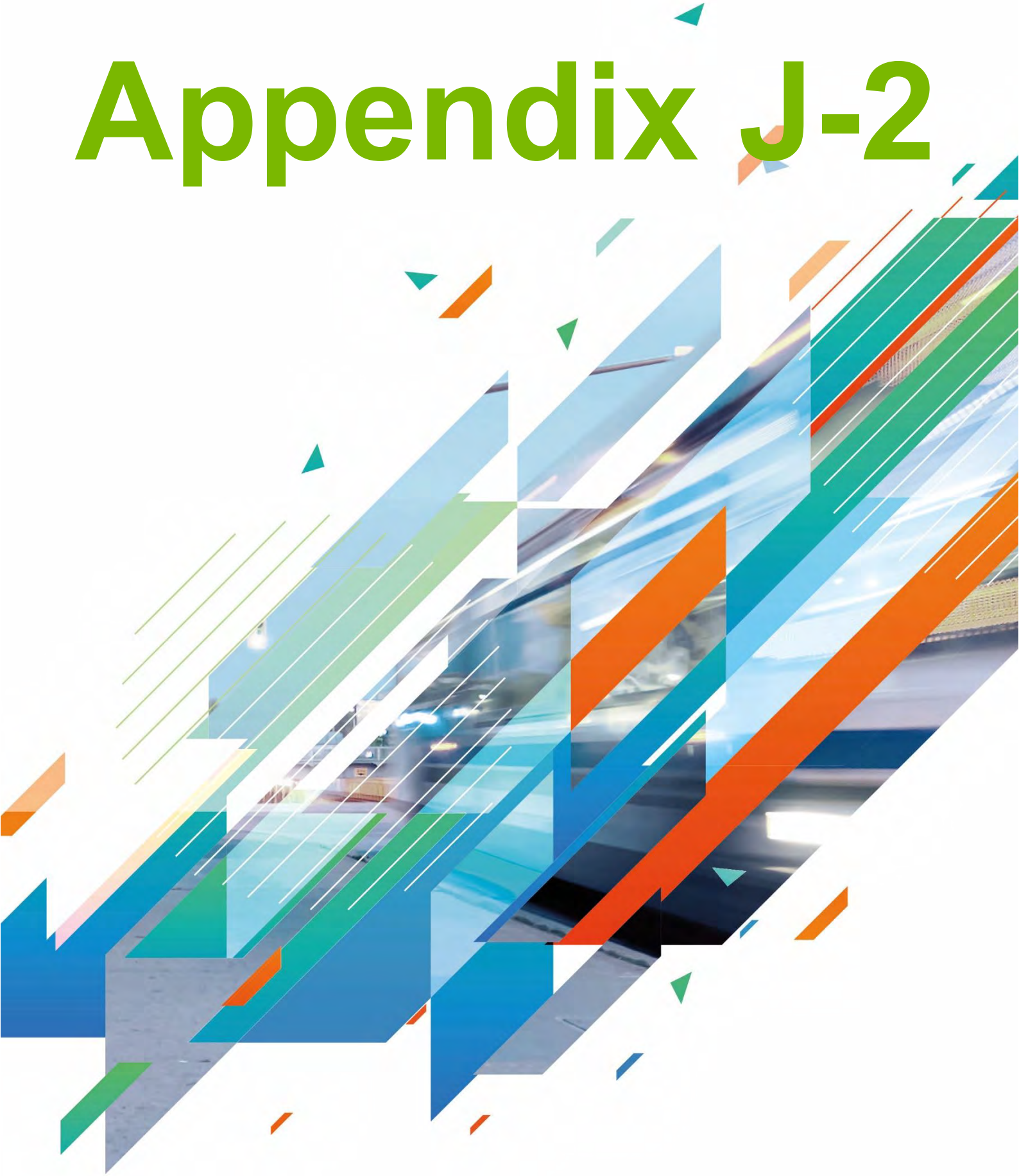
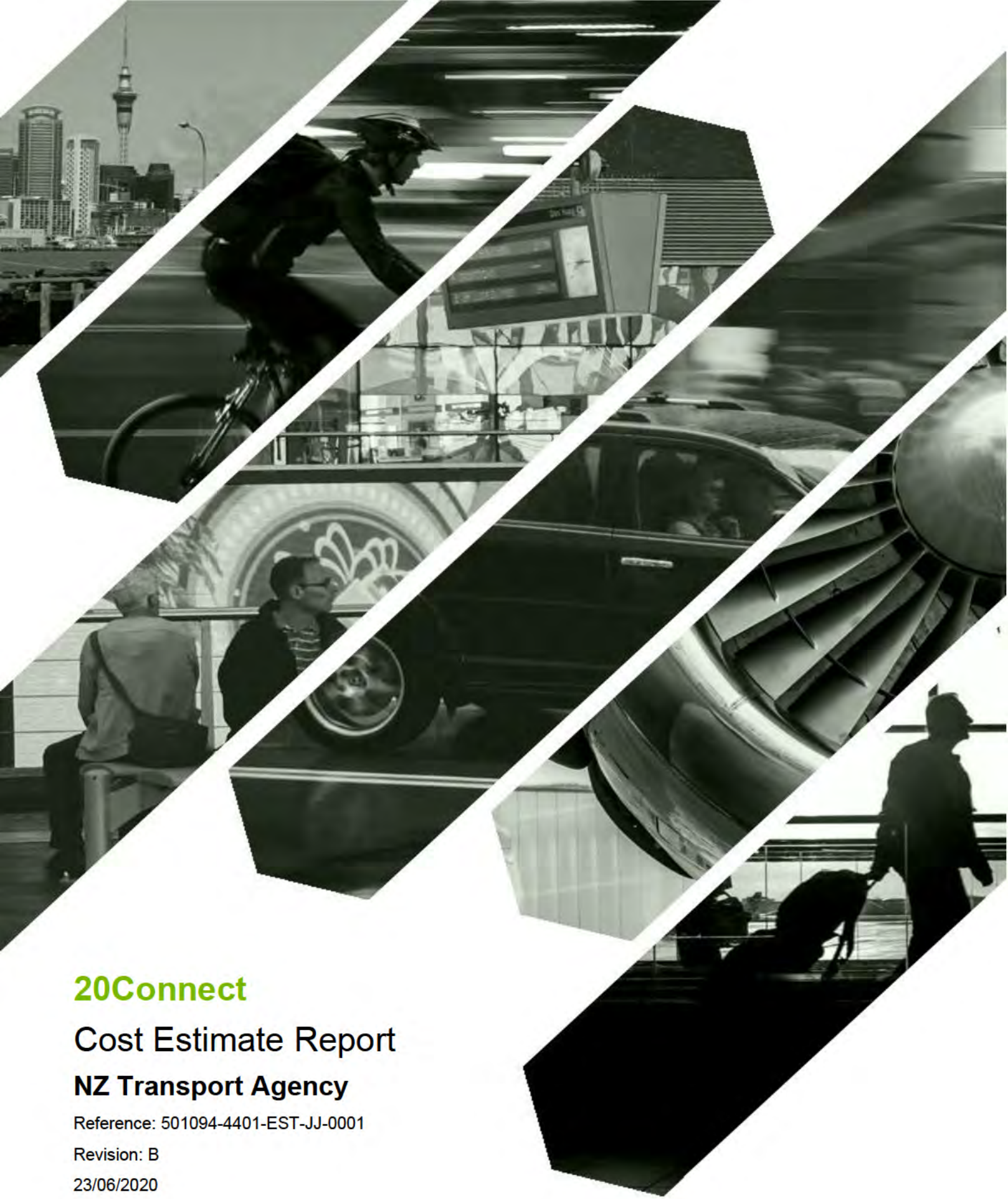
Appendix J-2



20Connect Cost Estimate Report

Appendix J-2
20Connect Cost Estimate Report



20Connect

Cost Estimate Report

NZ Transport Agency

Reference: 501094-4401-EST-JJ-0001

Revision: B

23/06/2020

NZ TRANSPORT AGENCY
WAKA KOTAHI

aurecon

Document control record

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B	23/06/2020	Update following client review	[redacted]	[redacted]	[redacted]	[redacted]
A	12/05/2020	Draft issue for SSBC	[redacted]	[redacted]	[redacted]	[redacted]
Current revision		**B**				

Approval			
Author signature	[redacted]	Approver signature	[redacted]
Name		Name	
Title	Civil Engineer	Title	Project Director

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Glossary of Abbreviations

Abbreviation	Term
AIAL	Auckland International Airport Limited
AT	Auckland Transport
DBE	Detailed Business Case Estimate
DPS	Design Philosophy Statement
MMG	Manukau Memorial Gardens
MSQA	Management, Surveillance and Quality Assurance
NIMTR	North Island Main Trunk Railway
ONRC	One Network Road Classification
P&G	Preliminary and General
RTC	Rapid Transit Corridor
SH1	State Highway 1
SH20	State Highway 20
SH20A	State Highway 20A
SH20B	State Highway 20B
SSBC	Single-Stage Business Case
SUP	Shared Use Path
SWG	Southwest Gateway
SWGP	Southwest Gateway Programme
Transport Agency	Waka Kotahi NZ Transport Agency

1 Executive Summary

This report outlines the methodology taken to produce the Detailed Business Case Estimate (DBE) for the 20Connect (the Project) Single Stage Business Case (SSBC).

1.1 Property Costs

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

1.2 Construction Cost Estimate

[redacted]

[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

2 Introduction

2.1 General

This report highlights the methodology taken to produce the DBE for the 20Connect (the Project) Single Stage Business Case (SSBC).

The estimate was prepared by Aurecon New Zealand Limited (Aurecon) in accordance with the Transport Agency Cost Estimation Manual (SM014).

The report also references the Parallel Estimate undertaken by Alta Consulting and the baseline Property Costs produced by Align and Auckland Transport, both being engaged directly by the Transport Agency.

The estimate was undertaken during the 4th quarter of 2019 and developed from a supplied set of the preferred option drawings produced by Aurecon.

Aurecon engaged Construction Consulting Group Limited (CCG) to undertake the base estimate.

Additional scope has been accounted for as the Project has progressed. CCG have provided a base estimate for these, but a parallel estimate has not been undertaken.

The work undertaken to agree the base and parallel estimates reconciled the overall estimates, the direct costs and the uplift percentages. In order to provide a recommendation, the direct costs and uplift percentages provided by both estimators have been examined and amended to meet current expectations.

There are Project risks and opportunities that have been identified at this stage, which are to be carried over for further investigation and consideration in the pre-implementation stage.

2.2 Scope of Report

This report identifies the following:

- Summary of information provided to both estimators to ensure that a consistent approach is maintained whilst undertaking the estimation.
- Methodology and presentation of the base estimate, expected (P50), P95, and property estimates (including percentages to calculate fee's, overheads etc.).
- Alignment of the estimates with the staging extents (refer to Section 5.2)
- Expected (P50) Estimate and 95th Percentile (P95) Estimate
- Summary of risks and opportunities

3 Project Scope

The Transport Agency, alongside investment partners AT and Auckland International Airport Limited (AIAL) are investigating improvements to customer journey experiences and access to and from Auckland International Airport (Auckland Airport) and the surrounding area.

The 20Connect SSBC is part of the wider Southwest Gateway Programme (SWGP), which focuses on developing the transport networks resilience, journey reliability and mode choice. The study area encompasses the south-west area of Auckland including Westfield Manukau, the suburbs of Mangere, Puhinui, Manukau, as well as multiple schools, open spaces and commercial zones. Surrounding these significant attractors are medium density residential catchments. As such the potential demand for the study area is high.

The study area covers the section of SH20 located between the southern end of the Mangere bridge and Lambie Drive, and SH20A (east of Kirkbride Road interchange) and SH20B (east of Orrs Road). Figure 3-1 shows the location of these corridors in relation to the surrounding study area.

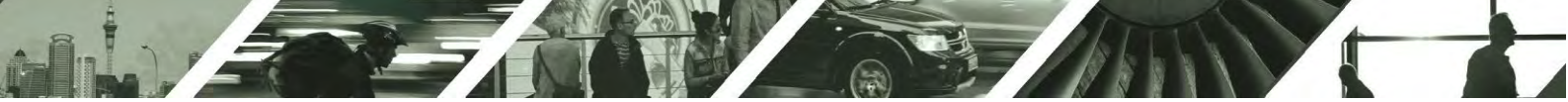
Figure 3-1: 20Connect SSBC study area

Auckland Airport is located in the south-west of the Auckland region and plays a significant role in Auckland's economy. Land transport access to the airport is via SH20, SH20A and SH20B. These corridors are classified by One Network Road Classification (ONRC) as National High Volume. Hence, they are both regionally and nationally significant routes, which connect New Zealand's largest and busiest airport with major population centres to the north, south-east and to the wider Auckland region.

The key elements of this Project are:

- New SH20 and SH20A Motorway Interchange connection (south-facing ramp)
- New SH20 and SH20B Service Interchange connection (south-facing ramp)
- Local road bridge and footbridge replacements to accommodate additional lanes on the state highway network as well as improve connections across the state highway network.

- State highway capacity and safety improvements
- RTC on SH20B / Puhinui Road.
- Shared use paths (SUP) along SH20, SH20A and SH20B and at interchanges within the Project area



4 Estimate Assumptions

[redacted]

[redacted]

- [redacted]
- [redacted]

[redacted]

- [redacted]
- [redacted]
- [redacted]
- [redacted]

5 Cost Estimate

[redacted]

[redacted]

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[redacted]

7 Parallel Estimate

The Transport Agency commissioned a parallel estimate to be undertaken, as per SM014, by Alta Consulting. The report outlining their work can be found in Appendix G.

The cost estimate instructions sent to Alta Consulting for the parallel estimate can be found in Appendix A1.

7.1 Direct Cost

Data analysis was undertaken to reconciliate direct cost data from the estimators.

[redacted]

- [redacted]
- [redacted]
  - [redacted]
  - [redacted]
  - [redacted]

[redacted]

8 Recommendation

The work undertaken to reconcile the base and parallel estimates reconciled the overall estimates to within 8%.

Both parties had made a number of assumptions in relation to the cost allocation between the three stages of work. These assumptions were discussed and following the meeting updates were made to both estimates.

Following the cost estimate reconciliation between CCG and Alta Consulting, Stages 1A and 1B were later combined into an all-encompassing Stage 1, due to insufficient information regarding the funding allocation between Stages 1A and 1B.

Table 8-1 summarises the outcome from the Base Estimates, P50 and P95 (including property costs). Refer to Appendix H for more details.

[redacted]

Appendices

Appendix A - Cost estimation information

Appendix A-1 Instructions for cost estimators

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Hope you had a good weekend..

Hoping for this to be the last change – Just a minor one: The Retaining Wall on Sheet 12 (i.e. RW 12-3) has been changed to a concrete slab, if you could please make that adjustment in your cost estimates.

Regards,
[redacted]

[redacted]

[redacted]

[redacted]

Following on from [redacted] email below, please find attached the updated stormwater drawing set.

In addition, please also find the updated information, as follows:

[redacted]

[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

[redacted]

If you have any questions, please do not hesitate to get in touch.

Have a good weekend.

Regards,
[redacted]

DISCLAIMER

[redacted]

Hi Both,

You will shortly receive a transmittal of the draft stormwater drawings. If you prefer to collect them from our office on a USB stick then please let me know. They are not complete, but should allow you to get started. The drawings contain pipe sizes and structures, and are unlikely to change drastically from a cost point of view.

To assist with the estimate, I have attached a spreadsheet containing all the data exported from Civil 3D, which should give you a running start on pipe and structure quantities. The quantities have been summarised in pivot tables, that should be self-explanatory. You will receive a revised and final quantity list by next Friday.

In the information provided, the following abbreviations have been used:

- D/Des/DS = Design
- E/Ex = Existing (don't price)

In the next revision you will receive information on the wetlands and additional detail on the proprietary treatment sizing/specs.

Please note I will be on leave between 24th August and 9th September inclusive. If you require any additional information during that time please contact [redacted]

[redacted]

[redacted]

I wanted to provide an update on the outstanding stormwater information. There has been a delay due to some urgent work on the SH20B early works, but we anticipate issuing the stormwater drawings to you by the end of this week. These drawings will include pipe lengths and sizes which should hopefully save you some time.

If you have any questions then feel free to give me a shout.

Cheers,

[redacted]

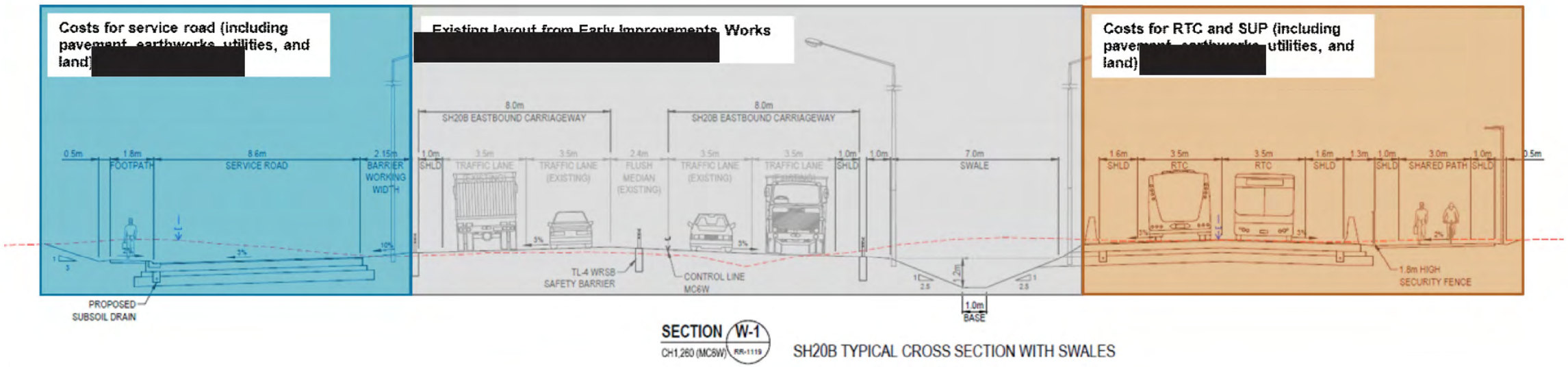
[redacted]

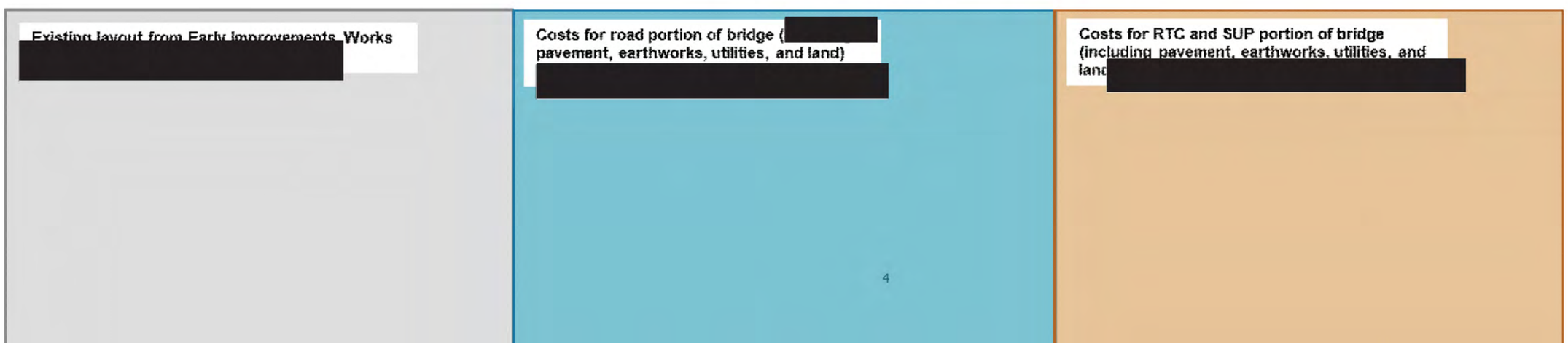
Hi Both,

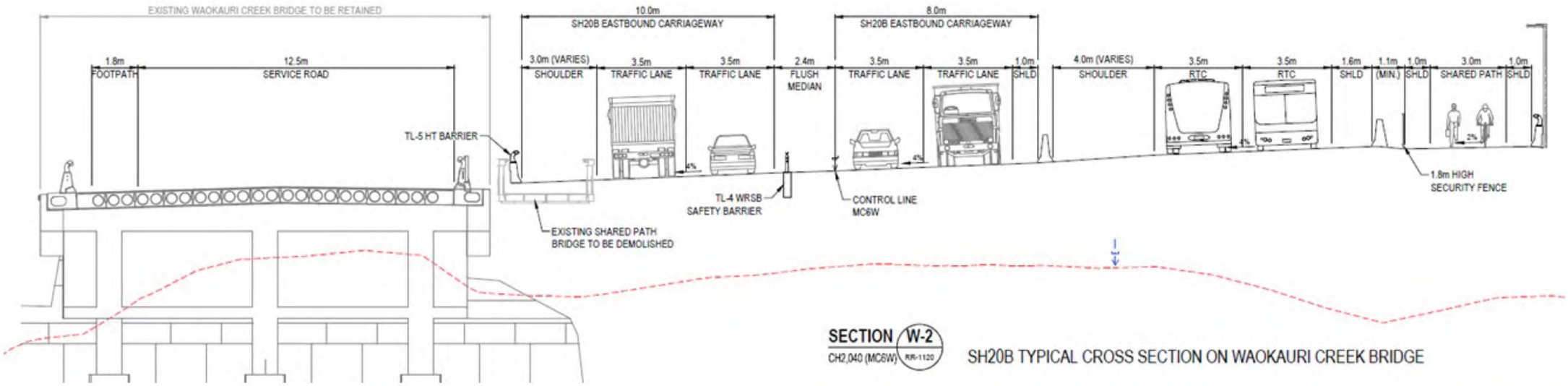
As discussed during our meeting on Tuesday, please find below some notes to assist you with preparing the DBC cost estimate.

[redacted]

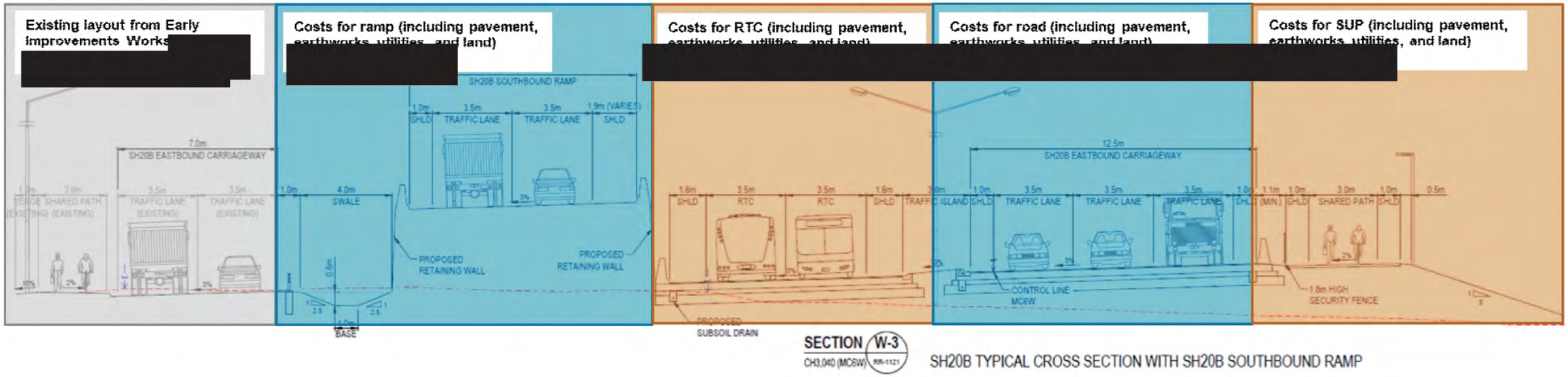
I've marked up some plans and typical cross sections below which might help.







SH20B TYPICAL CROSS SECTION ON WAOKAURI CREEK BRIDGE



SH20B TYPICAL CROSS SECTION WITH SH20B SOUTHBOUND RAMP

[redacted]

6. Addition of:

[redacted]

Supporting Information

Drawings for general arrangement plans, plan and long sections and typical cross sections will be sent via a separate transmittal. A copy on a USB stick can also be collected from our office. Drawings for stormwater will be available at the end of next week.

	SH20	**SH20A**	**SH20B**
Pavement	All existing pavement within project extents to be rehabilitated with structural overlay to minimise disruption. **Cost of rehabilitation to be separate item to allow allocation to maintenance budget**	All existing pavement within project extents to be resurfaced only	All existing pavement within project extents to be resurfaced only
Barriers	All median barriers within project extents to be replaced with new TL5 concrete TL4 WRSB to be used as edge barrier except below: • TL5 concrete will be used where bridge pier/abutment exist. • TL4 concrete barrier to be used where retaining walls exist. • TL4 concrete barrier with security fence will be used where shared path exists.	All median barriers within project extents to be retained. Existing barrier to be retained on westbound. TL4 concrete barrier with security fence will be used where shared path exists. TL5 concrete will be used where bridge pier/abutment exist. TL5 HT concrete barrier to be used on SH20A southbound ramp bridge.	All median barriers within project extents to be retained except realigned section around Waokauri Creek bridge. Proposed TL4 WRSB on median to be provided at this section. TL4 WRSB to be used as edge barrier on SH20B eastbound on west side of Manukau Memorial Garden. TL4 WRSB to be used as edge barrier where swale exists between SH20B eastbound and RTC. TL4 concrete barrier to be used on both sides of RTC on west side of Manukau Memorial Garden. Security fence will be used against TL4 concrete barrier where shared path exists. TL5 concrete barrier to be used on edge of Waokauri Creek bridge.

			TL5 HT concrete barrier to be used on SH20B southbound ramp bridge.
Lighting	All median lighting to be replaced within project extents SUP has a separate lighting system	All median lighting to be retained within project extents SUP has a separate lighting system	SUP has a separate lighting system
Structures	Existing local road bridges and footbridges can be closed for complete demolition, with no existing elements retained, then replaced online. Refer to attached file for new structural arrangement. Future Proofed Structures (Cavendash Drive, Puhunui Creek, and NIMT Overpass) can be widened with no strengthening of the substructure required.	Existing local road bridges and footbridges can be closed for complete demolition, with no existing elements retained, then replaced online. Refer to attached file for new structural arrangement. New Killington Crescent footbridge to be priced as architectural design	Cost of new Waokauri Creek bridge to be allocated as follows: Road = 55% (NZTA) RTC = 30% (AT) SUP = 15% (AT) Works in the CMA for the central pier of Waokauri Creek Bridge may require additional contingency to the P&G / Temporary Works cost to account for restrictive access requirements.
Earthworks	Refer to attached file for volumes. Volumes do not take into account the pavement volume. 0% re-use at this point in time. Cut soils are likely to be unsuitable and/or soft with limited space to rework.	Refer to attached file for volumes. Volumes do not take into account the pavement volume. 0% re-use at this point in time. Cut soils are likely to be unsuitable and/or soft with limited space to rework.	Refer to attached file for volumes. Volumes do not take into account the pavement volume. 0% re-use at this point in time. Cut soils are likely to be unsuitable and/or soft with limited space to rework.
Noise Walls	New noise walls to be provided down both sides between Mangere Bridge and Puhinui Road.	New noise walls to be provided down eastbound side within project extents.	New noise walls to be provided down both sides within project extents.
Landscaping	TBC	TBC	TBC

The final cost estimates for 1A, 1B and 2A are due by **c.o.b. Friday 30th August**.

If you have any questions then feel free to give either [redacted] or myself a call.

Cheers,

[redacted]

[redacted]

aurecongroup.com

DISCLAIMER

Appendix A-2 Earthworks volumes

Appendix A-3 Pavement areas

Appendix A-4 Structural information

[redacted]

[redacted]

Appendix A-5 Stormwater information

Summary of Structures

Count of Depth Category	Column Labels										
Row Labels	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**16**	**Grand Total**
D-450 Wingwall	17	1	2							1	21
1,660 x 745 x 1,200 mm Series 600 Wingwall	7										7
D-750 Wingwall	7										7
D-900 Wingwall	2										2
D-600 Wingwall	2			1							3
D-1050 Wingwall	3										3
D-1200 Wingwall	4						1				5
4,390 x 1,460 x 2,000 mm Series 1350 Wingwall	1										1
D-1,050 dia CPMH		11	406	83	10	1	1		2		514
D-1,050 dia MH			4	13	4	2	1	1			25
D-1,050 dia SCMH		1	22	10	4	2	1				40
D-1,500 dia MH			2	9	3	1		1			16
D-1,800 dia MH			2	2	5	1	3	2			15
D-675 x 450 Cess pit		3	74	34	3						114
Grand Total	**43**	**16**	**512**	**152**	**29**	**7**	**7**	**4**	**2**	**1**	**773**

Summary of Pipes

Sum of Length	Column Labels										
Row Labels	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**10**	**Grand Total**
1050Ø			31	63	93	277			11	5	479
1200Ø		222		24	62	102	89				500
300Ø	90	1028	489	6174	64	94	9	36			7983
375Ø		1083	232	5544	180						7040
450Ø	51	824	322	1775	357	59					3388
525Ø		254	189	1247	227						1917
600Ø		687	332	1249	107						2375
675Ø		391	184	438		18					1031
750Ø		382	131	650	317						1480
825Ø		97	86	364	63						610
900Ø		290	113	269	41	81			172		967
Grand Total	**141**	**5257**	**2110**	**17797**	**1511**	**631**	**97**	**36**	**183**	**5**	**27769**

Appendix B - Property costs summary

Appendix C - Breakdown of Estimates

[redacted]

[redacted]

Appendix D - Estimate Updates – Road Safety Audit Items

Appendix D-1 RSA item 2.6.1 and 2.8.1

Appendix D-2 RSA item 2.12.2

Appendix D-3 RSA item 2.13.4

Plot Date 2019-11-21 08:47:00 Office Auckland Filename pw fdn signature as surveyed info PW_AUDC1_01 D:\documents\Projects\60 tuc\60 0004 - SWG - 20 Connect SSBO\06 Detail Design\60.1 CADD\Drawings\Sketches\60109-4-4403-SKT-RR-0145.dwg

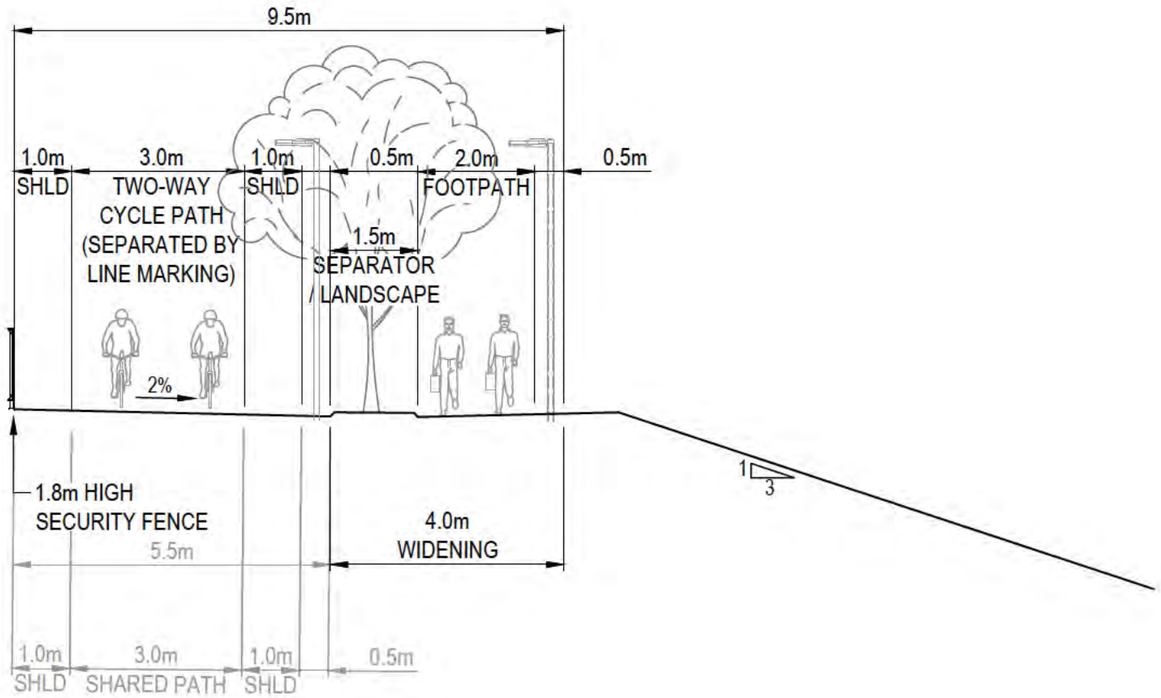
Appendix E - CCG estimate update and risk schedule

Appendix F - Risk items

Appendix F-1 RID 2 Online local road bridge replacement

MOT

Appendix F-2 RID 5 Upgrading SH20/SH20A/SH20B SUPs to Segregated Facilities



TYPICAL CROSS SECTION OF SEGREGATED WALKING AND CYCLING FACILITY ALONG SH20/SH20A/SH20B

[redacted]

Appendix F-3 RID 8 Maintaining access from SH20A to Bader Drive

Appendix F-4 RID 11 Braided ramp from Kirkbride Road to SH20A

Appendix F-5 RID 12 Local road walking and cycling facilities replace SUP

[redacted]

[redacted]

Appendix G - Parallel estimate report

ALTA

20CONNECT – LONG TERM IMPROVEMENTS
NZ TRANSPORT AGENCY
DETAILED BUSINESS CASE
PARALLEL ESTIMATE
25 SEPTEMBER 2019

CONTENTS

Revision History

Revision Number	Revision	Revision Date	Prepared By	Checked By
1	Issued for review	25 Sept 19	[redacted]	[redacted]

This report has been prepared by Alta on the specific instruction of the client. It is intended solely for the clients use in accordance with the agreed scope and contract conditions. It has been based on relevant information provided prior to or during the assignment to the relevant revision date.

Reliance on this report by any person other than the client without Alta's written consent is entirely at their own risk. Quantities, rates and costs included in this report are indicative and should not be used for any other purpose.

Electronic file name: 20Connect Long Term Improvements- Parallel Estimate

1 IN BRIEF

Alta has been engaged by NZ Transport Agency (NZTA) to provide a parallel estimate for the single stage business case preliminary design on the 20Connect Long Term improvements project. The project involves the following:

- Widening of SH20 between Mangere Bridge and Lambie Drive
- Widening of SH20A between Kirkbride Road and SH20
- New southbound on ramp at the SH20A / SH20 interchange
- New southbound on ramp at the SH20B (Puhinui Road) / SH20 interchange
- New rapid transit corridor (RTC) on SH20B between Orrs Road and Manukau Memorial Gardens
- Widening of SH20B between Orrs Road and SH20
- New service road running adjacent to SH20B between Orrs Road and Manukau Memorial Gardens

The outcome of the parallel estimate process is summarised in the table below. These figures have been reconciled with the Aurecon estimate for the project. (note: risk values are an approximation and an in-depth risk assessment will be carried out in conjunction with Aurecon)

SUMMARY OF ESTIMATE VALUES.

[redacted]

2 PARALLEL ESTIMATE

The parallel estimate has been prepared based on the drawings and reports provided by Aurecon refer to Appendix 3. Build-up of rates has generally been from first principles and from rates used on other similar projects in the Auckland region. Where rates and prices have been used from previous years, these have been indexed to a 2019 base date.

Where assumptions have been made due to a lack of design information or where multiple options exist, they have been detailed in this report. [redacted]

[redacted]

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]

[redacted]

5 APPENDIX

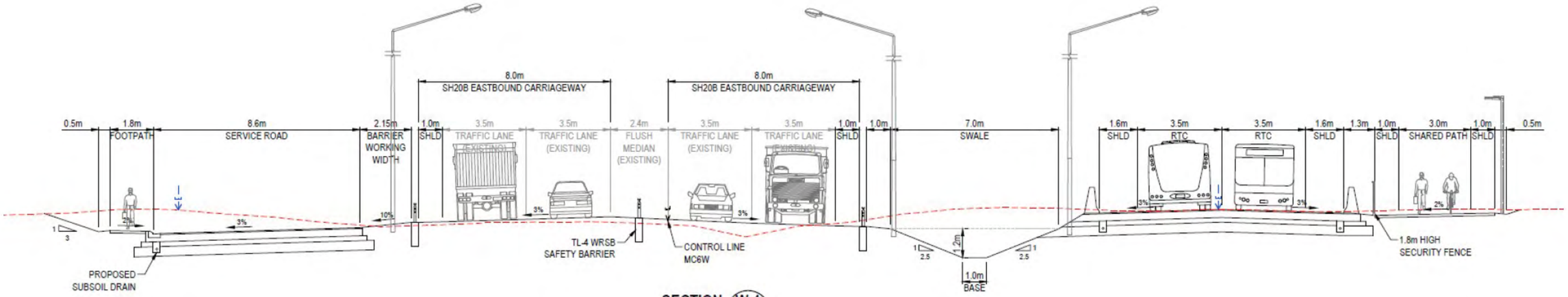
Appendix	Description	Source
Appendix 1	Parallel Estimate Summary Sheet (total project cost)	Alta
Appendix 2	Split of costs by section	Alta
Appendix 3	Information provided	Aurecon

[redacted]

Hi Both,

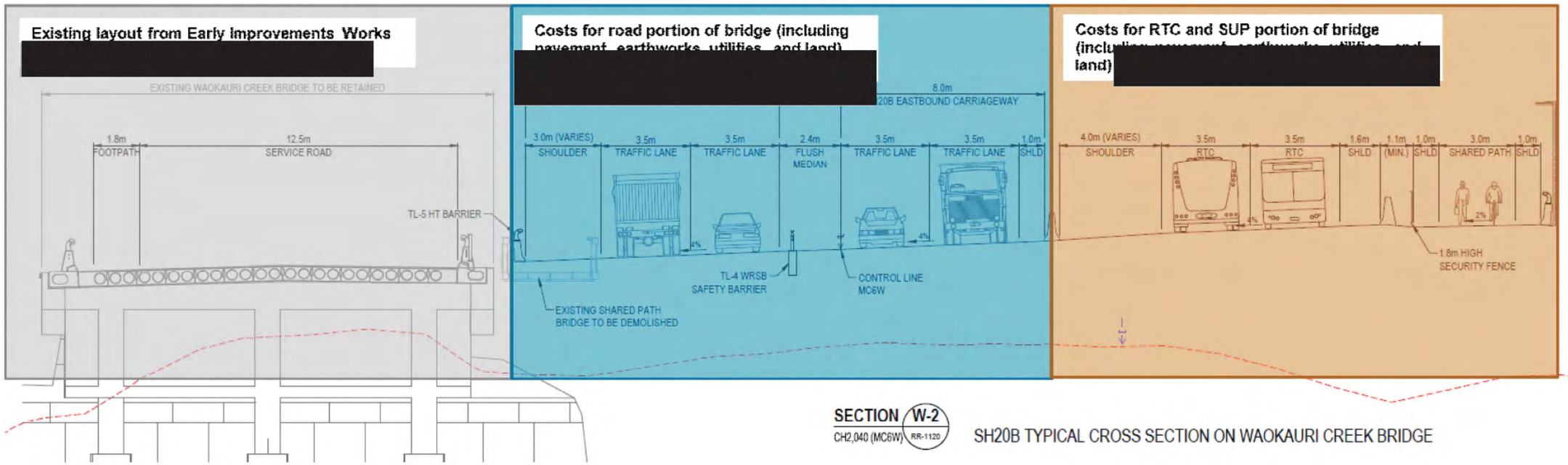
As discussed during our meeting on Tuesday, please find below some notes to assist you with preparing the DBC cost estimate.

I've marked up some plans and typical cross sections below which might help.



SECTION W-1
CH1,260 (MC6W) RR-1119

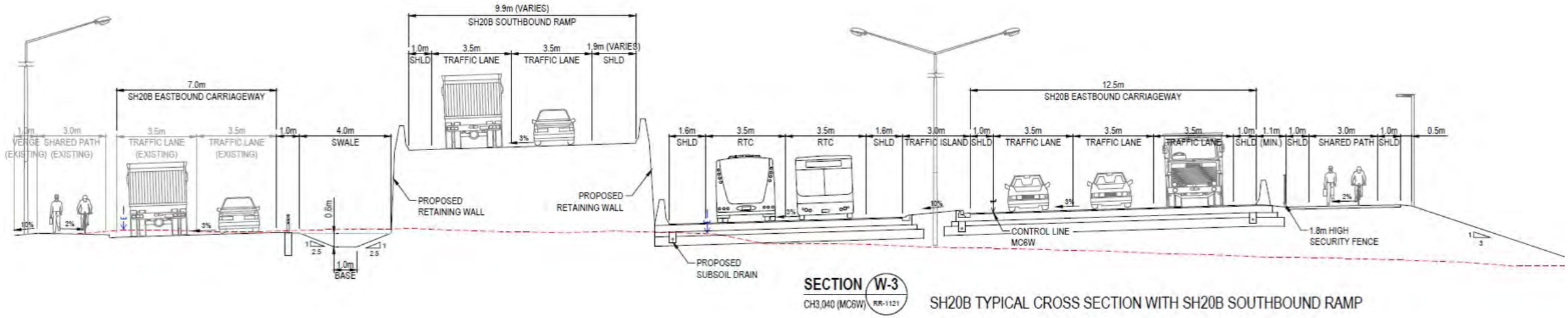
SH20B TYPICAL CROSS SECTION WITH SWALES



SECTION W-2
CH2,040 (MC6W) RR-1120

SH20B TYPICAL CROSS SECTION ON WAOKAURI CREEK BRIDGE

Existing layout from Early Improvements Works ([redacted]	Costs for ramp (including pavement, earthworks, utilities, and land) [redacted]	Costs for RTC (including pavement, earthworks, utilities, and land) [redacted]	Costs for road (including pavement, earthworks, utilities, and land)	Costs for SUP (including pavement, earthworks, utilities, and land)



SH20B TYPICAL CROSS SECTION WITH SH20B SOUTHBOUND RAMP

[redacted]

[redacted]

[redacted]

Supporting Information

Drawings for general arrangement plans, plan and long sections and typical cross sections will be sent via a separate transmittal. A copy on a USB stick can also be collected from our office. Drawings for stormwater will be available at the end of next week.

	SH20	SH20A	SH20B
Pavement	All existing pavement within project extents to be rehabilitated with structural overlay to minimise disruption. **Cost of rehabilitation to be separate item to allow allocation to maintenance budget**	All existing pavement within project extents to be resurfaced only	All existing pavement within project extents to be resurfaced only

Barriers	All median barriers within project extents to be replaced with new TL5 concrete TL4 WRSB to be used as edge barrier except below: • TL5 concrete will be used where bridge pier/abutment exist. • TL4 concrete barrier to be used where retaining walls exist. • TL4 concrete barrier with security fence will be used where shared path exists.	All median barriers within project extents to be retained. Existing barrier to be retained on westbound. TL4 concrete barrier with security fence will be used where shared path exists. TL5 concrete will be used where bridge pier/abutment exist. TL5 HT concrete barrier to be used on SH20A southbound ramp bridge.	All median barriers within project extents to be retained except realigned section around Waokauri Creek bridge. Proposed TL4 WRSB on median to be provided at this section. TL4 WRSB to be used as edge barrier on SH20B eastbound on west side of Manukau Memorial Garden. TL4 WRSB to be used as edge barrier where swale exists between SH20B eastbound and RTC. TL4 concrete barrier to be used on both sides of RTC on west side of Manukau Memorial Garden. Security fence will be used against TL4 concrete barrier where shared path exists. TL5 concrete barrier to be used on edge of Waokauri Creek bridge. TL5 HT concrete barrier to be used on SH20B southbound ramp bridge.
Lighting	All median lighting to be replaced within project extents SUP has a separate lighting system	All median lighting to be retained within project extents SUP has a separate lighting system	SUP has a separate lighting system
Structures	Existing local road bridges and footbridges can be closed for complete demolition, with no existing elements retained, then replaced online. Refer to attached file for new structural arrangement. Future Proofed Structures (Cavendash Drive, Puhunui Creek, and NIMT Overpass) can be widened with no	Existing local road bridges and footbridges can be closed for complete demolition, with no existing elements retained, then replaced online. Refer to attached file for new structural arrangement. New Killington Crescent footbridge to be priced as architectural design	Cost of new Waokauri Creek bridge to be allocated as follows: Road = 55% (NZTA) RTC = 30% (AT) SUP = 15% (AT) Works in the CMA for the central pier of Waokauri Creek Bridge may require additional contingency to the P&G / Temporary Works cost to account for restrictive access requirements.

	strengthening of the substructure required.		
Earthworks	Refer to attached file for volumes. Volumes do not take into account the pavement volume. 0% re-use at this point in time. Cut soils are likely to be unsuitable and/or soft with limited space to rework.	Refer to attached file for volumes. Volumes do not take into account the pavement volume. 0% re-use at this point in time. Cut soils are likely to be unsuitable and/or soft with limited space to rework.	Refer to attached file for volumes. Volumes do not take into account the pavement volume. 0% re-use at this point in time. Cut soils are likely to be unsuitable and/or soft with limited space to rework.
Noise Walls	New noise walls to be provided down both sides between Mangere Bridge and Puhinui Road.	New noise walls to be provided down eastbound side within project extents.	New noise walls to be provided down both sides within project extents.
Landscaping	TBC	TBC	TBC

The final cost estimates for 1A, 1B and 2A are due by **c.o.b. Friday 30th August**.

If you have any questions then feel free to give either Neill or myself a call.

Cheers,

[redacted]

Appendix H - Cost estimate reconciliation

Document prepared by

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