERPASS
6002 1:400 (A3)



2 TYPICAL SECTION OF UNDERPASS
1:100 (A3)

LEGEND	
---	EXISTING GROUND LEVEL
—	PROPOSED GROUND LEVEL
---	INFERRED GEOLOGICAL BOUNDARY
— ? —	INFERRED GROUNDWATER LEVEL
0a	LOOSE, LOCALLY DENSE GRANULAR FILL
0b	SOFT TO FIRM ORGANIC COHESIVE FILL
1	SOFT TO FIRM ORGANIC SILT
2a	LOOSE TO MEDIUM DENSE HOLOCENE SAND
2b	DENSE TO VERY DENSE GRAVELLY HOLOCENE SAND
3a	SOFT TO FIRM HOLOCENE CLAY
3b	LOOSE TO MEDIUM DENSE HOLOCENE SAND
4a	LOOSE TO MEDIUM DENSE UPPER PLEISTOCENE SILT
4b1	LOOSE TO MEDIUM DENSE SLIGHTLY PUMICEOUS PLEISTOCENE SAND
4b2	DENSE TO VERY DENSE SLIGHTLY PUMICEOUS PLEISTOCENE SAND
4b3	VERY DENSE SLIGHTLY PUMICEOUS PLEISTOCENE SAND
4c	STIFF TO VERY STIFF PLEISTOCENE SANDY SILT

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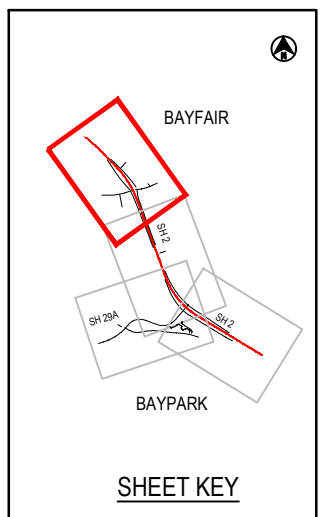
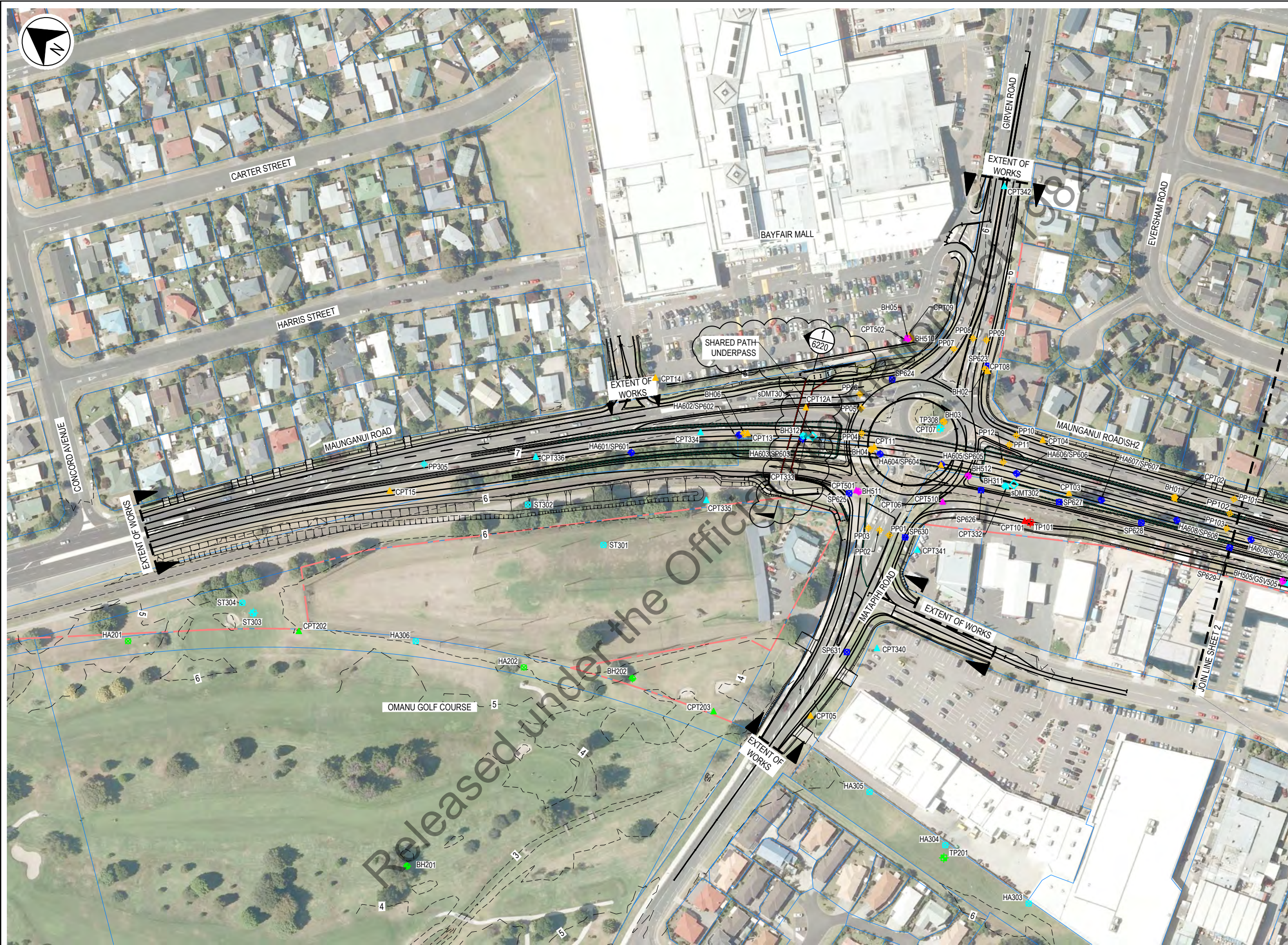
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A	08.03.19	AMM	DMMM	CJB	50% ISSUE



SCALE	1:400 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY	
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)	
DRAWN ME	DRAWING CHECK AMM	APPROVED CJB
DESIGNED YFT	DESIGN REVIEW DMMM	

TITLE	MGI SHARED PATH UNDERPASS SECTION AT UNDERPASS CENTRELINE	
DRAWING No	B2B-DRG-GT01-6220	
REV	A	



- LEGEND**
- EXISTING CADASTRAL
 - - - DESIGNATION BOUNDARY
 - 5 — EXISTING CONTOUR (5m INTERVAL)
 - - 1 - - EXISTING CONTOUR (1m INTERVAL)
- T+T INVESTIGATIONS**
- HA606 HAND AUGER LOCATIONS 2017
 - SP626 SCALA LOCATIONS 2017
 - HA01 CONTAMINATED LAND HAND AUGER LOCATIONS 2017
- BECA INVESTIGATIONS**
- BH511 BOREHOLE LOCATIONS AUG 2016
 - CPT501 CPT LOCATIONS AUG 2016
 - TP502 TEST PIT LOCATIONS AUG 2016
 - sCPT404 sCPT LOCATIONS MAY 2016
 - sDMT403 sDMT LOCATIONS MAY 2016
 - BH302 BOREHOLE LOCATIONS NOV 2015
 - CPT309 CPT LOCATIONS JUL 2015
 - HA305 HAND AUGER LOCATIONS 2015
 - PP308 PAVEMENT PITS LOCATIONS JUL 2015
 - sDMT304 sDMT LOCATIONS 2015
 - ST301 SOAKAGE TESTING LOCATIONS OCT 2015
 - TP308 TEST PIT LOCATIONS JUL 2015
 - BH201 BOREHOLE LOCATIONS JUN 2013
 - CPT202 CPT LOCATIONS MAY 2013
 - HA201 HAND AUGER LOCATIONS MAY 2013
 - TP201 TEST PIT LOCATIONS AUG 2013
 - BH103 BOREHOLE LOCATIONS DEC 2012
 - CPT106 CPT LOCATIONS DEC 2012
 - TP101 TEST PIT LOCATIONS DEC 2012
 - PP107 PAVEMENT PITS LOCATIONS DEC 2012
 - BH01 BOREHOLE LOCATIONS JUL 2011
 - CPT02 CPT LOCATIONS JUN 2011
 - PP12 PAVEMENT PITS LOCATIONS JUL 2011

DATE: 08/03/2019 1:57:16 PM, LOCNAME: MARK ENNION
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No	DATE	AMM	DMM	CJB	TO ACCOMPANY MGI UNDERPASS 50% ISSUE
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REVISIONS & ISSUES					
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1:2000 @ A3					

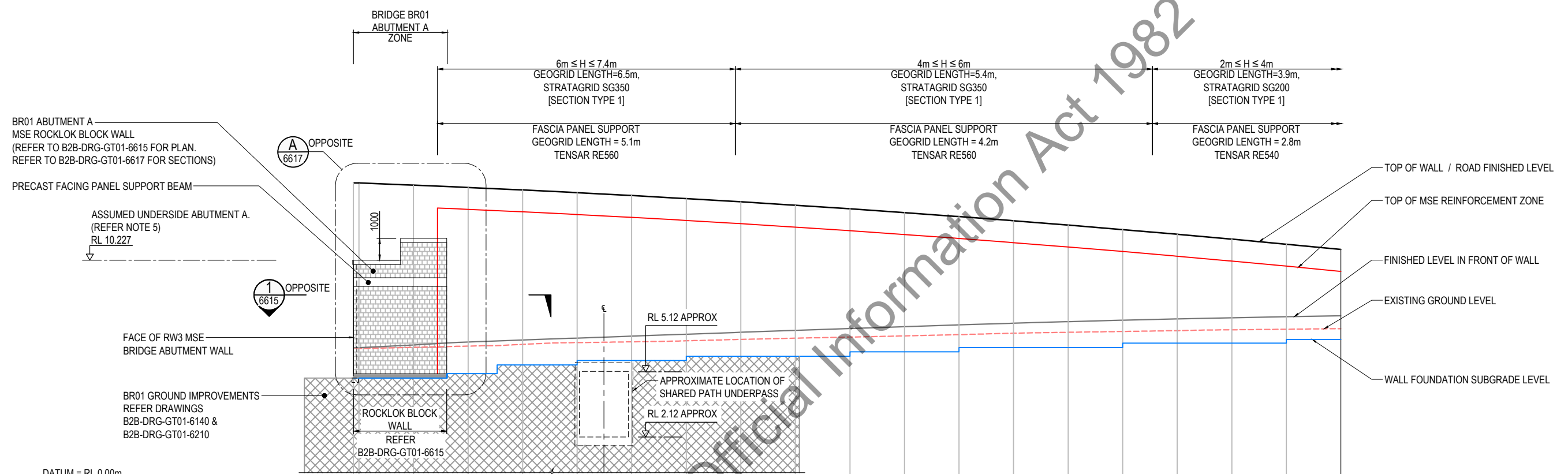


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 STATUS: FOR INFORMATION
 PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN BY: ME
 DESIGN CHECK: AMM
 DESIGN REVIEW: DMM
 APPROVED: CJB

TITLE: MGI SHARED PATH UNDERPATH SITE INVESTIGATION PLAN
 DRAWING No: B2B-SKT-GT01-6002
 REV: A

NOTES:
1. REFER TO DRAWING B2B-DRG-GT01-6620.



DATUM = RL 0.00m

TOP OF WALL / ROAD FINISHED LEVEL (m)	13.76	13.67	13.56	13.44	13.32	13.19	13.05	12.90	12.74	12.58	12.41	12.22	12.04	11.84	11.63	11.42	11.19	10.96	10.72
FINISHED LEVEL IN FRONT OF WALL (m)	6.22	6.35	6.48	6.57	6.66	6.75	6.84	6.93	7.01	7.10	7.18	7.26	7.34	7.42	7.48	7.54	7.59	7.64	7.68
WALL FOUNDATION SUBGRADE LEVEL (m)	-4.827	-4.827	-5.03	-5.43	-5.43	-5.63	-5.63	-5.83	-5.83	-5.83	-6.03	-6.03	-6.23	-6.23	-6.23	-6.43	-6.43	-6.43	-6.60
EXISTING GROUND (m)	-6.22	-6.24	-6.29	-6.37	-6.45	-6.49	-6.54	-6.60	-6.66	-6.71	-6.76	-6.82	-6.88	-6.93	-6.96	-7.00	-7.04	-7.07	-7.09
EXPOSED WALL HEIGHT (m)	7.54	7.32	7.08	6.87	6.66	6.44	6.21	6.00	5.98	5.73	5.48	5.23	4.96	4.69	4.42	4.15	4.00	3.88	3.60
DISTANCE (m)	-0.5	0.0	5.0	10.0	15.0	20.0	22.4	25.0	30.0	35.5	35.0	40.0	45.0	50.0	55.0	60.0	65.0	70.0	77.3
MAINLINE CHAINAGE		375.0	370.0	365.0	360.0	355.0	350.0	345.0	340.0	335.0	330.0	325.0	320.0	315.0	310.0	305.0	300.0	295.0	290.0

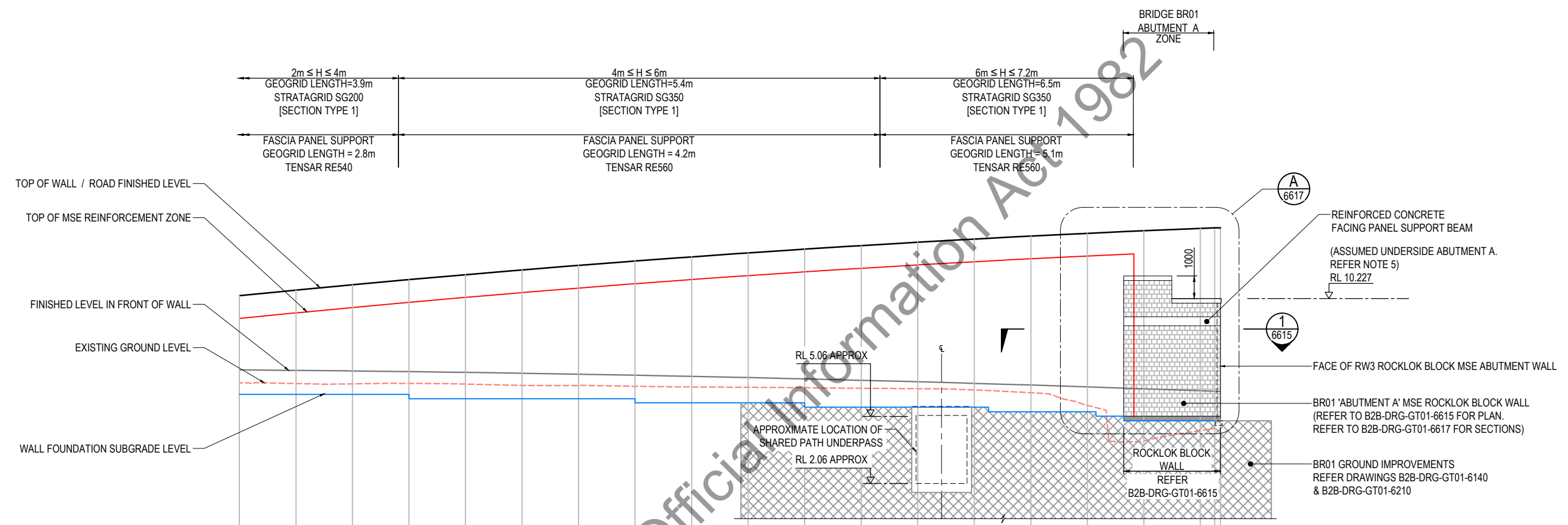
LONGITUDINAL SECTION - RW01 - WALL ELEVATION (SHEET 1 OF 2)
1:400H 1:200V (A3)

DATE: 08/03/2019 1:56:07 PM, LOCIN: NAME: MARK ENNION, LOCATION: L:\B2B\08082019\0803\01\0103_Sketches\06 - Geotechnical\B2B-SKT-GT01-6620.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APPROV D.MGR	REVISIONS & ISSUES
A	08.03.19	AMM	DMMM	CJB	TO ACCOMPANY MGI UNDERPASS 50% ISSUE

				SCALE	AS SHOWN (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE MGI INTERSECTION MSE RETAINING WALL RW1 LONG SECTION (UNDERPASS SHOWN)	
				STATUS	FOR INFORMATION				PROJECT NUMBER
				DRAWN	ME	DRAWING CHECK	AMM	APPROVED	CJB
				DESIGNED	YFT	DESIGN REVIEW	DMMM	REV	A
							DRAWING No	B2B-SKT-GT01-6620	

NOTES:
1. REFER TO DRAWING B2B-DRG-GT01-6641



DATUM = RL 0.00m

TOP OF WALL / ROAD FINISHED LEVEL (m)	10.36	10.60	10.84	11.06	11.28	11.49	11.69	11.89	12.07	12.25	12.41	12.57	12.72	12.86	12.99	13.11	13.23	13.33	13.36	
FINISHED LEVEL IN FRONT OF WALL (m)	7.08	7.06	7.03	7.00	6.97	6.93	6.89	6.84	6.79	6.74	6.68	6.62	6.55	6.48	6.41	6.33	6.24	6.15	6.13	
WALL FOUNDATION SUBGRADE LEVEL (m)	6.00	6.00	6.00	5.80	5.80	5.80	5.80	5.80	5.63	5.63	5.43	5.43	5.43	5.43	5.23	5.23	4.828	4.829	4.830	
EXISTING GROUND (m)	6.51	6.47	6.46	6.48	6.45	6.39	6.39	6.35	6.32	6.31	6.29	6.26	6.25	6.19	6.07	5.51	3.94	4.40	4.47	
EXPOSED WALL HEIGHT (m)	3.28	3.55	3.81	4.06	4.82	4.56	4.81	5.05	5.28	5.51	5.73	5.95	6.17	6.38	6.68	6.78	6.98	7.18	7.22	
DISTANCE (m)	90.0	95.0	100.0	105.0	110.0	115.0	120.0	125.0	130.0	135.0	140.0	145.0	150.0	152.1	155.0	160.0	165.0	170.0	175.0	176.2
MAINLINE CHAINAGE		295.0	300.0	305.0	310.0	315.0	320.0	325.0	330.0	335.0	340.0	345.0	350.0	355.0	360.0	365.0	370.0	375.0	377.9	

LONGITUDINAL SECTION - RW02 - WALL ELEVATION (SHEET 1 OF 2)
1:400H 1:200V (A3)

DATE: 03/03/2019 1:56:36 PM, LOCIN: NAME: MARK KENNION, LOCATION: L:\B2B\09\B2B_SKT_GT01-6641.dwg

No	DATE	DRG CHECK	DESIGN REVIEW	APPRO D.MGR	REVISIONS & ISSUES						
A	08.03.19	AMM	DMMM	CJB	TO ACCOMPANY MGI UNDERPASS 50% ISSUE						
1:200@ A1	0	2	4	6	8	10	12	14	16	18	20
1:400@ A3											

					SCALE	CLIENT	TITLE
					AS SHOWN (A3)	NZ TRANSPORT AGENCY	MGI INTERSECTION
					STATUS	PROJECT	MSE RETAINING WALL RW2
					FOR INFORMATION	BAYPARK TO BAYFAIR LINK	LONG SECTION (UNDERPASS SHOWN)
					PROJECT NUMBER	APPROVED	DRAWING No
					2/09-024/603	CJB	B2B-SKT-GT01-6641
					DRAWN ME	DRAWING CHECK AMM	REV
					DESIGNED YFT	DESIGN REVIEW DMMM	A

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Roading	Page:	1 of 1
Package Ref No.:	B2B-PP-ROA-01	Prepared By:	s 9(2)(a)
Date:	8 March 2019	Reviewed By:	
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	MGI Underpass Roading Pricing Pack		

The following is provided for the purposes of estimating the pricing package for the MGI Underpass

Package Inclusions / Exclusions

This package covers the following project elements:

- Plan layout and long sections of the geometric elements for the underpass within the project extent.
- Plan layout of the barrier arrangement within the project extent.
- Plan layout and details of the pavement markings arrangement within the project extent.
- Plan layout and details of the signage arrangement within the project extent.
- Plan layout of the footpaths and shared paths arrangement within the project extent.

Not included in this package:

- Pedestrian/cyclist fences adjacent to footpath and share path. These are shown in the Urban Design B2B-PP-UD-01.

Compliance with the Principal's Requirements

This package has been prepared in accordance with the following sections of the PR's and the Design Philosophy Statement.

- The design has been prepared generally in accordance with Principal's Requirements (PRs) section A1 Standards, Manuals and Publications, A2 Road Design Criteria, A8 Road Safety Barriers, A9 Kerbs, footpaths, Cycleways and Bus Stops, A11 Traffic Signs and A12 Carriage Delineation.
- Departure for the use of a shorter length of need for the barrier located on Bayfair side to be applied for.

Attachments

Drawings:

- B2B-DRG-AD01-8001 Rev A-Cover Sheet
- B2B-DRG-AD01-8002 Rev A-Sheet Index
- B2B-DRG-AL01-8051 Rev A-Plan Sheet1

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Roading	Page:	2 of 2
Package Ref No.:	B2B-PP-ROA-01	Prepared By:	§ 9(2)(a)
Date:	8 March 2019	Reviewed By:	
Issued to:	§ 9(2)(a) CPB	WBS Ref:	
Reference:	MGI Underpass Roading Pricing Pack		

- B2B-DRG-AL01-8052 Rev A-Plan Sheet2
- B2B-DRG-AL01-8053 Rev A-Plan Sheet3
- B2B-DRG-AL01-8054 Rev A-Plan Sheet4
- B2B-DRG-AL01-8101 Rev A-Plan & Long Sections Underpass MC70 & Ramp MC71
- B2B-DRG-AL01-8102 Rev A-Plan & Long Sections Bus Stop MCL5 & Ramp Access MC80
- B2B-DRG-RF01-8271 Rev A-Barriers
- B2B-DRG-PT01-8451 Rev A-Kerbs, Footpath & Cycleways
- B2B-DRG-SL01-8211 Rev A-Signage
- B2B-DRG-SL01-8222 Rev A-Guide Sign Details
- B2B-DRG-SL01-8226 Rev A-Sign Details Regulatory & Warning
- B2B-DRG-SL01-8240 Rev A-Pavement Markings Legend
- B2B-DRG-SL01-8245 Rev A- Pavement Markings

Refer to B2B-DE-GR-001 Geometric & Roading, B2B-DE-TS-003 Traffic Services - Signs & Lines and B2B-DE-TS-004 Traffic Services – Barriers Design Packages for details not included in the list that remain the same.

Sketches:

- N/A

Other Documents:

- N/A

Specification Details

- Refer to Roadside Safety Barriers Specifications B2B-R-SP-3002-Rev 1
- Refer to Signage and Pavement Markings Specifications B2B-R-SP-3003-Rev B

Completeness of Design For Pricing

The following items are required to be taken into account prior to pricing:

- Pedestrian guide signs have not been included.

Qualifications / Assumptions / Departures / Awaiting information

In preparing this price package the following assumptions have been made:

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Roading	Page:	3 of 3
Package Ref No.:	B2B-PP-ROA-01	Prepared By:	§ 9(2)(a)
Date:	8 March 2019	Reviewed By:	
Issued to:	§ 9(2)(a) CPB	WBS Ref:	
Reference:	MGI Underpass Roading Pricing Pack		

- No allowance has been made for any temporary works, construction techniques or tolerances unless specifically noted otherwise.
- Departures required for the barriers design will be granted by the Agency.
- The relocated gantry cannot be protected with safety barrier.
- It is assumed that all existing utilities and B2B design elements (installed or proposed) can be moved/protected/other to accommodate the design shown within this pricing pack.

The following departures have been accepted by the Principal:

- N/A

The following departures have been applied for and declined by the Principal:

- N/A

The following departures will need to be applied for and accepted by the Principal:

- U_1 Shorter safety barrier length of need than required due to the location of the MGI underpass and the Bus Stop on Bayfair side.

Designer needs to complete the following actions to verify the advice:

- N/A

Supplementary investigation or further information required:

- Confirmation that the gantry can be accommodated with regards to utilities and designation.

Other relevant comments including Safety-in-Design / Maintenance-in-Design Constructability / O&M:

- During the design phase the designer has engaged with all disciplines and contractor to incorporate Safety-in-Design, Maintenance-in-Design Constructability and O&M issues.
- The design has been subject to CPTED review.

Innovations & WOL considerations:

- The elements have been made integrated with the other elements to aid construction.

Overview of RISKS and Design Unknowns (to be considered in Pricing) (Note: This list may not be exhaustive. There may be other risks associated with this advice not listed below):

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Roading	Page:	4 of 4
Package Ref No.:	B2B-PP-ROA-01	Prepared By:	s 9(2)(a)
Date:	8 March 2019	Reviewed By:	
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	MGI Underpass Roading Pricing Pack		

Risk Description	Likely Impact	Suggested Mitigation
Departure requested to accommodate the reduced length of barrier not granted	The safety barrier is absolutely required, and the layout shown on the Bayfair side could not be implemented.	The only mitigation to be considered will be the relocation of the bus stop.
Road safety audit raises serious or significant concerns which require changes to the design.	Additional design time and program delay.	Carry out pre-audit internal reviews. Provide good briefing to safety audit team.
The assumption that utilities and the B2B design elements (installed or proposed) cannot be moved/protected/other to accommodate the design shown within this pricing pack, does not come to fruition	Additional design required to accommodate the utilities, additional costs and delay to programme.	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 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.

Contract Name	Baylink – MGI Underpass	Contract No.	2/09-024/603
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PRICING PACKAGE COVER SHEET

Design Element:	Roading	Page:	5 of 5
Package Ref No.:	B2B-PP-ROA-01	Prepared By:	s 9(2)(a)
Date:	8 March 2019	Reviewed By:	
Issued to:	s 9(2)(a) CPB	WBS Ref:	
Reference:	MGI Underpass Roading Pricing Pack		

<p>Opportunities for further cost / time / WOL savings (e.g. challenges to the PR's, standards, etc.):</p> <p>The following opportunities:</p> <ul style="list-style-type: none"> N/A 	
<p>Design Manager:</p> <p>s 9(2)(a)</p>	<p>Date:</p> <p>8/03/19</p>
<p>Design Team Leader:</p> <p>s 9(2)(a)</p>	<p>Date:</p> <p>8/03/19</p>

Released under the Official Information Act 1982

FILENAME	REV	TITLE-1	TITLE-2	TITLE-3
INDEX & LAYOUT				
B2B-DRG-AD01-8001	A	COVER SHEET		
B2B-DRG-AD01-8002	A	UNDERPASS UPGRADE	DRAWING INDEX SHEET	
ROAD PLANS				
B2B-DRG-AL01-8051	A	UNDERPASS UPGRADE	PLAN	SHEET 1
B2B-DRG-AL01-8052	A	UNDERPASS UPGRADE	BAYFAIR RAMP PLAN	SHEET 2
B2B-DRG-AL01-8053	A	UNDERPASS UPGRADE	MATAPIHI 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 DETAILS	
B2B-DRG-SL01-8226	A	UNDERPASS UPGRADE	SIGN DETAILS	REGULATORY & WARNING
PAVEMENT MARKINGS				
B2B-DRG-SL01-8240	A	UNDERPASS UPGRADE	PAVEMENT MARKINGS	LEGEND
B2B-DRG-SL01-8245	A	UNDERPASS UPGRADE	PAVEMENT MARKINGS	

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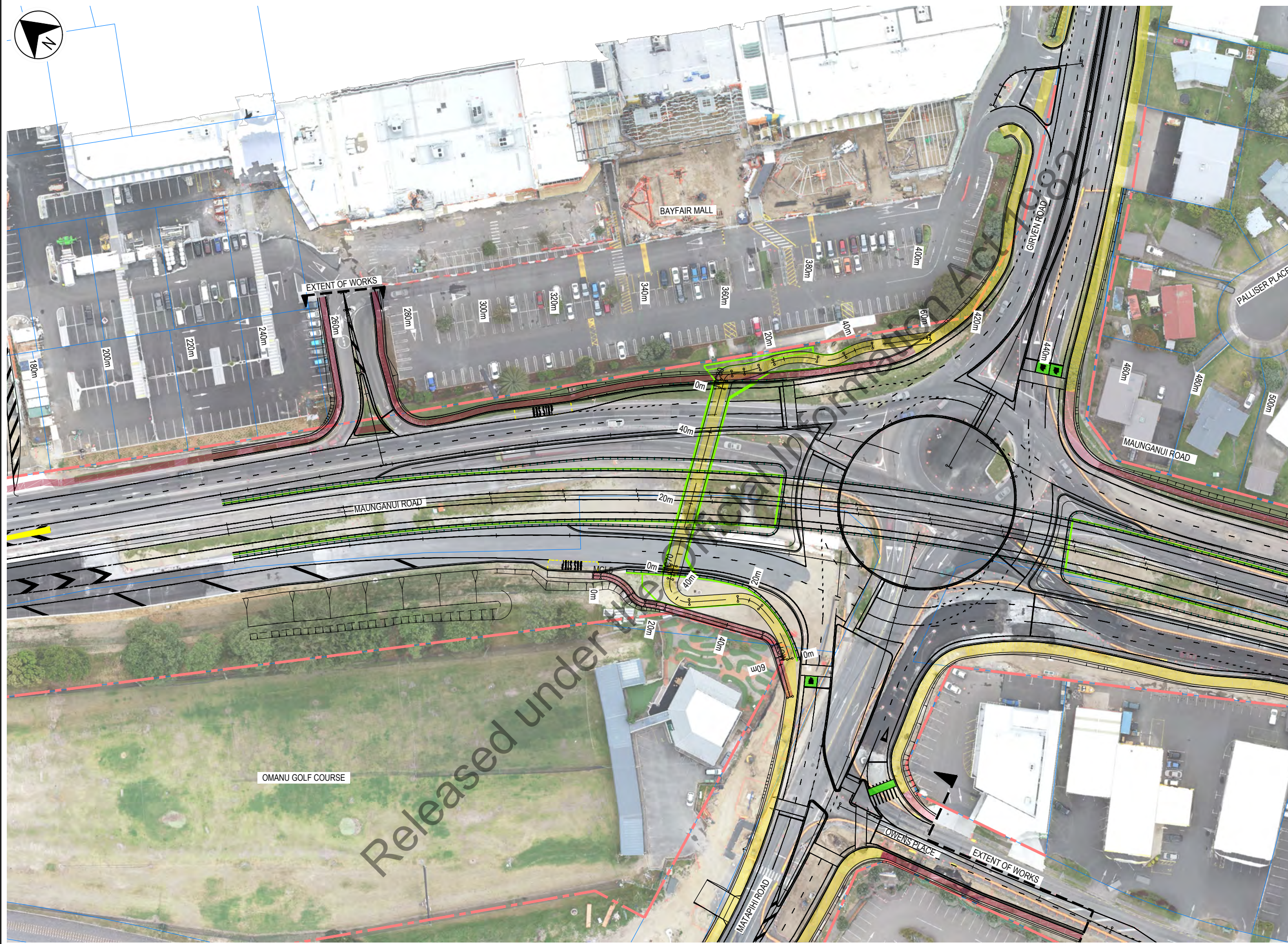
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PROJECT NUMBER	2/09-024/603

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

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



- LEGEND**
- EXISTING CADASTRAL
 - - - DESIGNATION BOUNDARY
 - SHOULDER / MERGE
 - RETAINING WALL



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



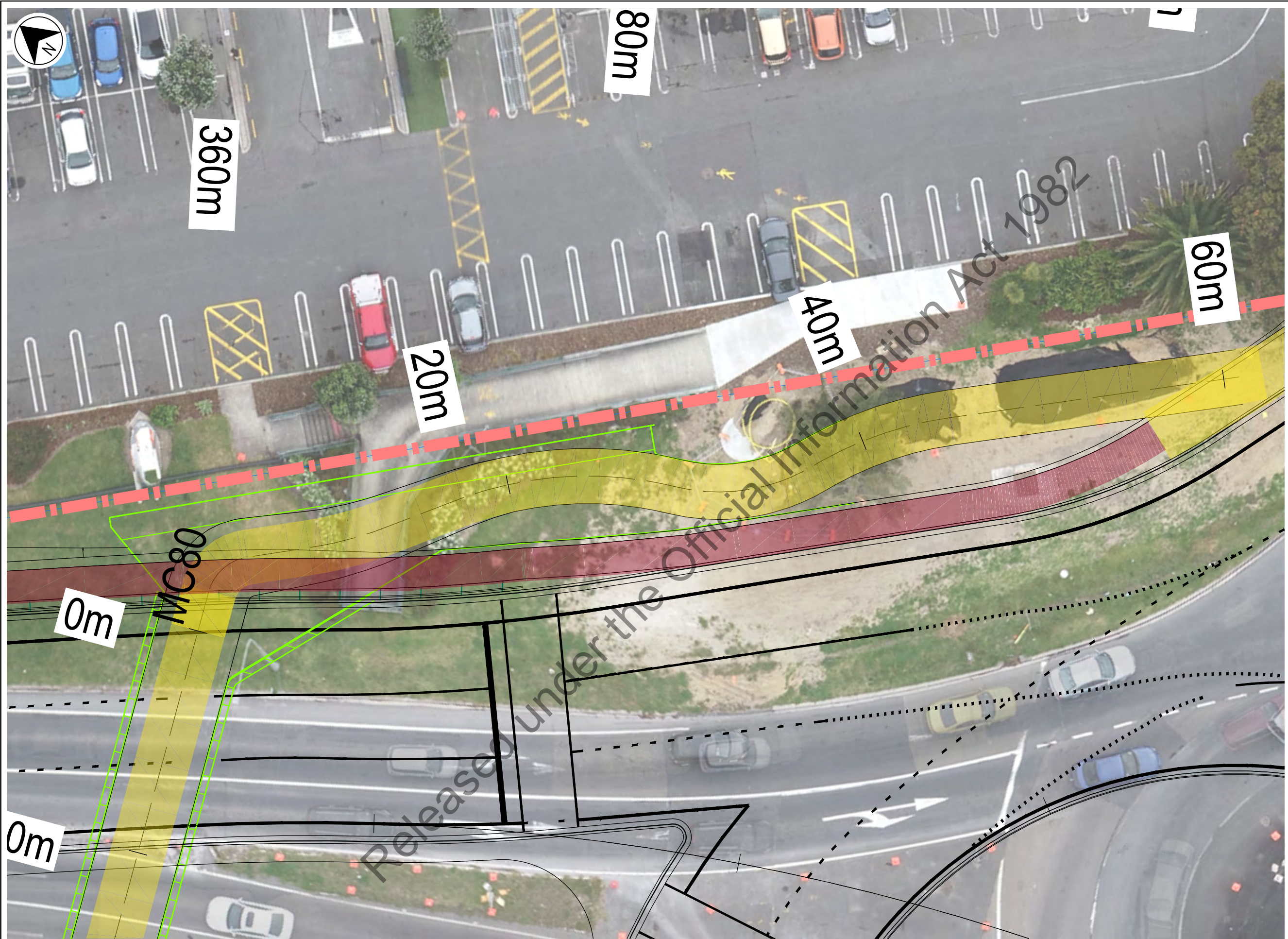
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CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: GK
 DESIGNED: KR
 DRAWING CHECK: GK
 DESIGN REVIEW: AC
 APPROVED: LW

TITLE: UNDERPASS UPGRADE PLAN SHEET 1
 DRAWING No: B2B-DRG-AL01-8051
 REV: A



- LEGEND**
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 - - - DESIGNATION BOUNDARY
 - SHOULDER /VERGE
 - RETAINING WALL



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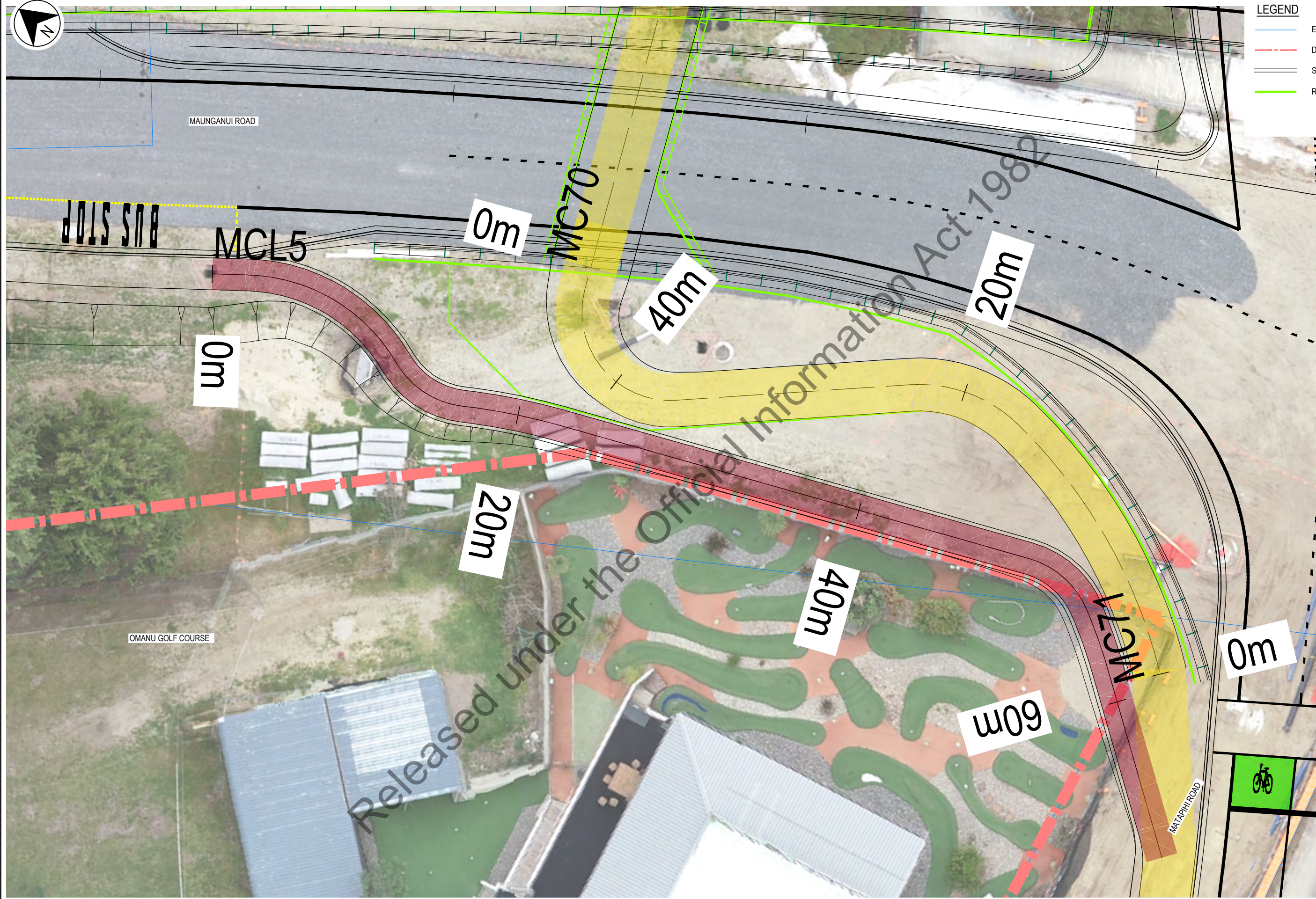
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 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: GK
 DESIGNED: KR
 DRAWING CHECK: GK
 DESIGN REVIEW: AC
 APPROVED: LW

TITLE: UNDERPASS UPGRADE BAYFAIR RAMP PLAN SHEET 2
 DRAWING No: B2B-DRG-AL01-8052
 REV: A



LEGEND

- EXISTING CADASTRAL
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- SHOULDER /VERGE
- RETAINING WALL



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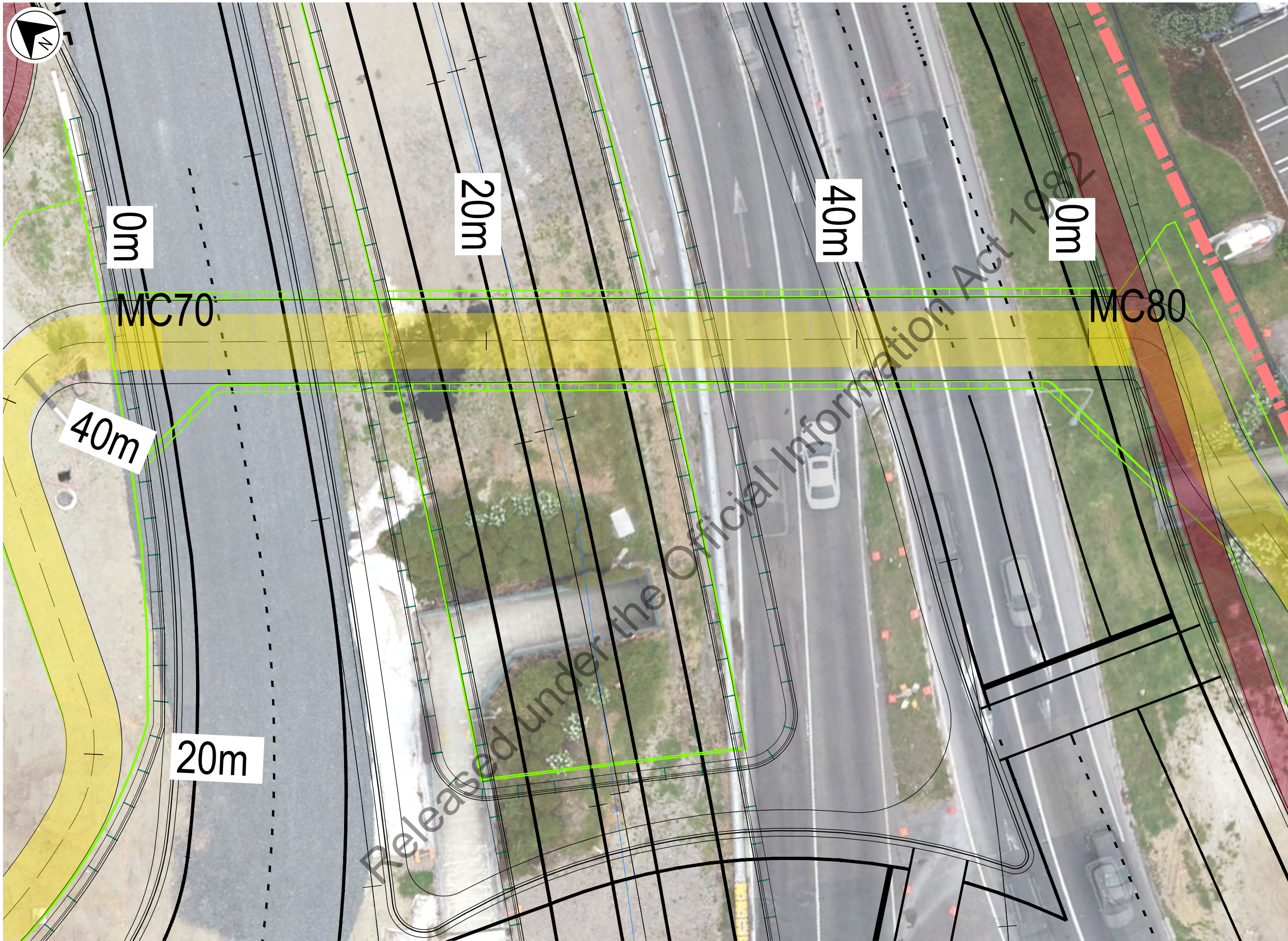
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1:200 @ A3



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

TITLE: UNDERPASS UPGRADE MATAPIHI RAMP PLAN SHEET 3
 DRAWING No: B2B-DRG-AL01-8053
 REV: A



LEGEND

- EXISTING CADASTRAL
- - - DESIGNATION BOUNDARY
- SHOULDER / VERGE
- RETAINING WALL

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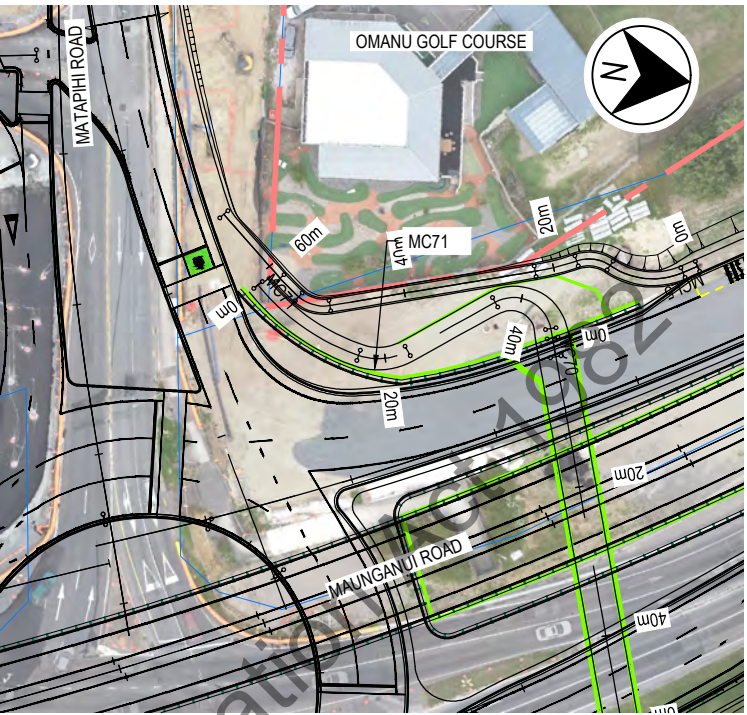
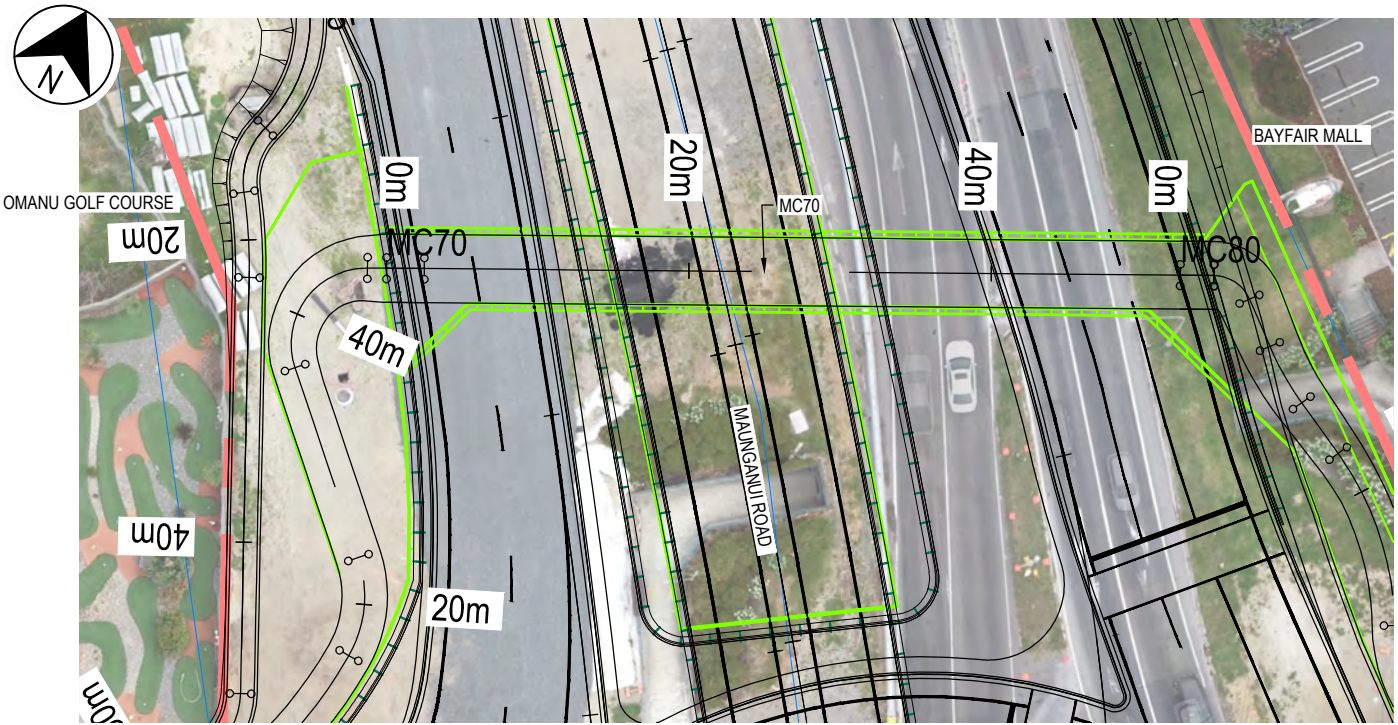
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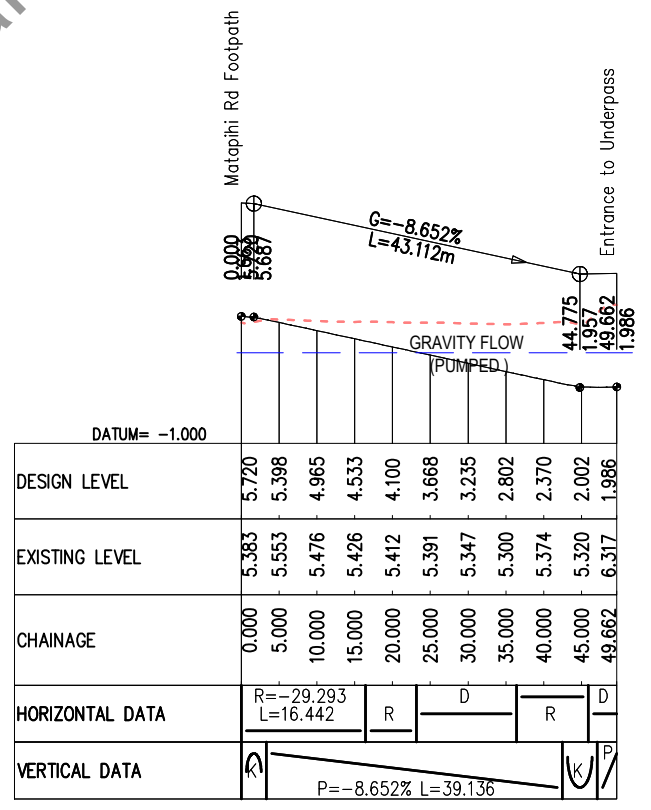
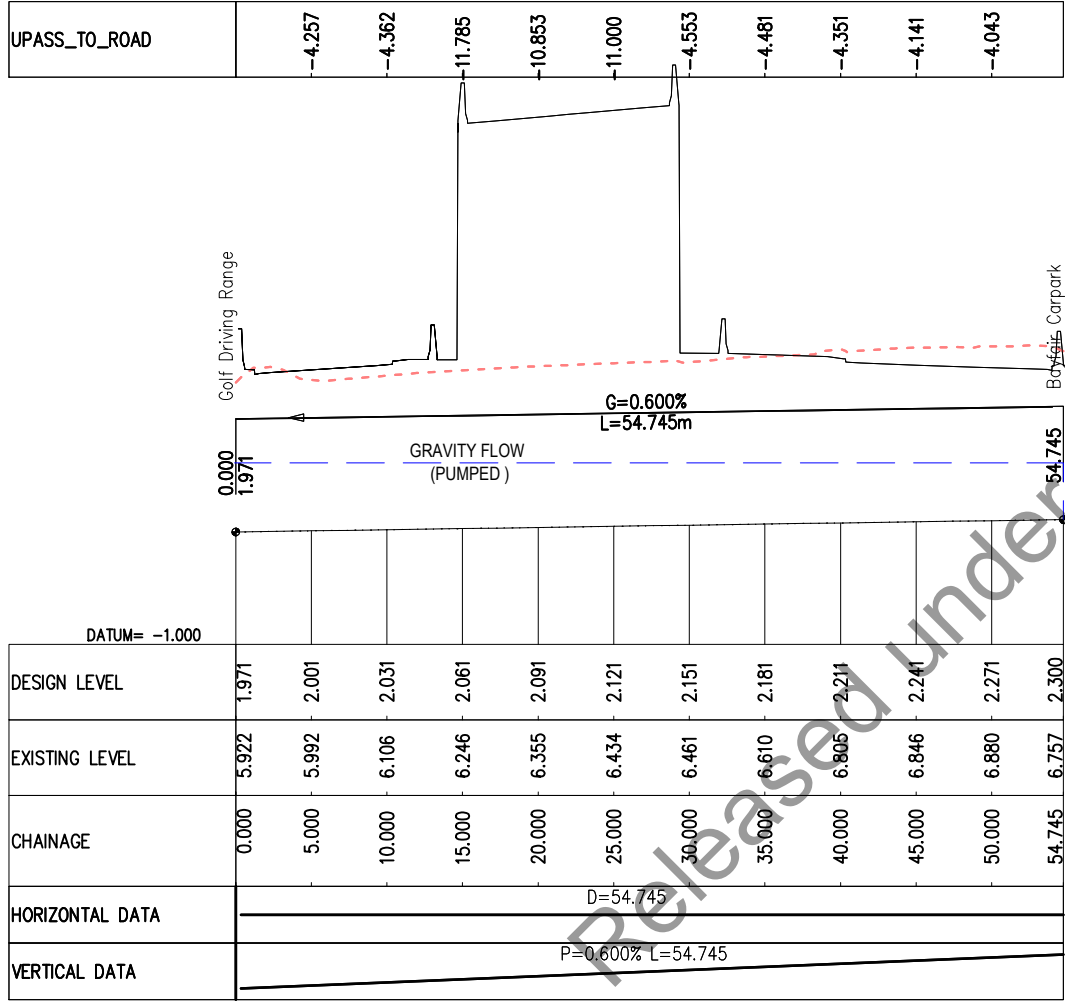
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 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: GK
 DESIGNED: KR
 DRAWING CHECK: GK
 DESIGN REVIEW: AC
 APPROVED: LW

TITLE: UNDERPASS UPGRADE UNDERPASS PLAN SHEET 4
 DRAWING No: B2B-DRG-AL01-8054
 REV: A



- LEGEND**
- EXISTING CADASTRAL
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 - SHOULDER / VERGE
 - RETAINING WALL



LONGITUDINAL SECTION

HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:100





LONGITUDINAL SECTION
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VERTICAL SCALE 1:200

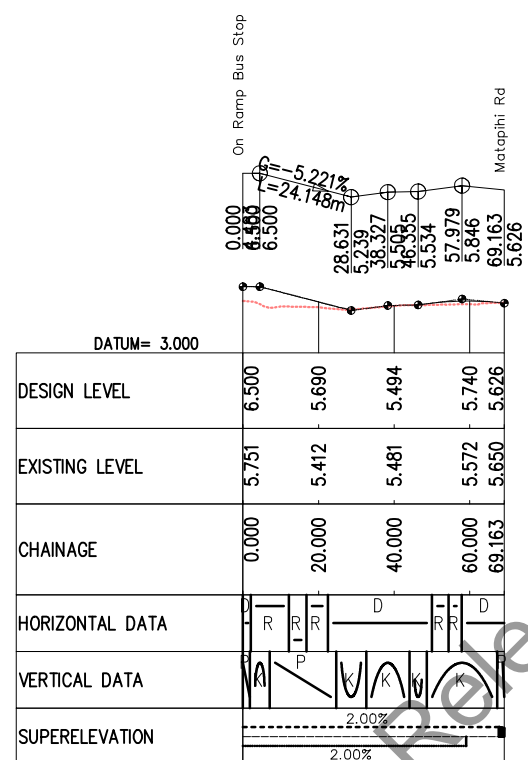
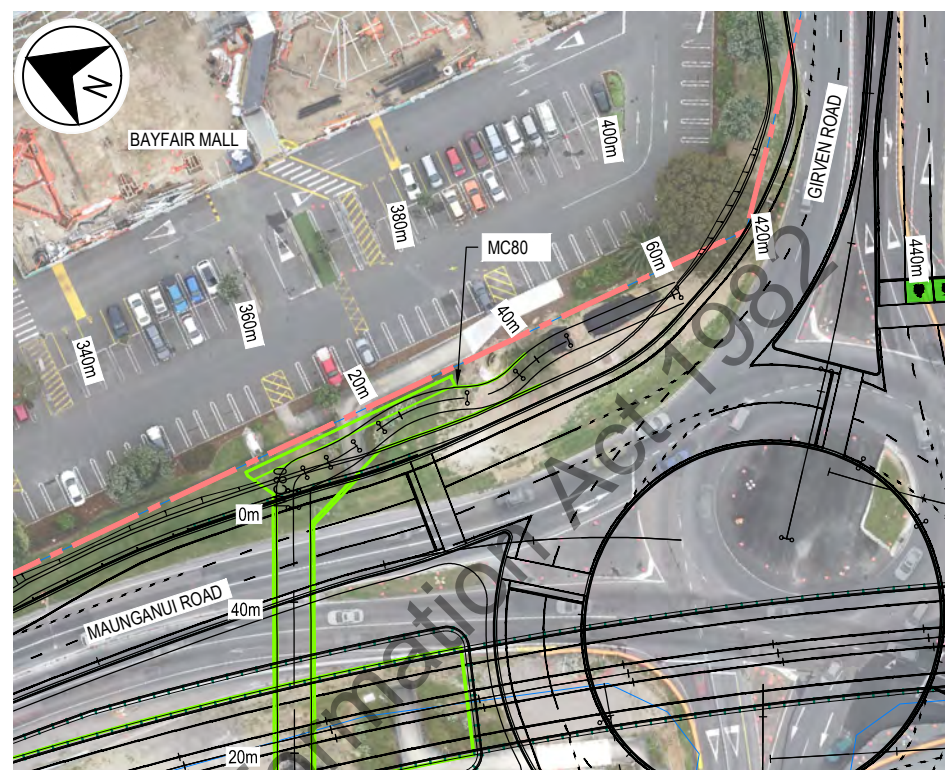
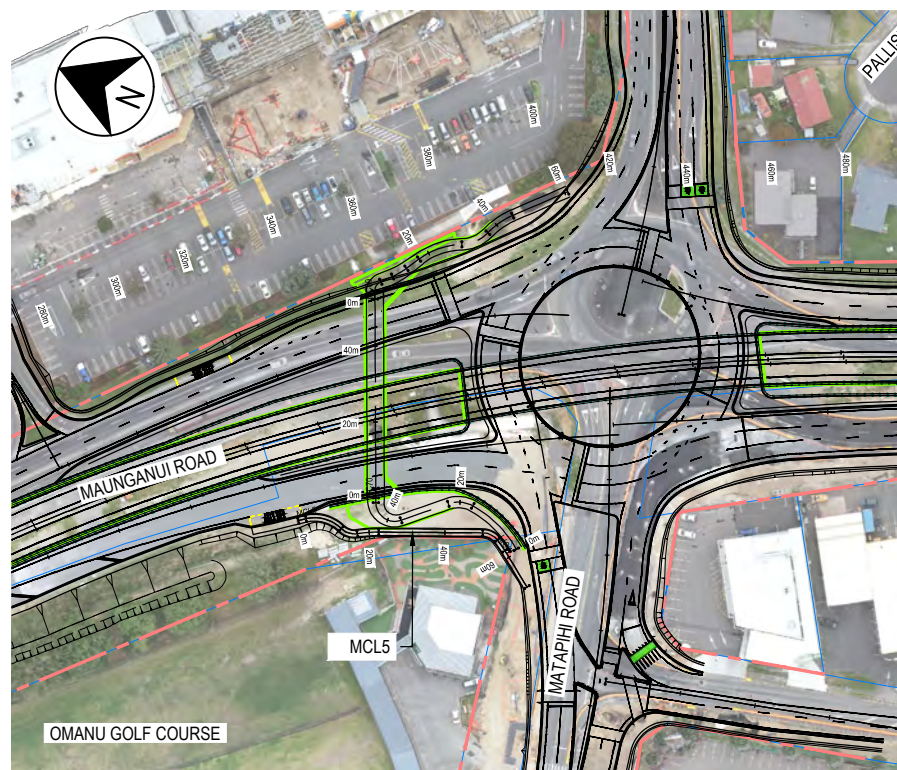
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A	GK	KR	LW	ISSUED FOR INFORMATION				
No	DATE	DRG CHECK	DESIGN REVIEW	APPRO D.MGR	REVISIONS & ISSUES			
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				SCALE AS SHOWN	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE UNDERPASS UPGRADE PLAN & LONG SECTIONS UNDERPASS MC70 & RAMP MC71
				STATUS FOR INFORMATION	DRAWN GK DESIGNED KR		DRAWING CHECK GK DESIGN REVIEW LW
				PROJECT NUMBER 2/09-024/603	APPROVED LW		DRAWING No B2B-DRG-AL01-8101
							REV A

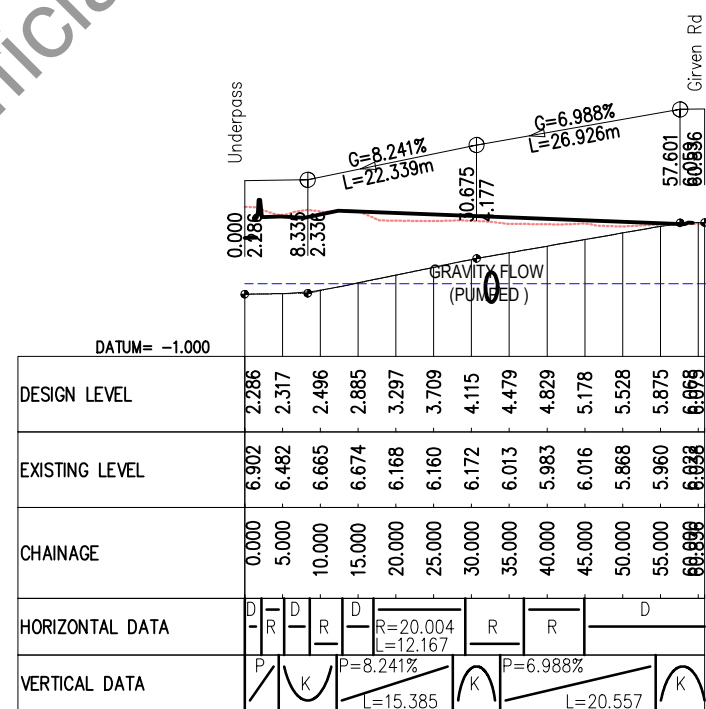
LEGEND

-  EXISTING CADASTRAL
-  DESIGNATION BOUNDARY
-  SHOULDER / VERGE
-  RETAINING WALL



LONGITUDINAL SECTION

HORIZONTAL SCALE 1:1000
VERTICAL SCALE 1:200



LONGITUDINAL SECTION

HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:200

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ISSUED FOR INFORMATION			
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3	20	LW	DESIGN REVIEW
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1:2000@ A3



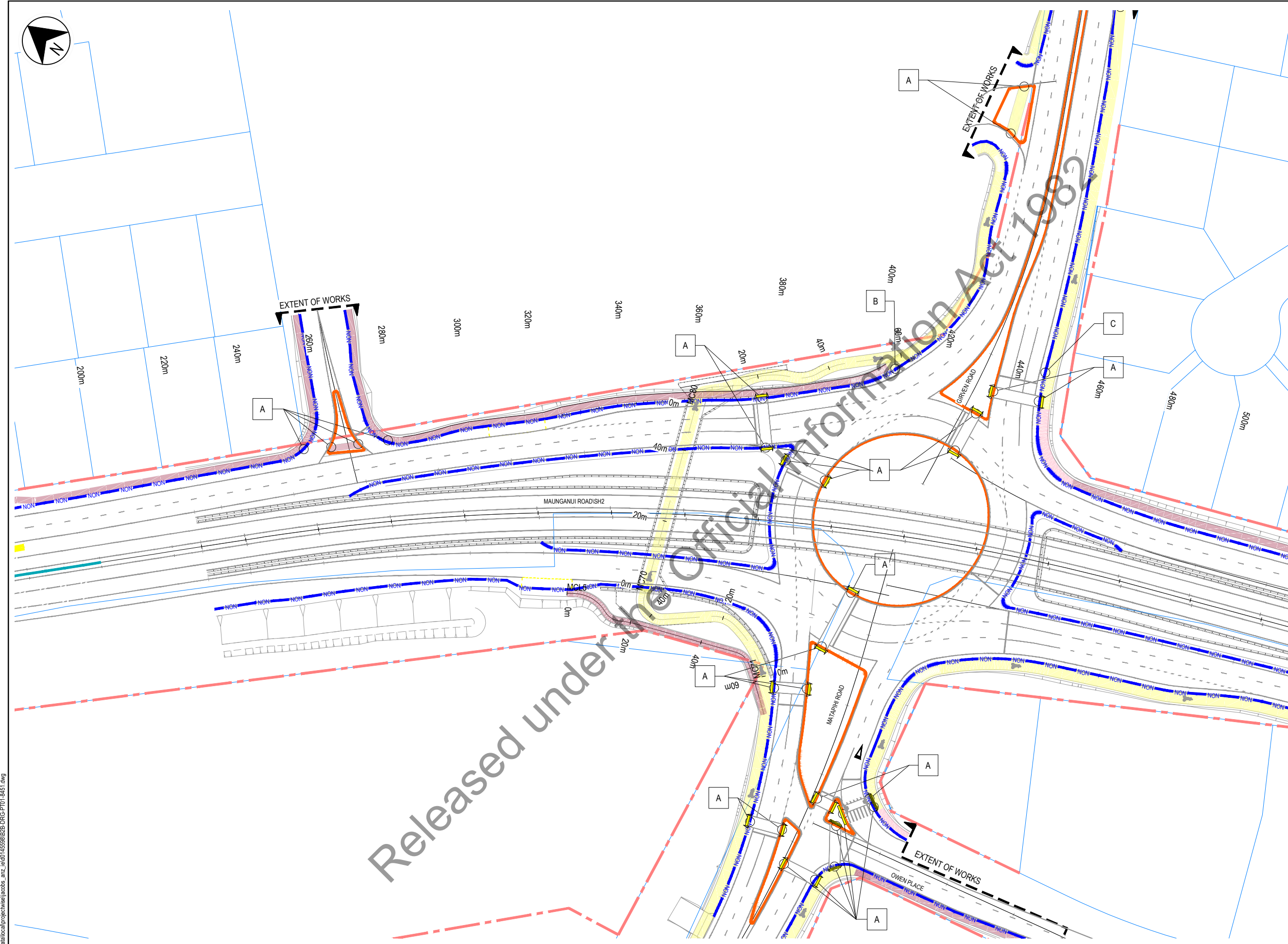
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STATUS: FOR INFORMATION
PROJECT NUMBER: 2/09-024/603

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

TITLE: UNDERPASS UPGRADE PLAN & LONG SECTIONS BUS STOP MCL5 & RAMP ACCESS MC80
DRAWING No: B2B-DRG-AL01-8102
REV: A



- LEGEND**
- DESIGNATION
 - EXISTING CADASTRAL BOUNDARY
- KERB AND CHANNEL LEGEND**
- TCC KERB FOR TRAFFIC ISLAND (T422)
 - TCC NON-MOUNTABLE KERB AND CHANNEL (T421)
 - TCC CHANNEL (T424)
- PATH LEGEND**
- FOOTPATH (1.8m WIDE)
 - SHARED PATH (3.0m WIDE)
 - FOOTPATH (3.0m WIDE)
- LEGEND**
- A TCC T440 STANDARD INCLUDING TGS1
 - B RAMP UP B2B-DRG-PT01-3460
 - C RAMP DOWN B2B-DRG-PT01-3460



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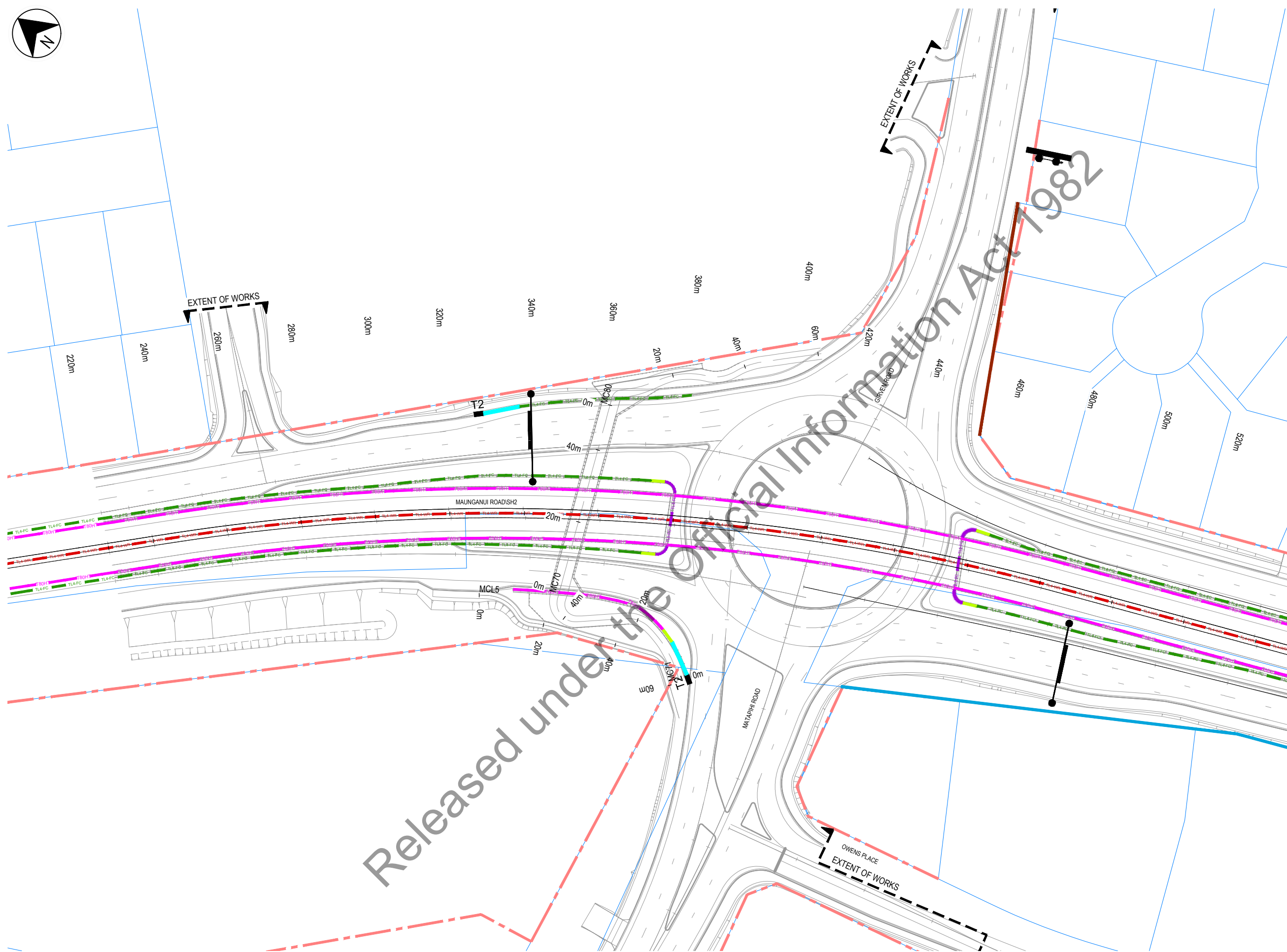


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 PROJECT NUMBER: 2/09-024/603

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

TITLE: UNDERPASS UPGRADE KERBS, FOOTPATH AND CYCLEWAYS
 DRAWING No: B2B-DRG-PT01-8451
 REV: A

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BARRIER NOTES

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

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

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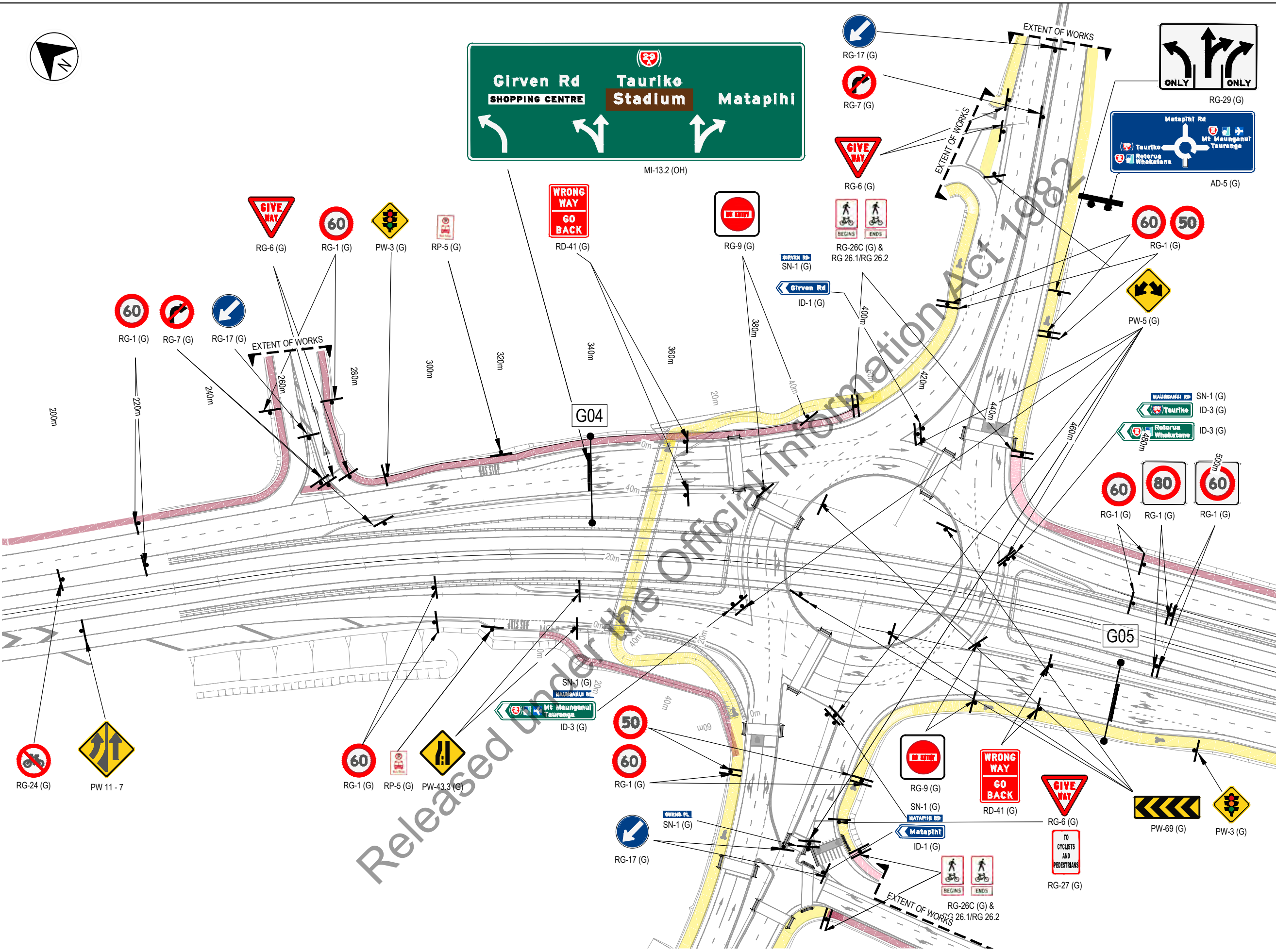
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STATUS: FOR INFORMATION
PROJECT NUMBER: 2/09-024/603

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

TITLE: UNDERPASS UPGRADE BARRIERS
DRAWING No: B2B-DRG-RF01-8271
REV: A



NOTES

1. ALL SIGNS TO BE IN ACCORDANCE WITH TRAFFIC CONTROL DEVICES (TCD) MANUAL AND MANUAL OF TRAFFIC SIGNS AND MARKINGS (MOTSAM).
2. SIGN LOCATIONS SHOWN ARE INDICATIVE ONLY. LOCATION TO BE IN ACCORDANCE WITH TCD MANUAL & MOTSAM.
3. ALL SIGN NUMBERS ARE IN 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 WIDE)

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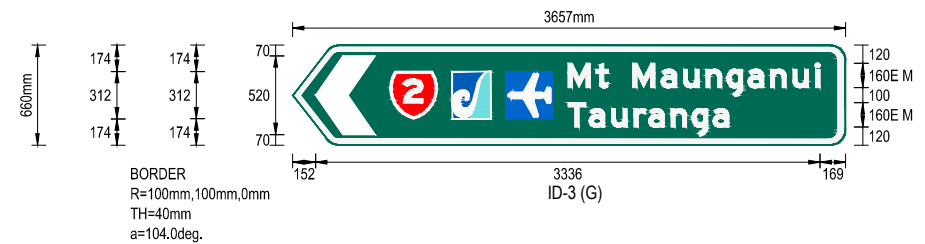
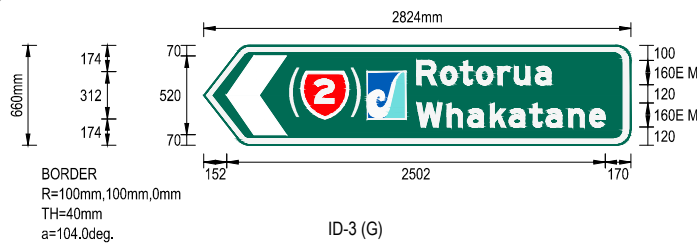
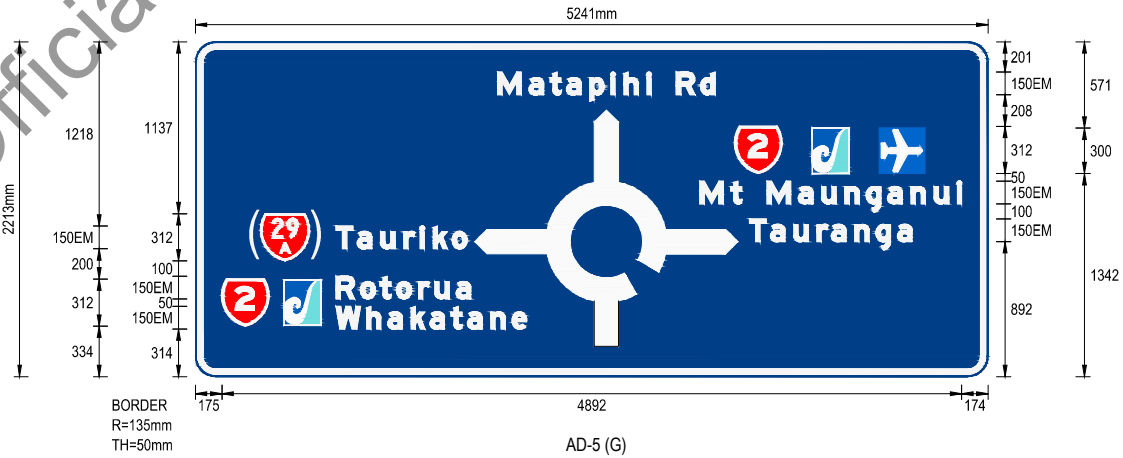
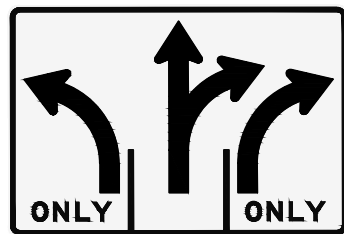
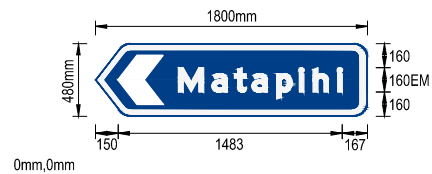
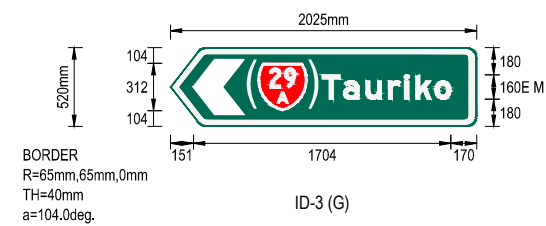
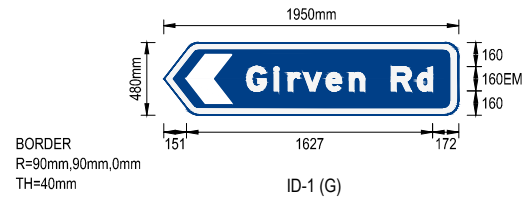
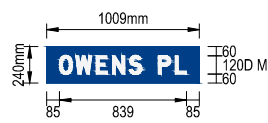
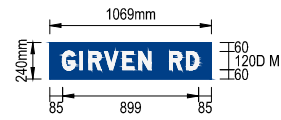
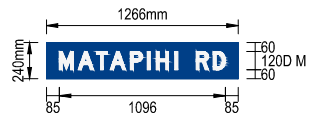
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 PROJECT NUMBER: 2/09-024/603

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

TITLE: UNDERPASS UPGRADE SIGNAGE
 DRAWING No: B2B-DRG-SL01-8211
 REV: A



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STATUS: FOR INFORMATION
PROJECT NUMBER: 2/09-024/603

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

TITLE: UNDERPASS UPGRADE GUIDE SIGN DETAILS
DRAWING No: B2B-DRG-SL01-8222
REV: A

LEGEND	PAVEMENT MARKINGS	SYMBOL	SPECIFICATION	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 TACTILE PROFILE BLOCKS 250 CENTRES	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B1	LANE LINE SH29A		HPLL 100mm WIDE INTERMITTED, 3m LONG, 7m GAP, AUDIO TACTILE PROFILE BLOCKS 250 CENTRES, 1 WHITE MONO-DIRECTIONAL RRP AT START OF LINE, 0.1m GAP FROM RRP END	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B2	LANE LINE - ROUNDABOUTS		HPLL 100mm WIDE INTERMITTED, 3m LONG, 7m GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B3	LANE LINE		HPLL 100mm WIDE INTERMITTED, 3m LONG, 7m GAP, 1 WHITE MONO-DIRECTIONAL RRP AT START OF LINE, 0.1m GAP FROM RRP END	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B4	CENTER LINE		HPLL 100mm WIDE CONTINUOUS, AUDIO TACTILE PROFILE BLOCKS 250 CENTRES	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
B5	CENTER LINE (TRACKING)		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 - COMBINED 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 - COMBINED 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, CONTINUOUS	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
I	FLUSH MEDIAN (URBAN)		POSITION INDICATED ON LAYOUT PLANS, HPLL 600mm WIDE DIAGONAL BAR, 100mm WIDE, CONTINUOUS	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
J1	CONTINUITY LINE (POSTED SPEED < 80kph)		HPLL 150mm WIDE, 1m STRIPE, 3m GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
J2	CONTINUITY LINE (POSTED SPEED > 80kph)		HPLL 200mm WIDE, 1m STRIPE, 3m GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
J3	CONTINUITY LINE (LANE DROP)		HPLL 200mm, 3m STRIPE, 7m GAP, WHITE RRPMS CENTRALLY LOCATED IN EVERY SECOND GAP	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20

LEGEND	PAVEMENT MARKINGS	SYMBOL	SPECIFICATION	MATERIALS
K	SHOULDER MARKING		HPLL 300mm WIDE, SLOPE 1:2 AT 25m SPACING	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
L	VEHICLE LIMIT LINE		HPLL 300mm WIDE, CONTINUOUS LINE	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
M1	BORDER LINE		HPLL 200mm WIDE, CONTINUOUS	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
M2	BORDER LINE (ATP)		HPLL 200mm WIDE, CONTINUOUS AUDIO TACTILE PROFILE BLOCKS 250mm CENTRES	WHITE, REFLECTORISED PAINT, NZTA P22, P30 AND M20
N	PEDESTRIAN CROSS WALK LINES		HPLL 100mm WIDE, CONTINUOUS 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 WIDE 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 SPACING, FINAL DETAIL 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

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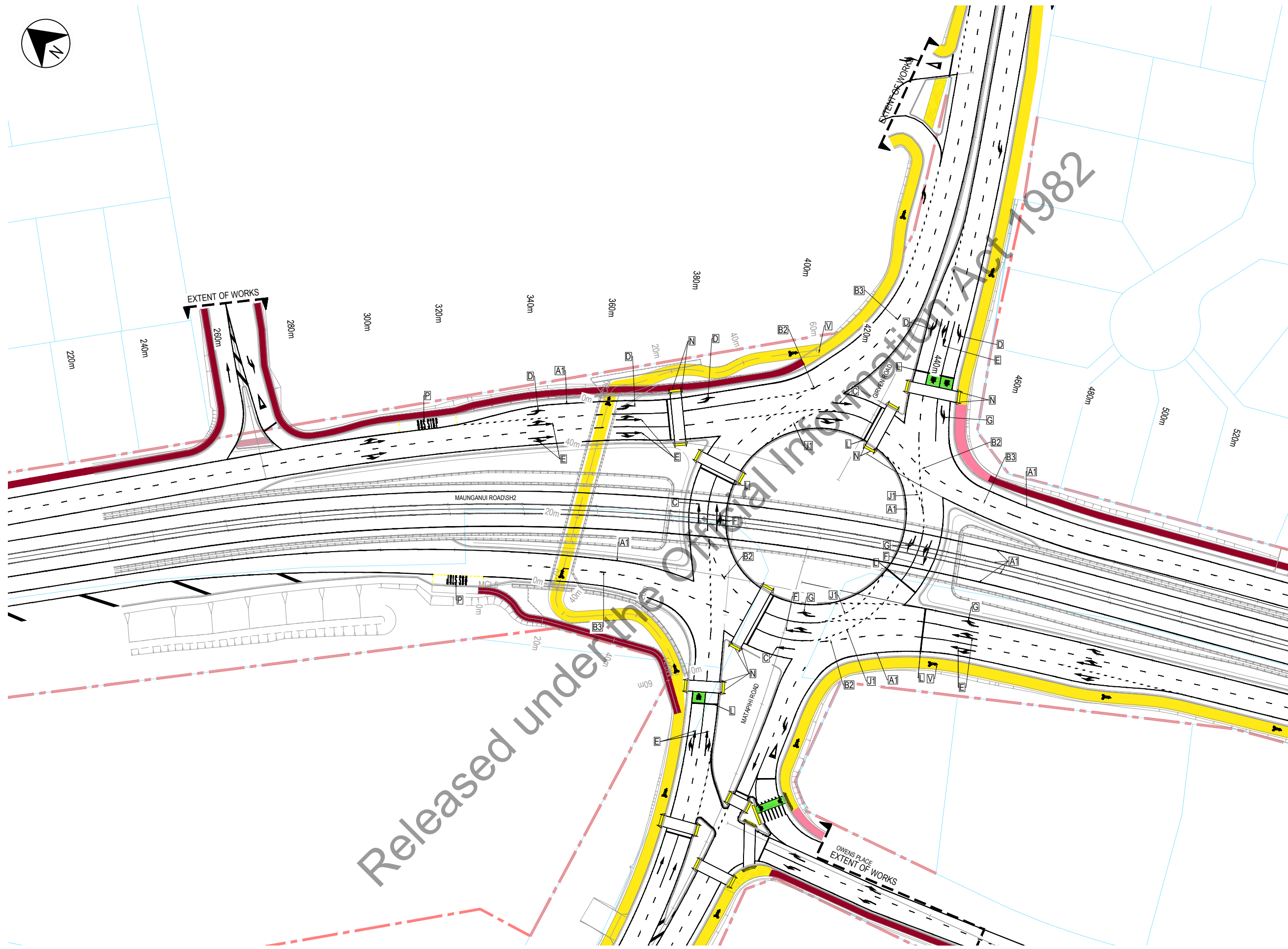
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PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: GK
DESIGNED: LG
DRAWING CHECK: GK
DESIGN REVIEW: LG
APPROVED: LW

TITLE: UNDERPASS UPGRADE PAVEMENT MARKINGS LEGEND
DRAWING No: B2B-DRG-SL01-8240
REV: A



PATH LEGEND

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



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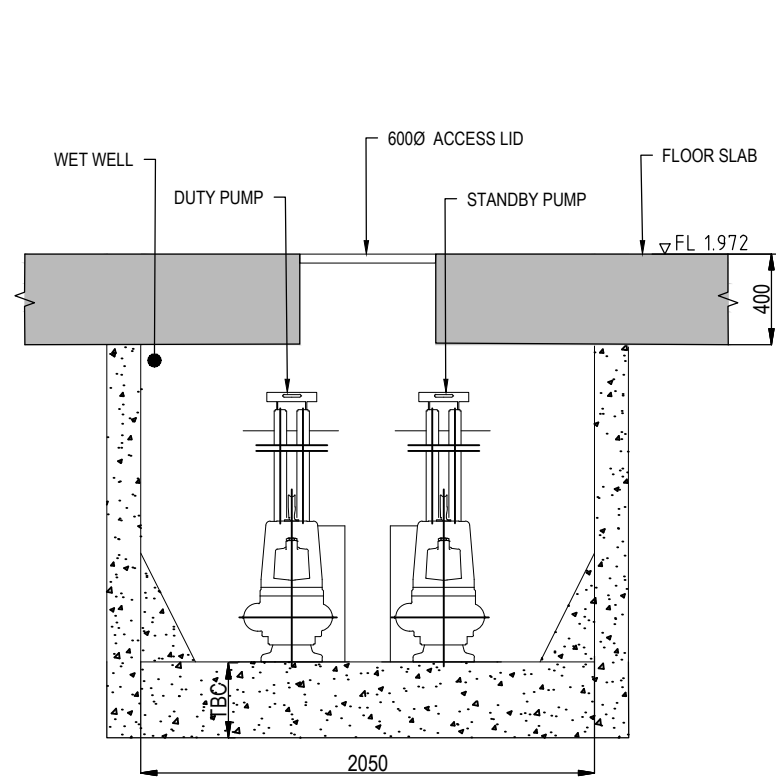
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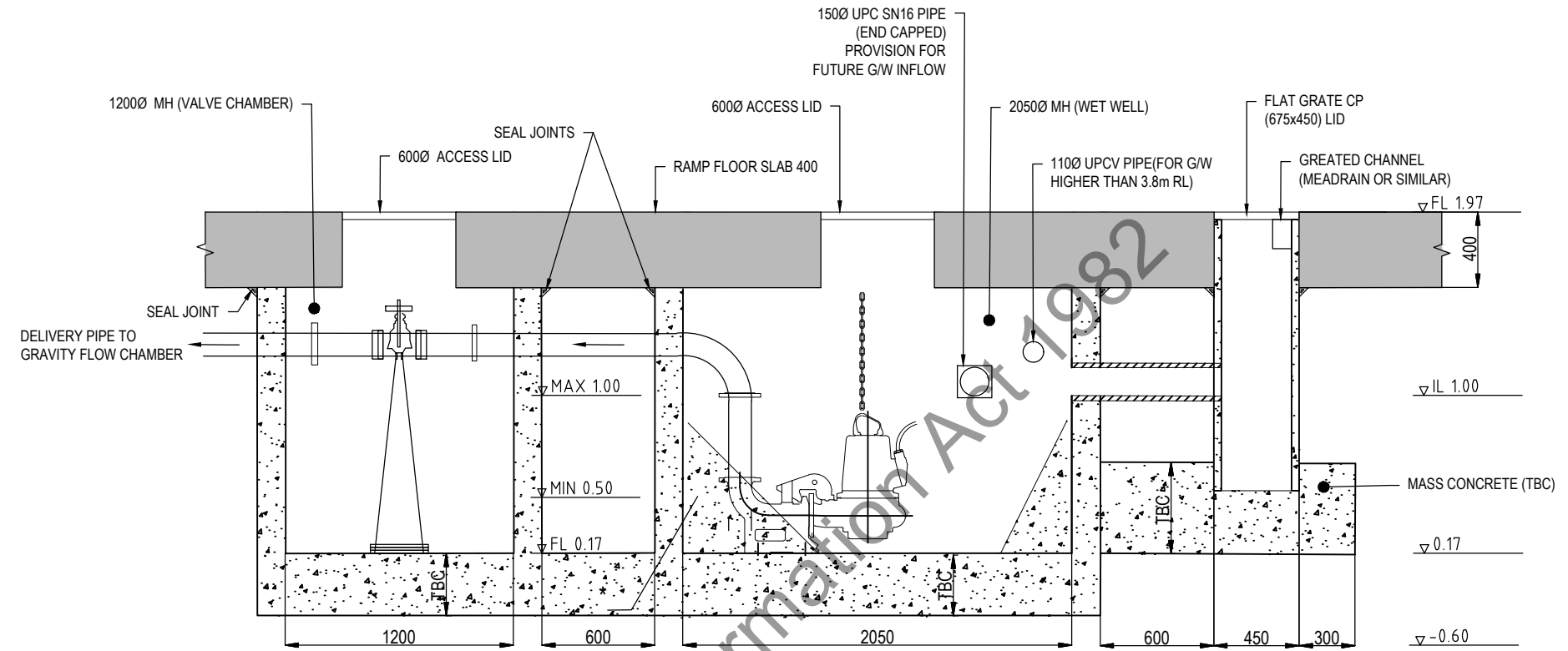
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 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: GK
 DESIGNED: KR
 DRAWING CHECK: GK
 DESIGN REVIEW: LG
 APPROVED: LW

TITLE: UNDERPASS UPGRADE PAVEMENT MARKINGS
 DRAWING No: B2B-DRG-SL01-8245
 REV: A



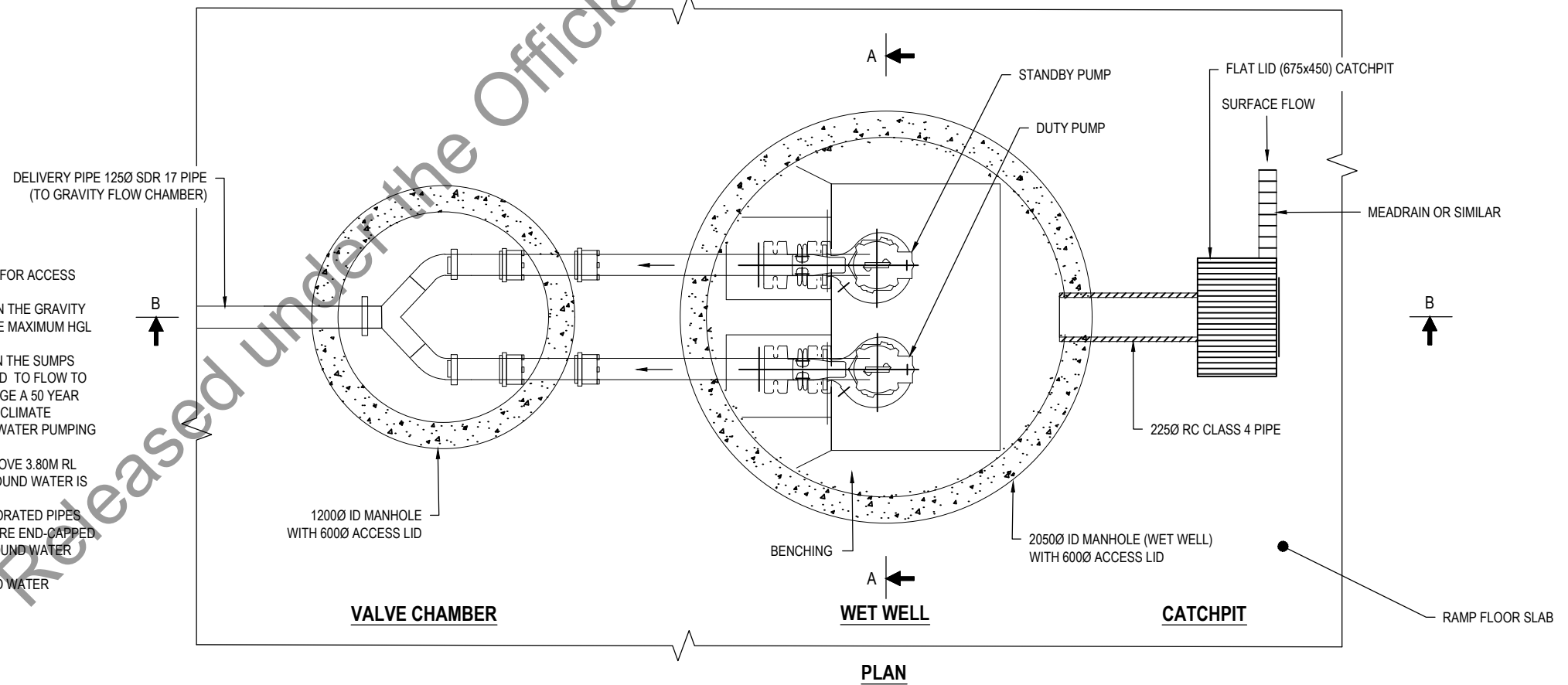
SECTION A-A



SECTION B-B

NOTES

1. THE UNDERPASS STRUCTURE IS COMPLETELY SEALED. RETAINING WALLS FOR ACCESS RAMPERS ARE SEALED FOR A GROUND WATER LEVEL OF 3.8 M RL.
2. SURFACE RUNOFF FROM ACCESS RAMPERS ABOVE 3.80M RL IS COLLECTED IN THE GRAVITY FLOW CHAMBERS AND IS DISCHARGED TO MANHOLE SP1.2 BY GRAVITY. THE MAXIMUM HGL AT MANHOLE SP1.2 AT A 50 YEAR ARI IS 3.73 M RL.
3. SURFACE RUNOFF FROM ACCESS RAMPERS 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 BLANKETING IS PROVIDED ON THE FACES OF THE RAMP BATTERS ABOVE 3.80M RL TO INTERCEPT GROUND WATER ABOVE 3.80M RL. THE INTERCEPTED GROUND WATER IS DISCHARGED TO THE GRAVITY FLOW CHAMBERS.
5. GROUND WATER BELOW 3.80M RL WILL NOT BE PUMPED. HOWEVER, PERFORATED PIPES LEADING TO THE SUMP WELLS ARE LAID AT LOWER LEVELS. THESE PIPES ARE END-CAPPED FOR THE CURRENT DESIGN WHICH MAY BE OPENED IN THE FUTURE IF GROUND WATER PUMPING 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

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

TITLE: UNDERPASS UPGRADE MATAPIHI PUMP STATION DETAILS
 DRAWING No: B2B-SKT-DR01-8471
 REV: A



Baylink

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 the 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:

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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 Rooding, Lighting Drainage and Structural Design for the MGI underpass.

Under Rooding 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.

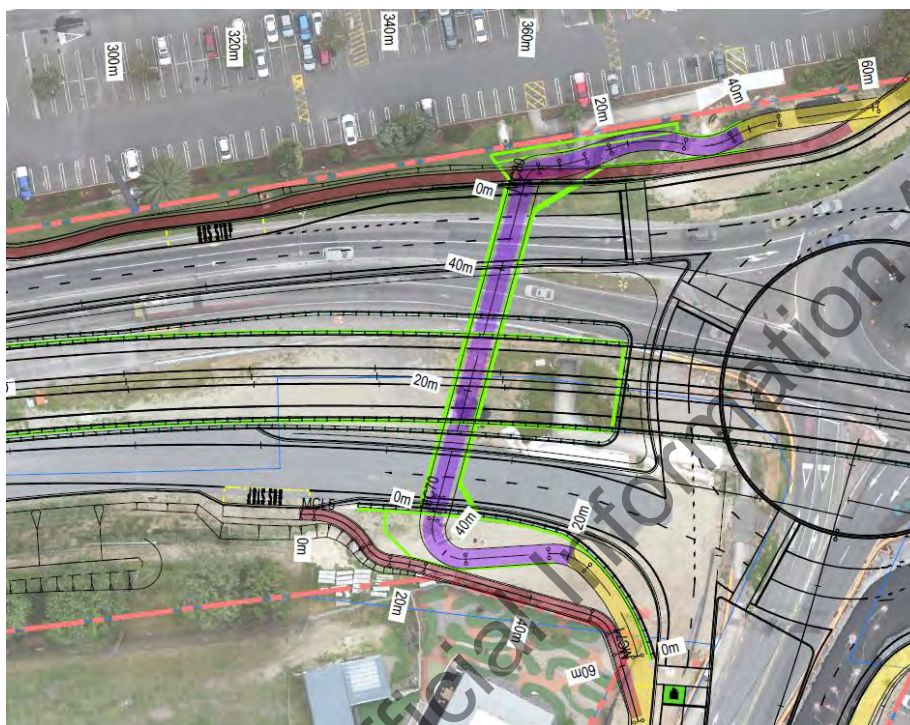
This new underpass aims to minimise the impacts on the current Baylink design.

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.

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2. Rooding

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 Rooding 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 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 whereas 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 ($3.80\text{m} - 1.95\text{m} = 1.85\text{m}$) is considered. Deducing 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 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 be 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 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 Matapini 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 is 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 CCAA 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 x 150mm 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 in 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 dia 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 675mm 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 the 1350mm 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 SP1.2 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

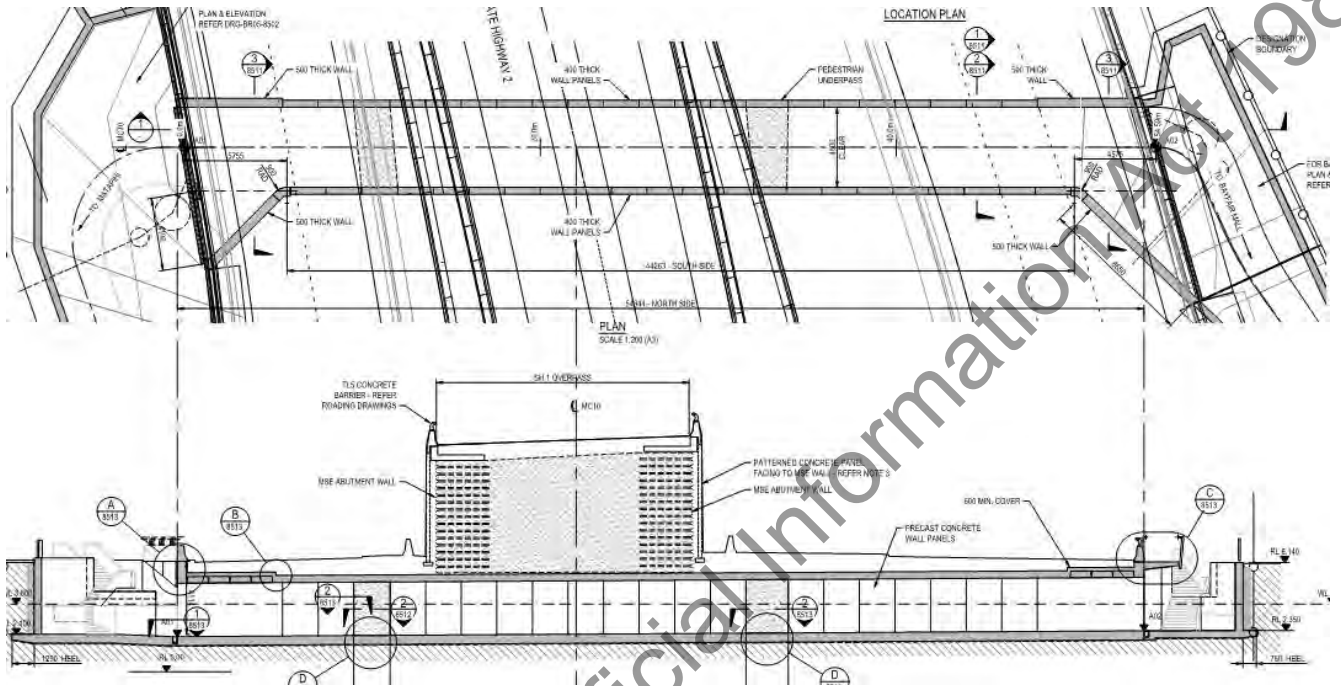
BR05 MGI Underpass is a new underpass, generally with internal dimensions of 4.5m wide by 3.0m high and approximately 54.3m in length. The underpass will provide unimpeded access for the proposed shared user path under the Maunganui Road/Girven Road Intersection (MGI) and BR01 – MGI Overpass Northern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

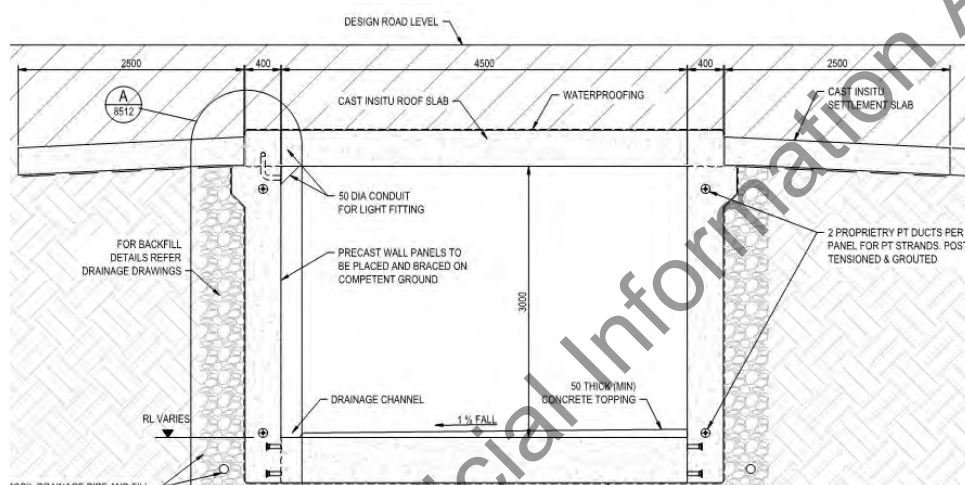
The provision for natural lightwells within the roof of the underpass will be considered during detailed design.

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 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 Roothing 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	<p>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</p> <p>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</p>
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:
(these tolerances are applied to the minimum covers)

Precast concrete: -0mm, +10mm
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 craneage 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/m² 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 & described 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.	Feasible 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 possible; 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/m³
- Unit weight of underpass floor overlay: 25.5kN/m³
- Unit weight of ramp pavement: 20kN/m³

- 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.

Exceptionally 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, $\epsilon_{csd, b}^* = 1315 \times 10^{-6}$ as per Table 4.4 of the BM;
- Coefficient of thermal expansion of $12 \times 10^{-6}/^{\circ}\text{C}$.

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_0) has been applied to the structural model.

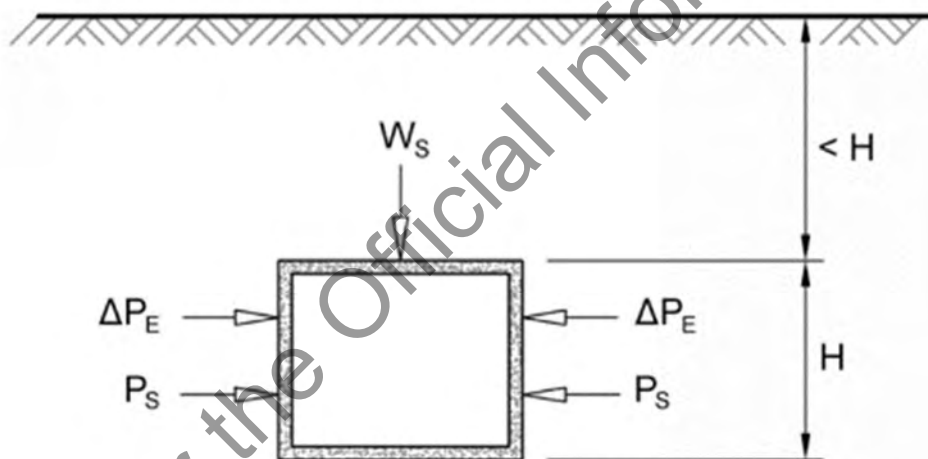
Surcharge Loading due to HN / HO Traffic

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).



(a) 'SHALLOW' OVERBURDEN

Earthquake forces for underpass with 'shallow' overburden

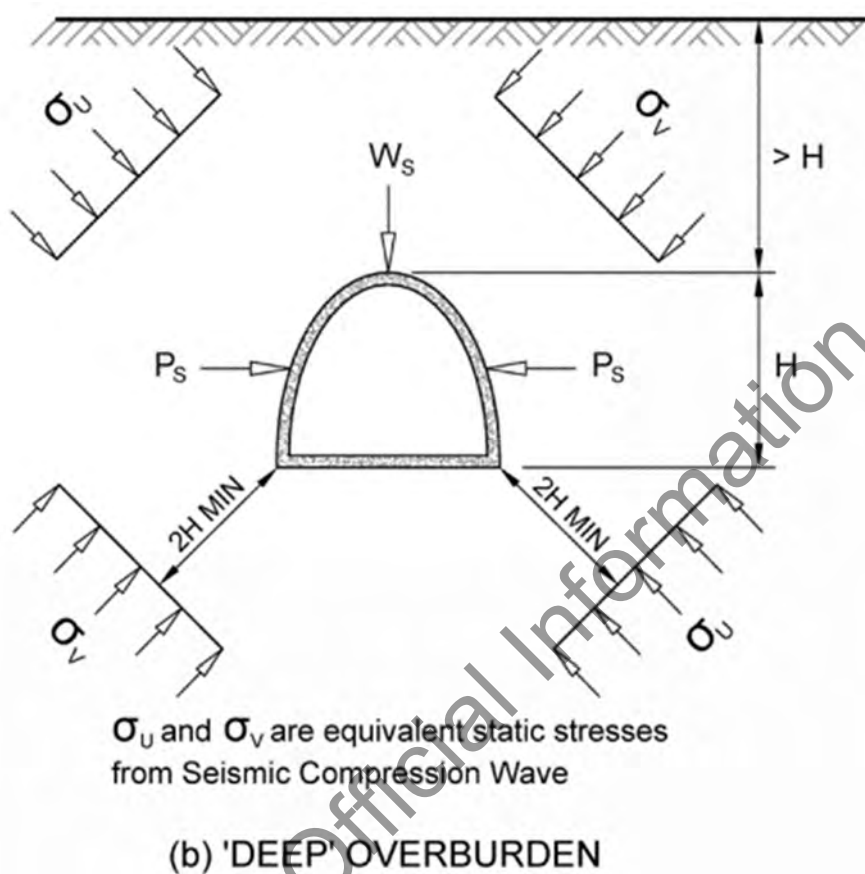


Figure 1: Earthquake forces for underpass with 'deep' overburden

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:

- LUSAS Bridge Plus Structural Analysis (Modeller/Solver), Version 16.0 (FEA Ltd., 2018): main software for the structural modelling and analysis;
- Response-2000, Version 1.0.5, 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;
- 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)

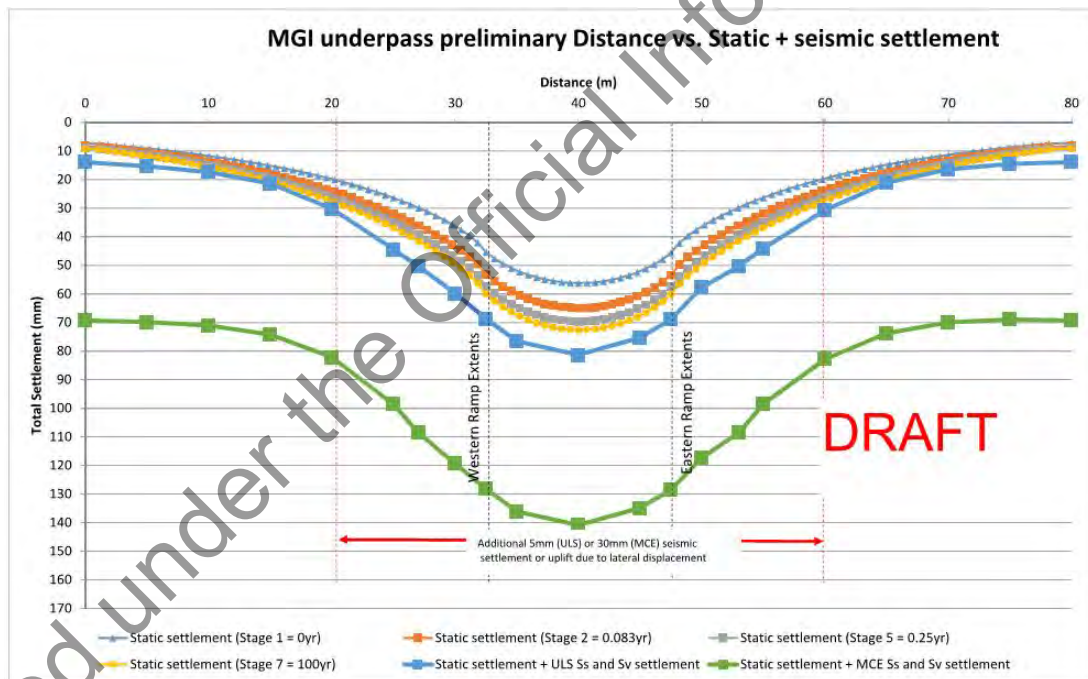
Soil Spring Stiffness Providing Resistance to Pier Pad Foundations

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

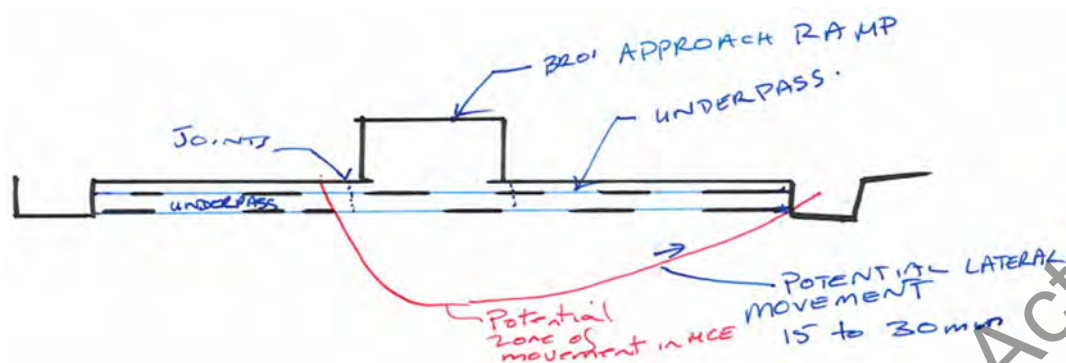
Preliminary static and seismic (included liquefaction induced) settlements along the length of the underpass have been provided by the geotechnical designers.



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 craneage 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

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NZ TRANSPORT AGENCY

BAYPARK TO BAYFAIR LINK
UNDERPASS
Detailed Design
50% ISSUE



ISSUED BY:

A	30% Detailed Design	Align Limited	Landscape Architects	15 February 2019
B	50% Detailed Design	Align Limited	Landscape Architects	15 March 2019

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DRAWING NUMBER	TITLE
B2B-DRG-LA-UP-000	COVER SHEET
B2B-DRG-LA-UP-010	DRAWING LIST
B2B-DRG-LA-UP-050	KEY NOTES / LEGEND
B2B-DRG-LA-UP-100	OVERALL SITE PLAN
B2B-DRG-LA-UP-101	BAYFAIR CONCEPT PLAN 1 OF 3
B2B-DRG-LA-UP-102	UNDERPASS CONCEPT PLAN 2 OF 3
B2B-DRG-LA-UP-103	MATAPIHI CONCEPT PLAN 3 OF 3
B2B-DRG-LA-UP-110	BAYFAIR GENERAL ARRANGEMENT PLAN 1 OF 3
B2B-DRG-LA-UP-120	UNDERPASS GENERAL ARRANGEMENT PLAN 2 OF 3
B2B-DRG-LA-UP-130	MATAPIHI GENERAL ARRANGEMENT PLAN 3 OF 3
B2B-DRG-LA-UP-300	OVERALL PLANTING PLAN
B2B-DRG-LA-UP-310	BAYFAIR PLANTING PLAN 1 OF 2
B2B-DRG-LA-UP-320	MATAPIHI PLANTING PLAN 2 OF 2
B2B-DRG-LA-UP-410	SECTIONS 1 OF 2
B2B-DRG-LA-UP-420	SECTIONS 2 OF 2
B2B-DRG-LA-UP-710	BAYFAIR LEVELS PLAN 1 OF 2
B2B-DRG-LA-UP-720	MATAPIHI LEVELS PLAN 2 OF 2
B2B-DRG-LA-UP-800	DETAILS - SURFACES
B2B-DRG-LA-UP-810	DETAILS - STREET FURNITURE AND STRUCTURES
B2B-DRG-LA-UP-820	DETAILS - FENCES AND WALLS
B2B-DRG-LA-UP-830	DETAILS - PLANTING
B2B-DRG-LA-UP-840	BAYFAIR FENCING PLAN 1 OF 2
B2B-DRG-LA-UP-850	MATAPIHI FENCING PLAN 1 OF 2
B2B-DRG-LA-UP-900	BAYFAIR LIGHTING PLAN 1 OF 2
B2B-DRG-LA-UP-910	MATAPIHI LIGHTING PLAN 2 OF 2

					 NZ TRANSPORT AGENCY WAKA KOTAHI	 CPB CONTRACTORS	 JACOBS	 Align Tonkin+Taylor	SCALE	N/A	CLIENT	NZ TRANSPORT AGENCY		TITLE	UNDERPASS DRAWING LIST SHEET 1 OF 1					
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR					REVISIONS & ISSUES	STATUS		50% ISSUE	PROJECT		BAYPARK TO BAYFAIR LINK (BAY LINK)		DRAWN	JW/MIP	DRAWING CHECK	AW

GENERAL NOTES

ALL STRUCTURAL / BUILDING WORK AND FOUNDATIONS TO DESIGNERS DETAILS.

DRAWINGS NOT TO BE SCALED, USE DIMENSIONED MEASUREMENTS ONLY.

ALL DIMENSIONS TO FINISHED SURFACE LEVELS.

EDGE DETAIL BETWEEN CONCRETE SURFACES TO BE TOWELED EDGE WITH 10MM FLEXIBLE SEALANT JOINT.

REFER TO LANDSCAPE HARD AND SOFTSCAPE SPECIFICATION, PREPARED BY ALIGN.

REFER TO GEOMETRICS, DRAINAGE, LIGHTING AND OTHER RELEVANT PACKAGES FOR FURTHER INFORMATION:

A. REFER TO GEOMETRICS PACKAGE FOR ROAD ALIGNMENT.

B. DESIGNATION BOUNDARY PROVIDED BY CPB. THE LANDSCAPING APPLIED TO EDGE OF ROAD IN ORDER TO ALIGN WITH THE GEOMETRICS PACKAGE (JACOBS).

C. FOR PEDESTRIAN FENCING DETAILS REFER TO JACOBS BARRIERS PACKAGE.

D. REFER TO JACOBS PAVEMENT MARKING PACKAGE FOR PAVEMENT MARKINGS AND TGS1 LOCATIONS.

E. REFER TO JACOBS SIGNAGE PACKAGE FOR SIGNAGE LOCATIONS.

F. REFER TO JACOBS TRAFFIC SIGNALS PACKAGE FOR TRAFFIC SIGNAL LOCATIONS.

G. REFER TO GEOTECHNICAL (TONKIN + TAYLOR) AND STRUCTURAL (JACOBS) FOR DETAILED DESIGN OF OVERPASS.

H. REFER TO JACOBS DRAINAGE PACKAGE. ALL DRAINAGE BY JACOBS STORMWATER DESIGN - FITTINGS AND SIZES SUBJECT TO ENGINEERS DETAILS.

I. REFER TO JACOBS LIGHTING PACKAGE.

SOFT LANDSCAPE NOTES

ALL GRASS AREAS TO BE FINISHED 25MM HIGHER THAN ADJOINING SURFACE TO ALLOW FOR SETTLEMENT.

ABSOLUTE PLANTING NUMBERS ARE INDICATIVE. CONTRACTOR TO ENSURE SUFFICIENT STOCK TO ACHIEVE SPECIFIED PLANTING DENSITIES.

METALWORK NOTES

GENERAL
CONFIRM ON SITE ALL MEASUREMENTS PRIOR TO MANUFACTURING. ALL DIMENSIONS NOMINAL ONLY.

CONTRACTOR TO SITE MEASURE AND MEASURE ALL COMPONENTS AND ENSURE ACCURATE FIT BETWEEN COWLS, COLLARS, FLANGES, PIPES, POSTS, BASE PLATES, FIXING SURFACES AND THE LIKE.

ALL WELDS TO BE BUFFED SMOOTH PRIOR TO HOT DIP GALVANISING/ZINC PLATING.

ALL NON-STAINLESS STEEL METAL WORK SHALL BE HOT DIPPED GALVANISED (HDG) OR ZINC PLATED AND PAINTED - METAL WORK TO BE CLEANED, DEGREASED FOLLOWING COMPLETION OF ALL WELDS AND HOT DIP GALVANISED/ZINC PLATED IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK (B2B-S-SP-5650)

ALL METALWORK TO BE APPROVED BY ENGINEER AFTER FABRICATION AND BEFORE HOT DIP GALVANISING/ZINC PLATING.

METALWORK NOTES

NO WELDING OR DRILLING TO BE CARRIED OUT BEFORE ZINC SPRAYING.

PRIMER AND PAINT SYSTEM TO LANDSCAPE HARDSCAPE SPECIFICATION. COLOURS TO BE CONFIRMED PRIOR TO ORDERING.

APPROVED EXTERIOR GRADE SILICON SEALANT TO ALL JOINTS AFTER FIXING.

ALL FIXINGS TO BE NON-FERROUS - ALL FIXINGS TO ENSURE ADEQUATE SEPARATION OF VARYING METALWORK ELEMENTS.

METALWORK FIXING PLATES AND FITTINGS NOT TO BE USED AS A GUIDE FOR DRILLING OR CUTTING.

P - SURFACES

P01A • INSITU CONCRETE
- SUPPLIER: CPB TO CONFIRM
- FINISH: SPONGED U5, PFL NATURAL SEALER
- COLOUR: PETER FELL COLOUR RANGE GELATO RASPBERRY
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-800

P01B • INSITU CONCRETE
- SUPPLIER: ALLIED CONCRETE
- FINISH: JET BLASTED, CEMIX CONCRETE SEALER MATT
- COLOUR: WOODVILLE PEBBLE WITH OXIDE
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD EXPOSED MIX
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-800

P03 • INSITU CONCRETE
- SUPPLIER: CPB TO CONFIRM
- FINISH: SPONGED U5, PFL NATURAL SEALER
- COLOUR: PLAIN
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-8000

P05A • CONCRETE UNIT PAVING
- NOT INCLUDED IN THIS PACKAGE

P05B • CONCRETE UNIT PAVING
- NOT INCLUDED IN THIS PACKAGE

P05C • CONCRETE UNIT PAVING
- NOT INCLUDED IN THIS PACKAGE

P06 • HOLLAND SETTS
- NOT INCLUDED IN THIS PACKAGE

P07 • TGS1 WARNING INDICATOR
- SUPPLIER: MOBILITY RESEARCH CENTRE
- STYLE: POLYURETHANE TACTILE STUD
- WARNING/HAZARD: TYPE B
- COLOUR: SAFETY YELLOW
- SIZE: 35DIA
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER TO GEOMETRICS DRAWINGS FOR LOCATIONS

P08 • TGS1 DIRECTIONAL INDICATOR
- SUPPLIER: MOBILITY RESEARCH CENTRE
- STYLE: POLYURETHANE TACTILE STUD
- WARNING/HAZARD: TYPE C
- COLOUR: SAFETY YELLOW
- SIZE: 288 X 35DIA MM
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER TO GEOMETRICS DRAWINGS FOR LOCATIONS

D10 • DETERRENT PAVING
- NOT INCLUDED IN THIS PACKAGE

D11 • SURFACE DRAINAGE
- TYPE: DUCTILE IRON DRAINAGE GRATE
- SIZE: 100MM
- FINISH: LASER CUT PATTERN
- REFER DRAWING B2B-DRG-LA-UP-800

S - STREET FURNITURE | STRUCTURES

S01 • BOLLARDS
- SUPPLIER: BOLLARDS NZ
- TYPE: B2 (114MM) SERIES
- FINISH: STAINLESS STEEL TUBE, REMOVABLE WITH REFLECTOR STRIP
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-810

S02 A, B, C, D • BOULDERS
- TYPE: KAIUA BLUESTONE OR LOCALLY SOURCED RIVER BOULDERS
- SIZE: MINIMUM SIZE 900MM DIA
- INSTALL 30% BURIED
NOTE: SAMPLES TO BE APPROVED BY LANDSCAPE ARCHITECT

S03A • BENCH SEAT
- NOT INCLUDED IN THIS PACKAGE

S03B • BENCH SEAT
- NOT INCLUDED IN THIS PACKAGE

S03C • BENCH SEAT
- NOT INCLUDED IN THIS PACKAGE

S04 • OVERHEAD STRUCTURES
- NOT INCLUDED IN THIS PACKAGE

S05 • WAYFINDING SIGNAGE FEATURE
- NOT INCLUDED IN THIS PACKAGE

S06 • HAND RAIL
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: WALL MOUNTED HANDRAIL
- FINISH: GALVANISED STEEL
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-110 & 130, 810

S07 SKATE BOARD DETERRENTS
- REFER DRAWING B2B-DRG-LA-UP-110 & 130
- INCLUDED IN F05 REFER DRAWING B2B-DRG-LA-UP-810
- REFER LANDSCAPE HARDSCAPE SPECIFICATION

S08 • STAIR NOSING
- SUPPLIER: TOTAL TACTILEZ
- TYPE: LBR127 TREFDX LUMAWAY STAIR NOSING
- FINISH: NATURAL WITH YELLOW INSERTS
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

S09 • PRE-CAST CONCRETE STAIRS
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: PRE CAST CONCRETE STRUCTURE
- FINISH: CONTRACTOR TO CONFIRM
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

S10 • PRE-CAST CONCRETE BRIDGE
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: PRE CAST CONCRETE STRUCTURE
- FINISH: CONTRACTOR TO CONFIRM
- REFER DRAWING B2B-DRG-LA-UP-110

F - FENCES, WALLS, GATES AND RENDERING

F01 • SAFETY FENCING
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: STEEL RAILING AS PER DESIGN
- FINISH: GALVANISED STEEL
- HEIGHT: 1200MM
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

F02 • RAISED PLANTER WALLS
- REFER DRAWING B2B-DRG-LA-UP-110, 120 & 810
- REFER UDLMF FOR GENERAL AESTHETICS
- TYPE: INSITU CONCRETE
- HEIGHT: AS PER LEVELS DRAWING B2B-DRG-LA-UP-710 & 720
- WIDTH: 200MM
- FINISH: F5

F03 • FOOTBRIDGE FENCING (ROAD SIDE)
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: CONCRETE ROAD BARRIER
- FINISH: F5
- HEIGHT: JACOBS TO CONFIRM
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-110

F04 • FOOTBRIDGE WALL / FENCING , GUARDRAIL
- REFER DRAWING B2B-DRG-LA-UP-110

F05 • RETAINING WALL INSERT PANELS
- REFER DRAWING B2B-DRG-LA-UP-810
- TYPE CORTEN STEEL (LASER CUT)
- SIZE 4MM
- FINISH: ALL CORTEN STEEL TO BE AGED BEFORE INSTALL (TO PREVENT LEACHING)

F06 • WALL PAINTING - WHITE
- SUPPLIER: DULUX
- TYPE: WHITE
- FINISH: MATT AND GRAFFITI RESISTANT
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

F07 • WALL PAINTING - RED
- SUPPLIER: DULUX
- TYPE: ELECTRO F RED 9064164K
- FINISH: MATT AND GRAFFITI RESISTANT
- REFER DRAWING B2B-DRG-LA-UP-110

F08 • DESIGNER FENCING
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: STEEL RAILING AS PER DESIGN
- FINISH: ZINC COATED AND POWDER COATED STEEL / COLOUR: ELECTRO F RED
- HEIGHT: 1200MM
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP- 820

F09 • RETAINING WALL RELIEF PATTERNING
- REFER DRAWING B2B-DRG-LA-UP-110 & 130
- TYPE: CAST INTO TILT SLAB USING FORM LINER
- FINISH: F5

G / T / G - PLANTING

G01 • GARDEN BED- STANDARD
- 100MM MIN MULCH AS PER P39 STANDARD SPECIFICATION
- PERMEABLE GEOTEXTILE TERRAM, BIODEGRADABLE & PINNED IN PLACE
- 300MM MIN TOPSOIL AS PER P39 STANDARD SPECIFICATION
- PREPARED SUB-SOIL BROKEN UP, DECOMPACTED TO A DEPTH OF 150MM
- REFER PLANT SCHEDULE & PLANTING PLANS
- REFER DRAWING B2B-DRG-LA-UP-830

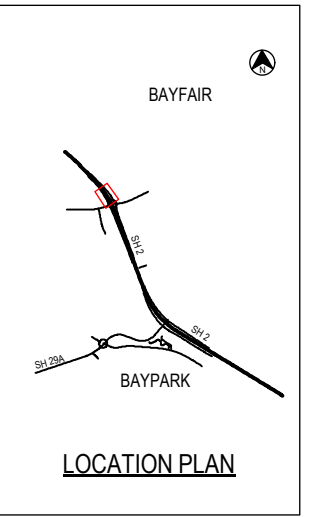
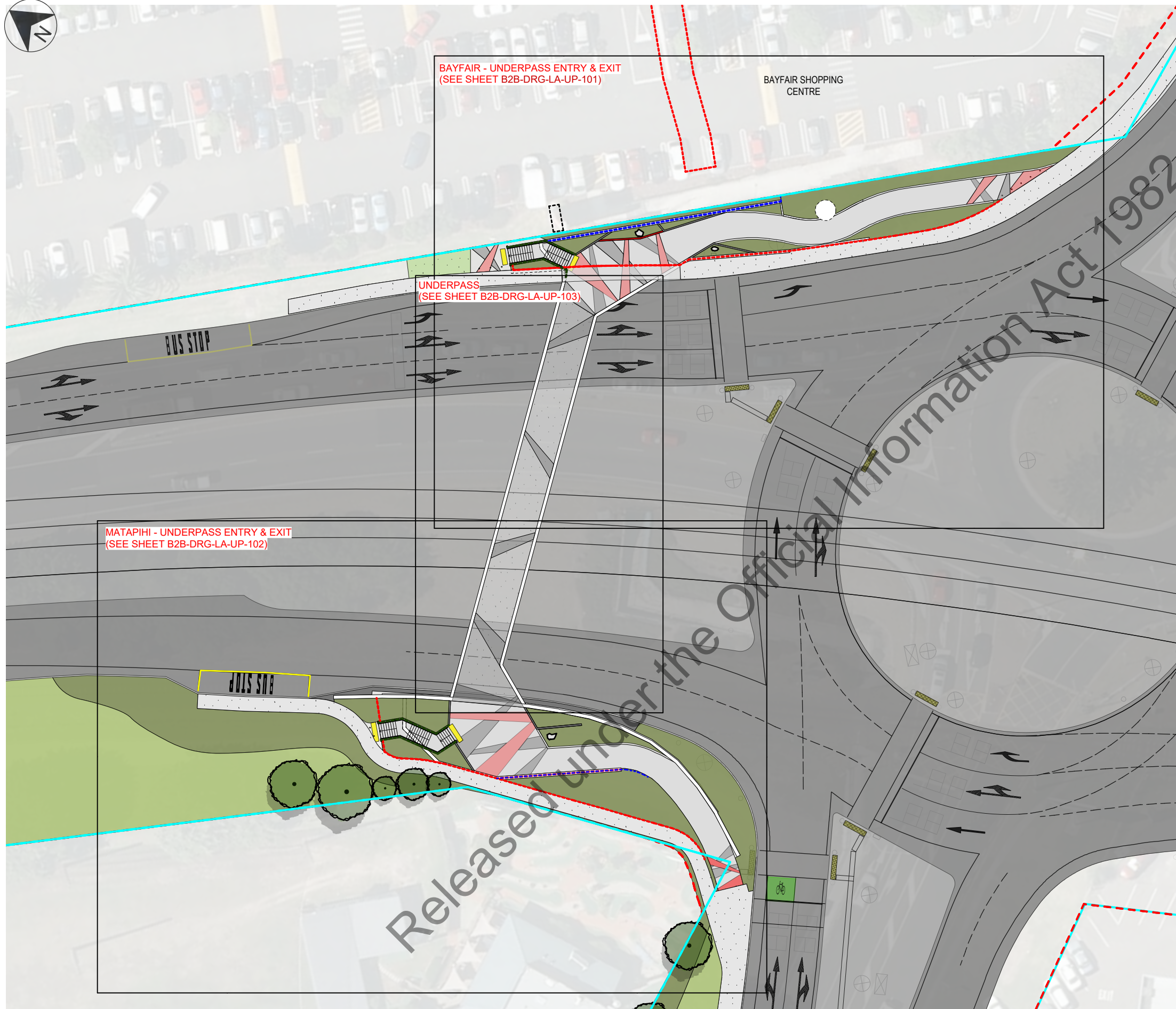
G02 • HYDROSEED GRASS
- HYDROSEED GRASS, RYE 70%, CHEWING FESCUE 25%, BROWN TOP 5%, FINISHED LEVEL, 25MM ABOVE ADJACENT HARD SURFACES AND EDGES TO ALLOW FOR SETTLEMENT. GRASS TYPE TO BE CONFIRMED BY TURFGRASS SEED SPECIALIST.
- 100MM MIN DEPTH TOPSOIL AS PER P39 STANDARD SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-830

T01 • PROPOSED TREE IN GARDEN AREA
- 100MM MIN MULCH AS PER P39 STANDARD SPECIFICATION
- 1000MM MIN TOPSOIL AS PER P39 STANDARD SPECIFICATION
- REFER PLANTING PLANS & PLANT SCHEDULES
- REFER DRAWING B2B-DRG-LA-UP-830

T04 • EXISTING TREE TO BE RETAINED AND PROTECTED



											CLIENT: NZ TRANSPORT AGENCY PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)		TITLE: UNDERPASS KEY NOTES/ LEGEND SHEET 1 OF 1	
CONTRACTOR: CPB CONTRACTORS					DESIGNER: JACOBS		SCALE: N/A		STATUS: 50% ISSUE		DRAWN: JW/MP		APPROVED: 18/03/19	
PROJECT NUMBER: 2/09-024/603					DRAWING CHECK: AW		DESIGN REVIEW: RS		DRAWING NO: B2B-DRG-LA-UP-050		REV: A			
REVISIONS & ISSUES														



- LEGEND**
- PROPOSED GRASS
 - PROPOSED PLANTING
 - BRUSHED CONCRETE
 - SANDBLASTED CONCRETE/
EXPOSED AGGREGATE
 - COLOURED CONCRETE
 - TREES - PROPOSED
SPECIMEN GRADE
 - LANDSCAPE BOUNDARY
 - PROJECT DESIGNATION

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES



SCALE
1:500 (A3)

STATUS
50% ISSUE

PROJECT NUMBER
2/09-024/603

CLIENT
NZ TRANSPORT AGENCY

PROJECT
BAYPARK TO BAYFAIR LINK
(BAY LINK)

DRAWN
JW/MP

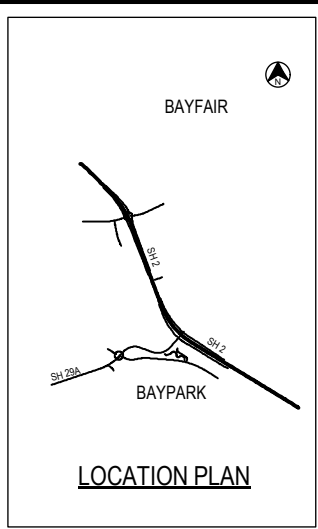
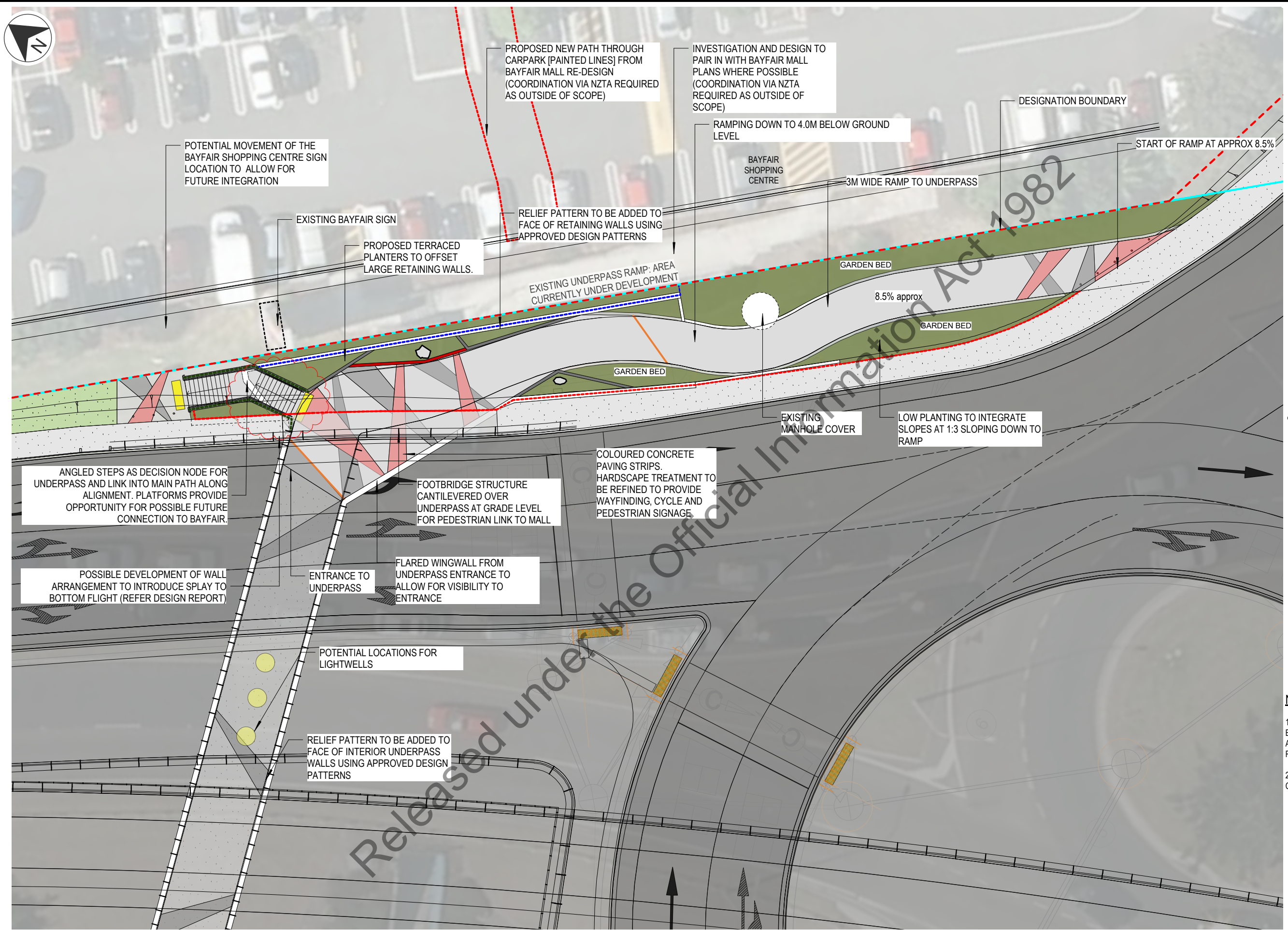
DRAWING CHECK
AW

APPROVED
18/03/19

TITLE
UNDERPASS
OVERALL SITE PLAN
SHEET 1 OF 1

DRAWING No
B2B-DRG-LA-UP-100

REV
A



- LEGEND**
- PROPOSED GRASS
 - PROPOSED PLANTING
 - BRUSHED CONCRETE
 - SANDBLASTED CONCRETE/ EXPOSED AGGREGATE
 - COLOURED CONCRETE
 - TREES - PROPOSED SPECIMEN GRADE
 - POWDER COATED RED DESIGNER FENCING AT 1200MM HEIGHT
 - POWDER COATED BLACK SAFETY FENCING AT 1200MM HEIGHT INTEGRATED WHERE POSSIBLE WITH CONCRETE BARRIER
 - NO FENCING - INTEGRATED WALL AND HANDRAIL TO BE UTILISED
 - LANDSCAPE BOUNDARY
 - CUSTOM DRAINAGE GRATE
 - PROJECT DESIGNATION

- NOTES**
1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
 2. DESIGNATION BOUNDARY PROVIDED BY CPB.

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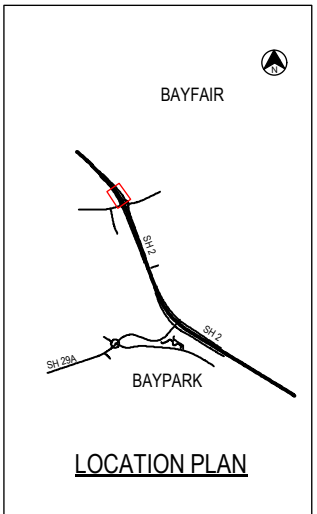
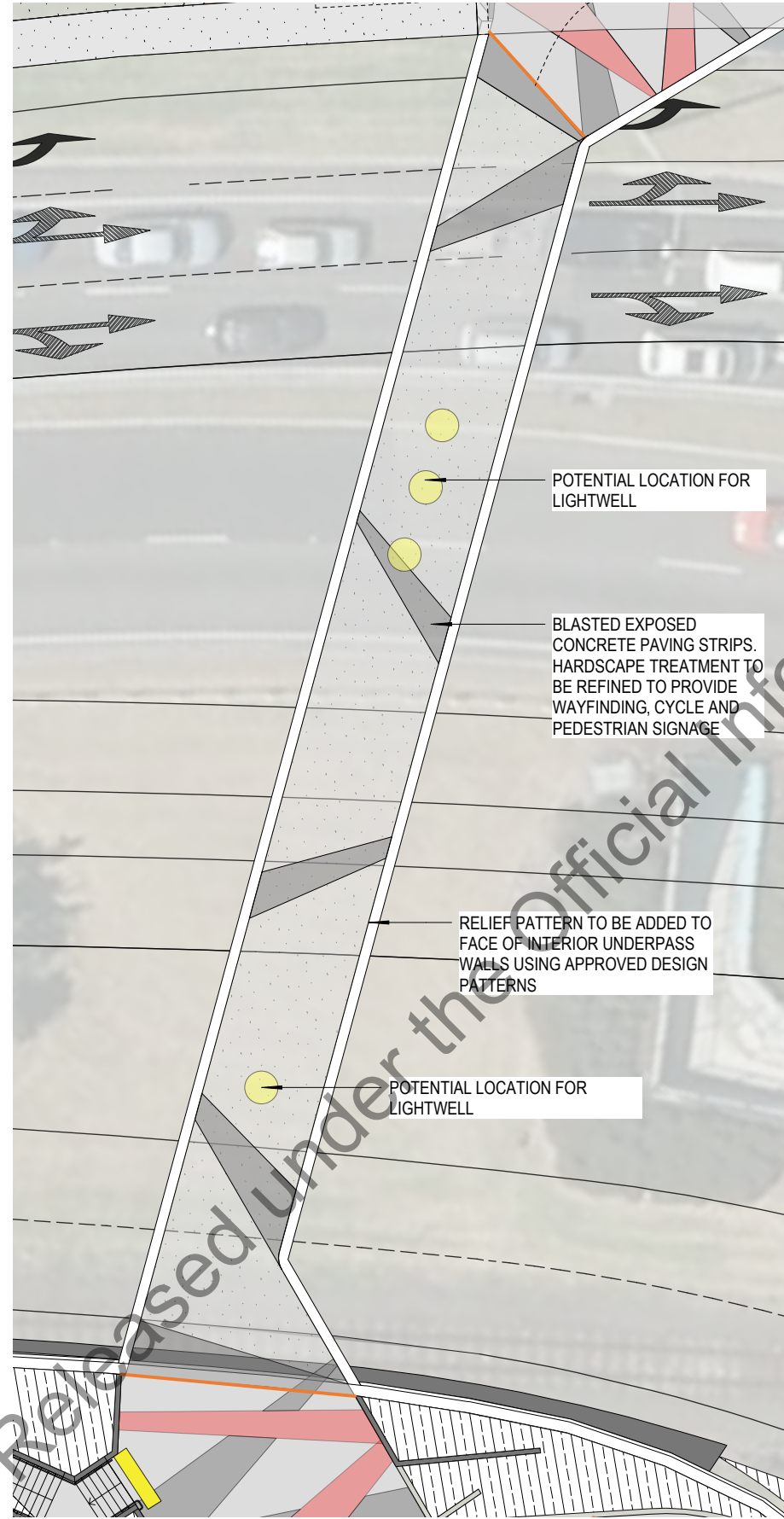
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SCALE: 1:250 (A3)
 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: JW/MP
 DRAWING CHECK: AW
 DESIGN REVIEW: RS
 APPROVED: 18/03/19

TITLE: UNDERPASS BAYFAIR CONCEPT PLAN SHEET 1 OF 3
 DRAWING No: B2B-DRG-LA-UP-101
 REV: A



- LEGEND**
- PROPOSED GRASS
 - PROPOSED PLANTING
 - BRUSHED CONCRETE
 - SANDBLASTED CONCRETE/ EXPOSED AGGREGATE
 - COLOURED CONCRETE
 - TREES - PROPOSED SPECIMEN GRADE

- POWDER COATED RED DESIGNER FENCING AT 1200MM HEIGHT
- POWDER COATED BLACK SAFETY FENCING AT 1200MM HEIGHT INTEGRATED WHERE POSSIBLE WITH CONCRETE BARRIER
- NO FENCING - INTEGRATED WALL AND HANDRAIL TO BE UTILISED
- LANDSCAPE BOUNDARY
- CUSTOM DRAINAGE GRATE
- PROJECT DESIGNATION

- NOTES**
1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
 2. DESIGNATION BOUNDARY PROVIDED BY CPB.

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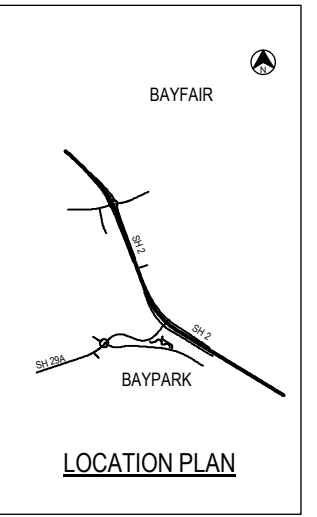
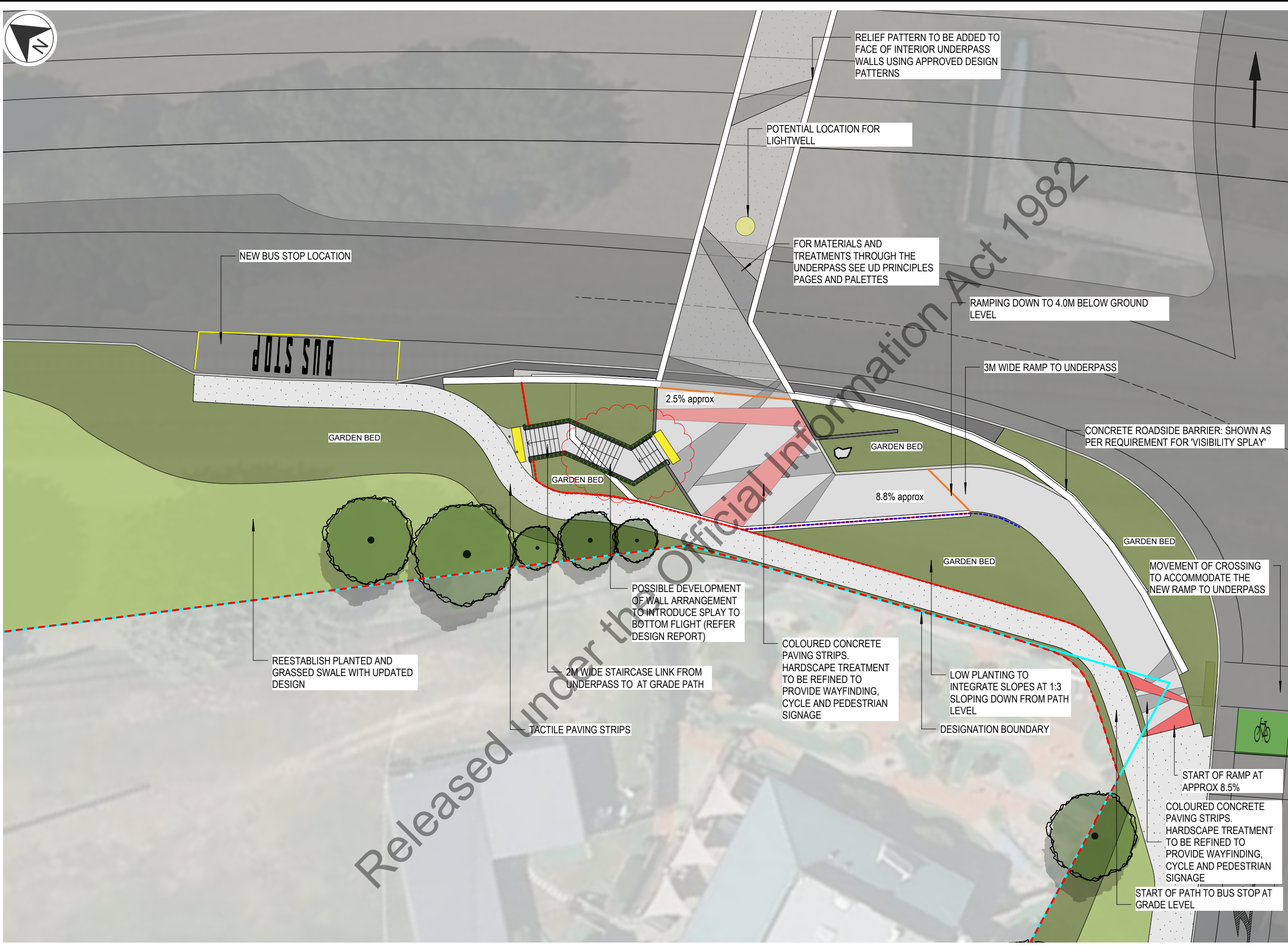
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES



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: JW/MP
 DESIGNED: TR/AW
 DRAWING CHECK: AW
 DESIGN REVIEW: RS
 APPROVED: 18/03/19

TITLE: UNDERPASS CONCEPT PLAN SHEET 2 OF 3
 DRAWING No: B2B-DRG-LA-UP-102
 REV: A



- LEGEND**
- PROPOSED GRASS
 - PROPOSED PLANTING
 - BRUSHED CONCRETE
 - SANDBLASTED CONCRETE/ EXPOSED AGGREGATE
 - COLOURED CONCRETE
 - TREES - PROPOSED SPECIMEN GRADE
 - POWDER COATED RED DESIGNER FENCING AT 1200MM HEIGHT
 - POWDER COATED BLACK SAFETY FENCING AT 1200MM HEIGHT INTEGRATED WHERE POSSIBLE WITH CONCRETE BARRIER
 - NO FENCING - INTEGRATED WALL AND HANDRAIL TO BE UTILISED
 - LANDSCAPE BOUNDARY
 - CUSTOM DRAINAGE GRATE
 - PROJECT DESIGNATION

- NOTES**
1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
 2. DESIGNATION BOUNDARY PROVIDED BY CPB.

Released Under the Official Information Act 1982

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES

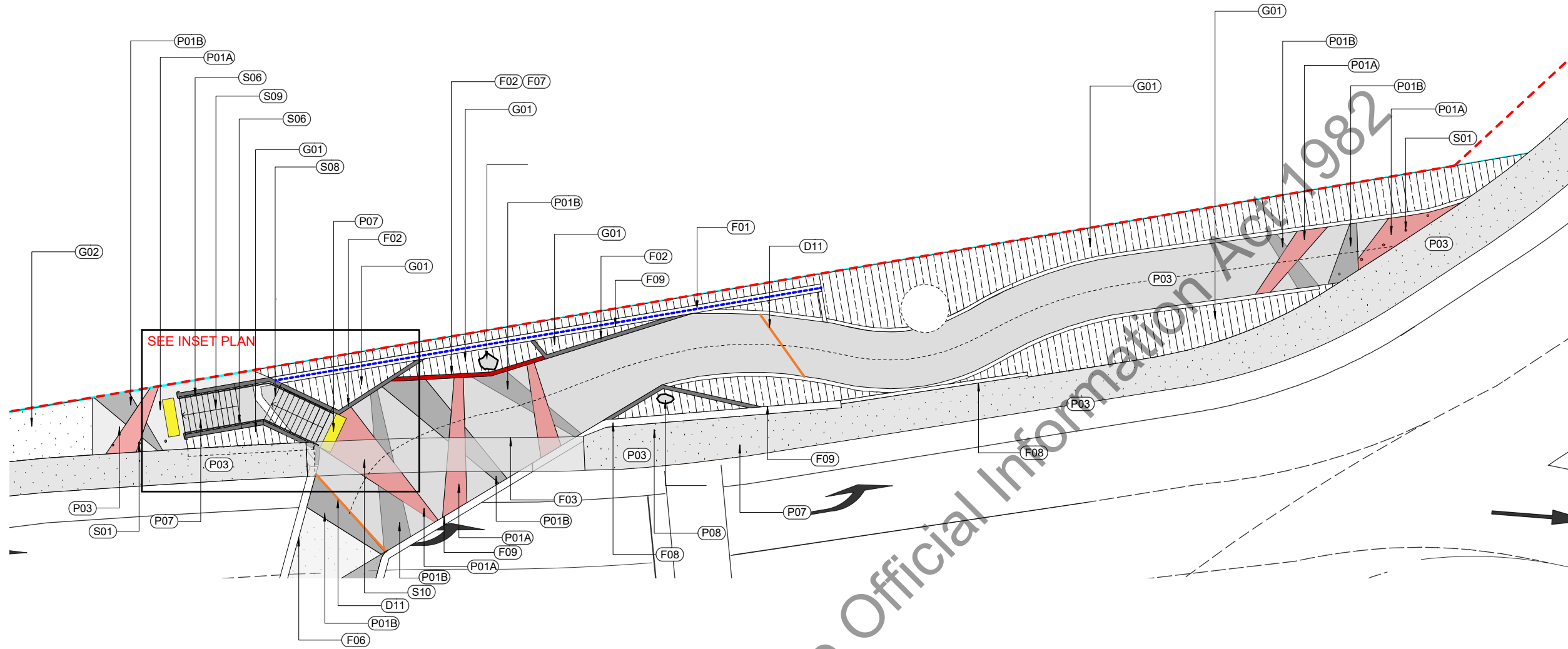
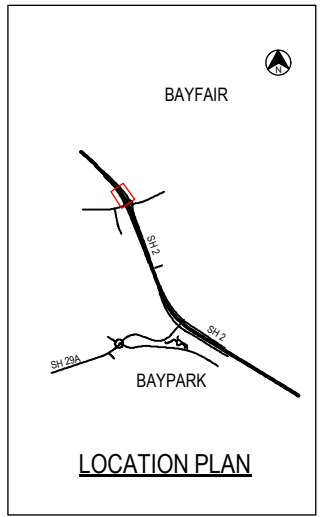
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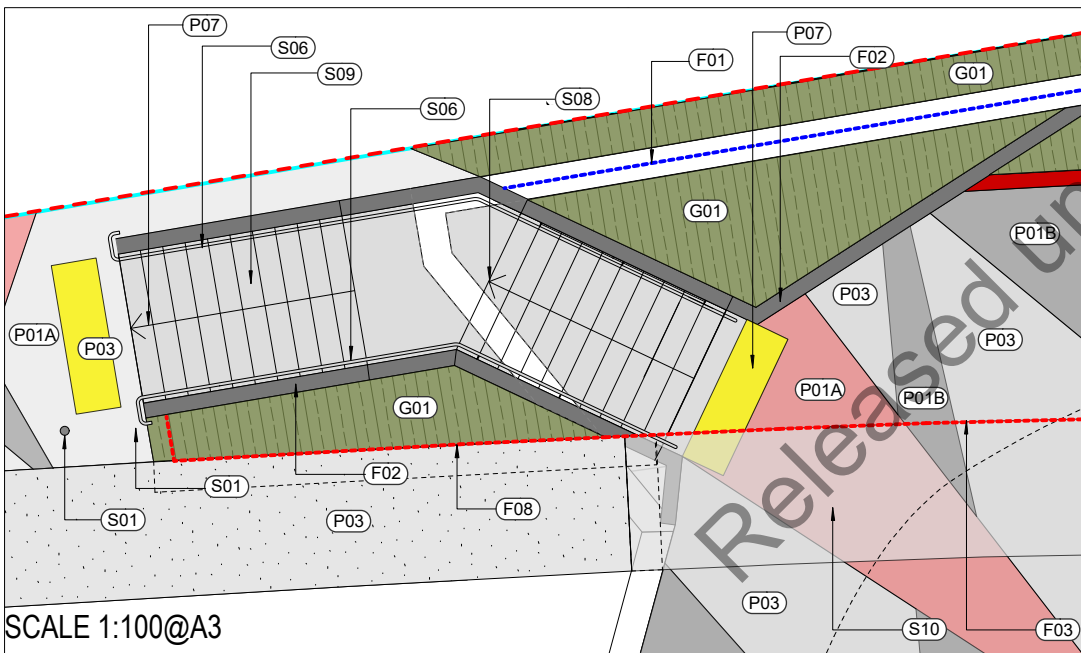
SCALE: 1:250 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: JW/MP
DESIGNED: TR/AW
DRAWING CHECK: AW
DESIGN REVIEW: RS
APPROVED: 18/03/19

TITLE: UNDERPASS MATAPIHI CONCEPT PLAN SHEET 3 OF 3
DRAWING No: B2B-DRG-LA-UP-103
REV: A



SEE INSET PLAN



SCALE 1:100@A3

LEGEND

- P - SURFACES
- P01A - INSITU CONCRETE - RASPBERRY
- P01B - INSITU CONCRETE - BLASTED EXPOSED
- P03 - INSITU CONCRETE - GREY BRUSHED
- P07 - TGSi WARNING INDICATOR
- P08 - TGSi DIRECTIONAL INDICATOR
- D11 - DRAINAGE GRATE

- S01 - BOLLARDS
- S02 - FEATURE BOULDER
- S06 - HANDRAIL
- S07 - SKATE BOARD DETERRANTS
- S08 - STAIR NOSING
- S09 - PRE-CAST CONCRETE STAIRS
- S10 - PRE-CAST CONCRETE BRIDGE

- F01 - SAFETY FENCING
- F02 - RAISED PLANTER WALL
- F03 - FOOTBRIDGE FENCING
- F04 - FOOTBRIDGE WALL / FENCING
- F05 - RETAINING WALL INSERT PANELS
- F06 - WALL PAINT - WHITE
- F07 - WALL PAINT - RED
- F08 - DESIGNER FENCING
- F09 - RETAINING WALL RELIEF PATTERNING

- G / T / G - VEGETATION
- G01 - GARDEN BED STANDARD
- G02 - HYDROSEED GRASS
- T01 - PROPOSED TREE
- T04 - EXISTING TREE TO REMAIN

- - - LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. DESIGNATION BOUNDARY PROVIDED BY CPB.

Released under the Official Information Act 1982

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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1:250 @ A3					



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 JW/MP

DESIGNED TR/AW

DRAWING CHECK AW

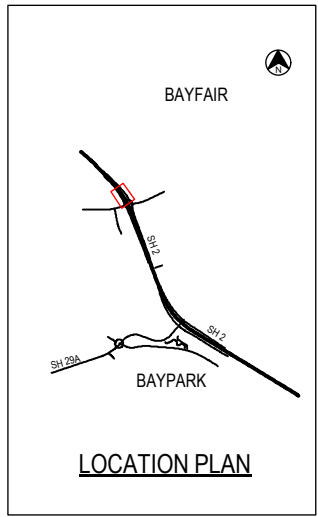
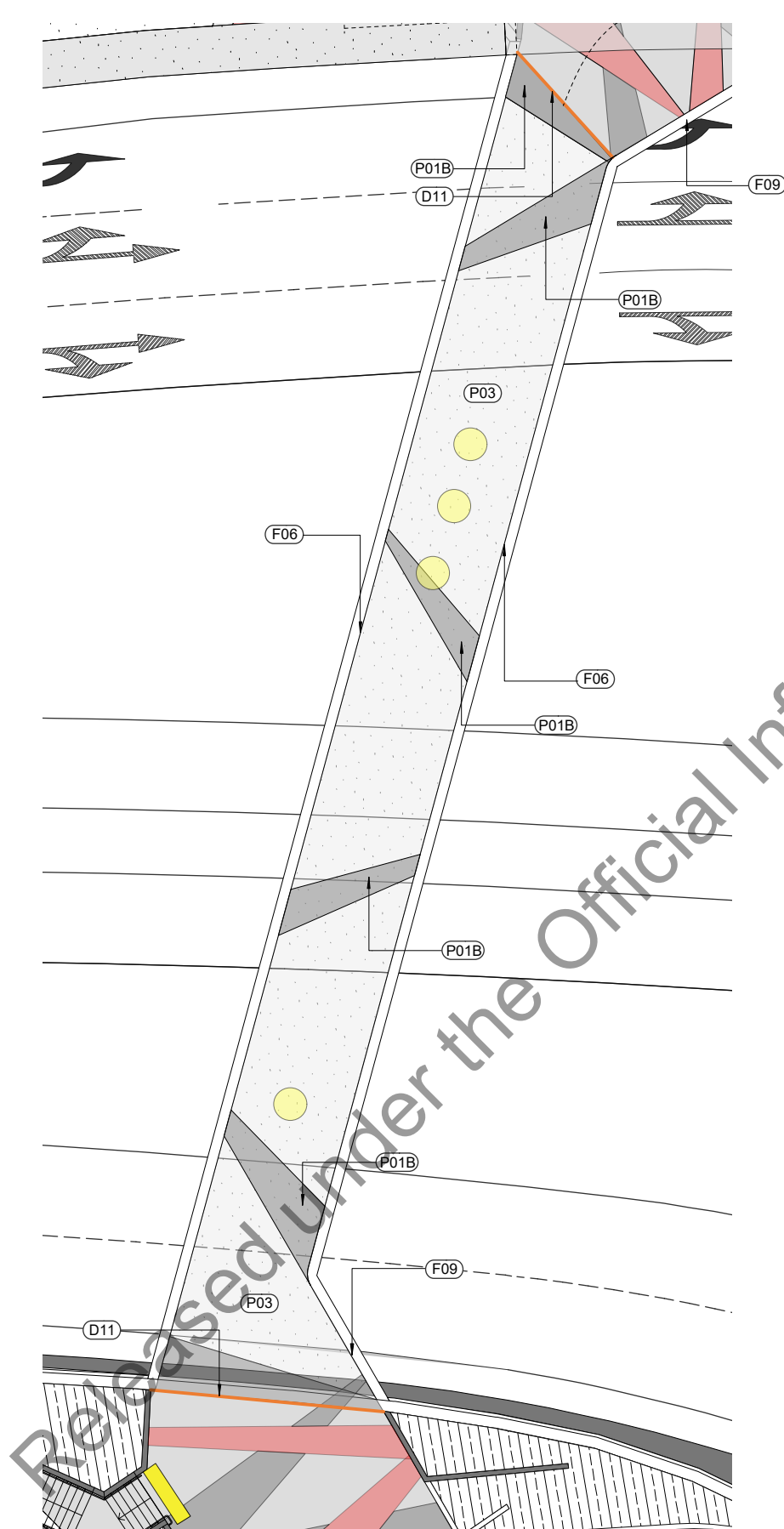
DESIGN REVIEW RS

APPROVED 18/03/19

TITLE UNDERPASS BAYFAIR GENERAL ARRANGMENT PLAN SHEET 1 OF 2

DRAWING No B2B-DRG-LA-UP-110

REV A



- LEGEND**
- P - SURFACES
 - P01A - INSITU CONCRETE - RASPBERRY
 - P01B - INSITU CONCRETE - BLASTED EXPOSED
 - P03 - INSITU CONCRETE - GREY BRUSHED
 - P07 - TGSi WARNING INDICATOR
 - P08 - TGSi DIRECTIONAL INDICATOR
 - D11 - DRAINAGE GRATE
 - S01 - BOLLARDS
 - S02 - FEATURE BOULDER
 - S06 - HANDRAIL
 - S07 - SKATE BOARD DETERRANTS
 - S08 - STAIR NOSING
 - S09 - PRE-CAST CONCRETE STAIRS
 - S10 - PRE-CAST CONCRETE BRIDGE

- F01 - SAFETY FENCING
- F02 - RAISED PLANTER WALL
- F03 - FOOTBRIDGE FENCING
- F04 - FOOTBRIDGE WALL / FENCING
- F05 - RETAINING WALL INSERT PANELS
- F06 - WALL PAINT - WHITE
- F07 - WALL PAINT - RED
- F08 - DESIGNER FENCING
- F09 - RETAINING WALL RELIEF PATTERNING
- G / T / G - VEGETATION
- G01 - GARDEN BED STANDARD
- G02 - HYDROSEED GRASS
- T01 - PROPOSED TREE
- T04 - EXISTING TREE TO REMAIN

- - - LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

- NOTES**
1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
 2. DESIGNATION BOUNDARY PROVIDED BY CPB.

Released Under the Official Information Act 1982

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES

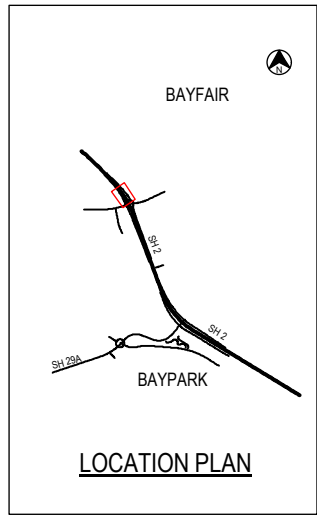
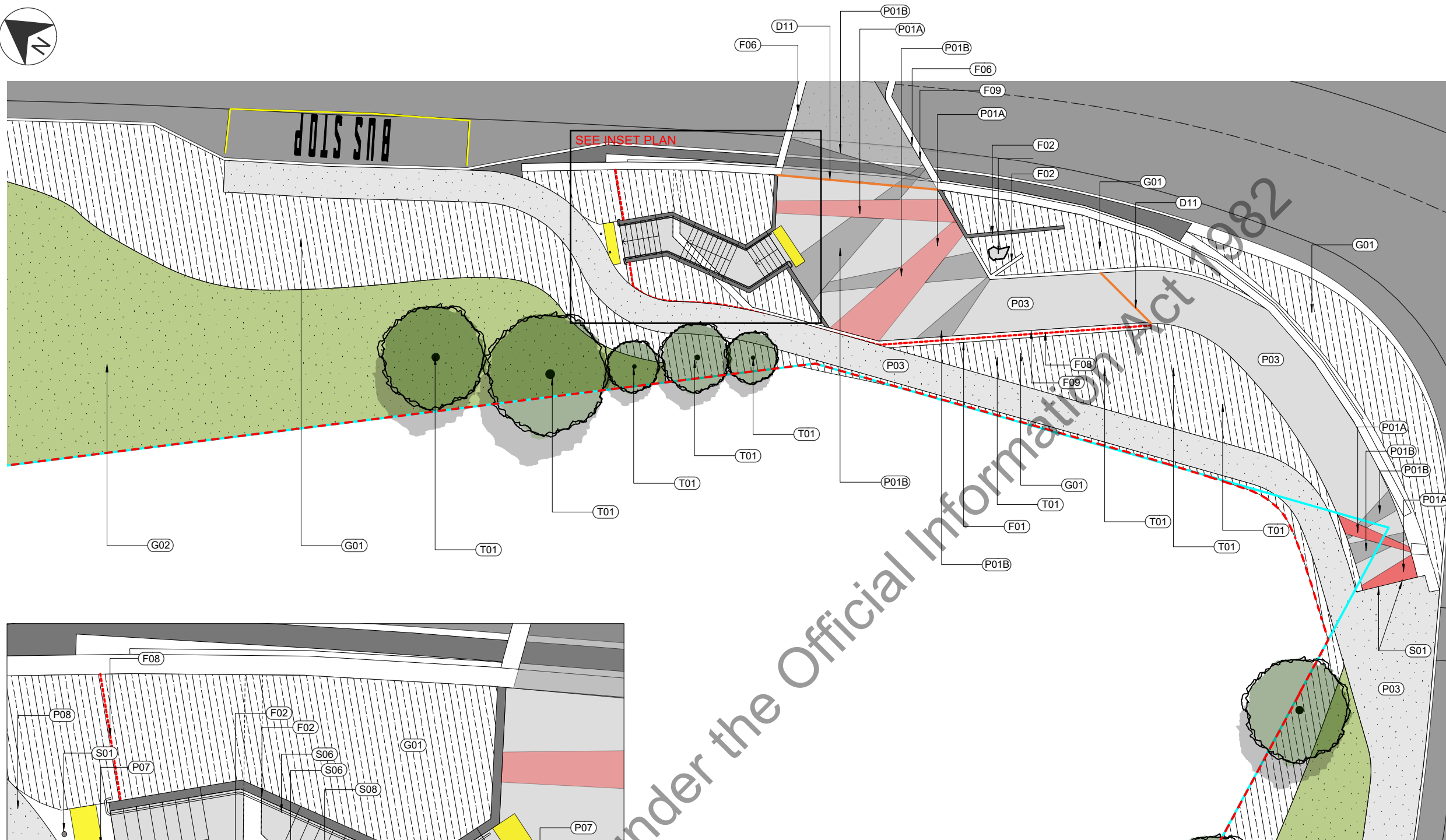
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SCALE: 1:250 (A3)
STATUS: 50% ISSUE
PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN: JW/MP
DESIGNED: TR/AW
DRAWING CHECK: AW
DESIGN REVIEW: RS
APPROVED: 18/03/19

TITLE: UNDERPASS GENERAL ARRANGMENT PLAN SHEET 2 OF 3
DRAWING No: B2B-DRG-LA-UP-120
REV: A



LEGEND

- P - SURFACES
- P01A - INSITU CONCRETE - RASPBERRY
- P01B - INSITU CONCRETE - BLASTED EXPOSED
- P03 - INSITU CONCRETE - GREY BRUSHED
- P07 - TCSI WARNING INDICATOR
- P08 - TCSI DIRECTIONAL INDICATOR
- D11 - DRAINAGE GRATE

- S01 - BOLLARDS
- S02 - FEATURE BOULDER
- S06 - HANDRAIL
- S07 - SKATE BOARD DETERRANTS
- S08 - STAIR NOSING
- S09 - PRE-CAST CONCRETE STAIRS
- S10 - PRE-CAST CONCRETE BRIDGE

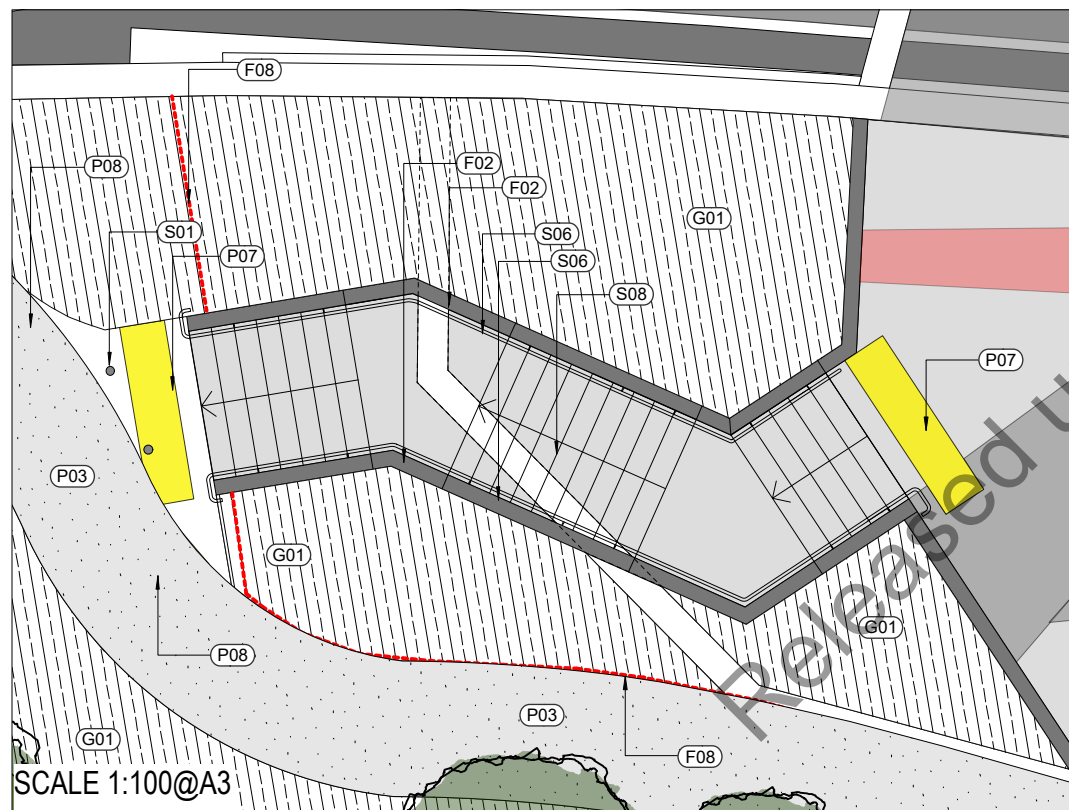
- F01 - SAFETY FENCING
- F02 - RAISED PLANTER WALL
- F03 - FOOTBRIDGE FENCING
- F04 - FOOTBRIDGE WALL / FENCING
- F05 - RETAINING WALL INSERT PANELS
- F06 - WALL PAINT - WHITE
- F07 - WALL PAINT - RED
- F08 - DESIGNER FENCING
- F09 - RETAINING WALL RELIEF PATTERNING

- G / T / G - VEGETATION
- G01 - GARDEN BED STANDARD
- G02 - HYDROSEED GRASS
- T01 - PROPOSED TREE
- T04 - EXISTING TREE TO REMAIN

- - - LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. DESIGNATION BOUNDARY PROVIDED BY CPB.



Released under the Official Information Act 1982

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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1:250 @ A3	0	2	4	6	8 10 12 m



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 JW/MP

DESIGNED TR/AW

DRAWING CHECK AW

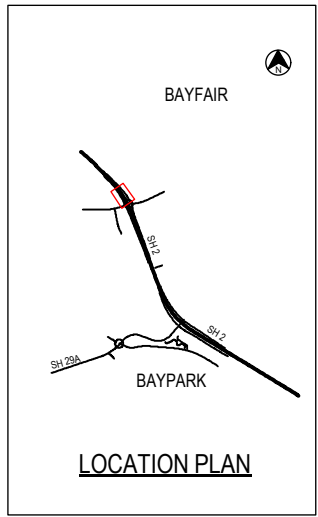
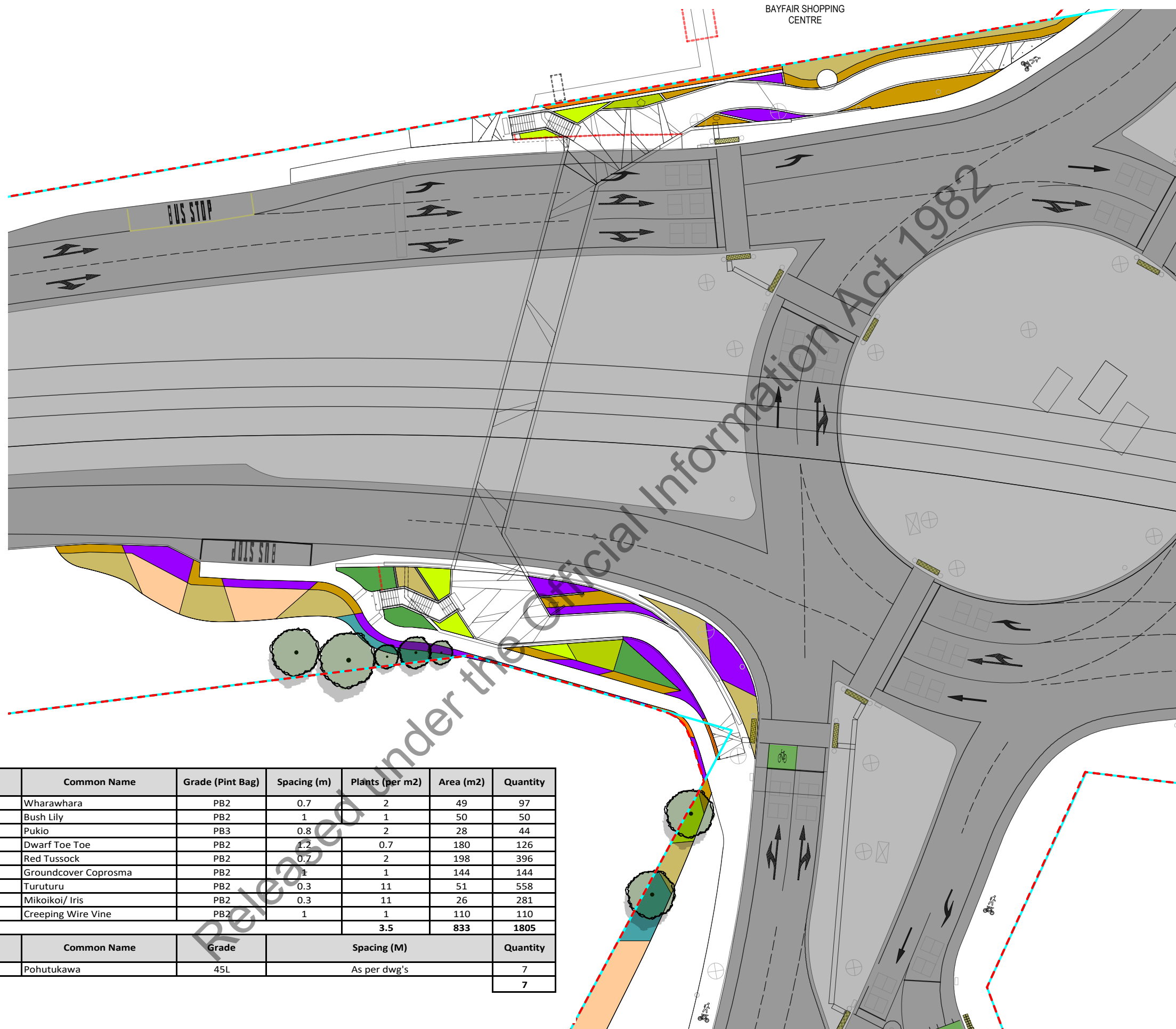
DESIGN REVIEW RS

APPROVED 18/03/19

TITLE UNDERPASS MATAPIHI GENERAL ARRANGEMENT PLAN SHEET 3 OF 3

DRAWING No B2B-DRG-LA-UP-130

REV A



LEGEND

- ASB - *Astelia banksii*
WHARAWHARA
- AF - *Astelia fragrans*
BUSH LILY
- CV - *Carex virgata*
PUKIO
- CF - *Chionochloa flavicans*
DWARF TOETOE
- CR - *Chionochloa rubra*
RED TUSSOCK
- CA - *Coprosma acerosa*
GROUNDCOVER COPROSMA
- DN - *Dianella nigra*
TURUTURU
- LP - *Libertia peregrinans*
MIKOIKOI/ NZ IRIS
- MA - *Muehlenbeckia axillaris*
CREEPING WIRE VINE
- TREES - PROPOSED SPECIMEN GRADE
- LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

PLANT SCHEDULE

Plant Code	Botanical Name	Common Name	Grade (Pint Bag)	Spacing (m)	Plants (per m2)	Area (m2)	Quantity
ASB	<i>Astelia banksii</i>	Wharawhara	PB2	0.7	2	49	97
AF	<i>Astelia fragrans</i>	Bush Lily	PB2	1	1	50	50
CV	<i>Carex virgata</i>	Pukio	PB3	0.8	2	28	44
CF	<i>Chionochloa flavicans</i>	Dwarf Toe Toe	PB2	1.2	0.7	180	126
CR	<i>Chionochloa rubra</i>	Red Tussock	PB2	0.7	2	198	396
CA	<i>Coprosma acerosa</i>	Groundcover Coprosma	PB2	1	1	144	144
DN	<i>Dianella nigra</i>	Turuturu	PB2	0.3	11	51	558
LP	<i>Libertia peregrinans</i>	Mikoikoi/ Iris	PB2	0.3	11	26	281
MA	<i>Muehlenbeckia axillaris</i>	Creeping Wire Vine	PB2	1	1	110	110
					3.5	833	1805
Trees	Botanical Name	Common Name	Grade	Spacing (M)		Quantity	
MET EXC	<i>Metrosideros excelsa</i>	Pohutukawa	45L	As per dwg's		7	
						7	

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-UP-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. FOR UNDERPASS DETAILED PLANT SCHEDULE REFER TO DRAWING B2B-DRG-LA-UP-060.
3. FOR NON-UNDERPASS PLANTING TYPES REFER TO LANDSCAPE PLANTING PLAN PACKAGE, DRAWING B2B-DRG-LA-1102 TO B2B-DRG-LA-1106. FOR PLANT SCHEDULE REFER TO DRAWING B2B-DRG-LA-5000 AND 5001.

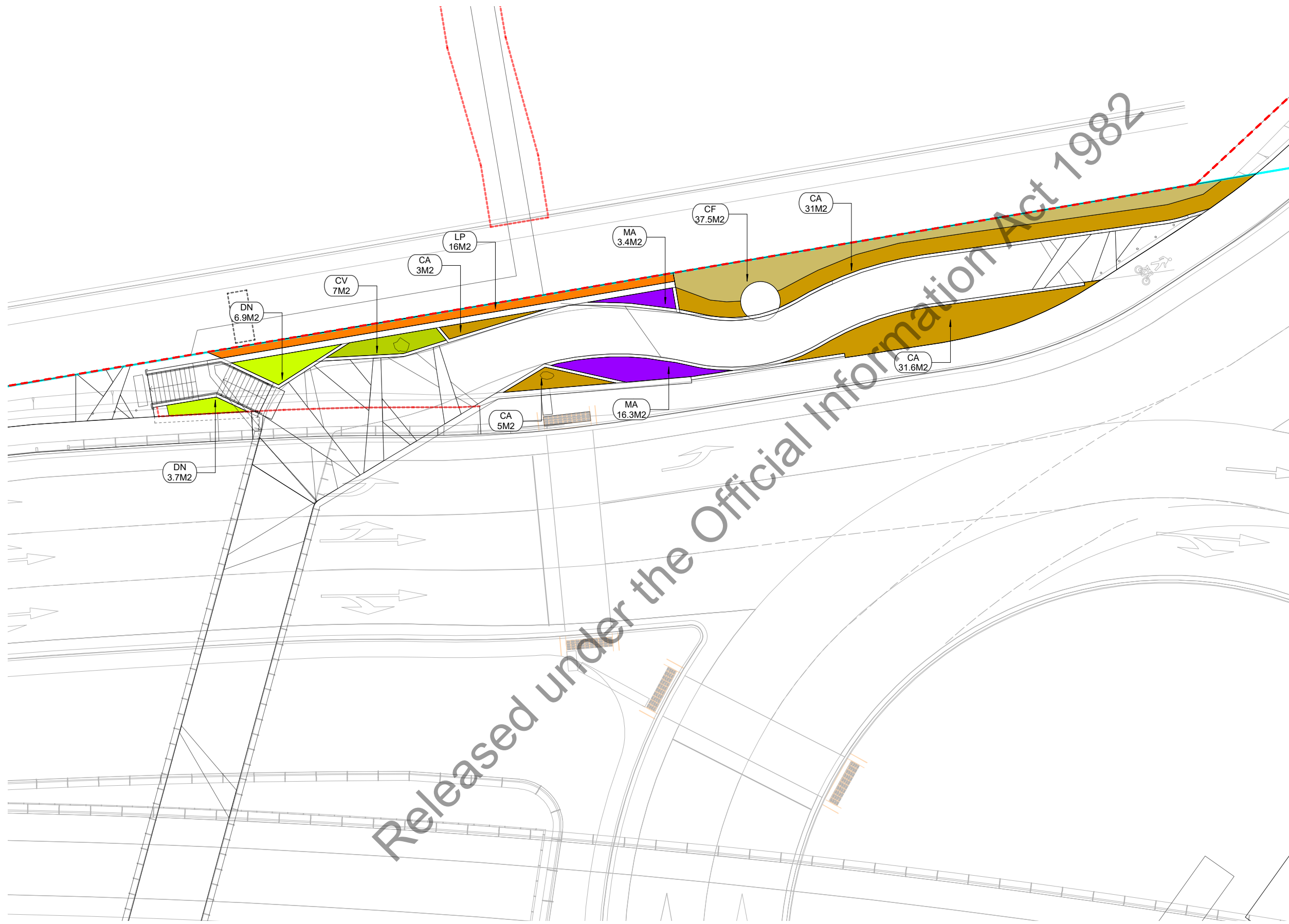
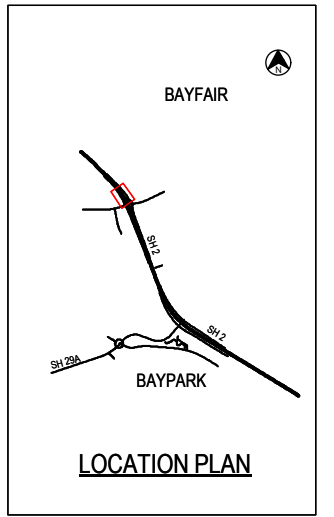
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SCALE: 1:500 (A3)
 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: JW/MP
 DESIGNED: TR/AW
 DRAWING CHECK: AW
 DESIGN REVIEW: RS
 APPROVED: 18/03/19

TITLE: UNDERPASS OVERALL PLANTING PLAN SHEET 1 OF 1
 DRAWING No: B2B-DRG-LA-UP-300
 REV: A



LEGEND

- ASB - *Astelia banksii*
WHARAWHARA
- AF - *Astelia fragrans*
BUSH LILY
- CV - *Carex virgata*
PUKIO
- CF - *Chionochloa flavicans*
DWARF TOETOE
- CR - *Chionochloa rubra*
RED TUSOCK
- CA - *Coprosma acerosa*
GROUNDCOVER COPROSMA
- DN - *Dianella nigra*
TURUTURU
- LP - *Libertia peregrinans*
MIKOIKOI/ NZ IRIS
- MA - *Muehlenbeckia axillaris*
CREEPING WIRE VINE
- TREES - PROPOSED SPECIMEN GRADE
- LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-UP-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. FOR UNDERPASS DETAILED PLANT SCHEDULE REFER TO DRAWING B2B-DRG-LA-UP-060.
3. FOR NON-UNDERPASS PLANTING TYPES REFER TO LANDSCAPE PLANTING PLAN PACKAGE, DRAWING B2B-DRG-LA-1102 TO B2B-DRG-LA-1106. FOR PLANT SCHEDULE REFER TO DRAWING B2B-DRG-LA-5000 AND 5001.

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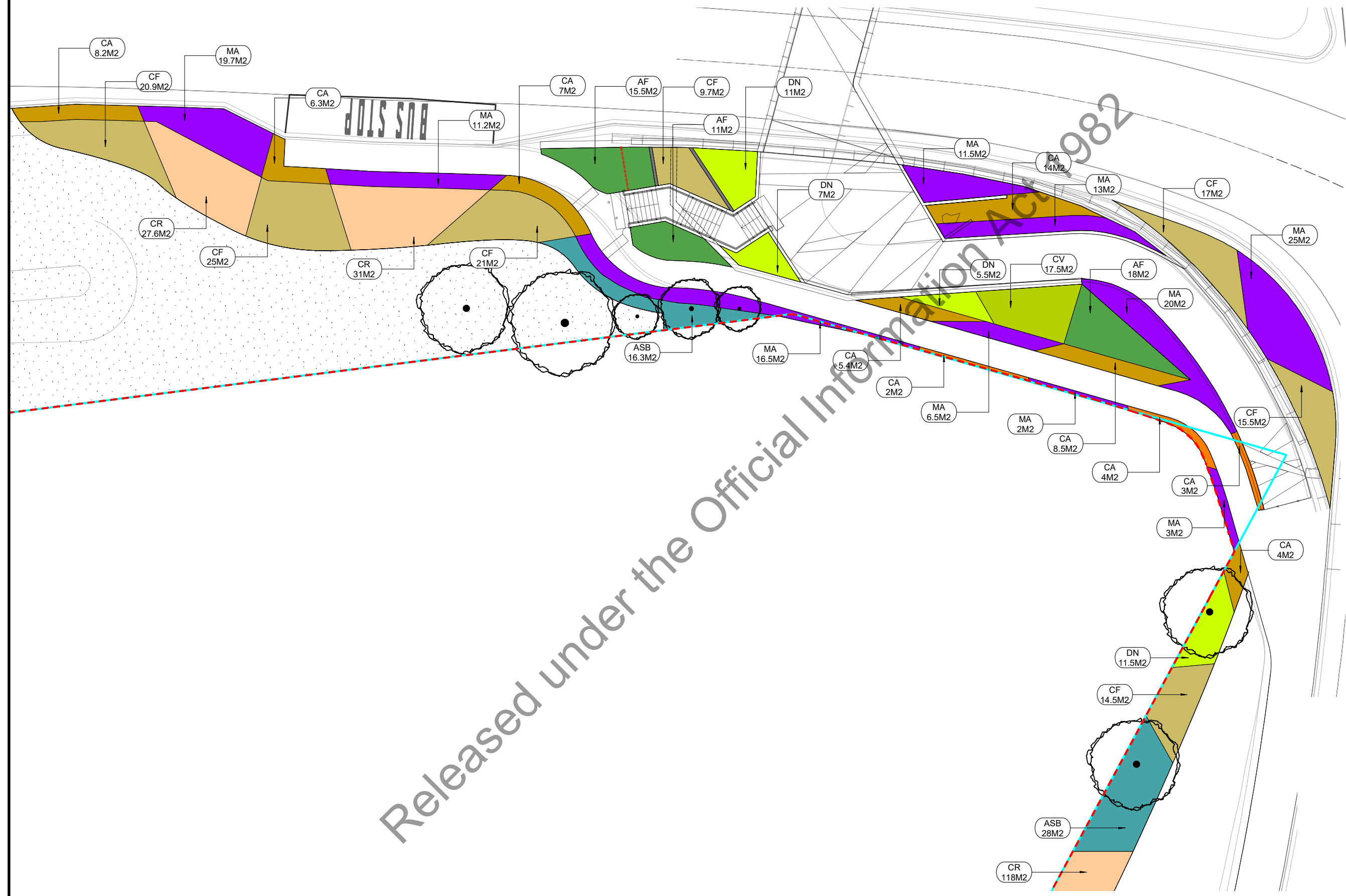
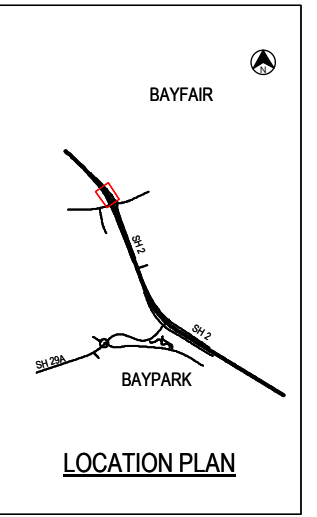
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SCALE: 1:250 (A3)
 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: JW/MP
 DESIGNED: TR/AW
 DRAWING CHECK: AW
 DESIGN REVIEW: RS
 APPROVED: 18/03/19

TITLE: UNDERPASS BAYFAIR PLANTING PLAN SHEET 1 OF 2
 DRAWING No: B2B-DRG-LA-UP-310
 REV: A



LEGEND

- ASB - *Astelia banksii*
WHARAWHARA
- AF - *Astelia fragrans*
BUSH LILY
- CV - *Carex virgata*
PUKIO
- CF - *Chionochloa flavicans*
DWARF TOETOE
- CR - *Chionochloa rubra*
RED TUSSOCK
- CA - *Coprosma acerosa*
GROUNDCOVER COPROSMA
- DN - *Dianella nigra*
TURUTURU
- LP - *Libertia peregrinans*
MIKOIKOI/ NZ IRIS
- MA - *Muehlenbeckia axillaris*
CREEPING WIRE VINE
- TREES - PROPOSED SPECIMEN GRADE
- LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-UP-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. FOR UNDERPASS DETAILED PLANT SCHEDULE REFER TO DRAWING B2B-DRG-LA-UP-060.
3. FOR NON-UNDERPASS PLANTING TYPES REFER TO LANDSCAPE PLANTING PLAN PACKAGE, DRAWING B2B-DRG-LA-1102 TO B2B-DRG-LA-1106. FOR PLANT SCHEDULE REFER TO DRAWING B2B-DRG-LA-5000 AND 5001.

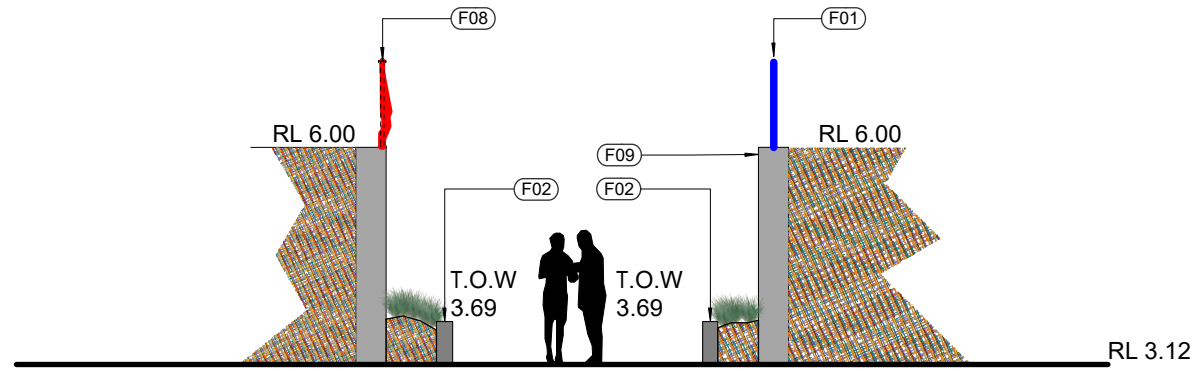
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1:250 @ A3					



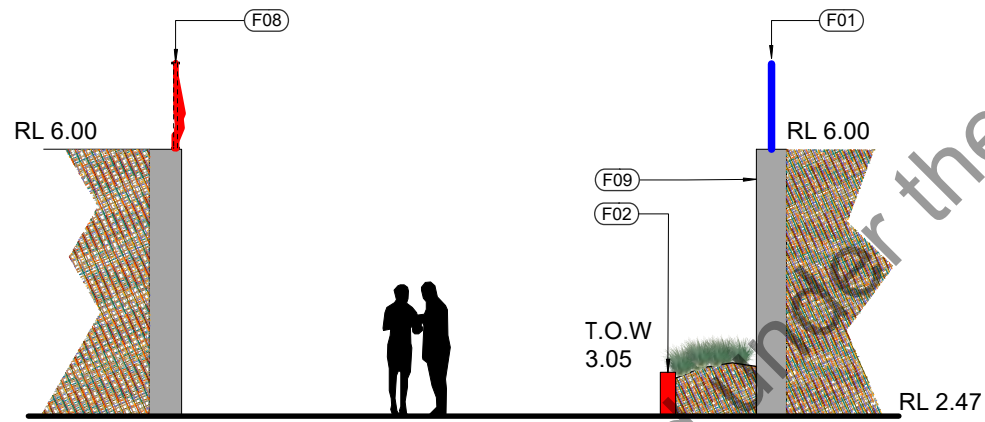
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 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: JW/MP
 DESIGNED: TR/AW
 DRAWING CHECK: AW
 DESIGN REVIEW: RS
 APPROVED: 18/03/19

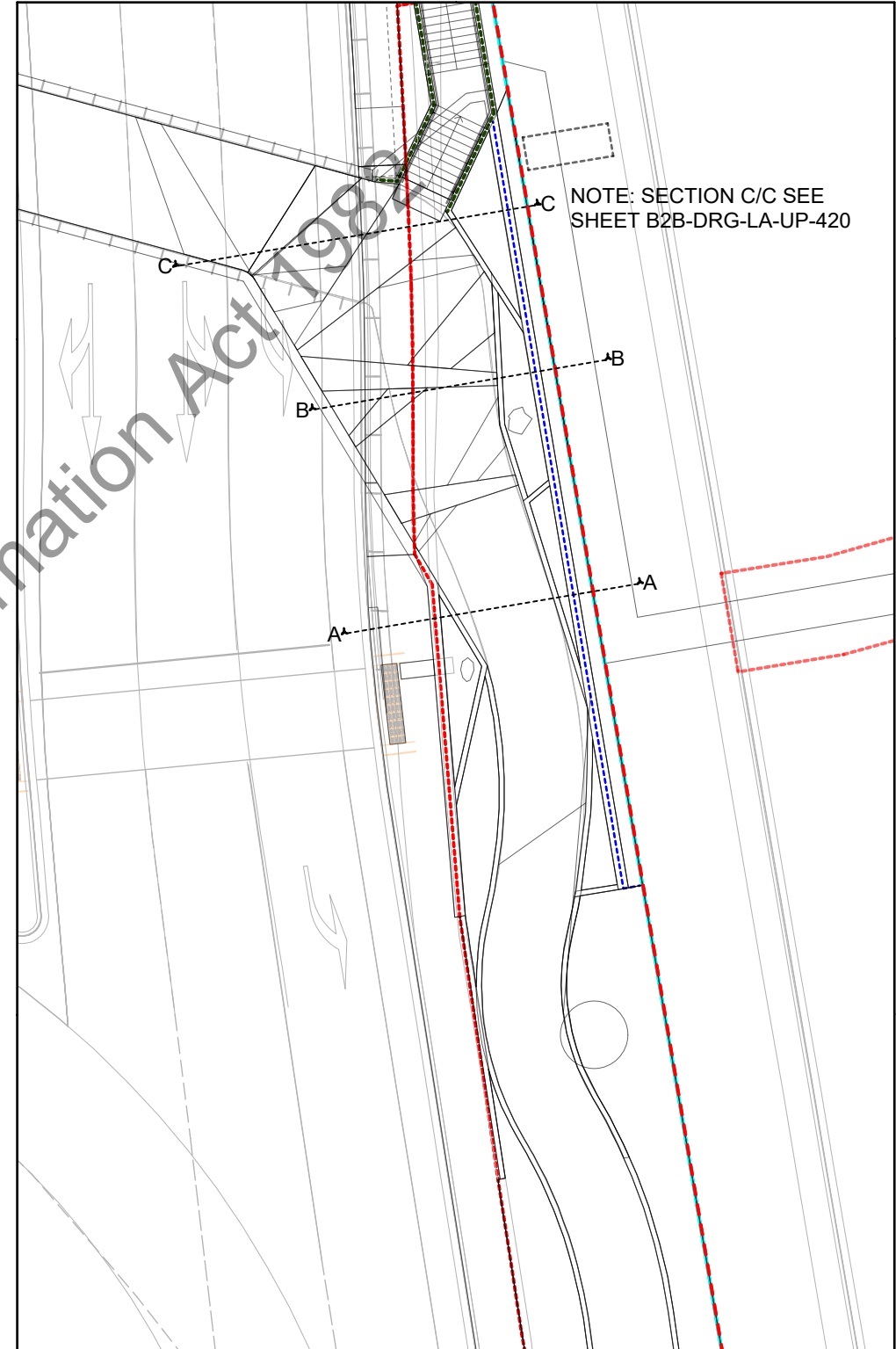
TITLE: UNDERPASS MATAPIHI PLANTING PLAN SHEET 2 OF 2
 DRAWING No: B2B-DRG-LA-UP-320
 REV: A



UNDERPASS NORTH ENTRANCE - SECTION A-A
SCALE 1:100



UNDERPASS NORTH ENTRANCE - SECTION B-B
SCALE 1:100



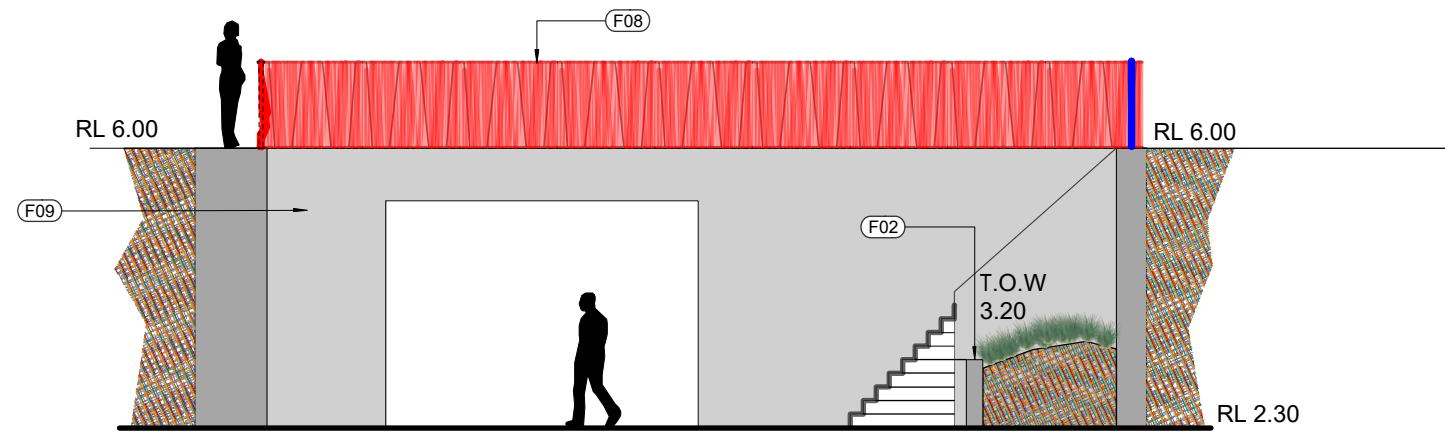
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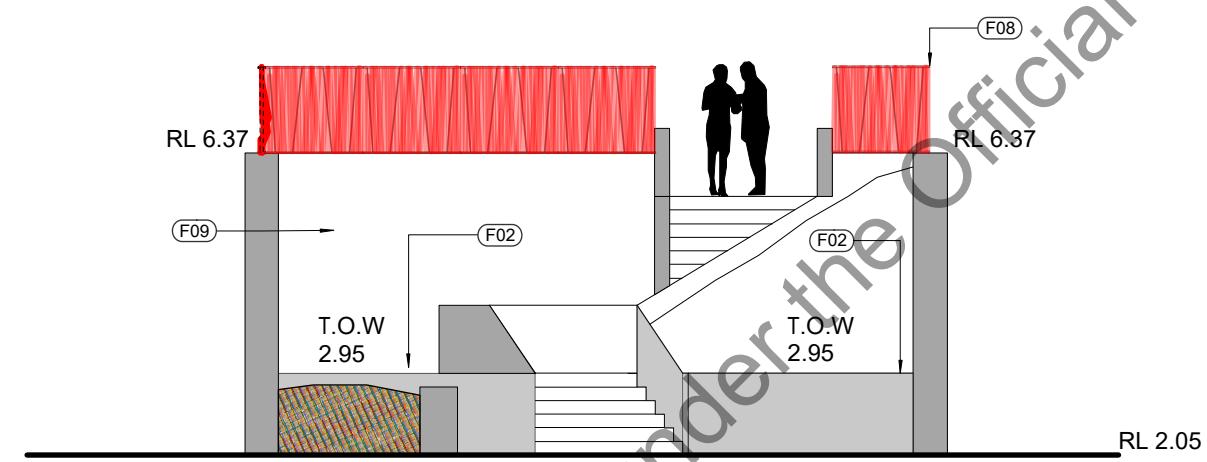
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STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY	
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)	
DRAWN	JW/MP	DRAWING CHECK
DESIGNED	TR/AW	DESIGN REVIEW
APPROVED	AW	RS
DATE	18/03/19	

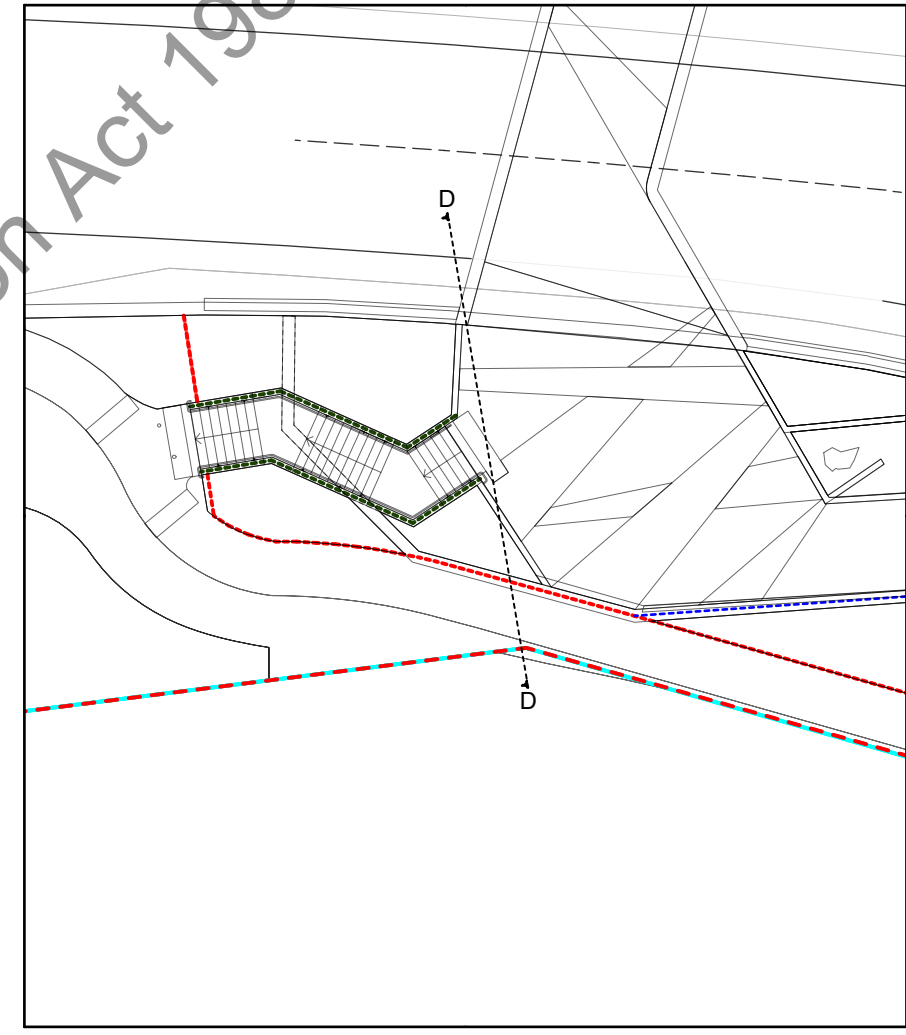
TITLE	UNDERPASS SECTIONS SHEET 1 OF 2	
DRAWING No	B2B-DRG-LA-UP-410	REV A



UNDERPASS NORTH ENTRANCE - SECTION C-C
SCALE 1:100



UNDERPASS SOUTH ENTRANCE - SECTION D-D
SCALE 1:100



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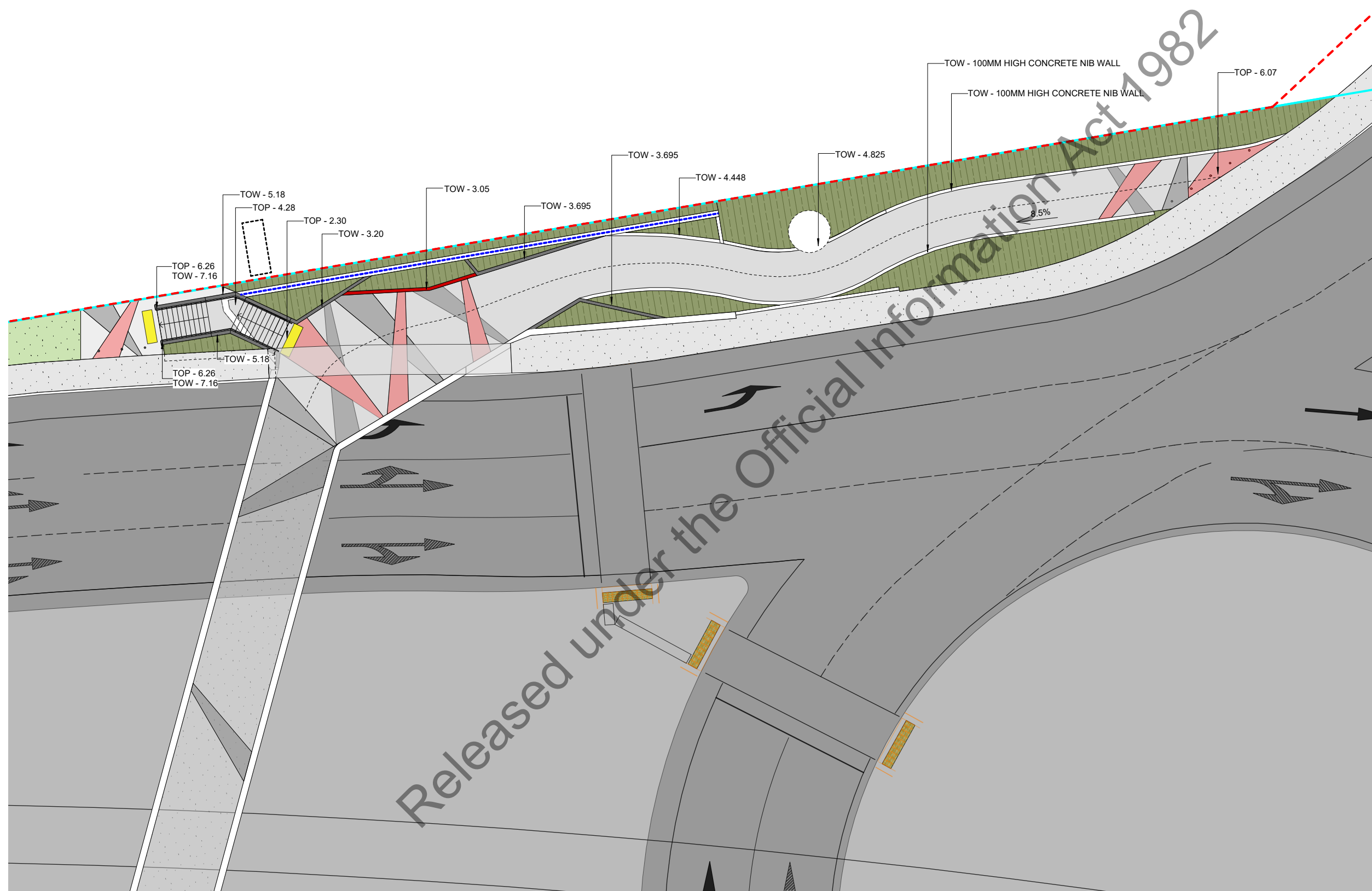
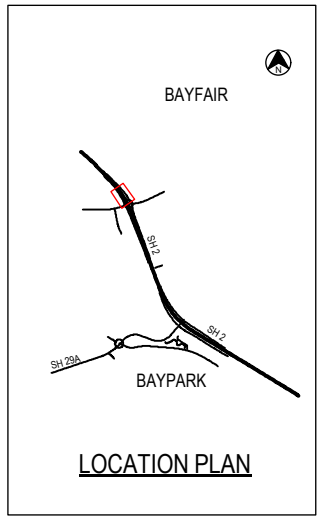
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SCALE	1:00 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY	
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)	
DRAWN	DRAWING CHECK	APPROVED
JW/MP	AW	18/03/19
DESIGNED	DESIGN REVIEW	
TR/AW	RS	

TITLE	UNDERPASS SSECTIONS SHEET 2 OF 2
DRAWING No	B2B-DRG-LA-UP-420
REV	A



LEGEND

- EX - EXISTING LEVEL
- TOL - TOP OF LIGHT
- TOP - TOP OF PAVING
- TOW - TOP OF WALL
- TOS - TOP OF STEP
- TOG - TOP OF GULLY / GRATE
- FGL - FINISHED GROUND LEVEL
- CHANGE IN GRADIENT
- 1:100 GRADIENT OF FALL
- TOB --- TOP OF BATTER
- - - LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. DESIGNATION BOUNDARY PROVIDED BY CPB. THE LANDSCAPING APPLIED TO EDGE OF ROAD IN ORDER TO ALIGN WITH THE GEOMETRICS PACKAGE (JACOBS).

Released under the Official Information Act 1982

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES



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
JW/MP

DRAWING CHECK
AW

DESIGNED
TR/AW

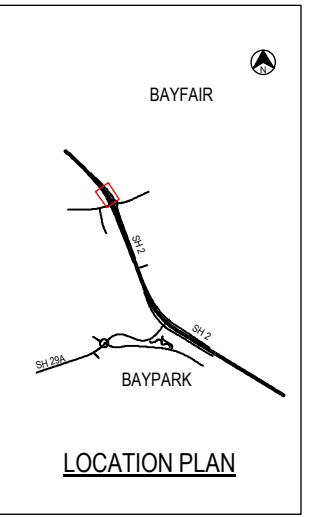
DESIGN REVIEW
RS

APPROVED
18/03/19

TITLE
UNDERPASS BAYFAIR LEVELS PLAN SHEET 1 OF 2

DRAWING No
B2B-DRG-LA-UP-710

REV
A



LEGEND

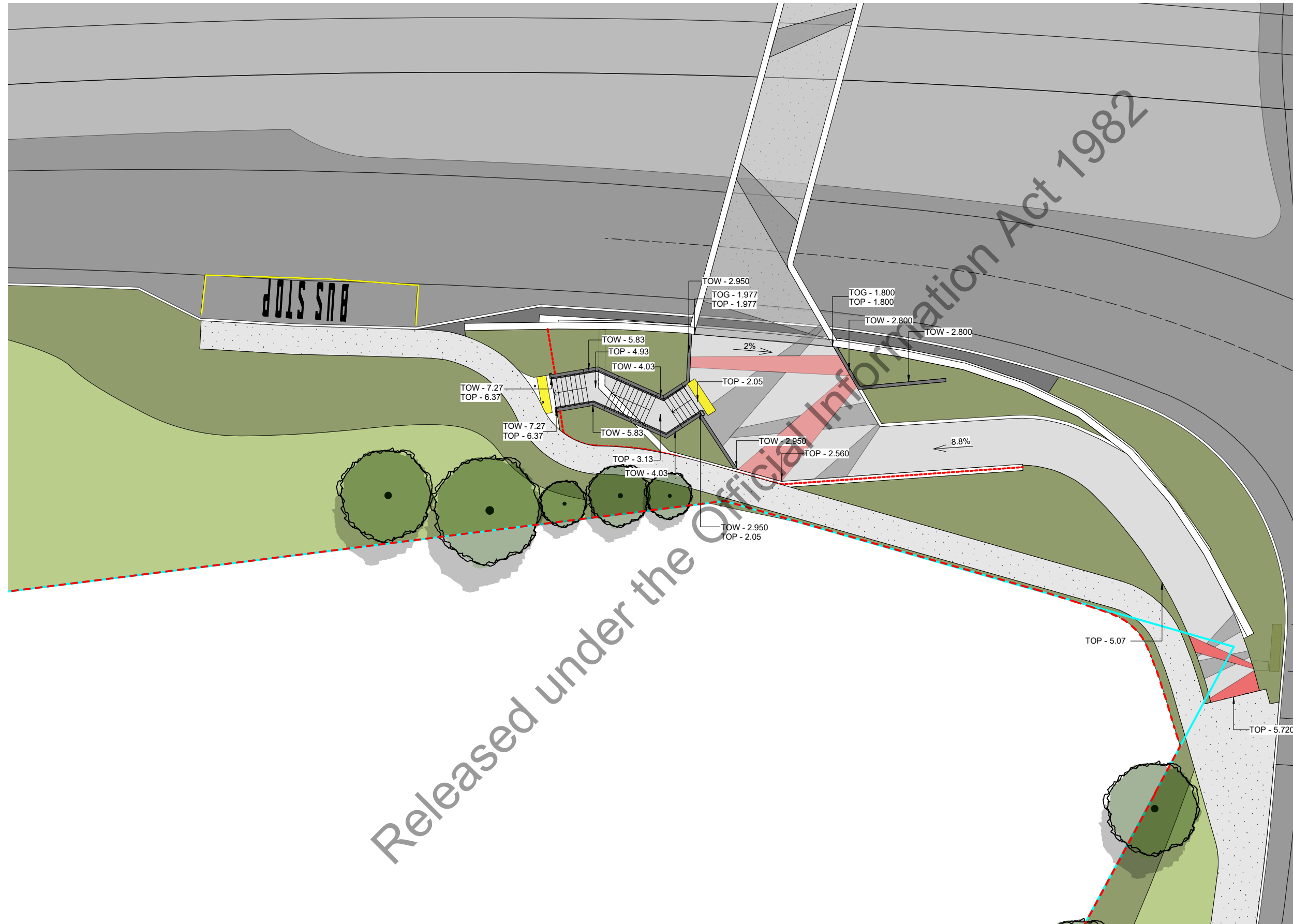
- EX - EXISTING LEVEL
- TOL - TOP OF LIGHT
- TOP - TOP OF PAVING
- TOW - TOP OF WALL
- TOS - TOP OF STEP
- TOG - TOP OF GULLY / GRATE
- FGL - FINISHED GROUND LEVEL

- - - CHANGE IN GRADIENT
- 1:100 GRADIENT OF FALL
- TOB--- TOP OF BATTER

- - - LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. DESIGNATION BOUNDARY PROVIDED BY CPB. THE LANDSCAPING APPLIED TO EDGE OF ROAD IN ORDER TO ALIGN WITH THE GEOMETRICS PACKAGE (JACOBS).



No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:125 @ A1					
1:250 @ A3					



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
JW/MP

DRAWING CHECK
AW

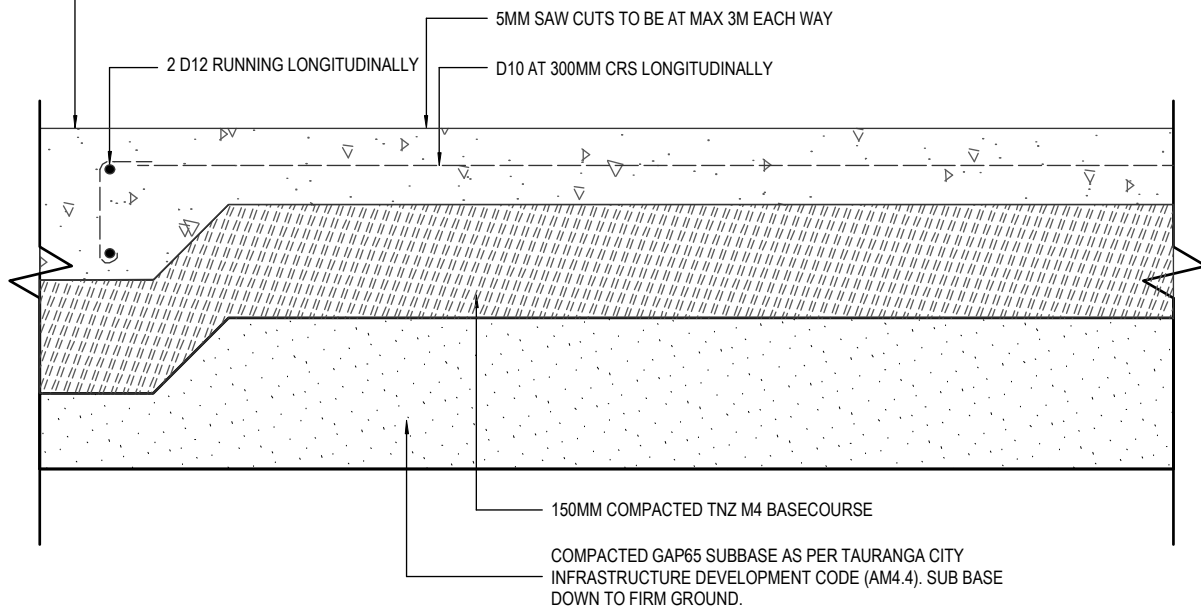
APPROVED
18/03/19

TITLE
UNDERPASS MATAPIHI LEVELS PLAN SHEET 2 OF 2

DRAWING No
B2B-DRG-LA-UP-720

REV
A

100MM MIN THICK, 25MPA INSITU CONCRETE SLAB WITH SE72 SEISMIC MESH MIN 30MM TOP COVER.
 AGGREGATE SIZE AND TYPE: 13MM STANDARD
 FINISH: AS PER GA PLANS, PFL NATURAL SEALER
 COLOUR: REFER GA PLAN AND KEY NOTES FOR MIX AND FINISH SELECTION. EITHER:
 P01A – RASPBERRY (PETER FELL, GELATO COLOUR RANGE)
 P01B – BLASTED EXPOSED FINISH
 P01D – GREY BRUSHED FINISH



P01: INSITU CONCRETE - TYPICAL DETAIL
 SCALE 1:20



PAVING SURFACES MATERIALS PALETTE
 (SEE GENERAL ARRANGEMENT PLANS FOR LAYOUT)



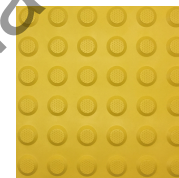
P01A – RASPBERRY (PETER FELL, GELATO COLOUR RANGE)



P01B – BLASTED EXPOSED FINISH (SEALED)



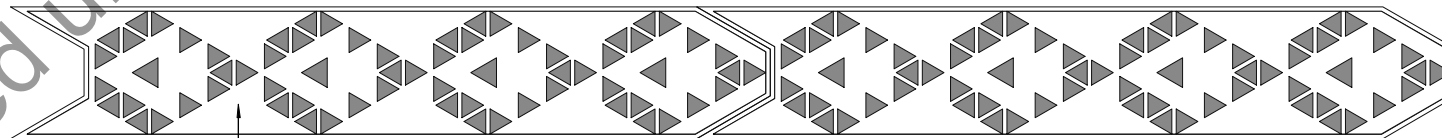
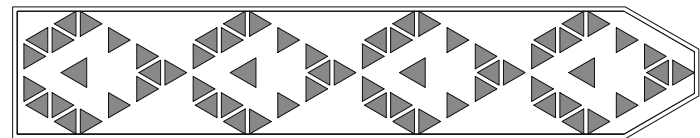
P03 – GREY BRUSHED FINISH (SEALED)



P07 – TGSi WARNING TACTILE PAVER



P08 – TGSi DIRECTIONAL TACTILE PAVER



DUCTILE IRON GRATING LASER CUT TO APPROVED PATTERN.
 100MM WIDE WITH THICKNESS DETERMINED BY ENGINEER TO MEET PERFORMANCE CRITERIA.

CUSTOM DRAINAGE GRATE - TYPICAL DETAIL
 SCALE 1:5



No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES



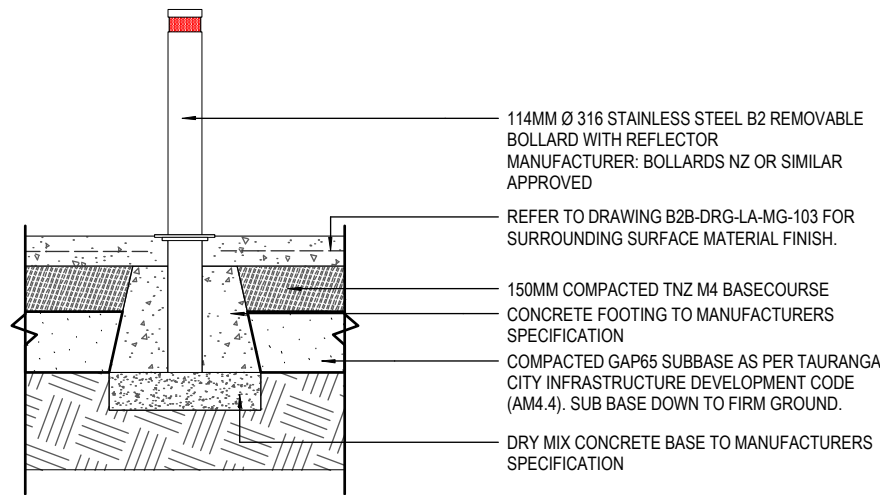
SCALE: AS SHOWN (A3)
 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: JW/MP
 DESIGNER: TR/AW
 DRAWING CHECK: AW
 DESIGN REVIEW: RS
 APPROVED: 18/03/19

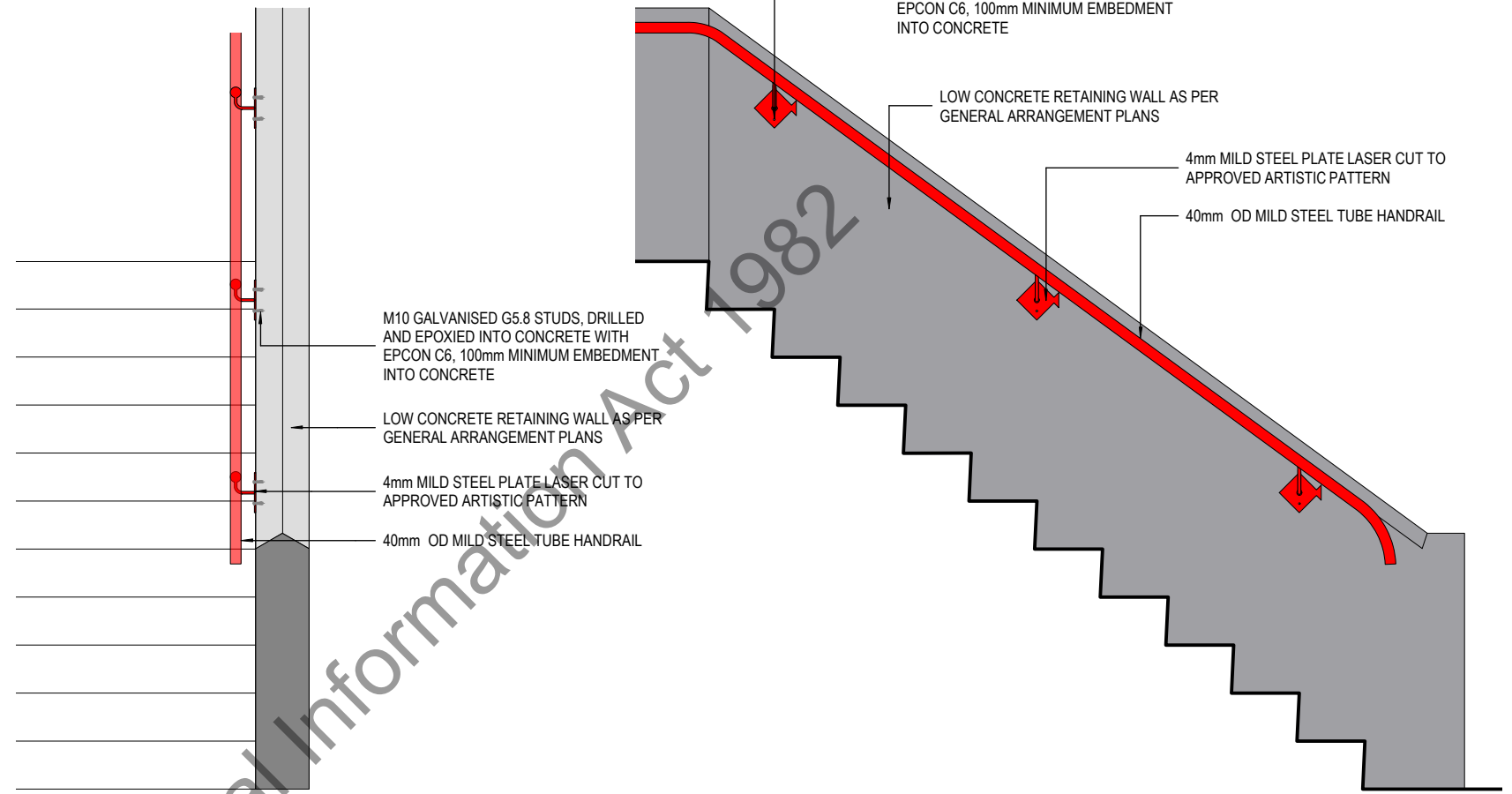
TITLE: UNDERPASS DETAILS - SURFACES
 SHEET 1 OF 1

DRAWING No: B2B-DRG-LA-UP-800

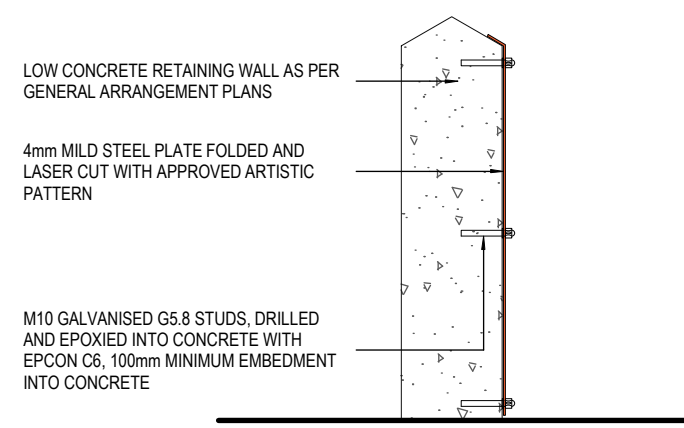
REV: A



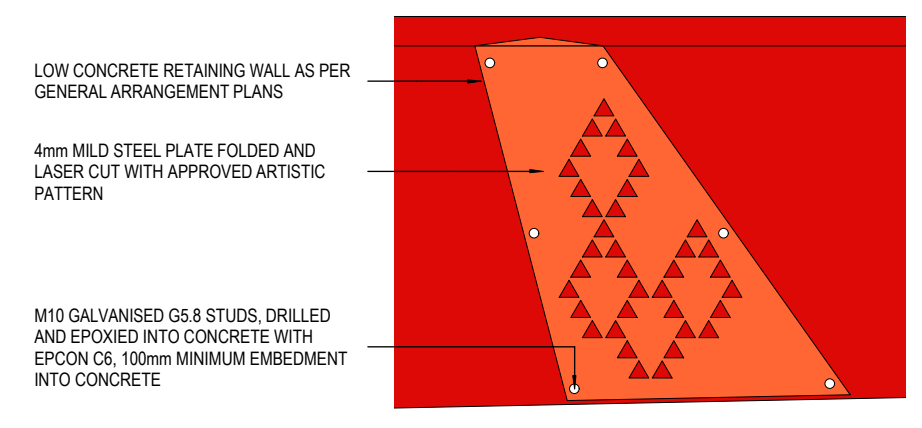
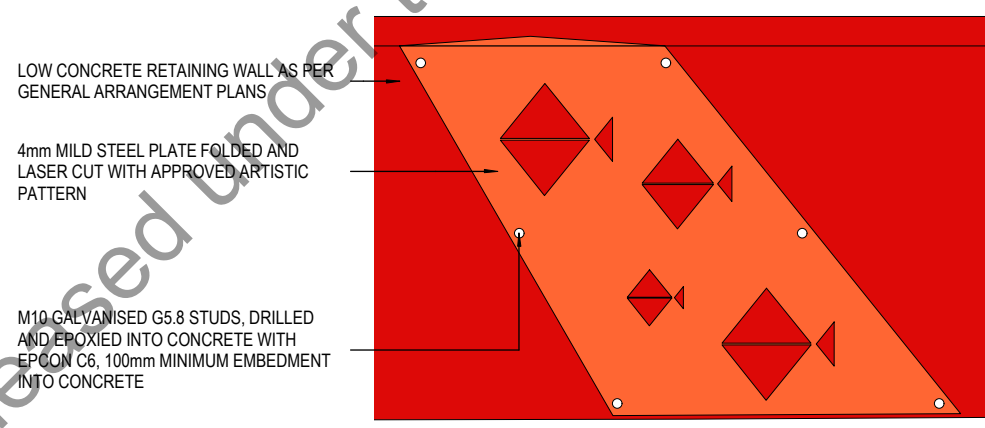
S01: TYPICAL REMOVABLE BOLLARD DETAIL (A)
SCALE 1:25



S01: TYPICAL DESIGNER HANDRAIL DETAIL (B)
SCALE 1:25

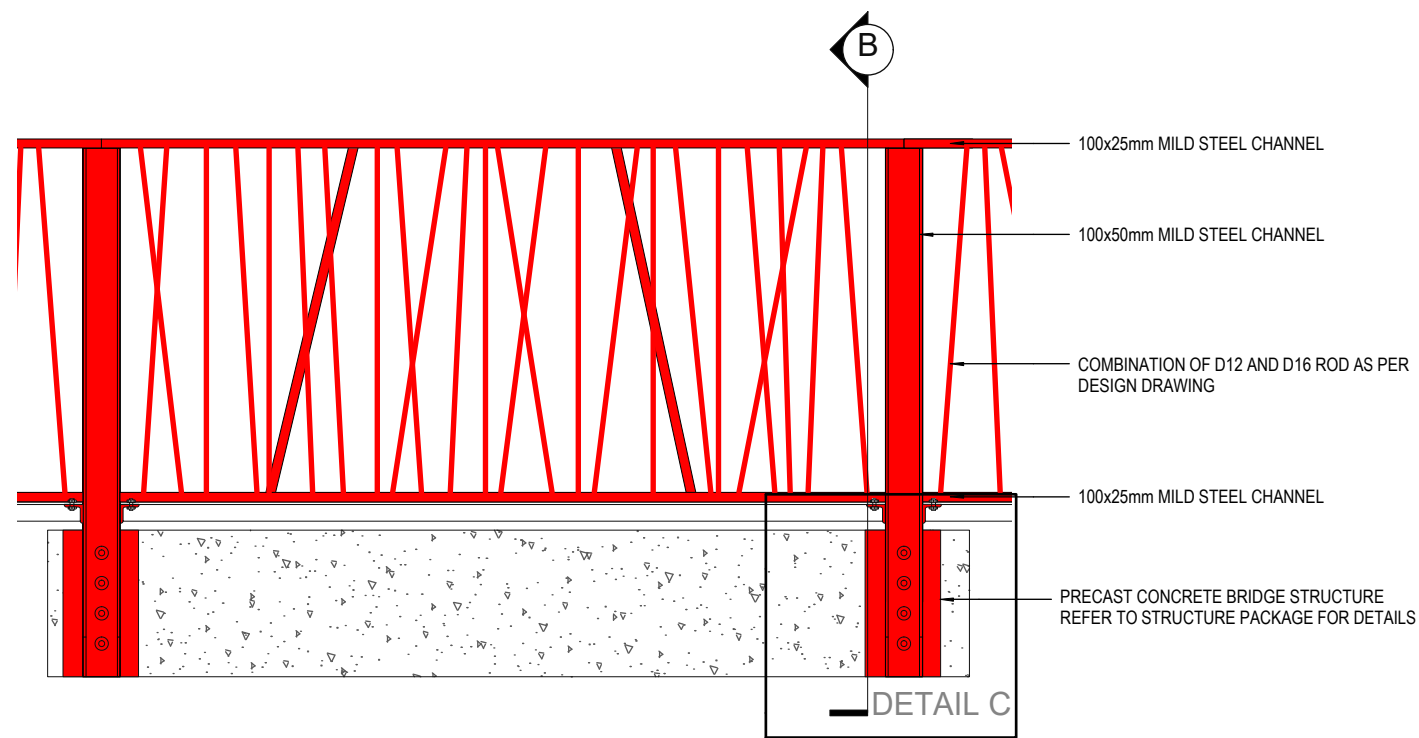


S01: DECORATIVE WALL PANEL DETAIL (C)
SCALE 1:15

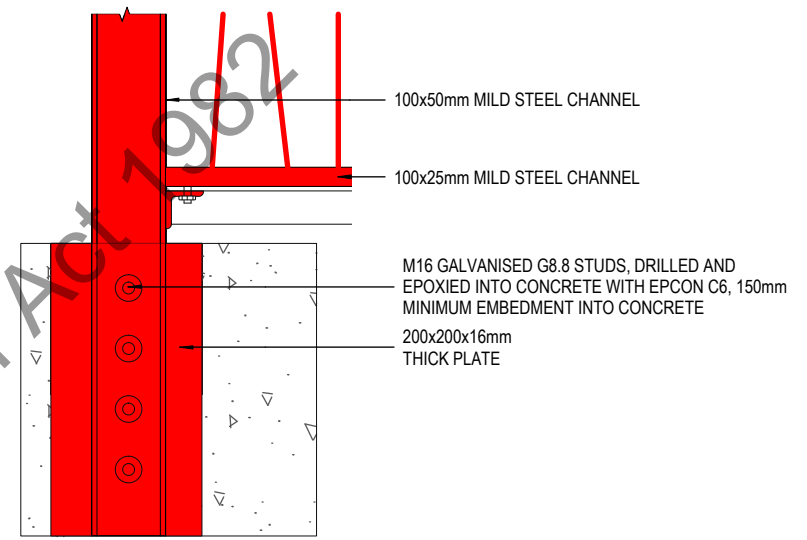


No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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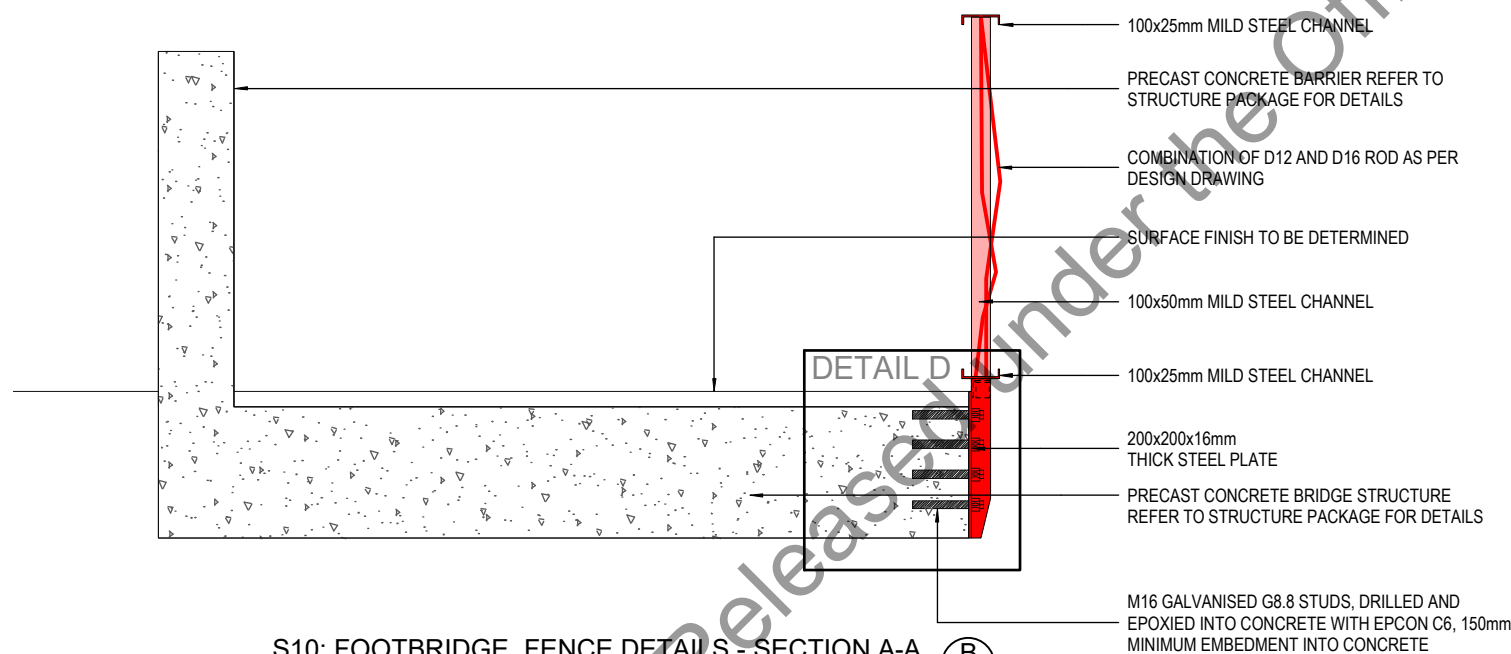
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			STATUS	50% ISSUE		
PROJECT NUMBER 2/09-024/603			DRAWN	JW/MP	DRAWING CHECK	AW
			DESIGNED	TR/AW	DESIGN REVIEW	RS
			APPROVED		18/03/19	DRAWING No
						B2B-DRG-LA-UP-810
						REV
						A



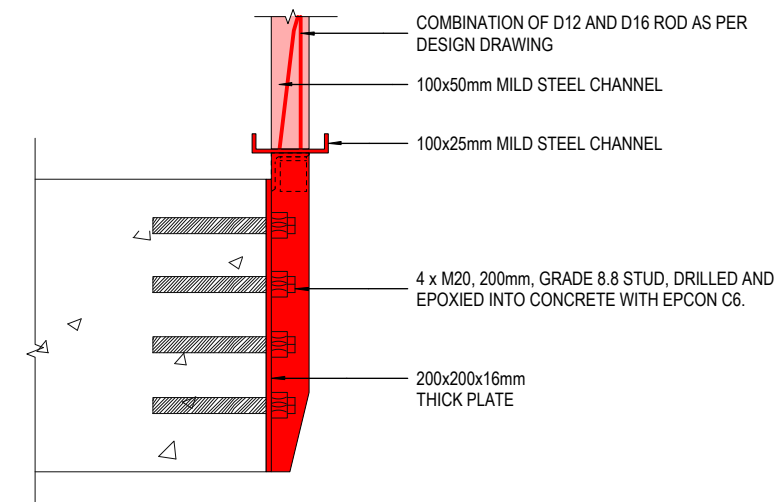
S10: FOOTBRIDGE FENCE DETAILS - ELEVATION
SCALE 1:20



S10: FOOTBRIDGE FENCE DETAILS - POST FRONT ELEVATION
SCALE 1:10



S10: FOOTBRIDGE FENCE DETAILS - SECTION A-A
SCALE 1:20



S10: FOOTBRIDGE FENCE DETAILS - POST BRACKET SECTION
SCALE 1:10

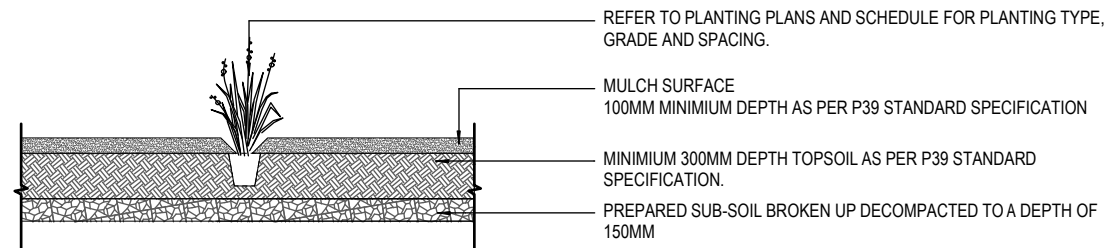
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1	1:10 @ A1				
2	1:20 @ A3				



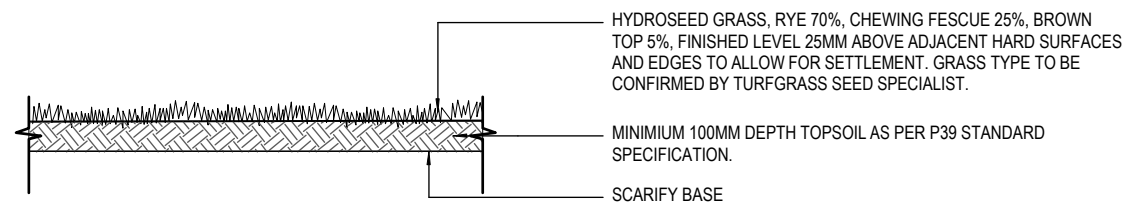
SCALE
AS SHOWN (A3)
STATUS
50% ISSUE
PROJECT NUMBER
2/09-024/603

CLIENT
NZ TRANSPORT AGENCY
PROJECT
BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN
JW/MP
DESIGNED
TR/AW
DRAWING CHECK
AW
DESIGN REVIEW
RS
APPROVED
18/03/19

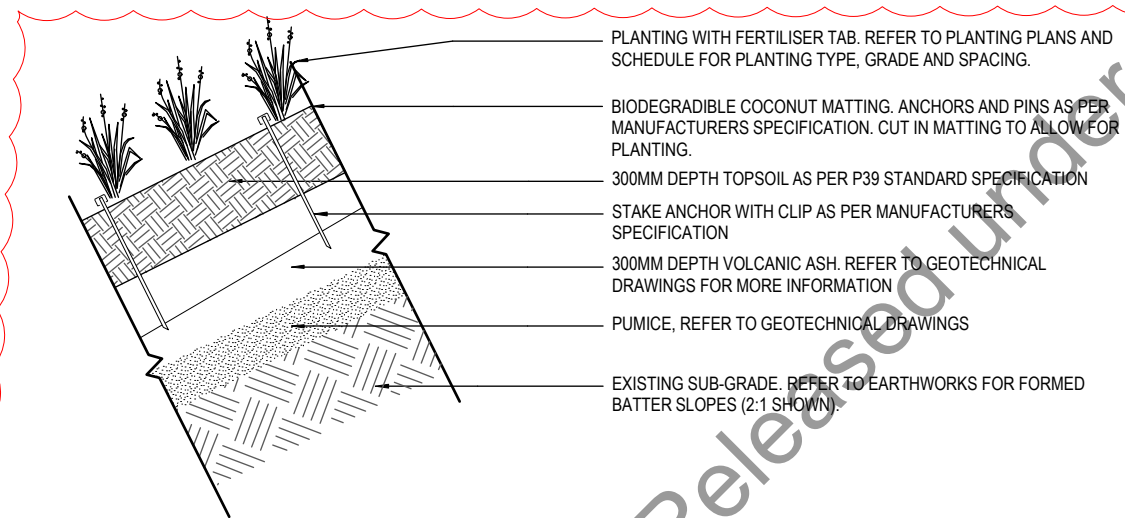
TITLE
UNDERPASS DETAILS-FOOTBRIDGE FENCE
SHEET 1 OF 1
DRAWING No
B2B-DRG-LA-UP-820
REV
A



TYPICAL PLANTING DETAIL (A)
SCALE 1:50

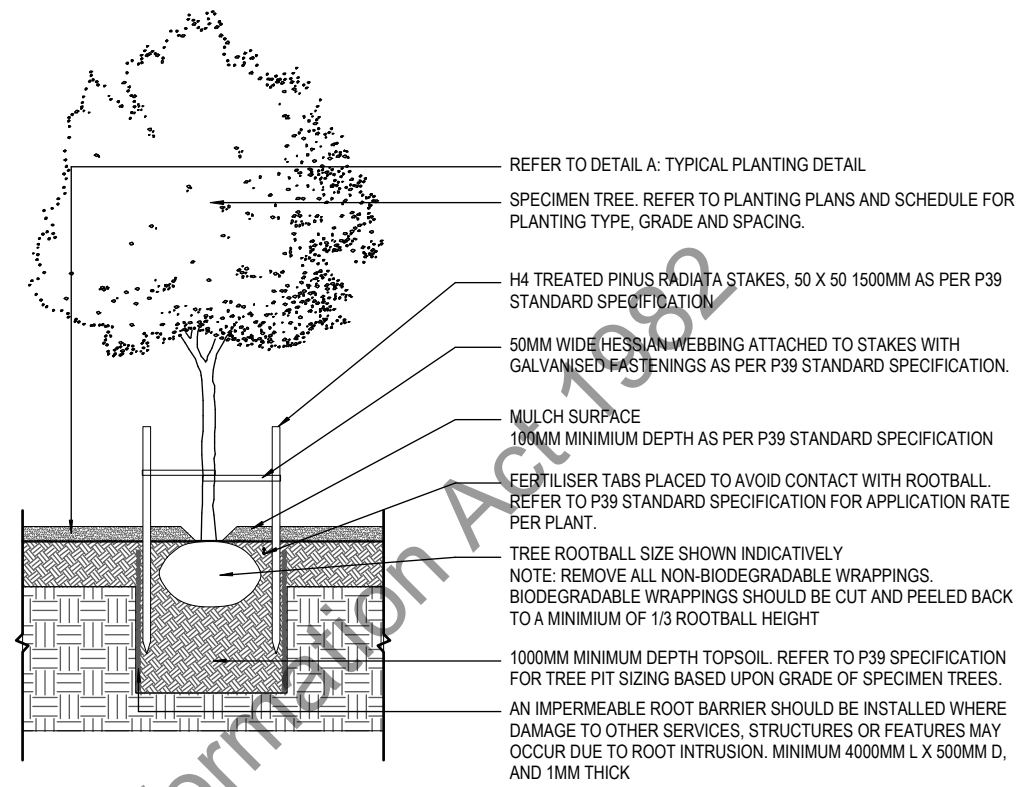


HYDROSEED GRASS DETAIL (B)
SCALE 1:25

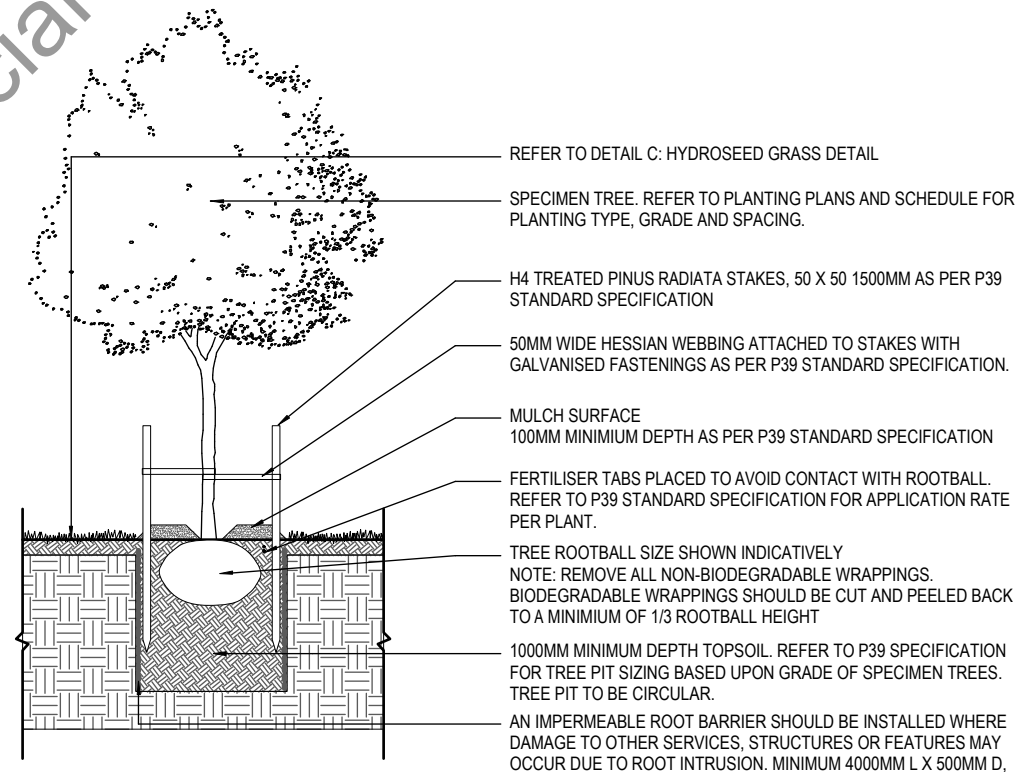


SPECIALIST PLANTING ON 3:1 SLOPES DETAIL (C)
SCALE 1:25

ON HOLD



TREE PIT IN GARDEN BED DETAIL (D)
SCALE 1:50



TREE PIT IN GRASSED AREA DETAIL (E)
SCALE 1:50

NOTES

- REFER TO LANDSCAPE HARD AND SOFT SPECIFICATION, PREPARED BY ALIGN LIMITED.
- ENSURE MULCH DOES NOT PILE UP AGAINST PLANT STEM.
- ENSURE SUB-GRADE IS FREE-DRAINING FOR PLANTING PRIOR TO PLACEMENT OF SOIL MIX (THIS DOES NOT APPLY TO WETLANDS, SWALES AND STORMWATER DETENTION AREAS).
- REFER TO PLANTING PLANS FOR PLANTING LOCATIONS.
- REFER TO PLANTING SCHEDULE DRAWING B2B-DRG-LA-5000 AND B2B-DRG-LA-5001 FOR PLANT MIXES, NUMBERS AND SPACINGS.
- AT TIME OF PLANTING, ENSURE PLANT HOLES AND TREE PITS DO NOT HOLD WATER.
- PRIOR TO PLACEMENT OF SOIL MIX, HEAVILY COMPACTED SUBGRADE TO BE LOOSENED TO ENSURE GROWING ZONE IS FREE DRAINING.
- EACH PLANTING TYPE TO BE LAID OUT ON SITE, COVERING A 10 X 10 METRE AREA AND APPROVED BY LANDSCAPE ARCHITECT PRIOR TO PLANTING.
- LOW GROWING SPECIES SHALL BE PLACED AT THE FRONT OF PLANTING AREAS, WITH TALL SPECIES PLANTED AT THE BACK, RELATIVE TO THE ROAD OR RESERVE VIEWING.
- SPECIES WITHIN PLANTING TYPES SHALL BE PLANTED IN GROUPS/DRIFTS OF A MINIMUM SIZE OF 3 OR 5 AND EVENLY DISTRIBUTED ACROSS THE SITE TO ACHIEVE A CONSISTENT MIX.
- PLANTING SETOUT IN SPECIES GROUPS IN A NATURALISTIC FASHION.
- REFER TO DRAINAGE DRAWING B2B-DRG-DG01-4104 FOR PLANTED SWALE DETAIL AND LANDSCAPE PLANTING PLANS AND SCHEDULES FOR FURTHER INFORMATION.

1:12.5 @ A1
1:25 @ A3
0 100 200 300 400 500 600 700 800 900 1000 1100 1200 mm

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES

1:12.5 @ A1
1:25 @ A3
0 10 20 30 40 50 60 70 80 90 100 cm



SCALE
AS SHOWN (A3)

STATUS
50% ISSUE

PROJECT NUMBER
2/09-024/603

CLIENT
NZ TRANSPORT AGENCY

PROJECT
BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN
JW/MP

DRAWING CHECK
AW

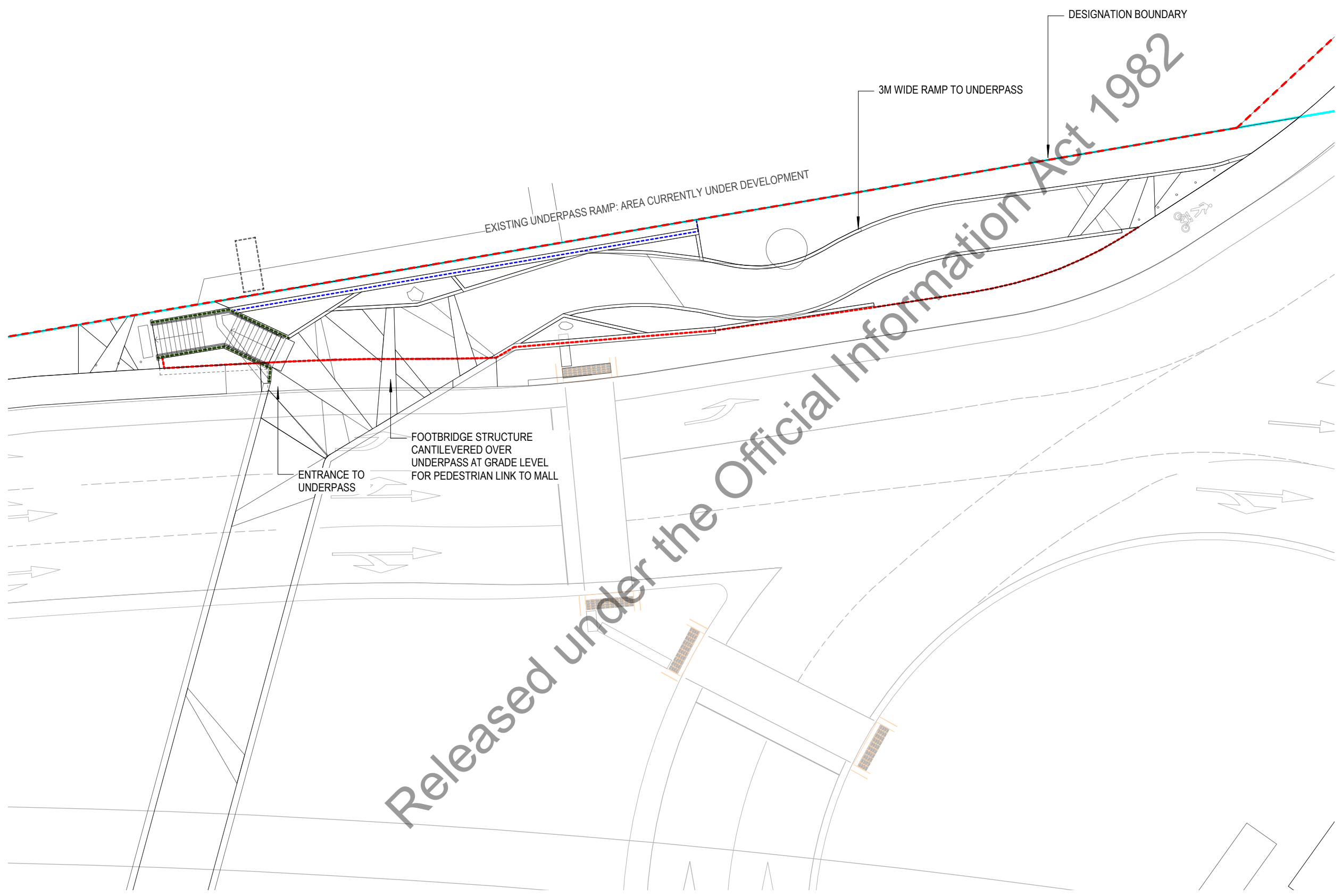
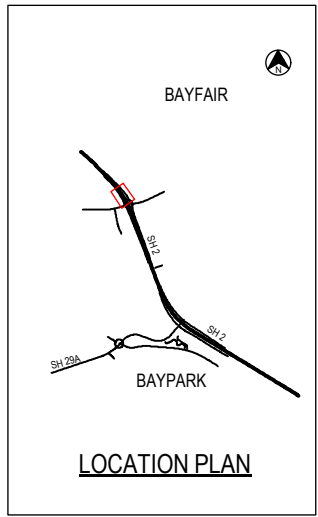
APPROVED
RS

18/03/19

TITLE
UNDERPASS DETAILS - PLANTING SHEET 1 OF 1

DRAWING No B2B-DRG-LA-UP-830

REV A



- LEGEND**
- - - POWDER COATED RED DESIGNER FENCING AT 1200MM HEIGHT
 - - - POWDER COATED BLACK SAFETY FENCING AT 1200MM HEIGHT INTEGRATED WHERE POSSIBLE WITH CONCRETE BARRIER
 - - - NO FENCING - INTEGRATED WALL AND HANDRAIL TO BE UTILISED

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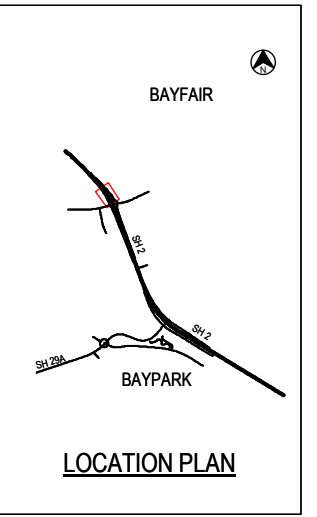
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SCALE: 1:250 (A3)
 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

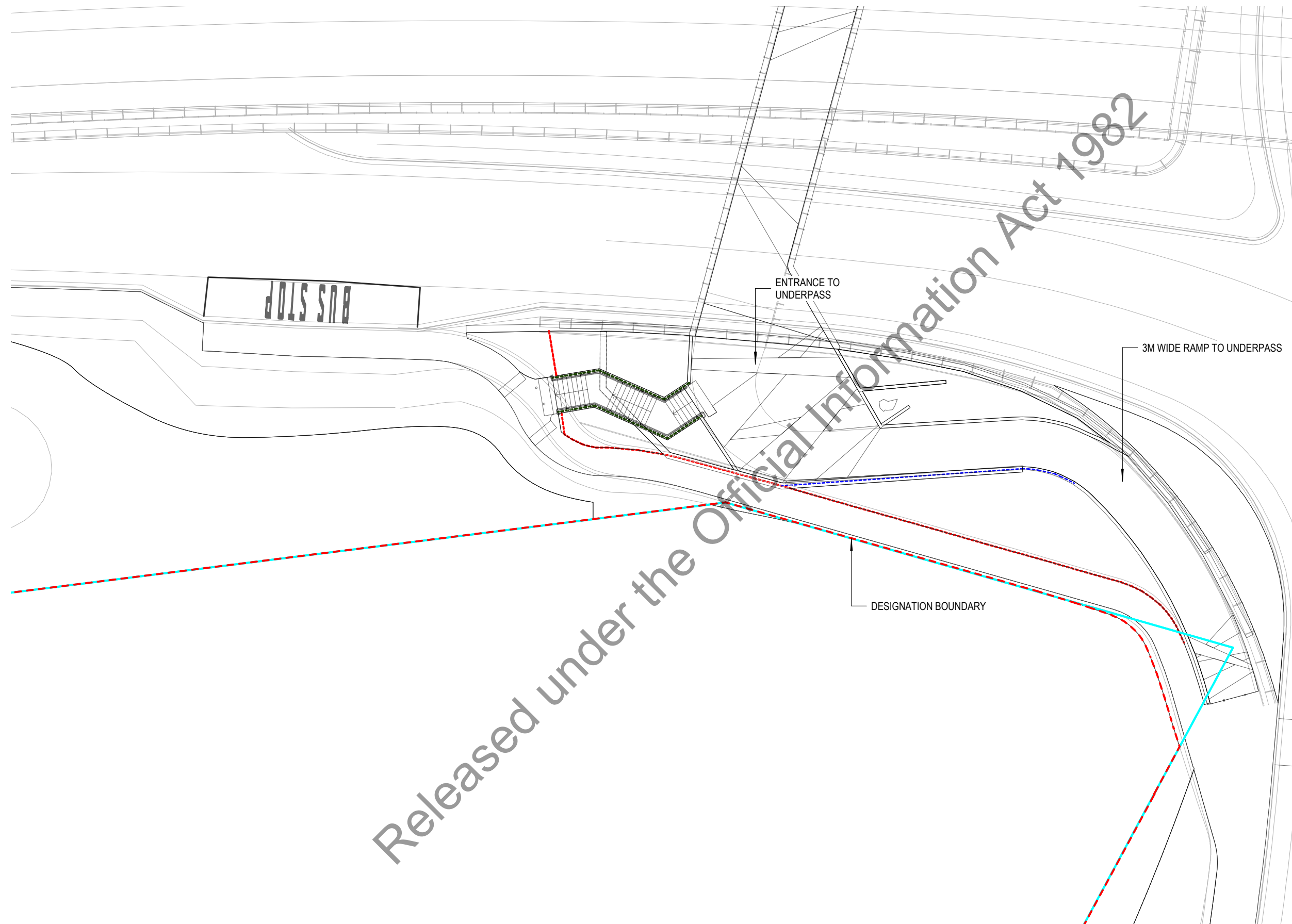
CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: JW/MP
 DESIGNER: TR/AW
 DRAWING CHECK: AW
 DESIGN REVIEW: RS
 APPROVED: 18/03/19

TITLE: UNDERPASS BAYFAIR FENCING PLAN SHEET 1 OF 2
 DRAWING No: B2B-DRG-LA-UP-840
 REV: A



LEGEND

- - - POWDER COATED RED DESIGNER FENCING AT 1200MM HEIGHT
- - - POWDER COATED BLACK SAFETY FENCING AT 1200MM HEIGHT INTEGRATED WHERE POSSIBLE WITH CONCRETE BARRIER
- - - NO FENCING - INTEGRATED WALL AND HANDRAIL TO BE UTILISED



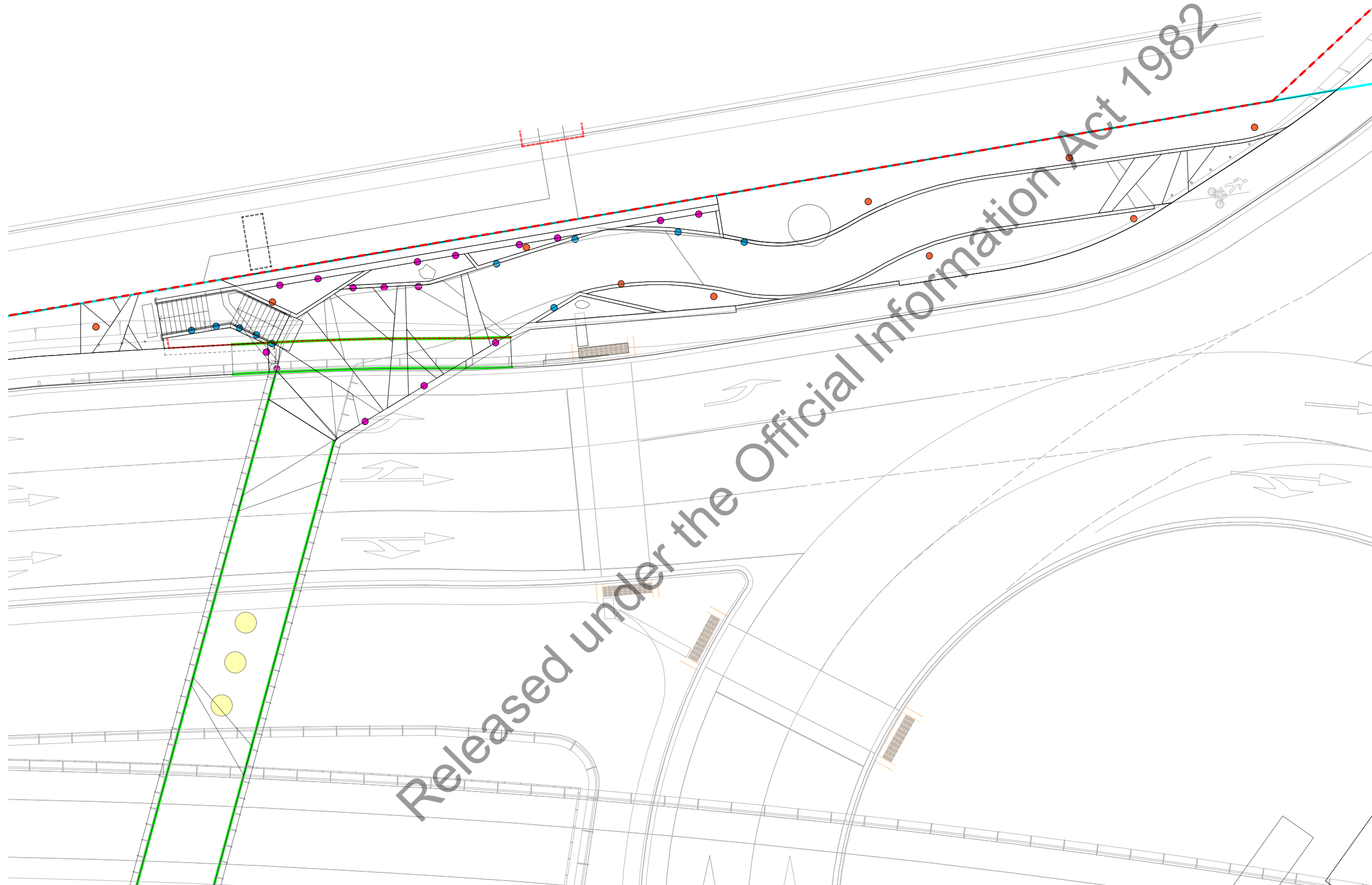
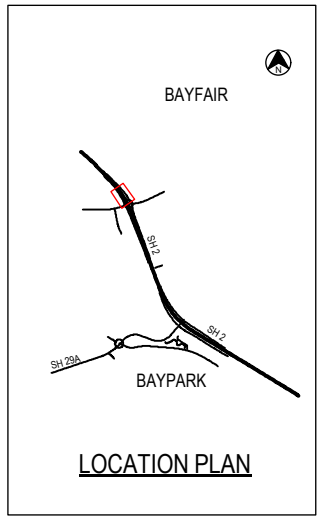
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2	1:250 @ A3	0	2	4	6



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: JW/MP
 DESIGNER: TR/AW
 DRAWING CHECK: AW
 DESIGN REVIEW: RS
 APPROVED: 18/03/19

TITLE: UNDERPASS MATAPIHI FENCING PLAN SHEET 2 OF 2
 DRAWING No: B2B-DRG-LA-UP-850
 REV: A



LEGEND

- RAMP AND PATH GROUND LEVEL LIGHTS
- FOOTBRIDGE LEDES
- LIGHT POLES TBA
- UP-LIGHTING ALONG RETAINING WALLS
- IN-BUILT STEP LIGHTING
- LIGHTWELLS TBA
SCALE NOT SHOWN OR EXACT LOCATION - SHOWN FOR INCLUSION ONLY DETAIL TO BE WORKED THROUGH

NOTES

1. THE JACOBS LIGHTING DESIGN HAS ONLY TAKEN INTO ACCOUNT LIGHTING TO MEET LIGHTING STANDARDS AND A FINAL DESIGN AROUND THE TYPE OF FITTINGS STILL NEEDS TO BE COMPLETED. FURTHER DESIGN COORDINATION BETWEEN ALIGN AND JACOBS IS REQUIRED TO CONFIRM THE LOCATION AND SPECIFICATION OF LIGHT FIXTURES.

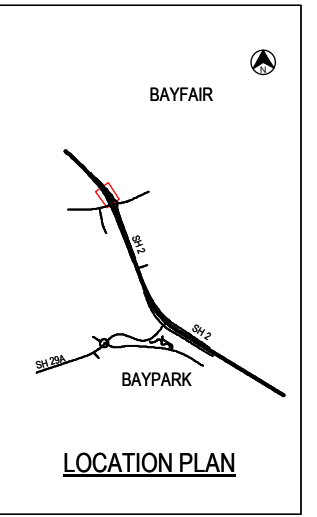
No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES



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	DRAWING CHECK	APPROVED
JW/MP	AW	18/03/19
DESIGNED	DESIGN REVIEW	RS
TR/AW		

TITLE	UNDERPASS BAYFAIR LIGHTING PLAN SHEET 1 OF 2
DRAWING No	B2B-DRG-LA-UP-900
REV	A



LEGEND

- RAMP AND PATH GROUND LEVEL LIGHTS
- FOOTBRIDGE LEDS
- LIGHT POLES TBA
- UP-LIGHTING ALONG RETAINING WALLS
- IN-BUILT STEP LIGHTING
- LIGHTWELLS TBA
SCALE NOT SHOWN OR EXACT LOCATION -
SHOWN FOR INCLUSION ONLY DETAIL TO BE
WORKED THROUGH

NOTES

1. THE JACOBS LIGHTING DESIGN HAS ONLY TAKEN INTO ACCOUNT LIGHTING TO MEET LIGHTING STANDARDS AND A FINAL DESIGN AROUND THE TYPE OF FITTINGS STILL NEEDS TO BE COMPLETED. FURTHER DESIGN COORDINATION BETWEEN ALIGN AND JACOBS IS REQUIRED TO CONFIRM THE LOCATION AND SPECIFICATION OF LIGHT FIXTURES.

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No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:125 @ A1					
1:250 @ A3					



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	JW/MP	DRAWING CHECK
DESIGNED	TR/AW	DESIGN REVIEW
APPROVED	18/03/19	

TITLE	UNDERPASS MATAPIHI LIGHTING PLAN SHEET 2 OF 2	
DRAWING No	B2B-DRG-LA-UP-910	REV
		A

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NZ TRANSPORT AGENCY

BAYPARK TO BAYFAIR LINK
UNDERPASS
Detailed Design
50% ISSUE



ISSUED BY:

A	30% Detailed Design	Align Limited	Landscape Architects	15 February 2019
B	50% Detailed Design	Align Limited	Landscape Architects	8 March 2019

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DRAWING NUMBER	TITLE
B2B-DRG-LA-UP-000	COVER SHEET
B2B-DRG-LA-UP-010	DRAWING LIST
B2B-DRG-LA-UP-050	KEY NOTES / LEGEND
B2B-DRG-LA-UP-060	PLANTING SCHEDULE
B2B-DRG-LA-UP-100	OVERALL SITE PLAN
B2B-DRG-LA-UP-101	NORTH CONCEPT PLAN
B2B-DRG-LA-UP-102	SOUTH CONCEPT PLAN
B2B-DRG-LA-UP-110	NORTH GENERAL ARRANGEMENT PLAN 1 OF 3
B2B-DRG-LA-UP-120	UNDERPASS GENERAL ARRANGEMENT PLAN 2 OF 3
B2B-DRG-LA-UP-130	SOUTH GENERAL ARRANGEMENT PLAN 3 OF 3
B2B-DRG-LA-UP-310	NORTH PLANTING PLAN 1 OF 2
B2B-DRG-LA-UP-320	SOUTH PLANTING PLAN 2 OF 2
B2B-DRG-LA-UP-410	SECTIONS 1 OF 2
B2B-DRG-LA-UP-420	SECTIONS 2 OF 2
B2B-DRG-LA-UP-710	NORTH LEVELS PLAN 1 OF 2
B2B-DRG-LA-UP-720	SOUTH LEVELS PLAN 2 OF 2
B2B-DRG-LA-UP-800	DETAILS - SURFACES
B2B-DRG-LA-UP-810	DETAILS - STREET FURNITURE AND STRUCTURES
B2B-DRG-LA-UP-820	DETAILS - FENCES AND WALLS
B2B-DRG-LA-UP-830	DETAILS - VEGETATION
B2B-DRG-LA-UP-900	NORTH LIGHTING PLAN 1 OF 2
B2B-DRG-LA-UP-910	SOUTH LIGHTING PLAN 2 OF 2

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES



SCALE	N/A
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY		
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)		
DRAWN	TR	DRAWING CHECK	APPROVED
DESIGNED	JW	DESIGN REVIEW	AW
			08/03/19

TITLE	UNDERPASS DRAWING LIST SHEET 1 OF 1		
DRAWING No	B2B-DRG-LA-UP-010		REV A

GENERAL NOTES

ALL STRUCTURAL / BUILDING WORK AND FOUNDATIONS TO DESIGNERS DETAILS.

ALL DRAINAGE BY JACOBS STORMWATER DESIGN - FITTINGS AND SIZES SUBJECT TO ENGINEERS DETAILS.

DRAWINGS NOT TO BE SCALED, USE DIMENSIONED MEASUREMENTS ONLY.

ALL DIMENSIONS TO FINISHED SURFACE LEVELS.

EDGE DETAIL BETWEEN CONCRETE SURFACES TO BE TROWELLED EDGE WITH 10MM FLEXIBLE SEALANT JOINT.

REFER TO LANDSCAPE HARD AND SOFTSCAPE SPECIFICATION, PREPARED BY ALIGN.

REFER TO GEOMETRICS, DRAINAGE, LIGHTING AND OTHER RELEVANT PACKAGES FOR FURTHER INFORMATION:

A. REFER TO GEOMETRICS PACKAGE FOR ROAD ALIGNMENT.

B. DESIGNATION BOUNDARY PROVIDED BY CPB. THE LANDSCAPING APPLIED TO EDGE OF ROAD IN ORDER TO ALIGN WITH THE GEOMETRICS PACKAGE (JACOBS).

C. FOR PEDESTRIAN FENCING DETAILS REFER TO JACOBS BARRIERS PACKAGE (B2B-DRG-RF01-3271 -3274).

D. REFER TO JACOBS PAVEMENT MARKING PACKAGE FOR PAVEMENT MARKINGS AND TGS LOCATIONS (B2B-DRG-SL01-3240 -3245).

E. REFER TO JACOBS SIGNAGE PACKAGE FOR SIGNAGE LOCATIONS (B2B-DRG-SL01-3211-3226).

F. REFER TO JACOBS TRAFFIC SIGNALS PACKAGE FOR TRAFFIC SIGNAL LOCATIONS (B2B-DRG-SI01-3301 AND 3305).

G. REFER TO GEOTECHNICAL (TONKIN + TAYLOR) AND STRUCTURAL (JACOBS) FOR DETAILED DESIGN OF OVERPASS.

H. REFER TO JACOBS DRAINAGE PACKAGE (B2B-DRG-DR01-4000).

I. REFER TO JACOBS LIGHTING PACKAGE (B2B-DRG-LV01-3402).

SOFT LANDSCAPE NOTES

ALL GRASS AREAS TO BE FINISHED 25MM HIGHER THAN ADJOINING SURFACE TO ALLOW FOR SETTLEMENT.

ABSOLUTE PLANTING NUMBERS ARE INDICATIVE. CONTRACTOR TO ENSURE SUFFICIENT STOCK TO ACHIEVE SPECIFIED PLANTING DENSITIES.

METALWORK NOTES

GENERAL
CONFIRM ON SITE ALL MEASUREMENTS PRIOR TO MANUFACTURING. ALL DIMENSIONS NOMINAL ONLY.

CONTRACTOR TO SITE MEASURE AND MEASURE ALL COMPONENTS AND ENSURE ACCURATE FIT BETWEEN COWLS, COLLARS, FLANGES, PIPES, POSTS, BASE PLATES, FIXING SURFACES AND THE LIKE.

ALL WELDS TO BE BUFFED SMOOTH PRIOR TO HOT DIP GALVANISING/ZINC PLATING.

ALL NON-STAINLESS STEEL METAL WORK SHALL BE HOT DIPPED GALVANISED (HDG) OR ZINC PLATED AND PAINTED - METAL WORK TO BE CLEANED, DEGREASED FOLLOWING COMPLETION OF ALL WELDS AND HOT DIP GALVANISED/ZINC PLATED IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK (B2B-S-SP-5650)

ALL METALWORK TO BE APPROVED BY ENGINEER AFTER FABRICATION AND BEFORE HOT DIP GALVANISING/ZINC PLATING.

METALWORK NOTES

NO WELDING OR DRILLING TO BE CARRIED OUT BEFORE ZINC SPRAYING.

PRIMER AND PAINT SYSTEM TO LANDSCAPE HARDSCAPE SPECIFICATION. COLOURS TO BE CONFIRMED PRIOR TO ORDERING.

APPROVED EXTERIOR GRADE SILICON SEALANT TO ALL JOINTS AFTER FIXING.

ALL FIXINGS TO BE NON-FERROUS - ALL FIXINGS TO ENSURE ADEQUATE SEPERATION OF VARYING METALWORK ELEMENTS.

METALWORK FIXING PLATES AND FITTINGS NOT TO BE USED AS A GUIDE FOR DRILLING OR CUTTING.

P - SURFACES

P01A • INSITU CONCRETE
- SUPPLIER: CPB TO CONFIRM
- FINISH: SPONGED U5, PFL NATURAL SEALER
- COLOUR: PETER FELL COLOUR RANGE GELATO RASPBERRY
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-800

P01B • INSITU CONCRETE
- SUPPLIER: CPB TO CONFIRM
- FINISH: SPONGED U5, PFL NATURAL SEALER
- COLOUR: PETER FELL COLOUR RANGE PREMIUM CHARCOAL 699
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-800

P01C • INSITU CONCRETE
- SUPPLIER: CPB TO CONFIRM
- FINISH: SPONGED U5, PFL NATURAL SEALER
- COLOUR: PETER FELL COLOUR RANGE PREMIUM CHARCOAL 678
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-800

P01D • INSITU CONCRETE
- SUPPLIER: CPB TO CONFIRM
- FINISH: SPONGED U5, PFL NATURAL SEALER
- COLOUR: PLAIN
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-800

P - SURFACES

P02 • INSITU CONCRETE
- SUPPLIER: CPB TO CONFIRM
- FINISH: MAGNESIUM/WOOD TROWELLED, PFL NATURAL SEALER
- COLOUR: PETER FELL COLOUR RANGE GELATO VANILLA
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-800

P03 • INSITU CONCRETE
- SUPPLIER: CPB TO CONFIRM
- FINISH: BRUSHED
- COLOUR: PLAIN
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-800

P04A • INSITU CONCRETE
- SUPPLIER: ALLIED CONCRETE
- FINISH: EXPOSED, CEMIX CONCRETE SEALER MATT (OR SIMILAR)
- COLOUR: WOODVILLE PEBBLE WITH OXIDE
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-800

P04B • INSITU CONCRETE
- SUPPLIER: ALLIED CONCRETE
- FINISH: TROWELLED, CEMIX CONCRETE SEALER MATT (OR SIMILAR)
- JET BLASTERED PATTERNING
- COLOUR: WOODVILLE PEBBLE WITH OXIDE
- THICKNESS: 100MM
- AGGREGATE SIZE AND TYPE: 13MM STANDARD EXPOSED MIX
- REINFORCING: SE72 SEISMIC MESH
- STRENGTH: 25MPA
- REFER LANDSCAPE HARDSCAPE SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-800

P05A • CONCRETE UNIT PAVING
- NOT INCLUDED IN THIS PACKAGE

P05B • CONCRETE UNIT PAVING
- NOT INCLUDED IN THIS PACKAGE

P05C • CONCRETE UNIT PAVING
- NOT INCLUDED IN THIS PACKAGE

P06 • HOLLAND SETTS
- NOT INCLUDED IN THIS PACKAGE

P07 • TGS WARNING INDICATOR
- SUPPLIER: MOBILITY RESEARCH CENTRE
- STYLE: POLYURETHANE TACTILE STUD
- WARNING/HAZARD: TYPE B
- COLOUR: SAFETY YELLOW
- SIZE: 35DIA
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER TO GEOMETRICS DRAWINGS FOR LOCATIONS

P08 • TGS DIRECTIONAL INDICATOR
- SUPPLIER: MOBILITY RESEARCH CENTRE
- STYLE: POLYURETHANE TACTILE STUD
- WARNING/HAZARD: TYPE C
- COLOUR: SAFETY YELLOW
- SIZE: 288 X 35DIA MM
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER TO GEOMETRICS DRAWINGS FOR LOCATIONS

P09 • DETERRENT PAVING
- SUPPLIER: CHARCON
- TYPE: FORMAT 3
- SIZE: 600X600MM
- COLOUR: WHITE
- REFER SUPPLIER FOR DETAILS & SPECIFICATION

S - STREET FURNITURE I STRUCTURES

S01 • BOLLARDS
- SUPPLIER: BOLLARDS NZ
- TYPE: B2 (114MM) SERIES
- FINISH: STAINLESS STEEL TUBE, REMOVABLE WITH REFLECTOR STRIP
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-810

S02 A, B, C, D • BOULDERS
- NOT INCLUDED IN THIS PACKAGE

S03A • BENCH SEAT
- NOT INCLUDED IN THIS PACKAGE

S03B • BENCH SEAT
- NOT INCLUDED IN THIS PACKAGE

S03C • BENCH SEAT
- NOT INCLUDED IN THIS PACKAGE

S04 • OVERHEAD STRUCTURES
- NOT INCLUDED IN THIS PACKAGE

S05 • WAYFINDING SIGNAGE FEATURE
- NOT INCLUDED IN THIS PACKAGE

S06 • HAND RAIL
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: WALL MOUNTED HANDRAIL
- FINISH: GALVANISED STEEL
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

S07 SKATE BOARD DETERRANTS
- REFER DRAWING B2B-DRG-LA-UP-110 & 130
- REFER LANDSCAPE HARDSCAPE SPECIFICATION

S08 • STAIR NOSING
- SUPPLIER: TOTAL TACTILEZ
- TYPE: LBR127 TREFX LUMAWAY STAIR NOSING
- FINISH: NATURAL WITH YELLOW INSERTS
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

S09 • PRE-CAST CONCRETE STAIRS
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: PRE CAST CONCRETE STRUCTURE
- FINISH: JCONTRACTOR TO CONFIRM
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

S10 • PRE-CAST CONCRETE BRIDGE
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: PRE CAST CONCRETE STRUCTURE
- FINISH: CONTRACTOR TO CONFIRM
- REFER DRAWING B2B-DRG-LA-UP-110

F - FENCES, WALLS, GATES AND RENDERING

F01 • SAFETY FENCING
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: STEEL RAILING AS PER DESIGN
- FINISH: GALVANISED STEEL
- HEIGHT: 1200MM
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

F02 • RAISED PLANTER WALLS
- REFER DRAWING B2B-DRG-LA-UP-110 & 120
- REFER UDLMF FOR GENERAL AESTHETICS

F03 • BRIDGE FENCING (ROAD SIDE)
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: STEEL RAILING AS PER DESIGN
- FINISH: ZINC COATED AND POWDER COATED STEEL
- HEIGHT: 1200MM
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-110

F04 • BRIDGE WALL / FENCING , GUARDRAIL
- REFER DRAWING B2B-DRG-LA-UP-110

F05 • RETAINING WALL INSERT PANELS
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

F06 • WALL PAINTING - WHITE
- SUPPLIER: DULUX
- TYPE: WHITE
- FINISH: MATT AND GRAFFITI RESISTANT
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

F07 • WALL PAINTING - RED
- SUPPLIER: DULUX
- TYPE: ELECTRO F RED 9064164K
- FINISH: MATT AND GRAFFITI RESISTANT
- REFER DRAWING B2B-DRG-LA-UP-110

F08 • DESIGNER FENCING
- SUPPLIER: CONTRACTOR TO CONFIRM
- TYPE: STEEL RAILING AS PER DESIGN
- FINISH: ZINC COATED AND POWDER COATED STEEL
- HEIGHT: 1200MM
- REFER MANUFACTURER FOR INSTALLATION & SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

F09 • RETAINING WALL RELIEF PATTERNING
- REFER DRAWING B2B-DRG-LA-UP-110 & 130

G / T / G - VEGETATION

G01 • GARDEN BED-STANDARD
- 100MM MIN MULCH AS PER P39 STANDARD SPECIFICATION
- PERMEABLE GEOTEXTILE TERRAM, BIODEGRADABLE & PINNED IN PLACE
- 300MM MIN TOPSOIL AS PER P39 STANDARD SPECIFICATION
- PREPARED SUB-SOIL BROKEN UP, DECOMPACTED TO A DEPTH OF 150MM
- REFER PLANT SCHEDULE & PLANTING PLANS
- REFER DRAWING B2B-DRG-LA-UP-830

G02 • HYDROSEED GRASS
- HYDROSEED GRASS, RYE 70%, CHEWING FESCUE 25%, BROWN TOP 5%, FINISHED LEVEL, 25MM ABOVE ADJACENT HARD SURFACES AND EDGES TO ALLOW FOR SETTLEMENT. GRASS TYPE TO BE CONFIRMED BY TURFGRASS SEED SPECIALIST.
- 100MM MIN DEPTH TOPSOIL AS PER P39 STANDARD SPECIFICATION
- REFER DRAWING B2B-DRG-LA-UP-830

T01 • PROPOSED TREE IN GARDEN AREA
- 100MM MIN MULCH AS PER P39 STANDARD SPECIFICATION
- 1000MM MIN TOPSOIL AS PER P39 STANDARD SPECIFICATION
- REFER PLANTING PLANS & PLANT SCHEDULES
- REFER DRAWING B2B-DRG-LA-UP-830

T04 • EXISTING TREE TO BE RETAINED AND PROTECTED

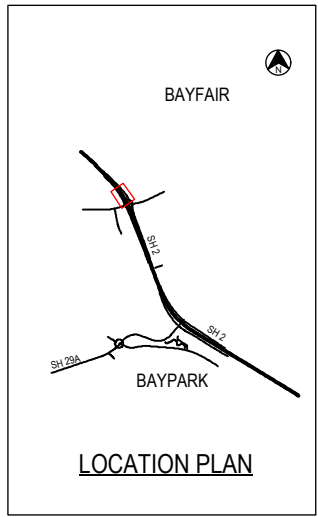
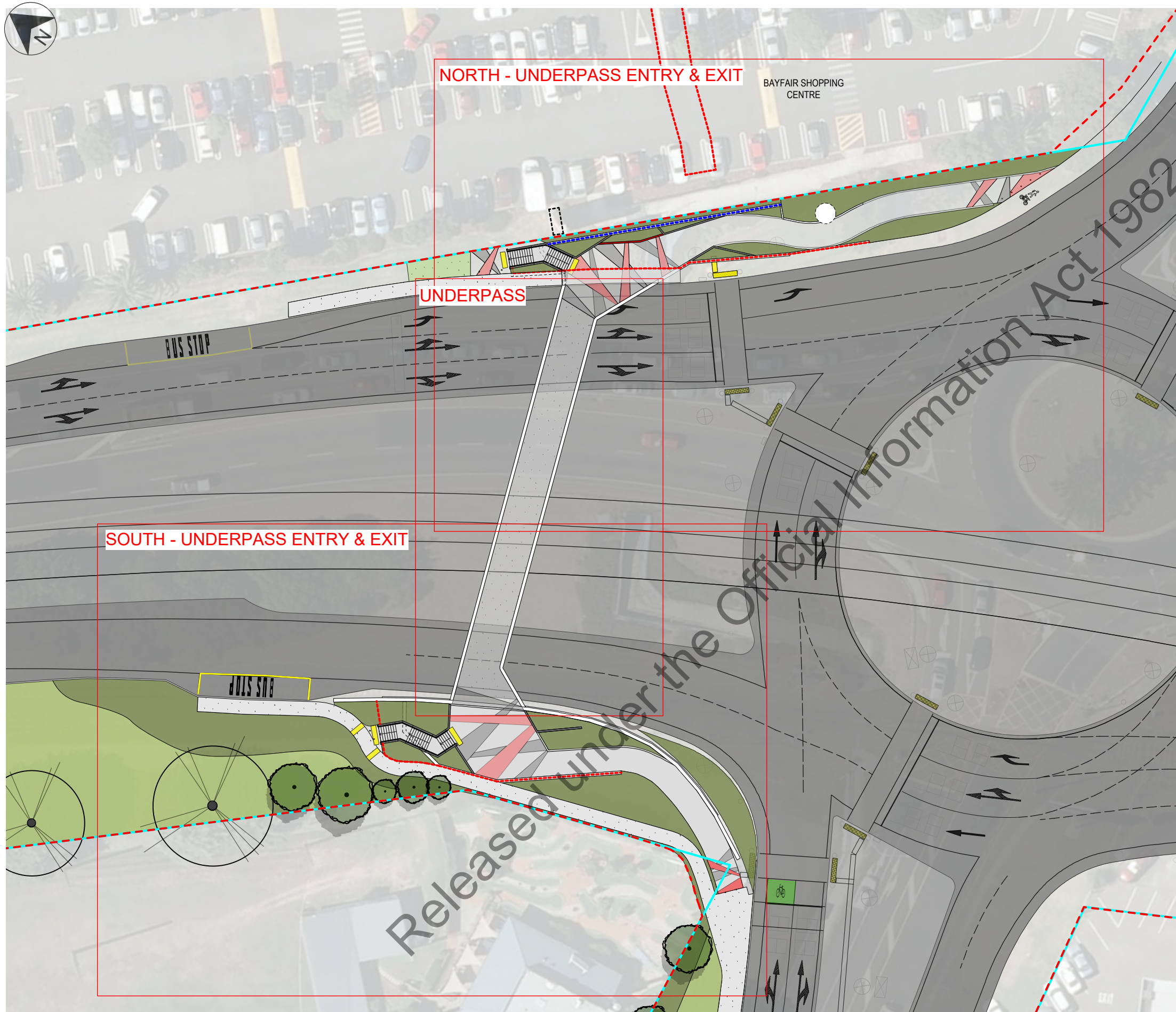
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No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES								DRAWN: TR		DRAWING CHECK: JW		APPROVED: 08/03/19		DRAWING No: B2B-DRG-LA-UP-050		REV: A

Plant Code	Botanical Name	Common Name	Grade (Pint Bag)	Spacing (m)	Plants (per m2)	Area (m2)	Quantity
ASB	<i>Astelia banksii</i>	Wharawhara	PB2	0.7	2	43	87
AF	<i>Astelia fragrans</i>	Bush Lily	PB2	1	1	44	44
CV	<i>Carex virgata</i>	Pukio	PB3	0.8	2	25	39
CF	<i>Chionochloa flavicans</i>	Dwarf Toe Toe	PB2	1.2	0.7	161	112
CR	<i>Chionochloa rubra</i>	Red Tussock	PB2	0.7	2	177	353
CA	<i>Coprosma acerosa</i>	Groundcover Coprosma	PB2	1	1	128	128
DN	<i>Dianella nigra</i>	Turuturu	PB2	0.3	11	45	498
LP	<i>Libertia peregrinans</i>	Mikoikoi/ Iris	PB2	0.3	11	23	251
MA	<i>Muehlenbeckia axillaris</i>	Creeping Wire Vine	PB2	1	1	98	98
					3.5	744	1611

Trees	Botanical Name	Common Name	Grade	Spacing (M)	Quantity
MET EXC	<i>Metrosideros excelsa</i>	Pohutukawa	45L	As per dwg's	7
					7

Released under the Official Information Act 1982

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No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES																																			



- LEGEND**
- PROPOSED GRASS
 - PROPOSED PLANTING
 - BRUSHED CONCRETE
 - SANDBLASTED CONCRETE/
EXPOSED AGGREGATE
 - COLOURED CONCRETE
 - TREES - PROPOSED
SPECIMEN GRADE
 - +
 TREES - EXISTING TO
BE RETAINED
 - LANDSCAPE BOUNDARY
 - PROJECT DESIGNATION

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES

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1:500@ A3

0 4 8 12 16 20 24 m



SCALE
1:500 (A3)

STATUS
50% ISSUE

PROJECT NUMBER
2/09-024/603

CLIENT
NZ TRANSPORT AGENCY

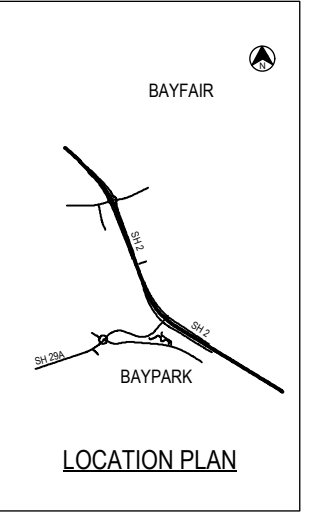
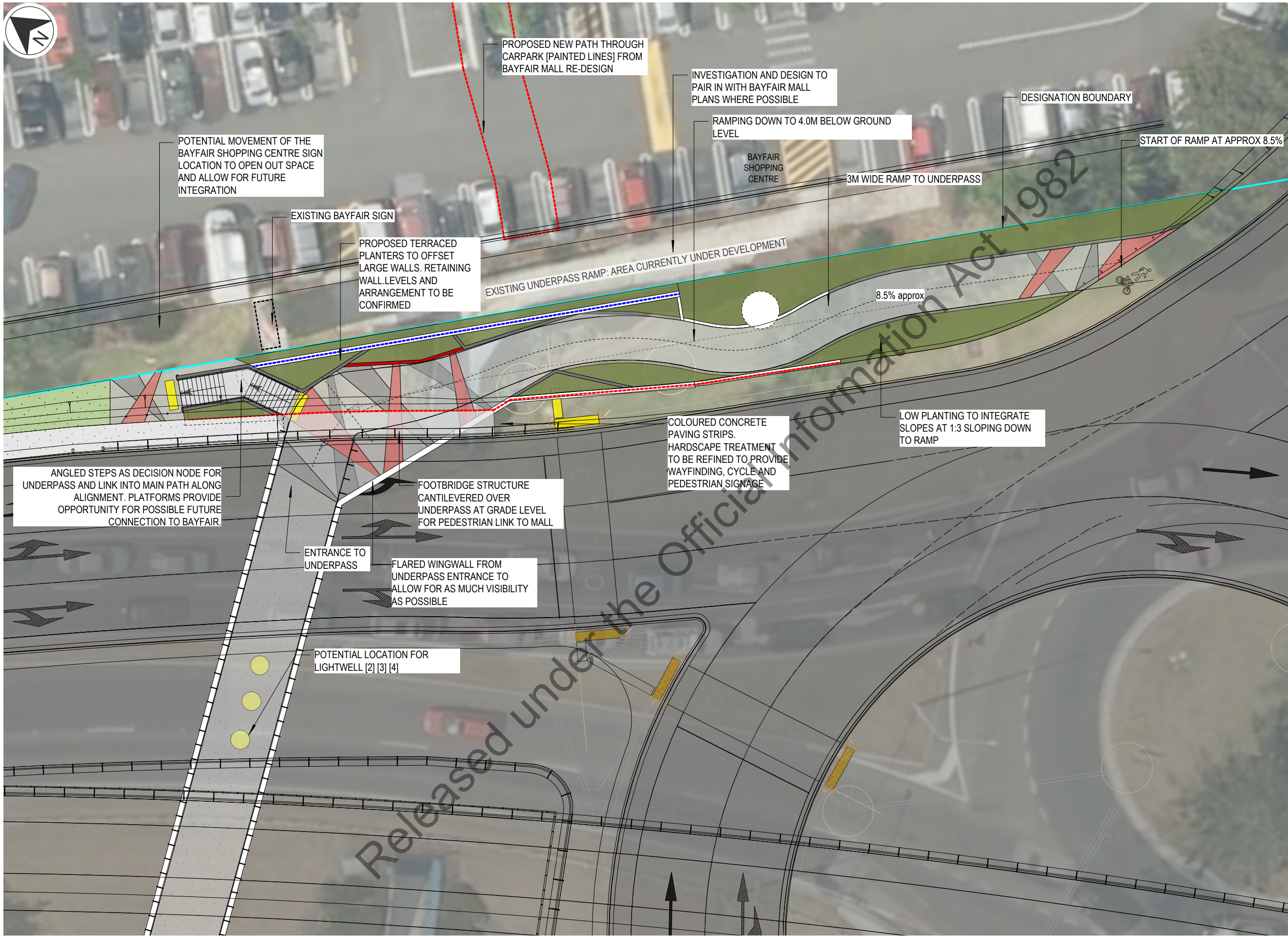
PROJECT
BAYPARK TO BAYFAIR LINK
(BAY LINK)

DRAWN TR	DRAWING CHECK JW	APPROVED
DESIGNED JW	DESIGN REVIEW AW	08/03/19

TITLE
UNDERPASS
OVERALL SITE PLAN
SHEET 1 OF 1

DRAWING No
B2B-DRG-LA-UP-100

REV
A



- LEGEND**
- PROPOSED GRASS
 - PROPOSED PLANTING
 - BRUSHED CONCRETE
 - SANDBLASTED CONCRETE/ EXPOSED AGGREGATE
 - COLOURED CONCRETE
 - TREES - PROPOSED SPECIMEN GRADE
 - TREES - EXISTING TO BE RETAINED
 - LANDSCAPE BOUNDARY
 - PROJECT DESIGNATION

Released under the Official Information Act 1982

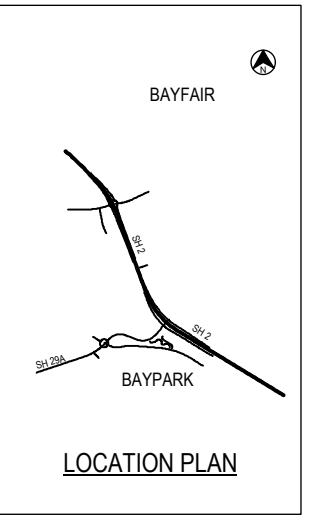
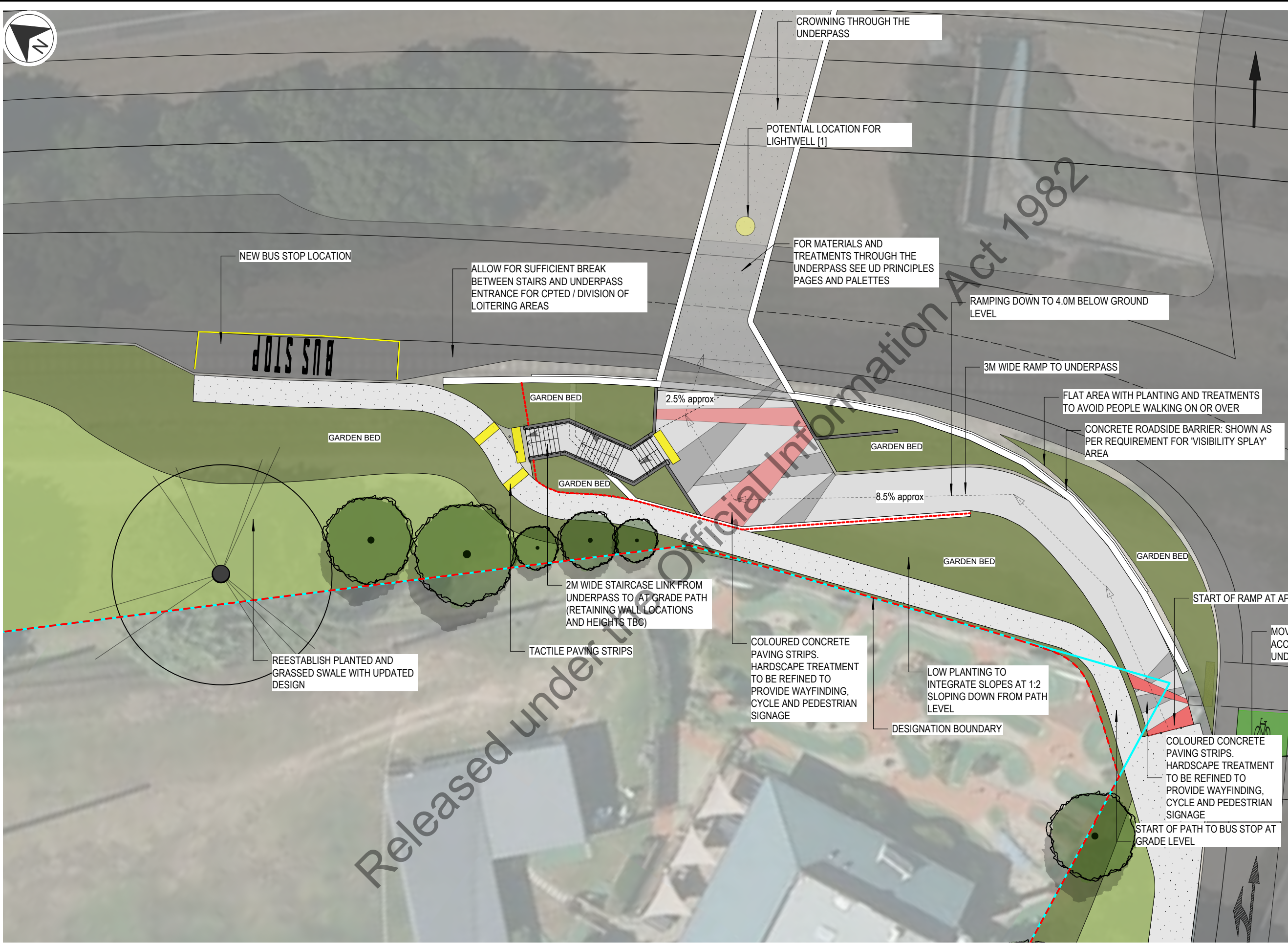
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1:250@ A3	0	2	4	6	8 10 12



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: TR
 DESIGNER: JW
 DRAWING CHECK: JW
 DESIGN REVIEW: AW
 APPROVED: 08/03/19

TITLE: UNDERPASS NORTH CONCEPT PLAN SHEET 1 OF 2
 DRAWING No: B2B-DRG-LA-UP-101
 REV: A



- LEGEND**
- PROPOSED GRASS
 - PROPOSED PLANTING
 - BRUSHED CONCRETE
 - SANDBLASTED CONCRETE/ EXPOSED AGGREGATE
 - COLOURED CONCRETE
 - TREES - PROPOSED SPECIMEN GRADE
 - TREES - EXISTING TO BE RETAINED
 - LANDSCAPE BOUNDARY
 - PROJECT DESIGNATION

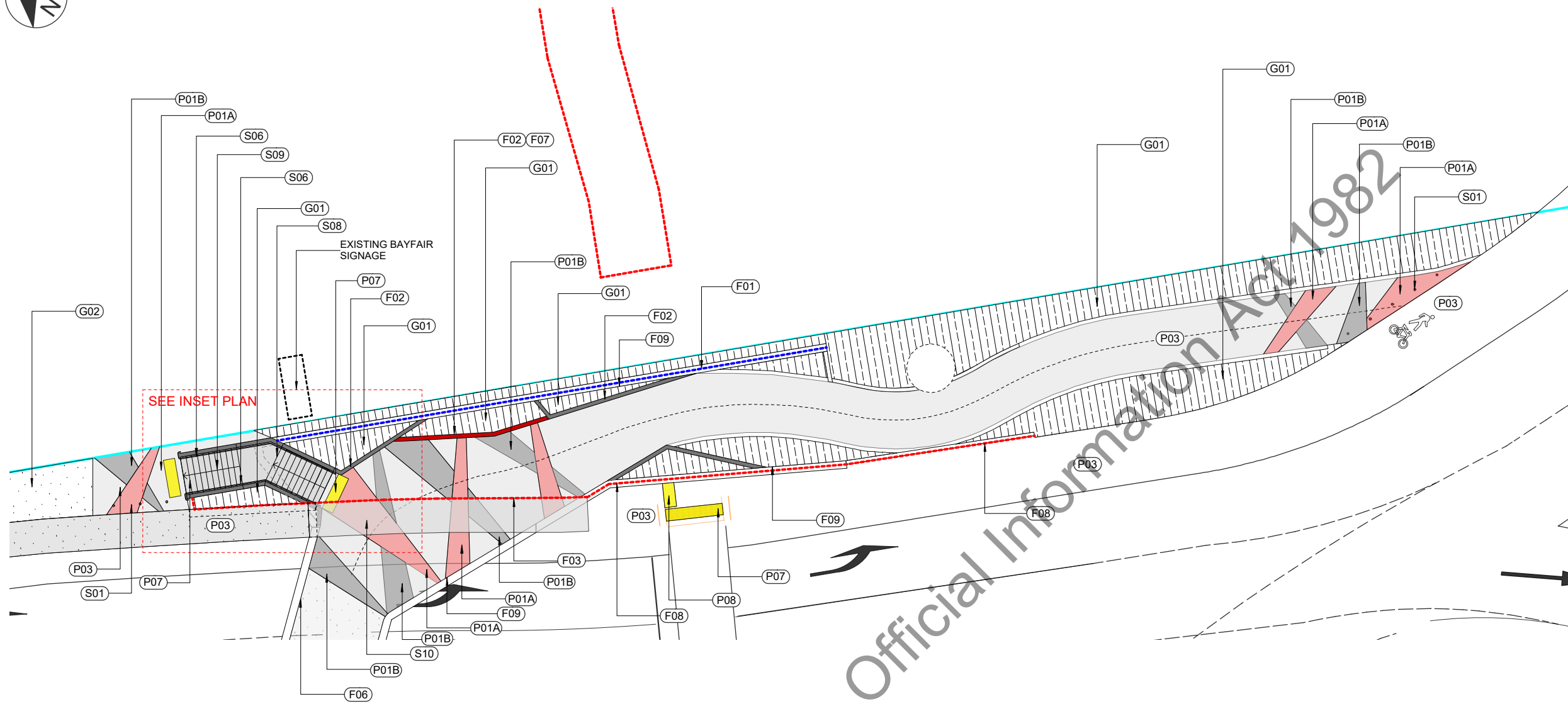
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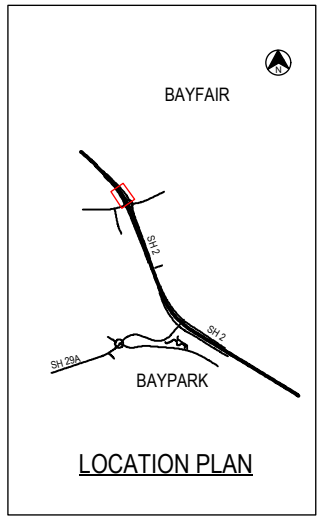
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 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: TR
 DESIGN REVIEW: JW
 APPROVED: 08/03/19

TITLE: UNDERPASS SOUTH CONCEPT PLAN SHEET 2 OF 2
 DRAWING No: B2B-DRG-LA-UP-102
 REV: A



SEE INSET PLAN



LEGEND

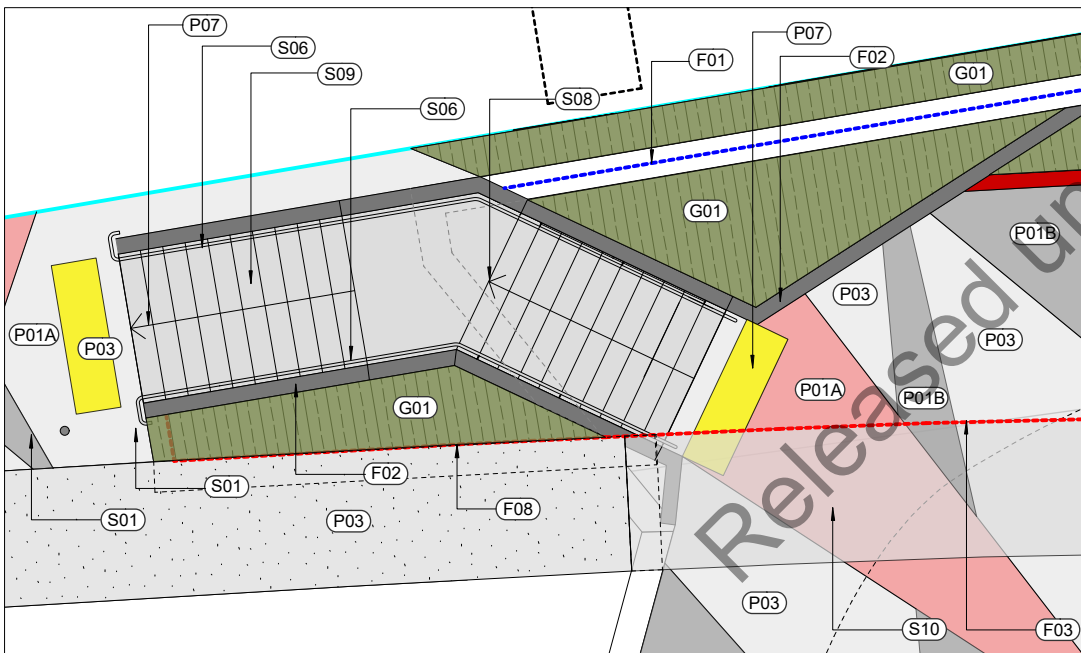
- P - SURFACES
- P01A - INSITU CONCRETE - RASPBERRY
- P01B - INSITU CONCRETE - CHARCOAL
- P01C - INSITU CONCRETE - GREY
- P01D - INSITU CONCRETE - PLAIN
- P07 - TGSi WARNING INDICATOR
- P08 - TGSi DIRECTIONAL INDICATOR
- D10 - DETERRENT PAVING

- S01 - BOLLARDS
- S06 - HANDRAIL
- S07 - SKATE BOARD DETERRANTS
- S08 - STAIR NOSING
- S09 - PRE-CAST CONCRETE STAIRS
- S10 - PRE-CAST CONCRETE BRIDGE

- F01 - SAFETY FENCING
- F02 - RAISED PLANTER WALL
- F03 - BRIDGE FENCING
- F04 - BRIDGE WALL / FENCING / GAURDRAIL
- F05 - RETAINING WALL INSERT PANELS
- F06 - WALL PAINT - WHITE
- F07 - WALL PAINT - RED
- F08 - DESIGNER FENCING
- F09 - RETAINING WALL RELIEF PATTERNING

- G / T / G - VEGETATION
- G01 - GARDEN BED STANDARD
- G02 - HYDROSEED GRASS
- T01 - PROPOSED TREE
- T04 - EXISTING TREE TO REMAIN

- PROJECT DESIGNATION



SCALE 1:100@A3

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. DESIGNATION BOUNDARY PROVIDED BY CPB. THE LANDSCAPING APPLIED TO EDGE OF ROAD IN ORDER TO ALIGN WITH THE GEOMETRICS PACKAGE (JACOBS).

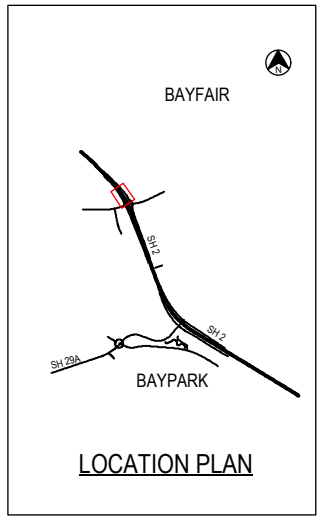
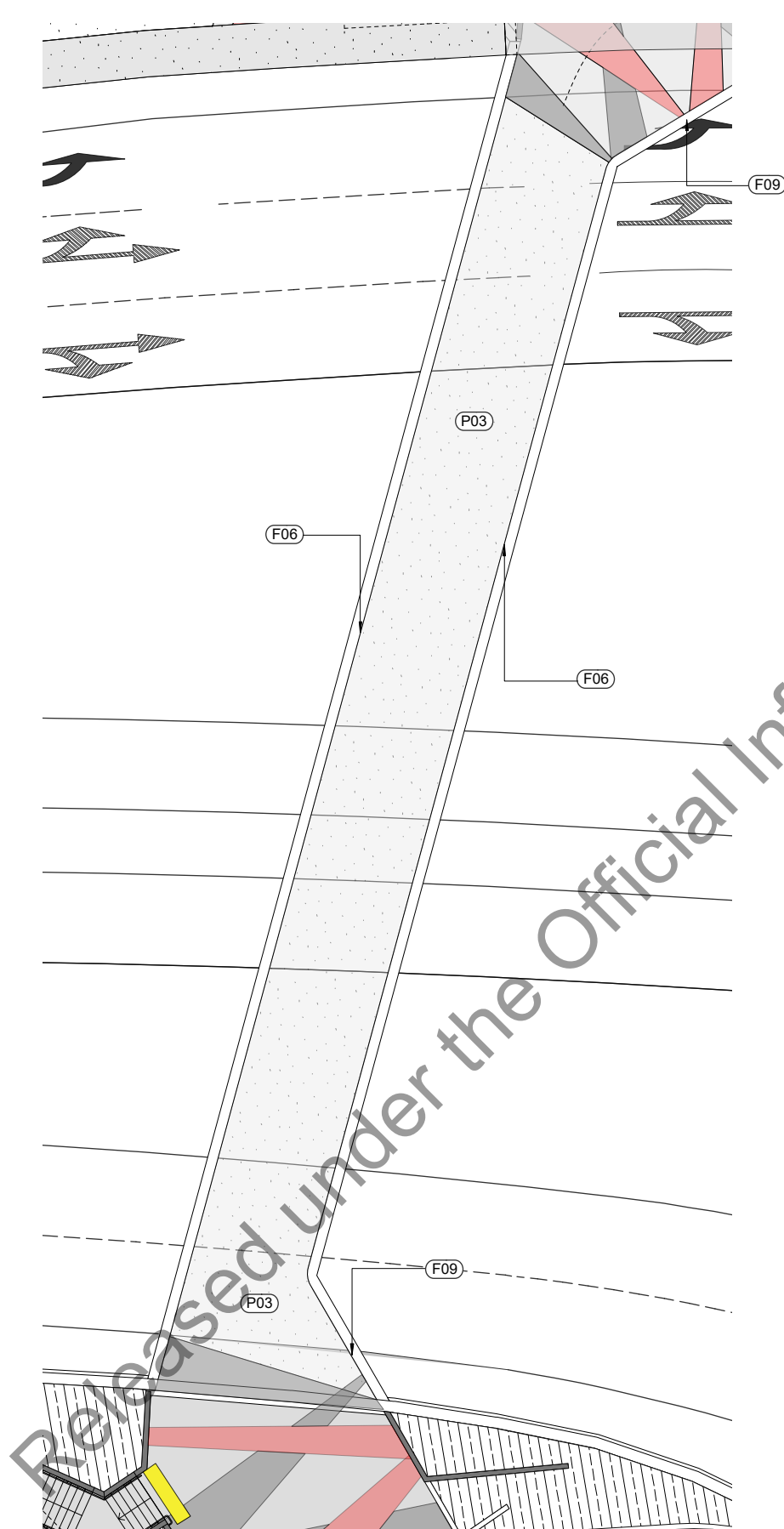
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SCALE 1:250 (A3)
 STATUS 50% ISSUE
 PROJECT NUMBER 2/09-024/603

CLIENT NZ TRANSPORT AGENCY
 PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN TR
 DESIGNED JW
 DRAWING CHECK JW
 DESIGN REVIEW AW
 APPROVED 08/03/19

TITLE UNDERPASS NORTH GENERAL ARRANGMENT PLAN SHEET 1 OF 2
 DRAWING No B2B-DRG-LA-UP-110
 REV A



LEGEND

- P - SURFACES
 - P01A - INSITU CONCRETE - RASPBERRY
 - P01B - INSITU CONCRETE - CHARCOAL
 - P01C - INSITU CONCRETE - GREY
 - P01D - INSITU CONCRETE - PLAIN
 - P07 - TGS1 WARNING INDICATOR
 - P08 - TGS1 DIRECTIONAL INDICATOR
 - D10 - DETERRENT PAVING
- S01 - BOLLARDS
- S06 - HANDRAIL
- S07 - SKATE BOARD DETERRANTS
- S08 - STAIR NOSING
- S09 - PRE-CAST CONCRETE STAIRS
- S10 - PRE-CAST CONCRETE BRIDGE
- F01 - SAFETY FENCING
- F02 - RAISED PLANTER WALL
- F03 - BRIDGE FENCING
- F04 - BRIDGE WALL / FENCING / GAURDRAIL
- F05 - RETAINING WALL INSERT PANELS
- F06 - WALL PAINT - WHITE
- F07 - WALL PAINT - RED
- F08 - DESIGNER FENCING
- F09 - RETAINING WALL RELIEF PATTERNING
- G / T / G - VEGETATION
 - G01 - GARDEN BED STANDARD
 - G02 - HYDROSEED GRASS
 - T01 - PROPOSED TREE
 - T04 - EXISTING TREE TO REMAIN
- PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. DESIGNATION BOUNDARY PROVIDED BY CPB. THE LANDSCAPING APPLIED TO EDGE OF ROAD IN ORDER TO ALIGN WITH THE GEOMETRICS PACKAGE (JACOBS).

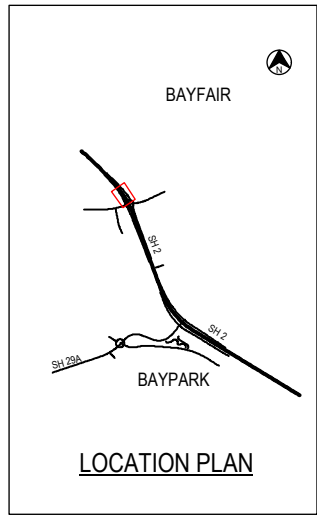
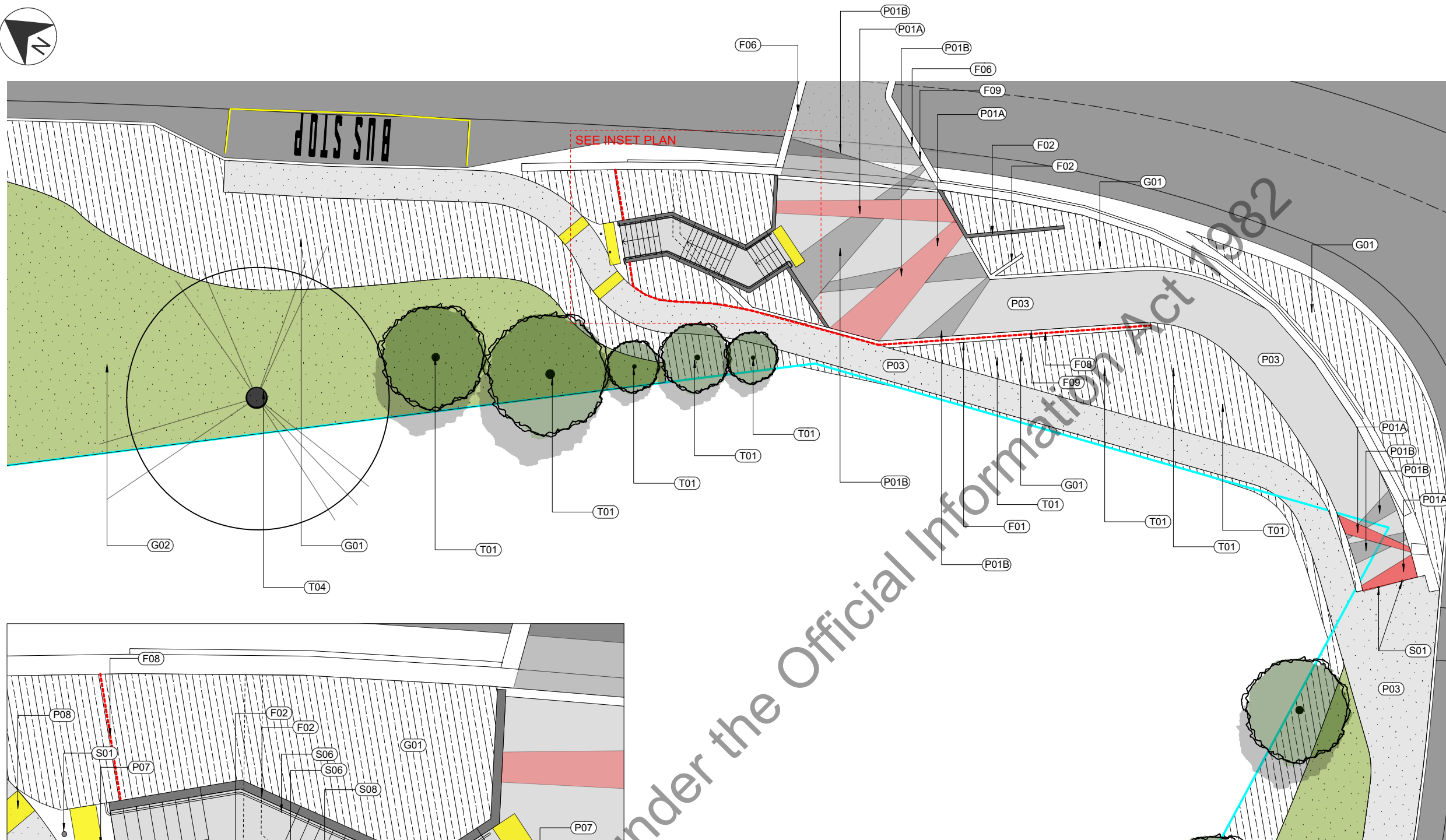
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1:250@ A3	0	2	4	6	8 10 12 m



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	TR	DRAWING CHECK	APPROVED
DESIGNED	JW	DESIGN REVIEW	AW
			08/03/19

TITLE	UNDERPASS TUNNEL GENERAL ARRANGMENT PLAN SHEET 2 OF 3		
DRAWING No	B2B-DRG-LA-UP-120		REV A



LEGEND

- P - SURFACES
- P01A - INSITU CONCRETE - RASPBERRY
- P01B - INSITU CONCRETE - CHARCOAL
- P01C - INSITU CONCRETE - GREY
- P01D - INSITU CONCRETE - PLAIN
- P07 - TCSI WARNING INDICATOR
- P08 - TCSI DIRECTIONAL INDICATOR
- D10 - DETERRENT PAVING

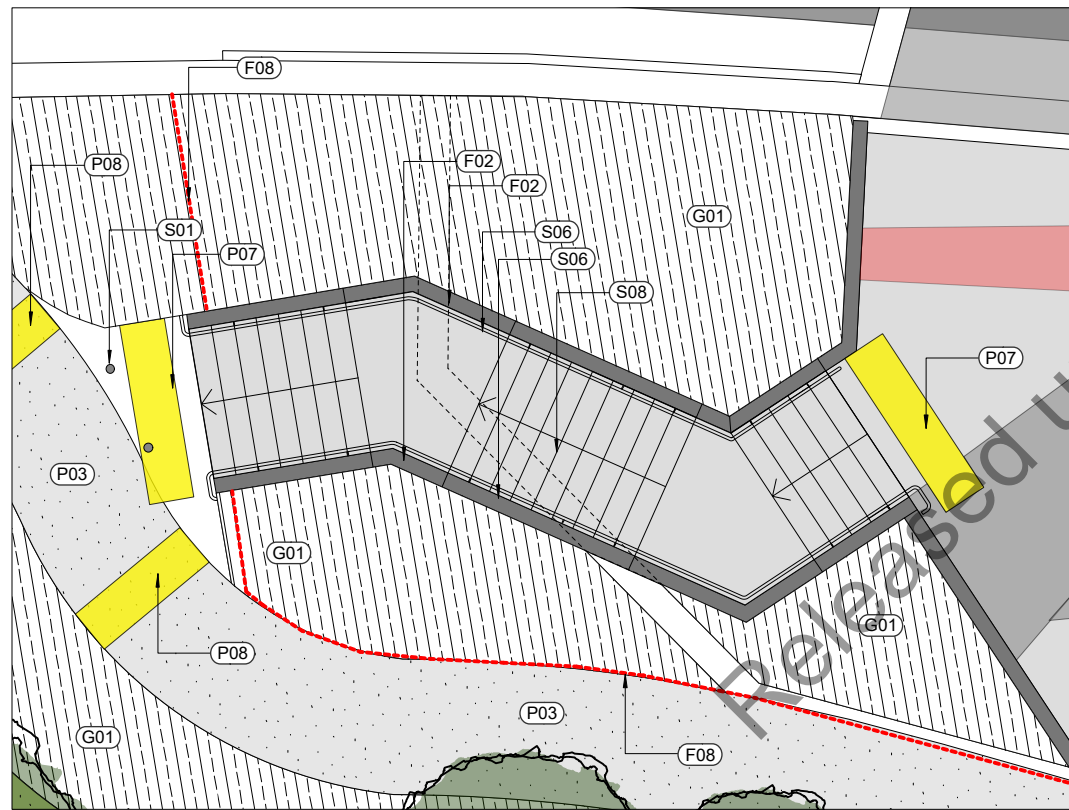
- S01 - BOLLARDS
- S06 - HANDRAIL
- S07 - SKATE BOARD DETERRANTS
- S08 - STAIR NOSING
- S09 - PRE-CAST CONCRETE STAIRS
- S10 - PRE-CAST CONCRETE BRIDGE

- F01 - SAFETY FENCING
- F02 - RAISED PLANTER WALL
- F03 - BRIDGE FENCING
- F04 - BRIDGE WALL / FENCING / GAURDRAIL
- F05 - RETAINING WALL INSERT PANELS
- F06 - WALL PAINT - WHITE
- F07 - WALL PAINT - RED
- F08 - DESIGNER FENCING
- F09 - RETAINING WALL RELIEF PATTERNING

- G / T / G - VEGETATION
- G01 - GARDEN BED STANDARD
- G02 - HYDROSEED GRASS
- T01 - PROPOSED TREE
- T04 - EXISTING TREE TO REMAIN
- LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. DESIGNATION BOUNDARY PROVIDED BY CPB. THE LANDSCAPING APPLIED TO EDGE OF ROAD IN ORDER TO ALIGN WITH THE GEOMETRICS PACKAGE (JACOBS).



SCALE 1:100@A3

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES

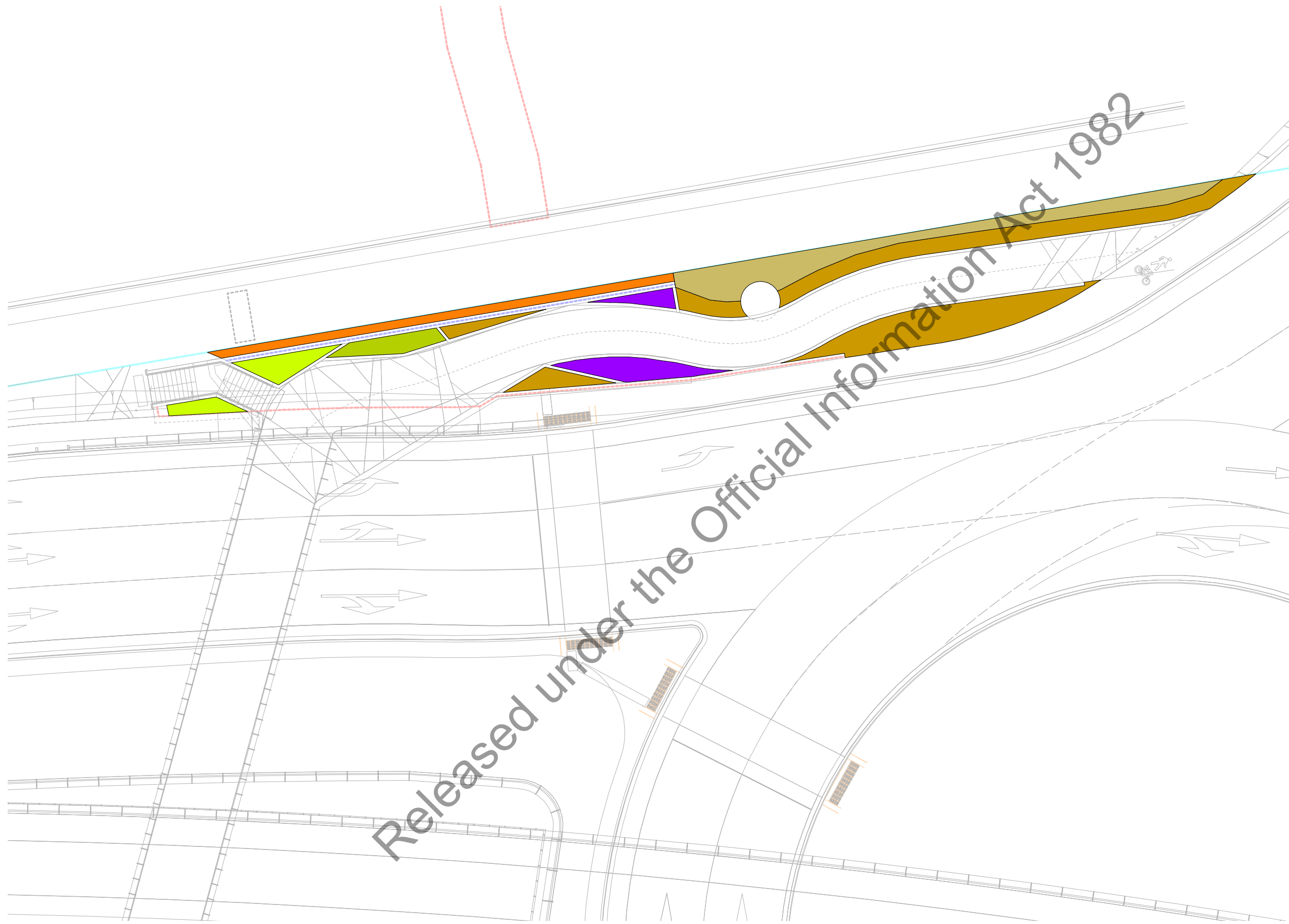
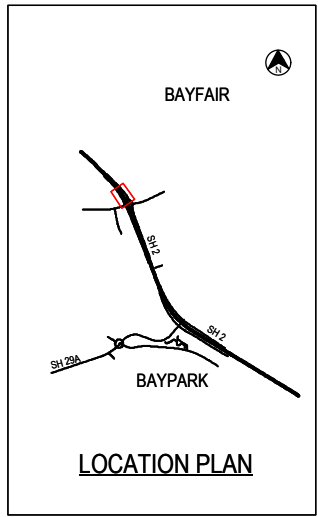
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1:250@A3



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 TR
DESIGNED JW
DRAWING CHECK JW
DESIGN REVIEW AW
APPROVED 08/03/19

TITLE UNDERPASS SOUTH GENERAL ARRANGEMENT PLAN SHEET 3 OF 3
DRAWING No B2B-DRG-LA-UP-130
REV A



Released under the Official Information Act 1982

LEGEND

- UNDERPASS PLANTING**
- ASB - *Astelia banksii*
WHARAWHARA
 - AF - *Astelia fragrans*
BUSH LILY
 - CV - *Carex virgata*
PUKIO
 - CF - *Chionochloa flavicans*
DWARF TOETOE
 - CR - *Chionochloa rubra*
RED TUSSOCK
 - CA - *Coprosma acerosa*
GROUNDCOVER COPROSMA
 - DN - *Dianella nigra*
TURUTURU
 - LP - *Libertia peregrianas*
MIKOIKOI/ NZ IRIS
 - MA - *Muehlenbeckia axillaris*
CREEPING WIRE VINE
- TREES - PROPOSED
SPECIMEN GRADE
 - TREES - EXISTING TO
BE RETAINED
 - LANDSCAPE BOUNDARY
 - PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-UP-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. FOR UNDERPASS DETAILED PLANT SCHEDULE REFER TO DRAWING B2B-DRG-LA-UP-060.
3. FOR NON-UNDERPASS PLANTING TYPES REFER TO LANDSCAPE PLANTING PLAN PACKAGE, DRAWING B2B-DRG-LA-1102 TO B2B-DRG-LA-1106. FOR PLANT SCHEDULE REFER TO DRAWING B2B-DRG-LA-5000 AND 5001.

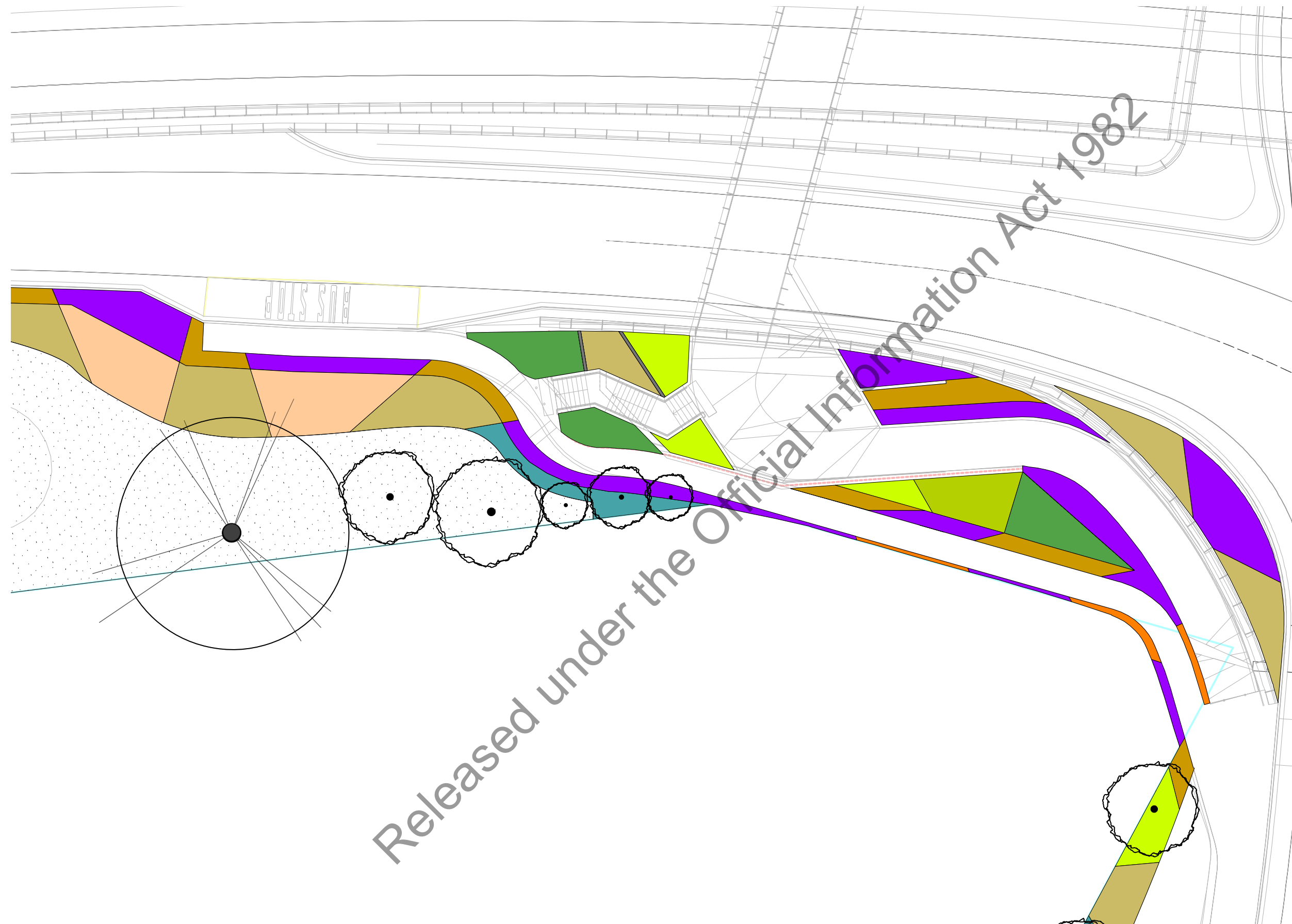
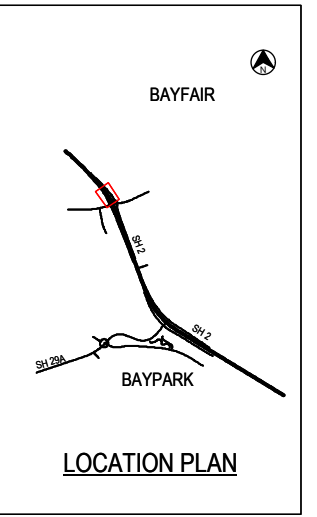
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES



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: TR
 DRAWING CHECK: JW
 APPROVED: 08/03/19
 DESIGNED: JW
 DESIGN REVIEW: AW

TITLE: UNDERPASS NORTH PLANTING PLAN SHEET 1 OF 2
 DRAWING No: B2B-DRG-LA-UP-310
 REV: A



LEGEND

- UNDERPASS PLANTING**
- ASB - *Astelia banksii*
WHARAWHARA
 - AF - *Astelia fragrans*
BUSH LILY
 - CV - *Carex virgata*
PUKIO
 - CF - *Chionochloa flavicans*
DWARF TOETOE
 - CR - *Chionochloa rubra*
RED TUSSOCK
 - CA - *Coprosma acerosa*
GROUNDCOVER COPROSMA
 - DN - *Dianella nigra*
TURUTURU
 - LP - *Libertia peregrianans*
MIKOIKOI/ NZ IRIS
 - MA - *Muehlenbeckia axillaris*
CREEPING WIRE VINE
- TREES - PROPOSED
SPECIMEN GRADE
 - TREES - EXISTING TO
BE RETAINED
 - LANDSCAPE BOUNDARY
 - PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-UP-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. FOR UNDERPASS DETAILED PLANT SCHEDULE REFER TO DRAWING B2B-DRG-LA-UP-060.
3. FOR NON-UNDERPASS PLANTING TYPES REFER TO LANDSCAPE PLANTING PLAN PACKAGE, DRAWING B2B-DRG-LA-1102 TO B2B-DRG-LA-1106. FOR PLANT SCHEDULE REFER TO DRAWING B2B-DRG-LA-5000 AND 5001.

Released under the Official Information Act 1982

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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1:250@ A3					

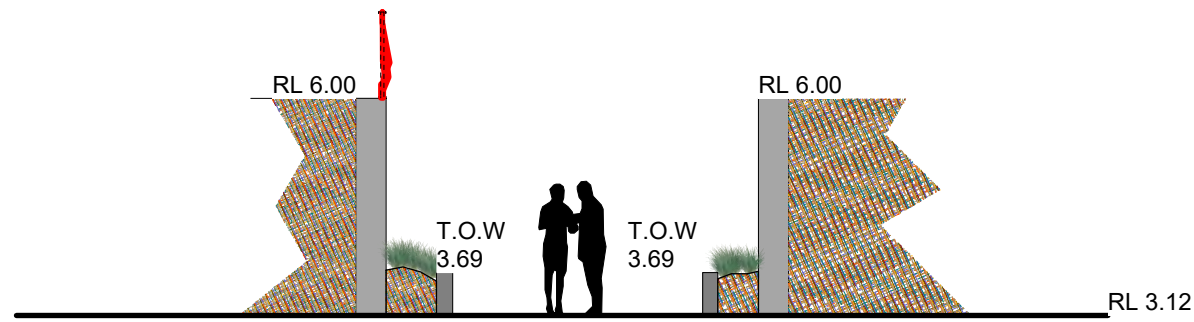


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 PROJECT NUMBER: 2/09-024/603

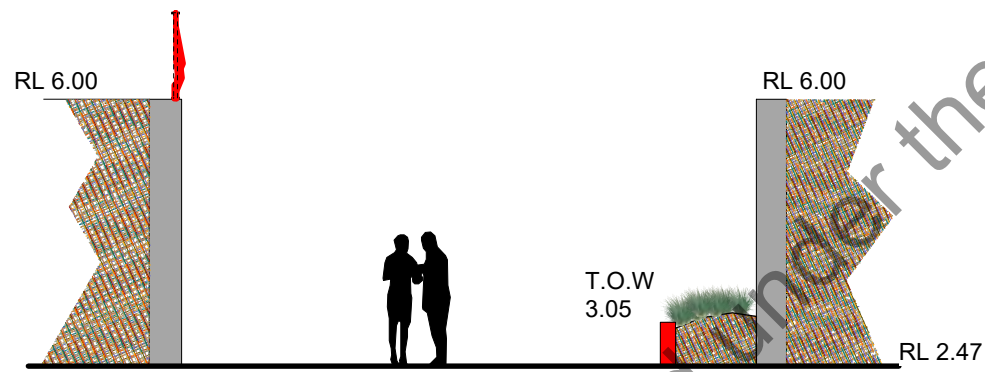
CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: TR
 DESIGNED: JW
 DRAWING CHECK: JW
 DESIGN REVIEW: AW
 APPROVED: 08/03/19

TITLE: UNDERPASS SOUTH PLANTING PLAN SHEET 1 OF 1

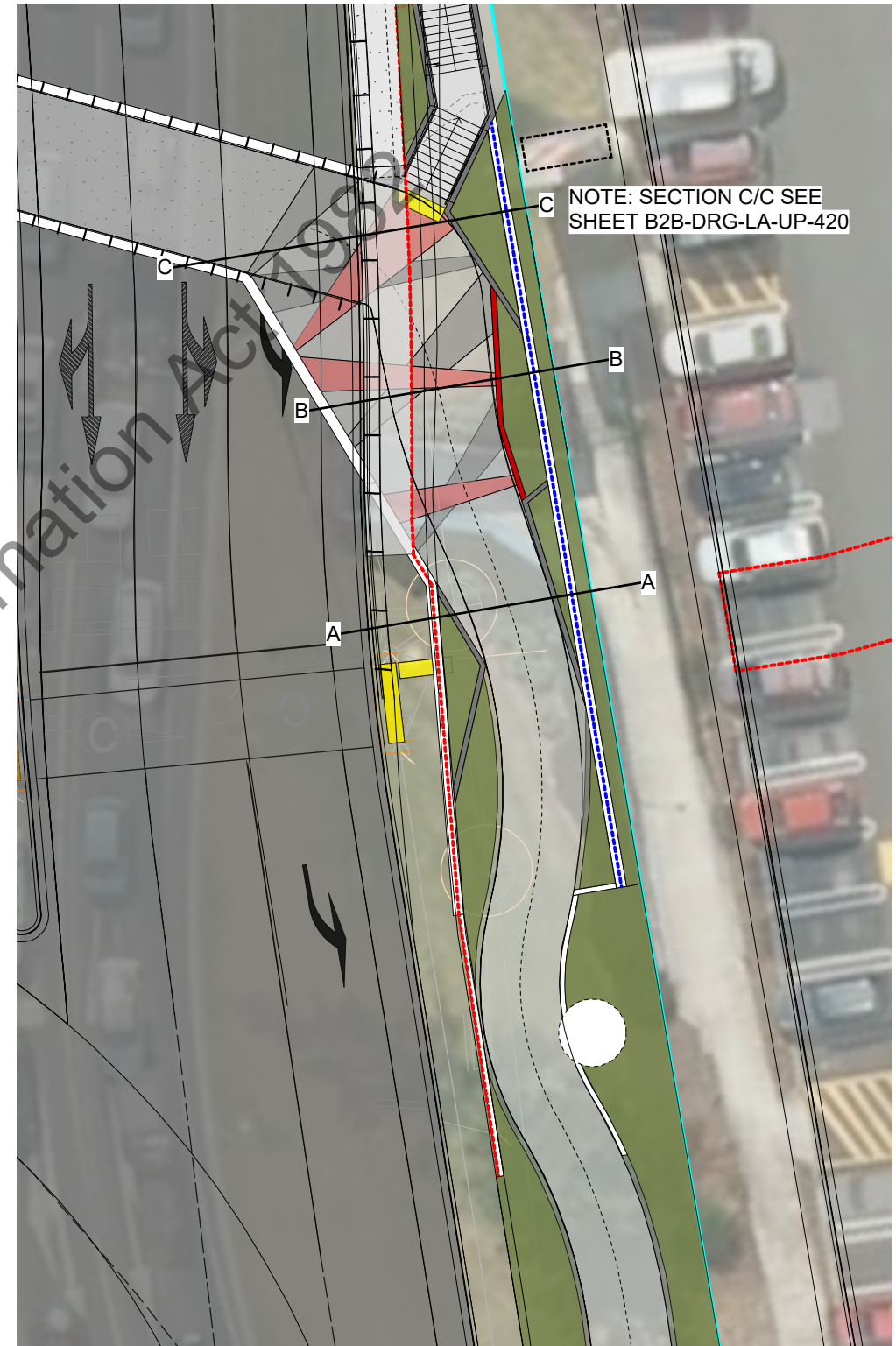
DRAWING No: B2B-DRG-LA-UP-320 REV: A



UNDERPASS NORTH ENTRANCE - SECTION A-A
SCALE 1:100



UNDERPASS NORTH ENTRANCE - SECTION B-B
SCALE 1:100



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No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES

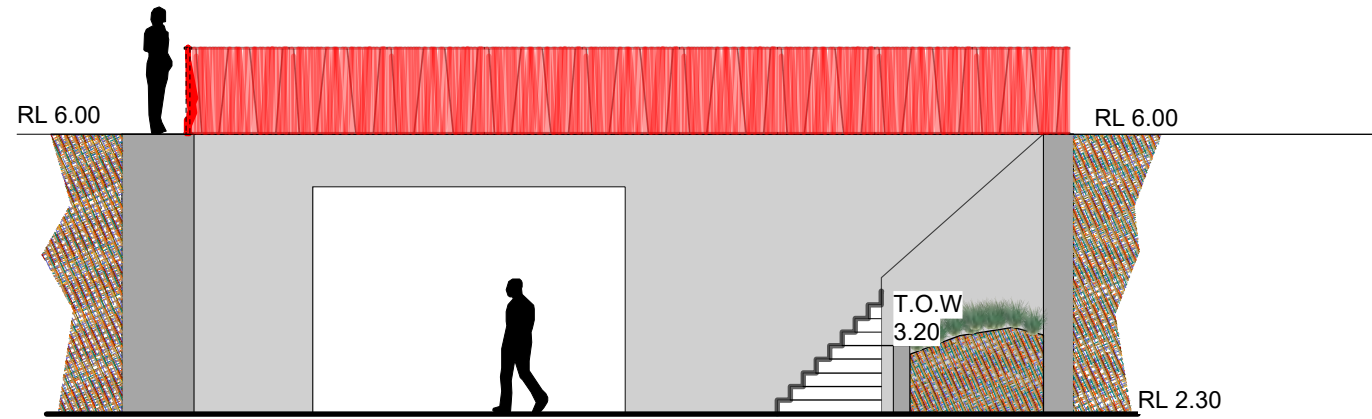
1:50 @ A1 [|||||]
1:100 @ A3 [|||||] 0 1 2 3 4 5 m



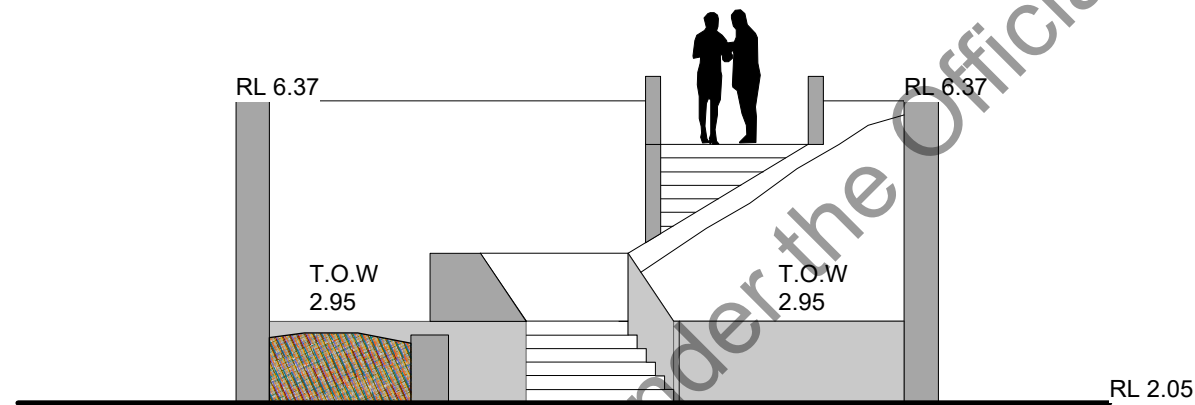
SCALE	1:100 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY		
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)		
DRAWN	TR	DRAWING CHECK	APPROVED
DESIGNED	JW	DESIGN REVIEW	AW
			08/03/19

TITLE	UNDERPASS SECTIONS SHEET 1 OF 2	
DRAWING No	B2B-DRG-LA-UP-410	REV A



UNDERPASS NORTH ENTRANCE - SECTION C-C
SCALE 1:100



UNDERPASS SOUTH ENTRANCE - SECTION C-C
SCALE 1:100



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No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES

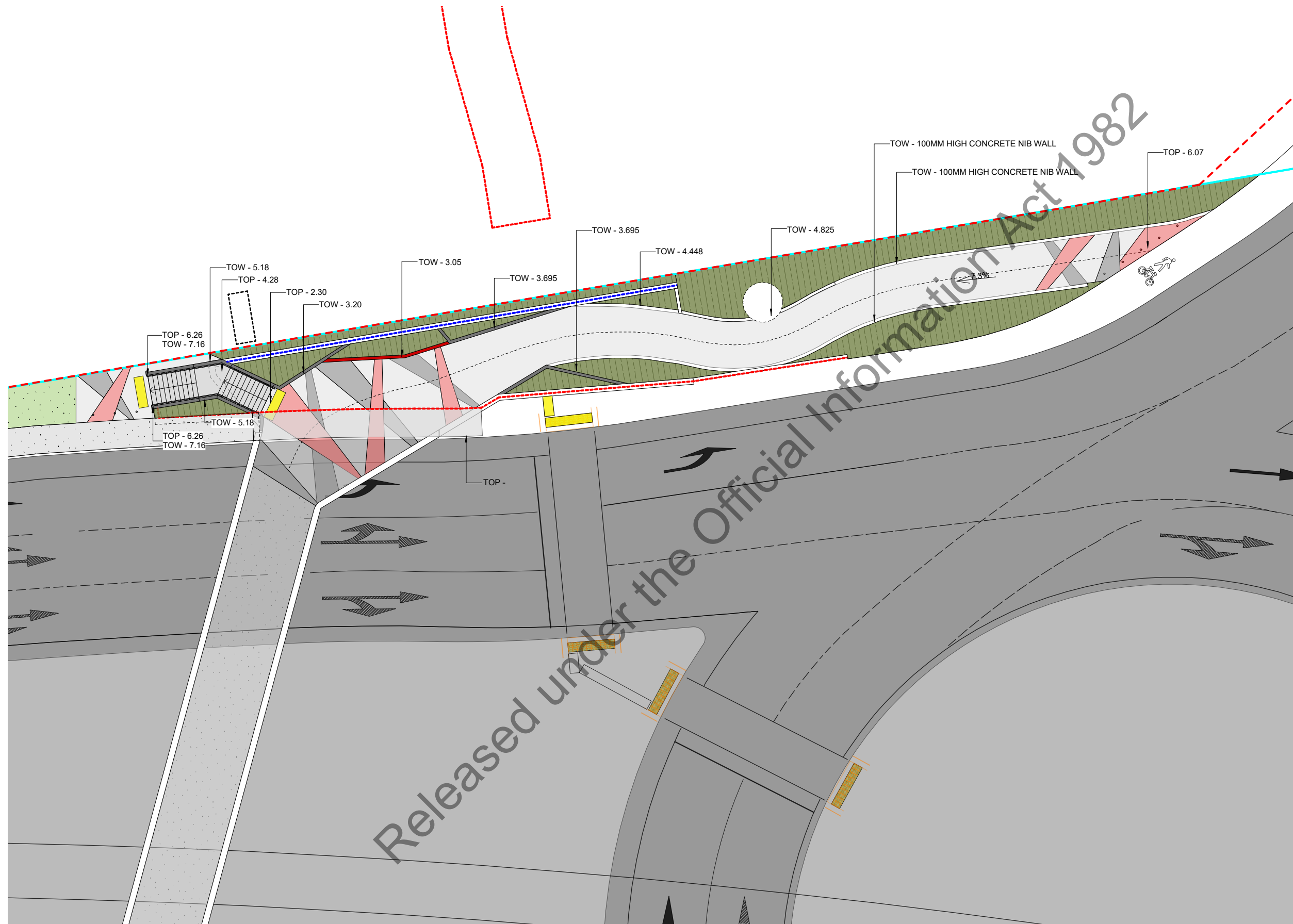
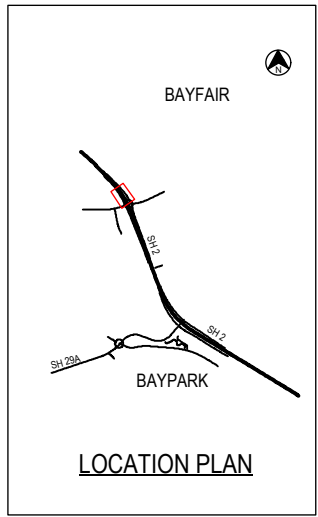
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1:100@ A3 0 1 2 3 4 5 m



SCALE	1:00 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY		
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)		
DRAWN	TR	DRAWING CHECK	APPROVED
DESIGNED	JW	DESIGN REVIEW	AW
			08/03/19

TITLE	UNDERPASS SSECTIONS SHEET 2 OF 2	
DRAWING No	B2B-DRG-LA-UP-420	REV A



LEGEND

- EX - EXISTING LEVEL
- TOL - TOP OF LIGHT
- TOP - TOP OF PAVING
- TOW - TOP OF WALL
- TOS - TOP OF STEP
- TOG - TOP OF GULLY / GRATE
- FGL - FINISHED GROUND LEVEL
- CHANGE IN GRADIENT
- 1:100 GRADIENT OF FALL
- TOP OF BATTER
- ◇ DRAIN GRATE
- - - LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. DESIGNATION BOUNDARY PROVIDED BY CPB. THE LANDSCAPING APPLIED TO EDGE OF ROAD IN ORDER TO ALIGN WITH THE GEOMETRICS PACKAGE (JACOBS).

No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES
1:125@ A1					
1:250@ A3	0	2	4	6	8 10 12 m



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 TR

DESIGNED JW

DRAWING CHECK JW

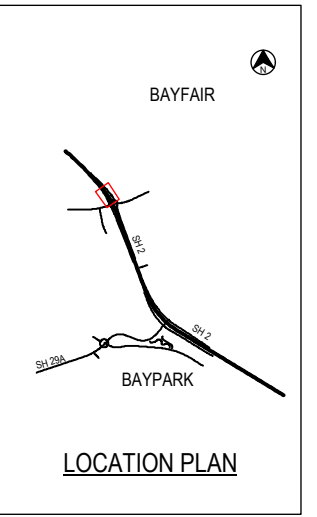
DESIGN REVIEW AW

APPROVED 08/03/19

TITLE UNDERPASS NORTH LEVELS PLAN SHEET 1 OF 2

DRAWING No B2B-DRG-LA-UP-710

REV A



LEGEND

- EX - EXISTING LEVEL
- TOL - TOP OF LIGHT
- TOP - TOP OF PAVING
- TOW - TOP OF WALL
- TOS - TOP OF STEP
- TOG - TOP OF GULLY / GRATE
- FGL - FINISHED GROUND LEVEL

- - - CHANGE IN GRADIENT
- 1:100 GRADIENT OF FALL
- - - TOP OF BATTER
- ◇ DRAIN GRATE
- - - LANDSCAPE BOUNDARY
- PROJECT DESIGNATION

NOTES

1. REFER TO KEY NOTES/ LEGEND DRAWING B2B-DRG-LA-MG-050 FOR SPECIFICATIONS AND REFERENCE DETAILS FOR OTHER RELEVANT PACKAGES.
2. DESIGNATION BOUNDARY PROVIDED BY CPB. THE LANDSCAPING APPLIED TO EDGE OF ROAD IN ORDER TO ALIGN WITH THE GEOMETRICS PACKAGE (JACOBS).

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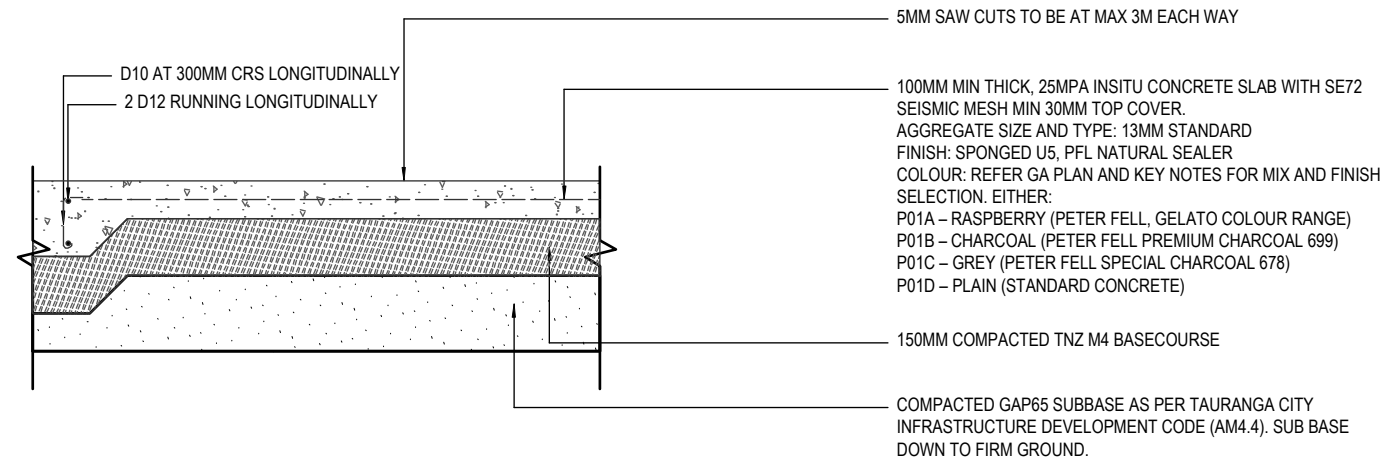
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1:250@ A3					



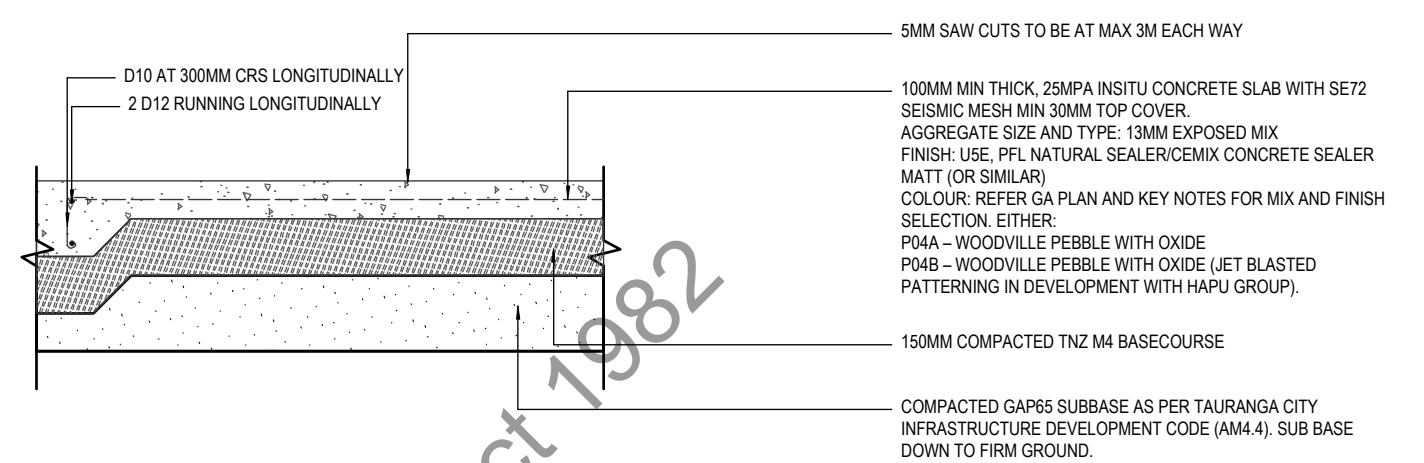
SCALE: 1:250 (A3)
 STATUS: 50% ISSUE
 PROJECT NUMBER: 2/09-024/603

CLIENT: NZ TRANSPORT AGENCY
 PROJECT: BAYPARK TO BAYFAIR LINK (BAY LINK)
 DRAWN: TR
 DESIGNED: JW
 DRAWING CHECK: JW
 DESIGN REVIEW: AW
 APPROVED: 08/03/19

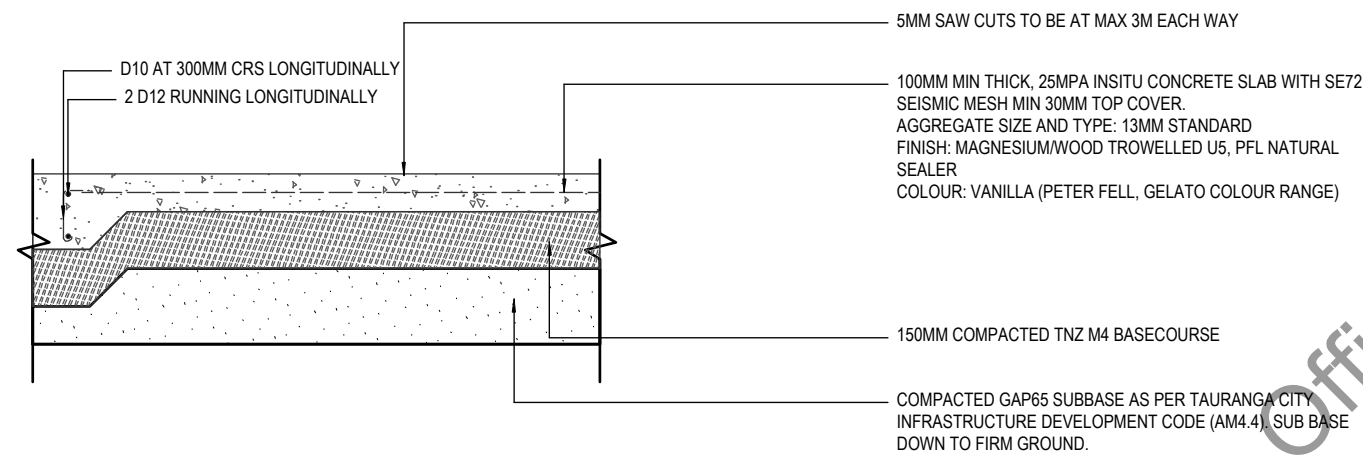
TITLE: UNDERPASS SOUTH LEVELS PLAN SHEET 1 OF 2
 DRAWING No: B2B-DRG-LA-UP-720
 REV: A



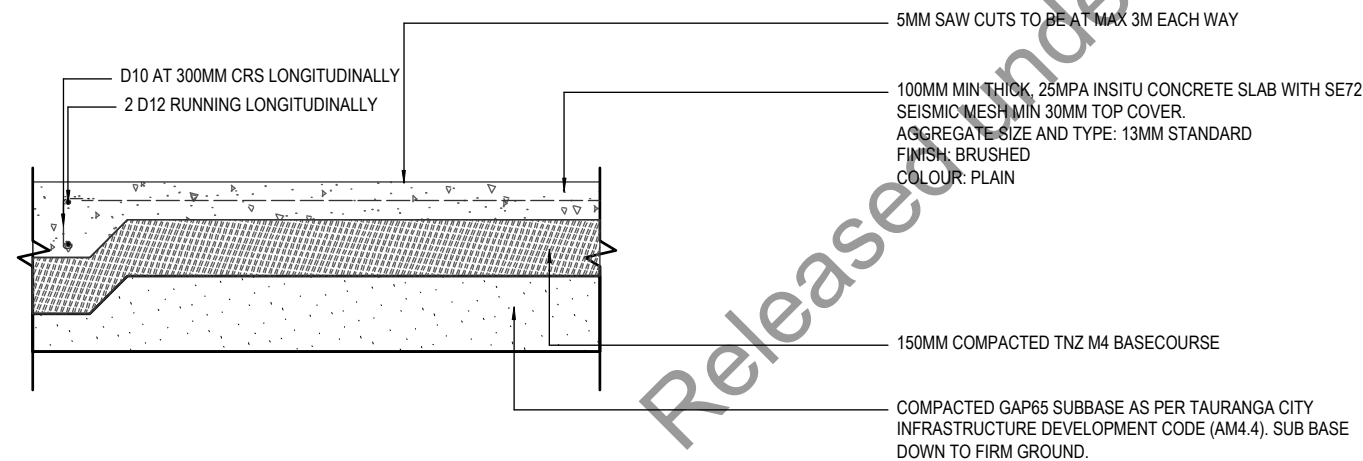
P01: INSITU CONCRETE - SPONGED FINISH DETAIL (A)
SCALE 1:20



P04: INSITU CONCRETE - EXPOSED AGGREGATE DETAIL (D)
SCALE 1:20



P02: INSITU CONCRETE - TROWELLED FINISH DETAIL (B)
SCALE 1:20



P03: INSITU CONCRETE - BRUSHED FINISH DETAIL (C)
SCALE 1:20

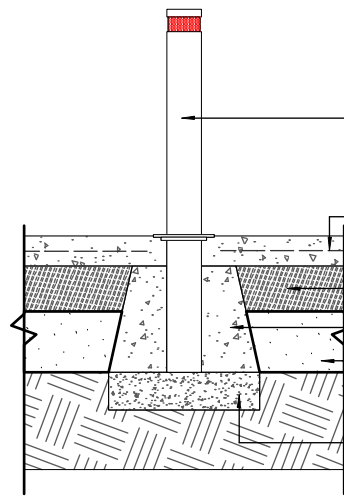
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SCALE	AS SHOWN (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY	
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)	
DRAWN	TR	DRAWING CHECK
DESIGNED	JW	AW
APPROVED	08/03/19	

TITLE	UNDERPASS DETAILS - SURFACES SHEET 1 OF 1	
DRAWING No	B2B-DRG-LA-UP-800	REV
		A



- 114MM Ø 316 STAINLESS STEEL B2 REMOVABLE BOLLARD WITH REFLECTOR
MANUFACTURER: BOLLARDS NZ OR SIMILAR APPROVED
- REFER TO DRAWING B2B-DRG-LA-MG-103 FOR SURROUNDING SURFACE MATERIAL FINISH.
- 150MM COMPACTED TNZ M4 BASECOURSE
- CONCRETE FOOTING TO MANUFACTURERS SPECIFICATION
- COMPACTED GAP65 SUBBASE AS PER TAURANGA CITY INFRASTRUCTURE DEVELOPMENT CODE (AM4.4). SUB BASE DOWN TO FIRM GROUND.
- DRY MIX CONCRETE BASE TO MANUFACTURERS SPECIFICATION

S01: TYPICAL REMOVABLE BOLLARD DETAIL (A)
SCALE 1:25

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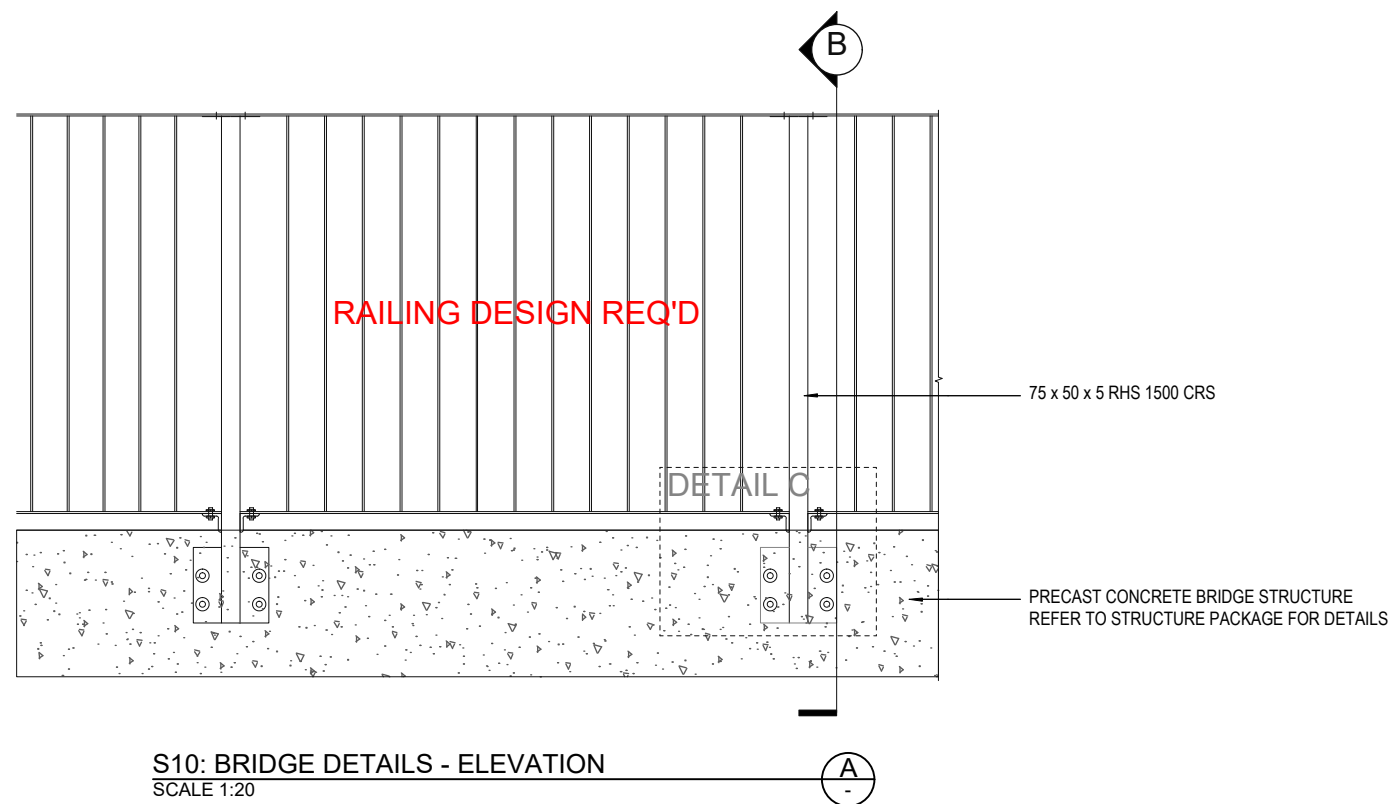
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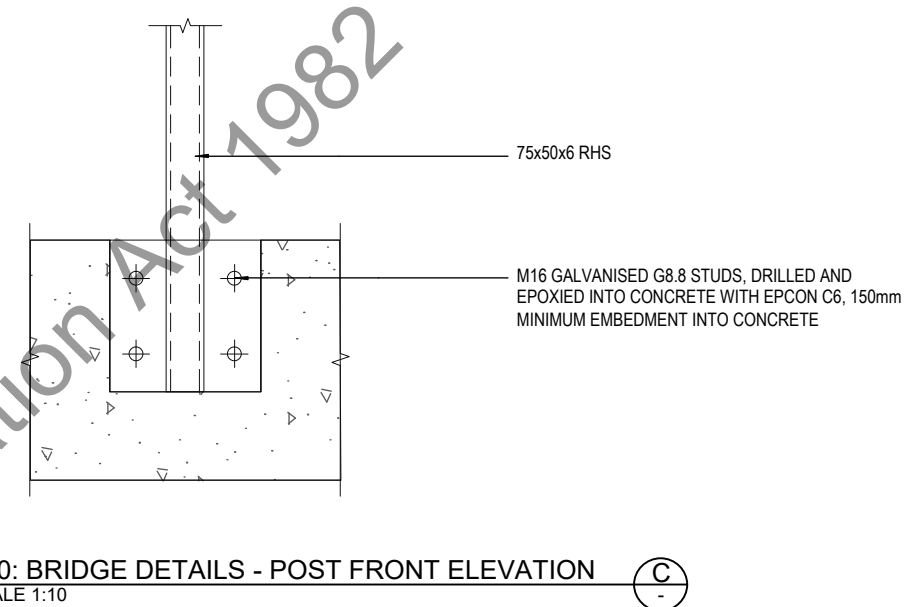
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STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY	
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)	
DRAWN	TR	DRAWING CHECK
DESIGNED	JW	DESIGN REVIEW
		AW
APPROVED	08/03/19	

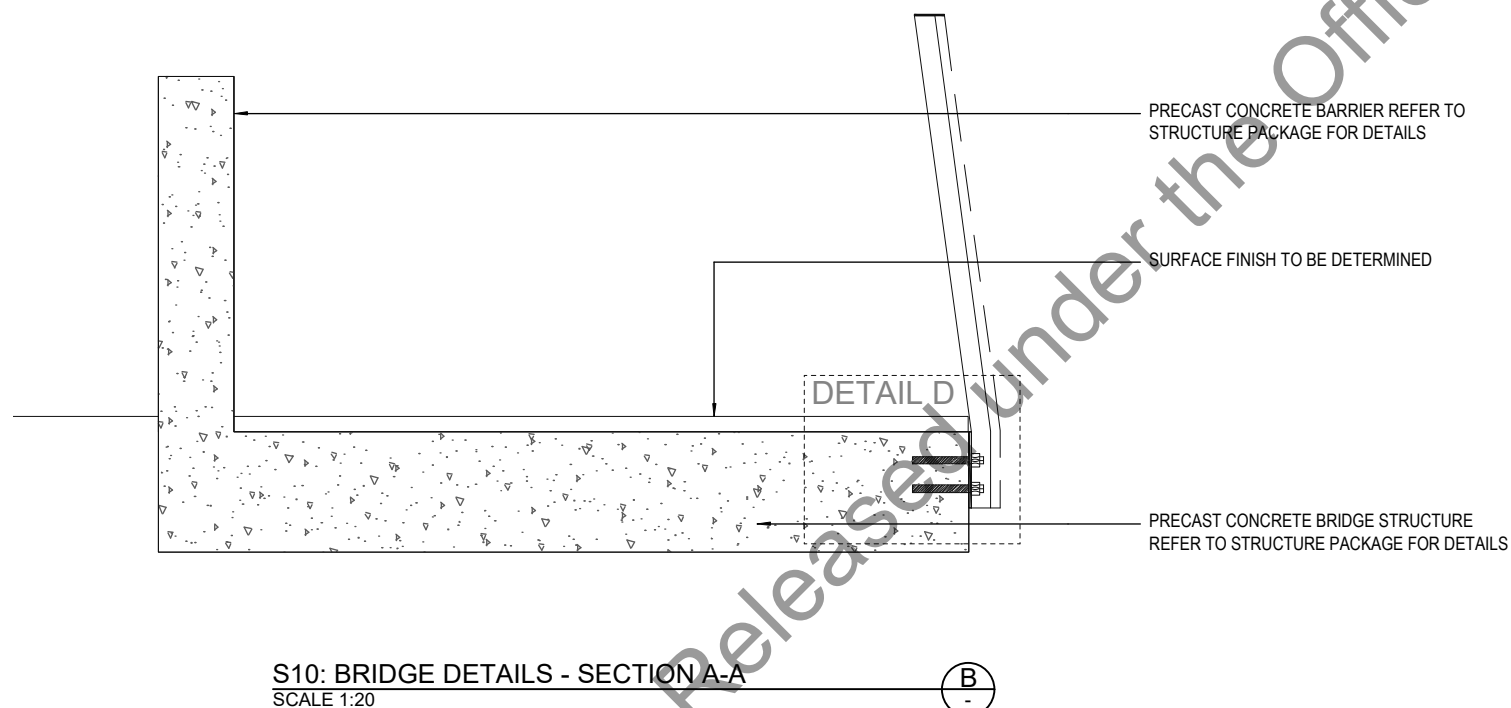
TITLE	UNDERPASS DETAILS - STREET FURNITURE AND STRUCTURES SHEET 1 OF 1
DRAWING No	B2B-DRG-LA-UP-810
REV	A



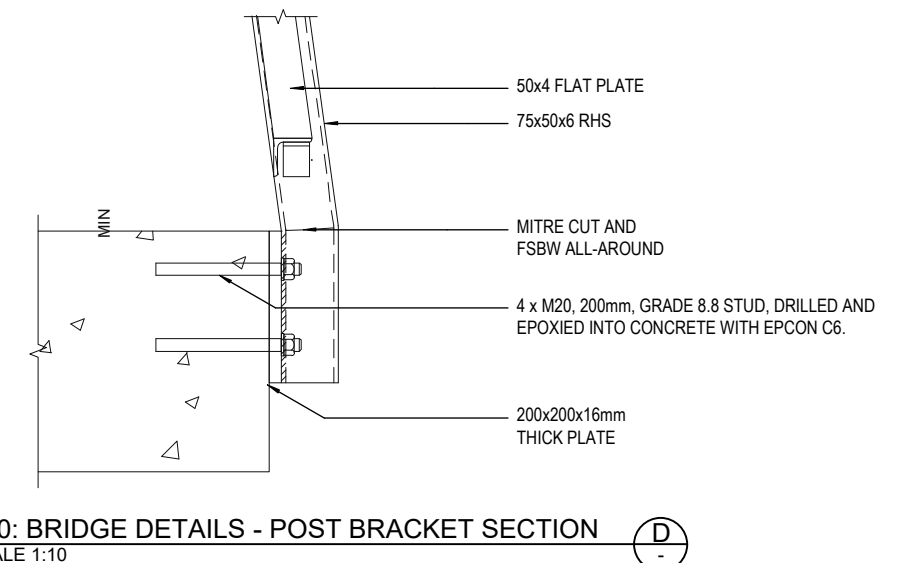
S10: BRIDGE DETAILS - ELEVATION
SCALE 1:20



S10: BRIDGE DETAILS - POST FRONT ELEVATION
SCALE 1:10



S10: BRIDGE DETAILS - SECTION A-A
SCALE 1:20



S10: BRIDGE DETAILS - POST BRACKET SECTION
SCALE 1:10

Released under the Official Information Act 1982

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES



SCALE
AS SHOWN (A3)

STATUS
50% ISSUE

PROJECT NUMBER
2/09-024/603

CLIENT
NZ TRANSPORT AGENCY

PROJECT
BAYPARK TO BAYFAIR LINK (BAY LINK)

DRAWN
TR

DRAWING CHECK
JW

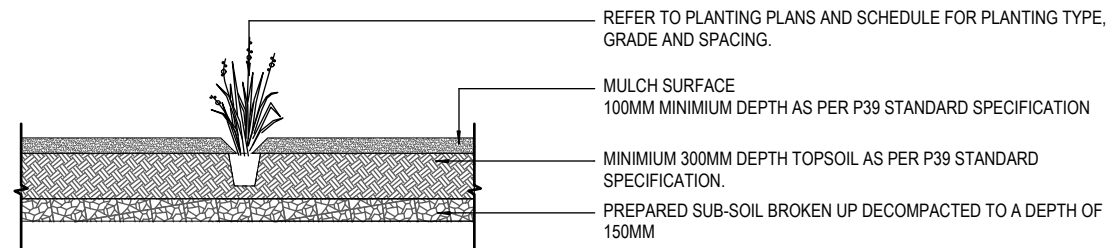
APPROVED
AW

08/03/19

TITLE
UNDERPASS DETAILS-FENCES AND WALLS
SHEET 1 OF 1

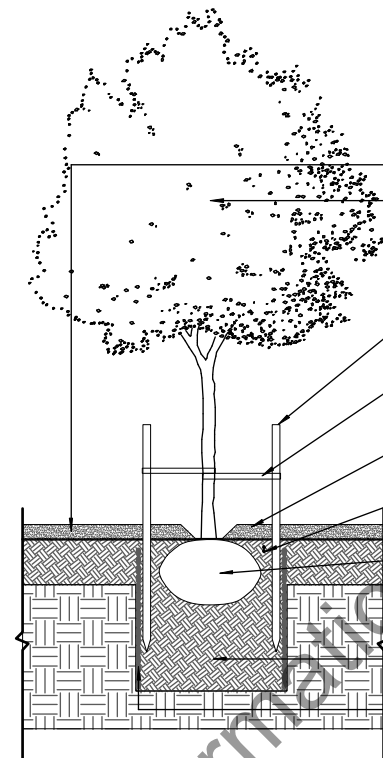
DRAWING No
B2B-DRG-LA-UP-820

REV
A



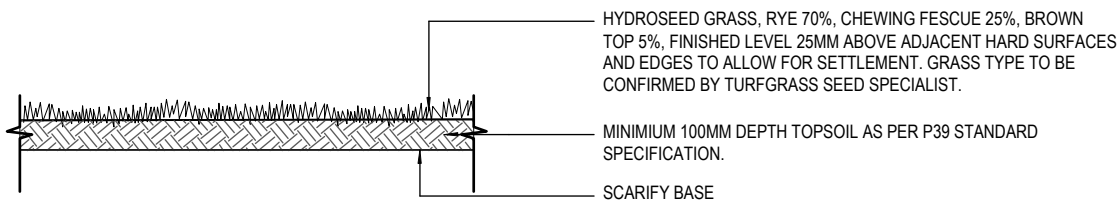
TYPICAL PLANTING DETAIL (A)
SCALE 1:50

- REFER TO PLANTING PLANS AND SCHEDULE FOR PLANTING TYPE, GRADE AND SPACING.
- MULCH SURFACE
100MM MINIMUM DEPTH AS PER P39 STANDARD SPECIFICATION
- MINIMUM 300MM DEPTH TOPSOIL AS PER P39 STANDARD SPECIFICATION.
- PREPARED SUB-SOIL BROKEN UP DECOMPACTED TO A DEPTH OF 150MM



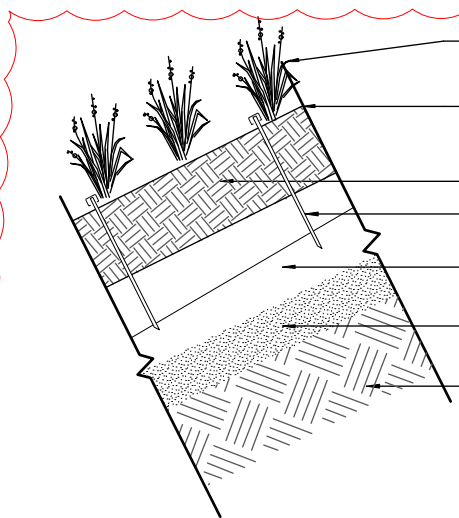
TREE PIT IN GARDEN BED DETAIL (E)
SCALE 1:50

- REFER TO DETAIL A: TYPICAL PLANTING DETAIL
- SPECIMEN TREE. REFER TO PLANTING PLANS AND SCHEDULE FOR PLANTING TYPE, GRADE AND SPACING.
- H4 TREATED PINUS RADIATA STAKES, 50 X 50 1500MM AS PER P39 STANDARD SPECIFICATION
- 50MM WIDE HESSIAN WEBBING ATTACHED TO STAKES WITH GALVANISED FASTENINGS AS PER P39 STANDARD SPECIFICATION.
- MULCH SURFACE
100MM MINIMUM DEPTH AS PER P39 STANDARD SPECIFICATION
- FERTILISER TABS PLACED TO AVOID CONTACT WITH ROOTBALL. REFER TO P39 STANDARD SPECIFICATION FOR APPLICATION RATE PER PLANT.
- TREE ROOTBALL SIZE SHOWN INDICATIVELY
NOTE: REMOVE ALL NON-BIODEGRADABLE WRAPPINGS. BIODEGRADABLE WRAPPINGS SHOULD BE CUT AND PEELED BACK TO A MINIMUM OF 1/3 ROOTBALL HEIGHT
- 1000MM MINIMUM DEPTH TOPSOIL. REFER TO P39 SPECIFICATION FOR TREE PIT SIZING BASED UPON GRADE OF SPECIMEN TREES.
- AN IMPERMEABLE ROOT BARRIER SHOULD BE INSTALLED WHERE DAMAGE TO OTHER SERVICES, STRUCTURES OR FEATURES MAY OCCUR DUE TO ROOT INTRUSION. MINIMUM 4000MM L X 500MM D, AND 1MM THICK



HYDROSEED GRASS DETAIL (C)
SCALE 1:25

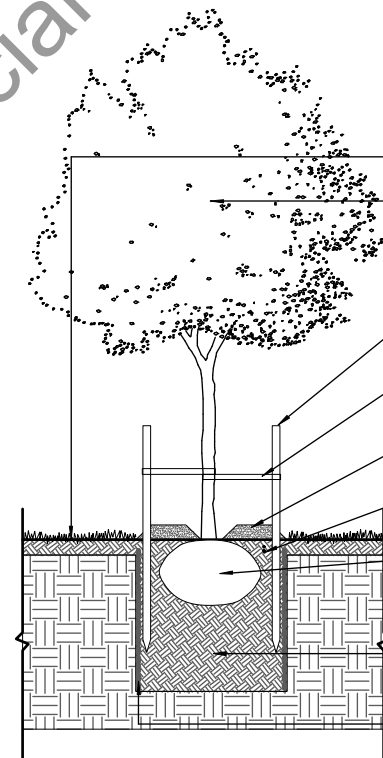
- HYDROSEED GRASS, RYE 70%, CHEWING FESCUE 25%, BROWN TOP 5%, FINISHED LEVEL 25MM ABOVE ADJACENT HARD SURFACES AND EDGES TO ALLOW FOR SETTLEMENT. GRASS TYPE TO BE CONFIRMED BY TURFGRASS SEED SPECIALIST.
- MINIMUM 100MM DEPTH TOPSOIL AS PER P39 STANDARD SPECIFICATION.
- SCARIFY BASE



SPECIALIST PLANTING ON 2:1 SLOPES DETAIL (D)
SCALE 1:25

- PLANTING WITH FERTILISER TAB. REFER TO PLANTING PLANS AND SCHEDULE FOR PLANTING TYPE, GRADE AND SPACING.
- BIODEGRADABLE COCONUT MATTING. ANCHORS AND PINS AS PER MANUFACTURERS SPECIFICATION. CUT IN MATTING TO ALLOW FOR PLANTING.
- 300MM DEPTH TOPSOIL AS PER P39 STANDARD SPECIFICATION
- STAKE ANCHOR WITH CLIP AS PER MANUFACTURERS SPECIFICATION
- 300MM DEPTH VOLCANIC ASH. REFER TO GEOTECHNICAL DRAWINGS FOR MORE INFORMATION
- PUMICE, REFER TO GEOTECHNICAL DRAWINGS
- EXISTING SUB-GRADE. REFER TO EARTHWORKS FOR FORMED BATTER SLOPES (2:1 SHOWN).

ON HOLD

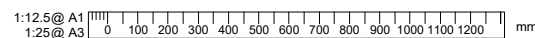


TREE PIT IN GRASSED AREA DETAIL (F)
SCALE 1:50

- REFER TO DETAIL C: HYDROSEED GRASS DETAIL
- SPECIMEN TREE. REFER TO PLANTING PLANS AND SCHEDULE FOR PLANTING TYPE, GRADE AND SPACING.
- H4 TREATED PINUS RADIATA STAKES, 50 X 50 1500MM AS PER P39 STANDARD SPECIFICATION
- 50MM WIDE HESSIAN WEBBING ATTACHED TO STAKES WITH GALVANISED FASTENINGS AS PER P39 STANDARD SPECIFICATION.
- MULCH SURFACE
100MM MINIMUM DEPTH AS PER P39 STANDARD SPECIFICATION
- FERTILISER TABS PLACED TO AVOID CONTACT WITH ROOTBALL. REFER TO P39 STANDARD SPECIFICATION FOR APPLICATION RATE PER PLANT.
- TREE ROOTBALL SIZE SHOWN INDICATIVELY
NOTE: REMOVE ALL NON-BIODEGRADABLE WRAPPINGS. BIODEGRADABLE WRAPPINGS SHOULD BE CUT AND PEELED BACK TO A MINIMUM OF 1/3 ROOTBALL HEIGHT
- 1000MM MINIMUM DEPTH TOPSOIL. REFER TO P39 SPECIFICATION FOR TREE PIT SIZING BASED UPON GRADE OF SPECIMEN TREES. TREE PIT TO BE CIRCULAR.
- AN IMPERMEABLE ROOT BARRIER SHOULD BE INSTALLED WHERE DAMAGE TO OTHER SERVICES, STRUCTURES OR FEATURES MAY OCCUR DUE TO ROOT INTRUSION. MINIMUM 4000MM L X 500MM D, AND 1MM THICK

NOTES

- REFER TO LANDSCAPE HARD AND SOFT SPECIFICATION, PREPARED BY ALIGN LIMITED.
- ENSURE MULCH DOES NOT PILE UP AGAINST PLANT STEM.
- ENSURE SUB-GRADE IS FREE-DRAINING FOR PLANTING PRIOR TO PLACEMENT OF SOIL MIX (THIS DOES NOT APPLY TO WETLANDS, SWALES AND STORMWATER DETENTION AREAS).
- REFER TO PLANTING PLANS FOR PLANTING LOCATIONS.
- REFER TO PLANTING SCHEDULE DRAWING B2B-DRG-LA-5000 AND B2B-DRG-LA-5001 FOR PLANT MIXES, NUMBERS AND SPACINGS.
- AT TIME OF PLANTING, ENSURE PLANT HOLES AND TREE PITS DO NOT HOLD WATER.
- PRIOR TO PLACEMENT OF SOIL MIX, HEAVILY COMPACTED SUBGRADE TO BE LOOSENED TO ENSURE GROWING ZONE IS FREE DRAINING.
- EACH PLANTING TYPE TO BE LAID OUT ON SITE, COVERING A 10 X 10 METRE AREA AND APPROVED BY LANDSCAPE ARCHITECT PRIOR TO PLANTING.
- LOW GROWING SPECIES SHALL BE PLACED AT THE FRONT OF PLANTING AREAS, WITH TALL SPECIES PLANTED AT THE BACK, RELATIVE TO THE ROAD OR RESERVE VIEWING.
- SPECIES WITHIN PLANTING TYPES SHALL BE PLANTED IN GROUPS/DRIFTS OF A MINIMUM SIZE OF 3 OR 5 AND EVENLY DISTRIBUTED ACROSS THE SITE TO ACHIEVE A CONSISTENT MIX.
- PLANTING SETOUT IN SPECIES GROUPS IN A NATURALISTIC FASHION.
- REFER TO DRAINAGE DRAWING B2B-DRG-DG01-4104 FOR PLANTED SWALE DETAIL AND LANDSCAPE PLANTING PLANS AND SCHEDULES FOR FURTHER INFORMATION.



No	DATE	DRG CHECK	DESIGN REVIEW	APPD D.MGR	REVISIONS & ISSUES
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2	1:25@A3				



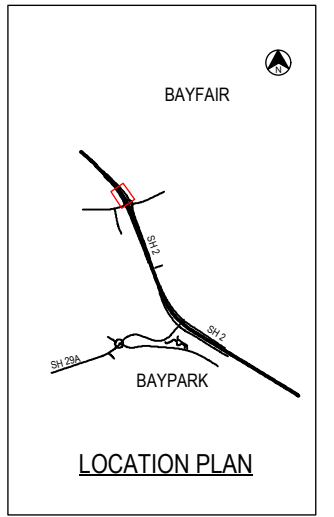
SCALE AS SHOWN (A3)
STATUS 50% ISSUE
PROJECT NUMBER 2/09-024/603

CLIENT NZ TRANSPORT AGENCY
PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN TR
DESIGNED JW
DRAWING CHECK JW
DESIGN REVIEW AW
APPROVED 08/03/19

TITLE UNDERPASS DETAILS - VEGETATION SHEET 1 OF 1

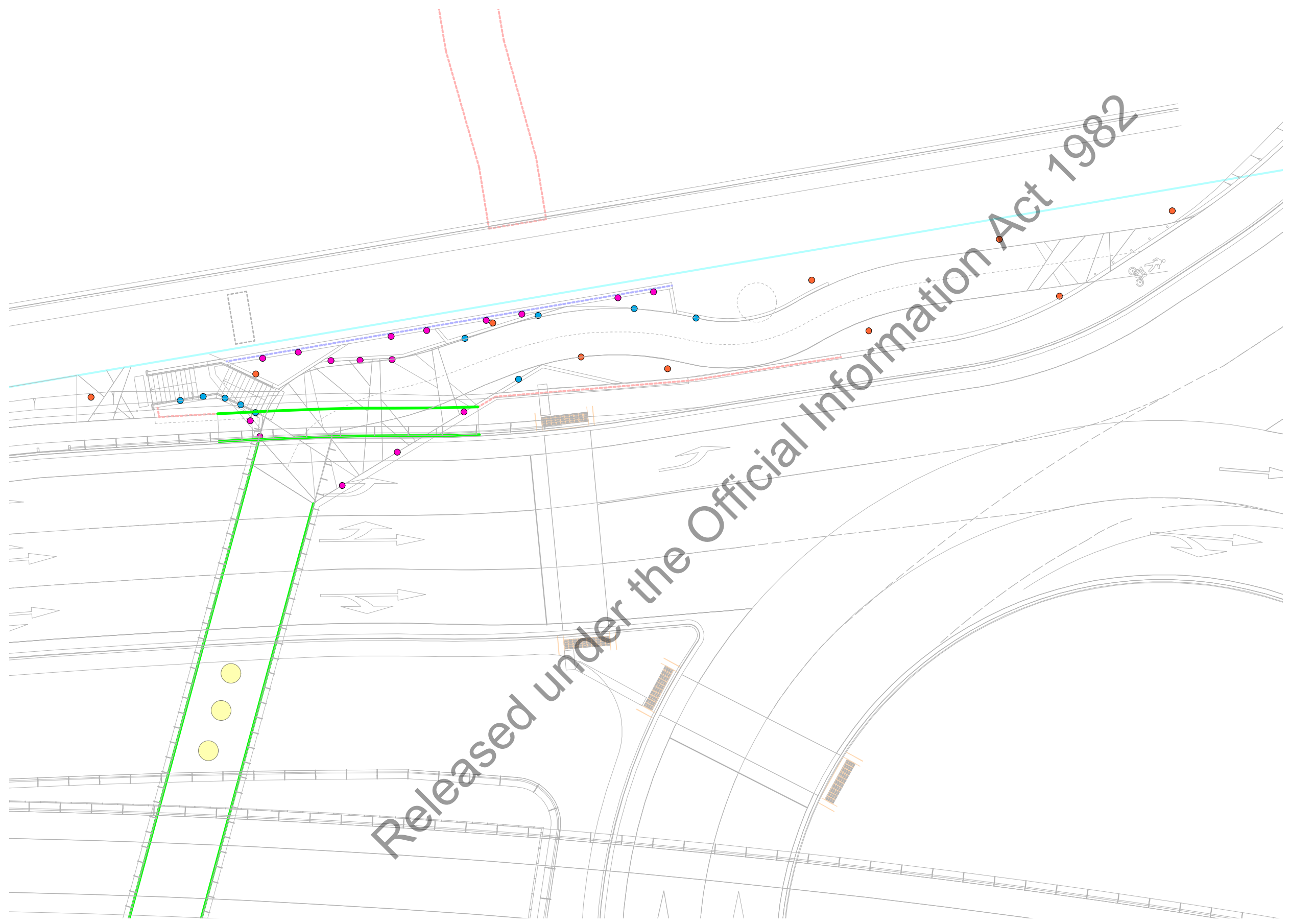
DRAWING No B2B-DRG-LA-UP-830

REV A



LEGEND

- RAMP AND PATH GROUND LEVEL LIGHTS
- FOOTBRIDGE LEDS
- LIGHT POLES TBA
- UP-LIGHTING ALONG RETAINING WALLS
- IN-BUILT STEP LIGHTING
- LIGHTWELLS TBA
SCALE NOT SHOWN OR EXACT LOCATION - SHOWN FOR INCLUSION ONLY DETAIL TO BE WORKED THROUGH



NOTES

1. THE JACOBS LIGHTING DESIGN HAS ONLY TAKEN INTO ACCOUNT LIGHTING TO MEET LIGHTING STANDARDS AND A FINAL DESIGN AROUND THE TYPE OF FITTINGS STILL NEEDS TO BE COMPLETED. FURTHER DESIGN COORDINATION BETWEEN ALIGN AND JACOBS IS REQUIRED TO CONFIRM THE LOCATION AND SPECIFICATION OF LIGHT FIXTURES.

No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES



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
TR

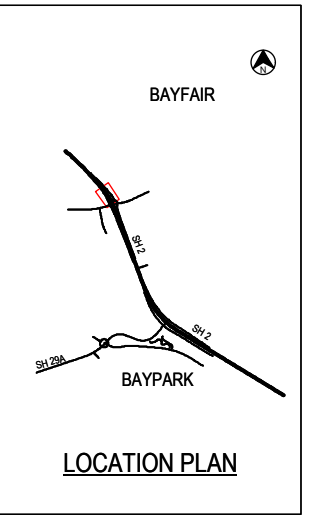
DRAWING CHECK
JW

APPROVED
08/03/19

TITLE
UNDERPASS NORTH LIGHTING PLAN
SHEET 1 OF 2

DRAWING No
B2B-DRG-LA-UP-900

REV
A



LEGEND

- RAMP AND PATH GROUND LEVEL LIGHTS
- FOOTBRIDGE LEDS
- LIGHT POLES TBA
- UP-LIGHTING ALONG RETAINING WALLS
- IN-BUILT STEP LIGHTING
- LIGHTWELLS TBA
SCALE NOT SHOWN OR EXACT LOCATION - SHOWN FOR INCLUSION ONLY DETAIL TO BE WORKED THROUGH

NOTES

1. THE JACOBS LIGHTING DESIGN HAS ONLY TAKEN INTO ACCOUNT LIGHTING TO MEET LIGHTING STANDARDS AND A FINAL DESIGN AROUND THE TYPE OF FITTINGS STILL NEEDS TO BE COMPLETED. FURTHER DESIGN COORDINATION BETWEEN ALIGN AND JACOBS IS REQUIRED TO CONFIRM THE LOCATION AND SPECIFICATION OF LIGHT FIXTURES.

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No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:125@ A1					
1:250@ A3					

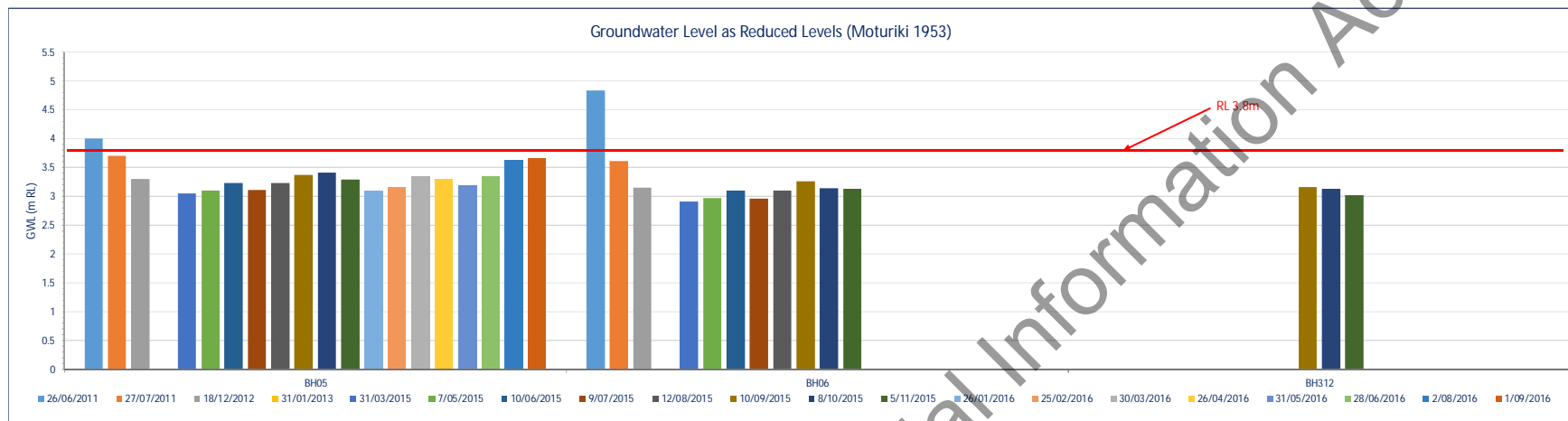


SCALE	1:250 (A3)
STATUS	50% ISSUE
PROJECT NUMBER	2/09-024/603

CLIENT	NZ TRANSPORT AGENCY	
PROJECT	BAYPARK TO BAYFAIR LINK (BAY LINK)	
DRAWN	TR	DRAWING CHECK
DESIGNED	JW	DESIGN REVIEW
		AW
APPROVED	08/03/19	

TITLE	UNDERPASS SOUTH LIGHTING PLAN SHEET 2 OF 2	
DRAWING No	B2B-DRG-LA-UP-910	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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Stormwater – Grated Trench Drains – Global Brand Improvement MEA® DRAIN - HiFlow Single Pin Profix System

Opportunity:

Grated trench drains help to manage surface flooding. Nationally and internationally a range of grated trench drainage systems are available. A range of 'varieties' exist at the AMA Motorway Network. Traditional grated trench drainage systems present a range of risks including:

- Safety risk of flying objects if grate becomes dislodged.
- Small grate apertures are susceptible to blockage causing flooding.
- Pavement overlays that can damage slot drains.
- Poor robustness against pavement milling operations.
- Fine tolerance fastenings mean additional parts and special tools required for operation. Small/fiddly bits are not desirable during night works under traffic control in dirty conditions.

Solution:

Positive engagement and collaboration between the AMA and globally reputable brand MEA for a new fastening system (single pin self-locking) for a grated trench drain product that is now suitable for motorways and heavily trafficked and constrained environments, the MEA-HIFLOW-Single Pin Profix system (200D and 300D) - Class D.

Estimated Results:

- **Improved reliability and function** of hydraulic performance with much larger aperture slots being less susceptible to blockage and flooding
- **Improved safety** for motorists and operators having a robust, reliable and simple single pin 'profix' fastening mechanism for the grate
- **No special tools** or special parts are required for operations
- **Quick and easy** to install and to operate
- **Costs** – Price tensioning by competition for cheaper outcomes

Contributors:

Peter Mitchell (AMA); Royhith Lal (NZTA); Tim Yandall (MEA)



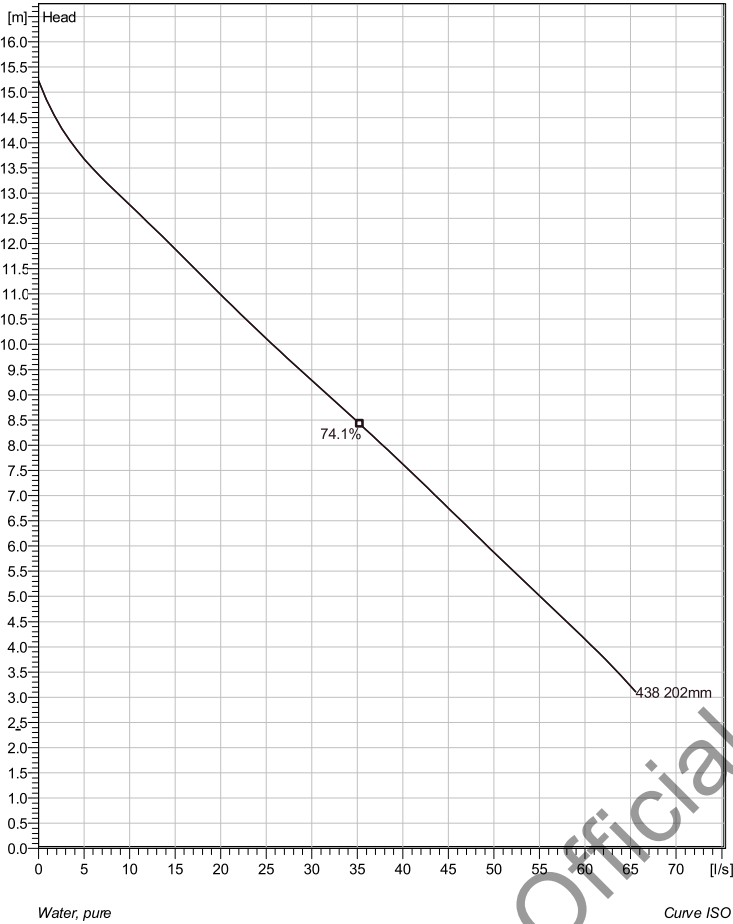
Auckland Motorways



KRA	Increase
Maximise Efficiency	Yes
Customer focus	Yes
Positive Legacy	Yes
Value for Money	Yes
Healthy Organisation	Yes

New Zealand Government

NP 3127 MT 3~ Adaptive 438 Technical specification



Note: Picture might not correspond to the current configuration.

General

Patented self cleaning semi-open channel impeller, ideal for pumping in most waste water applications. Possible to be upgraded with Guide-pin® for even better clogging resistance. Modular based design with high adaptation grade.

Impeller

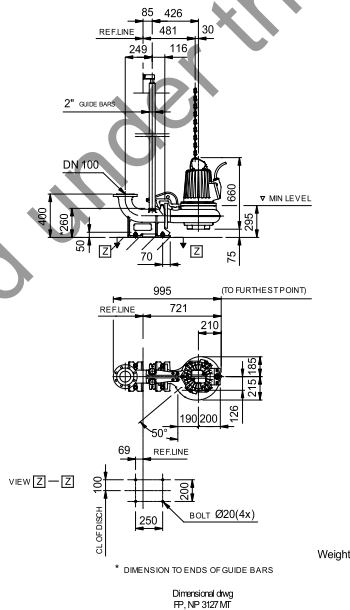
Impeller material	Hard-Iron
Discharge Flange Diameter	100 mm
Suction Flange Diameter	100 mm
Impeller diameter	202 mm
Number of blades	2

Motor

Motor #	N3127.060 21-12-4AL-W 5.9KW Standard
Stator variant	44
Frequency	50 Hz
Rated voltage	415 V
Number of poles	4
Phases	3~
Rated power	5.9 kW
Rated current	11 A
Starting current	64 A
Rated speed	1445 rpm
Power factor	
1/1 Load	0.87
3/4 Load	0.84
1/2 Load	0.76
Motor efficiency	
1/1 Load	83.8 %
3/4 Load	84.9 %
1/2 Load	83.9 %

Configuration

Installation: P - Semi permanent, Wet



Project	Project ID	Created by	Created on 2/27/2019	Last update
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NP 3127 MT 3~ Adaptive 438



Performance curve

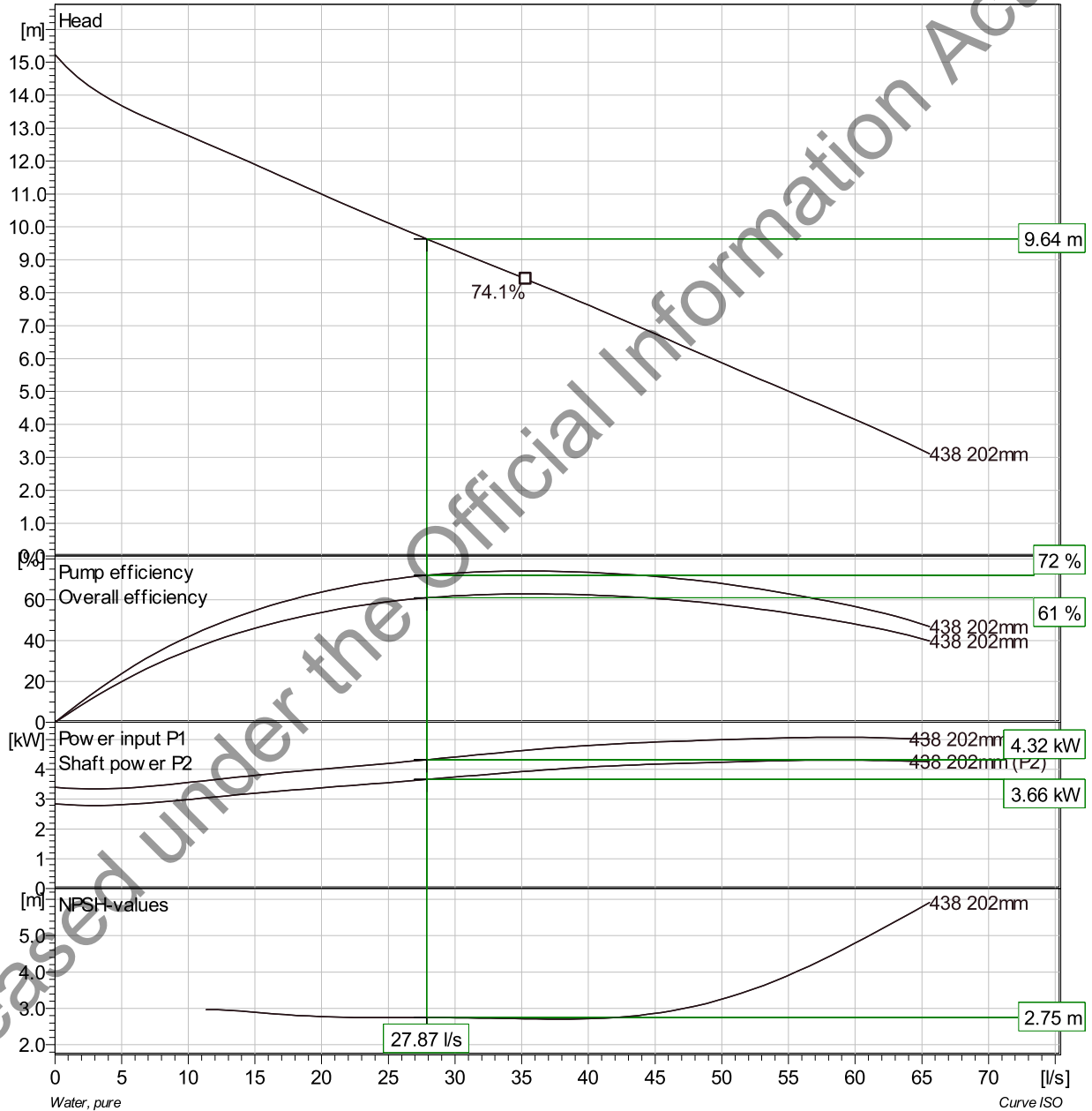
Pump

Discharge Flange Diameter	100 mm
Suction Flange Diameter	100 mm
Impeller diameter	202 mm
Number of blades	2

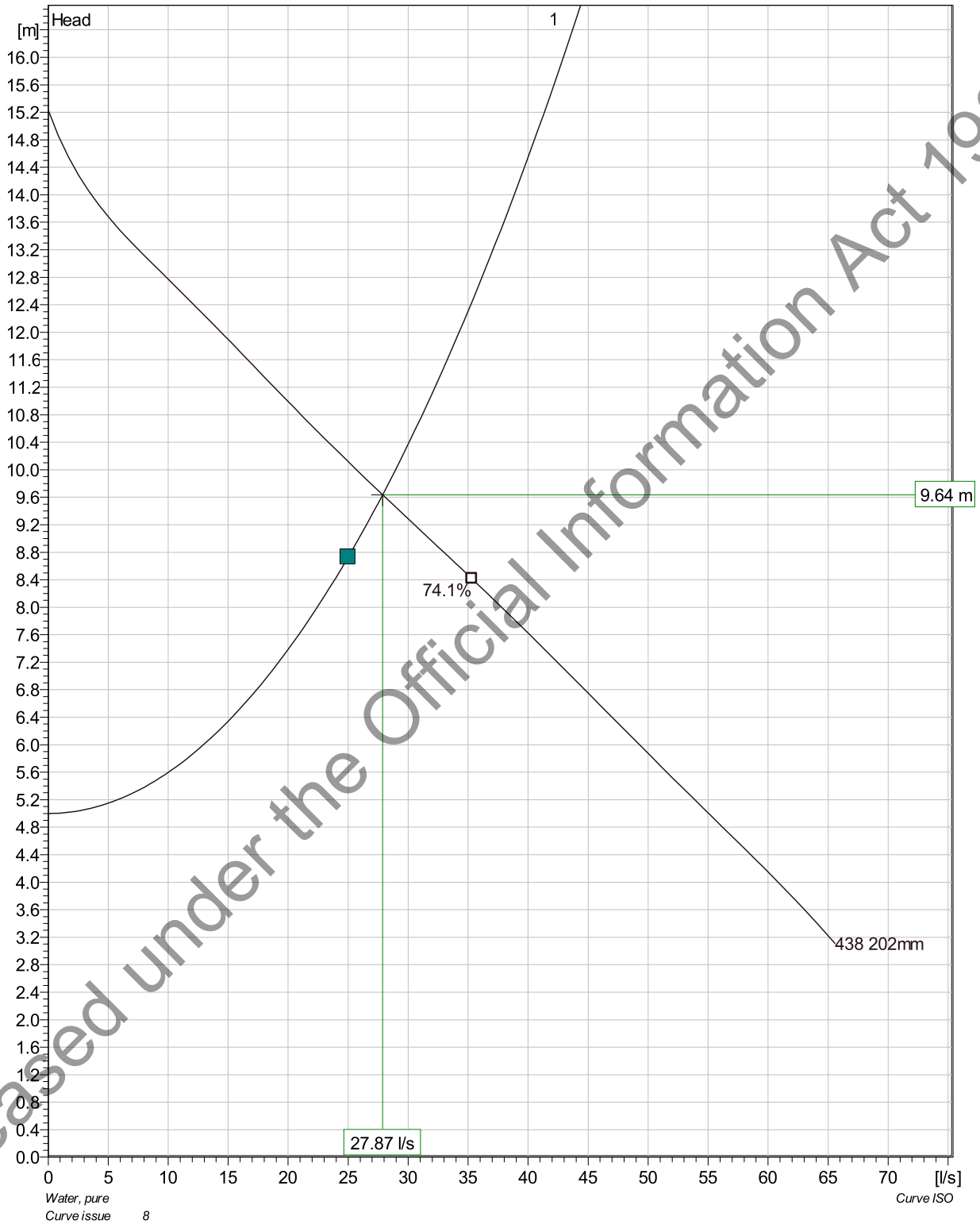
Motor

Motor #	N3127.060 21-12-4AL-W 5.9KW
Stator variant	44
Frequency	50 Hz
Rated voltage	415 V
Number of poles	4
Phases	3~
Rated power	5.9 kW
Rated current	11 A
Starting current	64 A
Rated speed	1445 rpm

Power factor	
1/1 Load	0.87
3/4 Load	0.84
1/2 Load	0.76
Motor efficiency	
1/1 Load	83.8 %
3/4 Load	84.9 %
1/2 Load	83.9 %

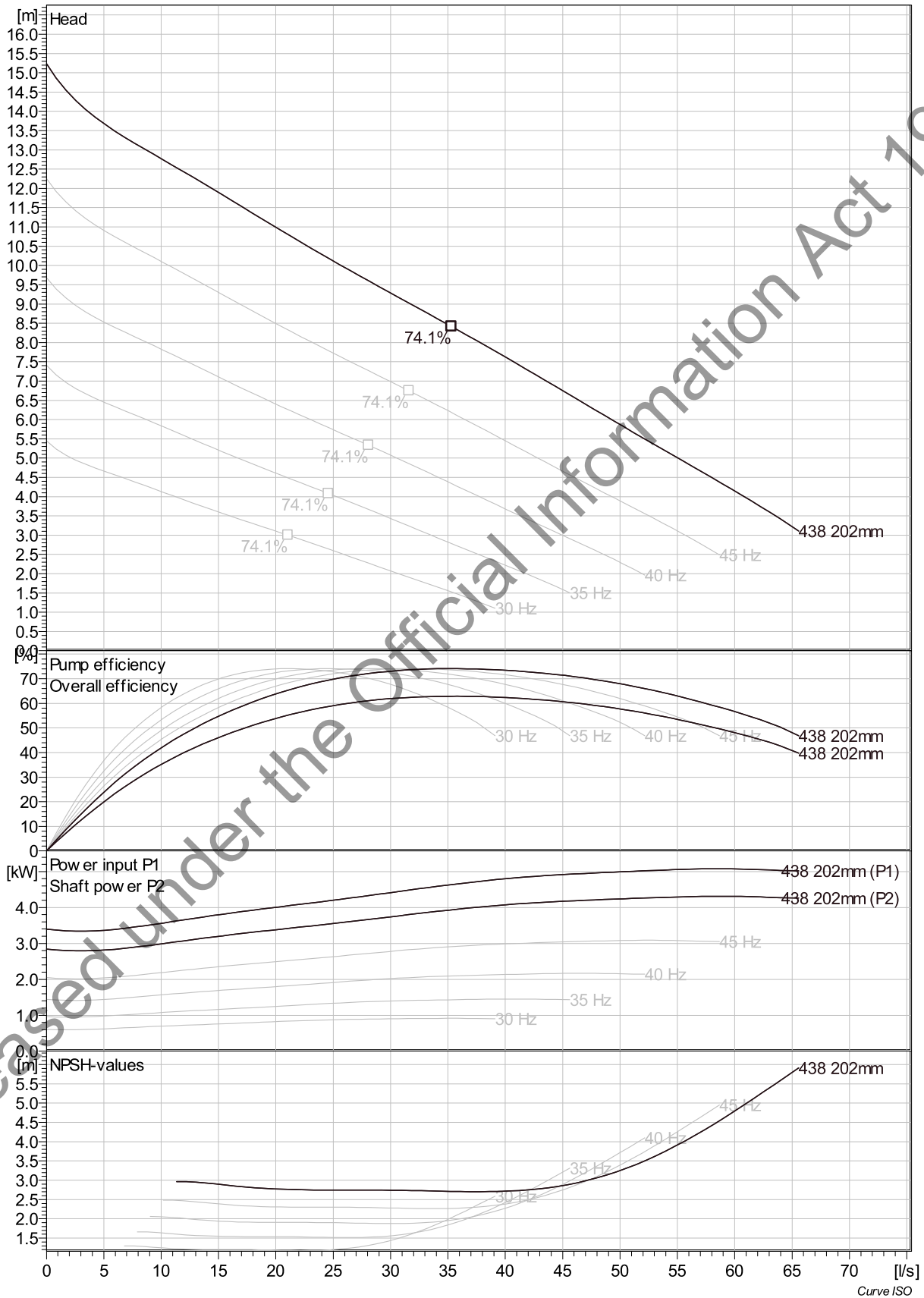


Project	Project ID	Created by	Created on 2/27/2019	Last update
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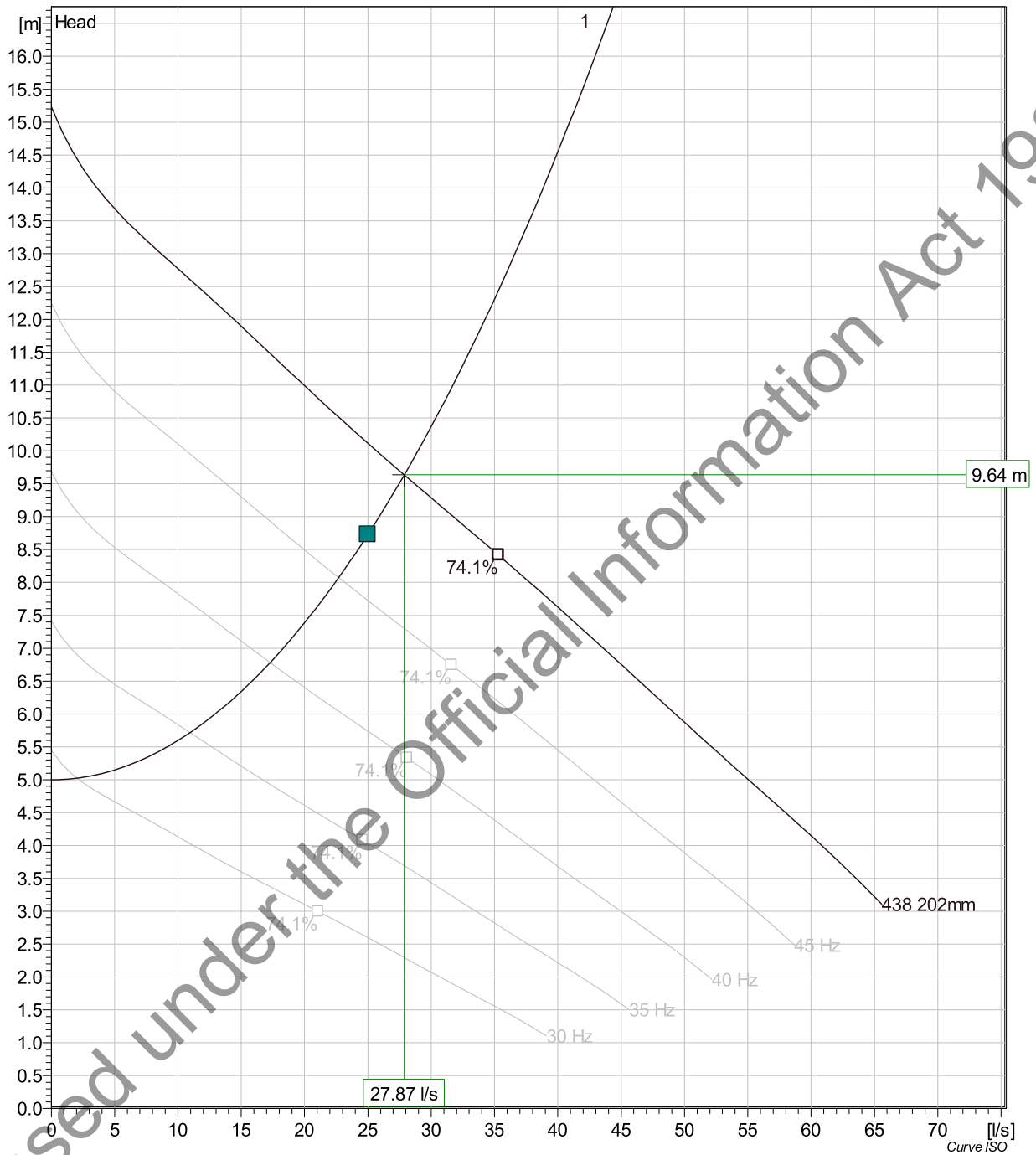


Pumps running /System	Individual pump			Total					
	Flow	Head	Shaft power	Flow	Head	Shaft power	Pump eff.	Specific energy	NPSHre
1	27.9 l/s	9.64 m	3.66 kW	27.9 l/s	9.64 m	3.66 kW	72 %25	0.0431 kWh/m ³	2.75 m

Project	Project ID	Created by	Created on 2/27/2019	Last update
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Project	Project ID	Created by	Created on	Last update
			2/27/2019	

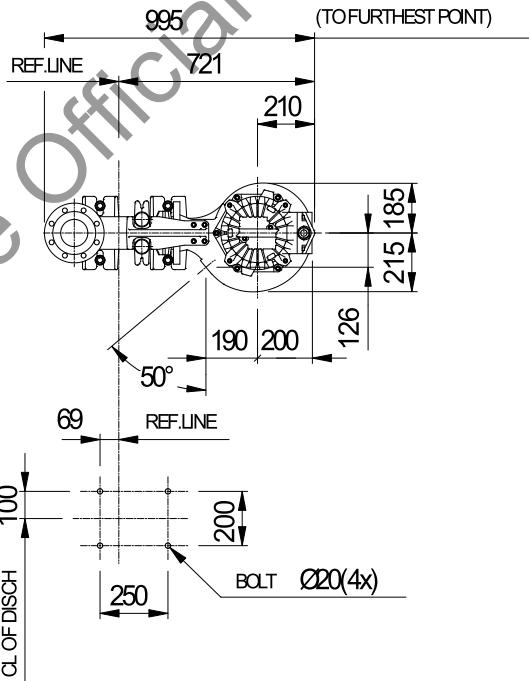
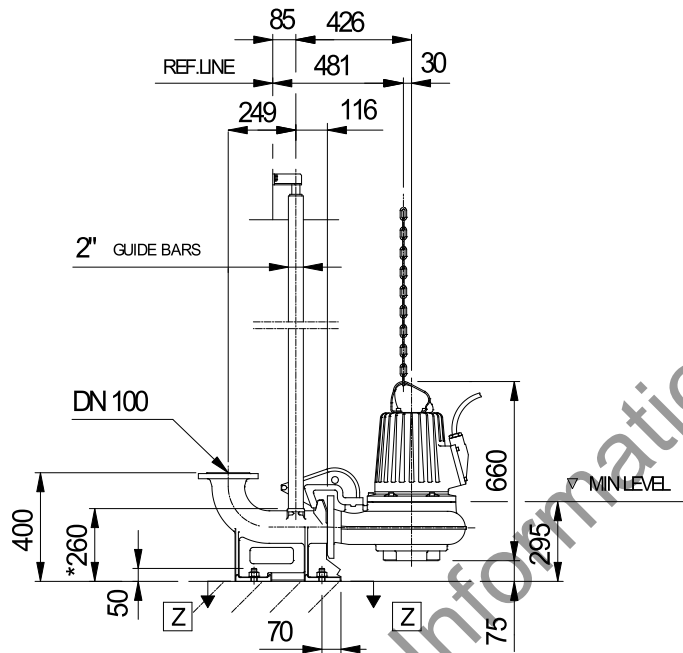


Pumps running / System

	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Pump eff.	Specific energy	NPSHre
1	50 Hz	27.9 l/s	9.64 m	3.66 kW	27.9 l/s	9.64 m	3.66 kW	72 %	0.0431 kWh/m ³	2.75 m
1	45 Hz	22.7 l/s	8.07 m	2.56 kW	22.7 l/s	8.07 m	2.56 kW	70.1 %	0.0378 kWh/m ³	2.3 m
1	40 Hz	17.3 l/s	6.78 m	1.74 kW	17.3 l/s	6.78 m	1.74 kW	66.2 %	0.0352 kWh/m ³	1.92 m
1	35 Hz	11 l/s	5.72 m	1.09 kW	11 l/s	5.72 m	1.09 kW	56.3 %	0.0384 kWh/m ³	1.61 m
1	30 Hz	2.02 l/s	5.02 m	0.597 kW	2.02 l/s	5.02 m	0.597 kW	16.7 %	0.139 kWh/m ³	

Project	Project ID	Created by	Created on 2/27/2019	Last update
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NP 3127 MT 3~ Adaptive 438
Dimensional drawing



* DIMENSION TO ENDS OF GUIDE BARS

Weight

Dimensional dwg
FP, NP 3127 MT

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Project	Project ID	Created by	Created on 2/27/2019	Last update
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DRAWING NUMBER	REVISION	TITLE 1	TITLE 2	TITLE 3
B2B-DRG-BR05-8500	A	BR05 - PEDESTRIAN UNDERPASS	DRAWING LIST	
B2B-DRG-BR05-8501	A	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - UNDERPASS
B2B-DRG-BR05-8502	A	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - MATAPIHI RAMP
B2B-DRG-BR05-8503	A	BR05 - PEDESTRIAN UNDERPASS	GENERAL ARRANGEMENT	PLAN & ELEVATION - BAYFAIR RAMP
B2B-DRG-BR05-8511	A	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS & DETAILS	SHEET 1
B2B-DRG-BR05-8512	A	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS & DETAILS	SHEET 2
B2B-DRG-BR05-8513	A	BR05 - PEDESTRIAN UNDERPASS	UNDERPASS - SECTIONS & DETAILS	SHEET 3
B2B-DRG-BR05-8521	A	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	TYPE BR05-PB1
B2B-DRG-BR05-8522	A	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	TYPE BR05-PB1
B2B-DRG-BR05-8523	A	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	STEEL RAIL ELEVATIONS
B2B-DRG-BR05-8524	A	BR05 - PEDESTRIAN UNDERPASS	PRECAST BARRIERS	STEEL RAIL DETAILS

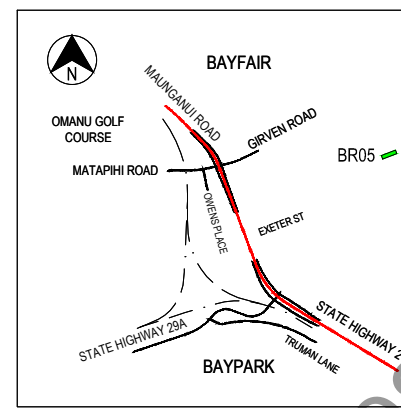
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							CONTRACTOR 		DESIGNER   		SCALE N.T.S. STATUS FOR INFORMATION PROJECT NUMBER 2/09-024/603		CLIENT NZ TRANSPORT AGENCY PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)			TITLE BR05 - PEDESTRIAN UNDERPASS DRAWING LIST										
REVISIONS & ISSUES <table border="1"> <thead> <tr> <th>No</th> <th>DATE</th> <th>DRG CHECK</th> <th>DESIGN REVIEW</th> <th>APP'D D.MGR</th> <th>ISSUE</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>08/03/19</td> <td>GKK</td> <td>PNO</td> <td>LW</td> <td>50% ISSUE</td> </tr> </tbody> </table>					No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	ISSUE	A	08/03/19	GKK	PNO	LW	50% ISSUE							DRAWING No B2B-DRG-BR05-8500			REV A
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	ISSUE																					
A	08/03/19	GKK	PNO	LW	50% ISSUE																					

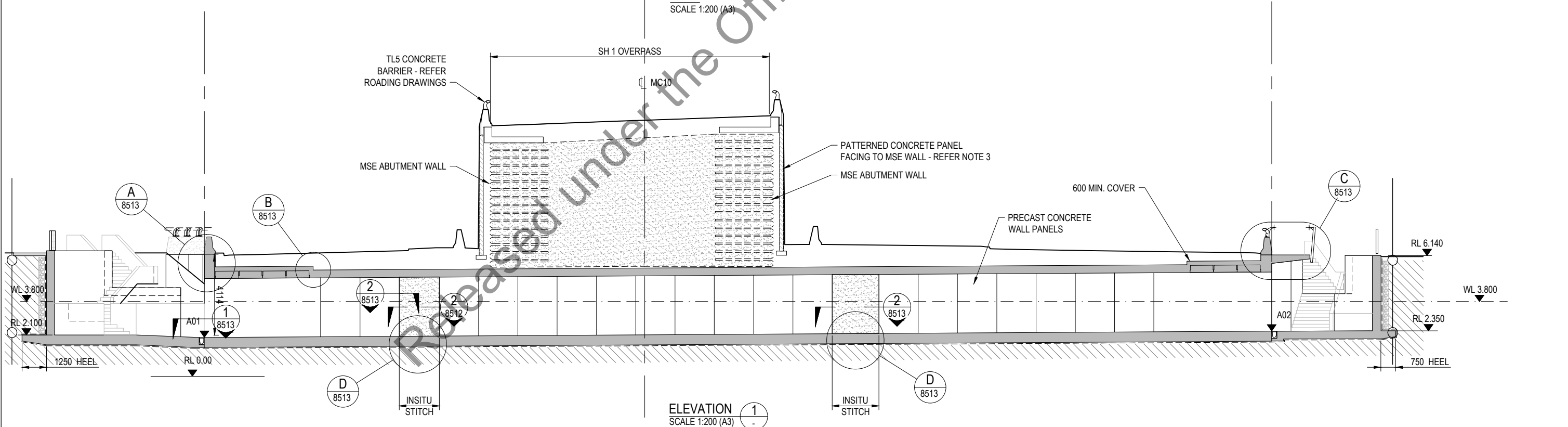
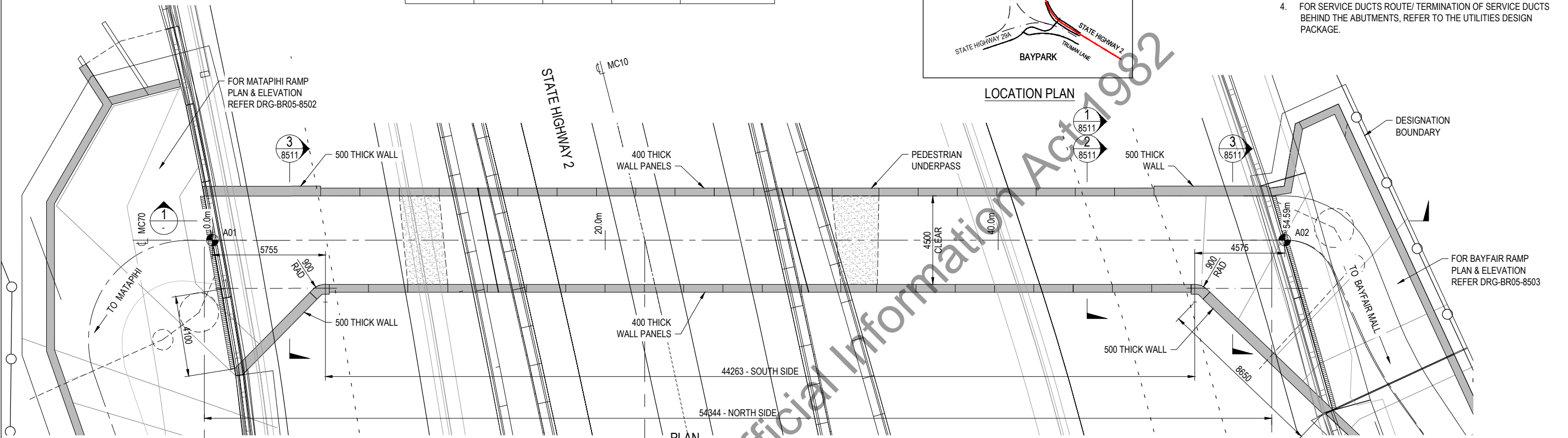


BR05 - PEDESTRIAN UNDERPASS				
SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
A01	378438.244	809430.359	1.980	
A02	378489.436	809449.319	2.300	



NOTES

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



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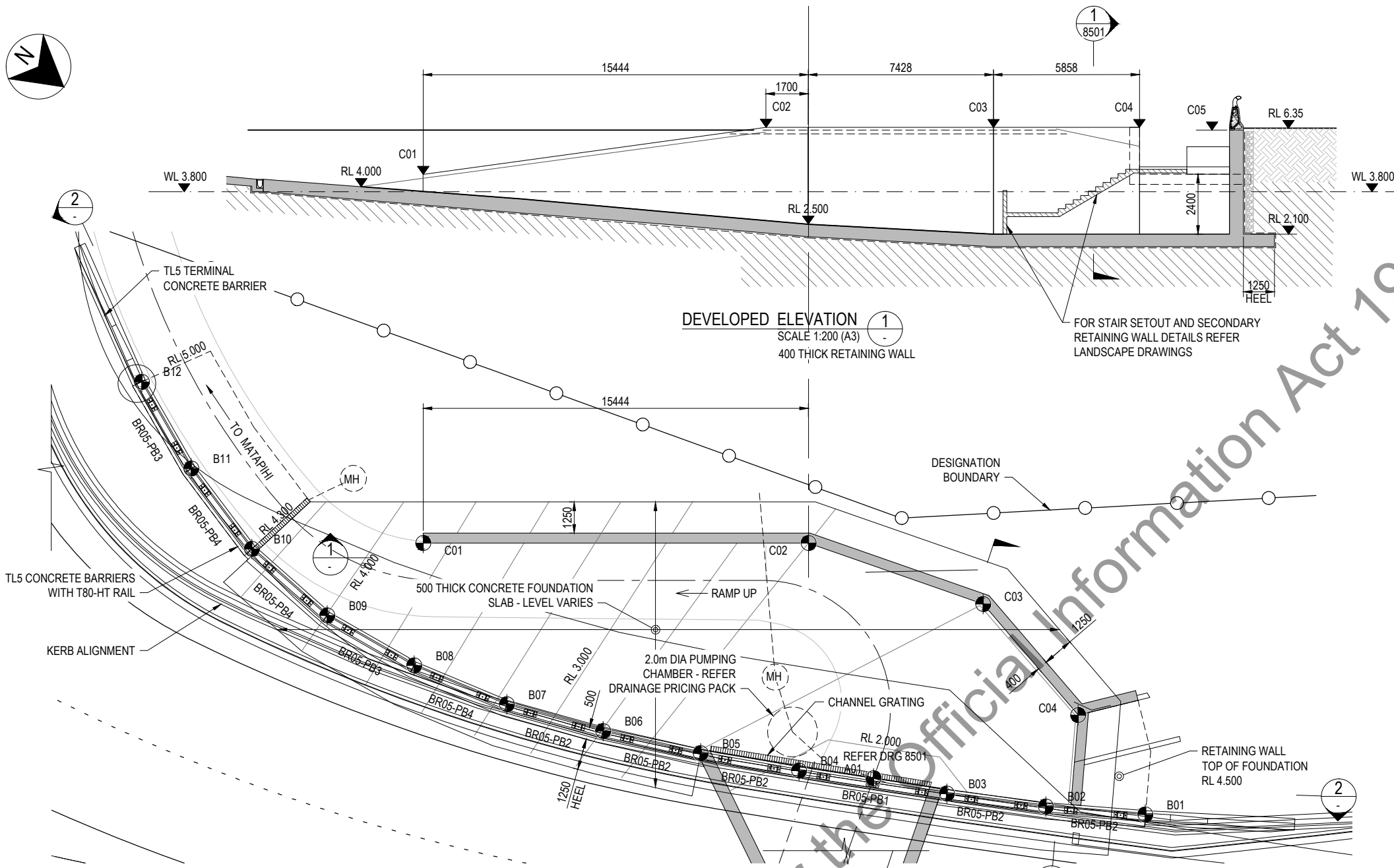
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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<p>NZ TRANSPORT AGENCY WAKA KOTAHĪ</p>	<p>CPB CONTRACTORS</p>	<p>JACOBS</p>	<p>Tonkin+Taylor</p>	SCALE 1:400 (A3) STATUS FOR INFORMATION PROJECT NUMBER 2/09-024/603	CLIENT NZ TRANSPORT AGENCY PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK) DRAWN DCC DESIGNED SKK DRAWING CHECK GKK DESIGN REVIEW PWC APPROVED LW JAN 2019	TITLE BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT UNDERPASS - PLAN & ELEVATION DRAWING No B2B-DRG-BR05-8501 REV A
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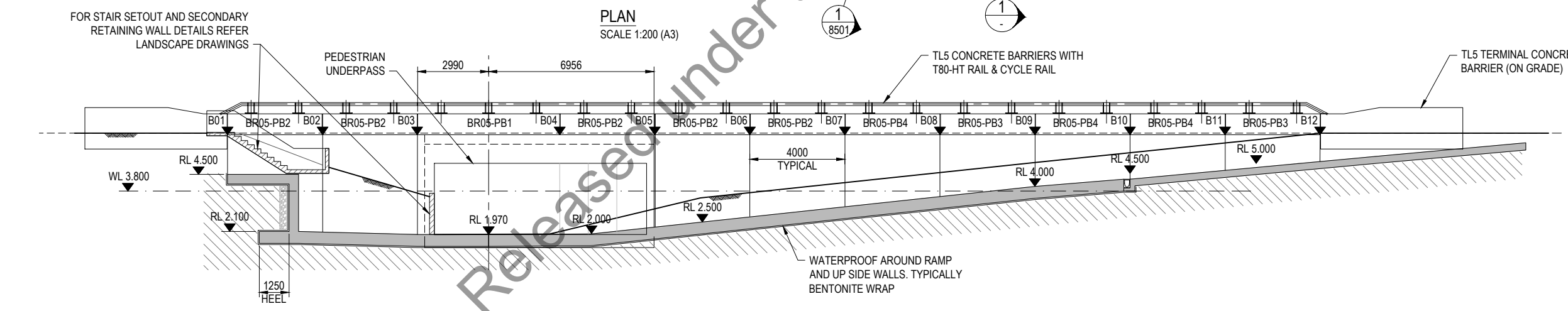
NOTES

- FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
- FOR OFF-BRIDGE ROAD SAFETY BARRIERS REFER B2B-DRG-BR05-8520 SERIES DRAWINGS.
- FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
- FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS BEHIND THE ABUTMENTS, REFER TO THE UTILITIES DESIGN PACKAGE.



BR05 - PEDESTRIAN UNDERPASS

SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
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	

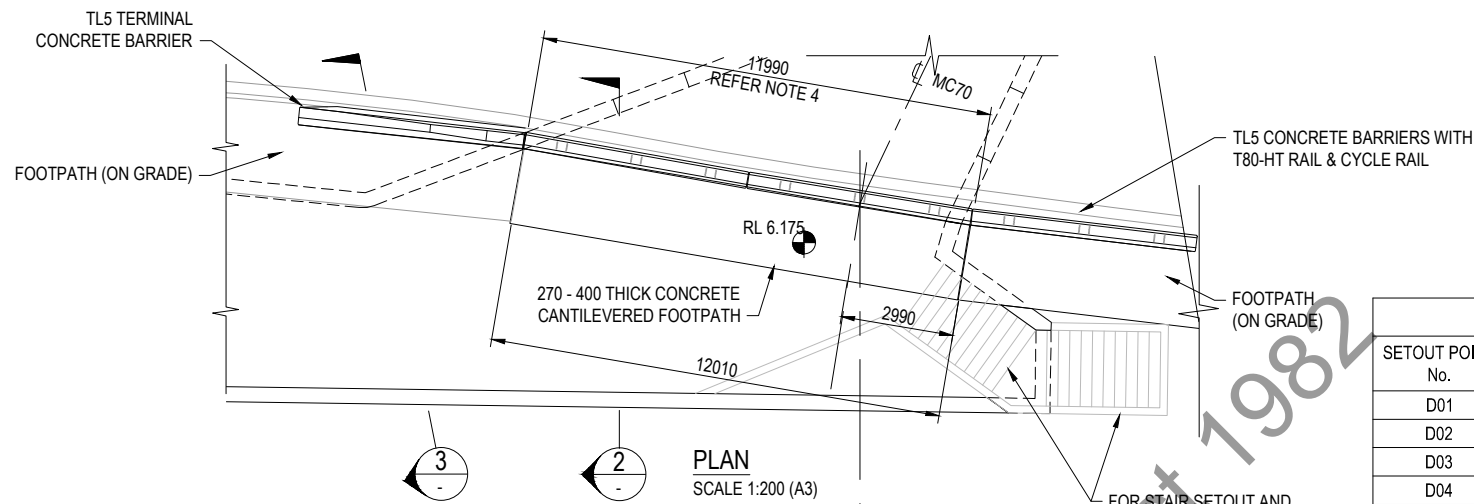


DEVELOPED ELEVATION (2)
SCALE 1:200 (A3)
500 THICK RETAINING WALL

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No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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3					
4					
5					
6					
7					
8					
9					
10					

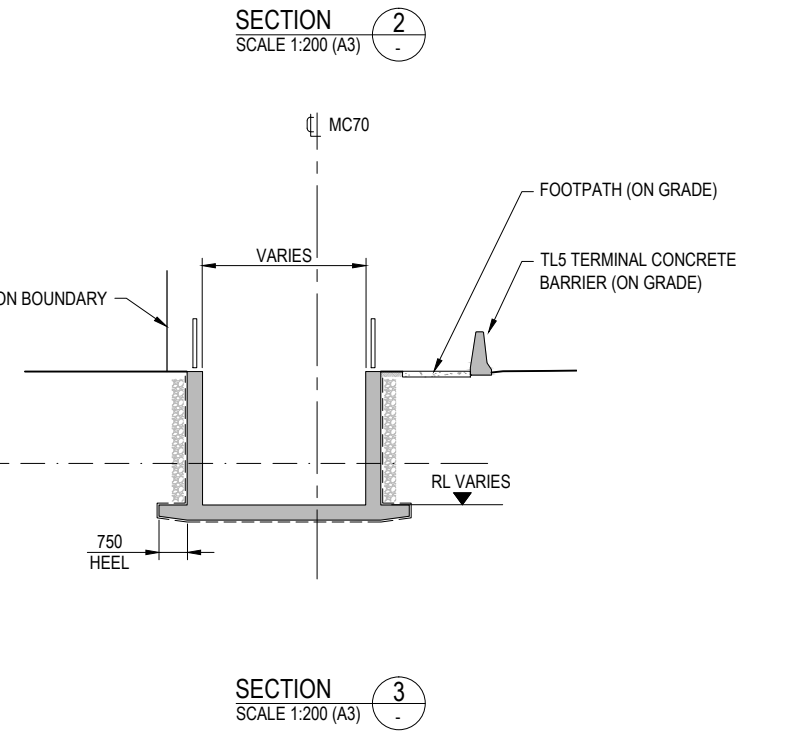
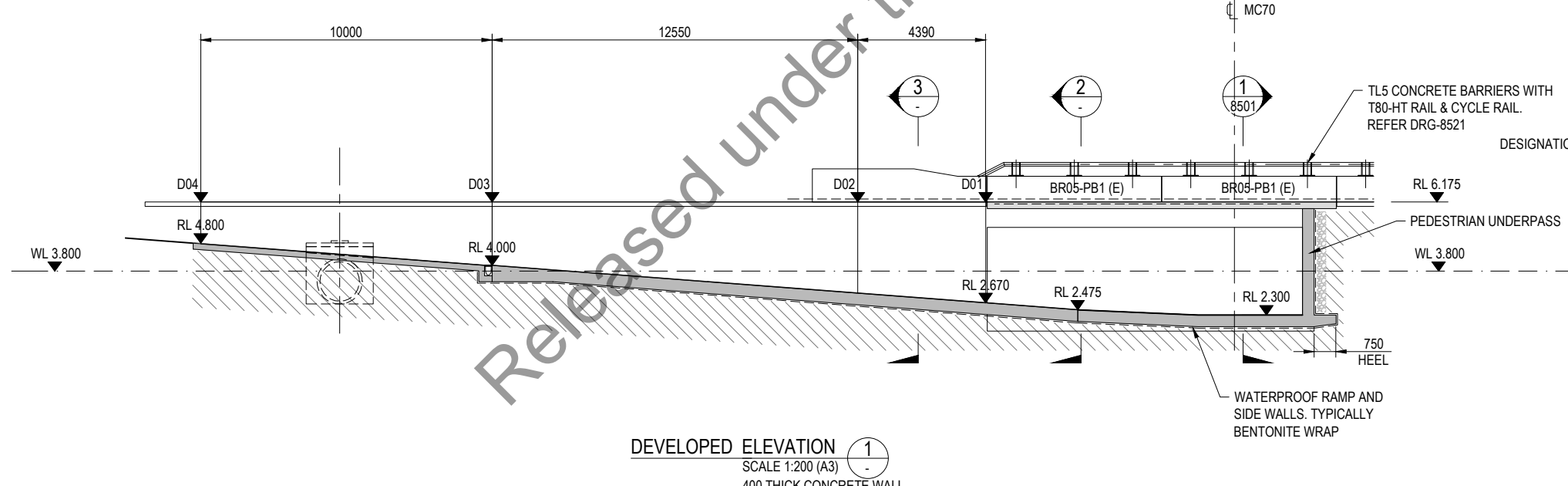
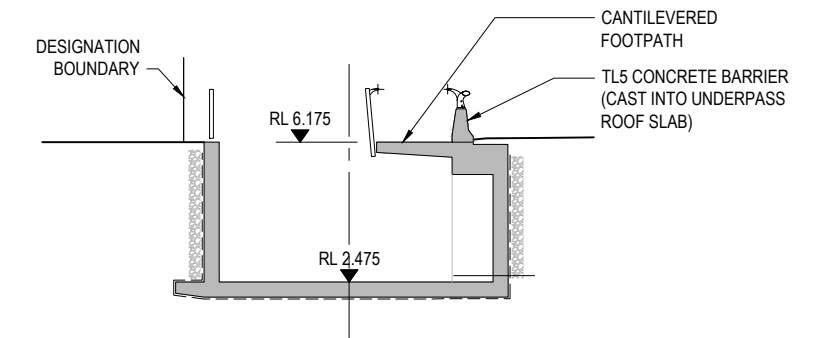
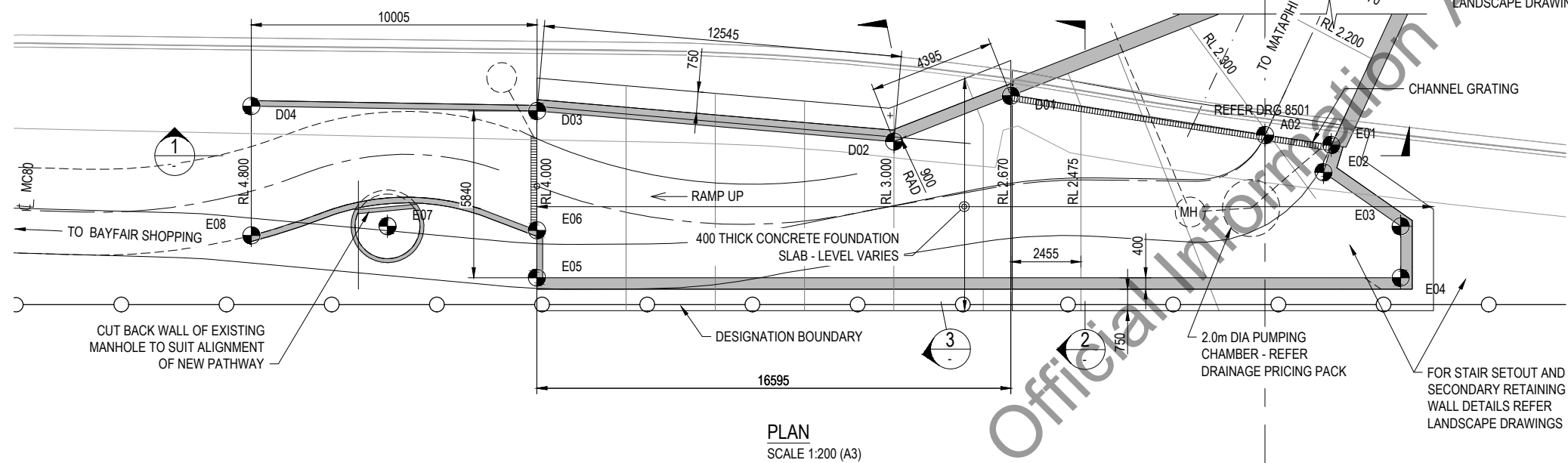
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				STATUS	FOR INFORMATION			
				PROJECT NUMBER	2/09-024/603	DRAWING No		B2B-DRG-BR05-8502
						REV		A



NOTES

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

BR05 - PEDESTRIAN UNDERPASS				
SETOUT POINT No.	CO-ORDINATES (m)		DESIGN LEVEL	CONSTRUCTION LEVEL (TOP OF WALL)
	E	N		
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	



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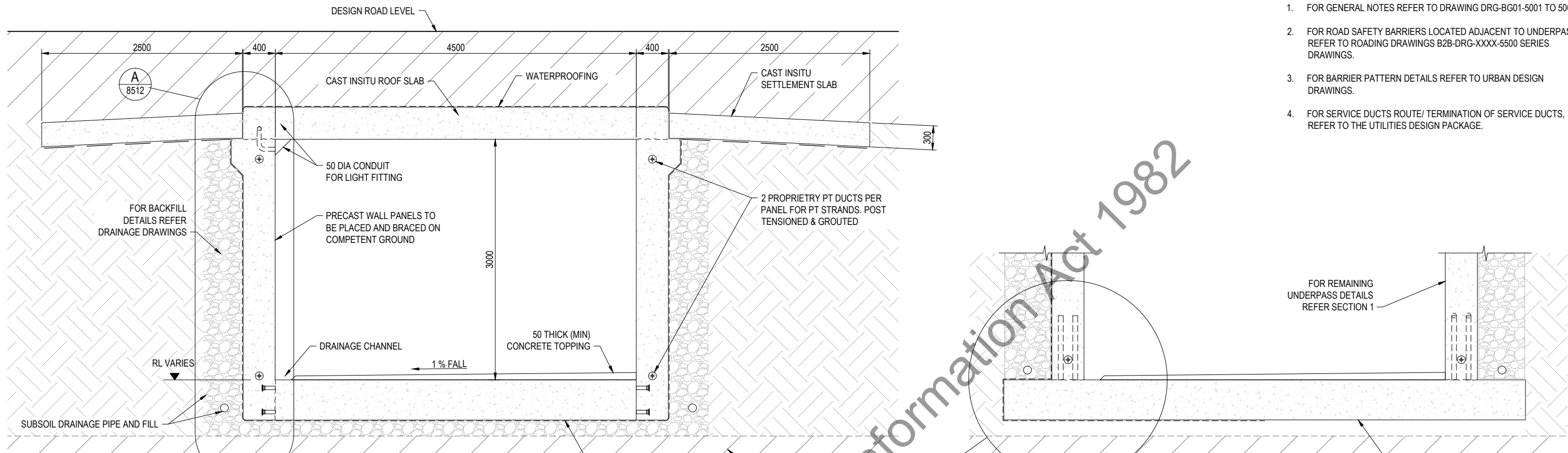
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No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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2					
3					
4					
5					
6					
7					
8					
9					
10					

			SCALE	1:400 (A3)	CLIENT NZ TRANSPORT AGENCY	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)	TITLE BR05 - PEDESTRIAN UNDERPASS GENERAL ARRANGEMENT PLAN & ELEVATION - BAYFAIR RAMP	
			STATUS	FOR INFORMATION				DRAWN DCC
			PROJECT NUMBER	2/09-024/603	DRAWN	SKK	DRAWING NO	B2B-DRG-BR05-8503
					DESIGNED	SKK	REV	A

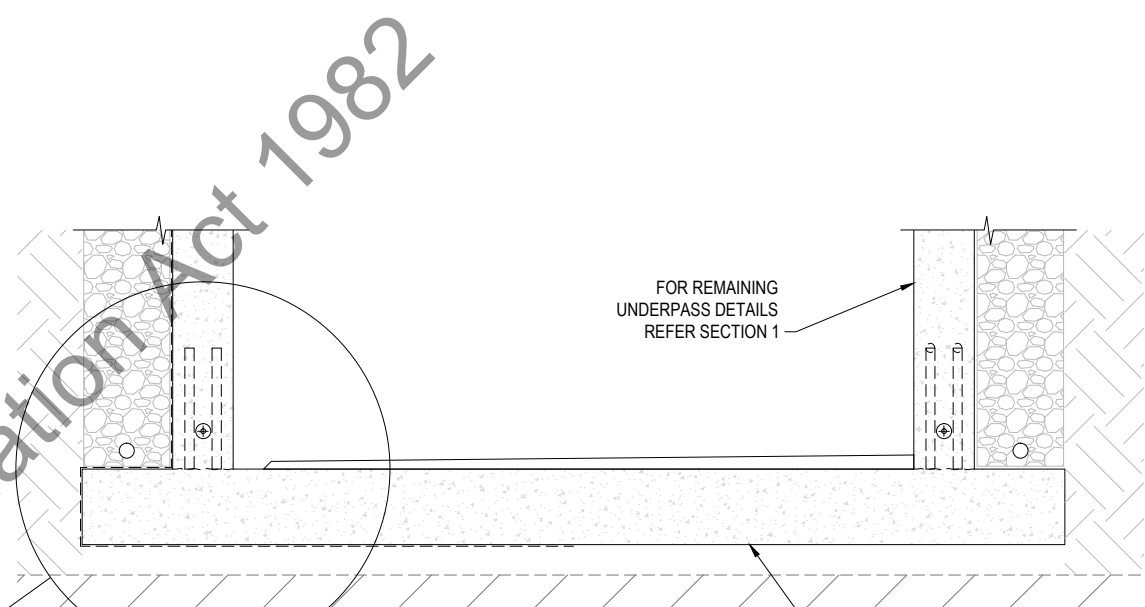
NOTES

1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
2. FOR ROAD SAFETY BARRIERS LOCATED ADJACENT TO UNDERPASS REFER TO ROADING DRAWINGS B2B-DRG-XXXX-5500 SERIES DRAWINGS.
3. FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
4. FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS, REFER TO THE UTILITIES DESIGN PACKAGE.

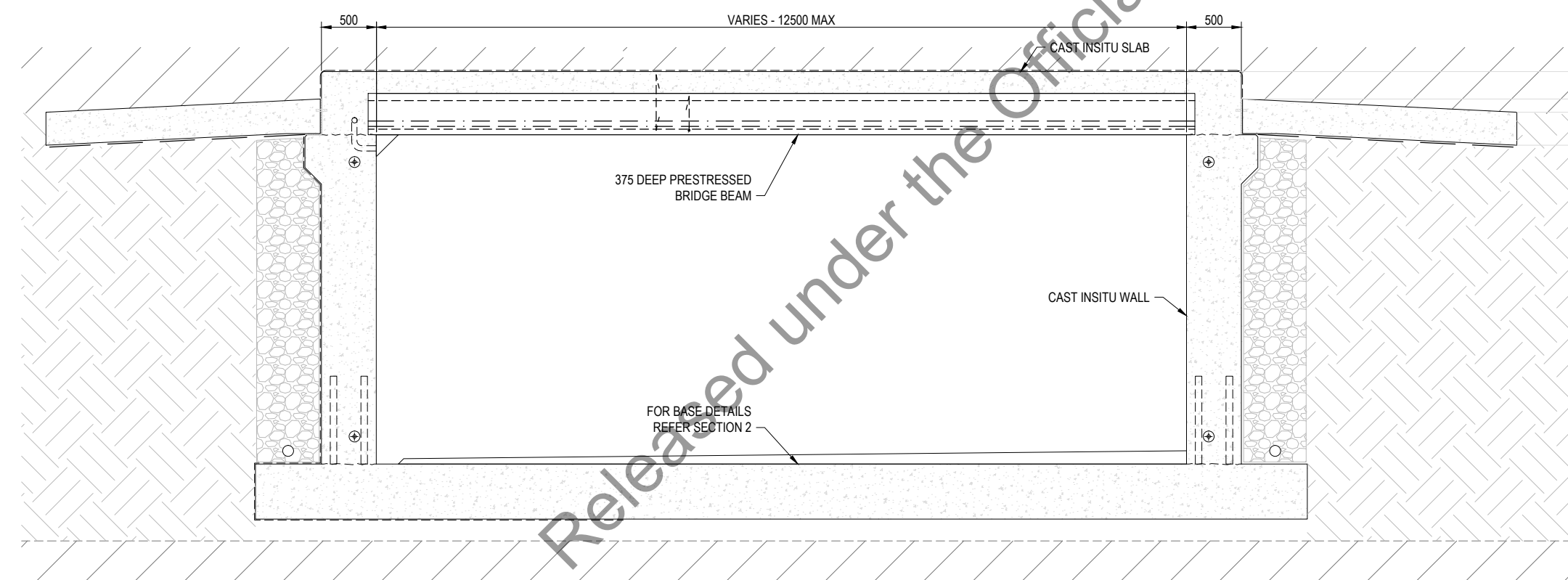


SECTION 1
SCALE 1:50 (A3) 8101
TYPICAL UNDERPASS SECTION

WATERPROOFING ALL AROUND BOX. TYPICALLY BENTONITE WRAP ALL AROUND + SEALS AT PRECAST PANEL JOINTS
GROUND IMPROVEMENTS (FOR DETAILS REFER GEOTECHNICAL PRICING PACK)



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



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

DATE: 03/03/2019 4:20:10 PM. LOGIN NAME: CONNOR, DAVID C. LOCATION: C:\users\connor\appdata\local\temp\work\jacobsonz\el014559822-DRG-BR05-8511.dwg

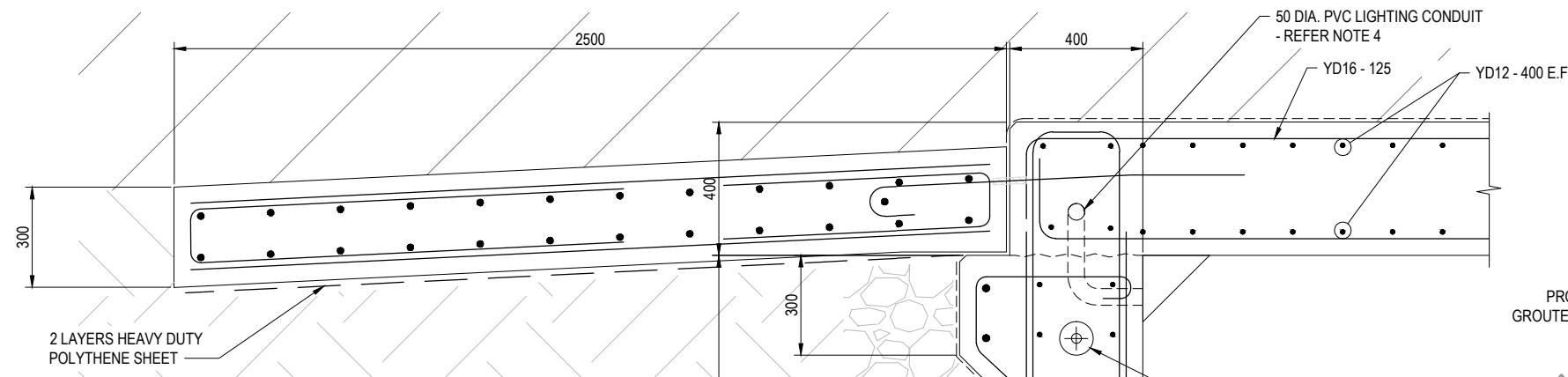
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D					
C					
B					
A	08/03/19	GKK	PWC	LW	PRELIMINARY
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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1:50 @ A3					



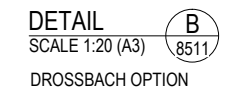
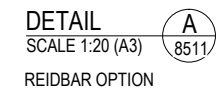
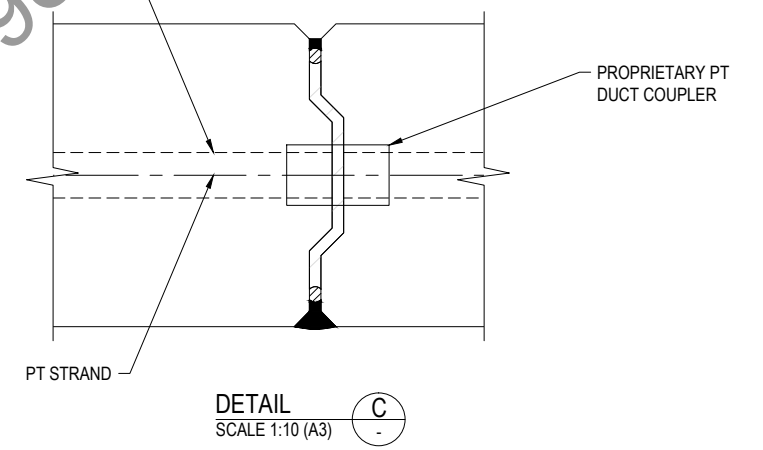
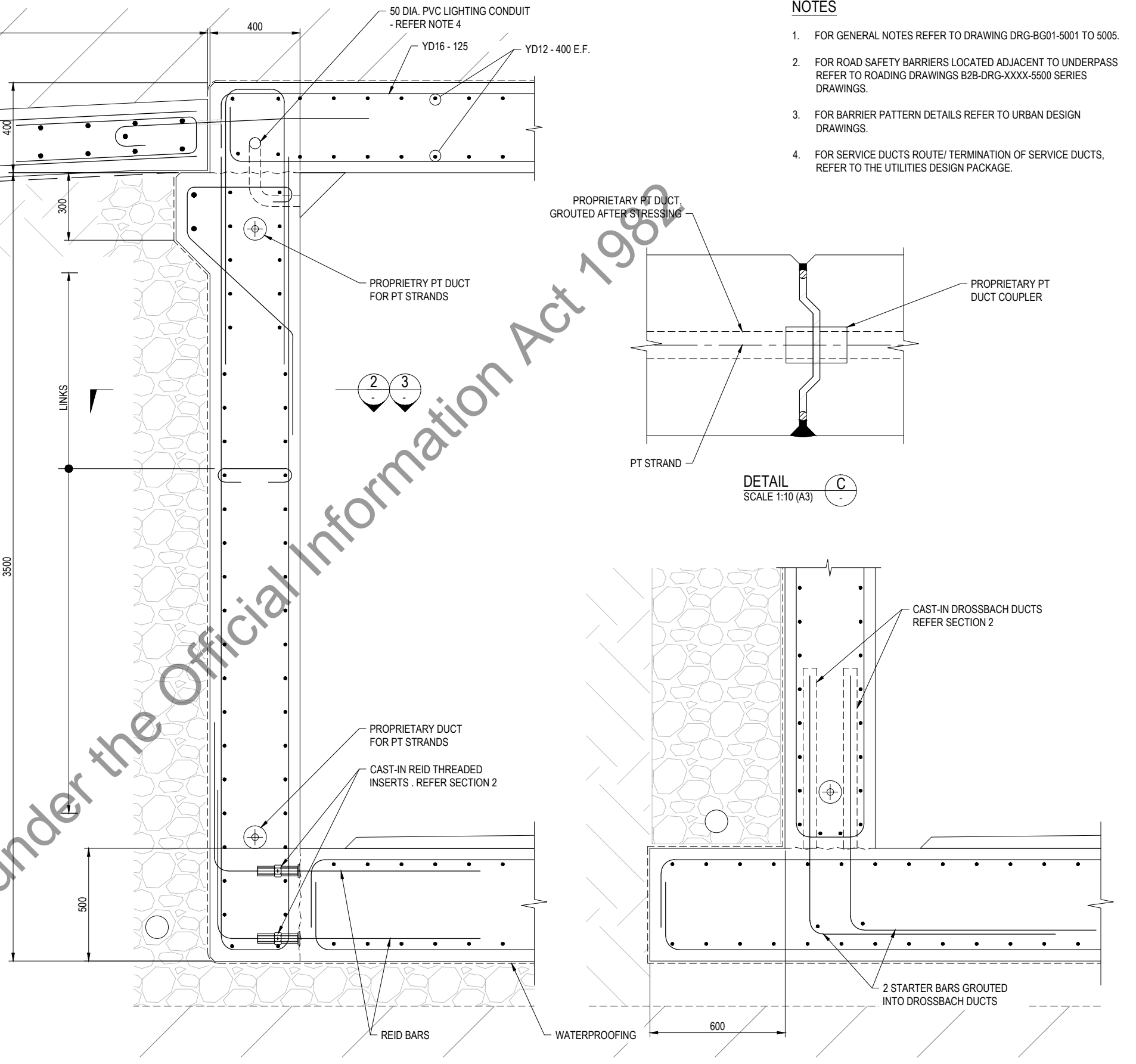
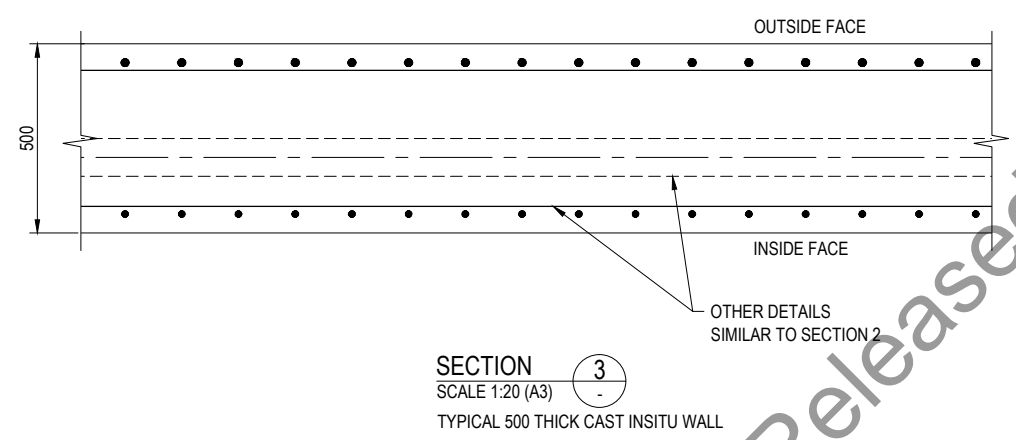
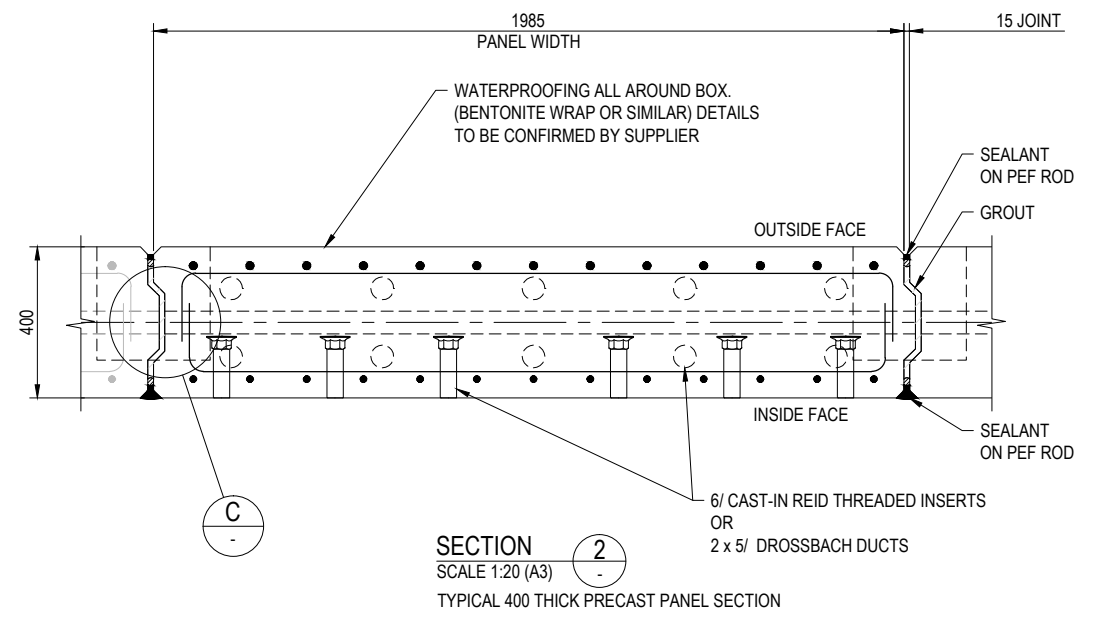
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STATUS FOR INFORMATION
PROJECT NUMBER 2/09-024/603

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

TITLE BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS
DRAWING No B2B-DRG-BR05-8511
REV A



- NOTES**
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
 2. FOR ROAD SAFETY BARRIERS LOCATED ADJACENT TO UNDERPASS REFER TO ROADING DRAWINGS B2B-DRG-XXXX-5500 SERIES DRAWINGS.
 3. FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
 4. FOR SERVICE DUCTS ROUTE/ TERMINATION OF SERVICE DUCTS, REFER TO THE UTILITIES DESIGN PACKAGE.



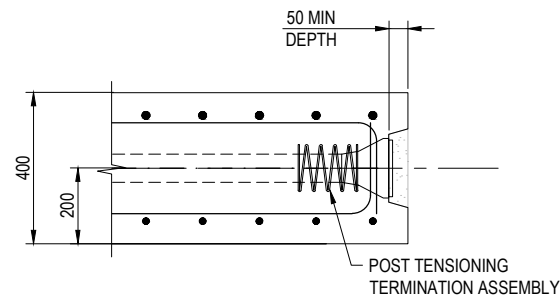
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1:20 @ A3					

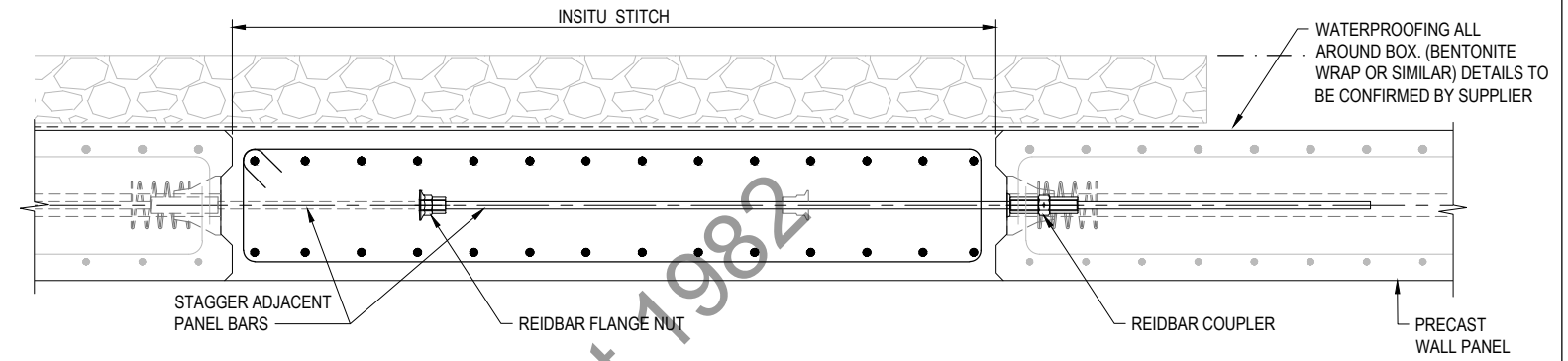
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				STATUS	FOR INFORMATION											
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NOTES

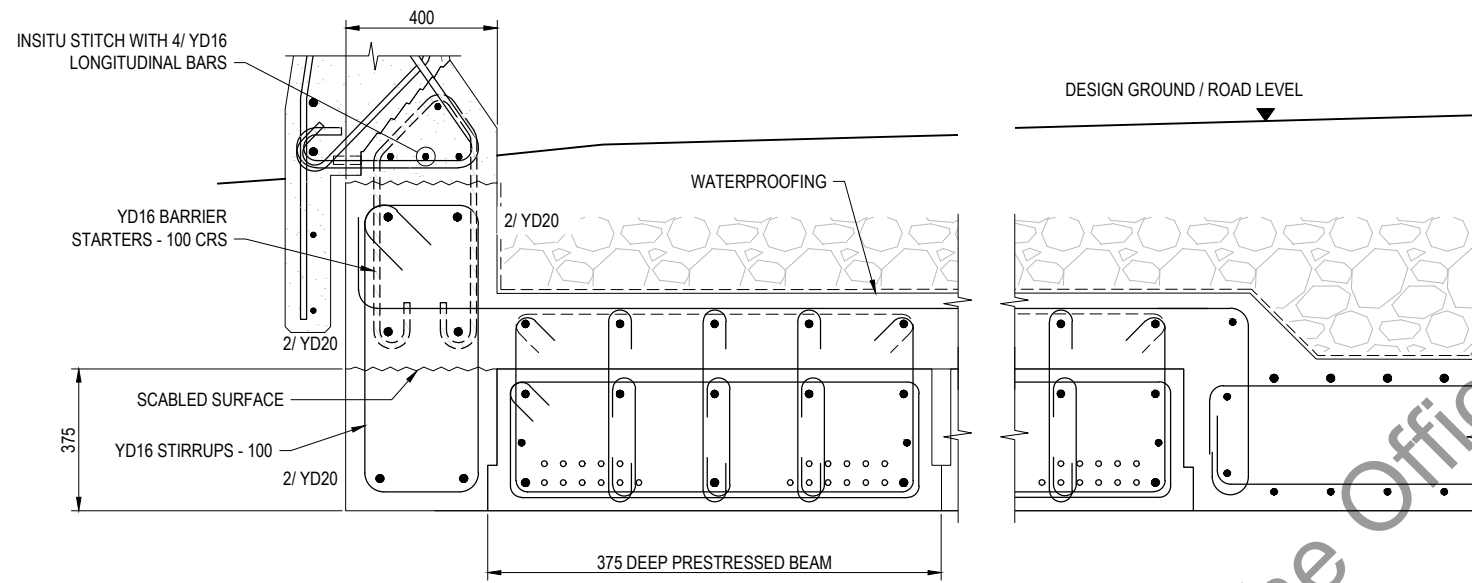
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.



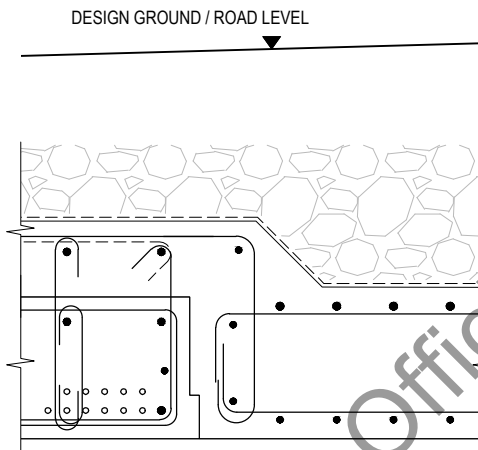
SECTION 2
SCALE 1:20 (A3) 8501
POST TENSIONING TERMINATION
AT STITCH PANEL & END PANEL



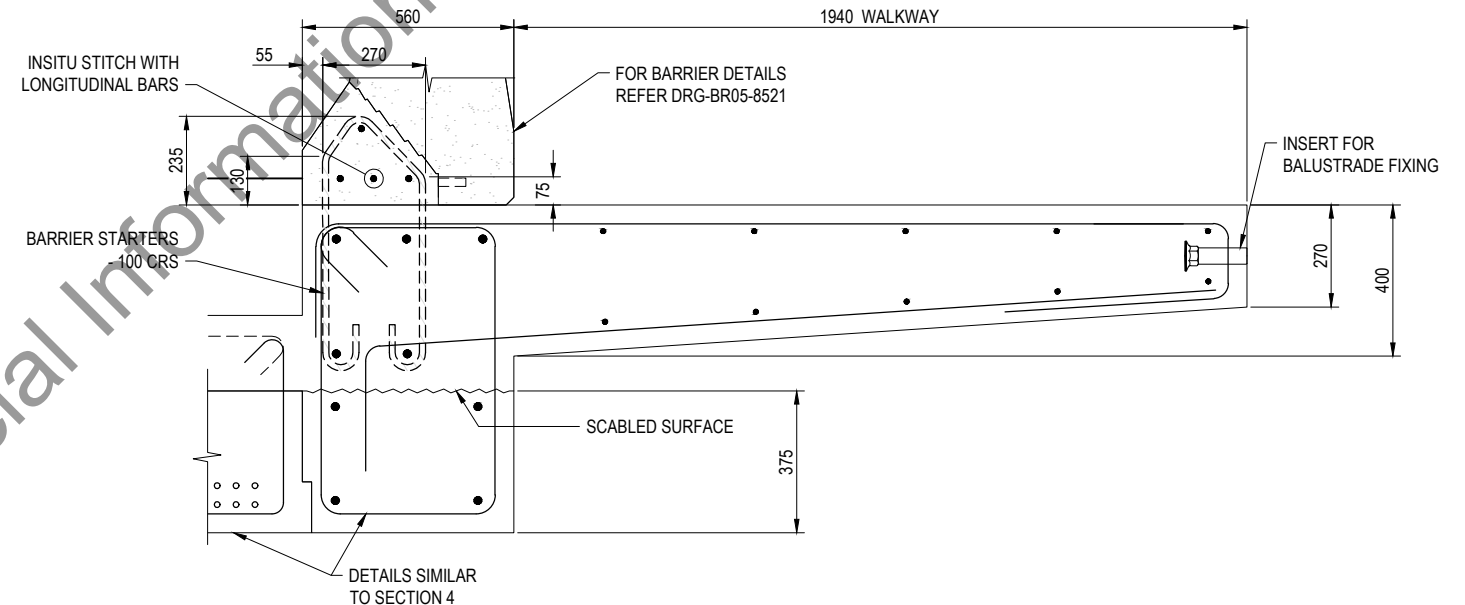
SECTION 3
SCALE 1:20 (A3) 8501
WALL STITCH DETAIL



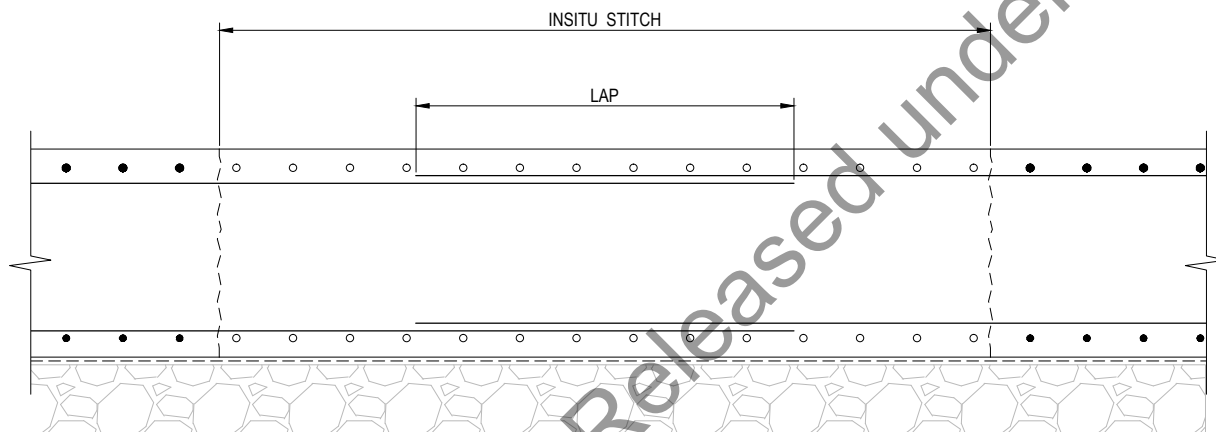
DETAIL 4
SCALE 1:20 (A3) 8501



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



DETAIL 6
SCALE 1:20 (A3) 8501



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

DATE: 08/03/2019 5:00:24 PM. LOGIN NAME: CONNOR, DAVID C. LOCATION: C:\users\connor\appdata\local\temp\pwworkspace\jacobsonz\1401455982\2B-DRG-BR05-8513.dwg

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A	08/03/19	GKK	PWC	LW	PRELIMINARY
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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1:20 @ A3	0	100	200	300	400



SCALE 1:400 (A3)
STATUS FOR INFORMATION
PROJECT NUMBER 2/09-024/603

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

TITLE BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS

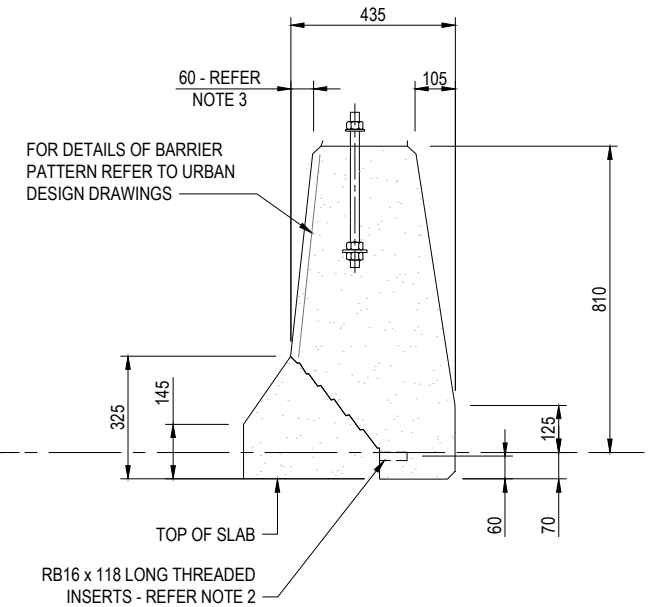
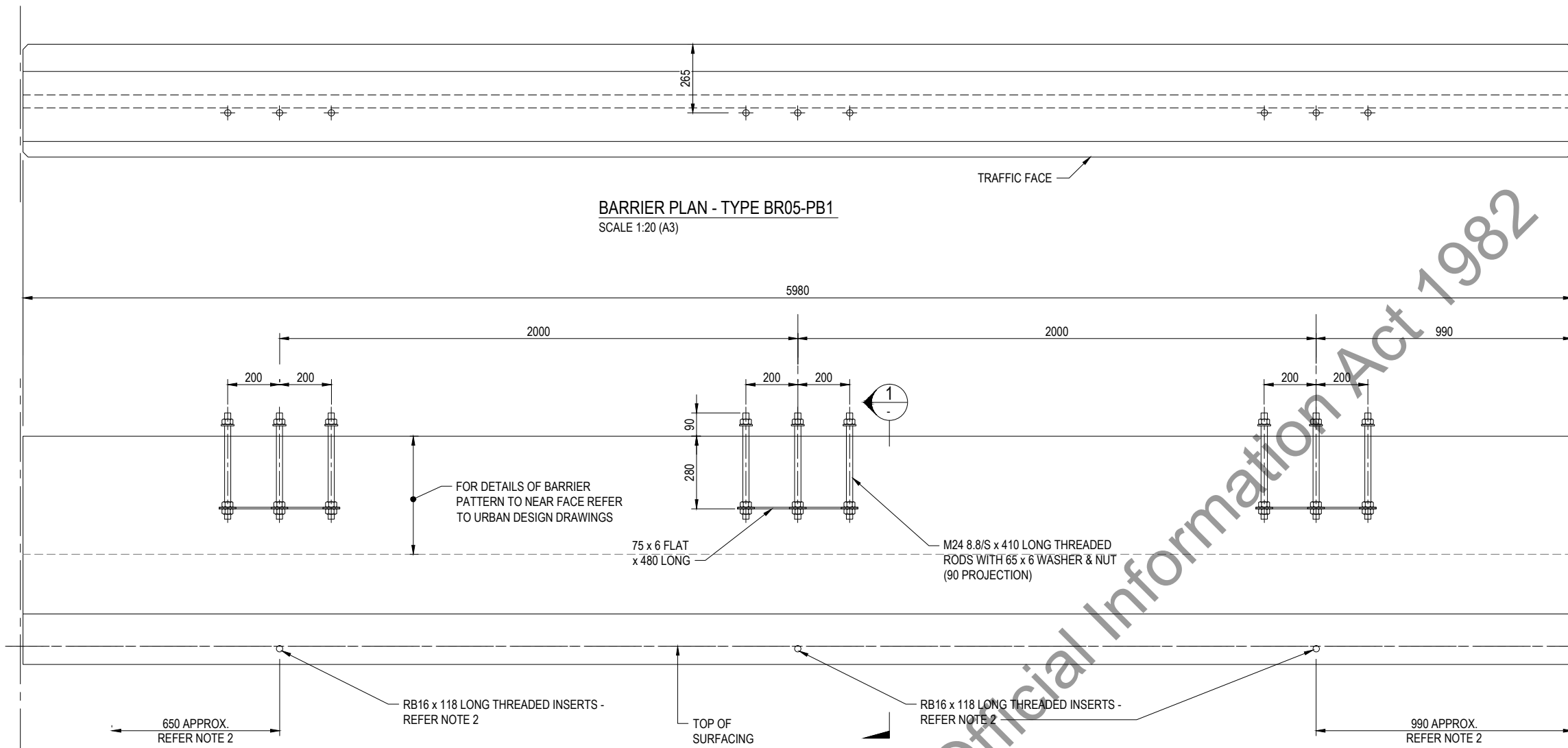
DRAWING No B2B-DRG-BR05-8513

REV A

NOTES

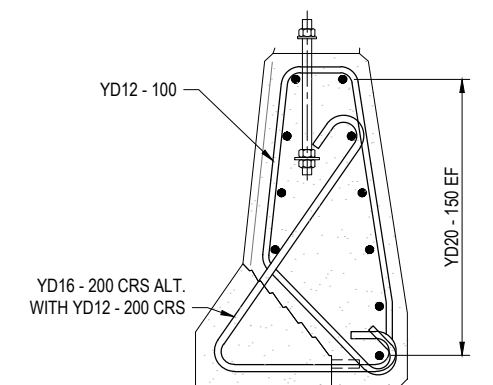
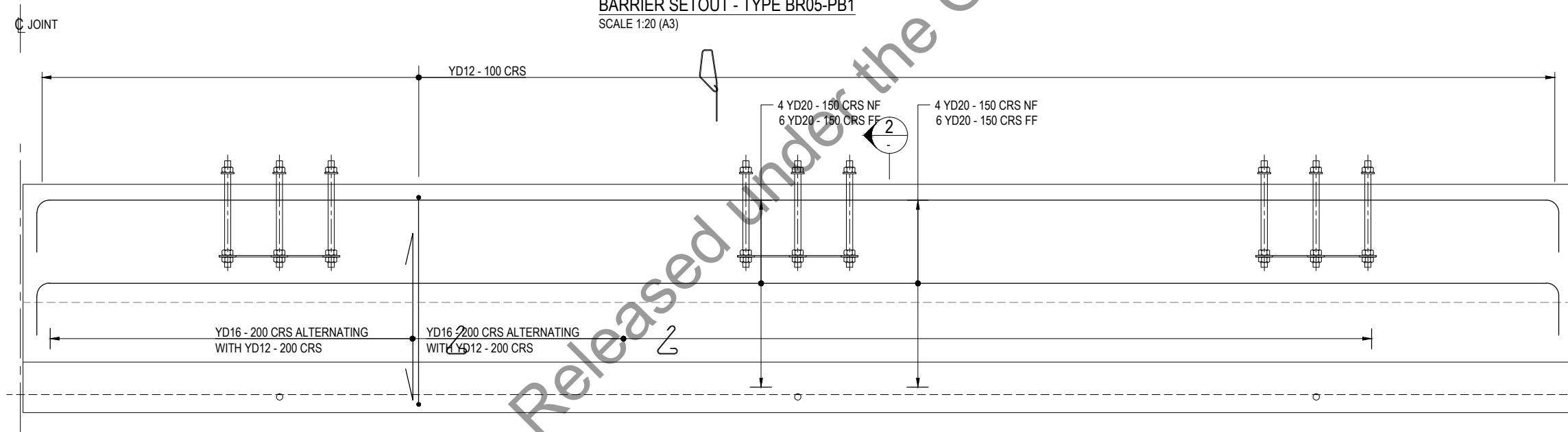
- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
- PROVIDE RB16 x 118 LONG THREADED INSERTS (PART No. RBA16T1) CAST INTO BARRIER TO RECEIVE HORIZONTAL REID BAR FOR TEMPORARY SUPPORT. ADJUST HORIZONTAL POSITION TO AVOID BARRIER VERTICAL BARS IF REQUIRED.
- FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
- ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)

BARRIER PLAN - TYPE BR05-PB1
SCALE 1:20 (A3)



SECTION 1
SCALE 1:20 (A3)

BARRIER SETOUT - TYPE BR05-PB1
SCALE 1:20 (A3)



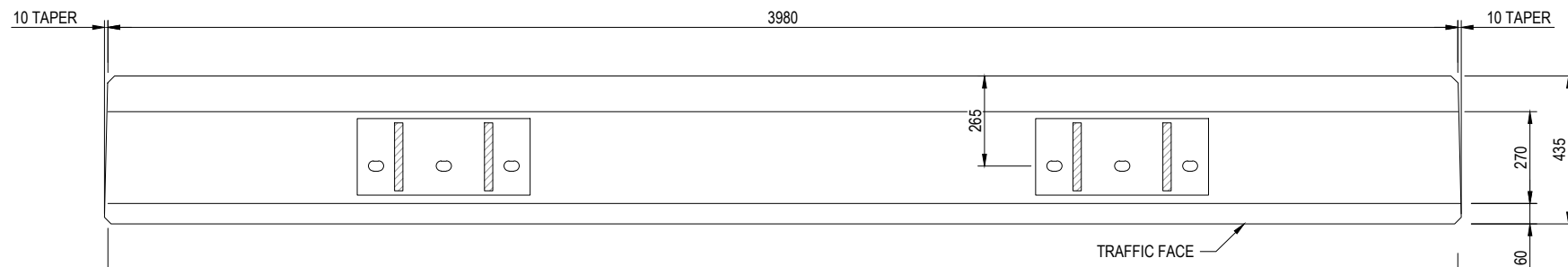
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SCALE 1:20 (A3)

BARRIER REINFORCEMENT - TYPE BR05-PB1
SCALE 1:20 (A3)

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A	08/03/19	GKK	PWC	LW	PRELIMINARY
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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1:10 @ A3					

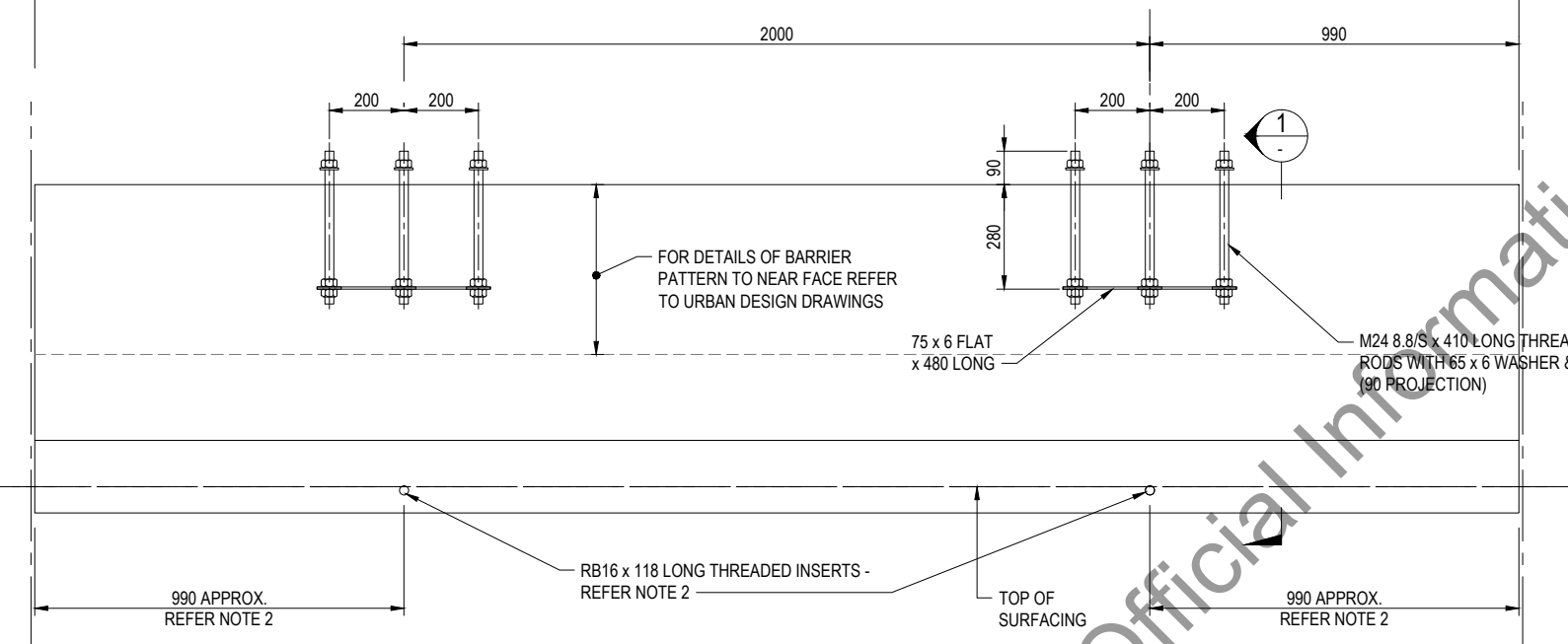
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				STATUS	FOR INFORMATION		
				PROJECT NUMBER	2/09-024/603	DRAWN	DCC
						DRAWING CHECK	GKK
						DESIGNED	SKK
						DESIGN REVIEW	PWC
						APPROVED	LW
							FEB 2019
						DRAWING No.	B2B-DRG-BR05-8521
						REV	A



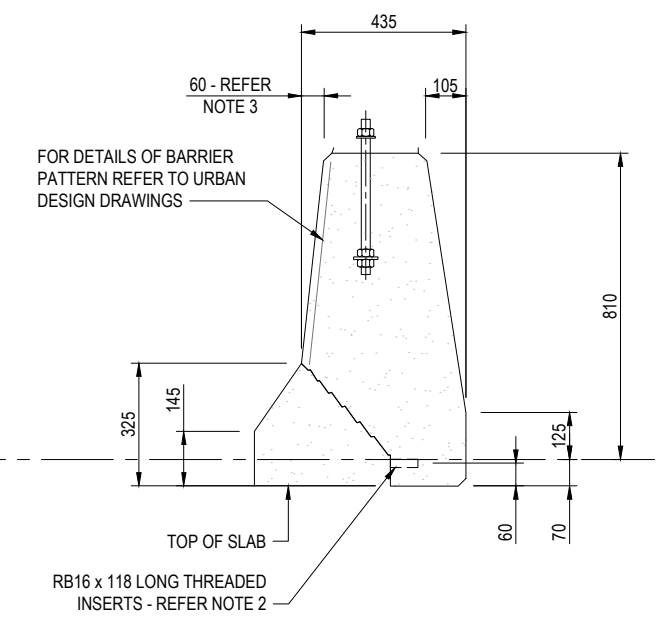
BARRIER PLAN - TYPE BR05-PB2
SCALE 1:20 (A3)

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-5001 TO DRG-BG01-5005.
- 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.
- FOR BARRIER INTERIOR PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
- ALL STEELWORK COMPONENTS TO BE HOT DIP GALVANISED TO HDG-600 IN ACCORDANCE WITH THE SPECIFICATION FOR STRUCTURAL STEELWORK. (REFER B2B-S-SP-5650)



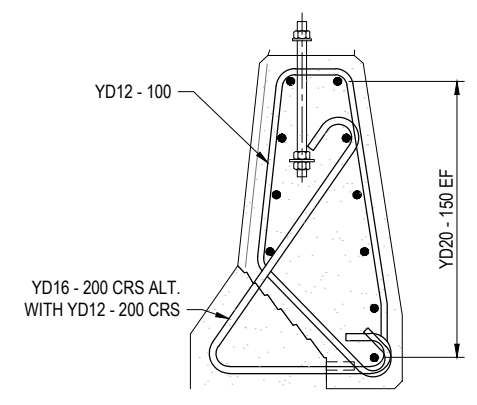
BARRIER SETOUT - TYPE BR05-PB2
SCALE 1:20 (A3)



SECTION 1
SCALE 1:20 (A3)



BARRIER REINFORCEMENT - TYPE BR05-PB2
SCALE 1:20 (A3)



SECTION 2
SCALE 1:20 (A3)

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B					
A	08/03/19	GKK	PWC	LW	PRELIMINARY
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
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1:10 @ A3					



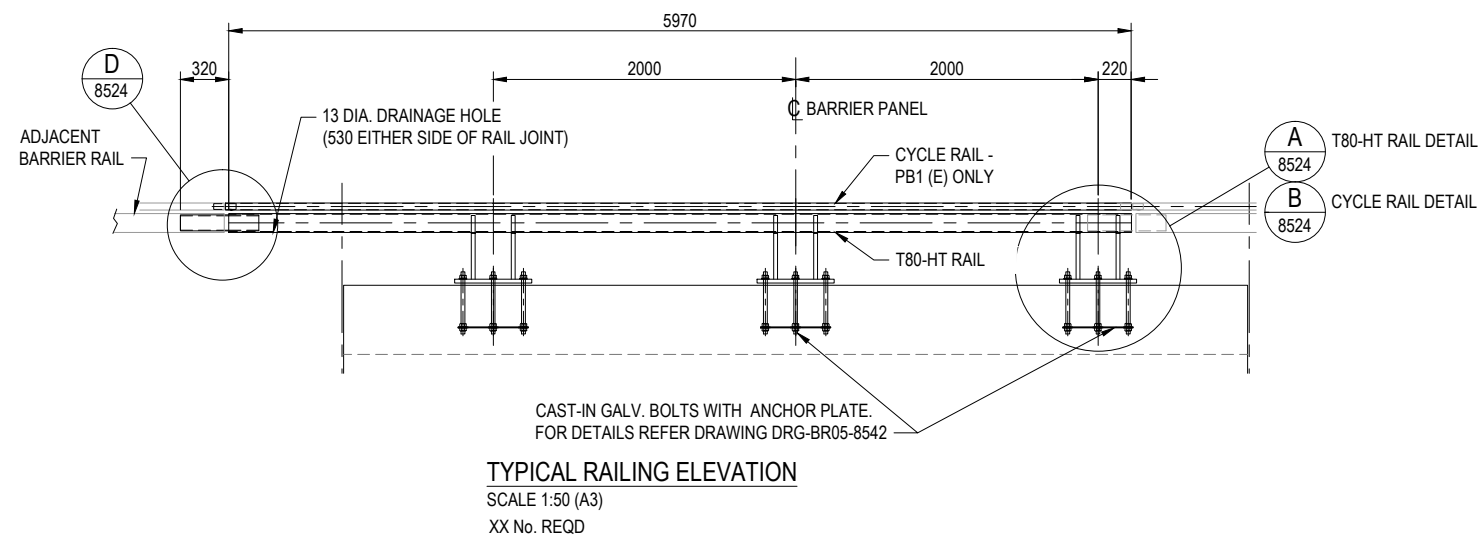
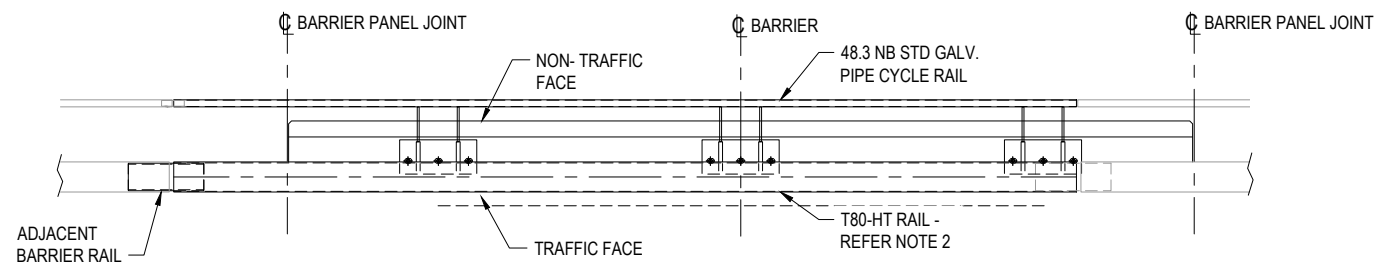
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STATUS: FOR INFORMATION
PROJECT NUMBER: 2/09-024/603

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

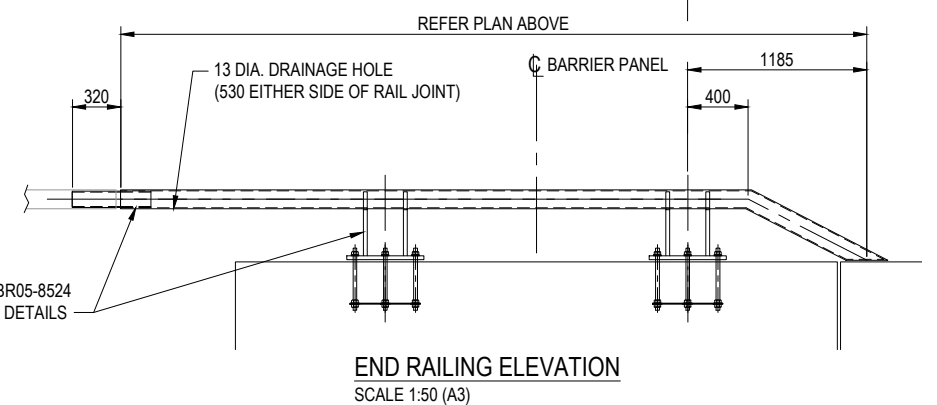
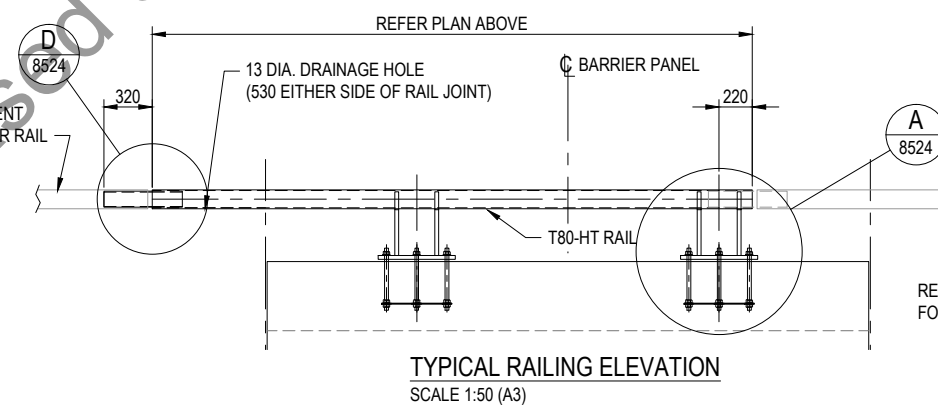
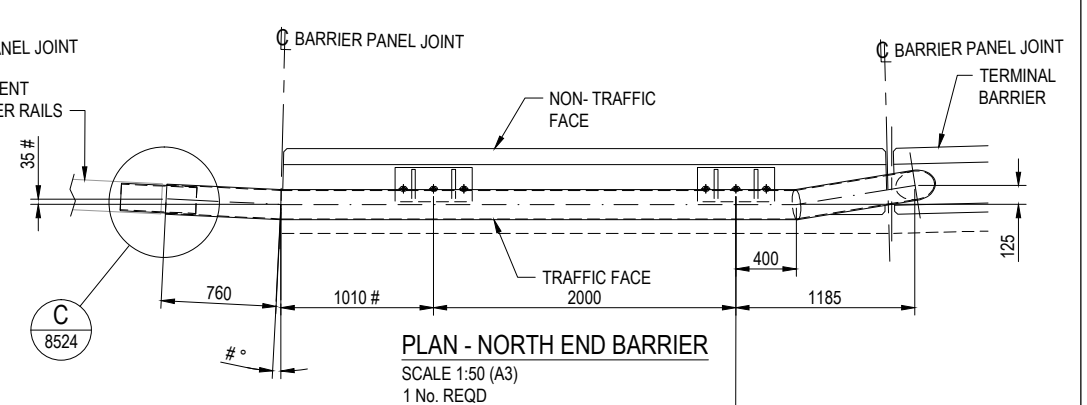
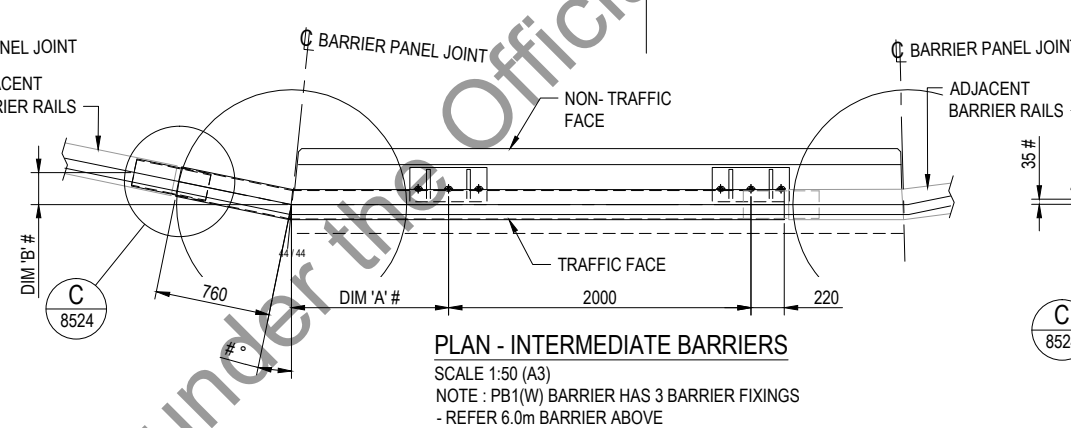
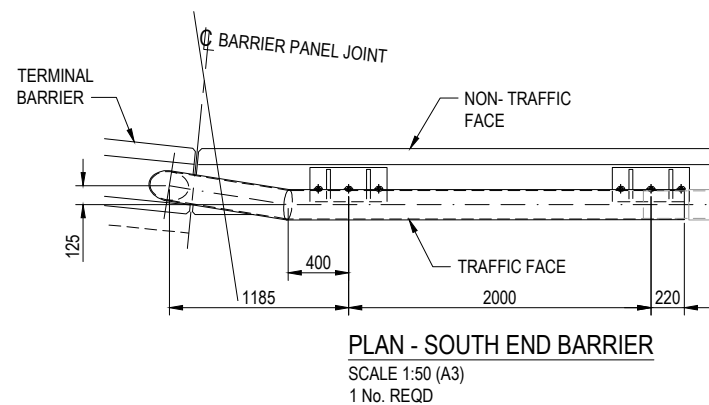
TITLE: BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS TYPE BR05-PB2, PB3 & PB4
DRAWING No: B2B-DRG-BR05-8522
REV: A

NOTES

- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
- 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.
- # - DENOTES DIMENSIONS TO BE CHECKED ON SITE PRIOR TO FABRICATION OF RAIL



RAIL SCHEDULE		
BARRIER TYPE	DIM 'A'	DIM 'B'
PB2	REFER NORTH END PLAN BELOW	
PB2	1010	18
PB1 (W)	1000	18
PB2	1010	37
PB2	1010	37
PB2	1005	95
PB4	1040	95
PB3	1040	152
PB4	1040	152
PB4	1040	95
PB3	REFER SOUTH END PLAN BELOW	

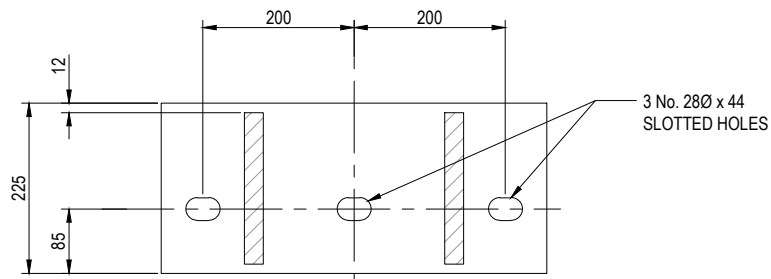


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D					
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B					
A	08/03/19	GKK	PWC	LW	PRELIMINARY
No.	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES
1:25 @ A1					
1:50 @ A3					

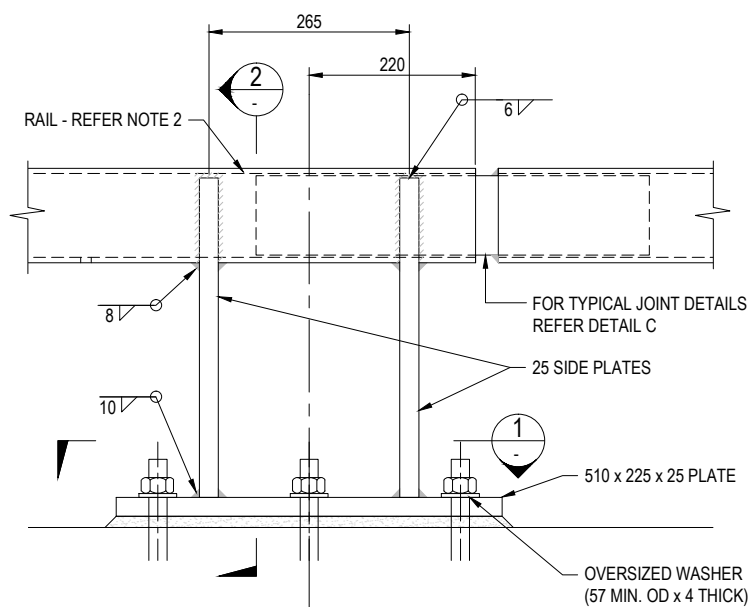
<p>NZ TRANSPORT AGENCY WAKA KOTAHĪ</p>	<p>CPB CONTRACTORS</p>	<p>JACOBS</p>	<p>Tonkin+Taylor</p>	SCALE 1:20 (A3)	CLIENT NZ TRANSPORT AGENCY	TITLE BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 1	
				STATUS FOR INFORMATION	PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)		
				PROJECT NUMBER 2/09-024/603	DRAWN DCC	DRAWING CHECK GKK	APPROVED LW FEB 2019
					DESIGNED SKK	DESIGN REVIEW PWC	DRAWING No. B2B-DRG-BR05-8523

REV A

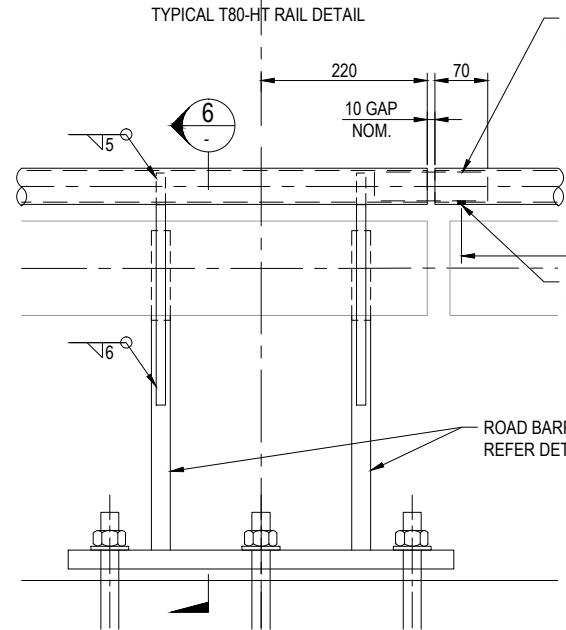


- NOTES**
- FOR GENERAL NOTES REFER DRAWINGS DRG-BG01-001 TO 5005.
 - BARRIER RAIL TO BE -
EITHER 150 NB ULTRAPIPE C350LO AS/NZS1163,
OR 6" DIAMETER STEEL PIPE ASTM A53 TYPE E OR S, GRADE B
OR 6 5/8" O.D. PIPE x .188" API-5LX52
AND ROLLED TO 203 WIDE x 124 DEEP ELLIPTICAL SHAPE.
 - # - DENOTES DIMENSIONS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

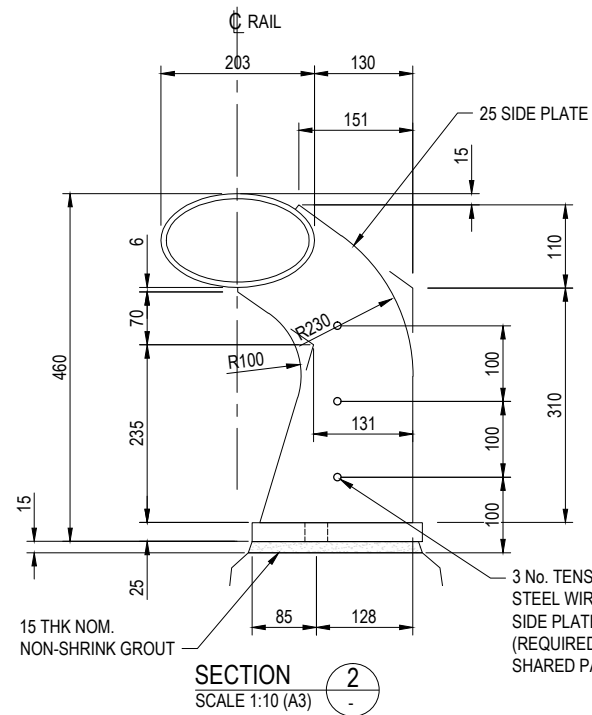
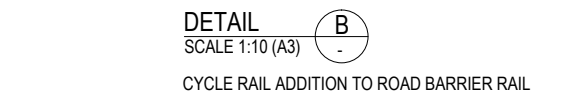
SECTION 1
SCALE 1:10 (A3)



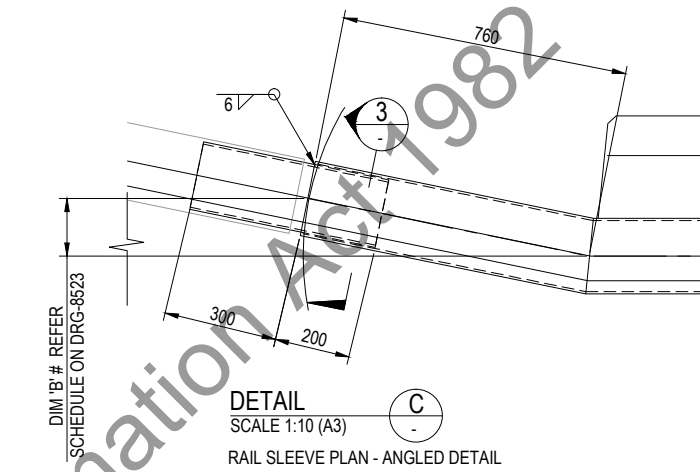
DETAIL A
SCALE 1:10 (A3)
TYPICAL T80-HT RAIL DETAIL



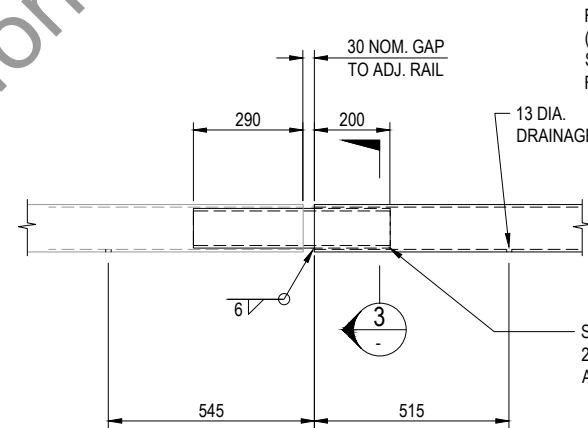
DETAIL B
SCALE 1:10 (A3)
CYCLE RAIL ADDITION TO ROAD BARRIER RAIL



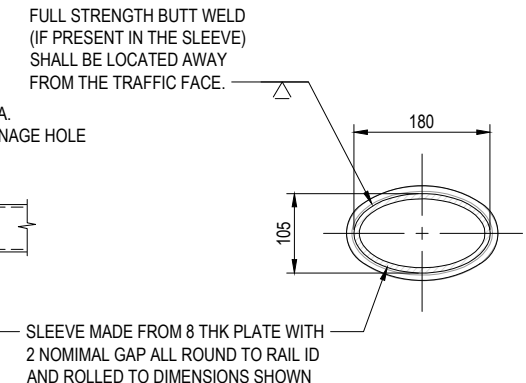
SECTION 2
SCALE 1:10 (A3)



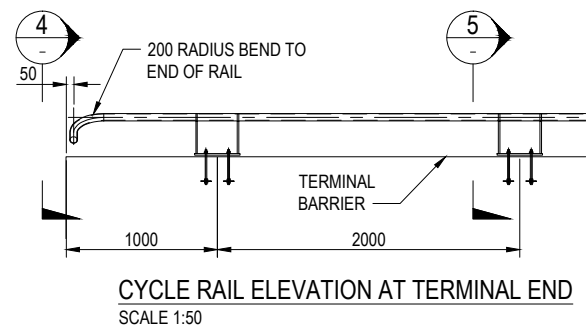
DETAIL C
SCALE 1:10 (A3)
RAIL SLEEVE PLAN - ANGLED DETAIL



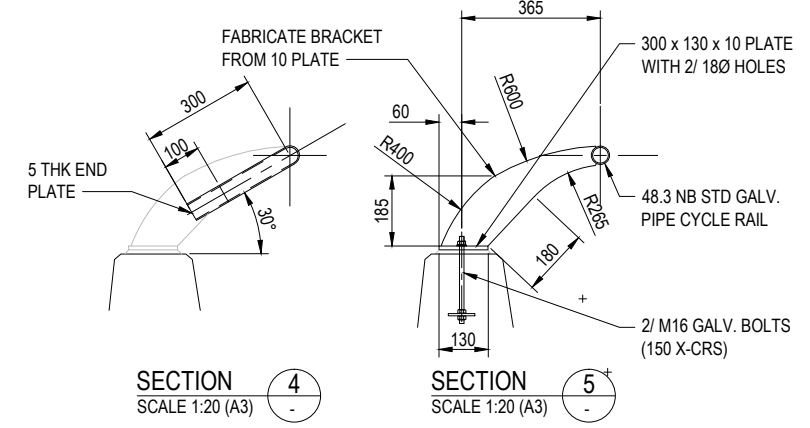
DETAIL D
SCALE 1:20 (A3)
TYPICAL RAIL SLEEVE ELEVATION



SECTION 3
SCALE 1:10 (A3)



SECTION 4
SCALE 1:20 (A3)



SECTION 5
SCALE 1:20 (A3)

Released under the Official Information Act 1982

1:10 @ A1	0	100	200	300	400	500	600	700	800	900	1000	mm
1:20 @ A3	0	400	800	1200	1600	2000	2400	mm				

E												
D												
C												
B												
A	08/03/19	GKK	PWC	LW	PRELIMINARY							
No	DATE	DRG CHECK	DESIGN REVIEW	APP'D D.MGR	REVISIONS & ISSUES							
1:5 @ A1	0	50	100	150	200	250	300	350	400	450	500	mm
1:10 @ A3												



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

CLIENT NZ TRANSPORT AGENCY
PROJECT BAYPARK TO BAYFAIR LINK (BAY LINK)
DRAWN DCC
DESIGNED SKK

TITLE BR05 - PEDESTRIAN UNDERPASS PRECAST BARRIERS STEELWORK DETAILS - SHEET 2
DRAWING No B2B-DRG-BR05-8524
REV A

DATE: 08/03/19 5:45:44 PM. LOGIN NAME: CONNOR, DAVID C. LOCATION: C:\users\connor\appdata\local\temp\workspace\proj\br05-8524.dwg

Skech No 1

Key - Drainage

NOTES

- ① 110φ draincoil wrapped with filter sock (at 3.8m RL)
 - ② 110φ draincoil wrapped with filter sock (at 2.0m RL)
 - ③ Geotextile (A-29 or similar)
 - ④ Vertical strip drainage cells wrapped with Geotextile.
1. FOR GENERAL NOTES REFER TO DRAWING DRG-BG01-5001 TO 5005.
 FOR ROAD SAFETY BARRIERS LOCATED ADJACENT TO UNDERPASS REFER TO ROADING DRAWINGS B2B-DRG-XXXX-5500 SERIES DRAWINGS.
 FOR BARRIER PATTERN DETAILS REFER TO URBAN DESIGN DRAWINGS.
 FOR SERVICE DUCTS ROUTE/TERMINATION OF SERVICE DUCTS, REFER TO THE UTILITIES DESIGN PACKAGE.

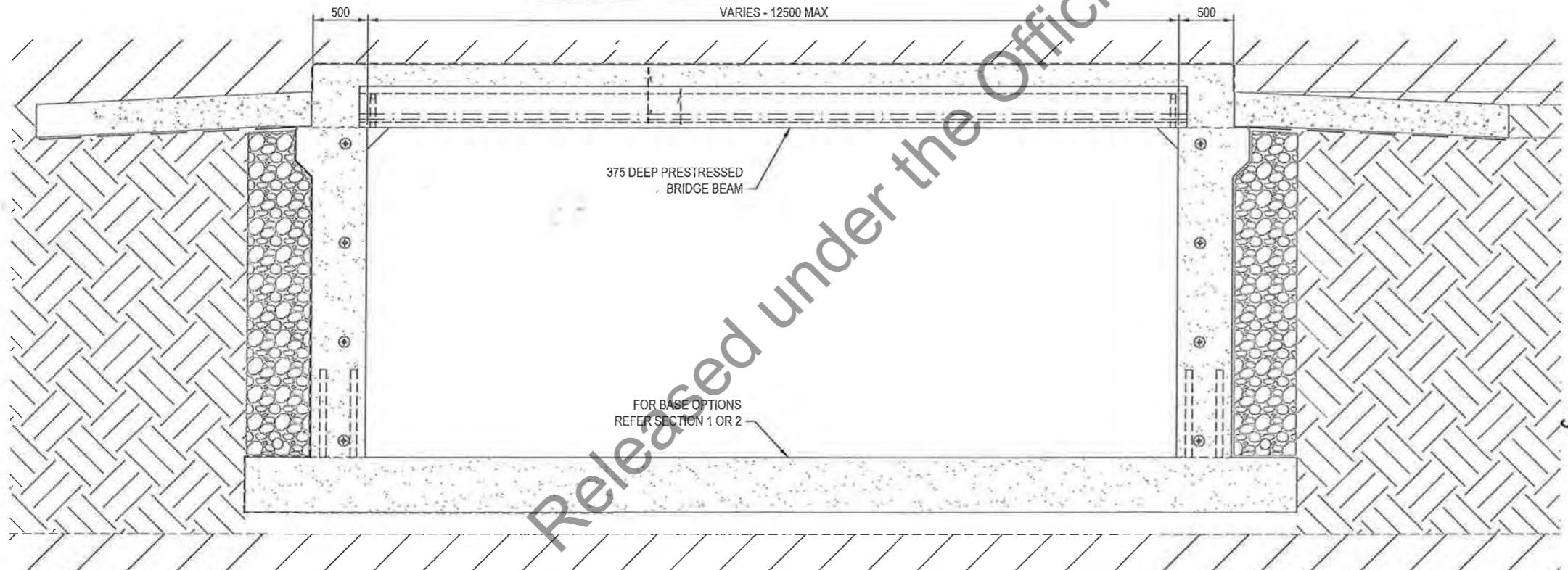


Figure 1

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

WATERPROOFING ALL AROUND BOX. TYPICALLY BENTONITE WRAP ALL AROUND + SEALS AT PRECAST PANEL JOINTS
 GROUND IMPROVEMENTS (FOR DETAILS REFER GEOTECHNICAL PRICING PACK)

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



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

Notes - Drainage

1. The Underpass is sealed from external water pressure upto a maximum level of 6.0m RL.
2. Groundwater is generally at & below 3.80m RL. It has risen to 4.80m RL during rare events.
3. It is not proposed to pump groundwater but provision is made to drain freely flowing groundwater to the sump wells (fig1) - (for future)
4. Draincoils at sump wells are end capped.

DATE: 20/09/2019 12:37:17 PM LOCAL NAME: COONAN, DAVID G LOCATION: C:\Users\connam\appdata\local\temp\proj\connam\br05_8511.dwg

E					
D					
C					
B					
A	XX	GKK	PWC	LW	PRELIMINARY
	DATE	CHK	DESIGN	APPD	DMGR
					REVISIONS & ISSUES
1:25 @ A1	0	400	800	1200	1600
1:50 @ A3	0	400	800	1200	2400

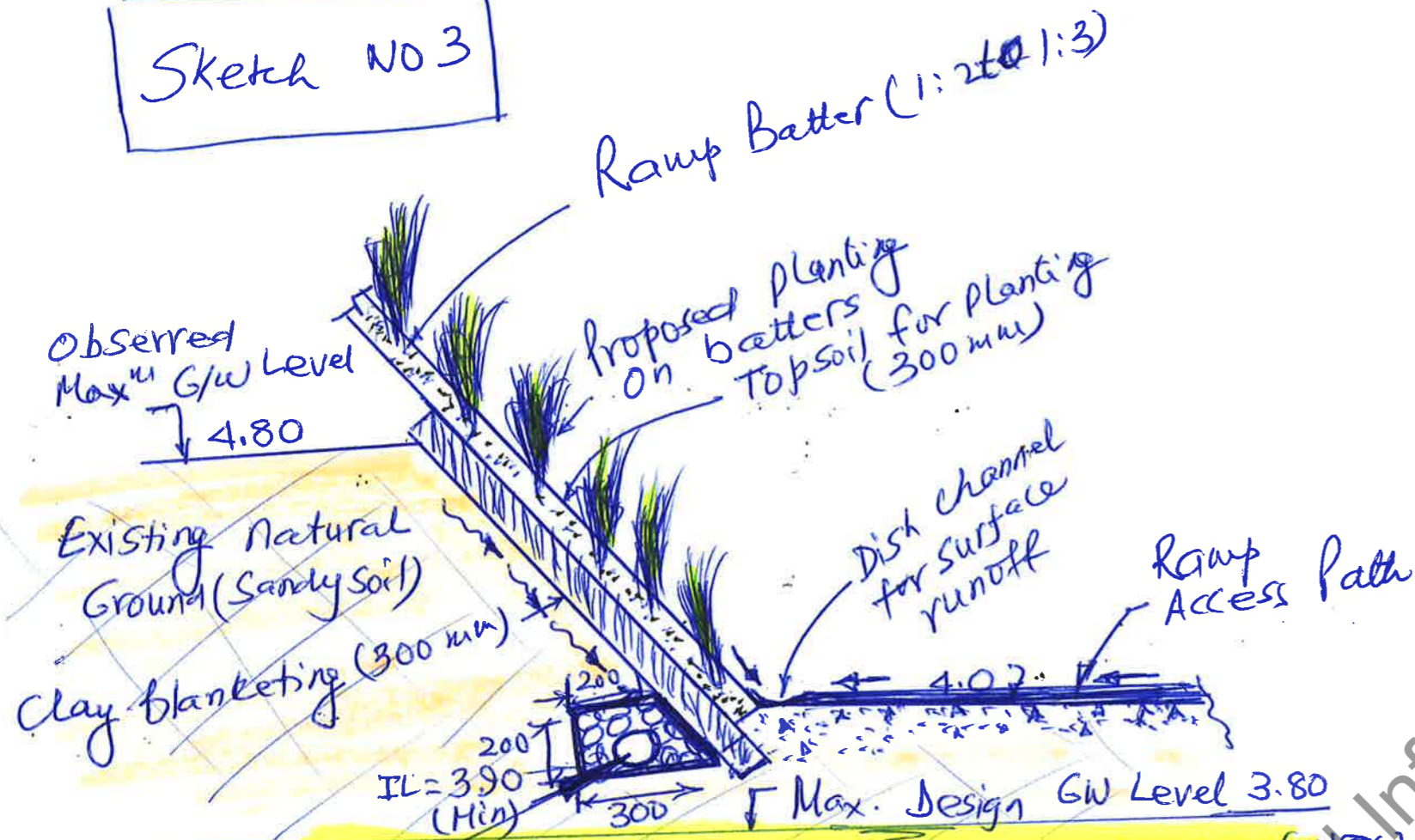


SCALE 1:400 (A3)
 STATUS FOR INFORMATION
 PROJECT NUMBER 2/09-024/603

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

TITLE BR05 - PEDESTRIAN UNDERPASS SECTIONS & DETAILS
 G/W Drainage - Future Provision
 DRAWING No B2B-DRG-BR05-8511
 A

Sketch NO 3



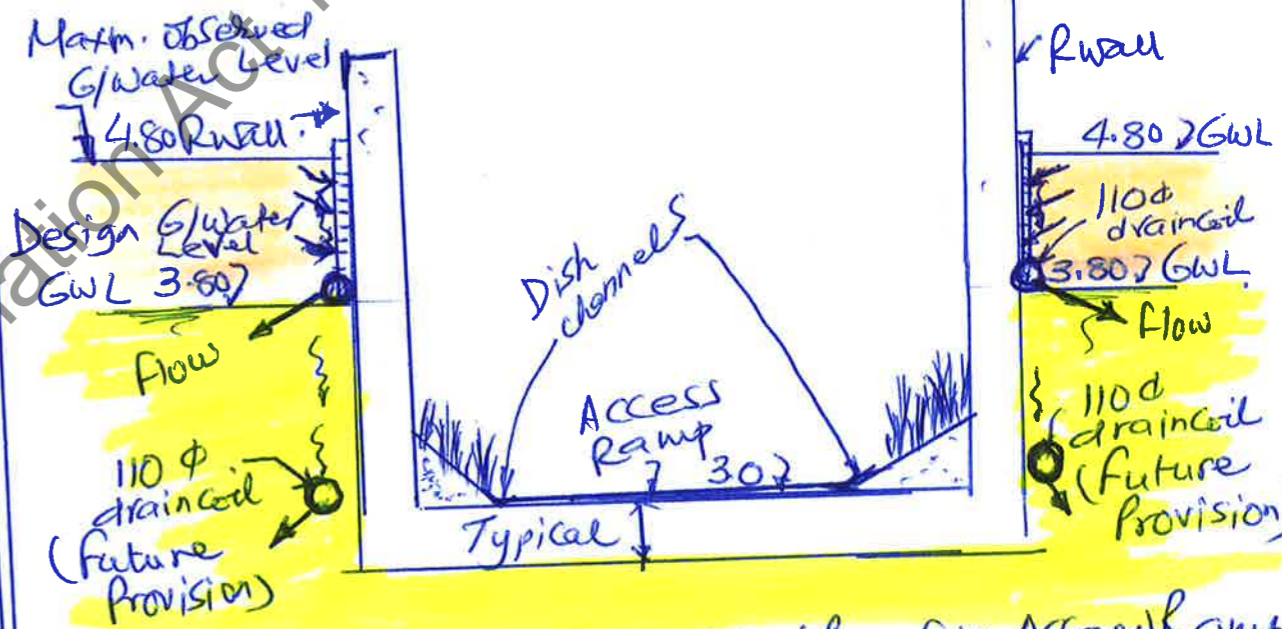
Typical Cross Section (NTS) (Matapahi access Ramp)

110 mm ϕ draincoil wrapped with filter sock. Discharge to Gravity flow chamber

Ground water Drainage from Access Ramp Batters.

Batter Drainage

Sketch NO 2



Typical C/S M80 (Bayfair Access) Ramp (NTS)

Retaining Wall Drainage

Notes

1. Rwalls and access ramps sealed for g/w upto 3.80m RL.
2. Vertical Strip drains (Atlantis drain or similar) are installed behind retaining walls to intercept freely draining groundwater between 3.80m RL and 4.80m RL.
3. The intercepted g/w is discharged to gravity flow chamber from where it discharges to MH SP1.2 by gravity.