AIRPORT TO BOTANY

A2B Cost Estimate

Auckland Transport and Waka Kotahi NZ Transport Agency

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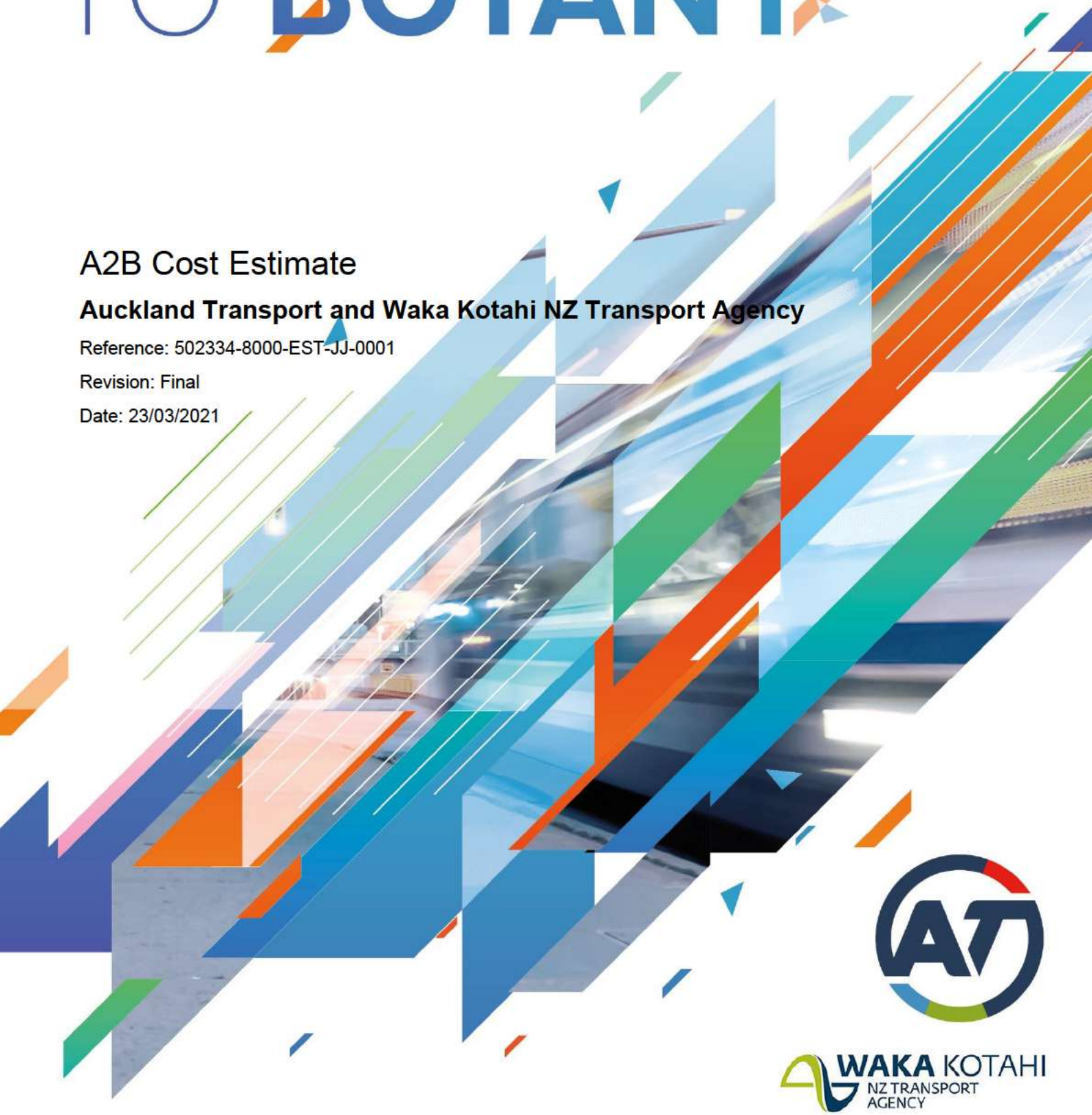
Revision: Final

Date: 23/03/2021



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1 Executive summary

This report outlines the methodology taken to produce the Detailed Business Case Estimate (DBE) for the Airport to Botany component (the Project), of the Airport to Botany Rapid Transit and 20Connect Single Stage Business Case (A2B/20Connect SSBC).

[redacted]

1.1 Property costs

The property costs have been provided by Auckland Transport (AT). The Property Acquisition Strategy only focuses on Horizon 3 and 4 for A2B long-term improvements. [redacted]

Table 1-1: A2B long term improvement property costs

Section	Number of properties to acquire		Estimate property cost to complete[1]
	Full	Partial	
Airport to Botany SH20 to South of Botany	[redacted]	[redacted]	[redacted]

1.2 Construction cost estimate

The construction cost estimate was developed initially by the project team with the parallel estimate provided by Alta Construction. [redacted] These costs summarise the H3 and H4 segments of the programme. Refer to 20Connect cost estimate report for other components. These exclude the property costs outlined above.

Table 1-2: Estimate outcome

Section	Base estimate	P50 estimate (risk adjusted)
Airport to Botany SH20 to South of Botany	[redacted]	[redacted]

[1] The estimated property costs are a base estimate or P50 estimate

2 Project background

The A2B project is a part of the A2B and 20Connect Single Stage Business Case (SSBC), which is a product of a joint programme involving Auckland Transport (AT), Waka Kotahi and Auckland Airport. In 2017 these organisations produced the Airport Access Supplementary Programme Business Case which identified a suite of measures to improve access to Auckland International Airport and its surrounding employment zones. This strategy led to the establishment of the multi-modal, integrated Southwest Gateway Programme (SWGP).

The SWGP comprises the following projects in a suite of multi-modal interventions:

- Rapid Transit between the airport and Botany, via Manukau (A2B), led by AT
- State highway projects in the southwest largely connecting to the airport and facilitating rapid transit (20Connect), led by Waka Kotahi
- Auckland Airport Precinct Improvements (AAPI), led by Auckland Airport.

Early stages of the SWGP are underway with SSBCs having been approved in 2019 with an enhanced interchange on the main rail line at Puhinui and priority along local roads and SH20B for enhanced bus services between Manukau and the airport. Early stages of the SWGP also include the opening of a new frequent “AirportLink” service and a series of cycling improvements in Māngere.

Figure 2-1: The Southwest Gateway Programme

The recommended option from the business case is shown in Figure 2-2. The key features of the recommended option of the A2B project includes:

- An 18 km rapid transit route connecting the airport and its employment areas with two major urban centres (Manukau and Botany) with:
  - Separated running ways, with at grade intersections.
  - Twelve stations with off-bus ticketing, level boarding and all-door boarding (all provided to reduce vehicle dwell times, and provide a more reliable and accessible service).
  - Connections to four existing and proposed rapid transit lines, including the proposed City Centre to Māngere (CC2M) LRT at the airport.

- A single bi-directional service between the airport and Botany (designed with flexibility to incorporate future additional services) with headways of as short as three minutes during peak times.
- Potential opportunities for transit-oriented development at key centres and station access enhancements.

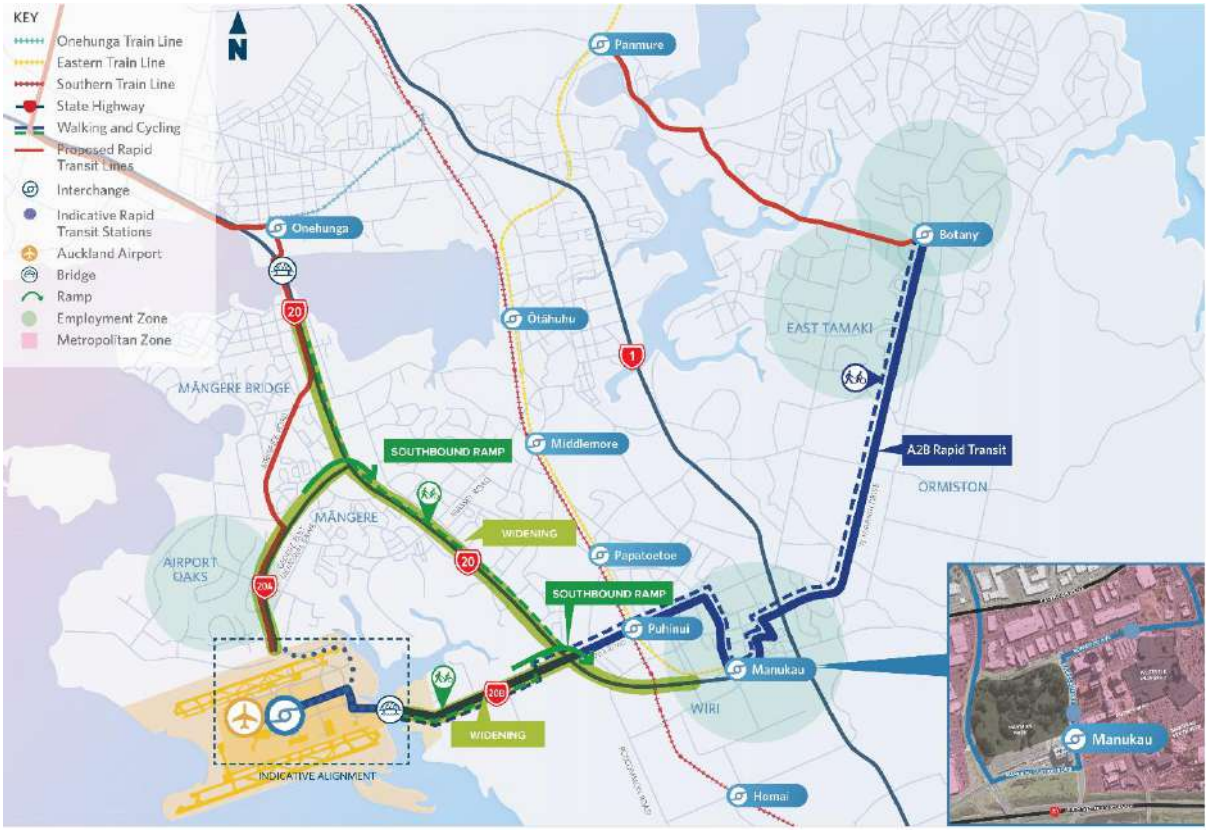

Figure 2-2: SWGP recommended option

3 Introduction

3.1 General

This report highlights the methodology taken to produce the DBE for the A2B project.

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

The report also references the Parallel Estimate undertaken by Alta Consulting and the Property Costs produced by Auckland Transport.

The estimate was undertaken during the 2nd quarter of 2020 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.

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 Route Protection and Resource Consent phase.

3.2 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
- Alignment of the estimates with the staging extents (refer to Section 5.2)
- Expected (P50) Estimate and 95th Percentile (P95) Estimate
- Summary of risks.

4 Estimate assumptions

4.1 General assumptions

The following assumptions have been made in the forming of the cost estimate:

- AT's admin cost was updated subsequent to the cost estimate being completed. AT advised a total of 5.7% should be provided for this.
- The cost estimate has been split as per the sections outlined in Section 5.2.

4.2 General exclusions

- The estimated property costs do not include business loss, relocation costs, cost of court hearings, rental to lease temporary occupation areas during construction or mitigation work.
- The construction cost estimates are exclusive of escalation and GST.
- Project Development Phase Estimates are Nil as these are assumed to be sunk costs.

5 Cost estimate

5.1 General

The estimate was undertaken during the 2nd quarter of 2020.

The estimate has been developed from the following drawings, which are provided in Appendix O of the A2B/20Connect SSBC.

- General Arrangement Plans (502334-7000-DRG-RR-0101 to 0117)
- Typical Cross Sections (502334-7000-DRG-RR-0301 to 0305)
- Plan & Long Sections (502334-7000-DRG-RR-0201 to 0220)
- Bridges (502334-7000-DRG-BB-0011 to 0017)
- Drainage (502334-7000-DRG-RR-1401 to 1417)
- Utilities (502334-7000-DRG-UT-1601 to 1617)

5.2 Staging

The SWGP recommended option proposes a staged delivery strategy, as below:

- Horizon 1 (2021): STAAI (constructed by 2021), which forms the do-minimum
- Horizon 2 (2025): A2B medium term premium bus service
- Horizon 3 (2030): Construction of ultimate SH20B corridor (both for A2B and for general traffic under 20Connect), SH20B to SH20 ramp and SH20 widening south of SH20B
- Horizon 4 (2035): Construction of the ultimate A2B rapid transit infrastructure for the full corridor
- Horizon 5 (2040): Construction of the ultimate 20Connect infrastructure on SH20 and SH20A

For further information regarding the staging and relationship between the 'horizons' of the overall SWGP refer to the Southwest Gateway Staging Technical Note (Appendix E of A2B/20Connect SSBC).

5.3 Sections

The cost estimate was done in the sections, which follows the horizons in which the project may be constructed and implemented.

Horizon 3

- **Section 1**
  - [redacted]
  - [redacted]
  - [redacted]
- **Section 2**
  - [redacted]
  - [redacted]
  - [redacted]
  - [redacted].
- **Section 3**
  - [redacted]

Horizon 4

- **Section 4**
  - [redacted]
  - [redacted]
- **Section 5**
  - [redacted]
  - [redacted]

5.4 Supporting information

Table 5-1 summarises the supporting information and documents on which the estimate was based on. Appendix A-1 covers the email sent as instructions for the cost estimate to be undertaken and the corresponding reference documents have been provided as per the 'appendix reference' column.

Table 5-1: Supporting information and assumptions provided to cost estimators

Item	Description and/or Reference
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]
[redacted]	[redacted]

Item	Description and/or Reference
[redacted]	[redacted]

5.5 Property costs

The property costs have been provided by Auckland Transport (AT). AT's Property Acquisition Strategy only focuses on Horizon 3 and 4 for A2B long-term improvements, as all property acquisitions in Horizon 1 have been completed, no proposed property acquisition in Horizon 5 and Waka Kotahi is responsible for property acquisition in Horizon 5.

Properties required to be acquired within AT's Road Controlling Authority area are summarised in Table 5-2 below, while properties required on SH20B are provided in the 20Connect Cost Estimate Report (Appendix J-2 of the SSBC).

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

[redacted]

5.6 Risk and opportunities

Project risks and opportunities were identified through a series workshops with AT and Waka Kotahi, and have been documented in the master risk and opportunities register, which can be found in Appendix I (ref 502334-7000-REG-JJ-0001) of the A2B/20Connect SSBC. The risk register has been used as the basis for a Monte Carlo assessment undertaken to provide risk adjusted cost estimates for the capital works, with exception being the AT components of the P95 costs (further discussed in Section 5.7 below).

Key risk items that were thought to have a potential significant impact on the DBE are listed below:

- Constructability
- Construction disruption
- Safety in design and construction
- Factors affecting demand
- Property acquisition
- Utilities
- Specific risks with recommended option elements, including Botany Station, Puhinui Over bridge across NIMT, SH20A/20SH southbound ramp, SH20B/SH20 southbound ramp.

The master risk and opportunities register shall be carried over for further investigation and consideration in the Route Protection and Resource Consents Phase.

5.7 Cost estimate

Delivery capital cost estimates were provided by Construction Consulting Group, in accordance with Waka Kotahi's 'Cost Estimation Manual' (SM014), providing a base estimate as shown in Table 5-3 below and in detail in Appendix B.

Table 5-3: Estimate outcome, excluding property

Section	Base estimate
[redacted]	[redacted]

Note that P50 costs reported in the Appendix B have been superseded with risk allowances as calculated below.

Delivery cost risk was estimated by the Aurecon team, utilising a Monte Carlo risk analysis based on the project risk register, providing an estimated P50 cost estimate. Table 5-4 shows the risk adjusted P50 estimate for the section.

Table 5-4: Risk adjusted estimate outcome, excluding property

Section	Base estimate	P50 estimate (risk adjusted)
[redacted]	[redacted]	[redacted]

The risk adjusted P50 and P95 cost estimate for the SWGP can be found in the Financial Case (Section 18 of the A2B/20Connect SSBC). [redacted]

6 Parallel estimate

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

[redacted]

7 Other cost estimates

7.1 Medium term cost estimate

[redacted]

7.2 Botany Station cost estimate

[redacted]

APPENDICES

Appendix A - Cost estimation information

Appendix A-1 Instructions for cost estimators

From: [redacted]
Sent: Friday, 28 February 2020 4:30 pm
To: [redacted]
Cc: [redacted]
Subject: [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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[redacted]

DISCLAIMER

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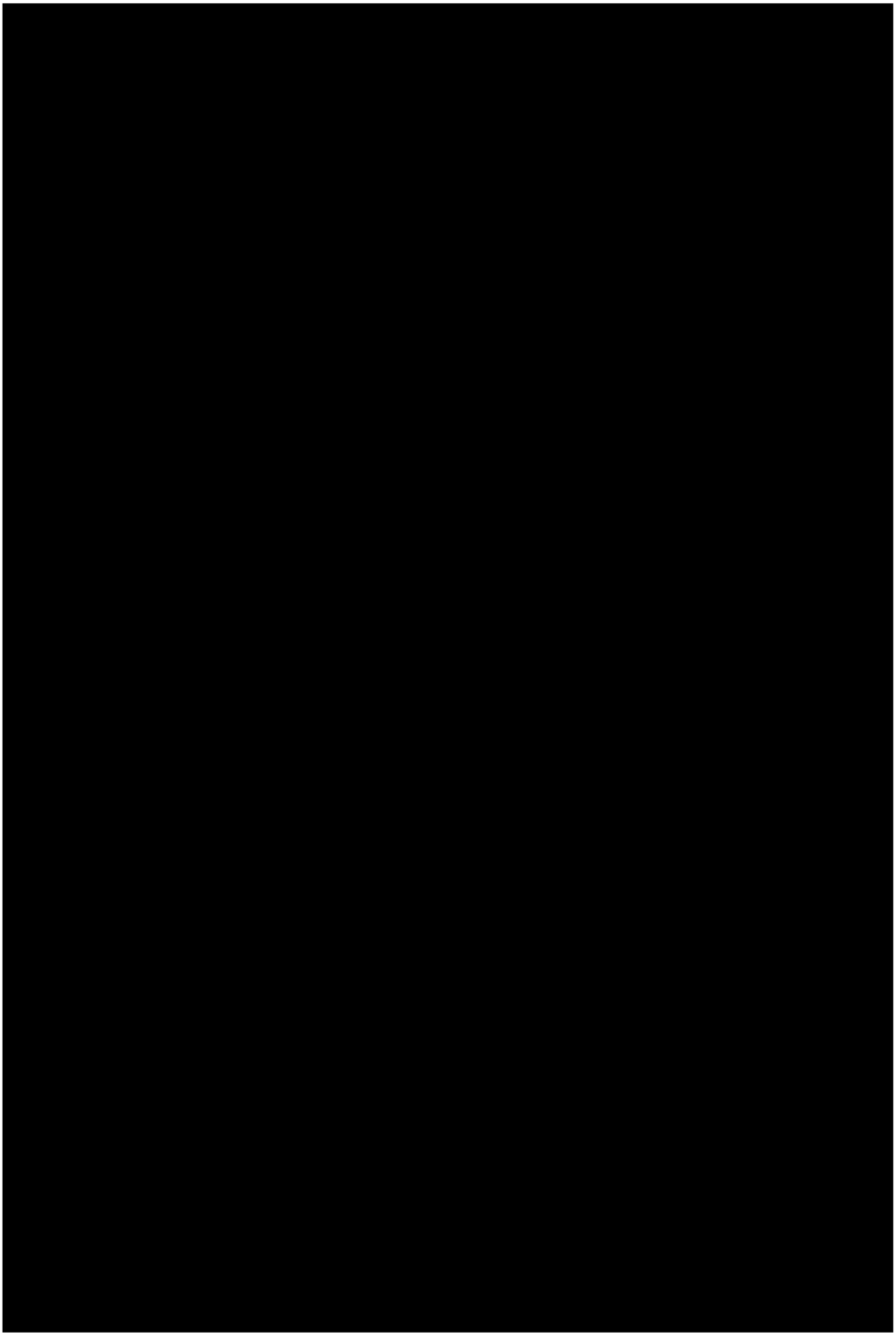

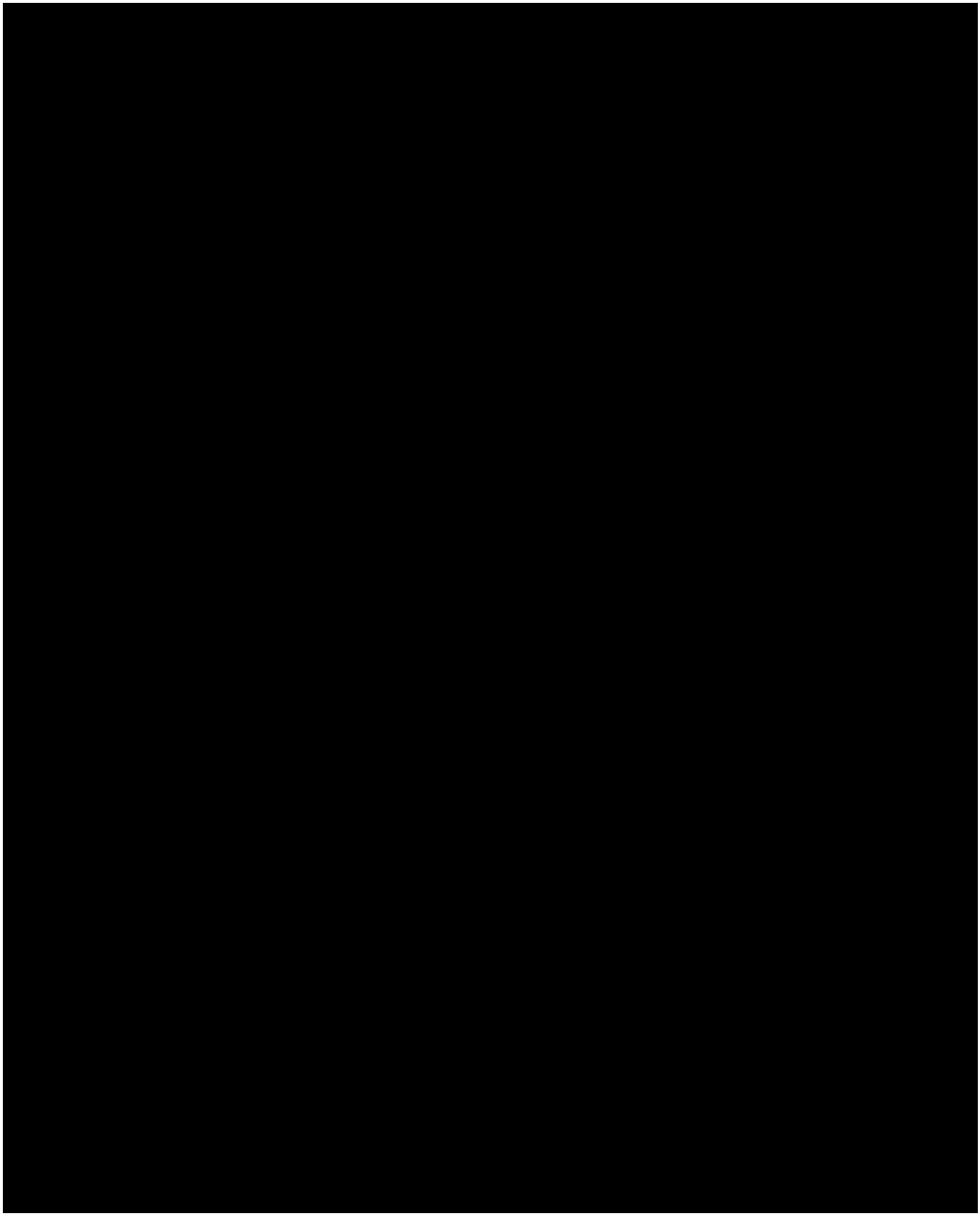

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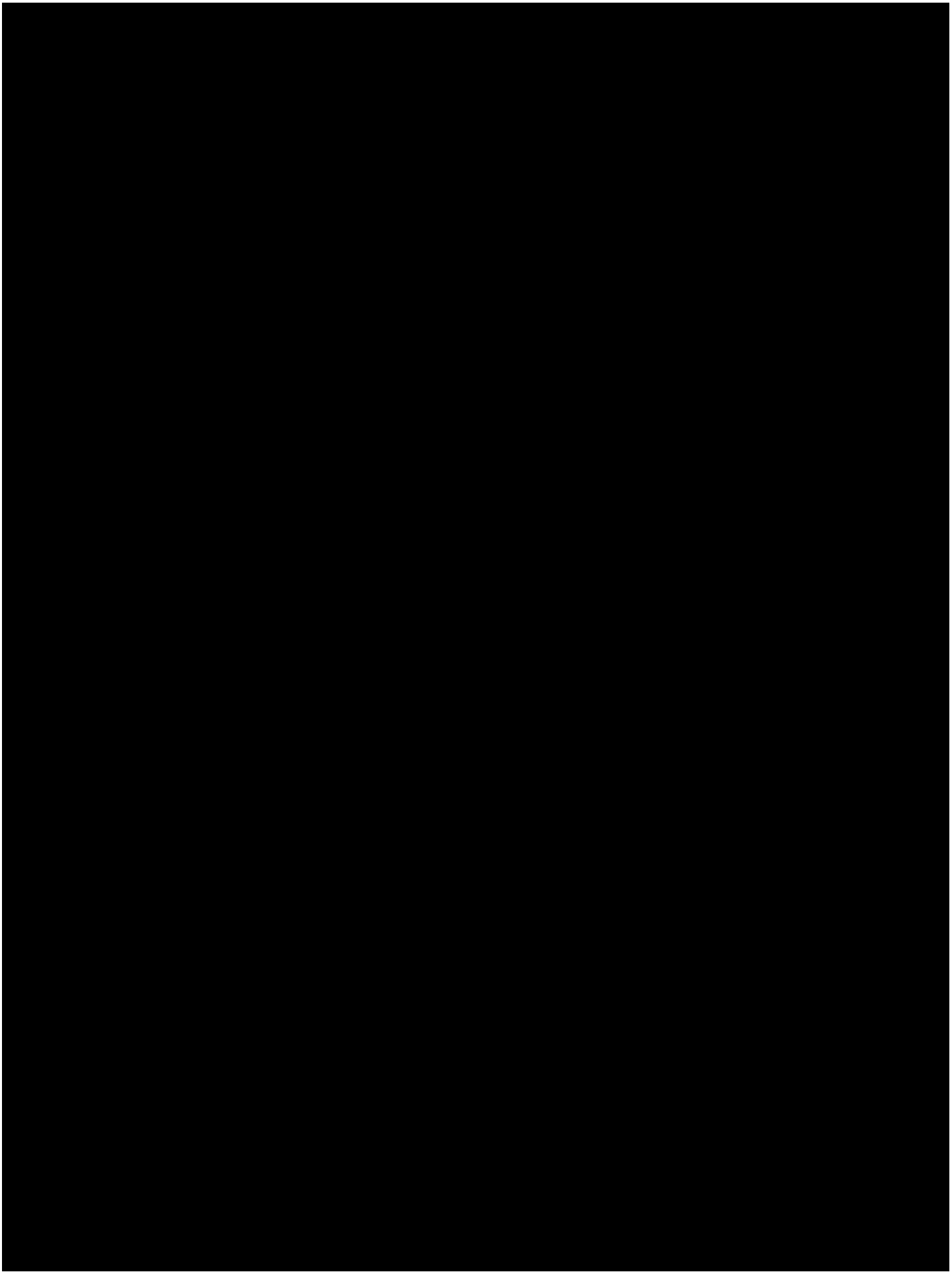
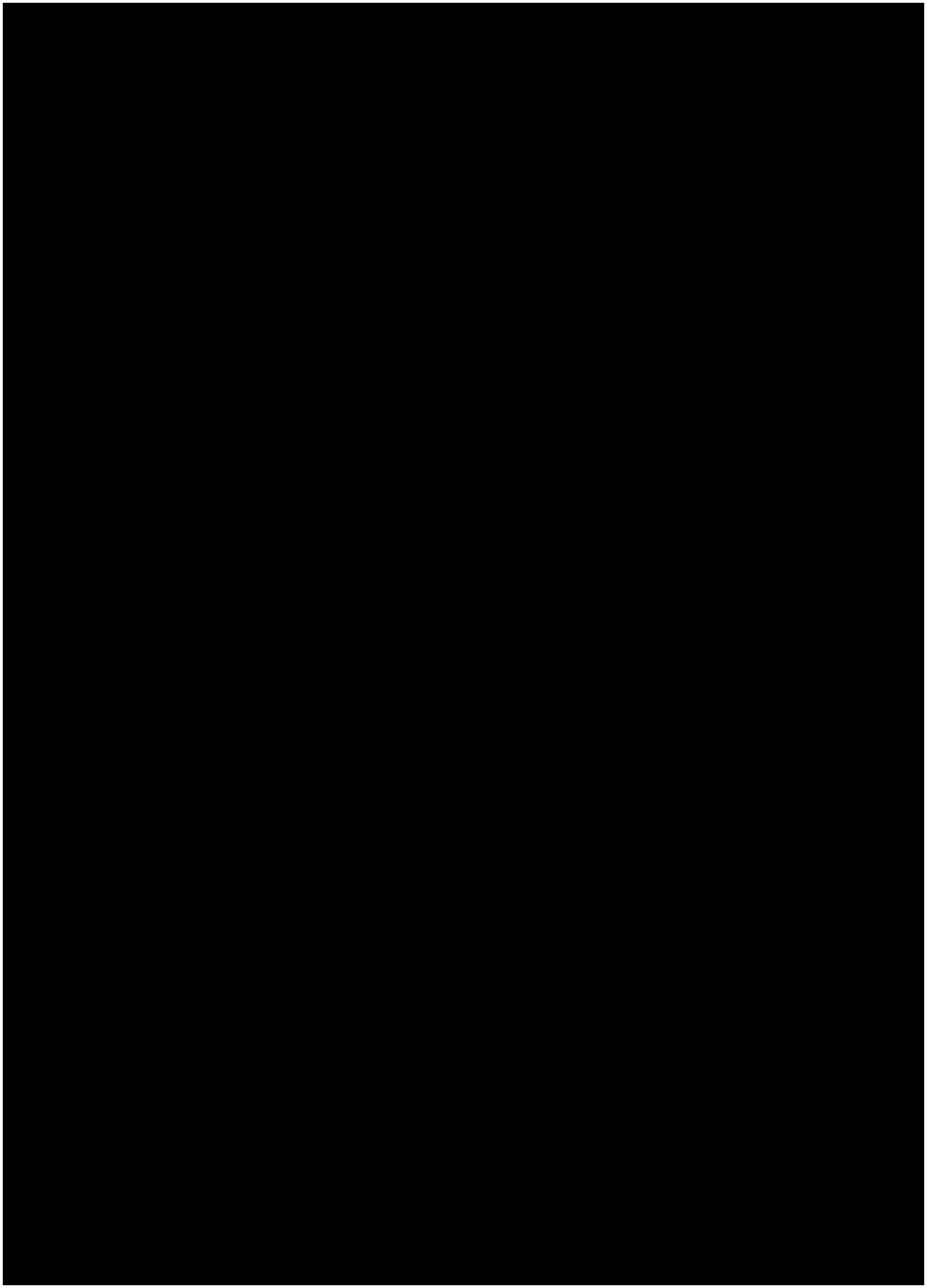
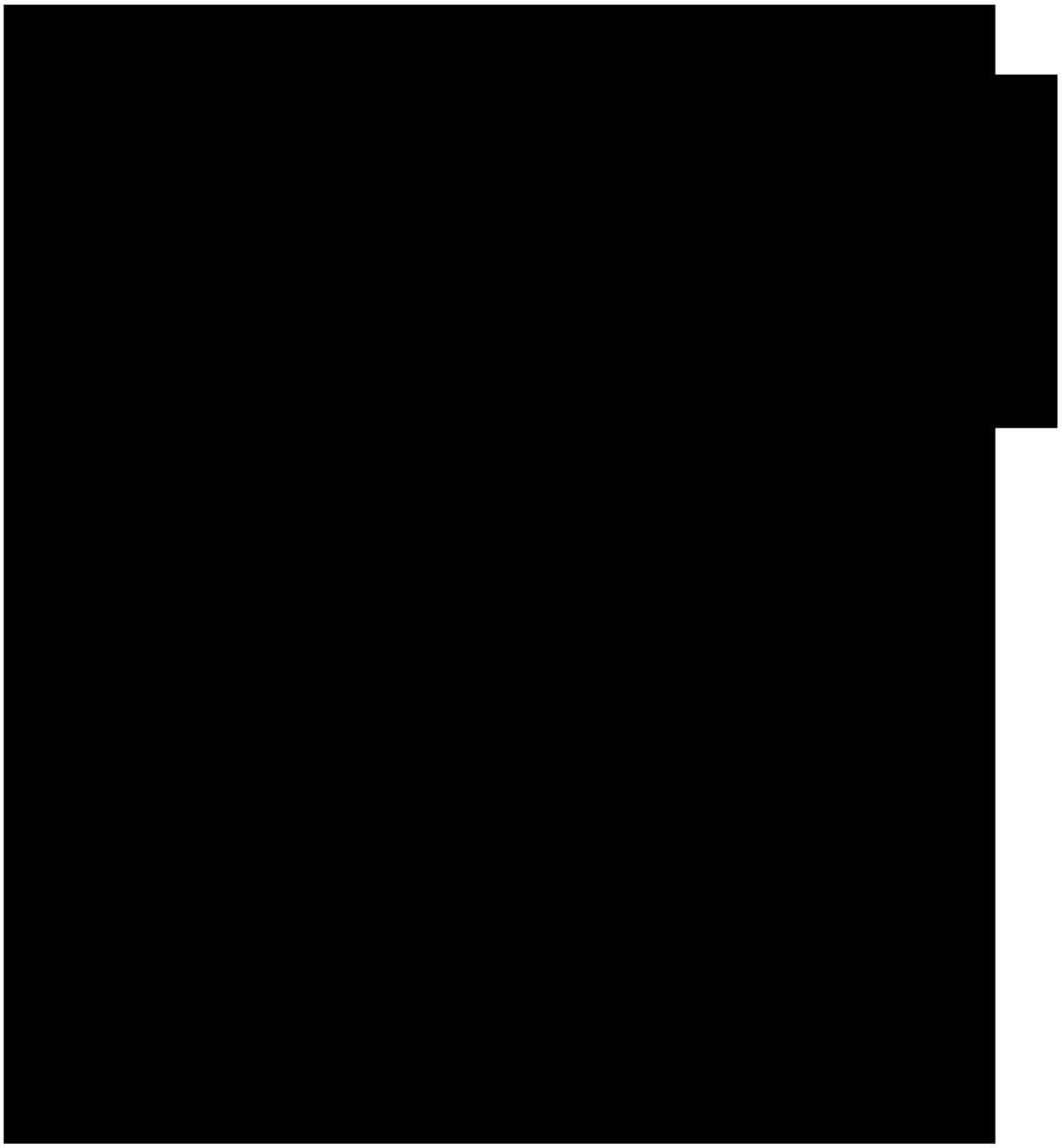






Appendix A-2 Preliminary pavement details

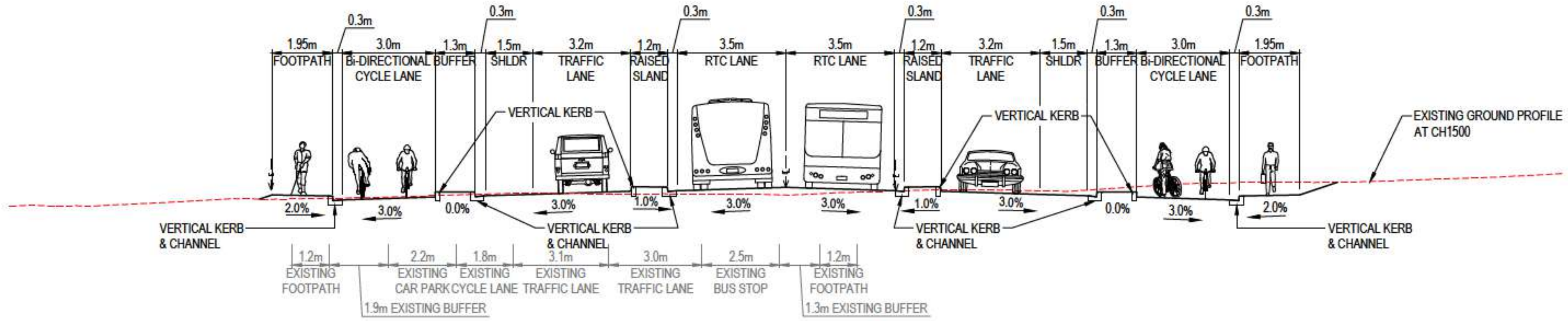
Proposed Pavement Types Along A2B Corridor:

Street	Chainages	Relevant Cross-Section
Puhinui Road	100-170m	Section A with an additional 2 traffic lanes (3.2m/lane)
	170m-275m	Section A
	275m-570m	Section A with an additional 2 traffic lanes (3.2m/lane)
	570m-650m	Section A
	650m-720m	Section B
	720m-815m	Section A
	815m-1250m	Refer to Plan A
	1250m-1410m	Refer to Plan B
	1410m-1620m	Section A
	1620m-1760m	Section A with an additional 2 traffic lanes (3.2m/lane)
	1760m-2130m	Section A
	2130m-2200m	Section B
	2200m-2400m	Section A
	2400m-2500m	Section A with an additional 2 traffic lanes (3.2m/lane)
Lambie Drive	003m-110m	Section D with an additional traffic lane (3.2m)
	110m-180m	Section C with 5m raised island
	180m-450m	Section C
	450m-1000m	Section D with an additional traffic lane (3.2m)
	1000m-1225m	Section D
	1225m-1300m	Section D with an additional traffic lane (3.2m)
Manukau Station Road	0m-150m	Section E (normal island and one additional traffic lane)
	150m-225m	Section E
	225m-300m	Section E with additional traffic lane and normal raised island
Davies Avenue	0m-80m	Section F
	80m-200m	Refer to Plan C
	200m-300m	Section G
	300m-350m	Section G with no parking but tapered shrub raised island occurs
	350m-433m	Section G, with no parking but additional traffic lane (3.2m)
Ronwood Avenue	0-100m	Section H
	100m-225m	Section H with an extra traffic lane (3.2m)
	225m-260m	Section H
	260m-370m	Section I
	370m-440m	Section H
	440m-550m	Section H with an extra traffic lane (3.2m)
Great South Road	0m-333.75m	Section J
Te Irirangi Drive	0m-270m	Section K
	270m-350m	Refer to Plan D
	350-600m	Section K
	600m-800m	Section N
	800m-1150m	Section L
	1150m-1450m	Section K
	1450m-1800m	Section L
	1800m-2100m	Section K
	2100m-3375m	Section L
	3375m-3475m	Section L
	3475m-3715m	Section N
	3715m-3925m	Section L
	3925m-3950m	Refer to Plan E
	3950m-4300m	Section K
	4300m-4575m	Section L

Street	Chainages	Relevant Cross-Section
Te Irirangi Drive	4460m-4570m	Refer to Plan F
	4570m-4800m	Section N
	4800m-4840m	Section L
	4840m-5020m	Refer to Plan G
	5020m-5100m	Section L
	5100m-5275m	Refer to Plan G
	5275m-5400m	Section L
	5400m-5875m	Refer to Plan H and Section M
	5875-5950m	Section L
	5950m-6150m	Section N
	6150m-6425m	Refer to Plan I
	6425m-6550m	Section L
	6550m-6825m	Refer to Plan J, K
	6825m-6890m	Section L

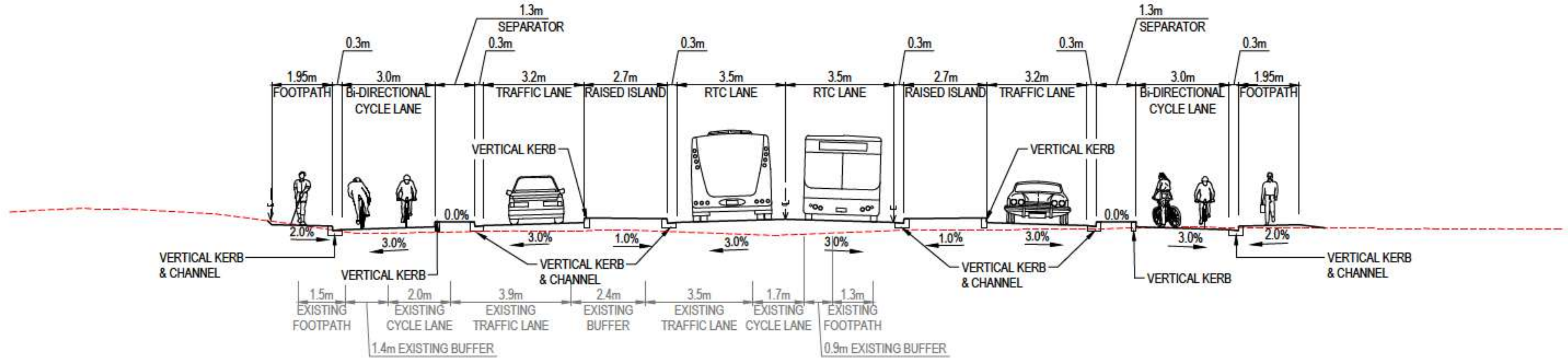
Proposed pavement types for all pavement works

Type 1 Pavement (Widening / RTC OGPA)	Type 2 Pavement (Strengthening OGPA)	Type 3 Pavement (Resurface OGPA)	Type 4 Pavement (Local Road resurface)	Type 5 Pavement (Bridge OGPA)	Type 6 SUP Pavement
30mm EPOXY OGPA	30mm EPOXY OGPA	30mm OGPA	50mm AC14	30mm EPOXY OGPA	100mm 20MPa concrete
Grade 5 membrane	Grade 5 membrane	Grade 5 membrane	100mm AP40. CBR ≥ 80%	25mm DG7 60/70 Binder, levelling course	100mm unbound granular ≥ 45%
280mm AC20	145mm AC20		150mm unbound granular subbase CBR ≥ 15%		Imported fill with CBR 15%
SAMI	50mm AC14 HF		150mm lower subbase		Design subgrade CBR 3%
200mm Cement bound GAP65 subbase (pre-cracked)			Design subgrade CBR 3%		
400mm SIL (Soaked CBR 10%)					
Design subgrade CBR 3%					



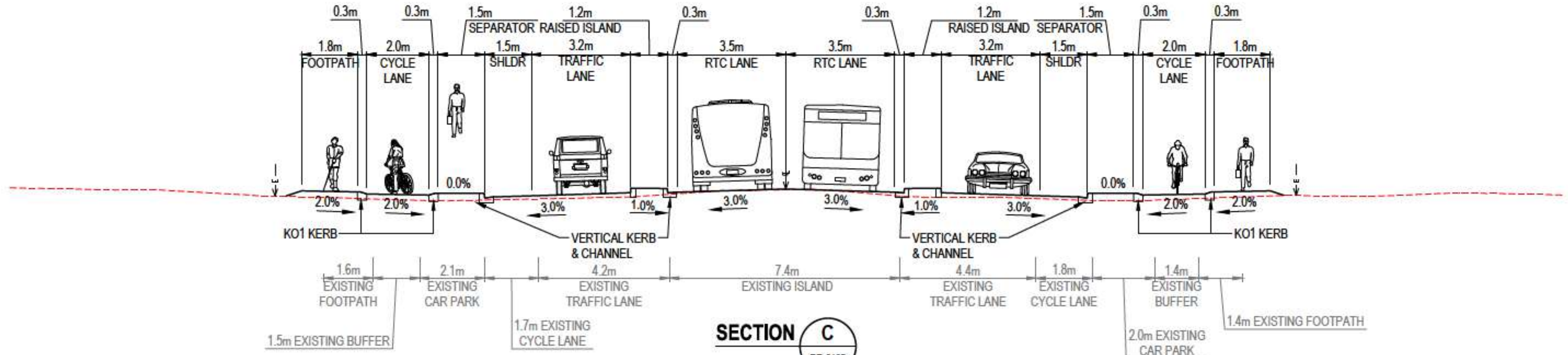
SECTION A (RR-0102 / RR-0103)

PUHINUI ROAD
CHAINAGE : 625m & 1500m (MCP0)



SECTION B (RR-0104)

PUHINUI ROAD
(ADJACENT TO MIDBLOCK CROSSING)
CHAINAGE: 2155m (MCP0)



SECTION C (RR-0105)

LAMBIE DRIVE
CHAINAGE : 300m (MCL0)

SCALE 1:100

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CLIENT: AT

REV	DATE	REVISION DETAILS	APPROVED
B	25.02.20	ISSUED FOR INFORMATION	[redacted]
A	08.10.19	ISSUED FOR ROAD SAFETY AUDIT	

SCALE	1:100
SIZE	A1
DRAWN	[redacted]
DESIGNED	[redacted]
REVIEWED	[redacted]

PRELIMINARY
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APPROVED
DATE

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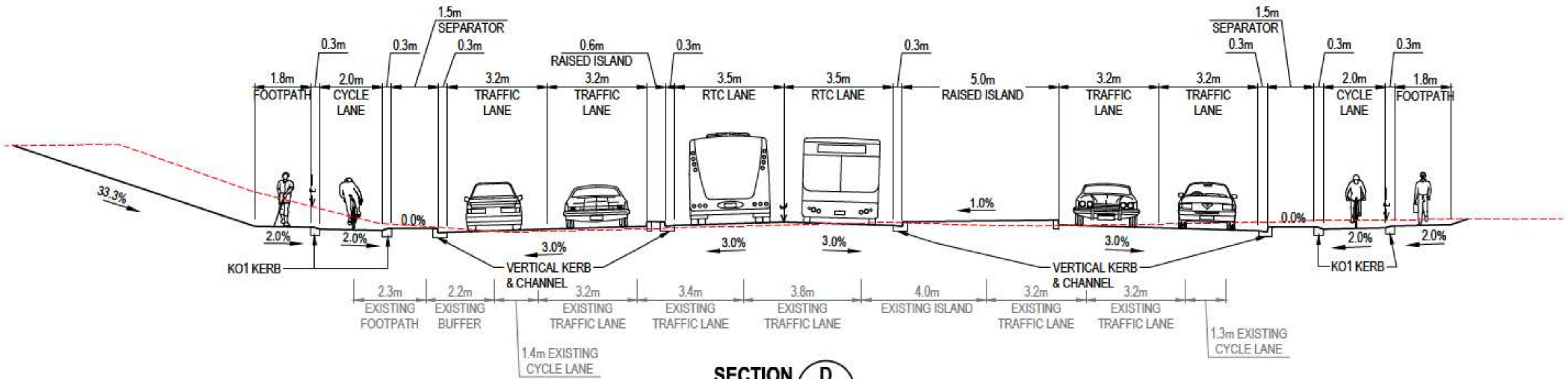
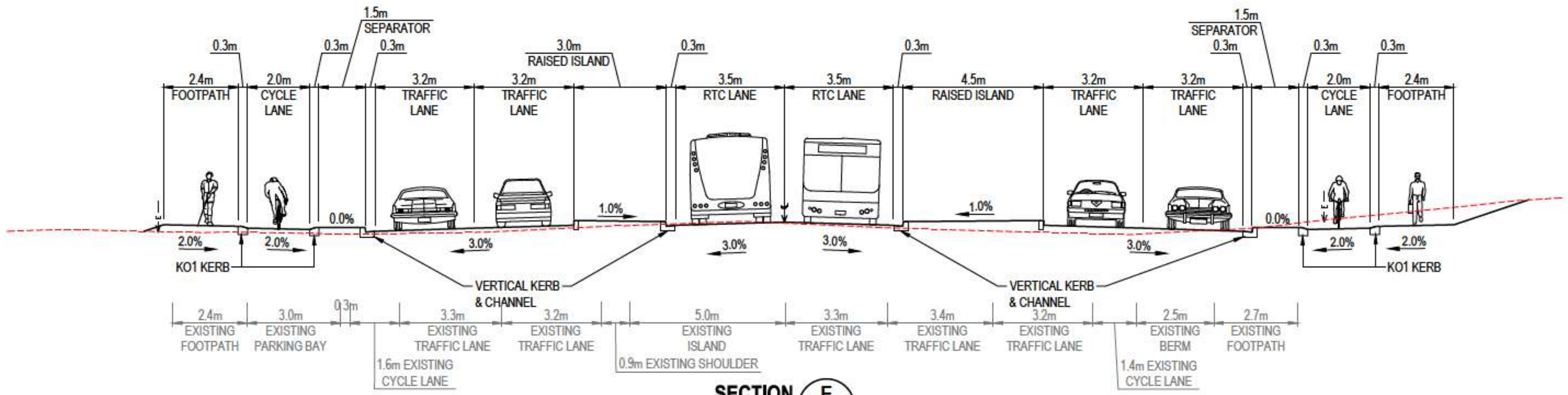


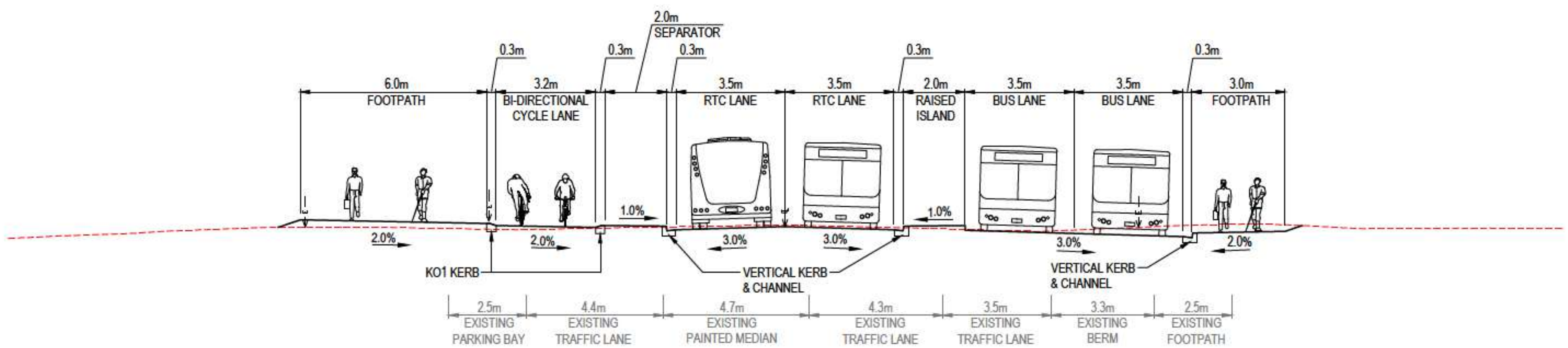
SECTION D RR-0106

LAMBIE DRIVE
CHAINAGE: 1040m (MCL0)



SECTION E RR-0106

MANUKAU STATION ROAD
CHAINAGE: 200m (MCM0)



SECTION F RR-0106

DAVIES AVENUE
CHAINAGE : 50m (MCD0)

SCALE 1:100

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CLIENT

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A	08.10.19	ISSUED FOR ROAD SAFETY AUDIT	

SCALE	SIZE
1:100	A1

DRAWN [redacted]
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REVIEWED [redacted]

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DATE

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TITLE: PREFERRED OPTION TYPICAL CROSS SECTIONS SHEET 2

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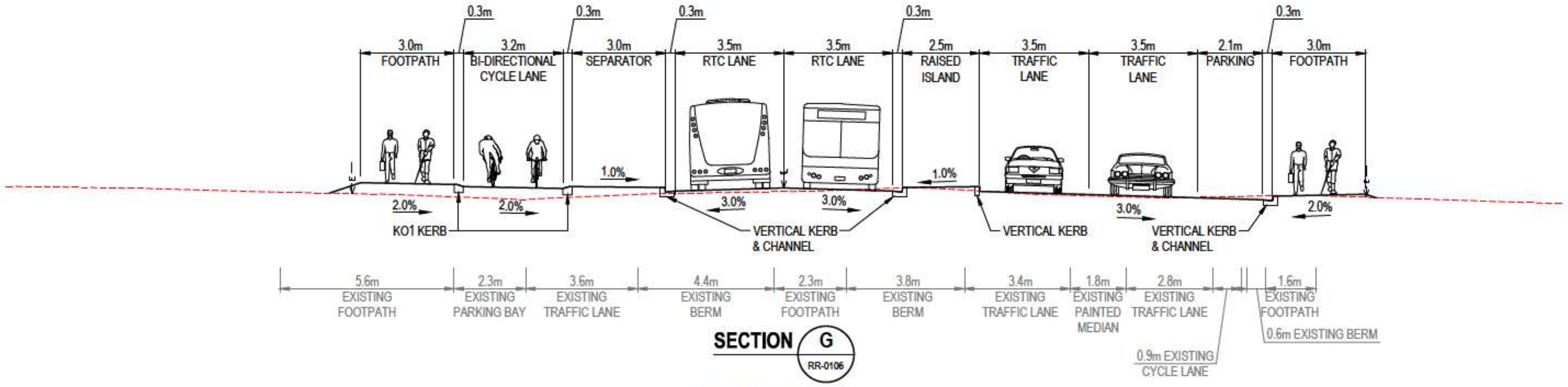
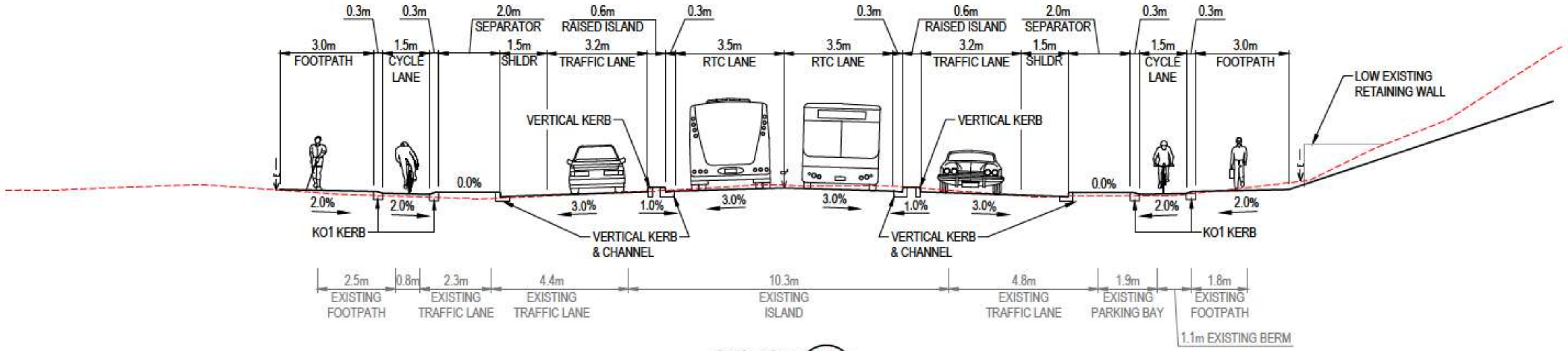


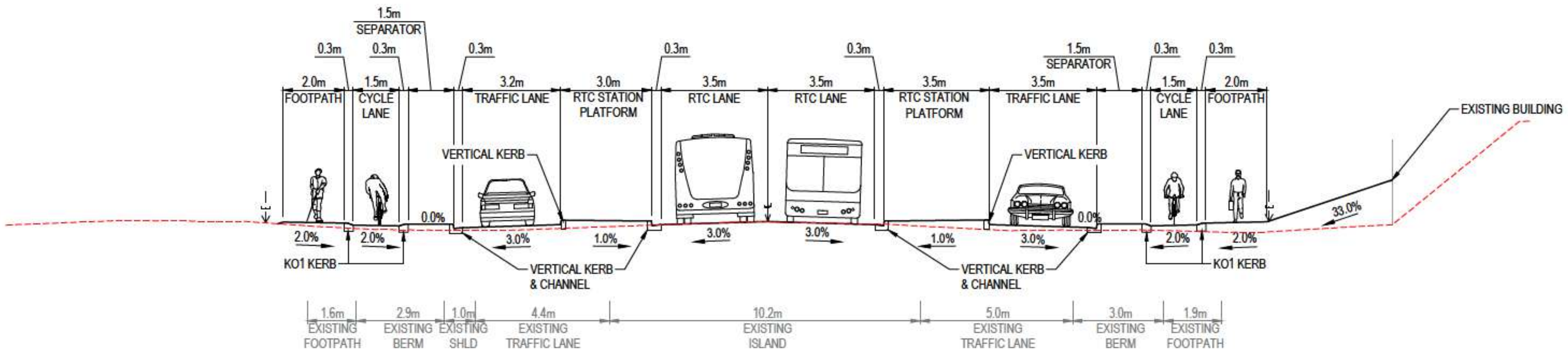
SECTION G RR-0106

DAVIES AVENUE
CHAINAGE: 250m (MCD0)



SECTION H RR-0107

RONWOOD AVENUE
CHAINAGE : 250m (MCR0)



SECTION I RR-0107

RONWOOD AVENUE
CHAINAGE : 330m (MCR0)

SCALE 1:100

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AT

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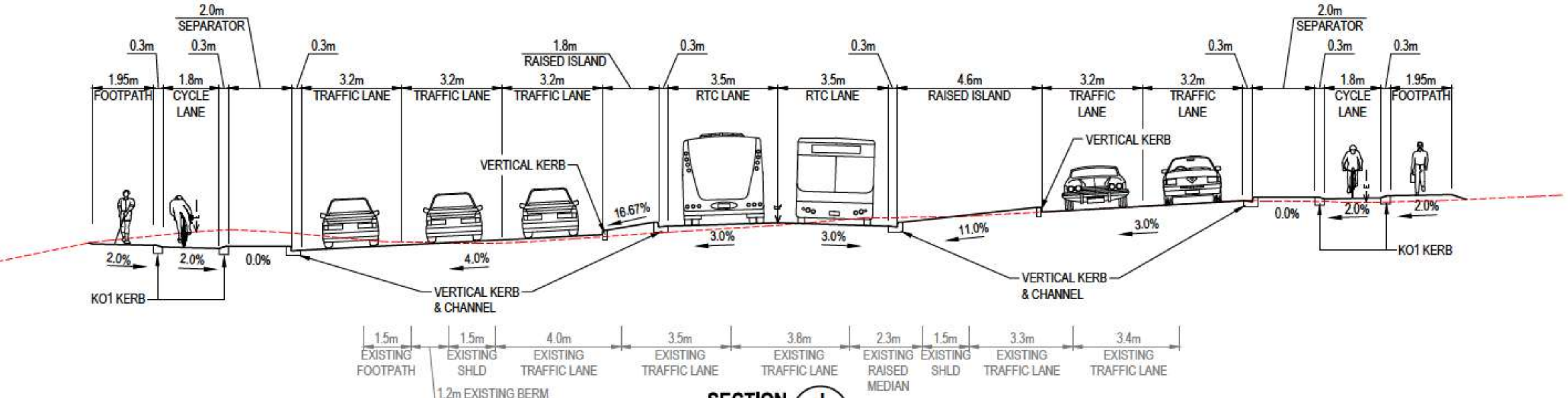
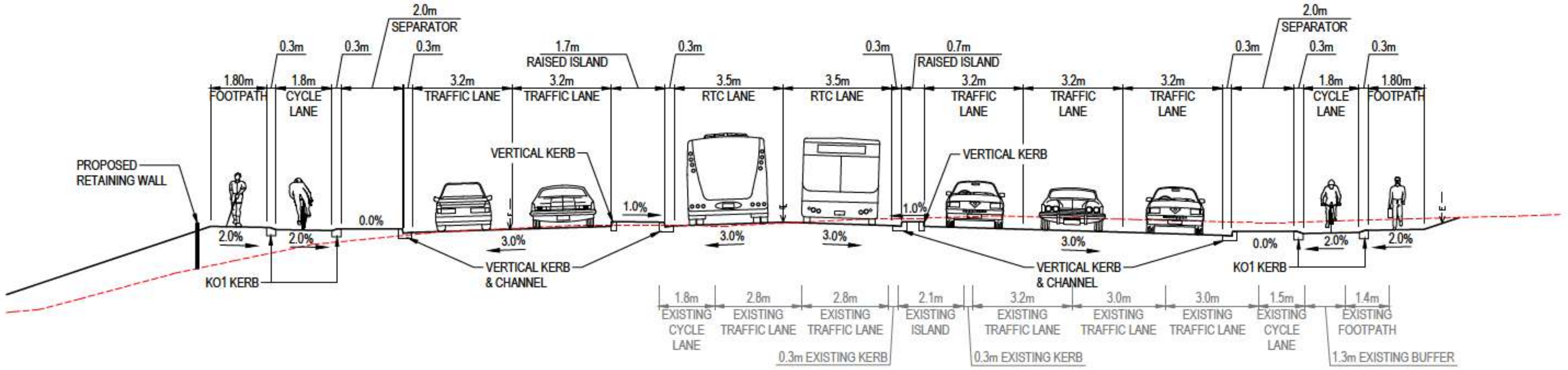
PROJECT	AIRPORT TO BOTANY RTC SSBC
TITLE	PREFERRED OPTION TYPICAL CROSS SECTIONS SHEET 3
DRAWING No.	502334 - 7000 - DRG - RR - 0303 - B (PROJECT No. - WBS - TYPE - DISC - NUMBER - REV)



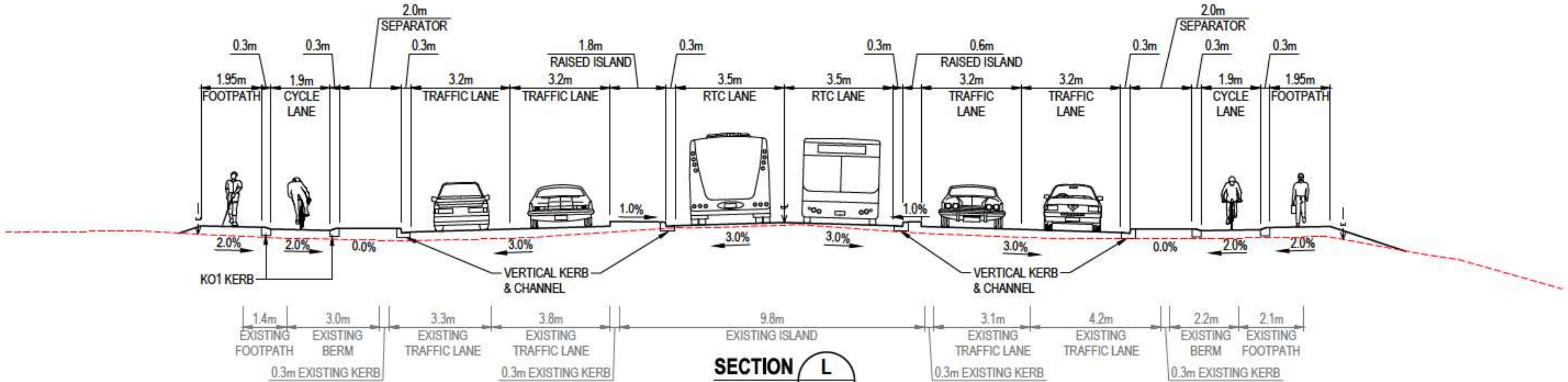
SECTION J (RR-0107)

GREAT SOUTH ROAD
CHAINAGE : 140m (MCG0)



SECTION K (RR-0108)

TE IRIRANGI DRIVE
CHAINAGE : 500m (MCT0)



SECTION L (RR-0112)

TE IRIRANGI DRIVE
CHAINAGE : 3850m (MCT0)

SCALE 1:100

aurecon

CLIENT: AT

REV	DATE	REVISION DETAILS	APPROVED
B	25.02.20	ISSUED FOR INFORMATION	[redacted]
A	08.10.19	ISSUED FOR ROAD SAFETY AUDIT	

SCALE: 1:100 SIZE: A1

DRAWN: [redacted]
DESIGNED: [redacted]
REVIEWED: [redacted]

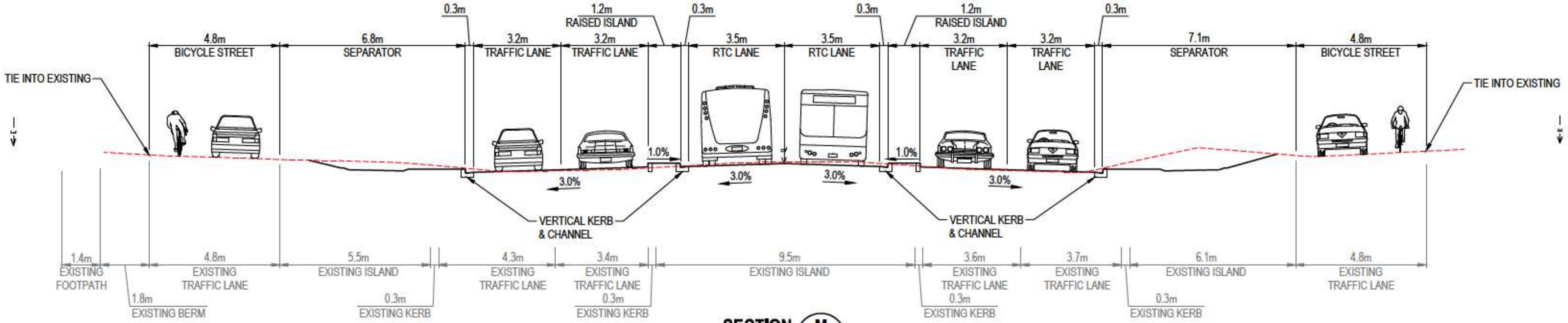
PRELIMINARY
NOT FOR CONSTRUCTION

APPROVED
DATE

PROJECT: AIRPORT TO BOTANY RTC SSBC

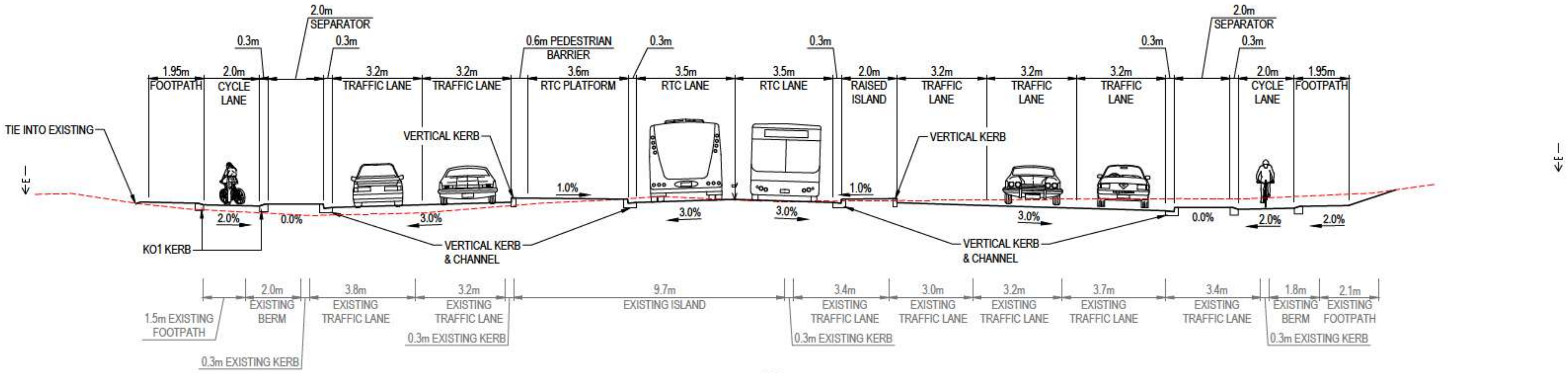
TITLE: PREFERRED OPTION TYPICAL CROSS SECTIONS SHEET 4

DRAWING No.: 502334 - 7000 - DRG - RR - 0304 - B



SECTION M RR-0115

TE IRIRANGI DRIVE
CHAINAGE : 5550m (MCT0)



SECTION N RR-0116

TE IRIRANGI DRIVE
CHAINAGE : 6100m (MCT0)

SCALE 1:100

aurecon

CLIENT: AT

REV	DATE	REVISION DETAILS	APPROVED
B	25.02.20	ISSUED FOR INFORMATION	[redacted]
A	08.10.19	ISSUED FOR ROAD SAFETY AUDIT	

SCALE: 1:100 | SIZE: A1

DRAWN: [redacted]

DESIGNED: [redacted]

REVIEWED: [redacted]

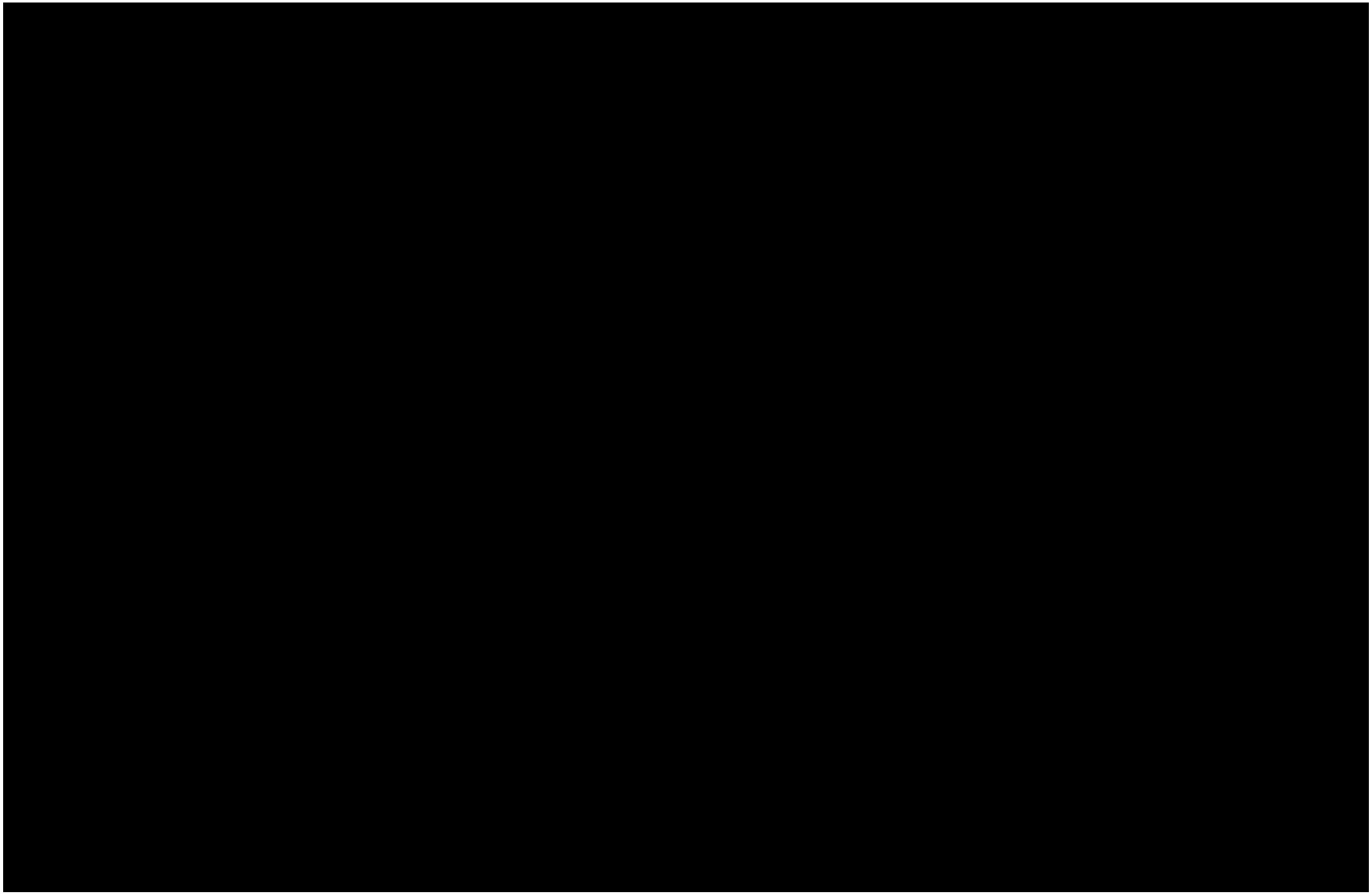
PRELIMINARY
NOT FOR CONSTRUCTION

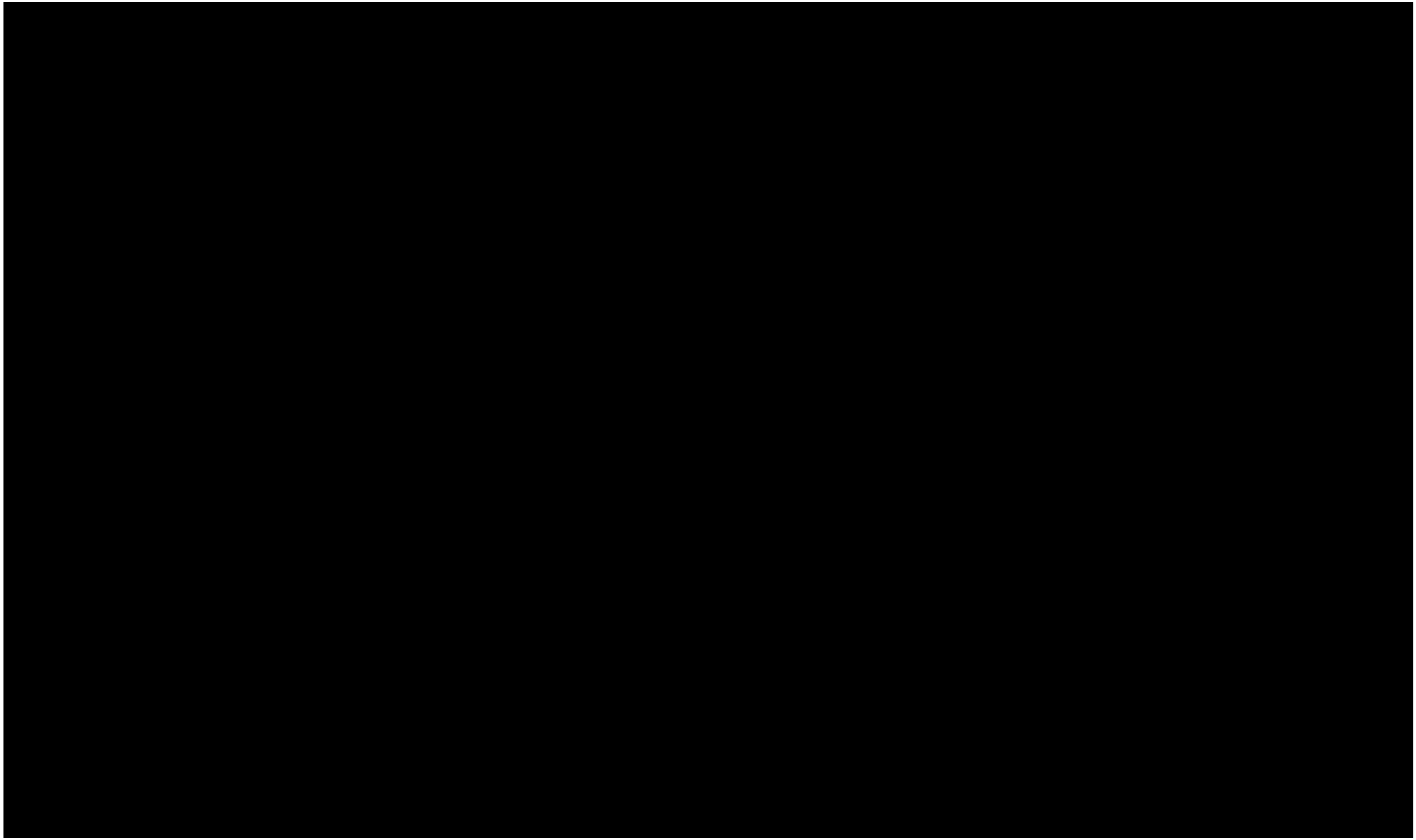
APPROVED
DATE

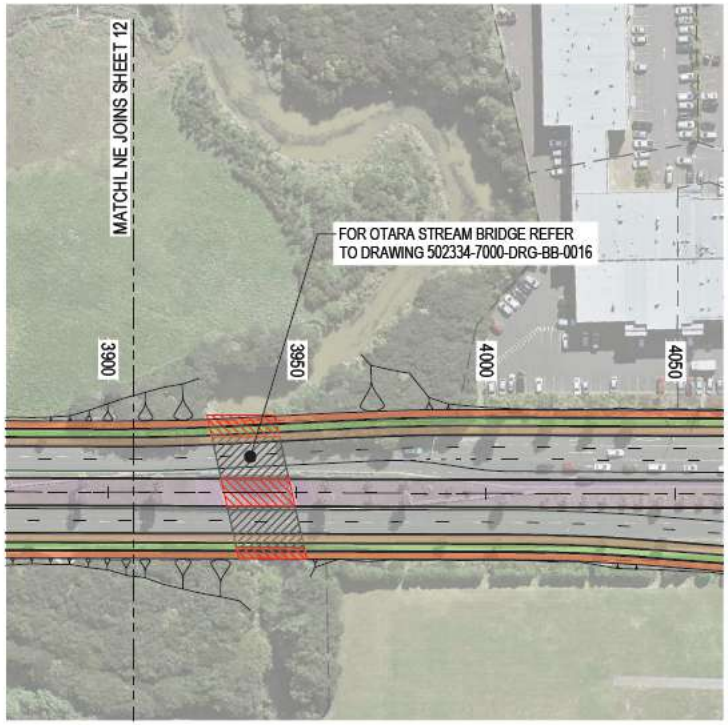
PROJECT: AIRPORT TO BOTANY RTC SSBC

TITLE: PREFERRED OPTION
TYPICAL CROSS SECTIONS
SHEET 5

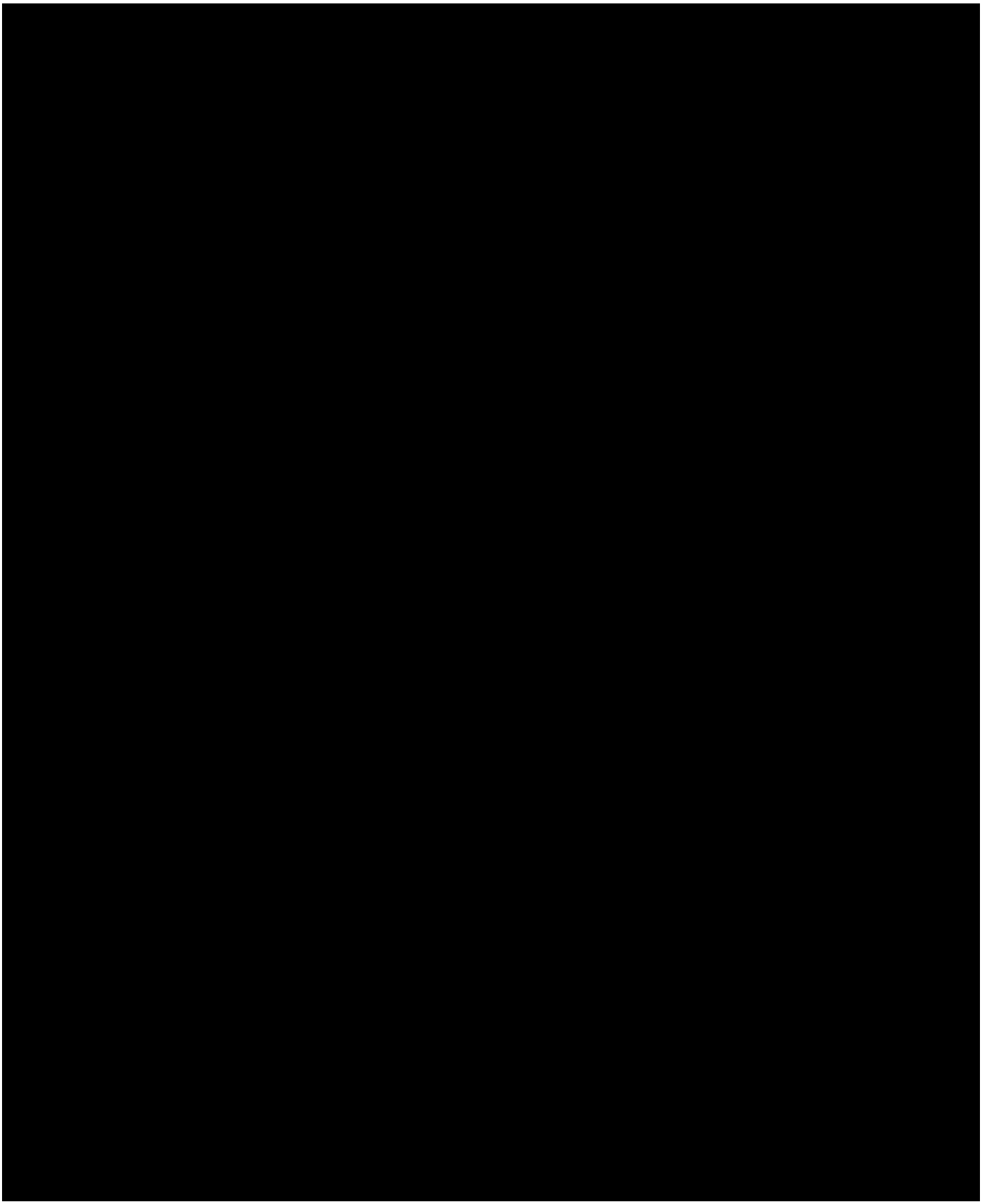
DRAWING No. 502334 - 7000 - DRG - RR - 0305 - B






MATCHL NE JOINS SHEET 12
FOR OTARA STREAM BRIDGE REFER
TO DRAWING 502334-7000-DRG-BB-0016
3900
3950
4000
4050

Appendix A-3 Bus stop details



1.1 Infrastructure and access

1.1.1 Stations

The role of the rapid transit network (RTN) in Auckland is to provide regional connectivity, supported by multiple bus routes and feeder services that, in turn, provide a local access coverage service role. Airport to Botany, as part of the proposed RTN, provides services focused on patronage and therefore, in line with the policy of the Auckland Regional Public Transport Plan, focuses on speed and directness above local access. Consequently, Airport to Botany, as a rapid transit line with a patronage service focus, targets station locations at major destinations and interchanges, rather than regularly spaced stop locations, which would be prioritised if the focus was on coverage.

The location of stations is a critical component for the accessibility and usefulness of a rapid transit line. For safe and efficient operations, passengers may only get on and off a rapid transit line at designated stations. This is especially so for 'closed' transit corridors operated by a single service pattern, like Airport to Botany, where local services do not move on or off the rapid transit running way, and network connections are based around passengers transferring at stations.

1.1.1.1 Locations

Station locations have been confirmed through the Station Locations Tech Note (502334-7000-TEC-KK-004) and are illustrated in **Figure** Error! No text of specified style in document.**-1**. This shows the relationship between the station locations and land use planning. Zones in purple are employment zones, striped purple/pink are high density town centres and yellow/orange residential.

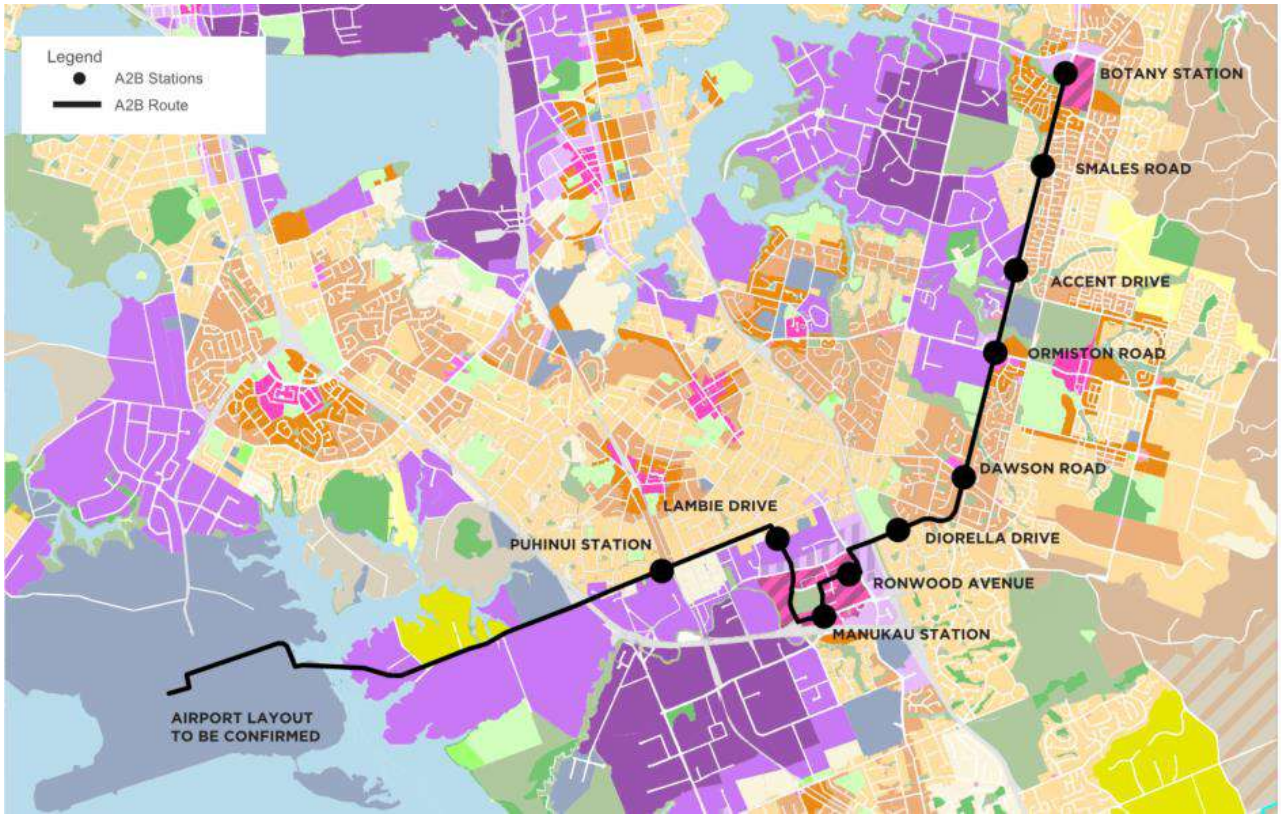


Figure Error! No text of specified style in document.**-1: Proposed station locations and land uses**

Table Error! No text of specified style in document.**-1** provides the full list of the Airport to Botany Rapid Transit stations and their indicative classification.

Table Error! No text of specified style in document.**-1: Station classifications**

Stop number	Section	Location	Major interchange	Minor interchange
1	Airport	Airport Passenger Terminal	X	
2	Airport	The Quad Business Park (Eastern Airport Precinct)		X
3	Puhinui	Puhinui Rail Station	X	
4	Puhinui	Puhinui Road/ Lambie Drive		X
5	Manukau	Manukau Station	X	
6	Manukau	Ronwood Avenue (Manukau Metropolitan Centre)		X
7	Te Irirangi	Diorella Drive (AUT/Sportsbowl)		X
8	Te Irirangi	Dawson Road		X
9	Te Irirangi	Ormiston Road – Botany Junction Shopping Centre		X
10	Te Irirangi	Accent Drive		X
11	Te Irirangi	Smales Road		X
12	Botany	Botany Metropolitan Centre	X	

These stations are a mixture of intermediate and interchange stations, where customers can connect with other public transport services. Design features of the intermediate and interchange stations are outlined in the following sections. As outlined in Section **Error! Reference source not found.** many stations provide a key role in access to the system through facilitating interchange with local bus services.

1.1.1.2 Major interchange stations

The arrangement of each major interchange station will provide short accessible paths with clear sightlines to connecting public transport services. **Table** Error! No text of specified style in document.**-2** provides a summary of the requirements for each of the major interchange stations.

Table Error! No text of specified style in document.**-2 Major interchange station design requirements**

Interchange Stations	Design requirements
Airport Passenger Terminal	▪ As a minimum, the assets provided will be equal to intermediate stations. In addition to these, the following apply: ▪ **Platforms will be a minimum of 5m wide at this station** ▪ **Platforms will be a minimum of 34m long at all stations to accommodate light rail vehicles** ▪ **Staffed Customer Service Centre, ticket machines and validation** ▪ Simple, comfortable (in all conditions), short and efficient customer connections between Airport to Botany Rapid Transit services and domestic and international terminals ▪ Rapid transit vehicle charging facilities ▪ Staff welfare facilities that are accessible from the layover location ▪ Accessible toilets if adjacent airport facilities are not available.
Puhinui Station	▪ As a minimum, the assets provided will be equal to intermediate stations. In addition to these, the following apply: ▪ The Puhinui Interchange stop is to tie-into the balcony designed in the Puhinui Interchange project, above the railway line ▪ Platforms will be a minimum of 5m wide at this station ▪ As Puhinui interchange station will be on an elevated bridge deck, the platform lengths will be designed to 67m lengths to allow for potential future coupling of LRT vehicles and avoid rebuilding the bridge deck ▪ Staffed Customer Service Centre, ticket machines and validation ▪ Simple and efficient customer connections between Airport to Botany Rapid Transit services and train services.
Manukau Station	▪ As a minimum, the assets provided will be equal to intermediate stations. In addition to these, the following apply: ▪ Staffed Customer Service Centre (existing) ▪ Simple and efficient customer connections between Airport to Botany Rapid Transit services, train services, and local bus services. This will include a pedestrian priority space within the intersection between the three public transport modes.

Interchange Stations	Design requirements
Botany Metropolitan Centre	▪ As a minimum, the assets provided will be equal to intermediate stations. In addition to these, the following apply: ▪ Platforms will be a minimum of 5m wide at this station ▪ Platforms will be a minimum of 34m long at all stations to accommodate light rail vehicles ▪ Staffed Customer Service Centre (existing), ticket machines and validation ▪ Convenient customer access to and from the Metropolitan Centre ▪ Simple and efficient customer connections between Airport to Botany Rapid Transit services, AMETI Eastern Busway services, and local bus services.

1.1.1.3 Minor interchange stations

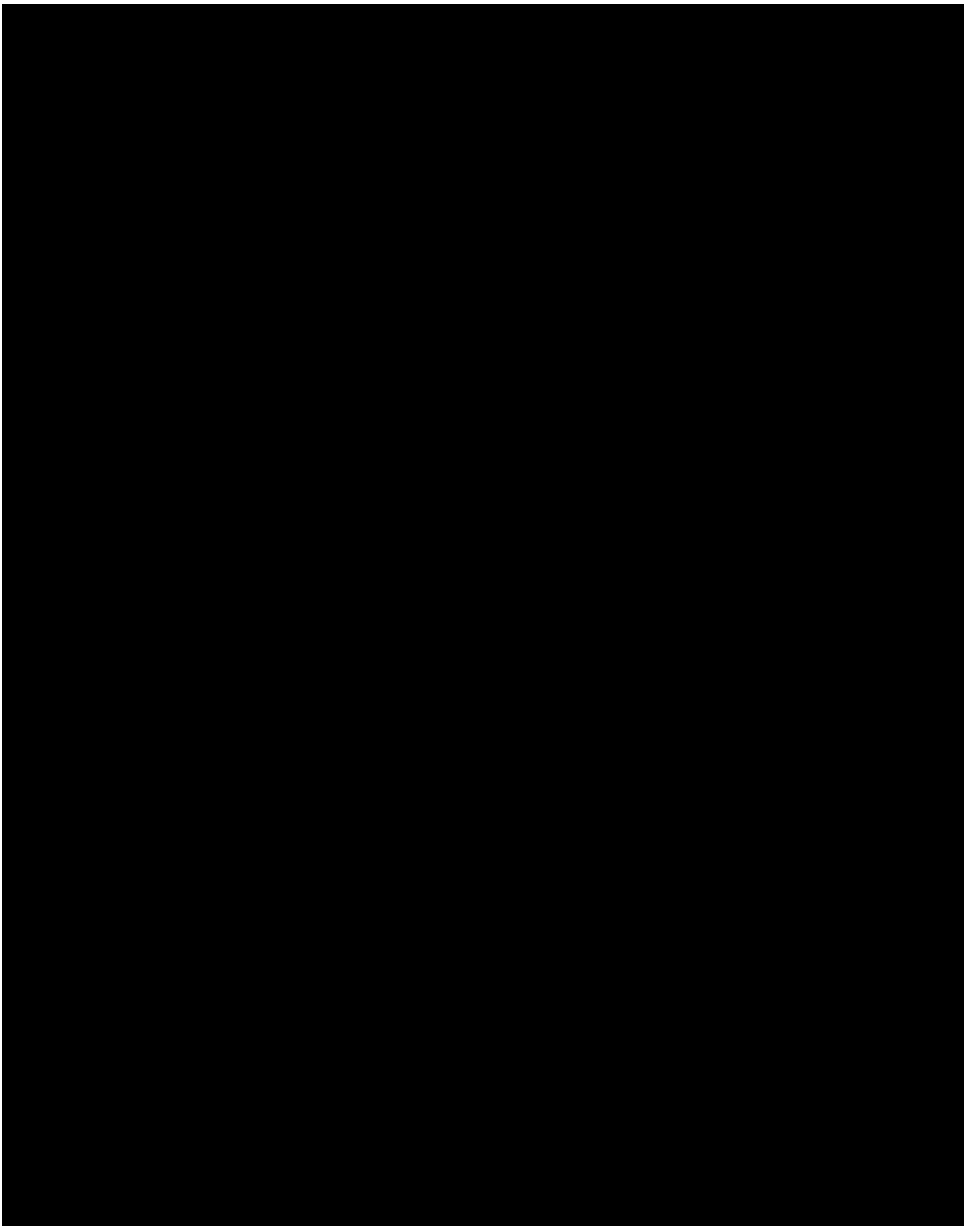
The arrangement of each minor interchange station will provide short accessible paths with clear sightlines to connecting public transport services. **Table** Error! No text of specified style in document.**-3** summarises the assets provided at each minor interchange station. In addition to these assets, the North of Botany Terminus will require charging facilities for the rapid transit vehicles, and staff welfare facilities that are accessible from the layover location.

Table Error! No text of specified style in document.**-3 Minor interchange station design requirements**

Asset	Design requirements
Platforms	▪ Platforms will be a minimum of 3m wide at all stations ▪ Platforms at Davies Ave and Ronwood Ave stops will be wider than 3m – the exact dimension is dependent on property constraints ▪ Platforms will be a minimum of 34m long at all stations to accommodate a range of single bus rapid transit and light rail vehicles. Only spatial future proofing for coupled light rail vehicles will be provided ▪ Platform markings to indicate safe areas etc.
Lighting	▪ To satisfy CPTED and IPTED principles
Shelter	▪ High standard of protection against wind, rain and sun ▪ To satisfy CPTED principles
Seating	▪ As per current best practice and AT codes
Vending and Reload Devices (VRDs)	▪ As per current best practice and AT codes
Fare Payment Devices (FPDs)	▪ As per current best practice and AT codes – no gate lines
Emergency Help Points (EHPs)	▪ As per current best practice and AT codes
Passenger Information Displays (PIDs)	▪ Dynamic real-time service information, including audible messages ▪ As per current best practice and AT codes
Public Address (PA) speakers	▪ As per current best practice and AT codes
Static information boards	▪ Route and service information posters ▪ As per current best practice and AT codes
Wayfinding signage (including maps)	▪ Simple and legible signage, in accordance with existing AT standards ▪ Illuminated station marker totem ▪ Platform signage that identifies the Rapid Transit direction of travel
CCTV	▪ As per current best practice and AT codes
Wi-Fi	▪ As per current best practice and AT codes
Rubbish bins	▪ As per current best practice and AT codes
Bicycle parking for privately owned bicycles (to provide first and last mile connections)	▪ As per current best practice and AT codes

Asset	Design requirements
Bicycle & scooter parking for shared mobility devices (to provide first and last mile connections)	▪ As per current best practice and AT codes
On-demand transport options (to provide first and last mile connections)	▪ Parking for taxis, Uber/ride-share vehicles, e-scooters etc. shall be accessible from the station e.g. within a 50m radius.

Appendix B - Breakdown of estimates



Appendix C - Parallel estimate report

AUCKLAND TRANSPORT
AIRPORT TO BOTANY
INDICATIVE BUSINESS CASE
PARALLEL ESTIMATE
8 APRIL 2020

CONTENTS

1 IN BRIEF 1
2 PARALLEL ESTIMATE 2
3 RISK 4
4 PARALLEL ESTIMATE ASSUMPTIONS 4
5 APPENDIX 8

REVISION HISTORY

Revision Number	Revision	Revision Date	Prepared By	Checked By
1	Issued for review	8 April 20	[redacted]	[redacted]

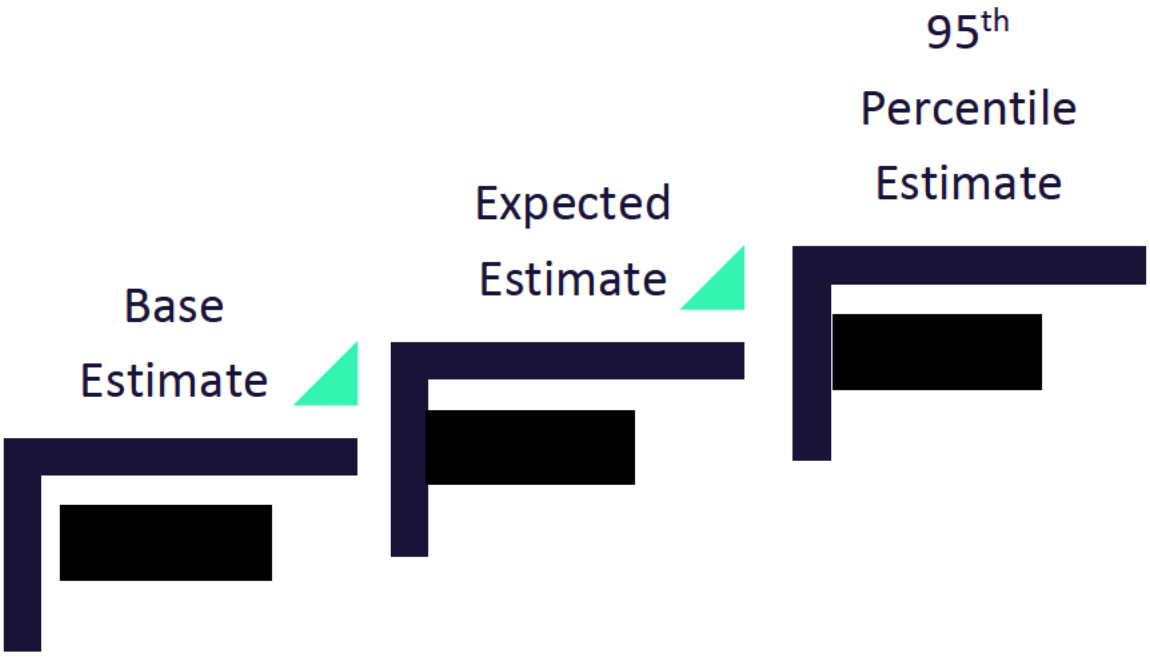
Electronic file name: Airport to Botany IBC Parallel Estimate

1 IN BRIEF

Alta has been engaged by Auckland Transport to provide a parallel estimate for the Indicative Business Case preliminary design on the Airport to Botany project. The project involves the widening and construction of a dedicated busway between Puhinui Road on the Western side of the Puhinui Interchange to southern side of the Botany Town Centre on Te Irirangi Drive.

The outcome of the parallel estimate process is summarised in the table below. These figures have been reconciled with Aurecon's engineer's 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



2 PARALLEL ESTIMATE

This parallel estimate has been prepared based on the drawings and reports provided by Aurecon, for detail refer to Appendix 2. 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 2020 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. The level of detail within the information provided should be considered as low. Aurecon has provided indicative service relocation information along the entire alignment, high level bridge detail and bus station requirements. All other information has been measured from the drawings provided or assumptions made.

While a total project estimate has been developed, we have also split the direct costs across five geographical sections of the project. These are as follows;

- Section 1 – Manukau Station Road, Davies Avenue, Ronwood Avenue
- Section 2 – Puhinui Interchange Bridge, Kenderdine Road, Bridge Street, Cambridge Terrace
- Section 3 – Lambie Drive
- Section 4 – Puhinui Road
- Section 5 – Great South Road and Te Irirangi Drive

Upon completion of the parallel estimate a review was held with Aurecon's Estimator, [redacted]. Initially this focused on agreeing the direct costs for each category of work. The initial costs from both parties are included in the table below, as well as updated final costs following discussion.

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

Following the meeting several changes were made to both estimates. From Alta's estimate, the changes consisted of the following;

- Reviewing drainage costs and decreasing kerb, subsoil drain and stormwater detention tank costs
- Reduction in bridge costs, specifically contingency allowed for tie in works to the Puhinui Interchange
- Increase in Service Relocation costs

From Aurecon's estimate, the changes consisted of the following;

- Increase in drainage costs and scope
- Reduction in Service Relocation Costs
- Reduction in Landscaping Costs

[redacted]

Within both estimates the two areas of remaining differences were within the drainage and traffic services. This is largely due to where various items within the estimate have been allocated.

The overall estimate values agreed between both Alta and Aurecon are as follows;

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

Costs were requested to be separated between the various sections of works within the estimate.

[redacted]

[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]
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3 RISK

At present, nominal risk values of 30% for P50 and 20% for P95 risk percentages have been used. At the request of Aurecon, a combined risk value will be developed and agreed in conjunction with Aurecon.

4 PARALLEL ESTIMATE ASSUMPTIONS

Both Alta and Aurecon have assumed the project would be delivered as an Alliance due to the size and complexity. Design and consenting costs have been estimated and included based on this approach. Further detail relevant to the various sections of works is listed below.

[redacted]

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5 APPENDIX

Appendix	Description	Source
Appendix 1	Parallel Estimate Summary Sheet	Alta
Appendix 2	Information provided	Aurecon

Appendix 1 – Parallel Estimate Summary Sheet

Project Estimate - Form B

Project Name: Airport to Botany

IBE

Indicative Business Case Estimate

Item	Description	Base Estimate	Contingency	Funding Risk Contingency
[redacted]				

Appendix 2 – Information Provided

Appendix D - Medium term cost estimate

TRUE-COST
CONSTRUCTION COST CONSULTANTS

A2B Medium Term Bus Corridor

Business Case Estimate

Prepared for:

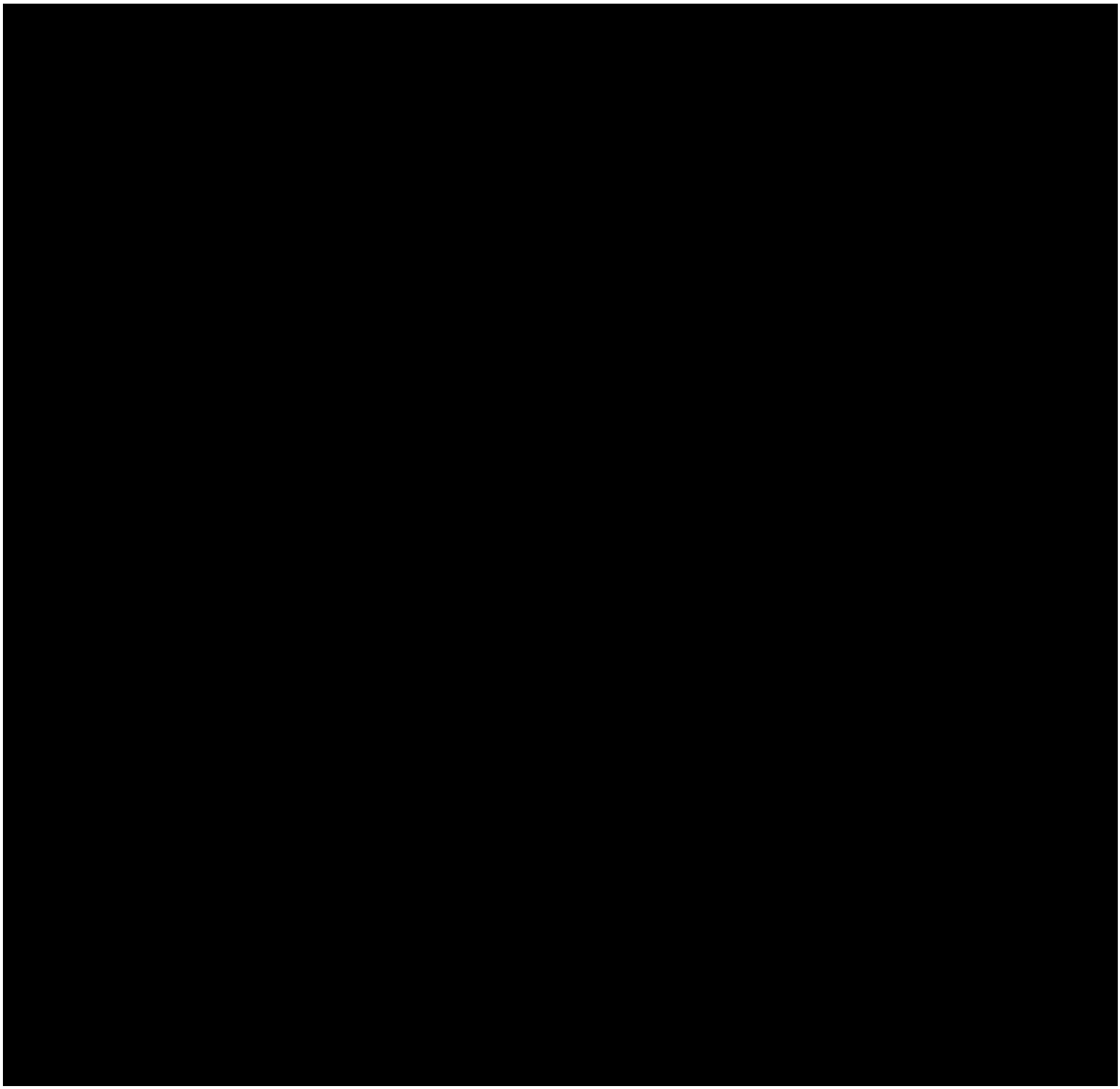
Aurecon

Issued date:

1/10/2020

[redacted]

[redacted]



APPENDIX A

TRUE-COST
CONSTRUCTION COST CONSULTANTS
19/852 Mt EDEN RD, AUCKLAND
021 497 775

PROJECT ESTIMATE SUMMARY

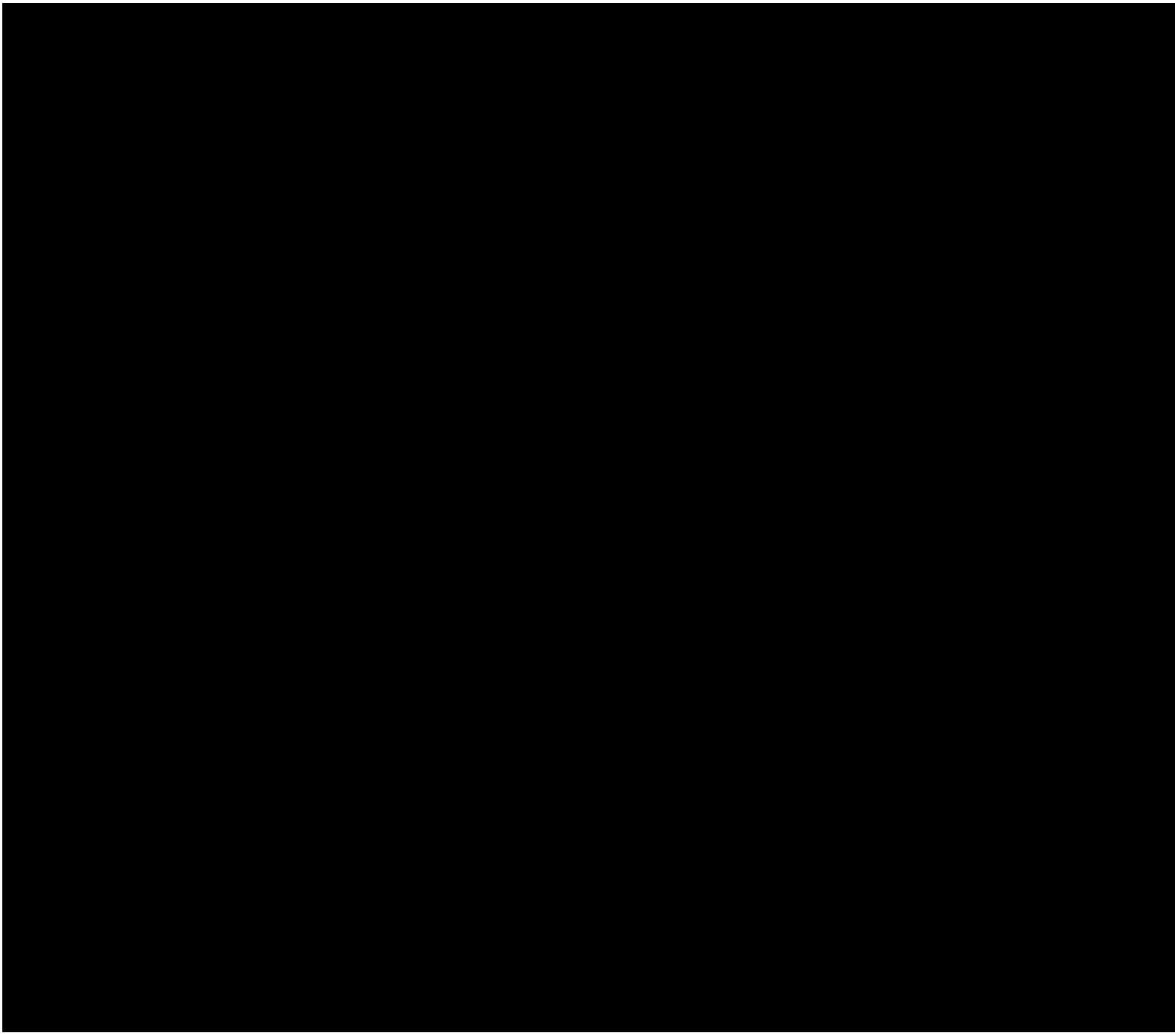
[redacted]

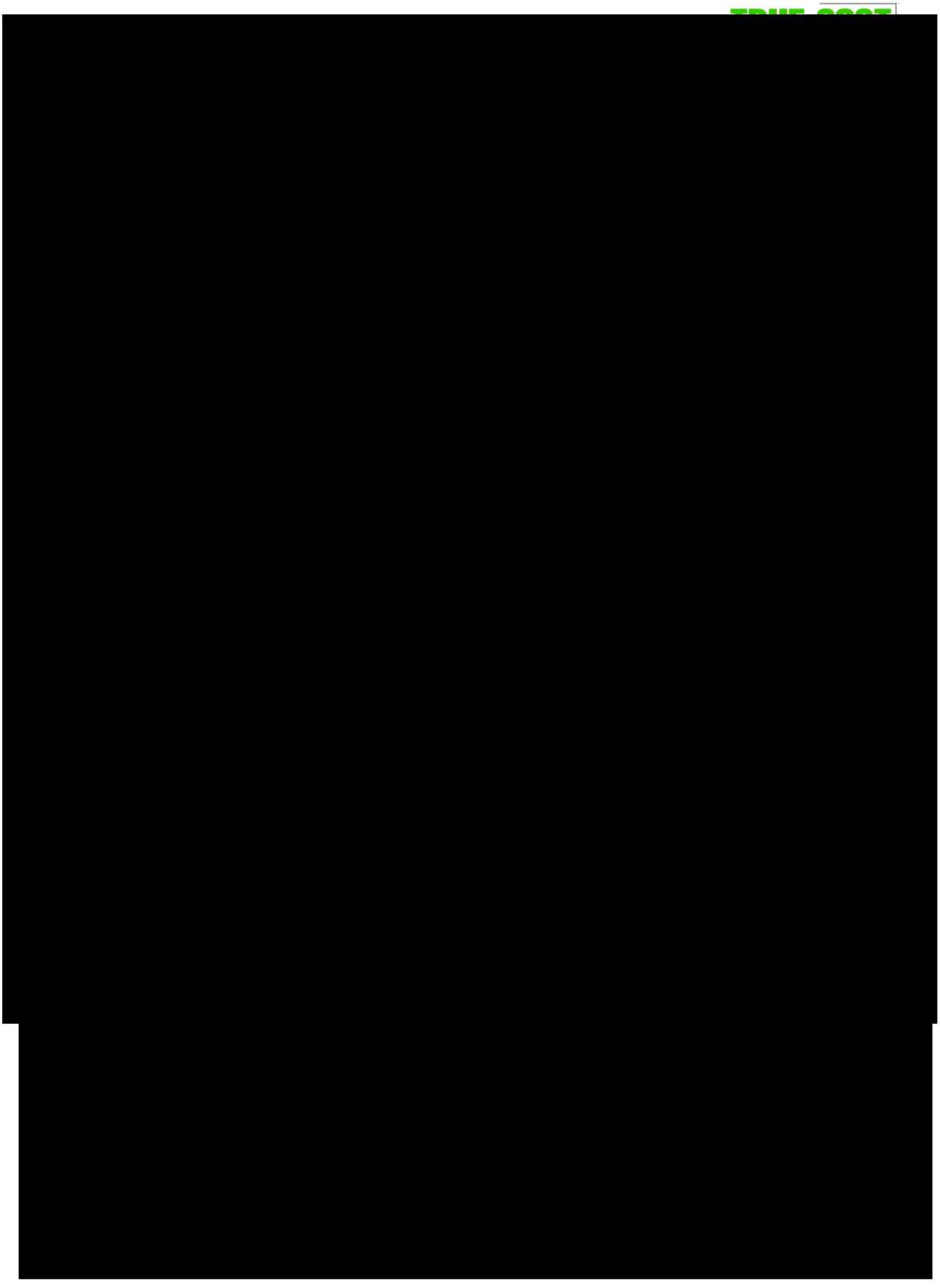
APPENDIX B

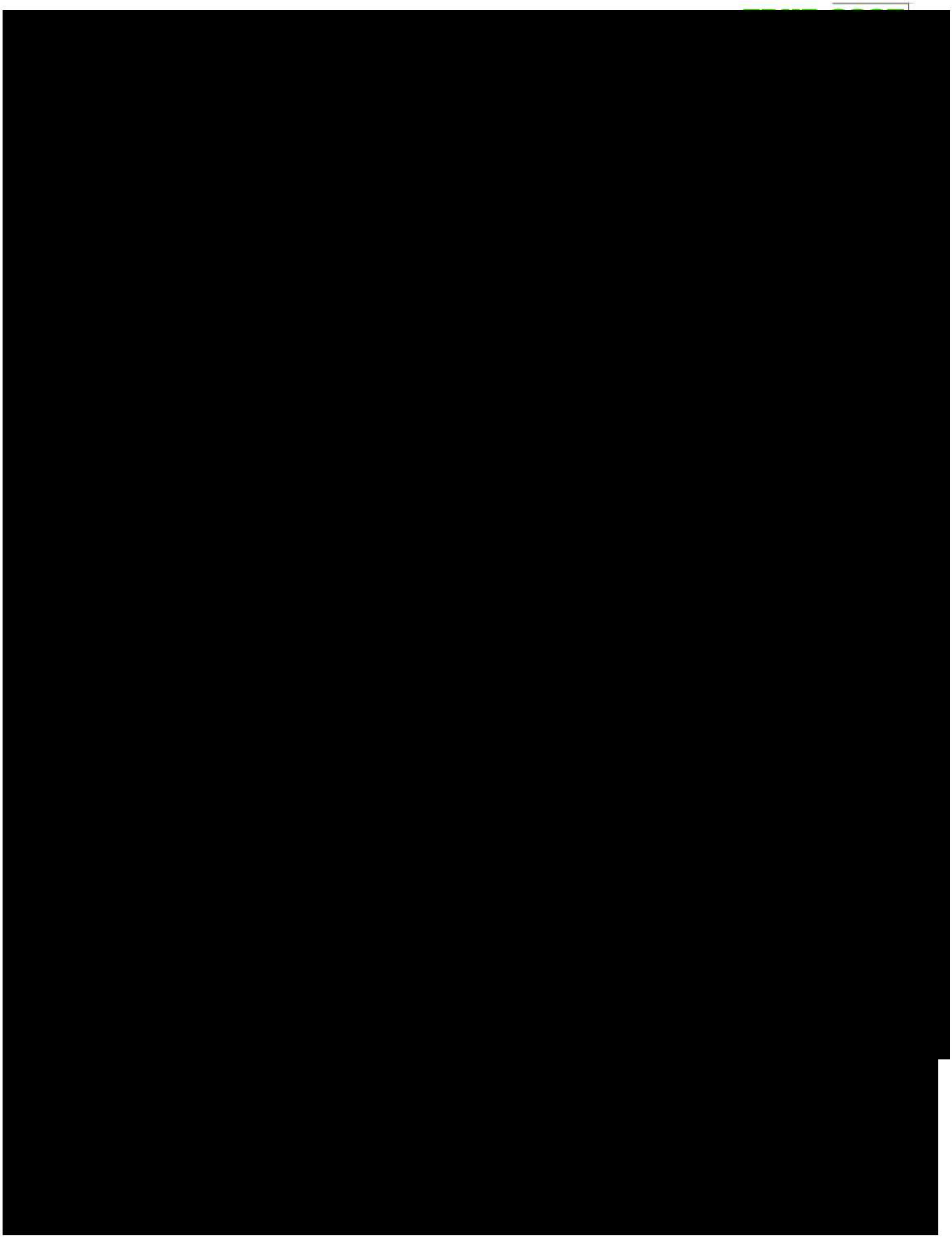
TRUE-COST
CONSTRUCTION COST CONSULTANTS
32/652 Mt EDEN RD, AUCKLAND
021 497 775

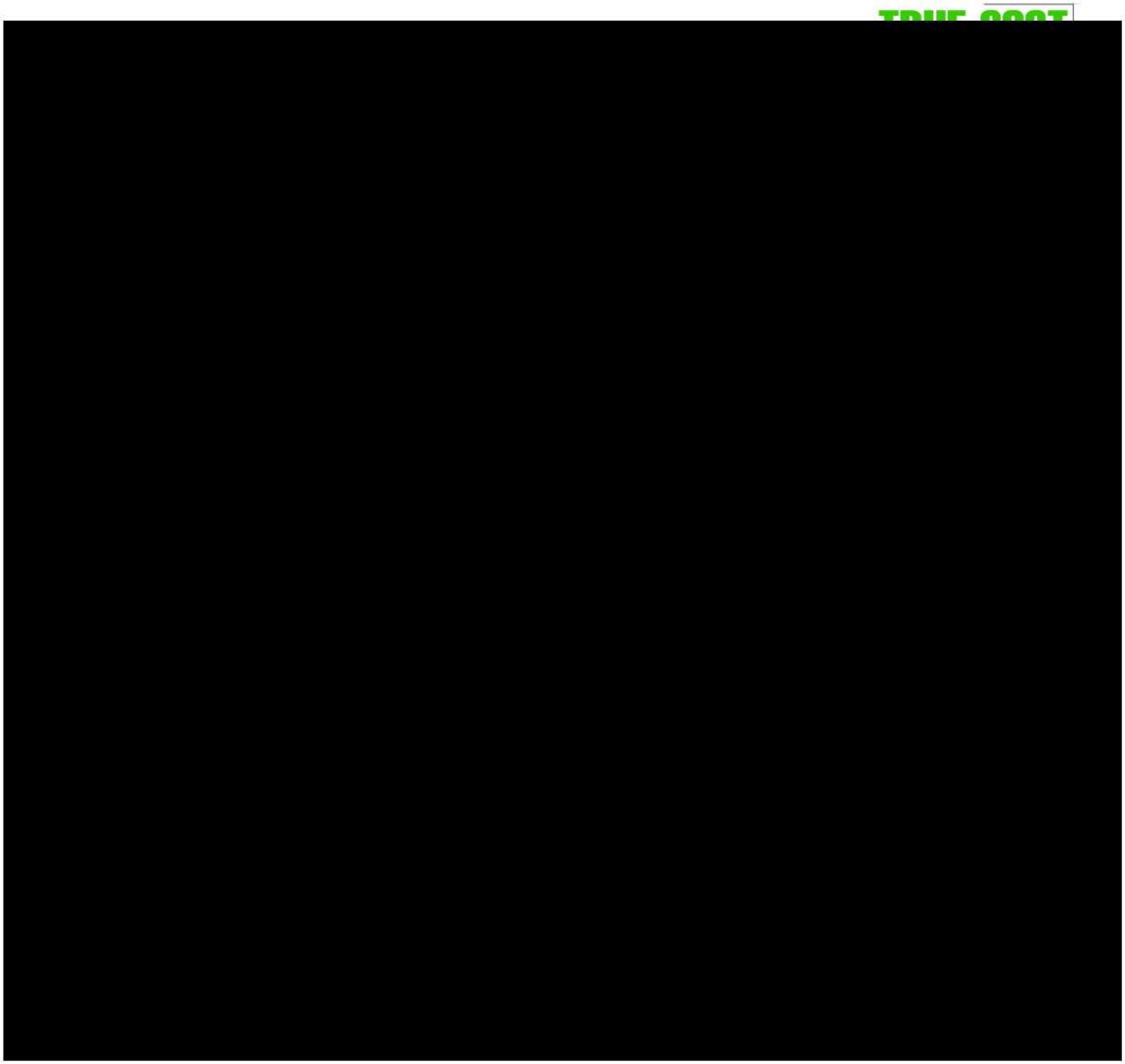
DETAILED ESTIMATE

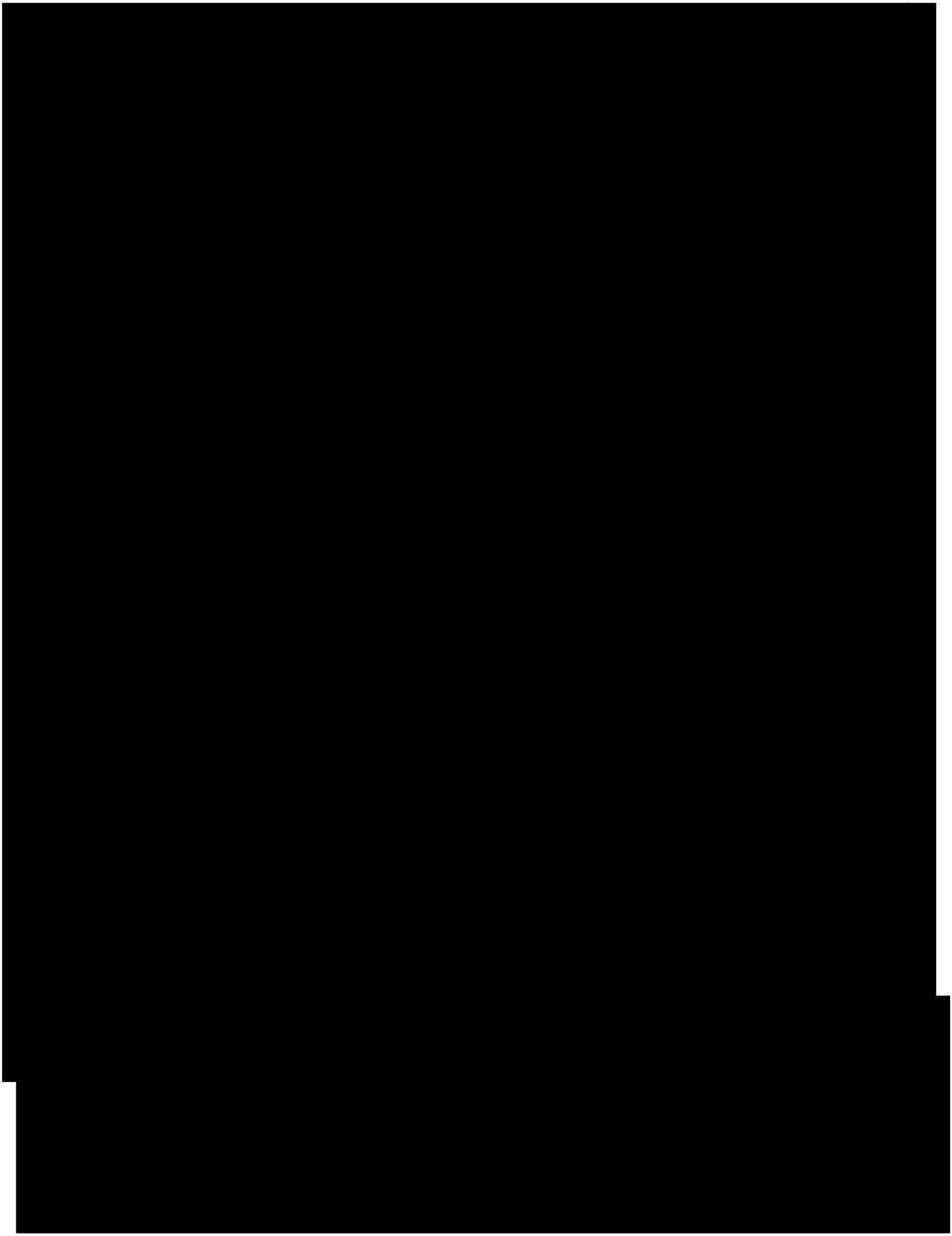
[redacted]

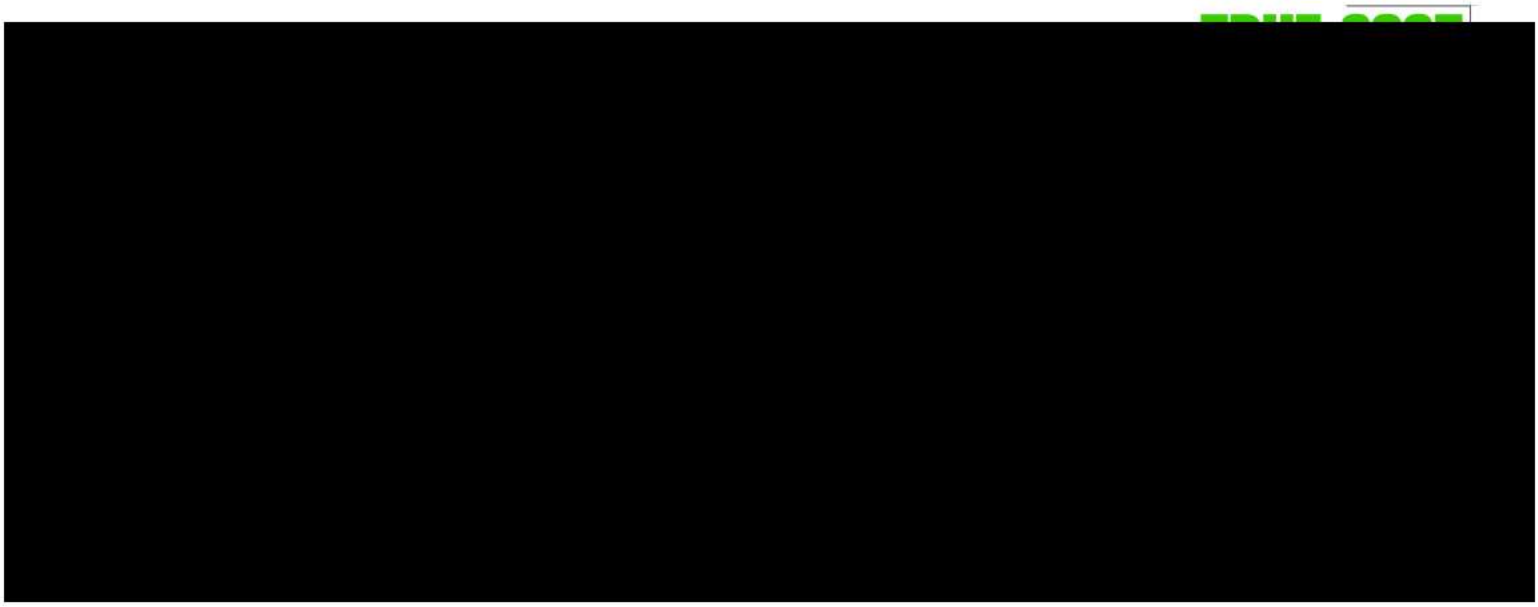












[redacted]

Appendix E - Botany Station cost estimate

TRUE-COST
CONSTRUCTION COST CONSULTANTS

Botany Interchange

Business Case Estimate

Prepared for:

Aurecon

Issued date:

1/09/2020

CONTENTS

TRUE-COST
CONSTRUCTION COST CONSULTANTS
19/852 Mt EDEN RD, AUCKLAND
021 497 775

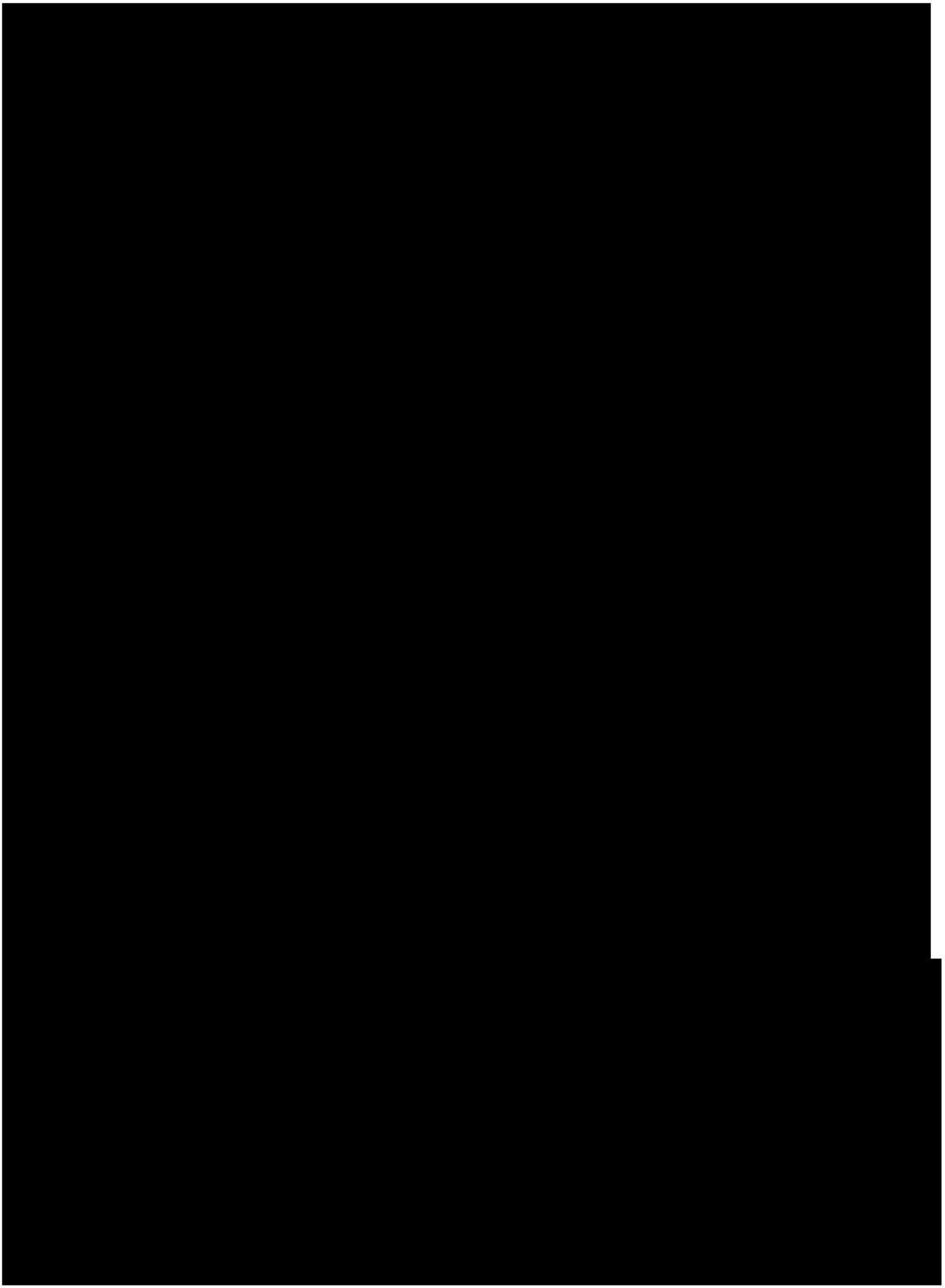
1.0 INTRODUCTION

2.0 BASIS OF ESTIMATE

APPENDIX A

TRUE-COST
CONSTRUCTION COST CONSULTANTS
19/852 Mt EDEN RD, AUCKLAND
021 497 775

PROJECT ESTIMATE SUMMARY



APPENDIX B

TRUE-COST
CONSTRUCTION COST CONSULTANTS
32/852 Mt EDEN RD, AUCKLAND
021 497 775

DETAILED ESTIMATE

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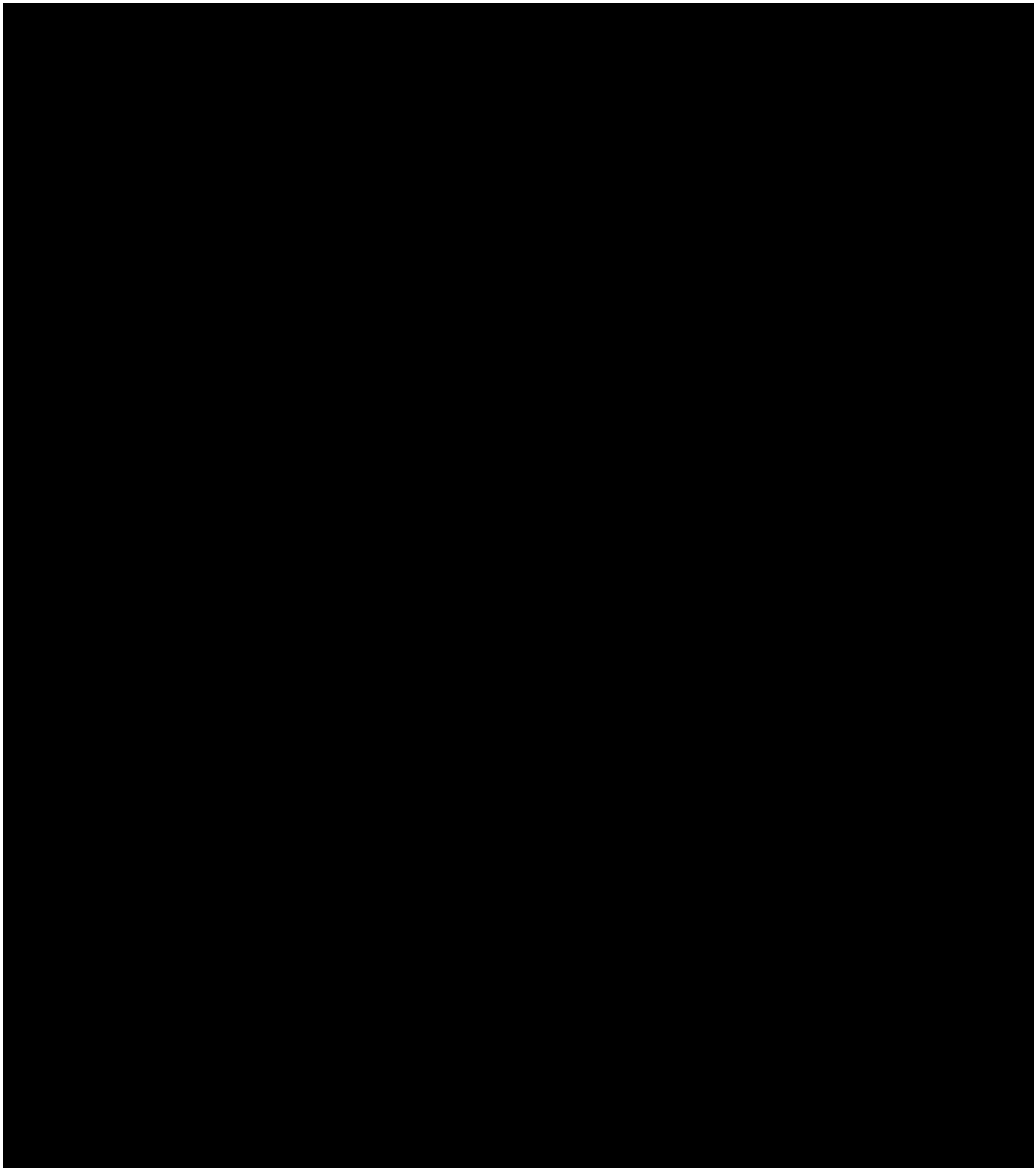

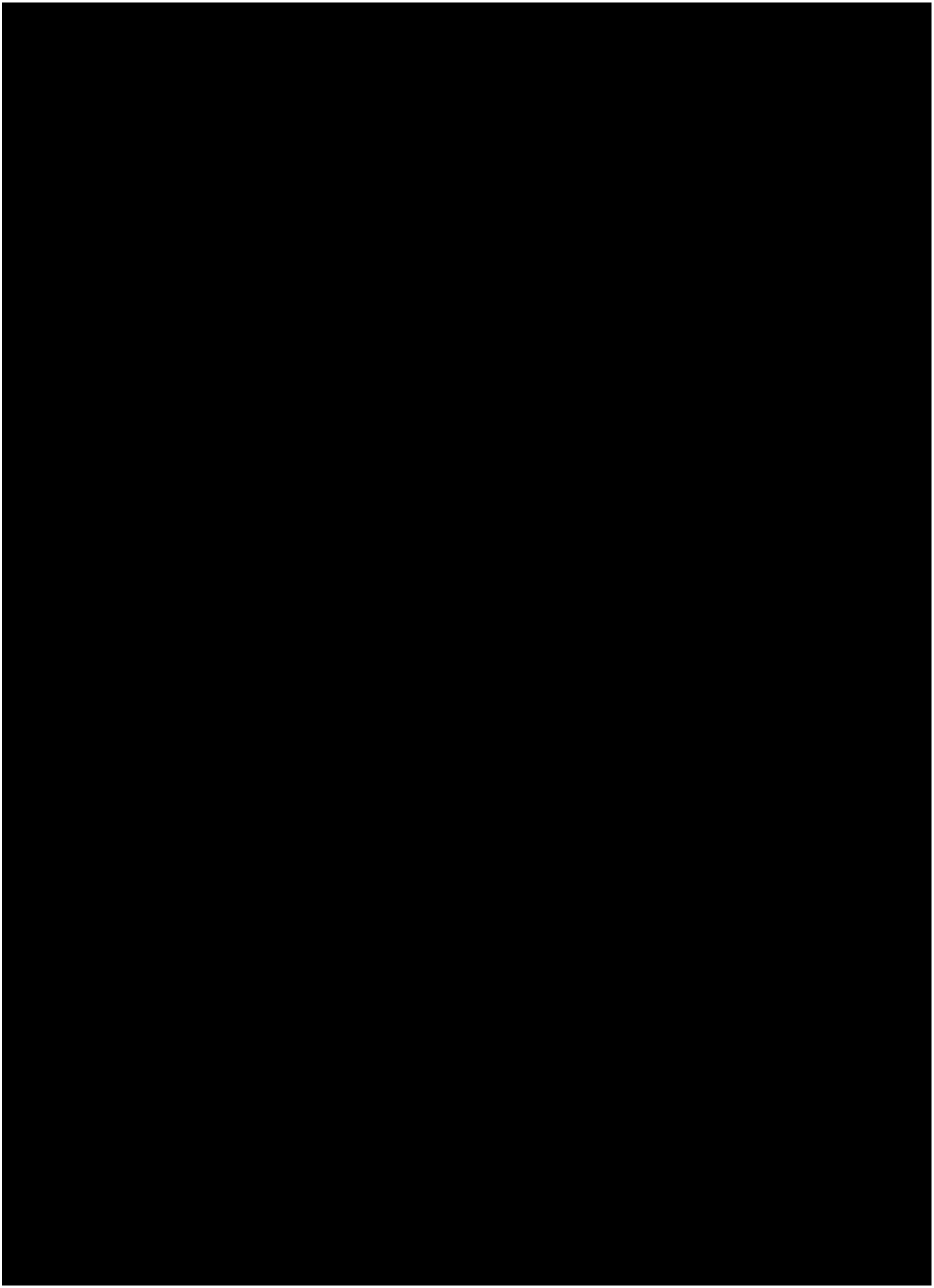

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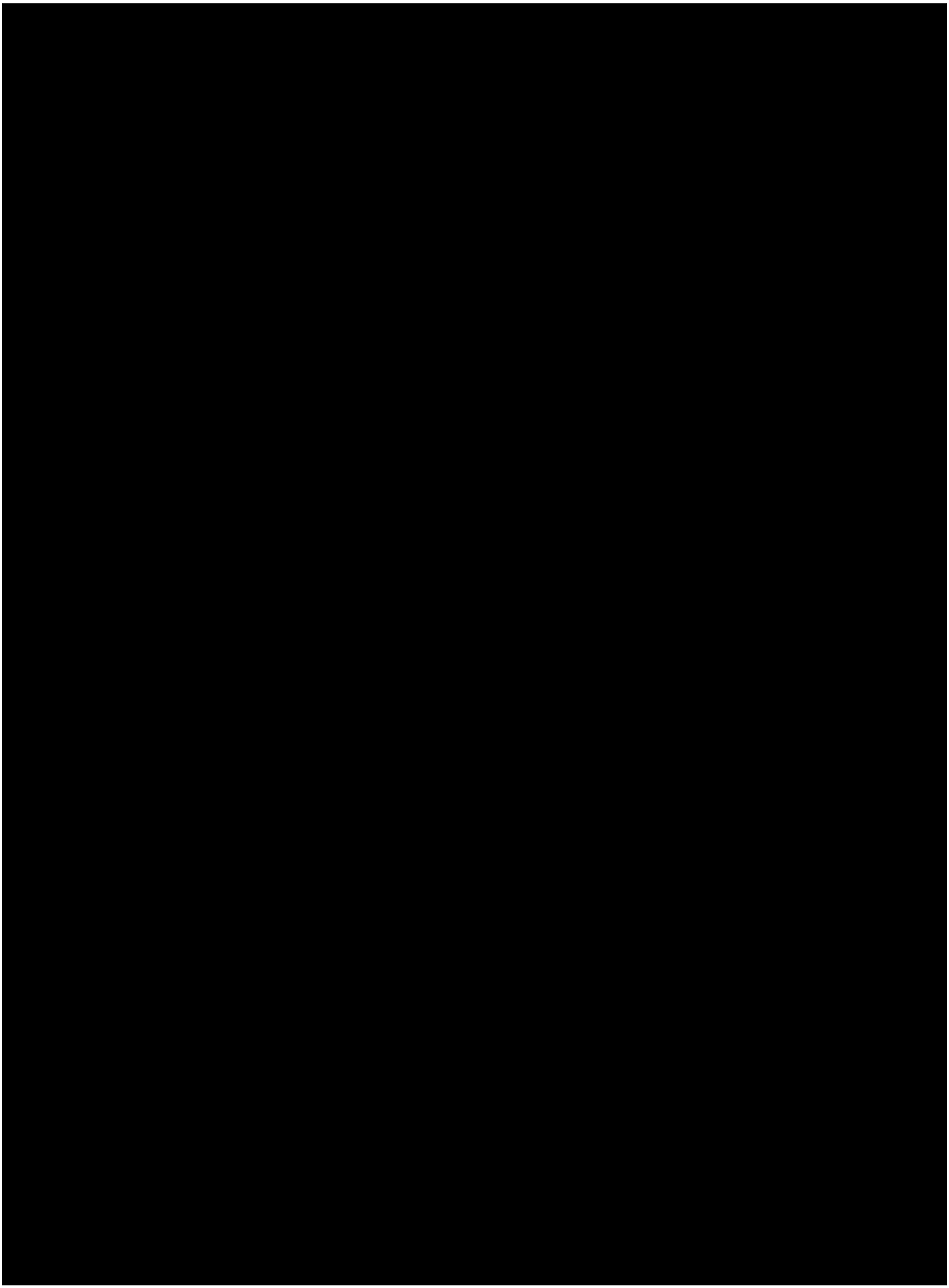

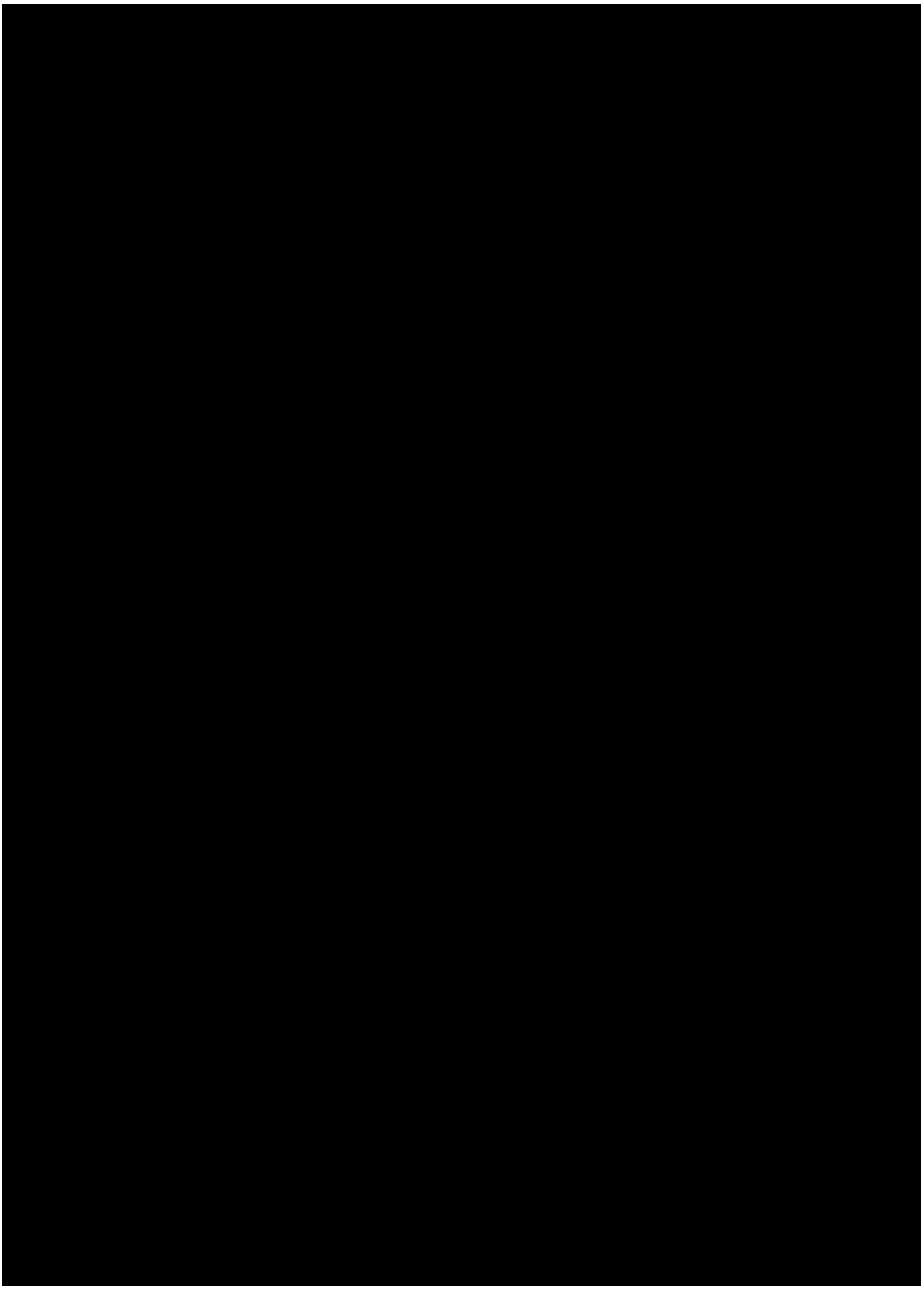

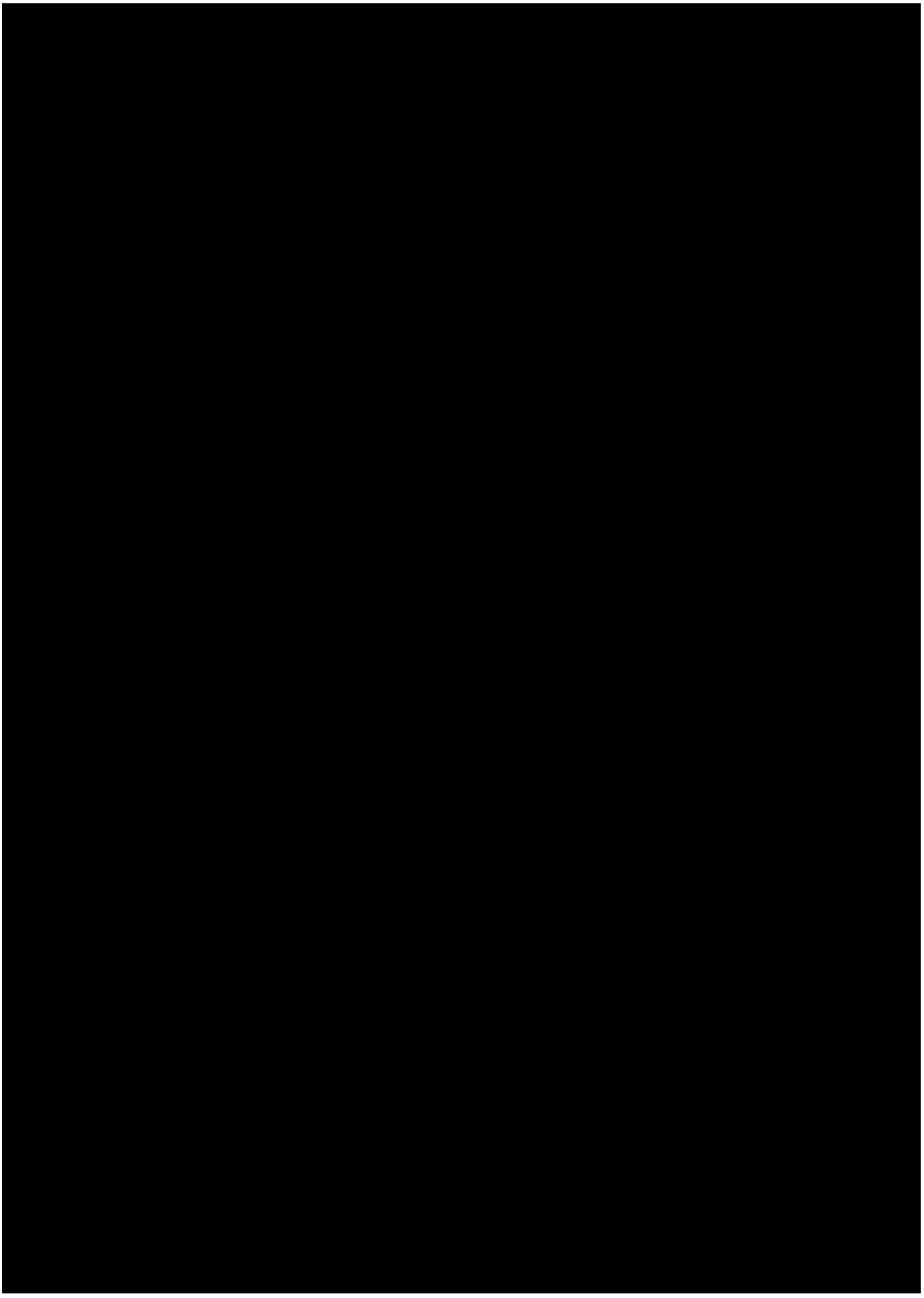

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Jasmax

MRCagney
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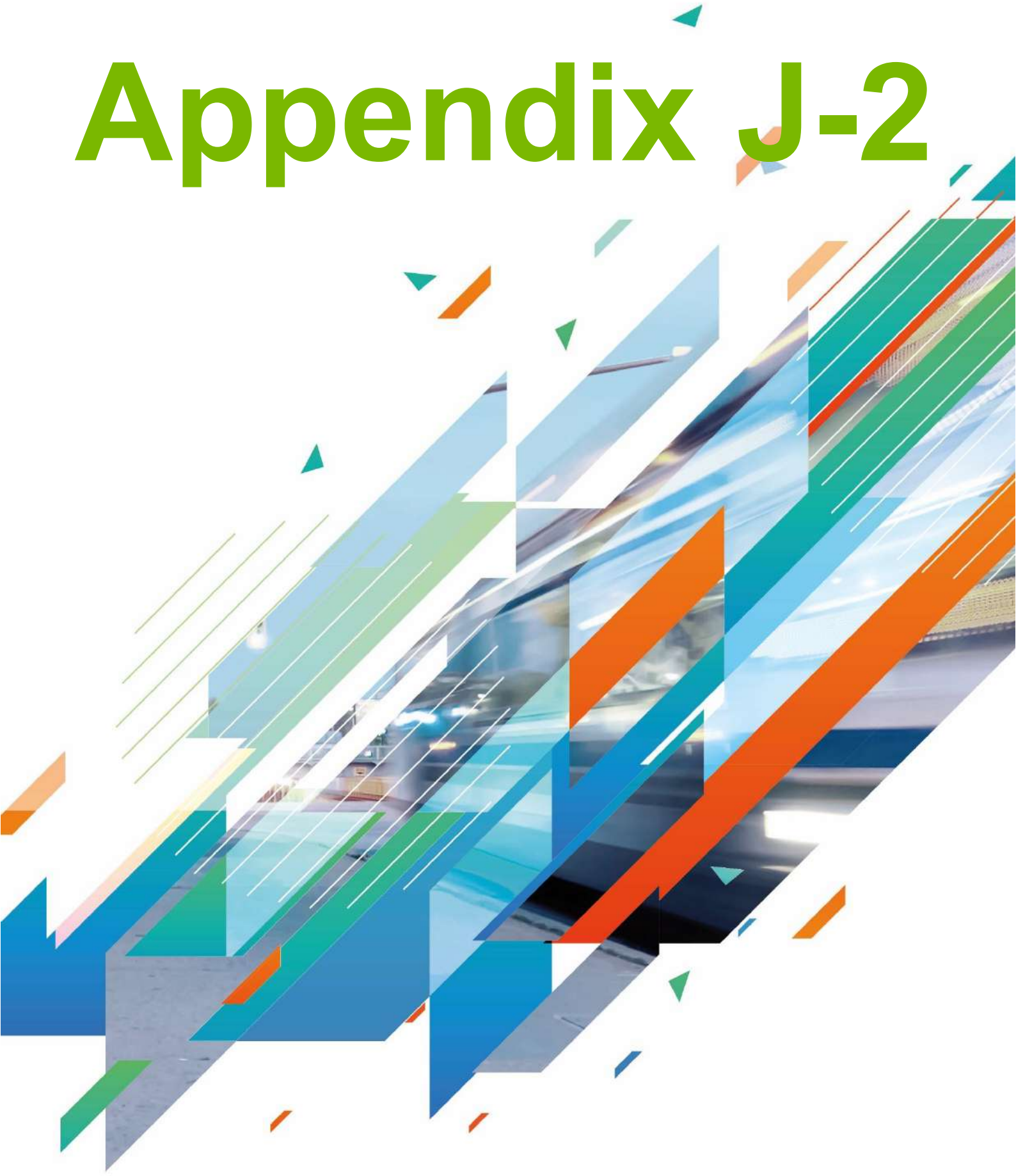
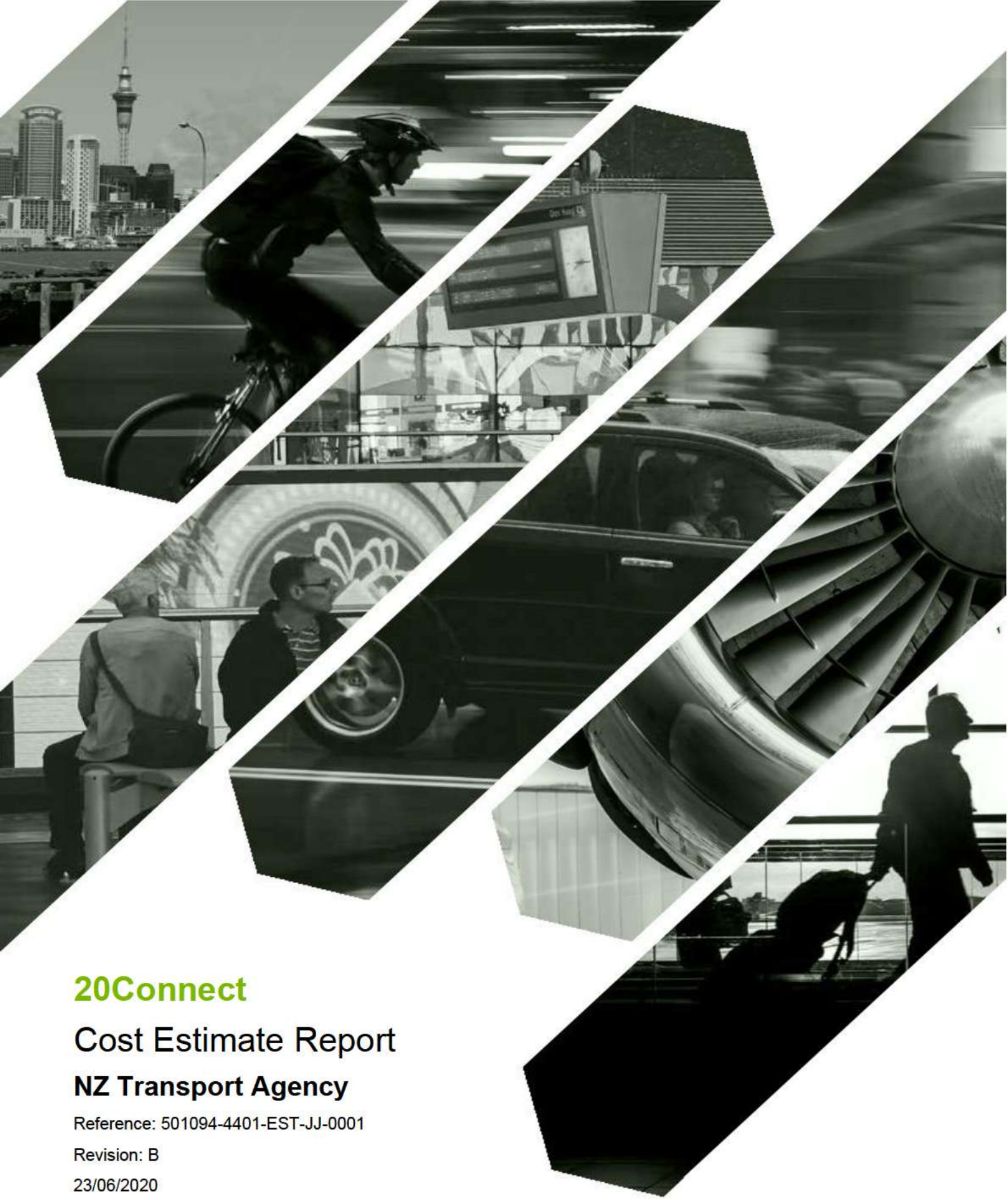
Appendix J-2



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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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]

1.2 Construction Cost Estimate

[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]

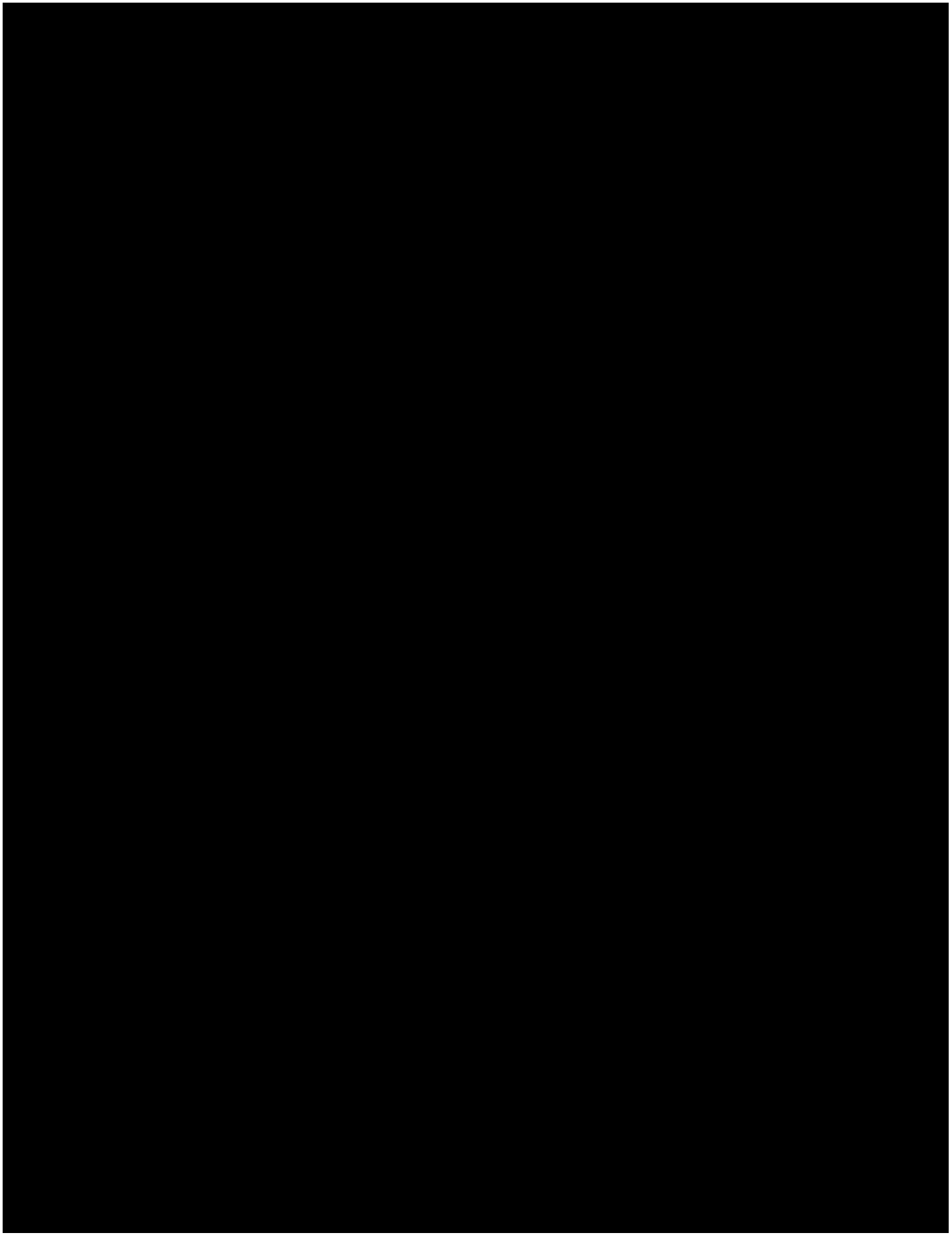
- [redacted]
- [redacted]

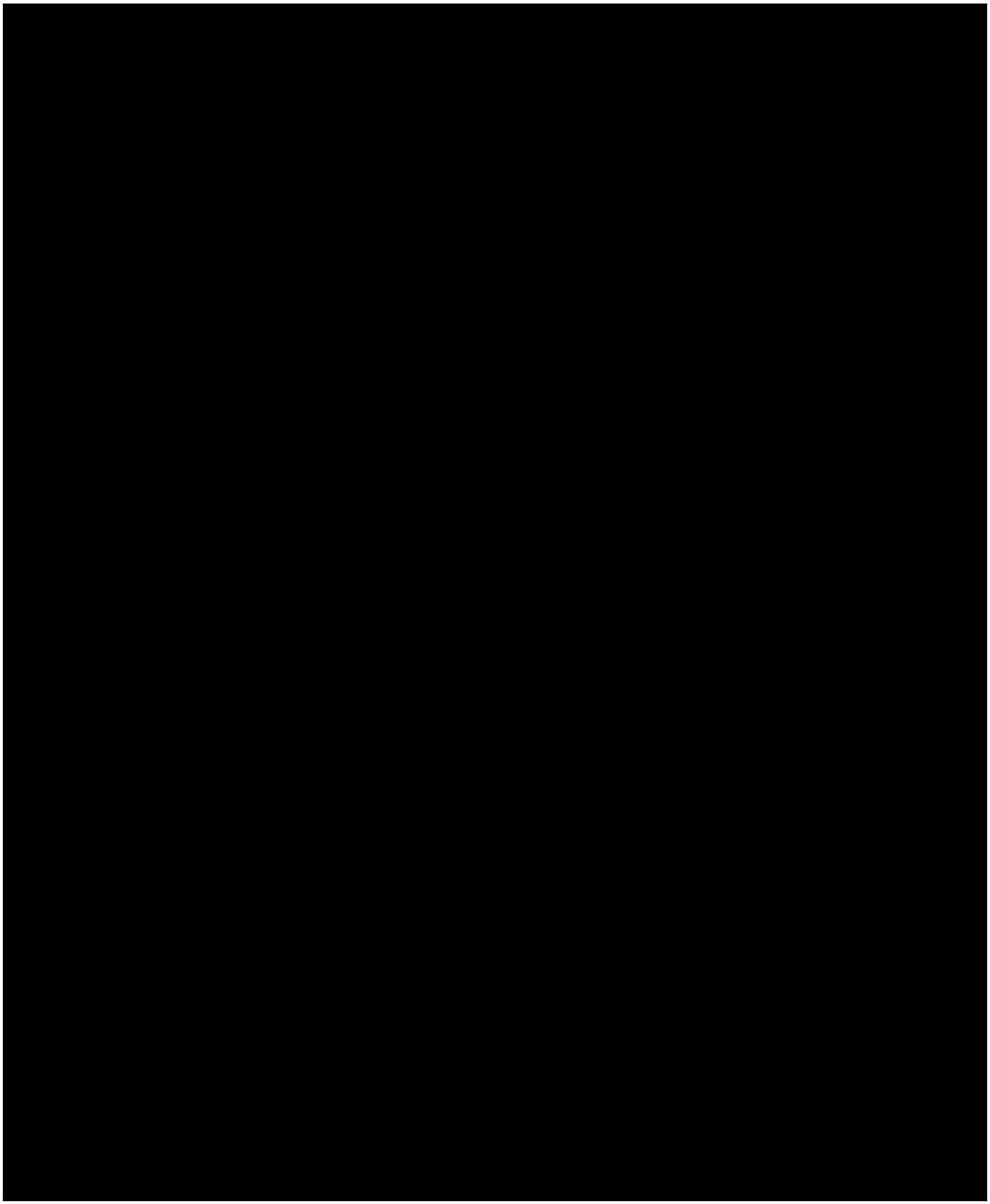
[redacted]

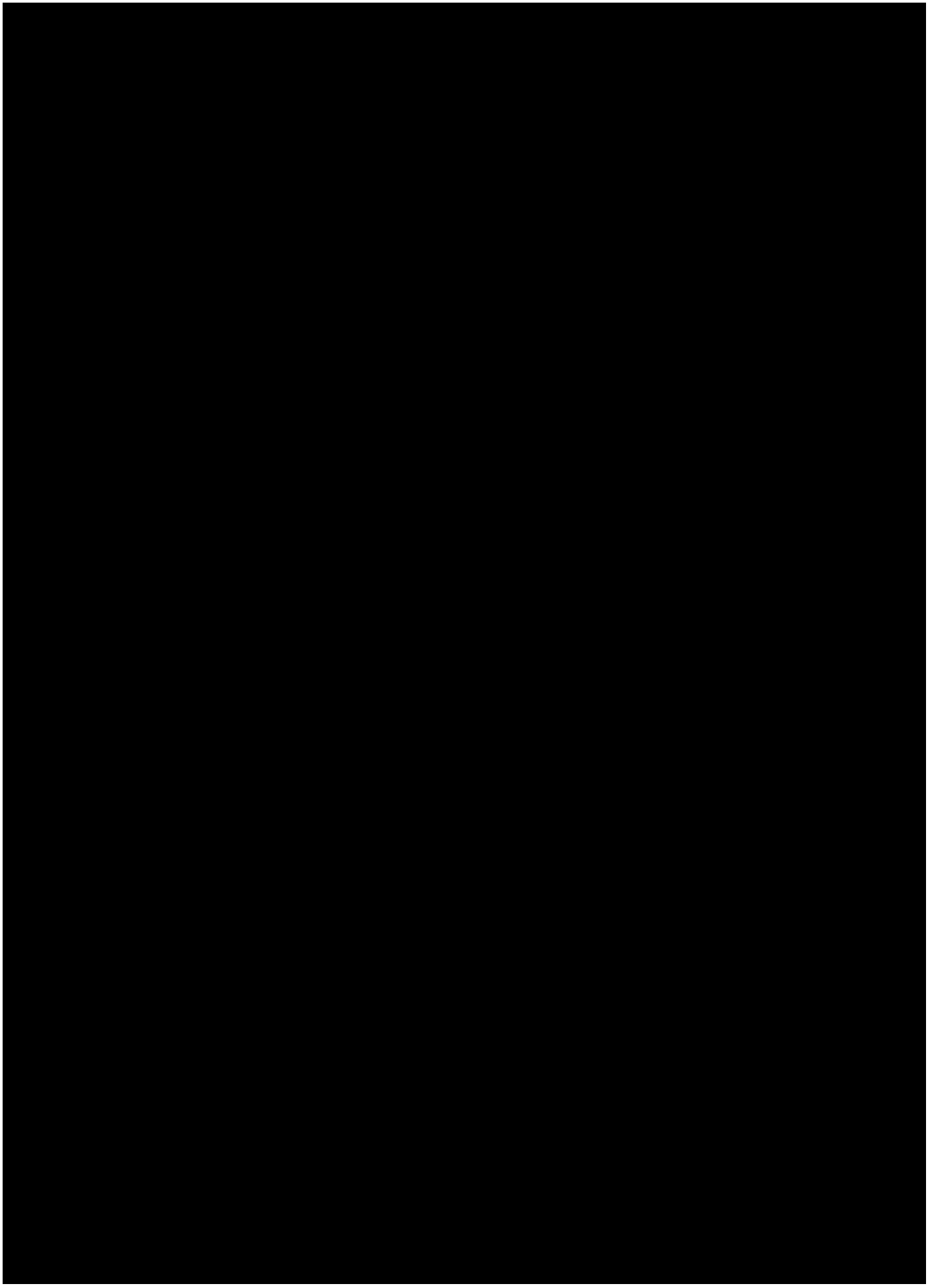
- [redacted]
- [redacted]
- [redacted]
- [redacted]

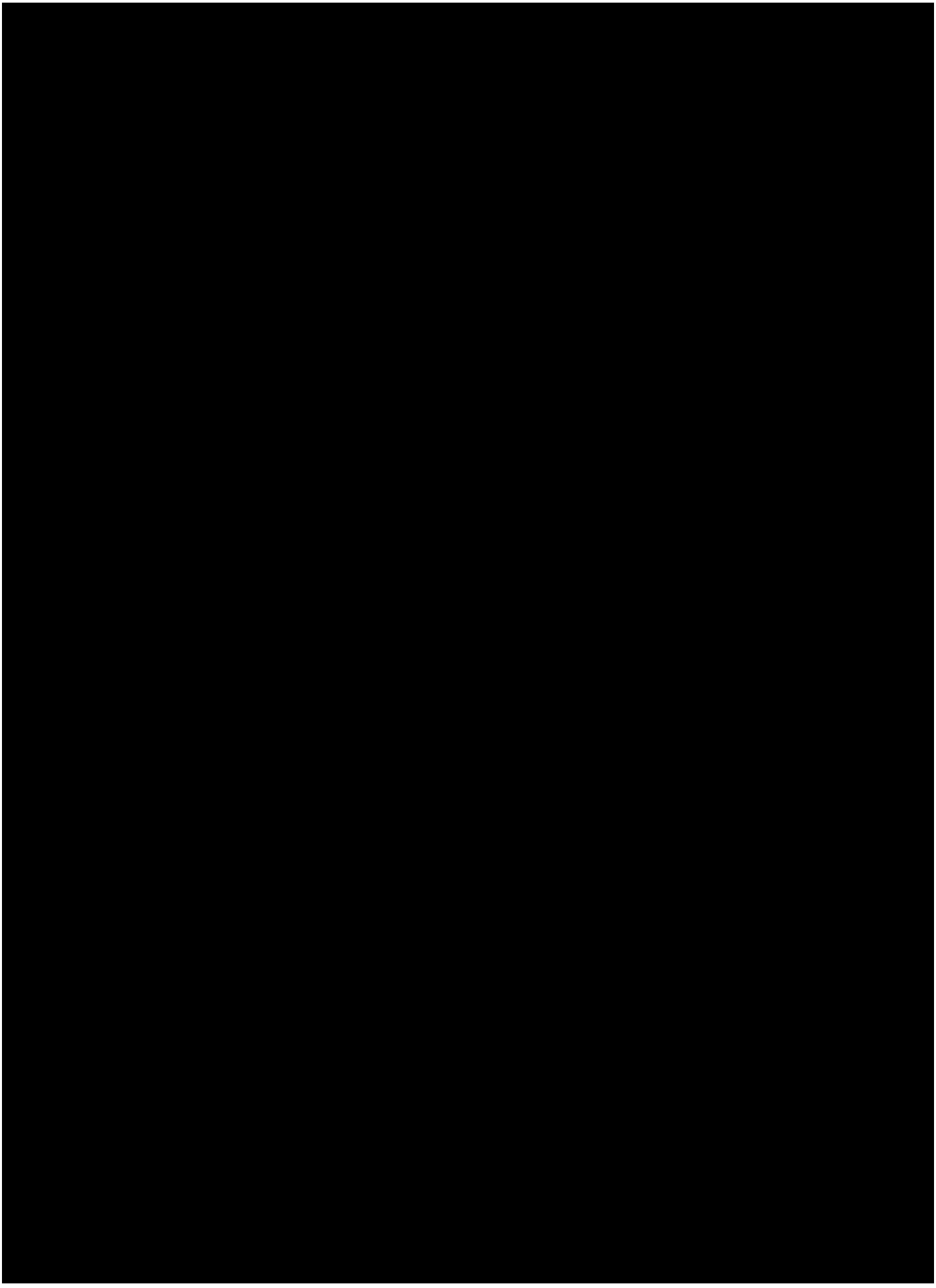
5 Cost Estimate

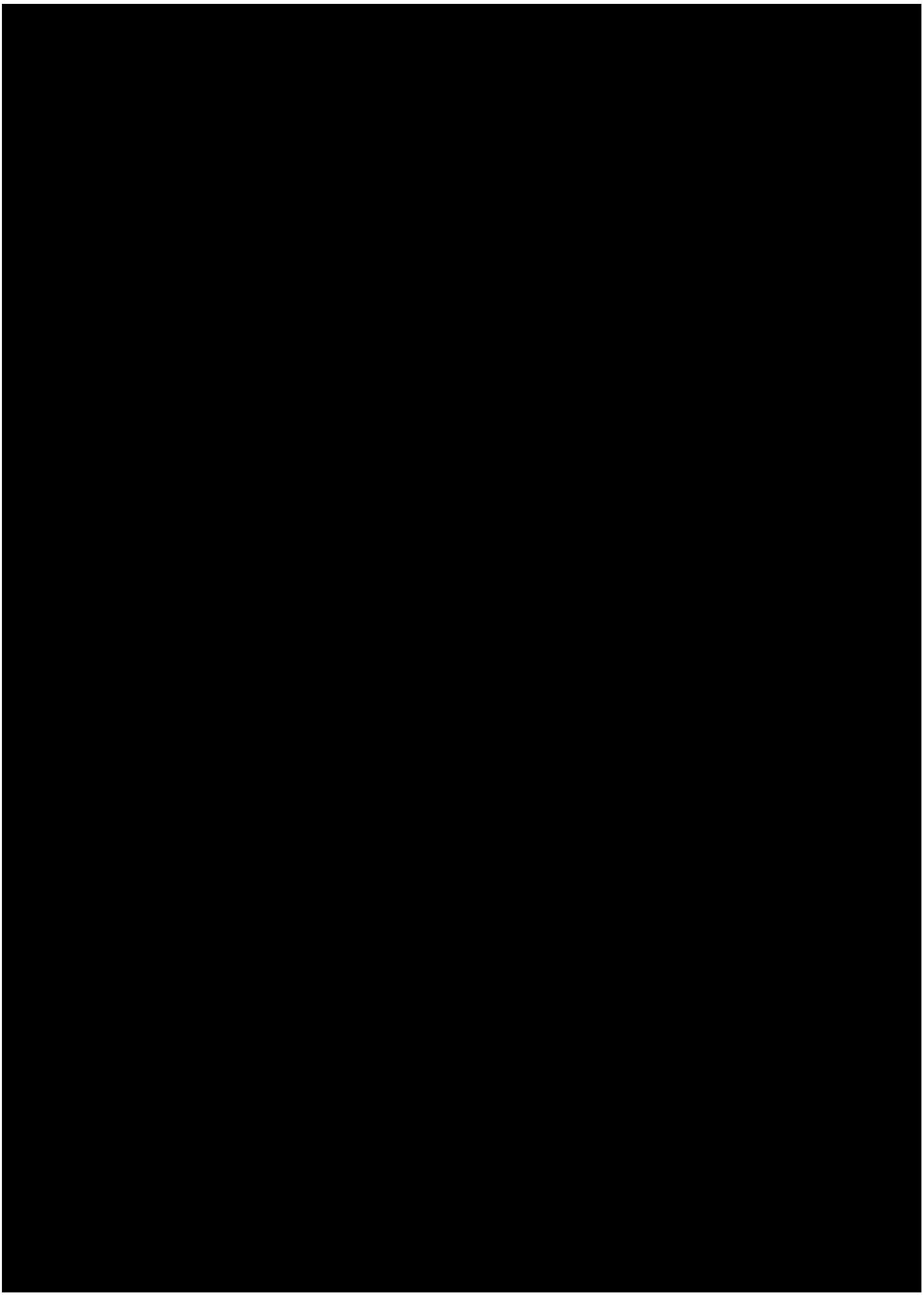
[redacted]

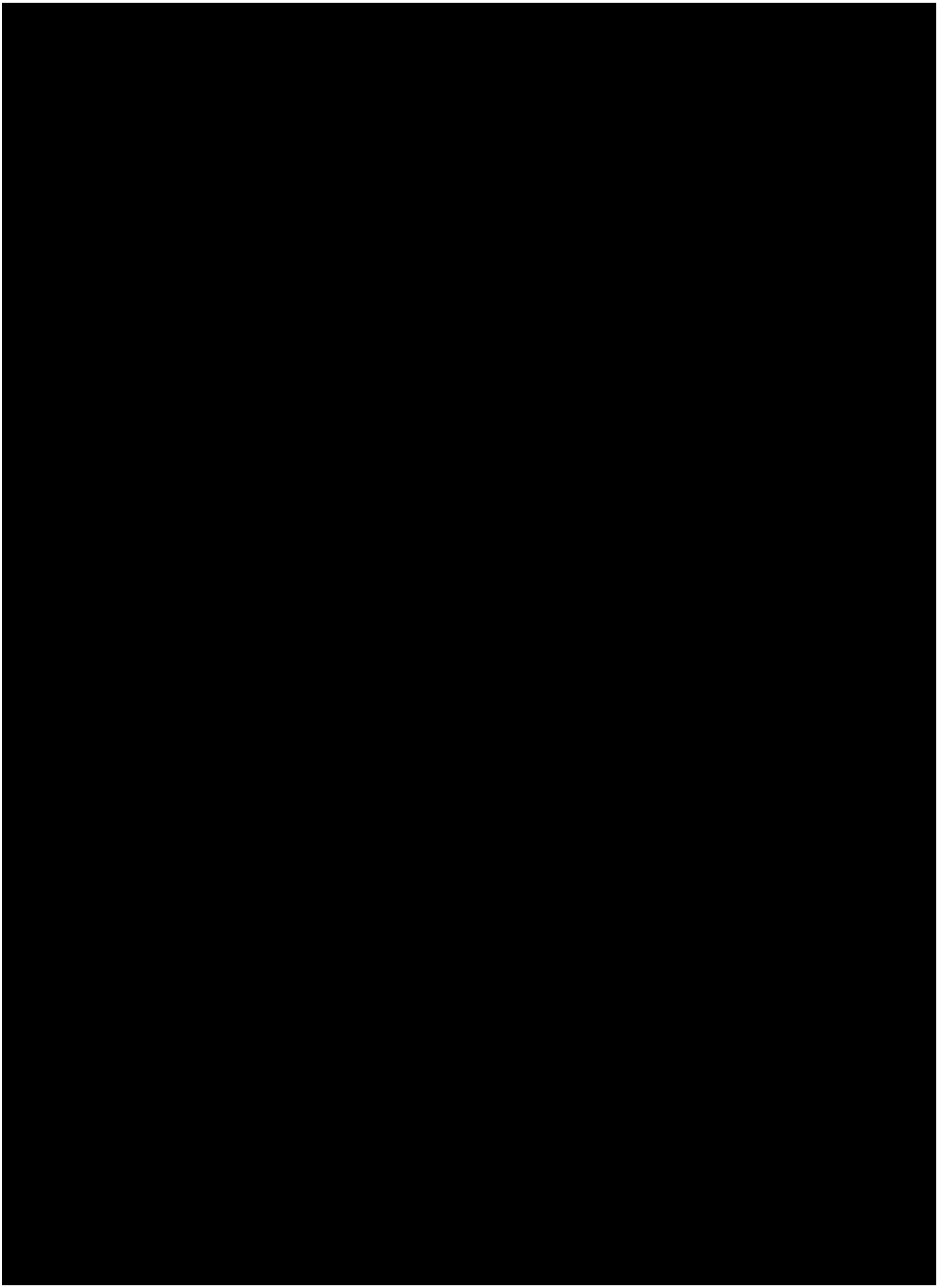


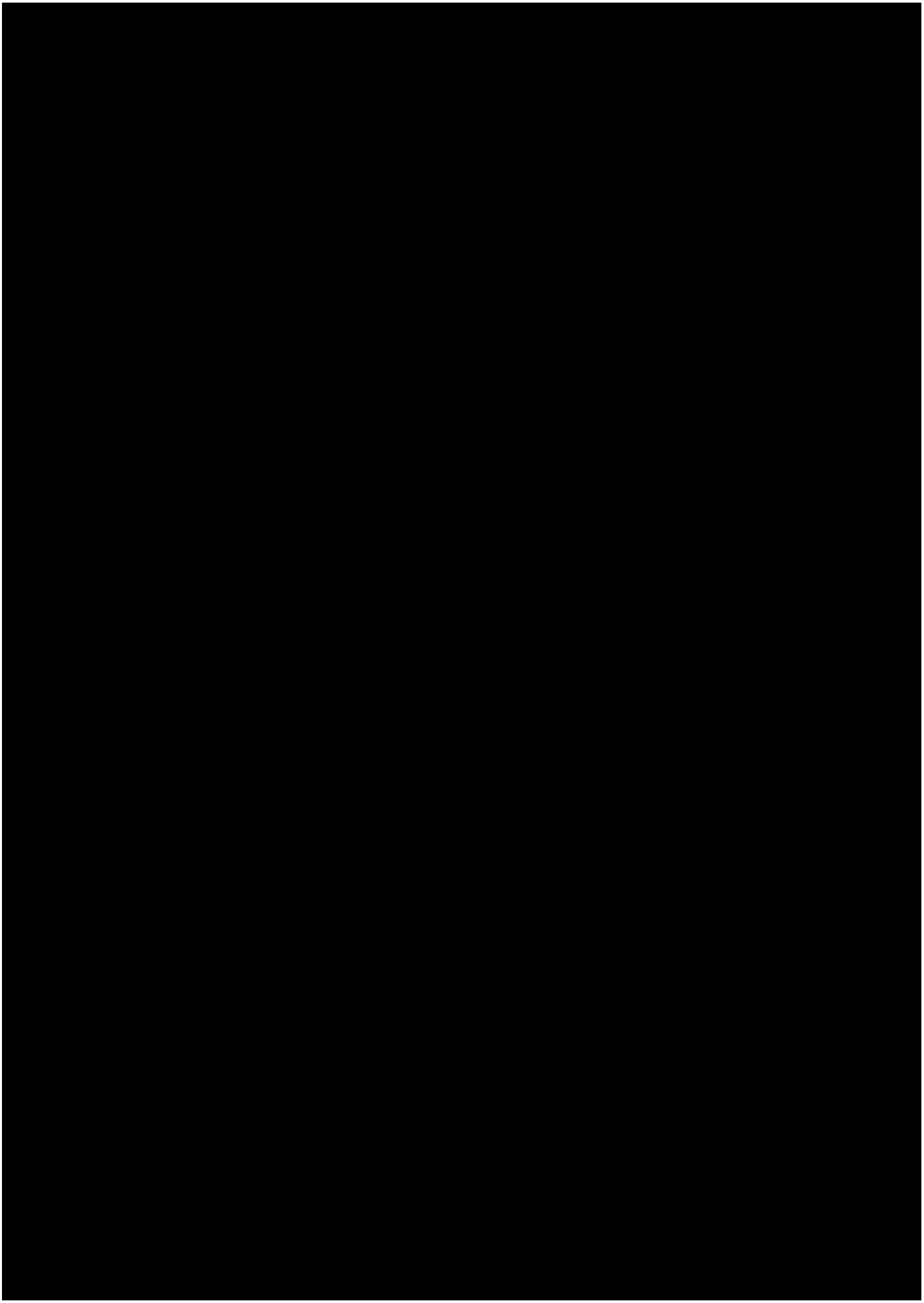












7 Parallel Estimate

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]

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.

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]

[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]

[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]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

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

Have a good weekend.

Regards,

[redacted]

[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]

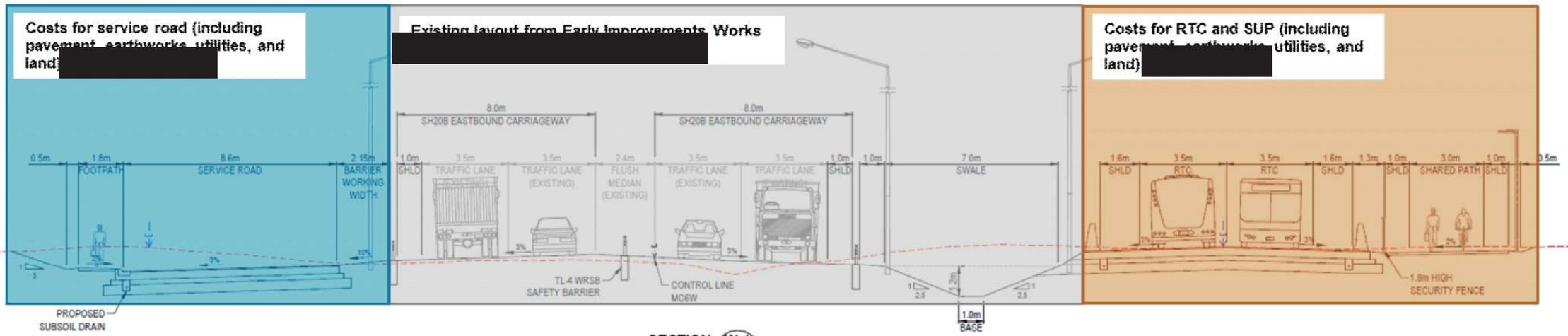
Hi Both,

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

[redacted]

[redacted]

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



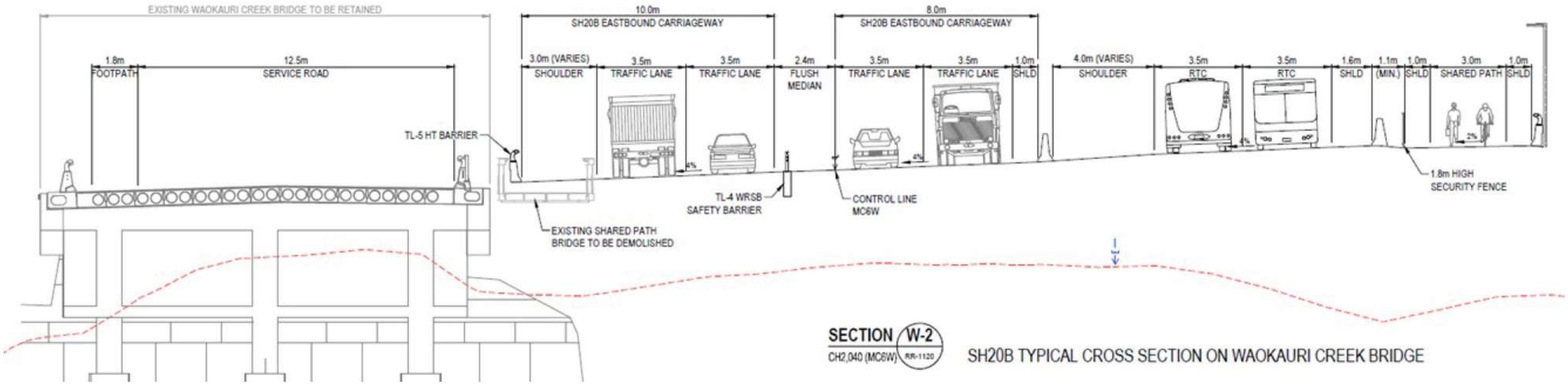
SECTION W-1
CH1,260 (MC6W) RR-1119

SH20B TYPICAL CROSS SECTION WITH SWALES

Existing layout from Early Improvements Works [redacted]

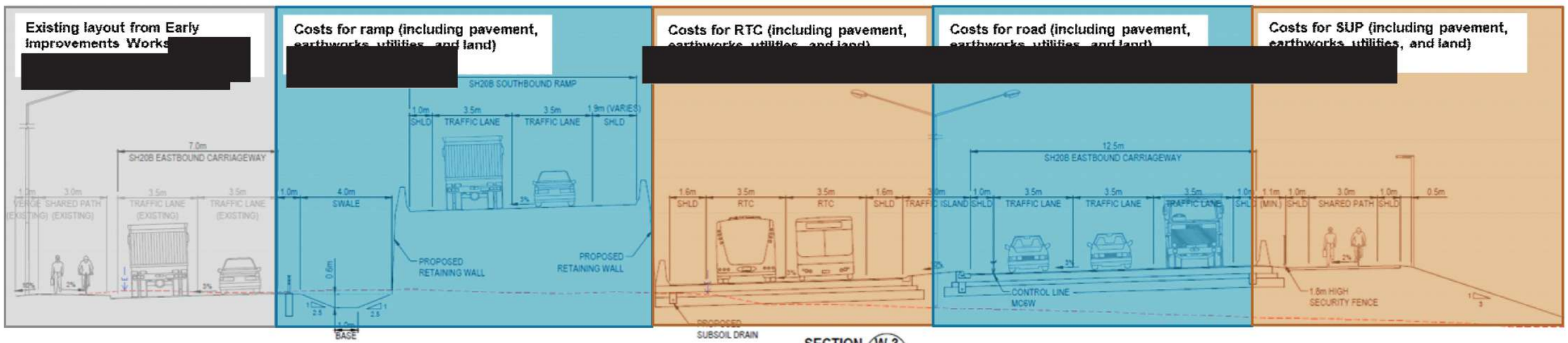
Costs for road portion of bridge ([redacted] pavement, earthworks, utilities, and land) [redacted]

Costs for RTC and SUP portion of bridge (including pavement, earthworks, utilities, and land [redacted]



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

SH20B TYPICAL CROSS SECTION ON WAOKAURI CREEK BRIDGE



SECTION W-3 CH3,040 (MC6W) RR-1121

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]

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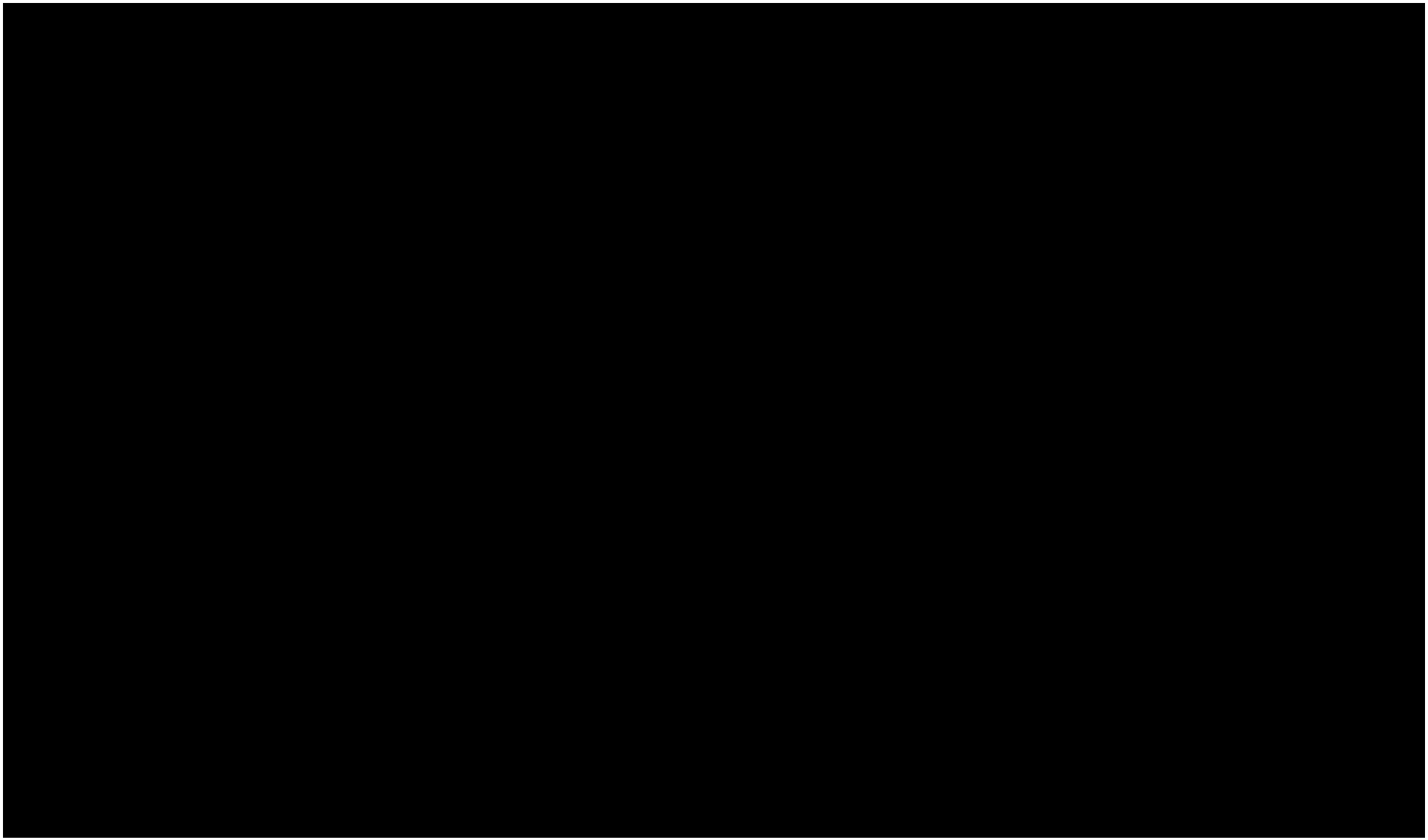
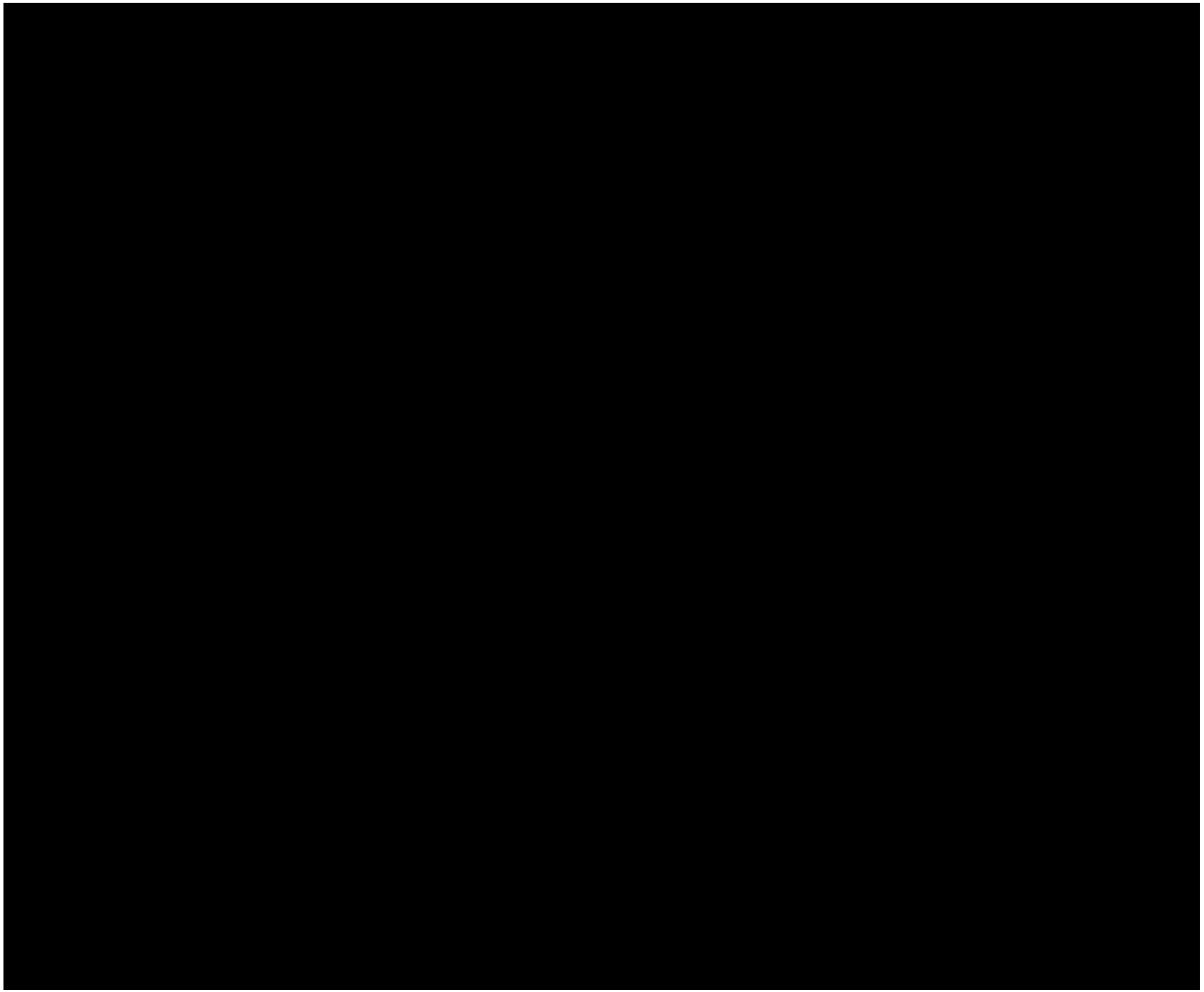
DISCLAIMER

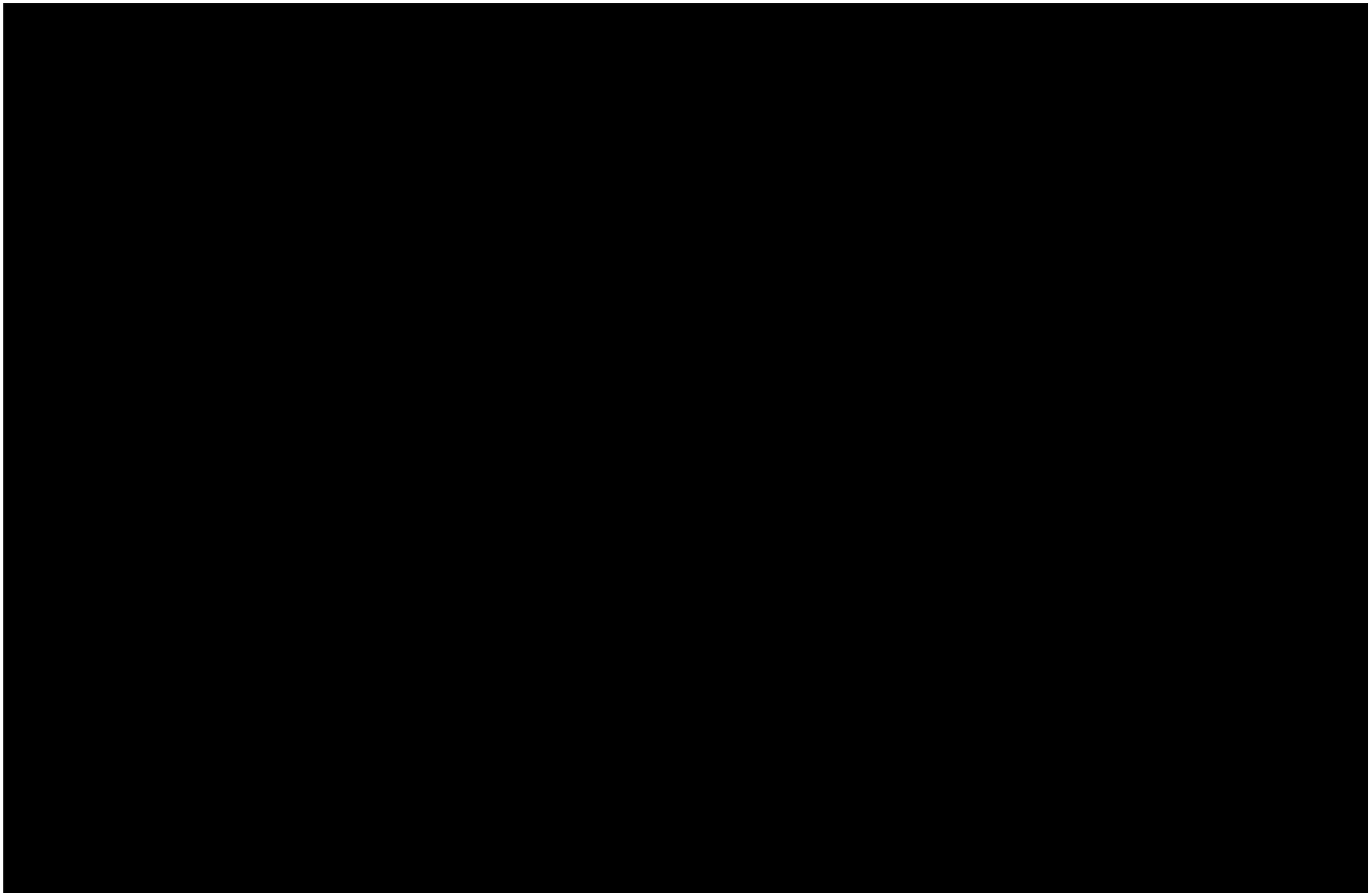
Appendix A-2 Earthworks volumes



Appendix A-3 Pavement areas



Appendix A-4 Structural information



Appendix A-5 Stormwater information

Summary of Structures

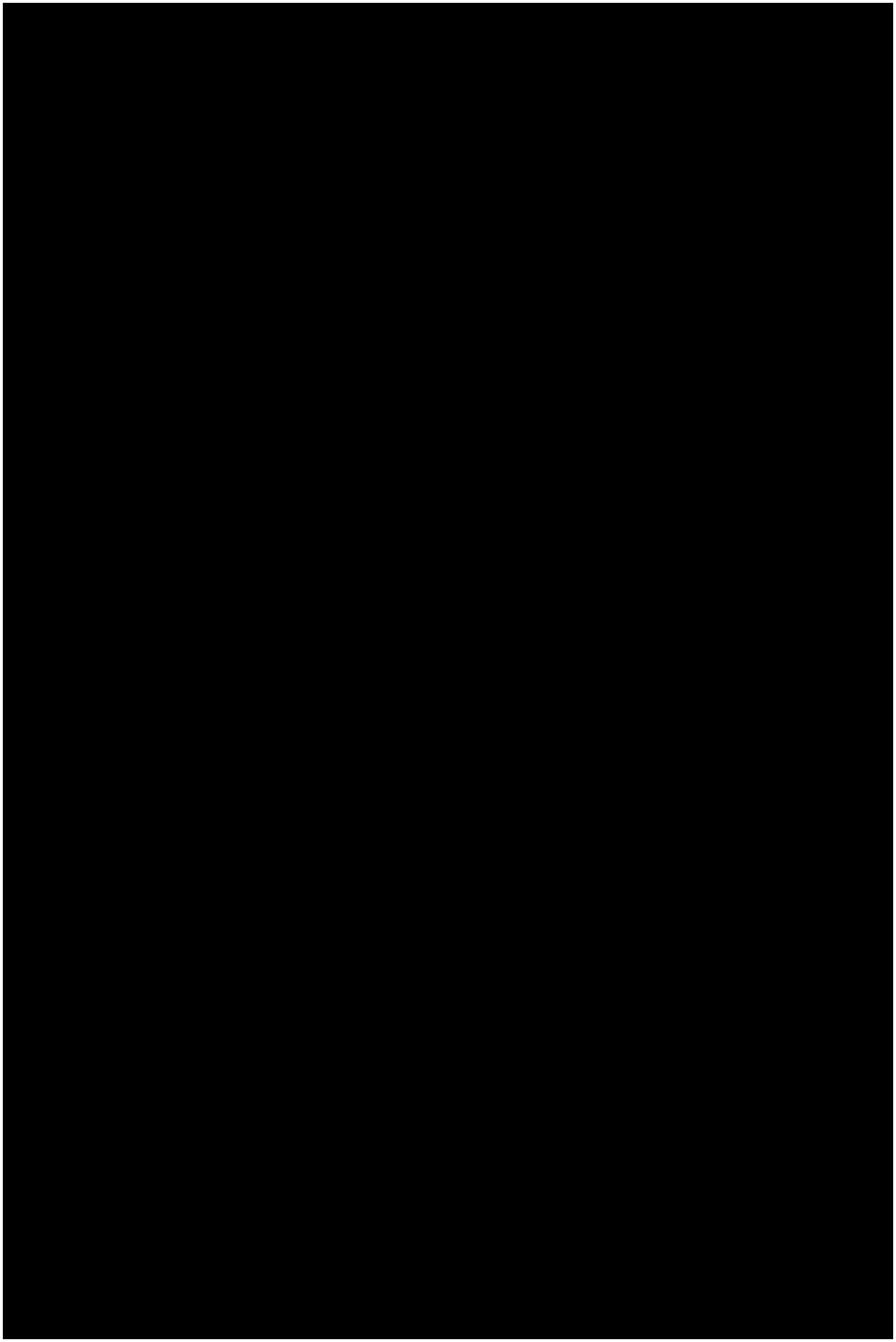
Count of Depth Category	Column Labels										
Row Labels	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**16**	**Grand Total**
D-450 Wingwall	17	1	2							1	21
1,660 x 745 x 1,200 mm Series 600 Wingwall	7										7
D-750 Wingwall	7										7
D-900 Wingwall	2										2
D-600 Wingwall	2			1							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**

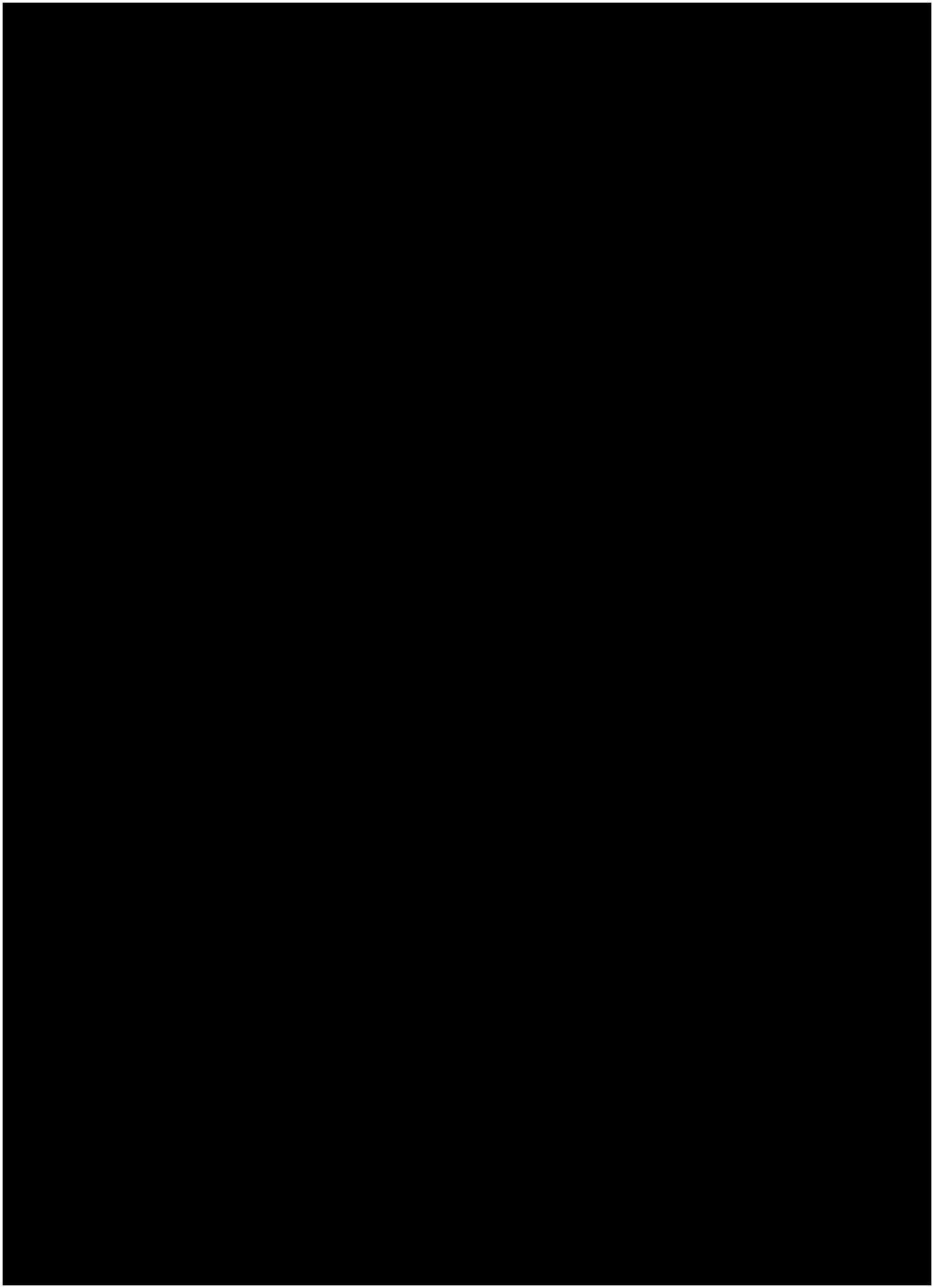
Summary of Pipes

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





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

[redacted]

Appendix D-3 RSA item 2.13.4

Plot Date: 2019-11-21 08:47:00   Office: Auckland   Filename: pw:\\dsdigital.aurecon.info:PW_AUDC1_01\Documents\Projects\50 1xxx\501094 - SWG - 20 Connect SSBC\5 Deliver Design\503 CADD\Drawings\Sketches\501094-4403-SKT-RR-0415.dwg

[redacted]

Appendix E - CCG estimate update and risk schedule

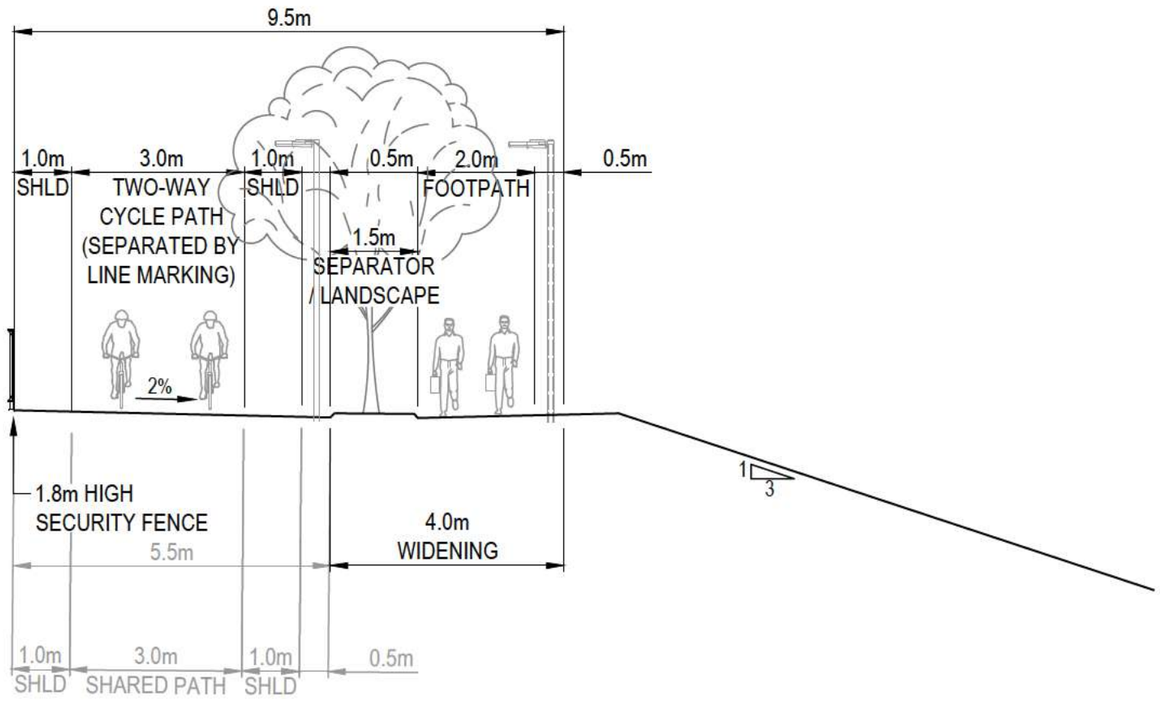
Appendix F - Risk items

Appendix F-1 RID 2 Online local road bridge replacement

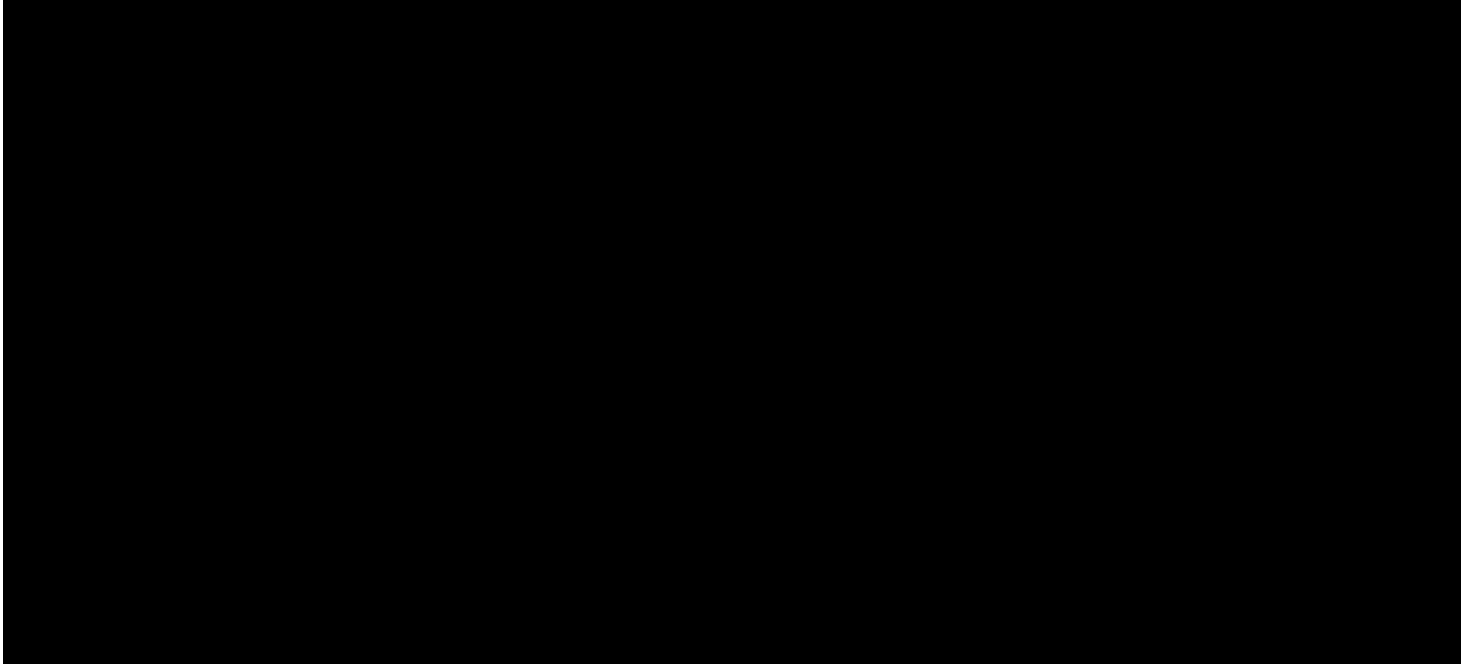
[redacted]


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



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

[redacted]

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

[redacted]

G MOORE G.WEMYSS – – – – –

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

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Appendix G - Parallel estimate report

ALTA

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

CONTENTS

1 IN BRIEF 4
2 PARALLEL ESTIMATE 5
3 RISK 7
4 PARALLEL ESTIMATE ASSUMPTIONS 7
5 APPENDIX 10

Revision History

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

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.

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.

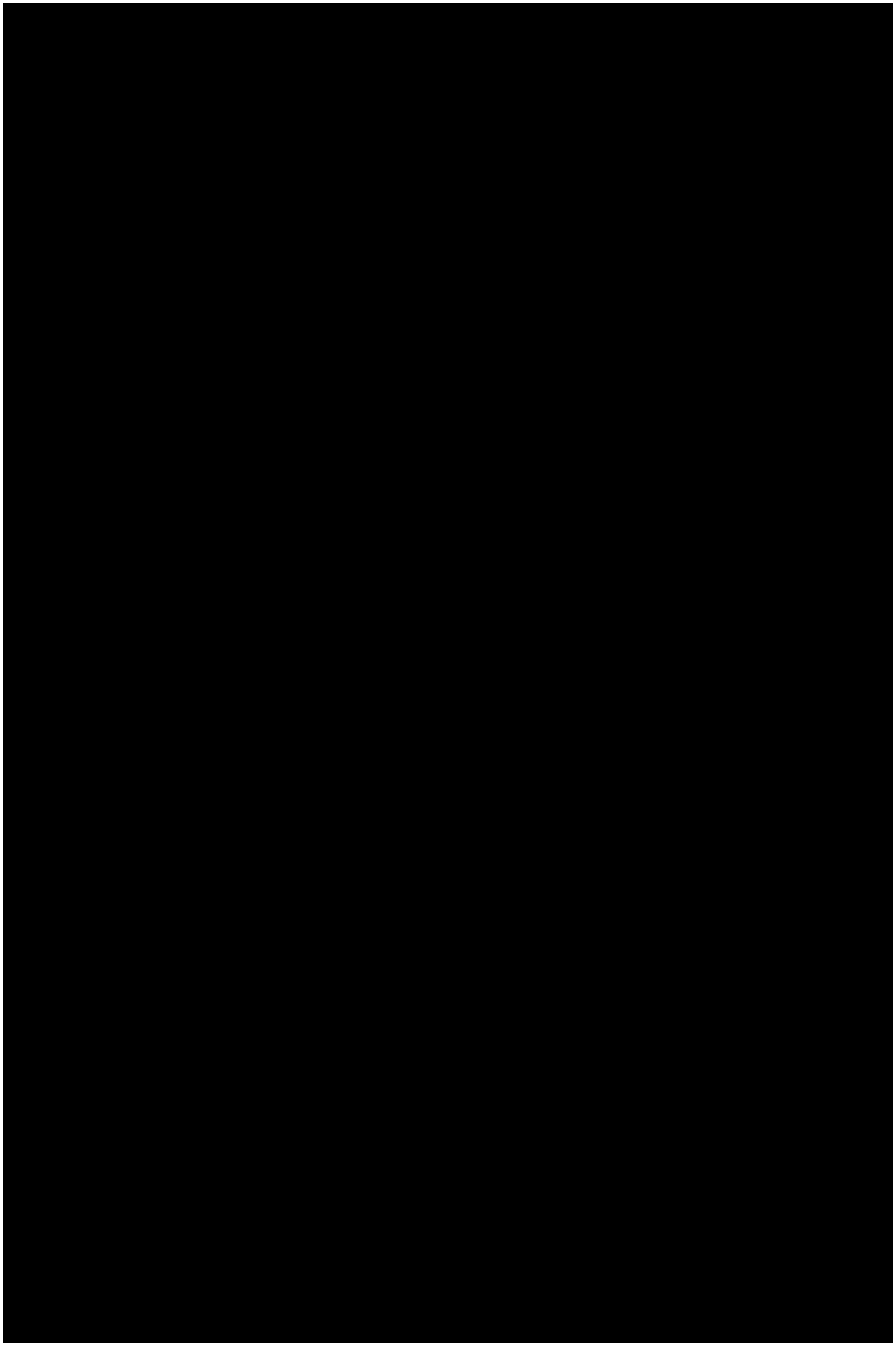
Where assumptions have been made due to a lack of design information or where multiple options exist, they have been detailed in this report. [redacted]

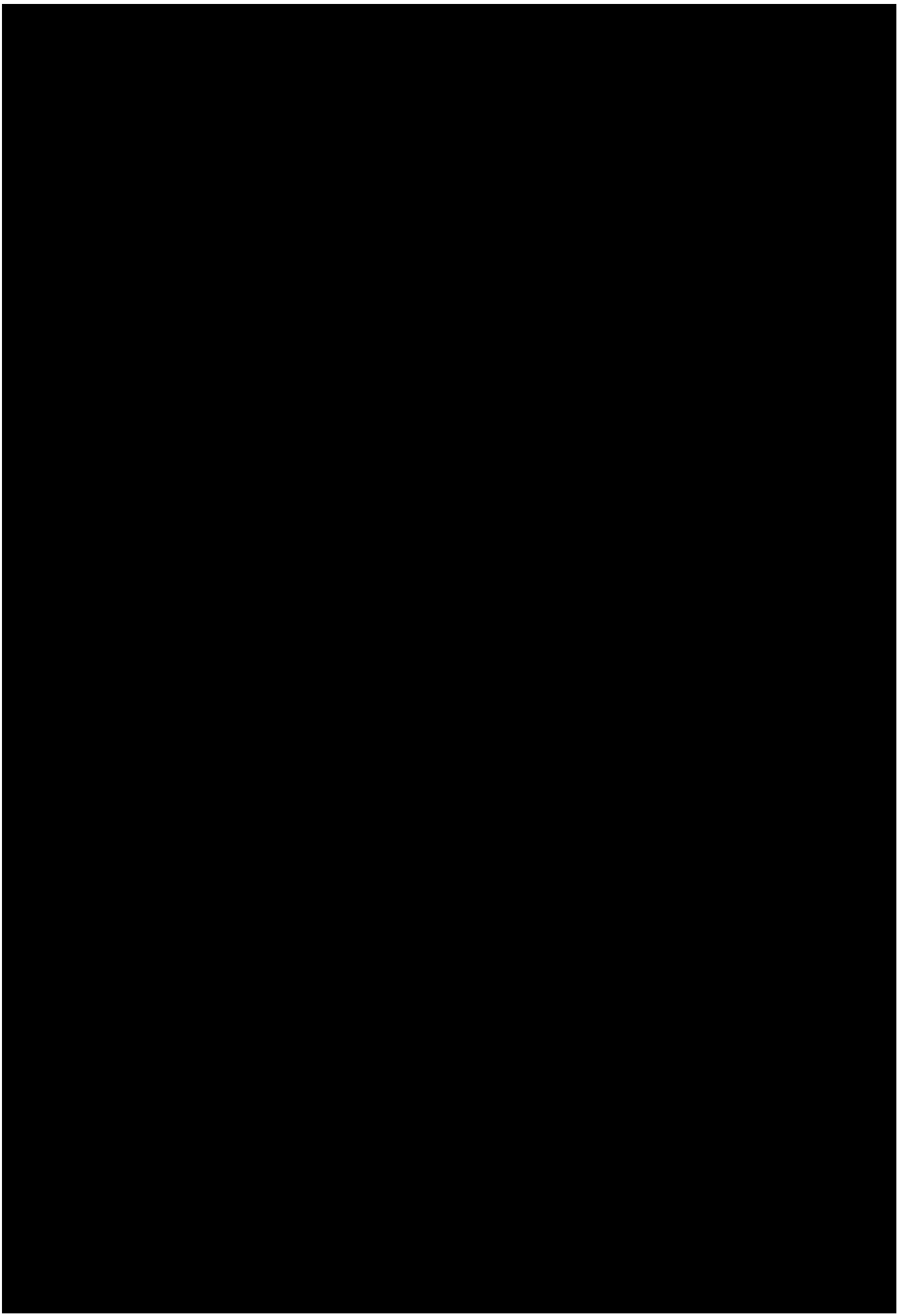
[redacted]

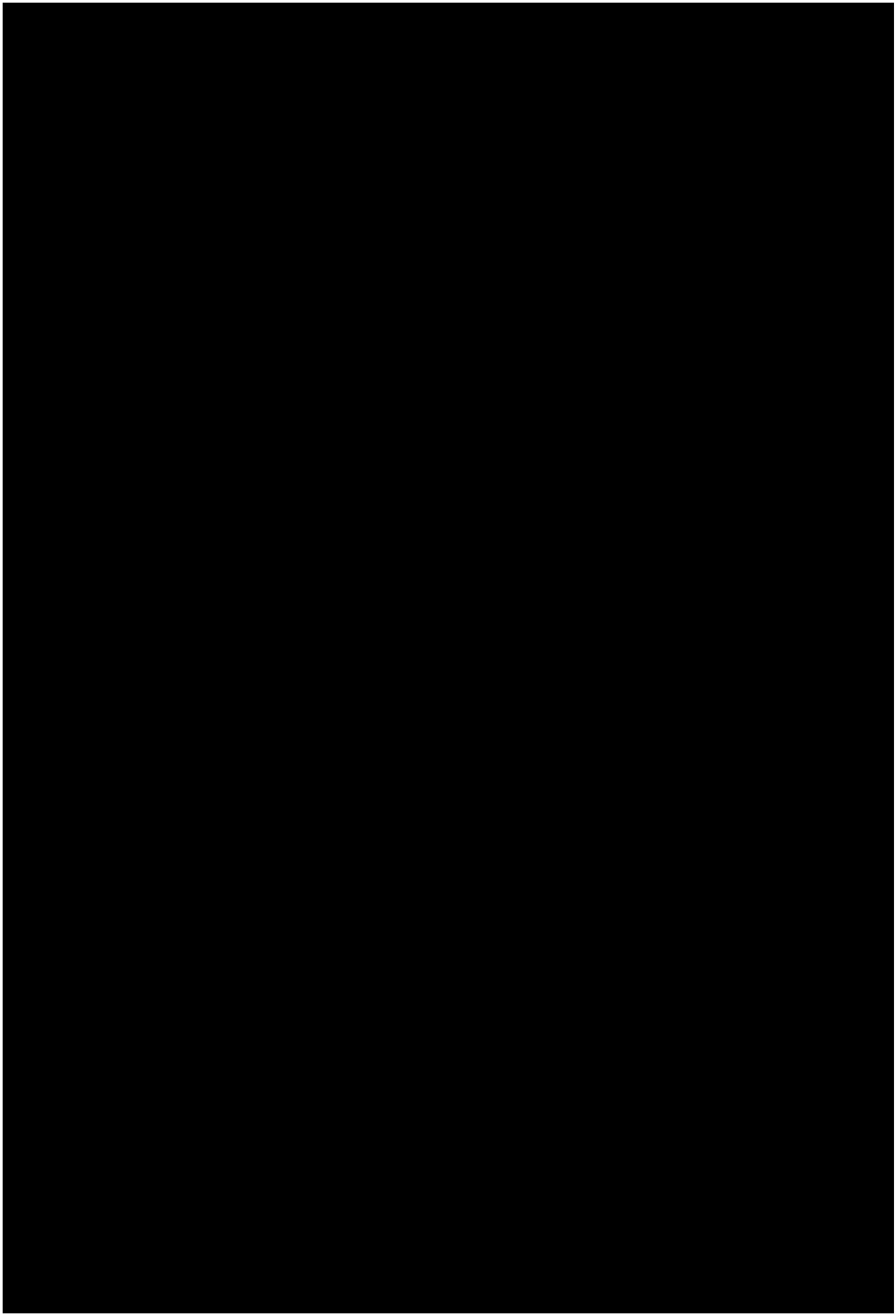
[redacted]

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

[redacted]

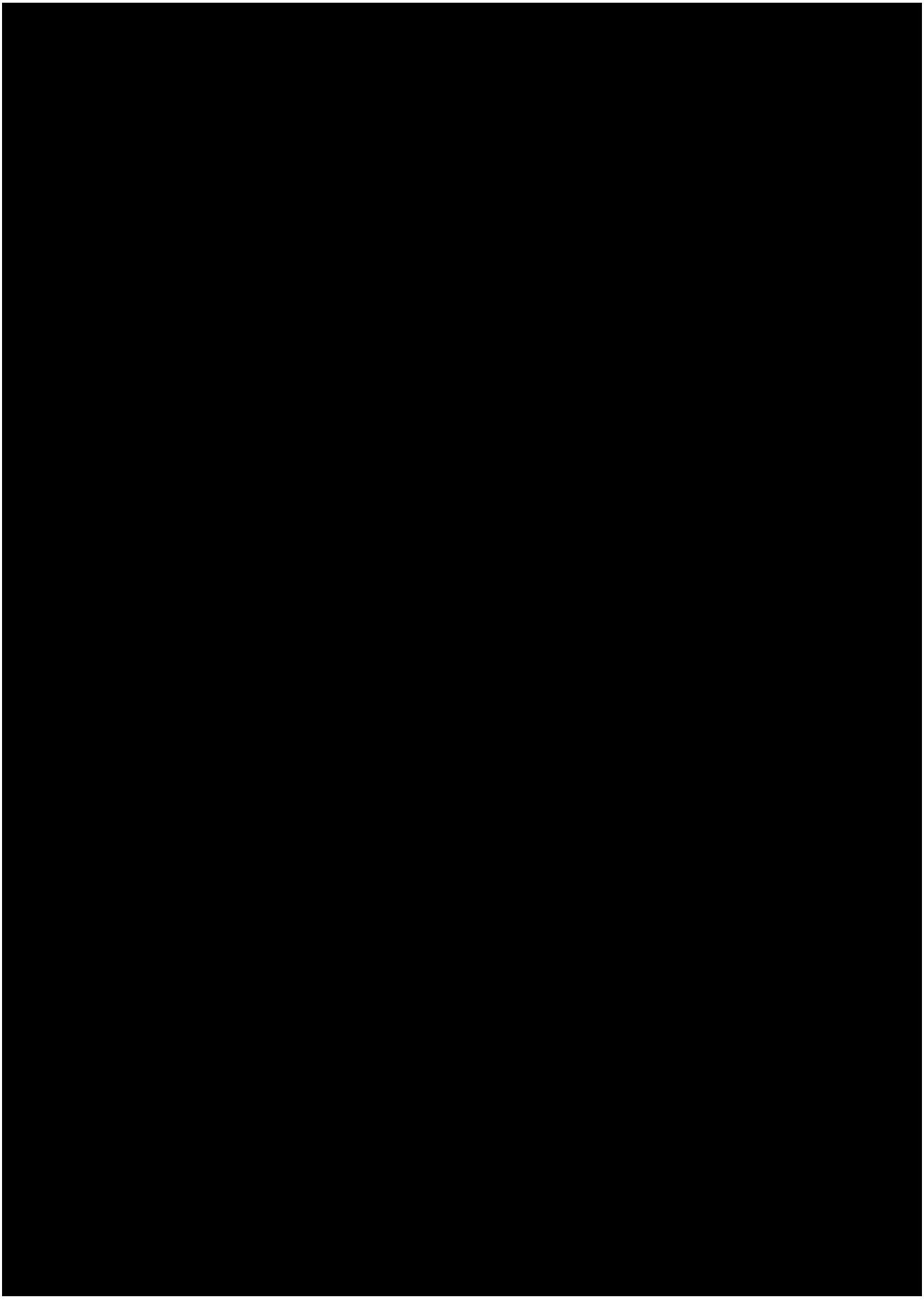






5 APPENDIX

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



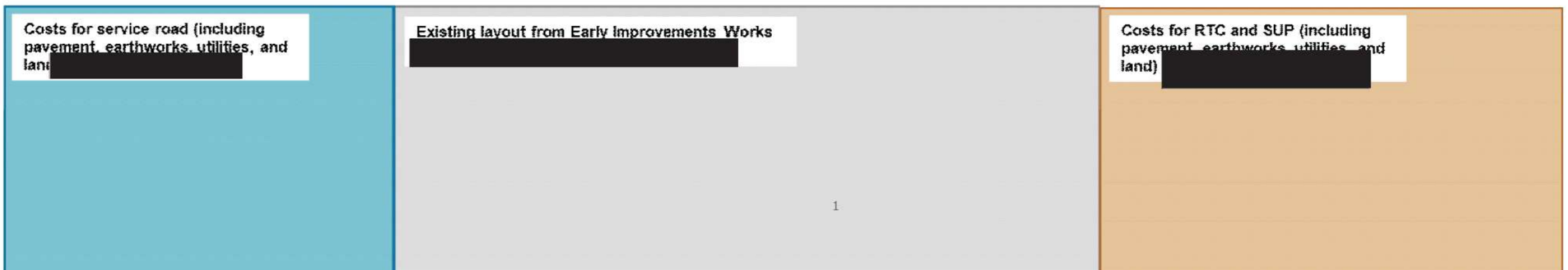
[redacted]

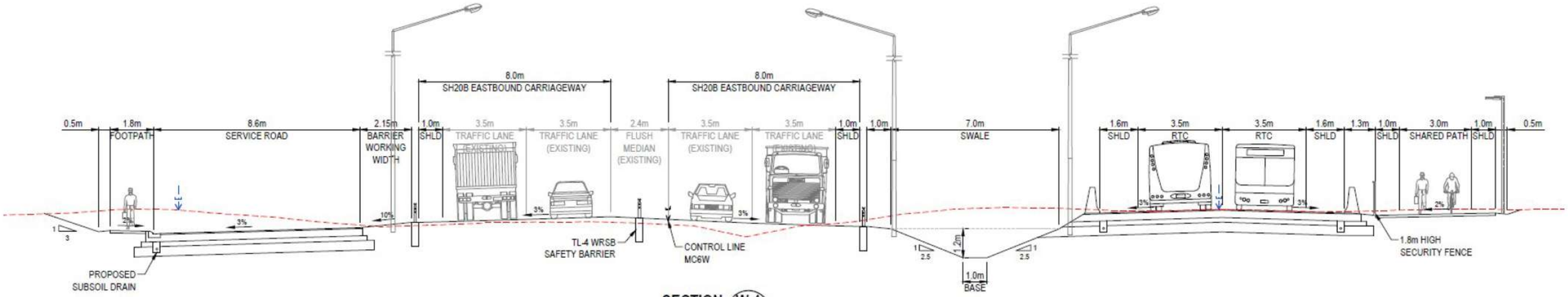
Hi Both,

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

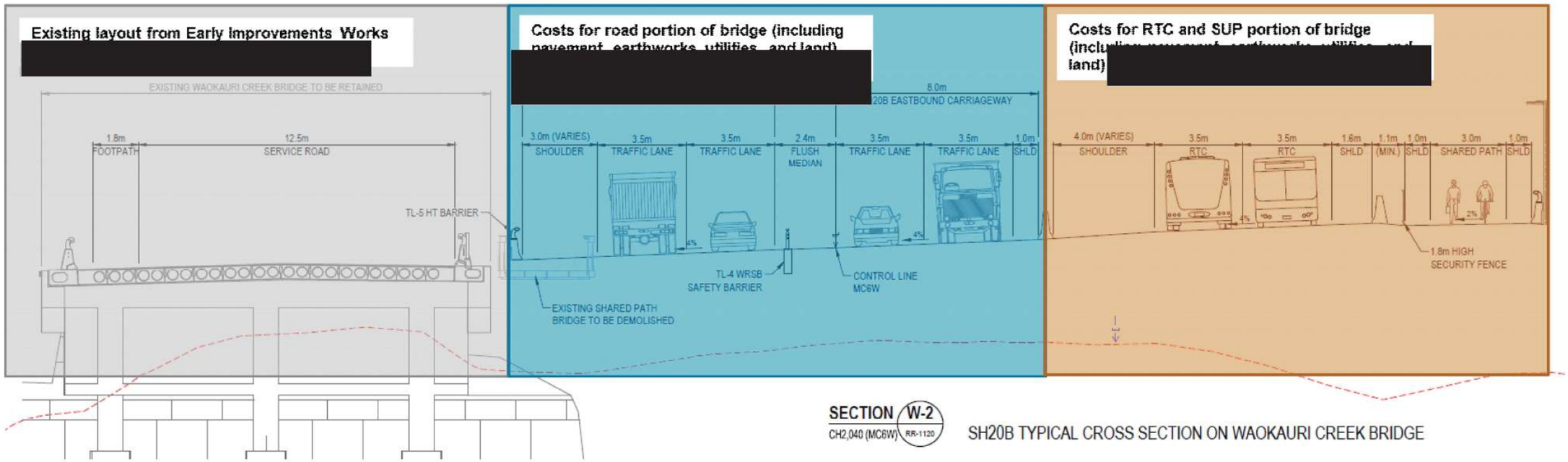
[redacted]

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



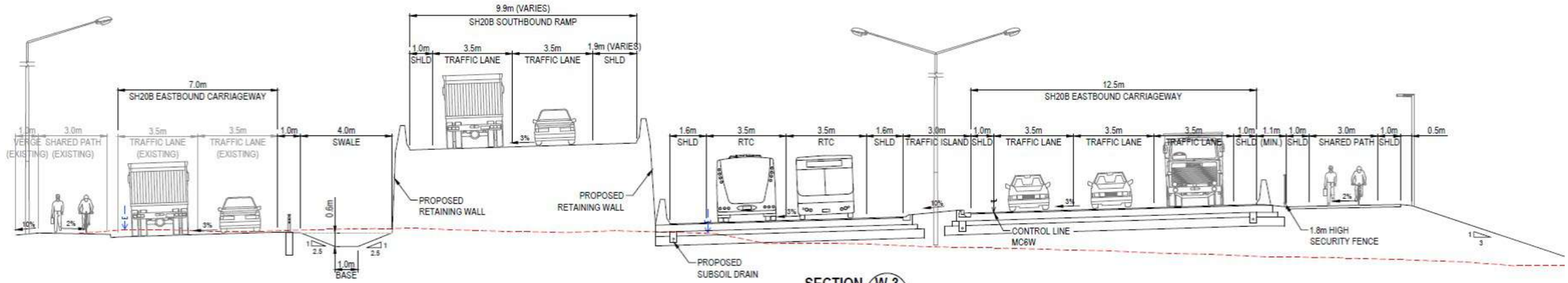


SECTION W-1 CH1,260 (MC6W) RR-1119 SH20B TYPICAL CROSS SECTION WITH SWALES



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)



SECTION W-3 (CH3,040 (MC6W) RR-1121)

SH20B TYPICAL CROSS SECTION WITH SH20B SOUTHBOUND RAMP

[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.

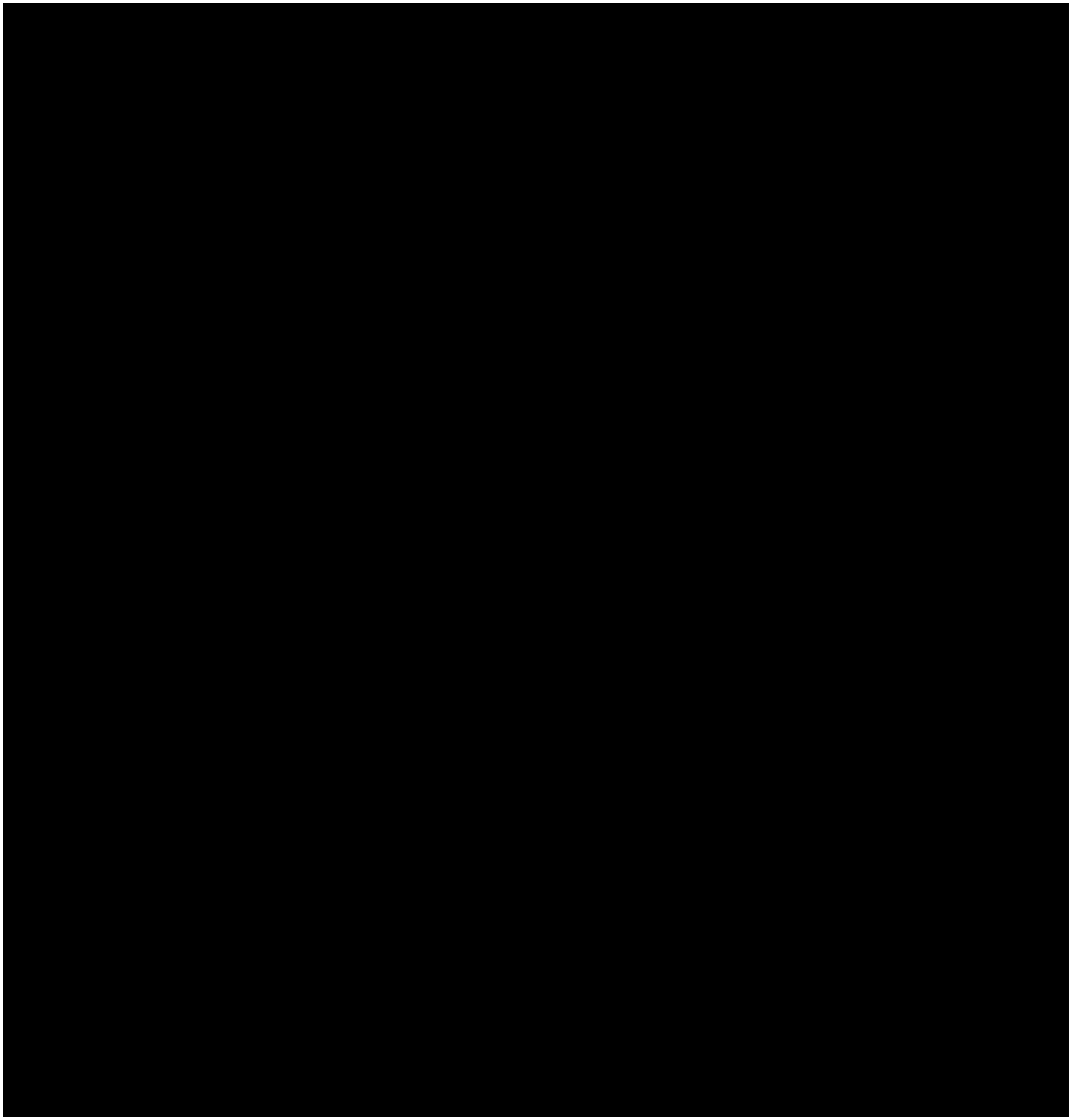
	strengthening of the substructure required.		
Earthworks	Refer to attached file for volumes. Volumes do not take into account the pavement volume. 0% re-use at this point in time. Cut soils are likely to be unsuitable and/or soft with limited space to rework.	Refer to attached file for volumes. Volumes 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

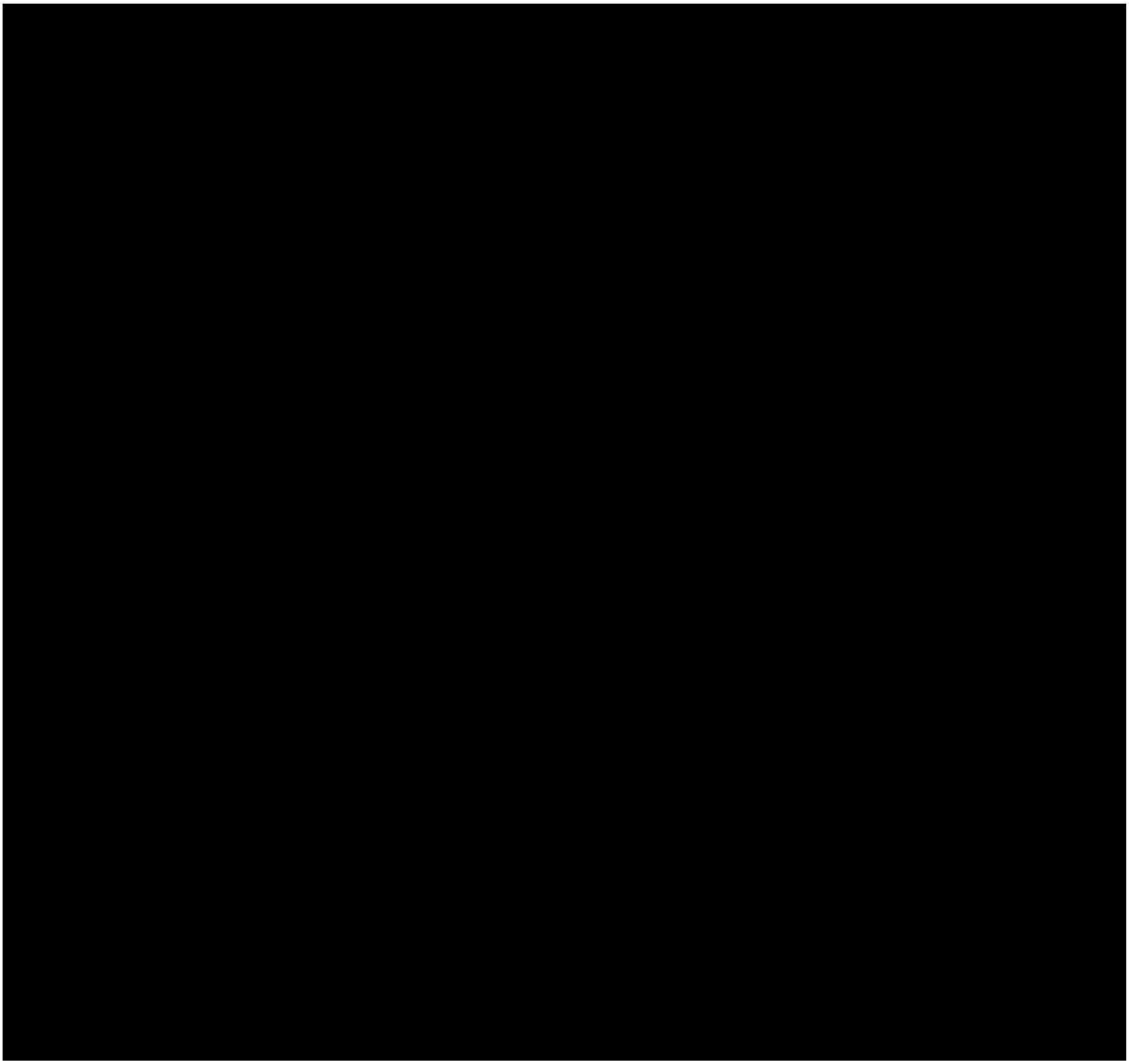
The final cost estimates for 1A, 1B and 2A are due by **c.o.b. Friday 30th August**.

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

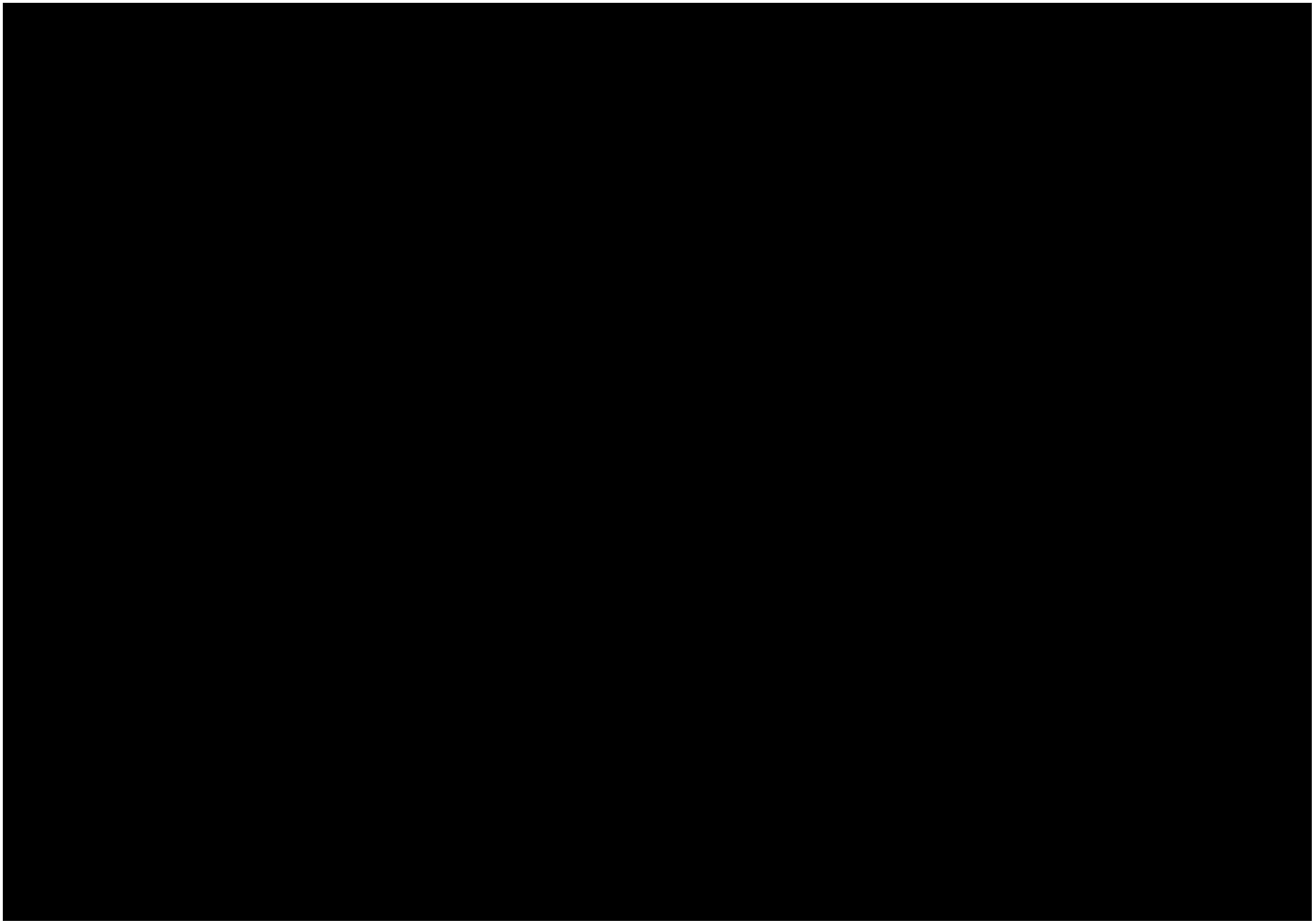
Cheers,

[redacted]





Appendix H - Cost estimate reconciliation



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Technical Note

To	**Auckland Transport**	From	[redacted]
Copy		Reference	**502334-7000-TEC-RR-0050**
Date	**15/12/2020**	Pages (including this page)	**2**
Subject	**A2B and 20Connect Maintenance and Renewal Cost Technical Note**		

A2B and 20Connect Maintenance and Renewal Cost Technical Note

The implementation of the project will result in additional assets requiring ongoing maintenance.

Annual maintenance costs have been assessed [redacted] based on recent records available from the ASM. The estimated periodic maintenance costs cover pavement, bridges, lighting, shared use paths, retaining, structures, traffic signals and stormwater ponds/wetlands.

The resulting annual maintenance costs for the additional lanes recommended for the project are indicated in Table 1. The rates are based on 2019 estimates.

[redacted]

*Note: The length included here only includes SH20B from SH20 to Orrs Road (the road controlling boundary). The remainder of the route between the Airport and Orrs Road falls within Auckland Airport's RCA area and hence maintenance and renewal costs are excluded and assumed to be addressed by Auckland Airport.

Periodic maintenance costs are primarily pavement and surfacing replacements and occur approximately every 8 years for traditional surfacing and 25+ years for Epoxy modified OGPA.

Cost estimates developed for motorway upgrades (based on 2019 estimates) include an upgrade to the existing pavement as well as newly constructed pavement as part of the project costs. The costs associated with the upgrade to the existing pavements would be required whether the project progressed or not therefore this assessment is considered conservative.

The cost estimates for 20Connect include construction of full width pavements as EMOGPA resulting in significantly lower periodic maintenance requirements.

[redacted]

[redacted]

Auckland Transport will take the responsibility for the operation and maintenance of the new busway, stations, and areas within the station perimeter, excluding infrastructure within Auckland Airport's RCA area. All public transport stations require regular and preventative maintenance. As the recommended option is a new asset, it will have an impact on the maintenance and renewal budgets of Auckland Transport.

General station maintenance includes Building Warrant of Fitness, trial evacuations, security, cleaning, landscaping as well as maintenance of facilities (painting, seat refurbishment and line-markings). Security and cleaning are generally the highest cost.

All systems and technical components of stations also require regular preventative maintenance. This includes aspects such as CCTV, customer help-points, HVAC and plumbing, electrical components and Passenger Information Displays.

While an exact annual maintenance cost cannot be determined at this stage due to the level of detail of the station design, maintenance costs have been provided by Auckland Transport, and is based on existing stations of similar size and layout. The rates are based on 2019 estimates. [redacted]

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

Note, the Airport and The Quad stations are excluded.

A detailed maintenance cost forecast needs to be developed during the preliminary design phase.

Approvals:

	Author	Reviewer
Name	[redacted]	
Signature		
Designation		