Appendix A Concept Design Drawings

	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
D	CONCEPT DESIGN	[redacted]				03/07/20
C	80% SUBMISSION					23/04/20
B	DRAFT CONCEPT DESIGN					31/01/20
A	DRAFT CONCEPT DESIGN					13/01/20

SCALE AT A3 1:1000

10 0 10 20 30 40

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Tasmanian Government

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PROJECT: HOBART SOUTHERN PROJECTS SP01

STATUS: CONCEPT

DRAWING TITLE: SOUTHERN OUTLET BUS LANE ROLL PLOT - SHEET 1

DRAWING No. HB19415-CIV-DRG-11101

SHEET 1

REV D

	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
D	CONCEPT DESIGN	[redacted]				03/07/20
C	80% SUBMISSION					23/04/20
B	DRAFT CONCEPT DESIGN					31/01/20
A	DRAFT CONCEPT DESIGN					17/01/20

SCALE AT A3 1:500

10 0 10 20 30 40

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Tasmanian Government

PROJECT HOBART SOUTHERN PROJECTS SP01

STATUS **CONCEPT**

DRAWING TITLE SOUTHERN OUTLET BUS LANE ROLL PLOT - SHEET 3

DRAWING No. HB19415-CIV-DRG-0003

SHEET 3

REV D

DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
A CONCEPT DESIGN	[redacted] s 36				07/08/20

SCALE AT A3 1:1000

10 0 10 20 30 40

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PROJECT
HOBART SOUTHERN PROJECTS
SP01

STATUS
CONCEPT

DRAWING TITLE
SOUTHERN OUTLET BUS LANE
ROLL PLOT - SHEET 1

DRAWING No.
HB19415-CIV-DRG-11201

SHEET 1

REV A

LEGEND
1 X E100 & 1 X C100
1 X E100
1 X C100
VDS4
VEHICLE DETECTION SENSORS
VSLS
CCTV
ITS
POLE MOUNTED CABINET (PMC)
ITS
ROADSIDE CABINET (RBC)
POWER DISTRIBUTION BOARD (DB)
POINT OF SUPPLY (PoS)
GANTRY
REFER TO HB19415-CIV-DRG-11203
XX
XX
XX
XX
XX
VDS3
VDS8
ITS
REFER TO HB19415-CIV-DRG-11201
Tasmanian Government

REV	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
A	CONCEPT DESIGN	[redacted]				14/07/20

SCALE AT A3 1:1000

10 0 10 20 30 40

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Tasmanian Government

PROJECT	DRAWING TITLE	SHEET
HOBART SOUTHERN PROJECTS SP01	SOUTHERN OUTLET BUS LANE ROLL PLOT - SHEET 3	3
STATUS: CONCEPT	DRAWING No. HB19415-CIV-DRG-11203	REV: A

DRAWING SCHEDULE - HOBART VISION PROJECT

PROJECT DRAWING NO.	DRAWING TITLE

GENERAL

HB19415-S-CIV-DRG-00001	COVER SHEET
HB19415-S-CIV-DRG-00002	DRAWING SCHEDULE
HB19415-S-CIV-DRG-00003	ALIGNMENT KEY PLAN
HB19415-S-CIV-DRG-00004	COMPUTER FILE LISTING
HB19415-S-CIV-DRG-00005	LEGEND AND GENERAL NOTES

SP1 SOUTHERN OUTLET - TYPICAL SECTIONS

HB19415-S-CIV-DRG-10101	TYPICAL SECTIONS - SHEET 1
HB19415-S-CIV-DRG-10102	TYPICAL SECTIONS - SHEET 2
HB19415-S-CIV-DRG-10103	TYPICAL SECTIONS - SHEET 3
HB19415-S-CIV-DRG-10104	TYPICAL SECTIONS - SHEET 4
HB19415-S-CIV-DRG-10105	TYPICAL SECTIONS - SHEET 5
HB19415-S-CIV-DRG-10106	TYPICAL SECTIONS - SHEET 6

SP1 SOUTHERN OUTLET - ALIGNMENT PLANS

HB19415-S-CIV-DRG-11001	ALIGNMENT PLANS - SHEET 1
HB19415-S-CIV-DRG-11002	ALIGNMENT PLANS - SHEET 2
HB19415-S-CIV-DRG-11003	ALIGNMENT PLANS - SHEET 3
HB19415-S-CIV-DRG-11004	ALIGNMENT PLANS - SHEET 4
HB19415-S-CIV-DRG-11005	ALIGNMENT PLANS - SHEET 5
HB19415-S-CIV-DRG-11006	ALIGNMENT PLANS - SHEET 6
HB19415-S-CIV-DRG-11007	ALIGNMENT PLANS - SHEET 7
HB19415-S-CIV-DRG-11008	ALIGNMENT PLANS - SHEET 8
HB19415-S-CIV-DRG-11009	ALIGNMENT PLANS - SHEET 9
HB19415-S-CIV-DRG-11010	ALIGNMENT PLANS - SHEET 10
HB19415-S-CIV-DRG-11011	ALIGNMENT PLANS - SHEET 11
HB19415-S-CIV-DRG-11012	ALIGNMENT PLANS - SHEET 12
HB19415-S-CIV-DRG-11013	ALIGNMENT PLANS - SHEET 13
HB19415-S-CIV-DRG-11014	ALIGNMENT PLANS - SHEET 14
HB19415-S-CIV-DRG-11015	ALIGNMENT PLANS - SHEET 15
HB19415-S-CIV-DRG-11016	ALIGNMENT PLANS - SHEET 16

SP1 SOUTHERN OUTLET - ROLL PLOTS

HB19415-S-CIV-DRG-11101	ROLL PLOTS - SHEET 1
HB19415-S-CIV-DRG-11102	ROLL PLOTS - SHEET 2
HB19415-S-CIV-DRG-11103	ROLL PLOTS - SHEET 3

SP2 MACQUARIE STREET/DAVEY STREET - TYPICAL SECTIONS

HB19415-S-CIV-DRG-20101	ALIGNMENT PLANS - SHEET 1
HB19415-S-CIV-DRG-20102	ALIGNMENT PLANS - SHEET 2
HB19415-S-CIV-DRG-20103	ALIGNMENT PLANS - SHEET 3
HB19415-S-CIV-DRG-20104	ALIGNMENT PLANS - SHEET 4
HB19415-S-CIV-DRG-20105	ALIGNMENT PLANS - SHEET 5
HB19415-S-CIV-DRG-20106	ALIGNMENT PLANS - SHEET 6

SP2 MACQUARIE STREET/DAVEY STREET - ALIGNMENT PLANS

HB19415-S-CIV-DRG-21001	ALIGNMENT PLANS - SHEET 1
HB19415-S-CIV-DRG-21002	ALIGNMENT PLANS - SHEET 2
HB19415-S-CIV-DRG-21003	ALIGNMENT PLANS - SHEET 3
HB19415-S-CIV-DRG-21004	ALIGNMENT PLANS - SHEET 4
HB19415-S-CIV-DRG-21005	ALIGNMENT PLANS - SHEET 5
HB19415-S-CIV-DRG-21006	ALIGNMENT PLANS - SHEET 6
HB19415-S-CIV-DRG-21007	ALIGNMENT PLANS - SHEET 7
HB19415-S-CIV-DRG-21008	ALIGNMENT PLANS - SHEET 8
HB19415-S-CIV-DRG-21009	ALIGNMENT PLANS - SHEET 9
HB19415-S-CIV-DRG-21010	ALIGNMENT PLANS - SHEET 10
HB19415-S-CIV-DRG-21011	ALIGNMENT PLANS - SHEET 11
HB19415-S-CIV-DRG-21012	ALIGNMENT PLANS - SHEET 12
HB19415-S-CIV-DRG-21013	ALIGNMENT PLANS - SHEET 13
HB19415-S-CIV-DRG-21014	ALIGNMENT PLANS - SHEET 14
HB19415-S-CIV-DRG-21015	ALIGNMENT PLANS - SHEET 15
HB19415-S-CIV-DRG-21016	ALIGNMENT PLANS - SHEET 16
HB19415-S-CIV-DRG-21017	ALIGNMENT PLANS - SHEET 17

SP2 MACQUARIE/DAVEY STREET - ROLL PLOTS

HB19415-S-CIV-DRG-21101	ROLL PLOTS - SHEET 1
HB19415-S-CIV-DRG-21102	ROLL PLOTS - SHEET 2
HB19415-S-CIV-DRG-21103	ROLL PLOTS - SHEET 3

SP2 MACQUARIE/DAVEY STREET - SWEPT PATHS

HB19415-S-CIV-DRG-22002	SWEPT PATHS - SHEET 1
HB19415-S-CIV-DRG-22004	SWEPT PATHS - SHEET 2
HB19415-S-CIV-DRG-22006	SWEPT PATHS - SHEET 3
HB19415-S-CIV-DRG-22014	SWEPT PATHS - SHEET 4
HB19415-S-CIV-DRG-22017	SWEPT PATHS - SHEET 5

SP3 BROWNS ROAD - ALIGNMENT PLANS

HB19415-S-CIV-DRG-31001	ALIGNMENT PLANS - SHEET 1
HB19415-S-CIV-DRG-31002	ALIGNMENT PLANS - SHEET 2
HB19415-S-CIV-DRG-31003	ALIGNMENT PLANS - SHEET 3
HB19415-S-CIV-DRG-31101	TURNING PATHS

SP3 HUNTINGFIELD AVENUE - ALIGNMENT PLANS

HB19415-S-CIV-DRG-41001	ALIGNMENT PLANS - SHEET 1
HB19415-S-CIV-DRG-41101	TURNING PATHS

FILE NAME:
DATE:

	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
B	CONCEPT DESIGN	s 36 [redacted]				03/07/20
A	80% SUBMISSION					

SCALE AT A3: NTS

0

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CLIENT: WSP

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PROJECT: HOBART SOUTHERN PROJECTS SP01, SP02 AND SP03

STATUS: CONCEPT

DRAWING TITLE: DRAWING SCHEDULE

DRAWING No.: HB19415-S-CIV-DRG-00002

SHEET: 02

REV: B

FILE NAME:

DATE:

	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
B	CONCEPT DESIGN	s 36 [redacted]				03/07/20
A	80% SUBMISSION					

SCALE AT A3 1:10000

100 0 100 200 300 400

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CCORDANCE WITH THE TERMS OF ENGAGEMENT.

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Tasmanian Government

[redacted]

PROJECT
HOBART SOUTHERN PROJECTS
SP01 AND SP02

CONCEPT

DRAWING TITLE
KEY PLAN

DRAWING No.
HB19415-S-CIV-DRG-00003

SHEET
03

REV
B

COMPUTER FILE LISTING

SURVEY

HB19415-S-CIV-XRF-CB01.dgn	CADASTRE BOUNDARIES
HB19415-S-CIV-XRF-UT01.dgn	UTILITIES
44899HC - ADDITIONAL INVERT OF KERB 20-04-2020 (PS 2013).DWG	ADDITIONAL 3D LINES FOR KERBS IN MACQUARIE AND DAVEY STREET
44899HC - GPS INVERT OF KERB 17-04-2020(PS 2013).DWG	3D LINES FOR KERBS IN MACQUARIE AND DAVEY STREET
44899HC-2(PARK & RIDE)2013.DWG	PARK AND RIDE 3D SURVEY LINES
44899HC- 8-30(SOUTHERN OUTLET DETAIL)2013.DWG	SOUTHERN OUTLET 3D SURVEY LINES

DESIGN

HB19415-S-CIV-XRF-AI01.dgn	AERIAL
HB19415-S-CIV-XRF-AI02.dgn	AERIAL PARK & RIDES
HB19415-S-CIV-XRF-CH01.dgn	CHAINAGES
HB19415-S-CIV-XRF-DE01.dgn	DESIGN SOUTHERN OUTLET
HB19415-S-CIV-XRF-DE02.dgn	DESIGN MACQUARIE/DAVEY STREETS
HB19415-S-CIV-XRF-DE31.dgn	DESIGN BROWNS ROAD PARK & RIDE
HB19415-S-CIV-XRF-DE32.dgn	DESIGN
HB19415-S-CIV-XRF-DE41.dgn	DESIGN
HB19415-S-CIV-XRF-DE42.dgn	DESIGN
HB19415-S-CIV-XRF-DE43.dgn	DESIGN
HB19415-S-CIV-XRF-DR11.dgn	DR11
HB19415-S-CIV-XRF-KP01.dgn	KEYPLAN
HB19415-S-CIV-XRF-KP02.dgn	KEYPLAN PARK & RIDES
HB19415-S-CIV-XRF-LM01.dgn	LINE MARKING
HB19415-S-CIV-XRF-SI11.dgn	SI11
HB19415-S-CIV-XRF-TS01.dgn	TYPICAL CROSS SECTIONS - SOUTHERN OUTLET
HB19415-S-CIV-XRF-TS02.dgn	TYPICAL CROSS SECTIONS - MACQUARIE/DAVEY STREETS
HB19415-S-CIV-XRF-XS01.dgn	CROSS SECTIONS - SOUTHERN OUTLET
PS Title Block.dgn	TITLE BLOCK

FILE NAME:

DATE:

	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
B	CONCEPT DESIGN	s 36 [redacted]				03/07/20
A	80% SUBMISSION					23/04/20

SCALE AT A3 NTS

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PROJECT: HOBART SOUTHERN PROJECTS SP01, SP02 AND SP03

STATUS: **CONCEPT**

DRAWING TITLE: COMPUTER FILE LIST

DRAWING No. HB19415-S-CIV-DRG-00004

SHEET: 04

REV: B

SURVEY

- TREE
- REINFORCED CONCRETE PIPE
- BOX CULVERT
- UNDERGROUND DRAINAGE
- SIDE ENTRY PIT
- GRATED PIT
- JUNCTION PIT
- OTHER DRAINAGE PIT
- WING WALL
- OBVERT - CULVERT PIPE
- END WALL
- FLUSHER PIT
- BUS/TRAM SHELTER
- RAILWAY STANCHION (LEFT)
- BOUNDARY INTERSECTION
- GATE
- PERMANENT SURVEY MARK
- SPOT ON BITUMEN
- CERAMIC DELINEATORS/MARKS
- TRAMWAYS POLE

- LINE MARKING (NON -CONTOUR)
- KILOMETRE POST
- SIGNS
- LETTER BOX (AUST POST)
- TRAFFIC SIGNAL POLE
- TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL PIT
- EMERGENCY TELEPHONE
- ROAD FURNITURE (UNCLASSIFIED)
- MONUMENT/HISTORIC MARK
- JOINT USE POLE
- CABLE PIT
- DETECTOR PIT
- RED LIGHT CAMERA FLASH
- RED LIGHT CAMERA
- SIDE MOUNTED SIGN
- CENTRE MOUNTED SIGN
- MULTIPLE MOUNTED SIGN
- BOLLARD
- STAY FOR POLE

- BORE/WELL
- WINDMILL, WIND PUMP
- TOWER/CHIMNEY
- PETROL BOWSER
- PETROL VALVE S/STATION
- ALL BRIDGE FEATURES
- LIGHT POLE
- ELECTRICITY POLE ONLY
- ELECTRIC POLE + LIGHT
- TRANSMISSION TOWER/PYLON
- ELECTRICITY- UNCLASSIFIED
- ELECTRICITY PIT
- ELECTRICITY MARKER POST
- TELECOM PIT (300 x 600)
- TELECOM PILLAR
- TELECOM MARKER POST
- TELECOM POLE
- TELECOM PHONE BOX
- TELECOM (UNCLASSIFIED)
- TELECOM PIT (1200 x 900)

- GAS & FUEL VALVE
- GAS & FUEL MARKER POST
- GAS & FUEL (UNCLASSIFIED)
- SEWERAGE PIT
- SEWERAGE (UNCLASSIFIED)
- STOP VALVE
- FIRE PLUG
- FIRE HYDRANT
- WATER METER
- WATER (UNCLASSIFIED)
- WATER MARKER POST
- UNCLASSIFIED PIT
- UNCLASSIFIED POLE
- UNCLASSIFIED UTILITY
- RAILWAY BOOM GATE
- RAILWAY SIGNAL POLE
- RAILWAY SIGNAL BOX
- RAILWAY STANCHION (RIGHT)
- RAILWAY (UNCLASSIFIED)
- TRAMWAYS (UNCLASSIFIED)

GENERAL NOTES

1 DRAWINGS TO BE READ IN ACCORDANCE WITH URBAN DESIGN AND ARCHITECTURAL DESIGN DRAWINGS
2 DESIGN SOLUTION DEVELOPED IN CONSULTATION WITH TRAFFIC MODELLING
3 WHERE GUARDFENCE POSTS ARE WITHIN 300mm OF DRAINAGE OR SERVICES, ADOPT CONCRETE STRIP FOOTING
4 NEW KERBS TO TRANSITION TO EXISTING KERB OVER 1m

SET-OUT NOTES

1 ALL COORDINATES ARE EXPRESSED TO MGA ZONE 55 AND REDUCED LEVEL ARE AHD
2 ALL LANE DIMENSIONS SHOWN ARE TO LINE OF KERB OR FB BARRIER

BARRIER TYPES

REG REGULAR CONTAINMENT LEVEL
GF GUARD FENCE
RW RETAINING WALL (INTEGRAL)

EXISTING SERVICES

- DRAIN
- SEWER
- W — WATER
- E — ELECTRICITY (UNDERGROUND)

DESIGN WORKS

- SM3 SM2 — KERB AND CHANNEL
- GF — GUARD FENCE
- WRSB — WIRE ROPE SAFETY BARRIER
- CONCRETE BARRIER
- IMPACT ATTENUATOR
- FENCE
- GATE
- RETAINING WALL
- NOISE WALL
- EXISTING PAVEMENT AREAS
- ULTIMATE DESIGN WORKS (WHERE SHOWN)

DRAINAGE LEGEND

- PROPOSED DRAINAGE PIPE SIZE-TYPE-FLOW DIRECTION
- SWALE DRAIN
- DRAINAGE SIDE ENTRY PIT
- DRAINAGE GRATED SIDE ENTRY PIT
- DRAINAGE JUNCTION PIT
- DRAINAGE GRATED PIT
- CONCRETE HEADWALL

BARRIER KEY AND DETAILS

TERMINAL
CH711
OFFSET 13m
LINE OF KERB

FILE NAME:
DATE:

REV	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
B	CONCEPT DESIGN	s 36 [redacted]				03/07/20
A	80% SUBMISSION					23/04/20

SCALE AT A3 NTS

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PROJECT
HOBART SOUTHER PROJECTS
SP01, SP02 AND SP03

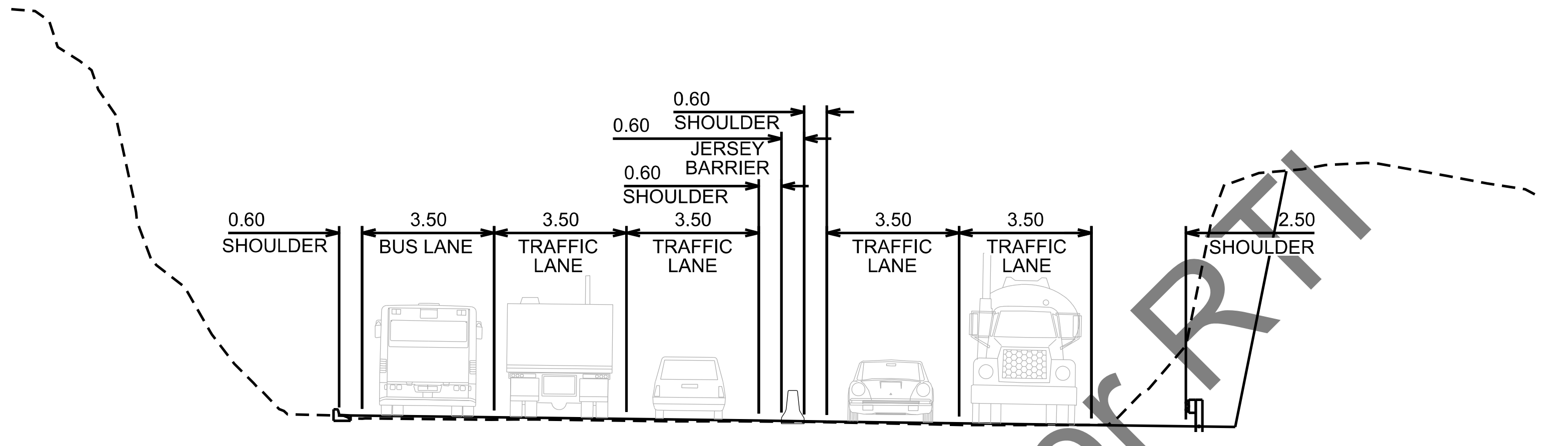
STATUS CONCEPT

DRAWING TITLE
LEGEND AND NOTES

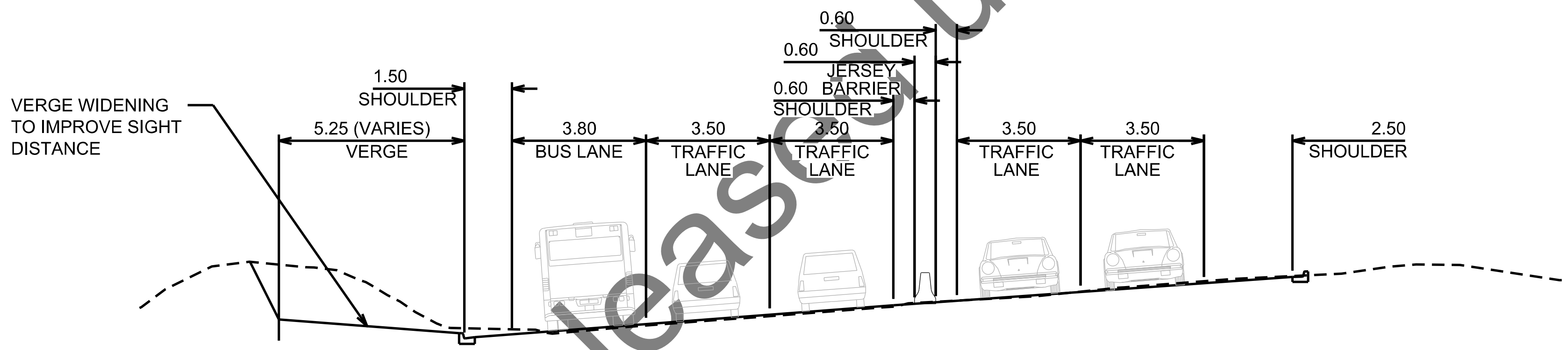
DRAWING No. HB19415-S-CIV-DRG-00005

SHEET 05

REV B



TYPICAL SECTION
CH 700



TYPICAL SECTION
CH 620

FILE NAME:
DATE:

	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
B	CONCEPT DESIGN	s 36 [redacted]				07/03/20
A	80% SUBMISSION					23/04/20

SCALE AT A3 1:200

2 0 2 4 6 8

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CLIENT
WSP

Tasmanian Government

PROJECT
HOBART SOUTHERN PROJECTS
SP01

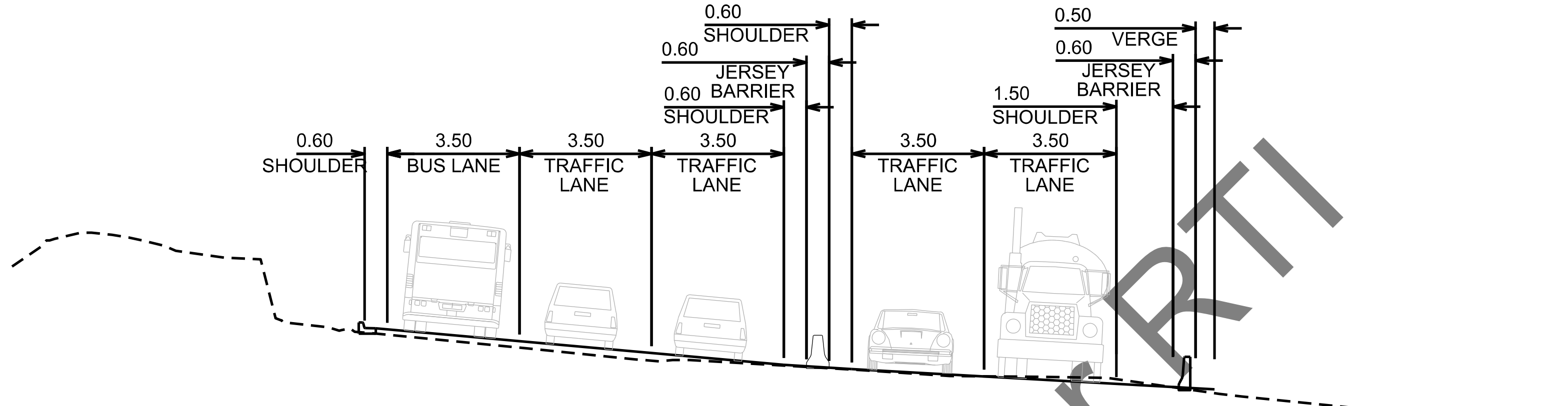
STATUS
CONCEPT

DRAWING TITLE
TYPICAL SECTIONS
SHEET 1

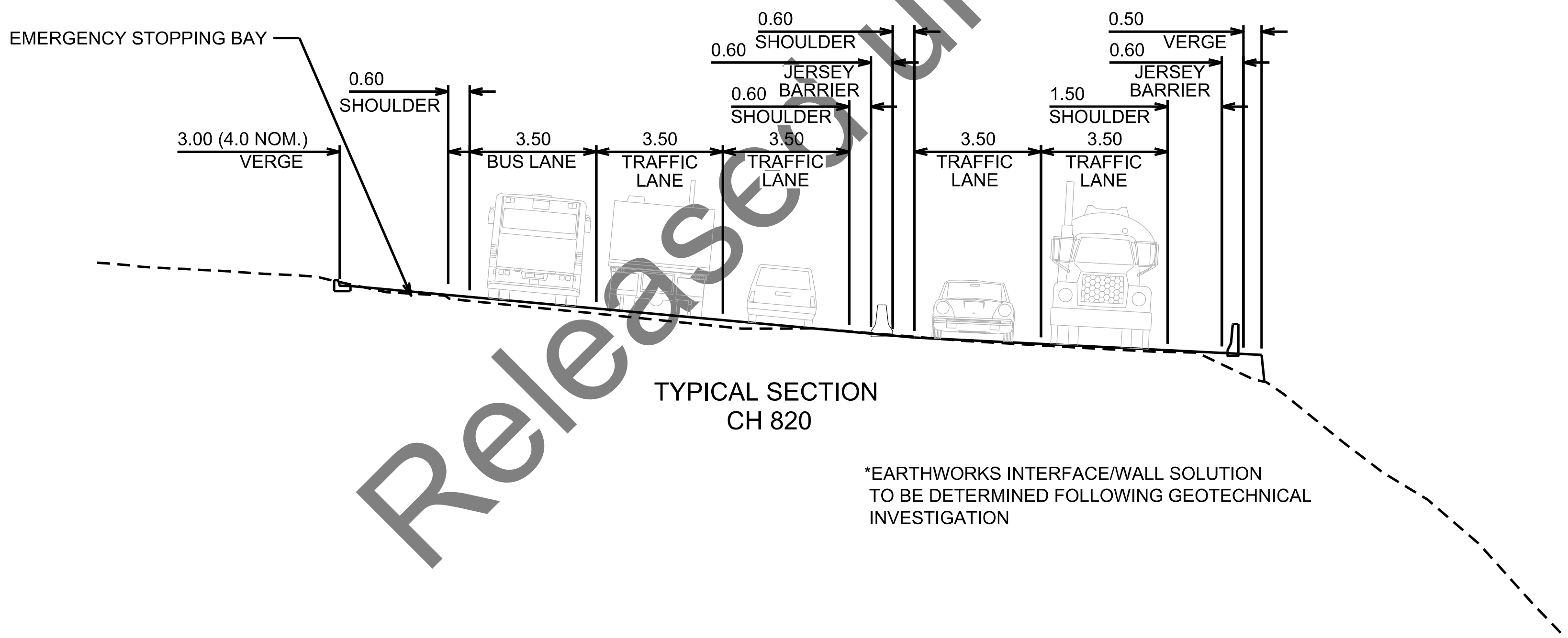
DRAWING No.
HB19415-S-CIV-DRG-10101

SHEET
01

REV
B



TYPICAL SECTION
CH 870



TYPICAL SECTION
CH 820

*EARTHWORKS INTERFACE/WALL SOLUTION
TO BE DETERMINED FOLLOWING GEOTECHNICAL
INVESTIGATION

FILE NAME:
DATE:

	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
B	CONCEPT DESIGN	s 36 [redacted]				03/07/20
A	80% SUBMISSION					

SCALE AT A3 1:200

2 0 2 4 6 8

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WSP

Tasmanian Government

PROJECT
HOBART SOUTHERN PROJECTS
SP01

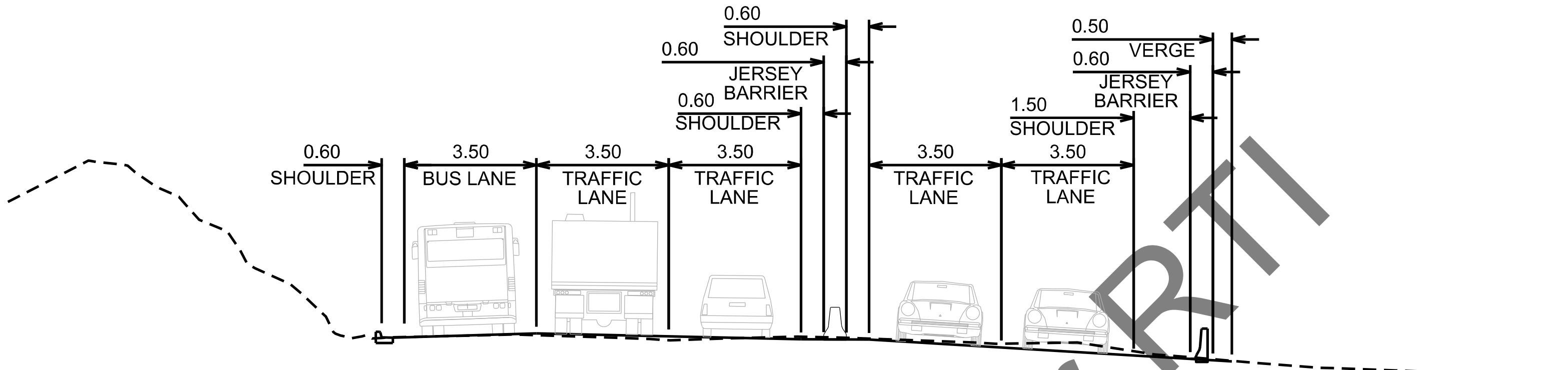
STATUS
CONCEPT

DRAWING TITLE
TYPICAL SECTIONS
SHEET 2

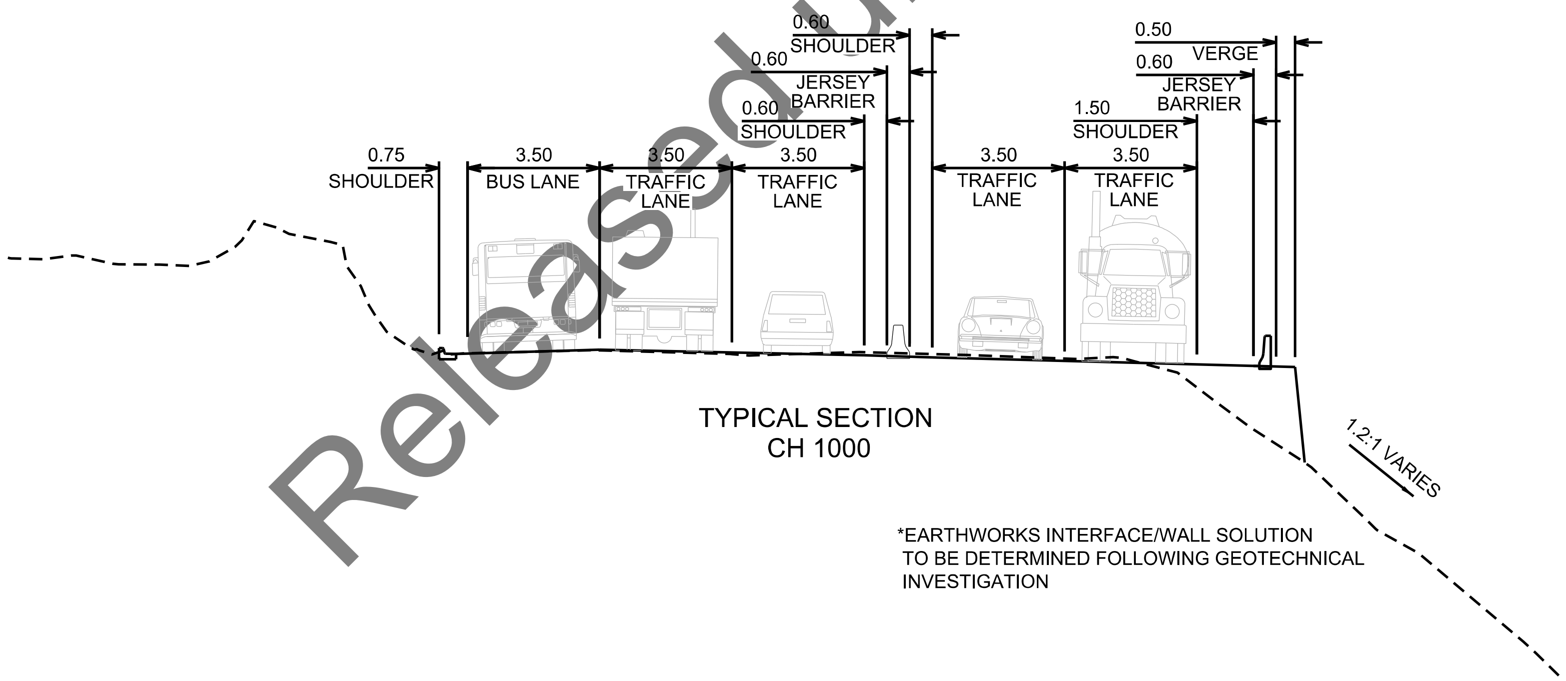
DRAWING No.
HB19415-S-CIV-DRG-10102

SHEET
02

REV
B



TYPICAL SECTION
CH 1160



TYPICAL SECTION
CH 1000

*EARTHWORKS INTERFACE/WALL SOLUTION
TO BE DETERMINED FOLLOWING GEOTECHNICAL
INVESTIGATION

FILE NAME:

DATE:

	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
B	CONCEPT DESIGN	s 36 [redacted]				03/07/20
A	80% SUBMISSION					

SCALE AT A3 1:200

2 0 2 4 6 8

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PROJECT
HOBART SOUTHERN PROJECTS
SP01

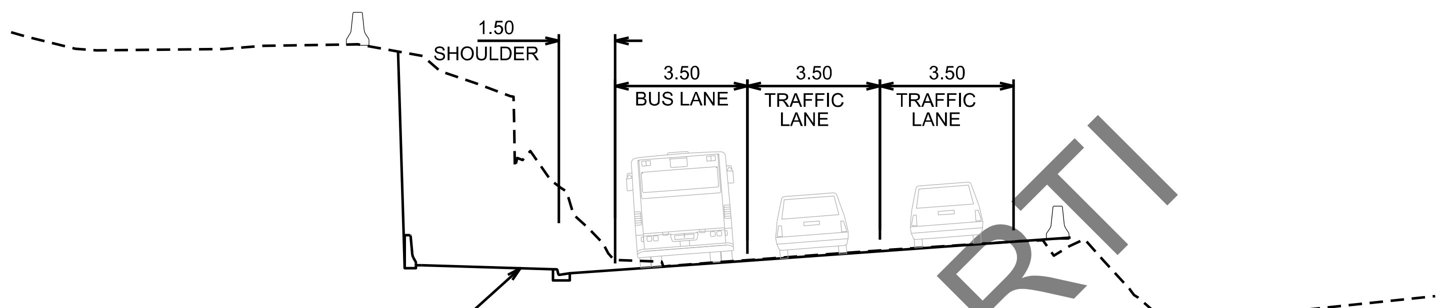
STATUS
CONCEPT

DRAWING TITLE
TYPICAL SECTIONS
SHEET 3

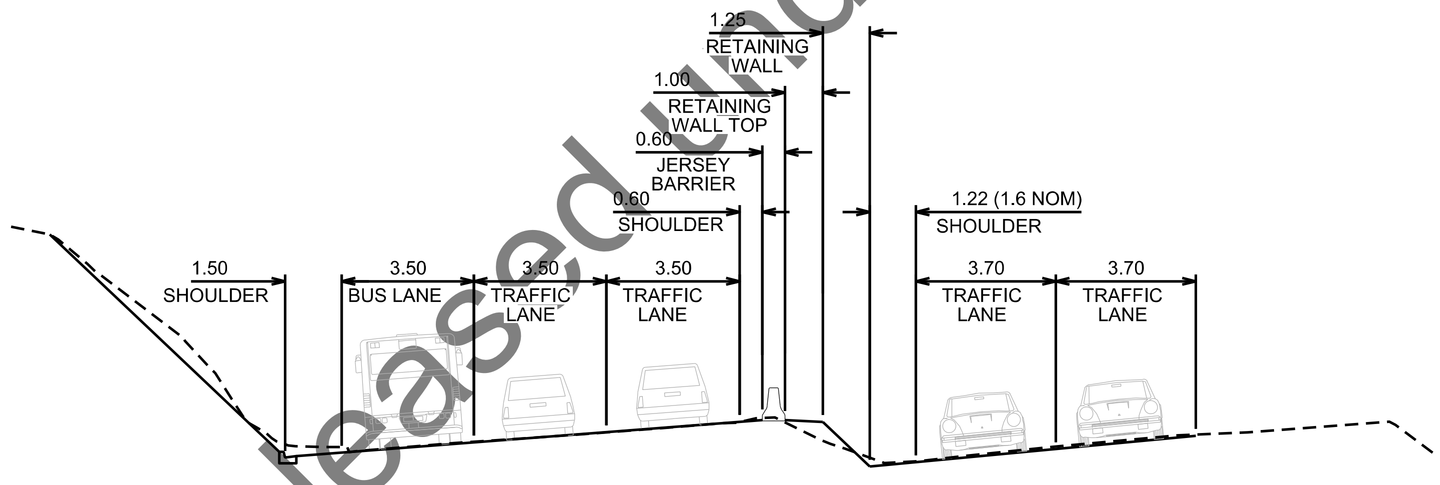
DRAWING No.
HB19415-S-CIV-DRG-10103

SHEET
03

REV
B



TYPICAL SECTION
CH 1410



TYPICAL SECTION
CH 1360

FILE NAME:

DATE:

	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
B	CONCEPT DESIGN	s 36 [redacted]				03/07/20
A	80% SUBMISSION					

SCALE AT A3 1:200

2 0 2 4 6 8

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PROJECT
HOBART SOUTHERN PROJECTS
SP01

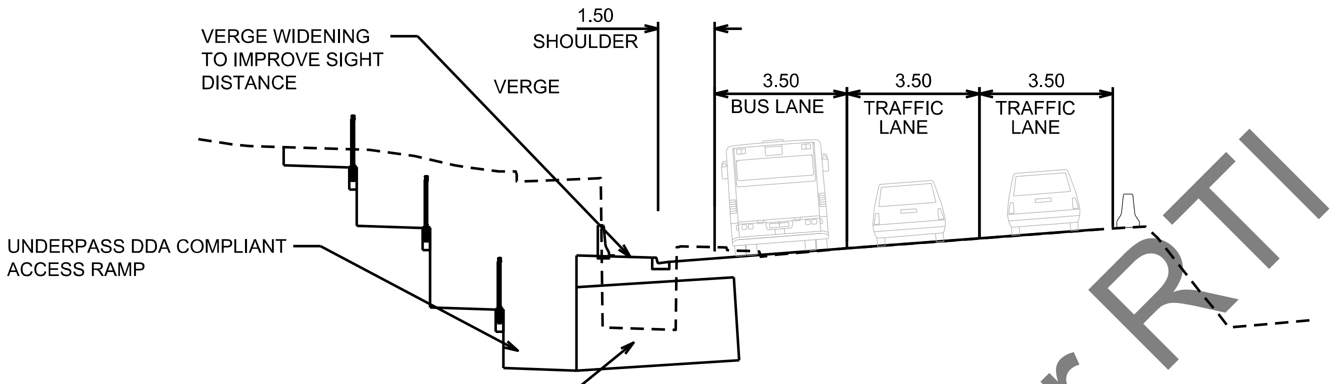
STATUS
CONCEPT

DRAWING TITLE
TYPICAL SECTIONS
SHEET 4

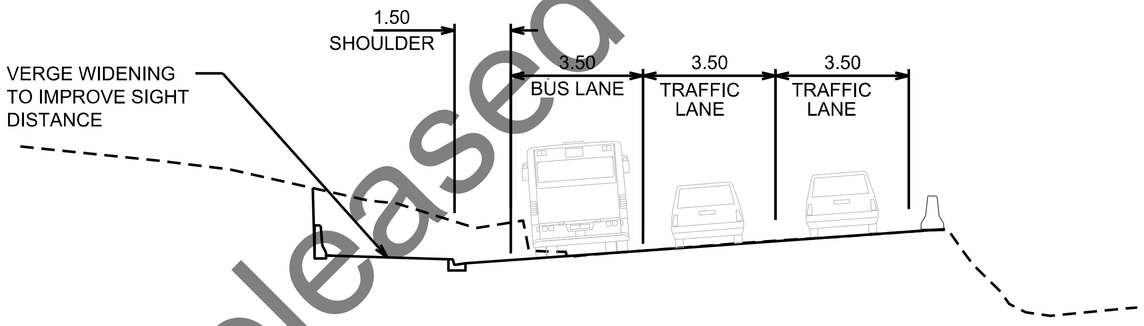
DRAWING No.
HB19415-S-CIV-DRG-10104

SHEET
04

REV
B



TYPICAL SECTION
CH 1580



TYPICAL SECTION
CH 1500

FILE NAME:
DATE:

	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
B	CONCEPT DESIGN	s 36 [redacted]				03/07/20
A	80% SUBMISSION					

SCALE AT A3 1:200

2 0 2 4 6 8

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CLIENT WSP

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PROJECT
HOBART SOUTHERN PROJECTS
SP01

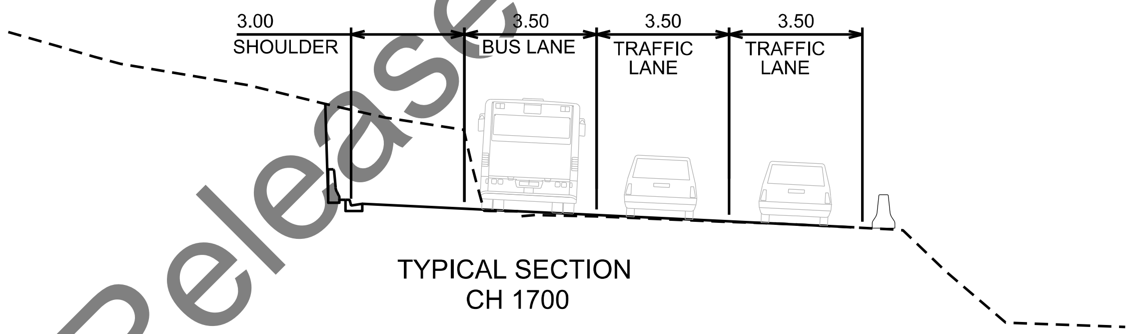
STATUS
CONCEPT

DRAWING TITLE
TYPICAL SECTIONS
SHEET 5

DRAWING No.
HB19415-S-CIV-DRG-10105

SHEET
05

REV
B



TYPICAL SECTION
CH 1700

FILE NAME:

DATE:

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B	CONCEPT DESIGN	s 36 [redacted]				03/07/20
A	80% SUBMISSION					

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DRAWING TITLE
TYPICAL SECTIONS
SHEET 6

DRAWING No.
HB19415-S-CIV-DRG-10106

SHEET
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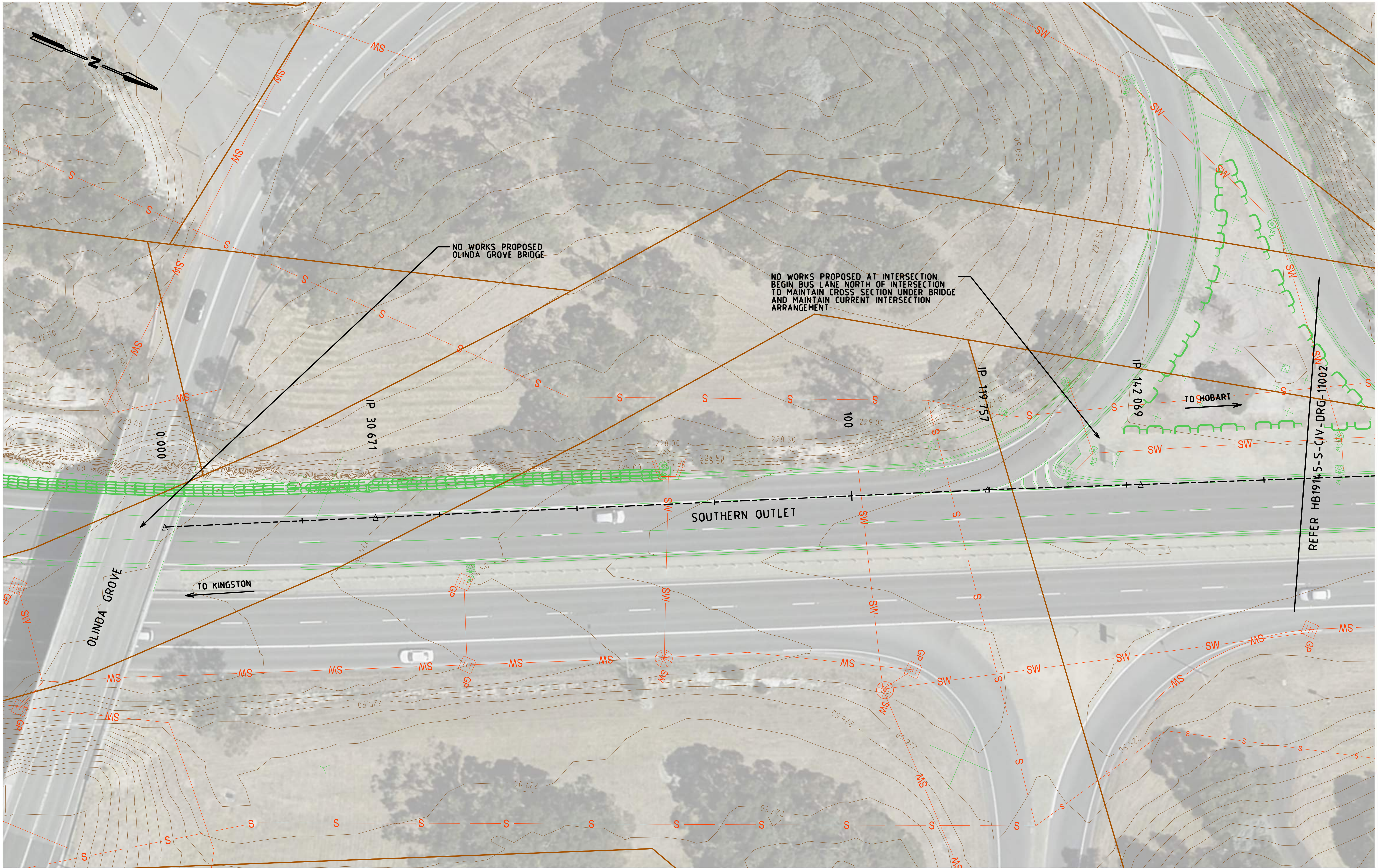

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A	80% SUBMISSION					23/04/20

SCALE AT A3 1:500

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CONCEPT

DRAWING TITLE
ALIGNMENT PLAN
SHEET 1

DRAWING No.
HB19415-S-CIV-DRG-11001

SHEET
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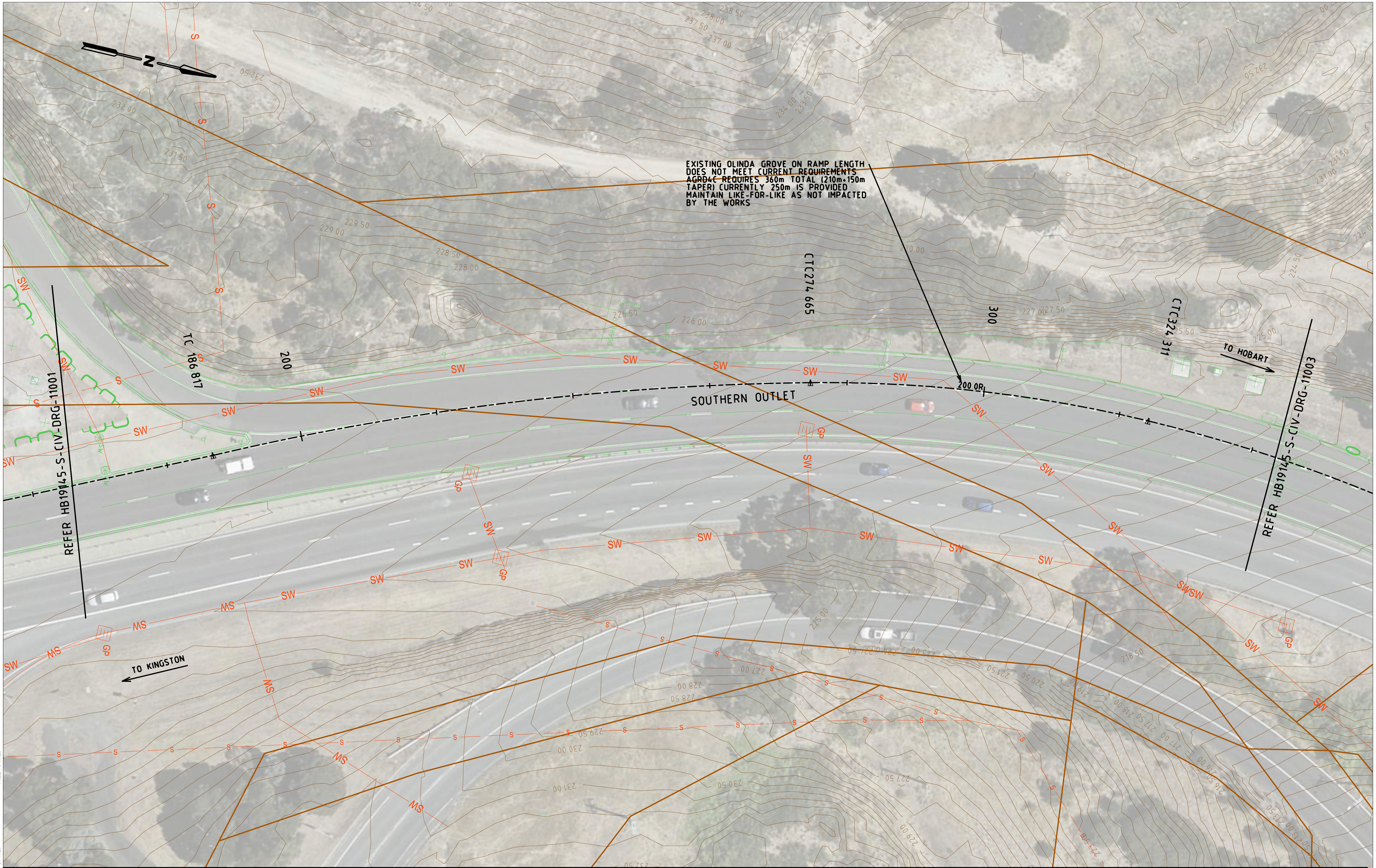

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SCALE AT A3 1:500

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PROJECT HOBART SOUTHERN PROJECTS SP01

STATUS **CONCEPT**

DRAWING TITLE ALIGNMENT PLAN SHEET 2

DRAWING No. HB19415-S-CIV-DRG-11002

SHEET 02

REV B

FILE NAME:

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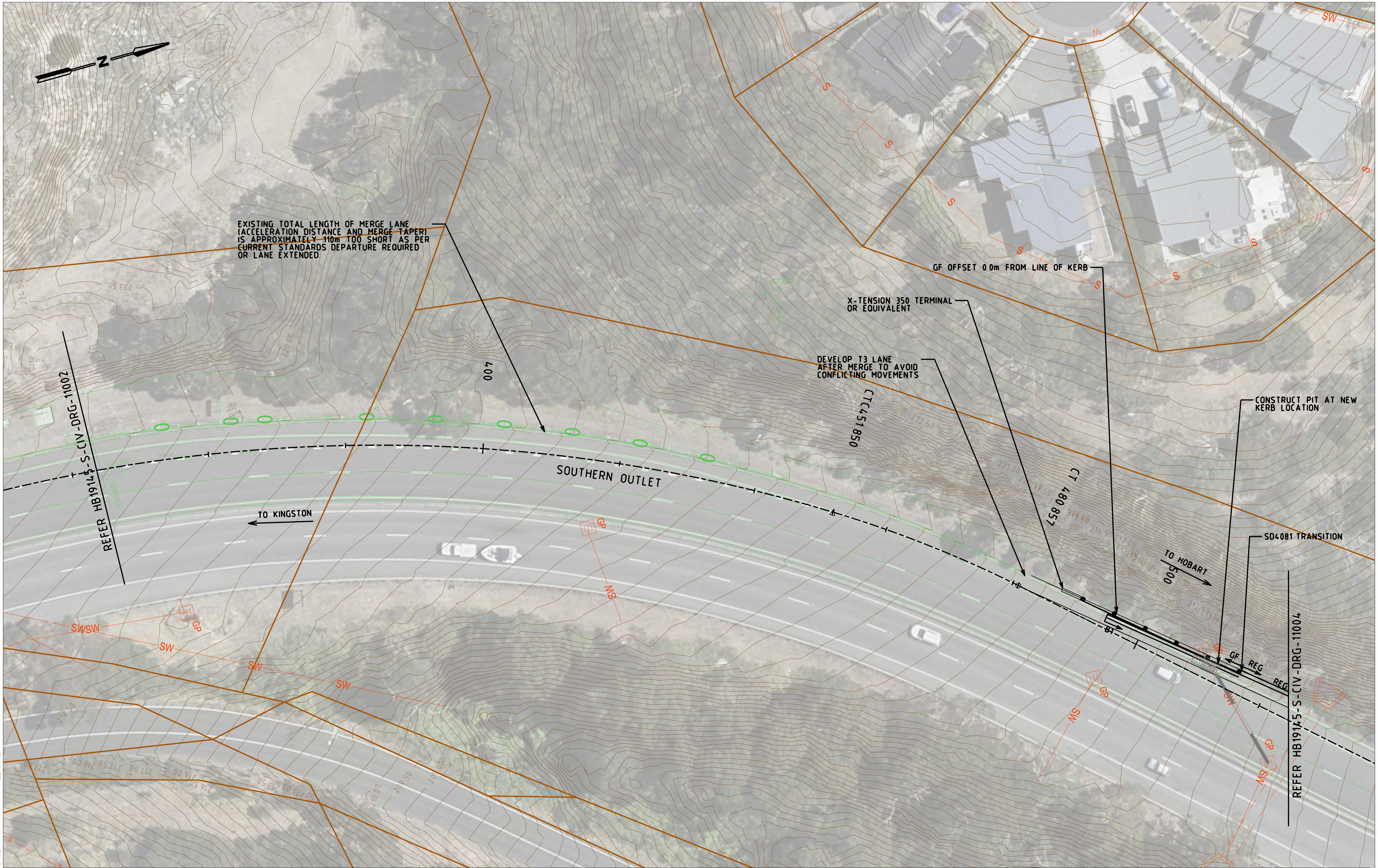

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SCALE AT A3 1:500

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PROJECT: HOBART SOUTHERN PROJECTS SP01

STATUS: CONCEPT

DRAWING TITLE: ALIGNMENT PLAN SHEET 3

DRAWING No. HB19415-S-CIV-DRG-11003

SHEET 03

REV B

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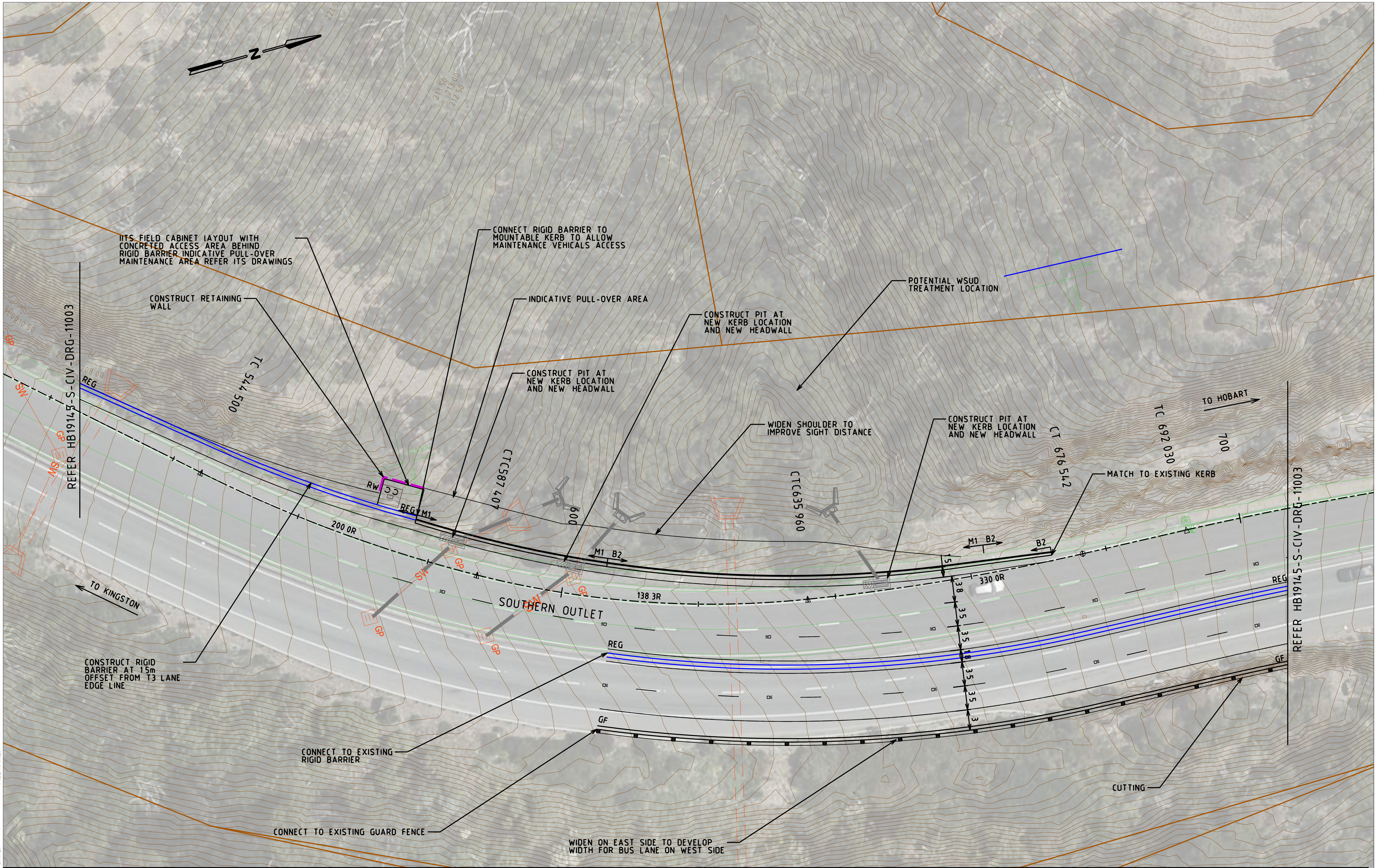

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A	80% SUBMISSION					23/04/20

SCALE AT A3 1:500

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STATUS **CONCEPT**

DRAWING TITLE ALIGNMENT PLAN SHEET 4

DRAWING No. HB19415-S-CIV-DRG-11004

SHEET 04

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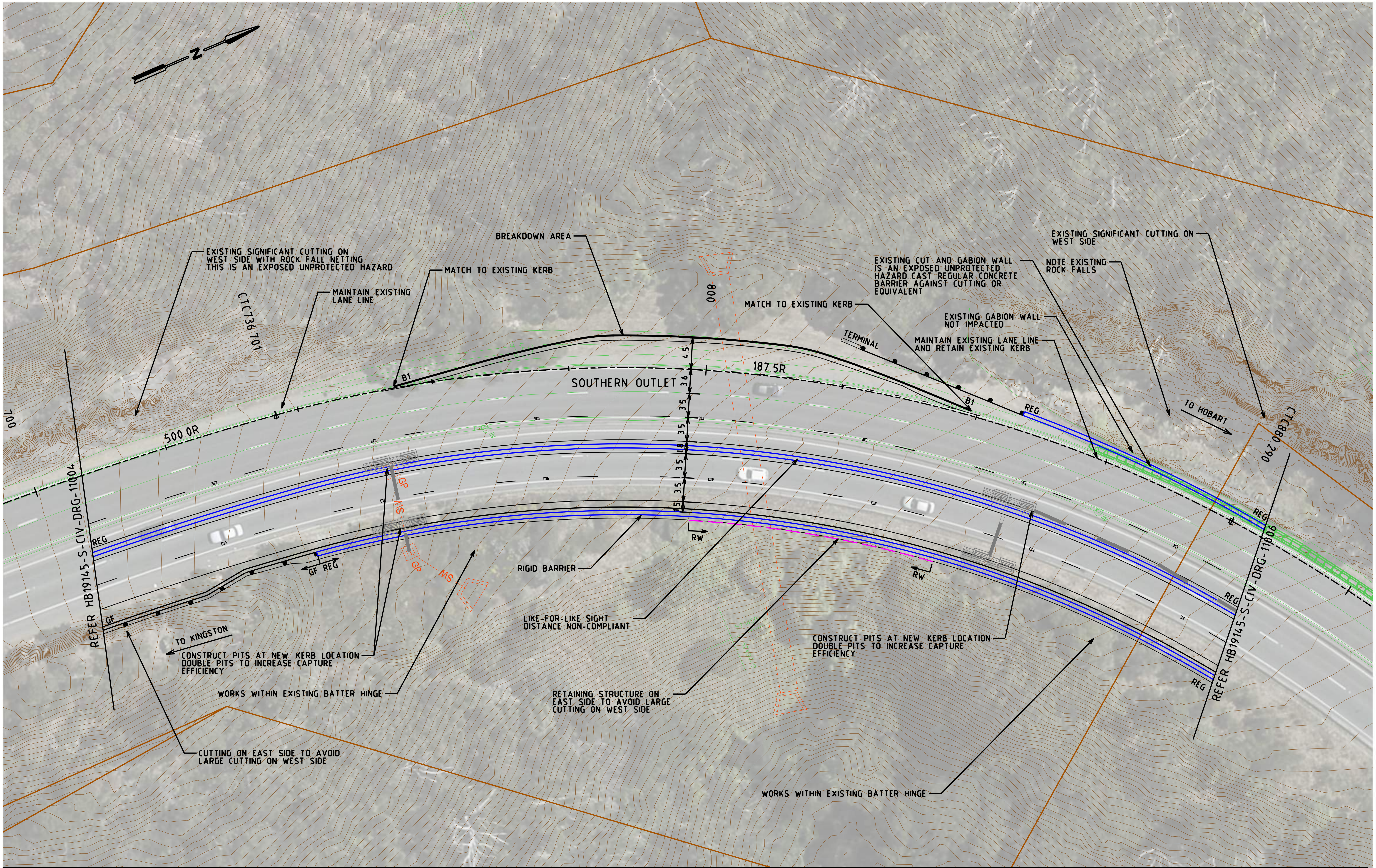

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SCALE AT A3 1:500

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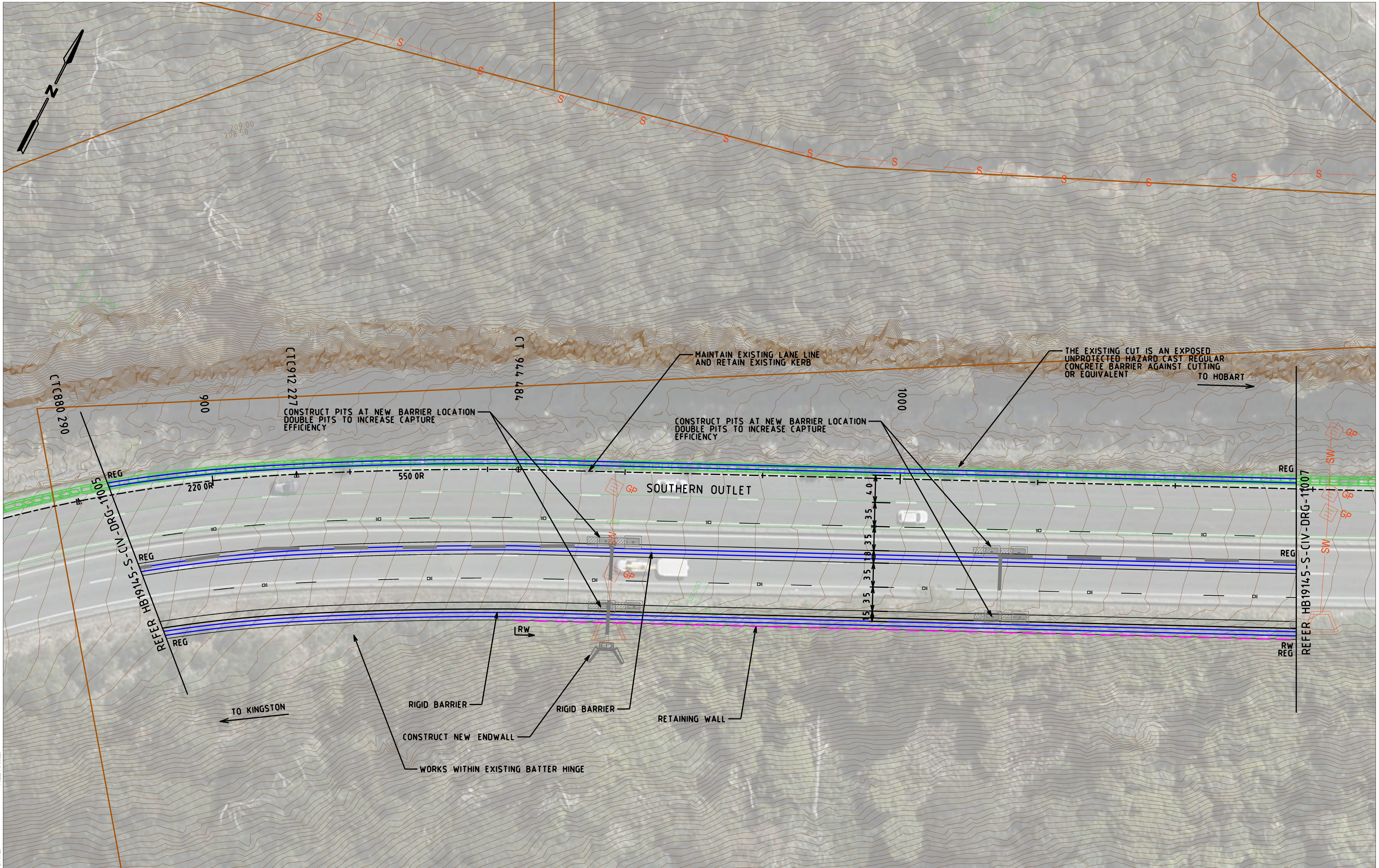
STATUS: **CONCEPT**

DRAWING TITLE: ALIGNMENT PLAN SHEET 5

DRAWING No. HB19415-S-CIV-DRG-11005

SHEET 05

REV B



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A	80% SUBMISSION					23/04/20

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CONCEPT

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ALIGNMENT PLAN
SHEET 6

DRAWING No.
HB19415-S-CIV-DRG-11006

SHEET
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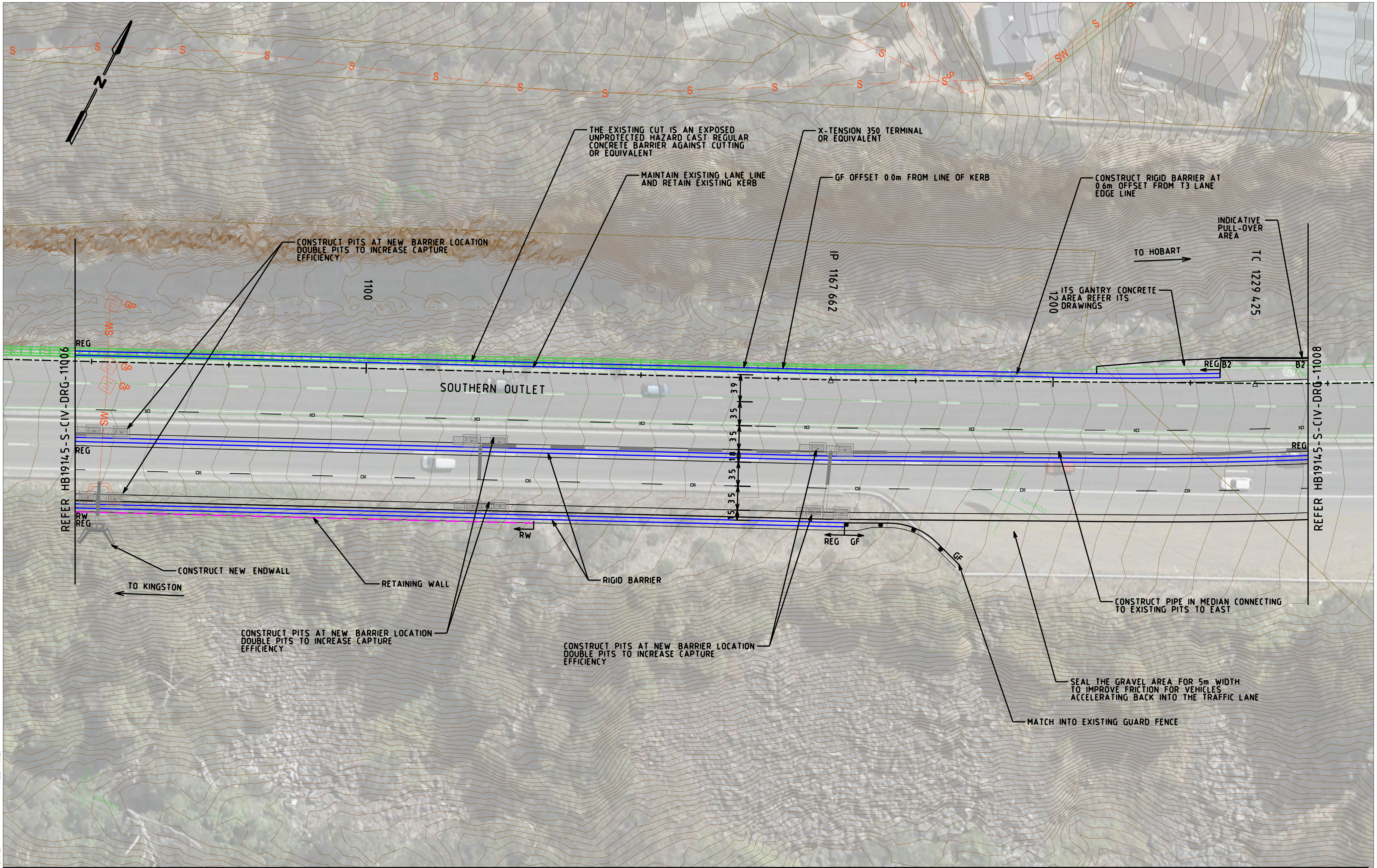

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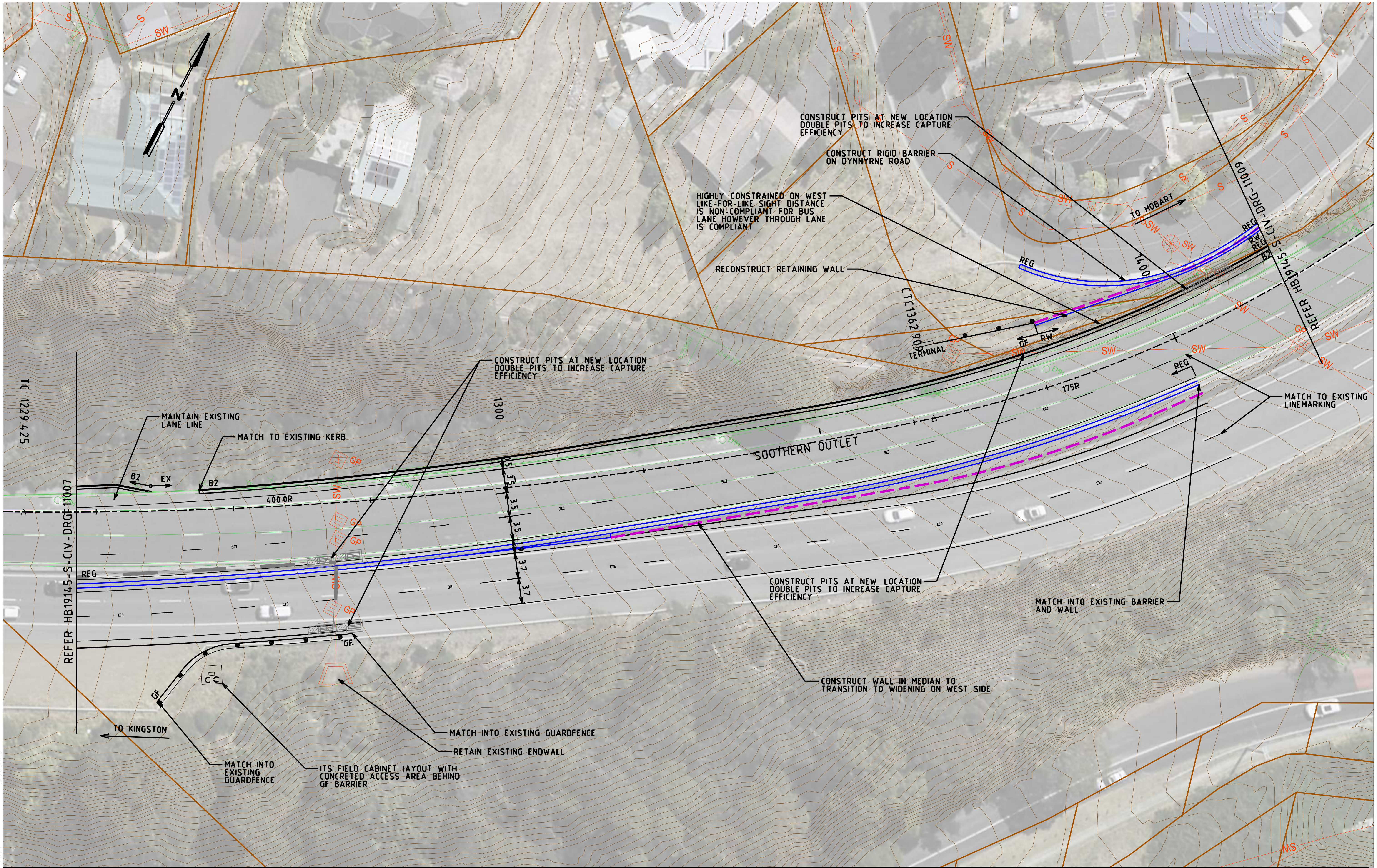
STATUS: **CONCEPT**

DRAWING TITLE: ALIGNMENT PLAN SHEET 7

DRAWING No. HB19415-S-CIV-DRG-11007

SHEET: 07

REV: B



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A	80% SUBMISSION					23/04/20

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DRAWING TITLE
ALIGNMENT PLAN
SHEET 8

DRAWING No.
HB19415-S-CIV-DRG-11008

SHEET 08

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FILE NAME:

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REV	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
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A	80% SUBMISSION					23/04/20

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SP01

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CONCEPT

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ALIGNMENT PLAN
SHEET 12

DRAWING No.
HB19415-S-CIV-DRG-11012

SHEET
12

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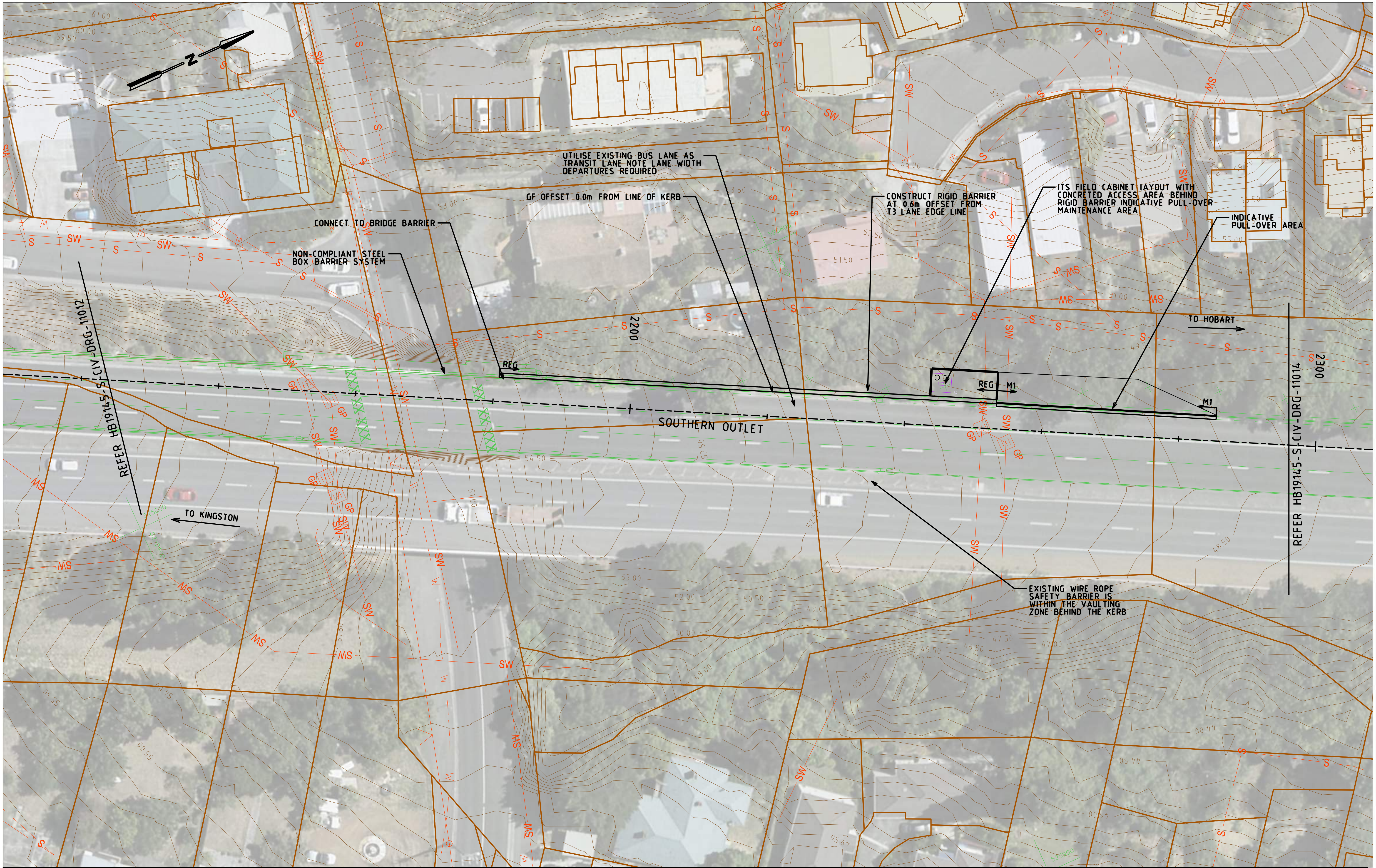

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A	80% SUBMISSION					23/04/20

SCALE AT A3 1:500

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PROJECT: HOBART SOUTHERN PROJECTS SP01

STATUS: **CONCEPT**

DRAWING TITLE: ALIGNMENT PLAN SHEET 13

SHEET: 13

DRAWING No. HB19415-S-CIV-DRG-11013

REV: B

FILE NAME:

DATE:

REV	DESCRIPTION	DRAWN	DESIGNED	REVIEWED	APPROVED	DATE
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A	80% SUBMISSION					23/04/20

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PROJECT: HOBART SOUTHERN PROJECTS SP01

STATUS: **CONCEPT**

DRAWING TITLE: ALIGNMENT PLAN SHEET 14

DRAWING No. HB19415-S-CIV-DRG-11014

SHEET 14

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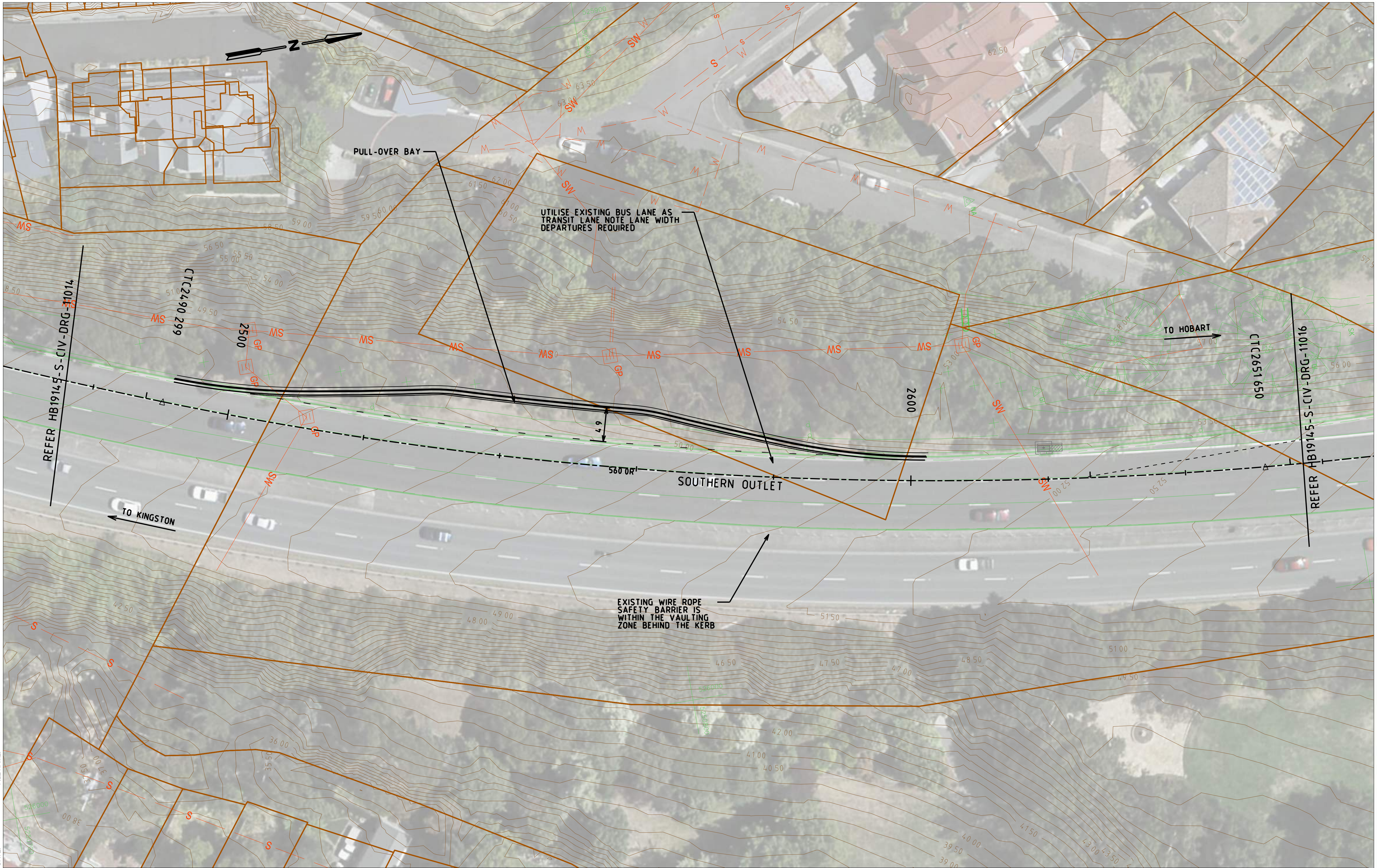

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SCALE AT A3 1:500

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STATUS
CONCEPT

DRAWING TITLE
ALIGNMENT PLAN SHEET 15

DRAWING No.
HB19415-S-CIV-DRG-11015

SHEET 15

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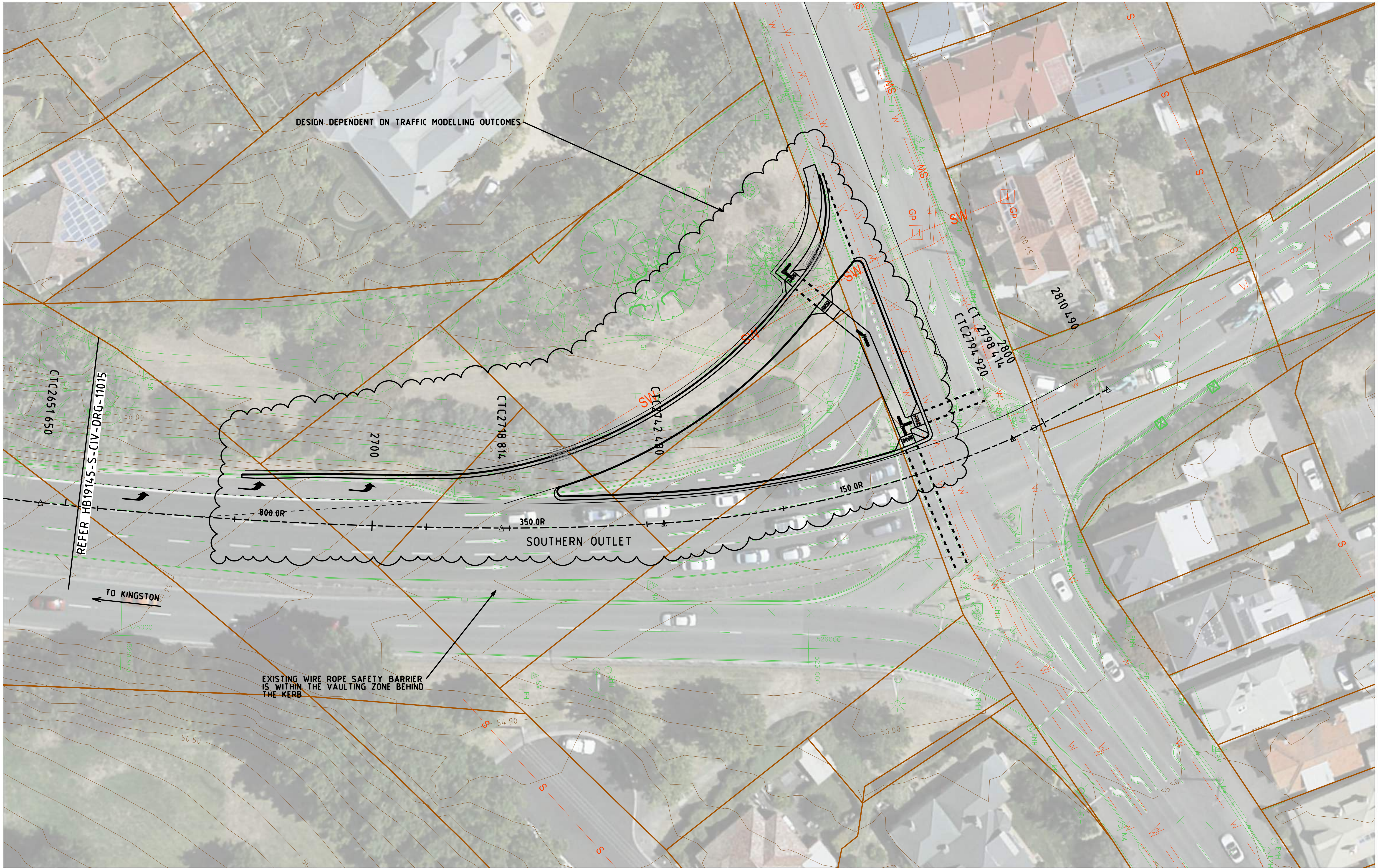

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A	80% SUBMISSION					23/04/20

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PROJECT: HOBART SOUTHERN PROJECTS SP01

STATUS: CONCEPT

DRAWING TITLE: ALIGNMENT PLAN SHEET 16

SHEET: 16

DRAWING No.: HB19415-S-CIV-DRG-11016

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Appendix B Cost Estimate

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Hobart Transport SP01

Southern Outlet Concept Design

Probabilistic Cost Estimate

Version: 25/11/2020 17:14

Summary of Risks by Likelihood, Consequence and Risk Rating

Risk Heat Map

	Consequence				
Likelihood	1	2	3	4	5
Almost Certain	Medium	High	High	Critical	Critical
Likely	Low	Medium	High	High	Critical
Moderate	Low	Low	Medium	High	High
Unlikely	Low	Low	Low	Medium	High
Rare	Low	Low	Low	Low	Medium

Contingent Risk

Count of contingent risks (excluding items noted as not to be included)

	Consequence				
Likelihood	1	2	3	4	5
Almost Certain	0	0	0	0	0
Likely	0	0	0	0	0
Moderate	1	3	5	1	1
Unlikely	0	5	3	2	0
Rare	0	0	0	0	2

Contingent Opportunities

Count of contingency opportunities (excluding items noted not to be included)

	Consequence				
Likelihood	1	2	3	4	5
Almost Certain	0	0	0	0	0
Likely	0	0	0	0	0
Moderate	0	0	0	0	0
Unlikely	0	0	0	0	0
Rare	0	0	0	0	0

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Appendix C Risk Register

Activity ID	Category	Potential Hazard / Impact	Initial Risk Rating Without			Controls (Eliminate so far as is reasonably practicable)	Highest Control Type	Residual Risk Rating			Responsible Person
			C	P	Risk			C	P	Risk	
1	1 - Implementation	No framework for T3 enforcement results in a design product that cannot be enforced	4	Moderate	High	Carry out ITS design in Concept Design stage. Continue open dialogue with ITS experts and client legal team.	Eng Control	3	Unlikely	Low	
2	1 - Implementation	Complexity of process to acquire land results in delays to commencement of construction	4	Likely	High	Extent of land required to be established early to enable commencement of acquisition process	Admin Control	4	Moderate	High	
4	2 - Scope	Scope change due to political direction results in delay to commencement of construction	4	Moderate	High	Minister to be kept updated regarding stakeholder matters and design development progress to align with project direction	Admin Control	4	Unlikely	Medium	
5	2 - Scope	Timeliness of decision making leads to delays in design development resulting in delay to commencement of construction	3	Moderate	Medium	Protocol for steering committee to be developed and integrated in Project Management Plan	Admin Control	3	Unlikely	Low	
6	2 - Scope	Service alteration costs exceed estimate	3	Moderate	Medium	Identify impact in Concept Design and allow for sufficient contingency. Review when authority estimates have been received	Eng Control	3	Moderate	Medium	
9	2 - Scope	Extent of pavement rehabilitation on existing carriageway	4	Likely	High	Assume existing pavement to be retained with resurfacing only (OGA). Allow for localised digout quantity but not rehabilitation. Pavement review not included in Concept Design scope.	Admin Control	4	Moderate	High	
10	2 - Scope	Noise mitigation costs higher than anticipated	4	Moderate	High	Recommend OGA surfacing to reduce noise and other benefits unrelated to noise. Noise testing recommended to be carried out in future stages of design. Acquisition proposed on west side where widening occurs.	Eng Control	3	Moderate	Medium	
11	2 - Scope	Catchment model provided by Council results in upgrade to cross drainage.	4	Likely	High	Minor changes to roadway levels not expected to affect floodlevels at cross drain location. Existing cross drains retained and not duplicated, maintaining like-for-like conditions. Allow contingency for some additional works to cross drains	Admin Control	4	Unlikely	Medium	
12	2 - Scope	Stormwater model results in increase to drainage to meet current standard and aquaplaning issues caused by steep grades.	3	Likely	High	Construct double-pits to increase capture efficiency. Increase number of pits to account for new road area. Allow for OGA in design to improve aquaplaning	Eng Control	2	Unlikely	Low	
13	2 - Scope	Underlying lighting issue is identified which results in lighting upgrade to Southern Outlet	3	Likely	High	The Department made aware of this item in Concept Design. Maintain like-for-like and improve where feasible to do so. The concept design is limited to widening works to create space for a transit lane in the northbound. It is not intended as an overall upgrade project of the Southern Outlet.	Admin Control	3	Unlikely	Low	
14	2 - Scope	Existing barrier systems currently not impacted by the works which are substandard are to be upgraded to current standards.	4	Likely	High	The Department made aware of this item in Concept Design. Maintain like-for-like. Existing barrier not impacted by the works is to be retained.	Admin Control	3	Moderate	Medium	
16	2 - Scope	Lynton Avenue Overpass barrier is determined to be substandard and requires upgrade as part of this project	3	Likely	High	The Department made aware of this item in Concept Design. Maintain like-for-like. Existing barrier not impacted by the works is to be retained.	Admin Control	3	Moderate	Medium	
17	2 - Scope	Existing sightline issues and horizontal curve issues must be upgraded resulting in significant scope increase and acquisition.	5	Moderate	High	The Department made aware of these departures in Concept Design. Maintain like-for-like and improve where feasible to do so. The concept design is limited to widening works to create space for a transit lane in the northbound. It is not intended as an overall upgrade project of the Southern Outlet.	Admin Control	5	Moderate	High	

Activity ID	Category	Potential Hazard / Impact	Initial Risk Rating Without			Controls (Eliminate so far as is reasonably practicable)	Highest Control Type	Residual Risk Rating			Responsible Person
			C	P	Risk			C	P	Risk	
18	2 - Scope	It is determined in later stages that Pedestrian crossing at Davey Street and Southern Outlet intersection requires major upgrade such as pedestrian overpass	4	Unlikely	Medium	Traffic analysis carried out in Concept Design and a pedestrian structure not expected to be necessary at this stage in the design and an at-grade solution is expected.	Admin Control	3	Unlikely	Low	
19	2 - Scope	It is determined that driver exposure to Cutting 20 is unacceptable requires upgrade to rockfall protection works	5	Unlikely	High	The Department are made aware of this item in Concept Design. The existing kerb and lane line offset is retained to maintain like-for-like risk exposure.	Admin Control	5	Rare	Medium	
20	2 - Scope	It is determined that the proposed Concept Design cross sections departures are unacceptable and all shoulders are to be upgraded to 3m resulting in significant scope increase (retaining wall solution becomes unfeasible).	5	Moderate	High	Departures determined in Concept Design where like-for-like conditions for shoulder widths are maintained at these constrained locations.	Admin Control	5	Rare	Medium	
21	2 - Scope	ITS solution difficult in constrained environment results in scope increase	4	Likely	High	Concept ITS solution developed early in Concept Design	Admin Control	3	Moderate	Medium	
23	2 - Scope	Existing underpass structure is substandard and requires strengthening works or replacement	4	Moderate	High	Set gradeline-control and no increase in levels or loading over the underpass structure. Works over the structure are over the widened section.	Eng Control	2	Moderate	Low	
24	2 - Scope	Total land acquisition of the properties is not obtained resulting in scope increase	5	Likely	Critical	Retaining walls are proposed rather than battering in the Concept Design stage which can be reviewed in later stages of design	Eng Control	3	Moderate	Medium	
25	3 - Stakeholder	Project is poorly received by the community. Negative press.	4	Likely	High	Utilise stakeholder experts with local knowledge to develop engagement plan early. Develop and engage Stakeholder Engagement plan early in the Concept Design phase.	Admin Control	3	Likely	High	
26	3 - Stakeholder	Stakeholders and public not engaged in project	4	Likely	High	Implement local stakeholder lead. Develop and engage Stakeholder Engagement plan early in the Concept Design phase.	Admin Control	3	Likely	High	
27	3 - Stakeholder	Unable to get meeting with councils at required time leading to project delays	4	Moderate	High	Anticipate and schedule meetings early. Gain visibility of council meeting schedule upfront.	Admin Control	2	Unlikely	Low	
28	3 - Stakeholder	Agreement on design not reached between key stakeholders	4	Moderate	High	Develop and engage Stakeholder Engagement plan early in the Concept Design phase.	Admin Control	2	Unlikely	Low	
29	3 - Stakeholder	Dissatisfied stakeholders results in media attention	4	Moderate	High	Justification for decisions regarding preferred option to be conveyed to all stakeholders Stakeholder Engagement Plan to be reviewed and updated on a regular basis	Admin Control	4	Moderate	High	
30	3 - Stakeholder	Long-term traffic delays due to construction results in media attention.	4	Likely	High	Carry out Construction Staging design early in Concept Design to determine impact and determine concept solutions.	Admin Control	3	Moderate	Medium	
31	3 - Stakeholder	Project land acquisition difficult to obtain and poorly received by the community. Negative press.	5	Likely	Critical	All alternatives considered in Concept Design phase to limit acquisition. Utilise stakeholder experts with local knowledge to develop engagement plan early. Develop and engage Stakeholder Engagement plan early in the Concept Design phase.	Admin Control	3	Likely	High	
32	4 - Design	Existing Traffic Model not suitable for proposed modelling task	4	Moderate	High	Ensure visibility of existing model to modelling experts early in project. Conduct suitability assessment so any additional modelling is identified upfront in Concept Design so project delays minimised.	Eng Control	3	Moderate	Medium	
33	4 - Design	Traffic model for the Concept Design does not meet project objectives	4	Moderate	High	Conduct Traffic Assessment during Concept Design to confirm it meets the project objectives.	Admin Control	3	Moderate	Medium	

Activity ID	Category	Potential Hazard / Impact	Initial Risk Rating Without			Controls (Eliminate so far as is reasonably practicable)	Highest Control Type	Residual Risk Rating			Responsible Person
			C	P	Risk			C	P	Risk	
34	4 - Design	Developed solution does not sufficiently enhance or consider the passenger experience	4	Moderate	High	Ensure to communicate importance of customer experience to all working on project. Include within design reviews. Include within monthly reporting.	Training	2	Unlikely	Low	
35	4 - Design	Developed solution is too expensive or unable to be delivered effectively	4	Unlikely	Medium	Utilise challenge team early to guide design solutions	Admin Control	3	Rare	Low	
36	4 - Design	Designed solution fails to achieve planned traffic operations	3	Unlikely	Low	Utilise traffic modelling information and engage challenge team.	Admin Control	3	Rare	Low	
37	4 - Design	Satisfying Council and potentially Federal WSUD water quality requirements results in complex drainage systems being required resulting in higher than anticipated costs	3	Moderate	Medium	Allow for water treatment in concept design estimate. Design criteria is only to account for additional pavement area.	Admin Control	2	Moderate	Low	
39	4 - Design	Designed solution fails to achieve planned traffic congestion relief	3	Unlikely	Low	Utilise traffic modelling information and engage challenge team.	Admin Control	3	Rare	Low	
41	4 - Design	Existing Olinda Grove On-Ramp too short and must be upgraded as part of these works (currently not impacted) resulting in changes to design	1	Likely	Low	The Department made aware of this item in Concept Design. Maintain like-for-like. Existing barrier not impacted by the works is to be retained	Admin Control	1	Moderate	Low	
42	5 - Approvals	Impact to unforseen Aboriginal Heritage	4	Unlikely	Medium	A search of the Aboriginal Heritage Register must be conducted	Admin Control	2	Unlikely	Low	
43	5 - Approvals	Development Application appealed resulting in delay to commencement of construction	4	Moderate	High	Justification for decisions regarding preferred option to be conveyed to all stakeholders Stakeholder Engagement Plan to be reviewed and updated on a regular basis	Admin Control	4	Unlikely	Medium	
44	5 - Approvals	COVID19 results in project delays	4	Moderate	High	Utilise stakeholder experts with knowledge to develop engagement plan early.	Admin Control	2	Moderate	Low	
45	5 - Approvals	Referral required but not deemed a controlled action and timeliness of approval results in delays to commencement of construction	3	Moderate	Medium	Selection of preferred concept to be confirmed early to enable process to be commenced	Admin Control	2	Unlikely	Low	
46	6 - Construction	Extent of soft foundations result in costs exceeding budget	3	Moderate	Medium	A desktop geotechnical assessment has been carried out and determined to be unlikely.	Admin Control	3	Unlikely	Low	
47	6 - Construction	Contract claim during construction	3	Moderate	Medium	Quality and completeness of documentation, comprehensive investigations, performance requirements in the specification, clarification of risk allocations between Contractor and Principal	Admin Control	2	Moderate	Low	
48	6 - Construction	Construction staging complexity results in traffic congestion during construction leading to media attention(not a cost)	4	Moderate	High	Construction staging considered in Concept Design and throughout design development	Eng Control	2	Moderate	Low	
49	6 - Construction	Complexity of structural activities (i.e. retaining walls) results in increased costs	4	Likely	High	Additional geotechnical testing carried out in Concept Design phase. Scope of structural engineering components to be reviewed early in design process to enable project cost estimate to be updated	Eng Control	4	Moderate	High	
50	7 - Other	Design input from public utility authorities causes delay to other design activities	3	Moderate	Medium	Seek early meeting with potentially effected utility owners to ensure they are onboard with delivery timeframes and to avoid requests for additional information	Admin Control	2	Unlikely	Low	

Activity ID	Category	Potential Hazard / Impact	Initial Risk Rating Without			Controls (Eliminate so far as is reasonably practicable)	Highest Control Type	Residual Risk Rating			Responsible Person
			C	P	Risk			C	P	Risk	
52	2 - Scope	Assessment and site inspection of proposed points of supply is outside the scope of the Intelligent Transport System (ITS) concept design. Potential risks include: - the capacity of PoS is not sufficient, - the need of upgrading the PoS, - and PoS proposed in the concept design cannot be used in this project.	4	Moderate	High	Points of Supply were either identified using Google maps/streetview or provided by State Growth. The assets are requiring power include LED speed signs, digital CCTV cameras and low voltage vehicle detection, all of which are generally of low power usage and unlikely to trigger a signifcant point of supply substation or other network upgrade.	Admin Control	4	Unlikely	Medium	
53	2 - Scope	The communication network integration into central system of the Intelligent Transport System (ITS) concept design. Potential risks exist in System Integration, and upstream network capacity.	4	Moderate	High	Best efforts have been made to locate likely termination/communication nodes in consultation with State Growth to reduce design relocation risks.	Elimination	4	Unlikely	Medium	
54	4 - Design	The ITS design is high-level concept design assumes that safety barriers will be provided as required. The maintenance access in this design were reviewed based on Google Street. Potential risk is that the maintenance access and barrier design may change in future design stages and this will impact the location of ITS devices. Location and length of need to be refined in future designs.	4	Moderate	High	Where required, estimated safety barriers and length of need are shown on the drawings.	Admin Control	4	Unlikely	Medium	
55	4 - Design	Several sections along the project corridor are with tight space constraints, and with road widening work inplace, installation of ITS devices especially gantries may require significant excavation and excessive cost.	4	Likely	High	Consideration to be included in the cost estimate.	Admin Control	2	Likely	Medium	
56	4 - Design	Variable Speed Limit Signs were located in the median at the request of State Growth. Some protection may be required depending on techinical specifications (yet to be developed). There is a risk if the future designs are not able to provide appropriate protection to the signs, the location and mounting design of VSLS will need to be changed.	4	Likely	High	Communication with State Growth so they are aware of this risk.	Admin Control	2	Likely	Medium	
57	4 - Design	The vehicle passenger occupancy detection technology solution is designed based on Indra system. The potential risk includes - high capex and opex cost, - the reliability of the system, - and the functionality of the system	4	Moderate	High	Communication with State Growth so they are aware of this risk.	Admin Control	3	Moderate	Medium	

Activity ID	Category	Potential Hazard / Impact	Initial Risk Rating Without			Controls (Eliminate so far as is reasonably practicable)	Highest Control Type	Residual Risk Rating			Responsible Person
			C	P	Risk			C	P	Risk	
58	4 - Design	ITS technical standards are still being developed by State Growth. This concept design is based on standards listed in the Concept Design Report. The requirement of the design may change once State Growth standards come into place.	4	Moderate	High	Confirmed with State Growth on the design standards to follow in the concept design.	Admin Control	4	Unlikely	Medium	
59	7 - Other	Southbound devices are optional at the direction of State Growth. However this may make the Southern Outlet an imcomplete ITS corridor and decrease the benefits it can bring to the local community	3	Moderate	Medium	Communication with State Growth so they are aware of this.	Admin Control	3	Unlikely	Low	

Appendix D ITS Design Memo

MEMO

TO:	s 36 [redacted], Department of State Growth
FROM:	s 36 [redacted]
SUBJECT:	**Southern Outlet ITS Design**
OUR REF:	PS117730-TAP-MEM-003-RevB.docx
DATE:	**21 August 2020**

1. INTRODUCTION

This concept design is to provide the scope area Intelligent Transport System (ITS) coverage that includes T3 enforcement sites (primary and secondary), Variable Speed Limit Sign (VSLS), Vehicle detecting devices, and CCTV. The concept design will be at high-level with sufficient details for a high-level cost estimate.

Scope beyond the minimum required to support a T3 lane (such as south bound devices and VSLS) have been included at the direction of State Growth.

2. REFERENCE DOCUMENTS

The standards and specifications referred to in this design are listed in Table 2.1

Table 2.1 Reference documents

Type	**Name**
State Growth document	General ITS Requirements
State Growth Standard Drawing	TC1220 – Cable Pit Access Cover
VicRoads Standard Drawing	TC2011 – Freeway Camera Site
VicRoads Standard Drawing	TC2230 – Cabinet and Post Foundations Single ITS Field Cabinet Foundation
VicRoads Standard Drawing	TC2204 – Pit and Conduits Arrangements Electrical & Communication Trenches Typical Arrangement
VicRoads Standard Drawing	TC2207 – Pit and Conduit Arrangements General Arrangement at Gantries
VicRoads Specification	Section 733 – Conduits and Pits for Underground Wiring and Cabling
VicRoads Handbook	TEM Vol 3 Part24 Managed Freeways Handbook

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3. SCOPE AREA

The scope area of this ITS concept design is for the Southern Outlet between Olinda Grove (approx. CH 100) and Hobart/ Macquarie Street (approx. CH 2900), both directions. The core devices will be T3 enforcement devices, vehicle detecting devices, Variable Speed Limit Signs (VSLS) and CCTV on North Bound; the optional devices will be VSLS, VDS, etc. on South Bound.

4. DESIGN ASSUMPTIONS

The following assumptions have been made for the design:

Power supply: All devices will run on mains power via one 100mm diameter power conduit from Points of Supply. The Points of Supply will be power poles with junction boxes or existing Distribution Boards reconnected.

An electrical conduit will be supplied and installed beside the communications conduit starting at the intersection of Davey St and Southern Outlet. One 100 mm diameter electrical conduit will be running along the corridor to the extent of the works. Where two carriageways have height differences, each of the carriageways will have one electrical conduit running until the altitudes of the carriageways are back to the same. Ideally the conduit should be buried underground behind the barriers, however, where space constraints exist, the conduit can run inside the barriers.

Communication: All devices will be connected via fibre optic communication network starting at the intersection of Davey St and Southern Outlet. One 100 mm diameter communication conduit will be running along the corridor. Where two carriageways have height differences, each of the carriageways will have one electrical conduit running until the altitudes of the carriageways are back to the same. Ideally the conduit should be buried underground behind the barriers, however, where space constraints exist, the conduit can run inside the barriers.

Existing devices: Existing devices identified along the corridor will not be incorporated into this design or kept. However, where existing devices provide required function at appropriate locations such as vehicle detection devices and CCTV at the intersection of Davey St and Southern Outlet, no new devices will be installed.

Design boundary: The ITS concept design is based on the lane design provided by Pitt & Sherry. At certain sections property acquisition will be required. The cost estimate has not included the cost of property acquisition.

CCTV coverage: CCTV is assumed to have 100% coverage to the extent of the works.

VSLS: State Growth requires VSLS signs to be installed on both sides of the carriageway including a two-lane carriageway. Signs located within median subject to road safety audit and consideration of yet to be released technical and design requirements. Use of physical protection or light weight VSLS could be considered.

Vehicle Detectors: Non-intrusive vehicle detectors are preferred in this project. However, Infra-Red Traffic Loggers (TIRTLs) are not considered as appropriate for this project. The design and cost estimate are based on Wireless SENSYS products that consist of the following parts:

- Sensors to be installed in the ground (FlexMag sensor)
- Access point (FlexAP)
- Repeater (with/ without external antenna)
- Controller (installed inside the Road Side Cabinets)

Only the locations of sensors are shown on the concept design drawings. The other devices' locations should be explored in future design stages.

5. SITE CONSTRAINTS

The corridor has the following constraints at various locations as summarised in Table 5.1

Table 5.1 Site Constraints

Chainage	Direction	Constraints	Impact
300	SB	Point of Supply out of scope area on the hill	Excavation and special working permit may be required
450-550	NB	Rock face on the North Bound and very tight verge	Not enough room for conduits; conduits will need to run on South Bound behind the barriers. Limited maintenance access; lane closure will be required for maintenance.
550-600	SB and NB	Rock face on both sides of the road	Significant excavation will be required.
650	SB and NB	Point of Supply is located far away from VSLS	Large electrical conduits will be required
650-750	SB and NB	Rocks on both sides	Excavation required for barrier and conduits installation. Limited maintenance access.
900-1150	NB	Rocks on NB	Conduits run SB. limited maintenance access.
1180	NB	Rocks on NB	Significant excavation required to put in the gantry
1300-2100	SB and NB	Carriageway height distance	Communication conduit and power conduit run on both sides of the road
1400-1800	NB	Tight space	Property acquisition will be required.
2800	NB	Power supply	Power will be supplied from existing Distribution Board in nearby area

6. CONCEPT DESIGN

6.1 POINT OF SUPPLY

The following Points of Supply have been identified in the scope area as listed in Table 6.1 and the screenshots of site condition are shown in Figure 6.1, Figure 6.2, and Figure 6.3.

Table 6.1 Points of Supply list

Ref	Chainage	Direction	Notes
PoS1	300	SB	Out of road boundary, special permit may be required. No junction box.
PoS2	1430	SB	No junction box.
PoS3	1930	NB	Existing junction box
PoS4	1730	NB	Existing Point of Supply to be relocated and reconnected

Figure 6.1 Point of Supply 1

Figure 6.2 Point of Supply 2

Figure 6.3 Point of Supply 3

Figure 6.4 Point of Supply 4 (existing Point of Supply to be relocated and reconnected)

6.2 DISTRIBUTION BOARDS

The Distribution Boards (DBs) are to be installed next to Points of supply. The new proposed DBs are listed in Table 6.2,

Table 6.2 DB list

Ref	Chainage	Directions
DB1	300	SB
DB2	1430	SB
DB3	1930	NB
DB4	1730	NB

Closer to the Hobart City, devices will be connected via same DB board of existing traffic signal controller cabinets. Figure 6.5 shows the Traffic Signal Controller at CH2780 and Figure 6.6 shows the Traffic Signal Controller at CH 2900.

Figure 6.5 Traffic Signal Controller at CH 2780

Figure 6.6 Traffic Signal Controller at CH 2900

6.3 T3 ENFORCEMENT SITES

As detailed in Concept of Operations Report, the T3 enforcement system requires three sites to be located along the corridor on the north bound as shown in Table 6.4. The details of T3 Enforcement Sites are included in the Concept of Operations Report.

Table 6.3 T3 Sites Details

Site	Chainage	Installation
Secondary enforcement site 1	560	side mounted
Primary enforcement site	1180	gantry mounted
Secondary enforcement site 2	2250	side mounted

6.4 CCTV

CCTV coverage will be provided along the whole corridor. The locations of the CCTV cameras are shown in Table 6.5,

Table 6.4 CCTV list

Site	Chainage	Direction
CCTV 1	100	NB
CCTV 2	350	NB
CCTV 3	850	NB
CCTV 4	1410	SB
CCTV 5	1980	NB
CCTV 6	2500	SB
CCTV 7	2900	Traffic island

6.5 VSLS

Based on the requirement of TEM Vol 3 Part24 Managed Freeways Handbook, there will be five sets of VSLS installed for NB traffic and five sets of VSLS installed for SB traffic.

The SB VSLS sites are included as a costed option.

The distance between each set of VSLS will be between 500 m to 800 m with the exception that

— the distance between SB Site 6 and Site 7 being 430m to allow 150 m distance between site 6 and the intersection of Davey St and Southern Outlet.

— the distance between NB Site 1 and Site 2 being 410 m to avoid installing site 2 at a corner location with no sufficient sight distance.

— the distance between SB Site 9 and Site 10 being 470 m to allow longer sight distance.

As the post speed limit of the scope area is 80 km/h, Size B sign will be required. The details of VSLS are shown in Table 6.6.

Table 6.5 VSLS list

Traffic Direction	Ref	Chainage	Number of signs
NB	Site 1	150	2 (side mounted)
	Site 1-1 (ramp)	180	1 (side mounted)
	Site 2	560	2 (side mounted)
	Site 3	1180	3 (gantry mounted)
	Site 4	1700	3 (cantilever mounted)
	Site 5	2250	2 (side mounted)
SB	Site 6	2650	2 (side mounted)
	Site 7	2220	2 (side mounted)
	Site 8	1720	2 (cantilever mounted)
	Site 9	1180	2 (gantry mounted)
	Site 10	650	2 (side mounted)

It is to be noticed that:

Where sign is proposed to be installed in the median, solution for protection will be resolved after concept design.

— At CH 1720 SB, it will be very challenging to have VSLS installed at the side of fast lane due to the retaining wall so cantilever is proposed.

— At CH2650, VSLS is only designed for SB traffic, approx. 150m from the intersection to allow sufficient distance for the drivers to see and read the VSLS. No VSLS is designed for NB traffic at this location as the traffic is approaching a signalised intersection.

6.6 WIRELESS VEHICLE DETECTOR

The design is based on using SENSYS wireless vehicle detecting products. Wireless vehicle detecting sensors will be installed in the pavement each lane to detect the presence and movement of vehicles, then these sensors will transmit the detection data in real-time via low-power radio technology to a nearby access point then to controllers. If the access point is too far away from the sensors, repeaters will be required between access point and sensors to transmit the data on. Design is based on SENSYS product as listed below:

- Sensors: FlexMag (Flush or Deep). Sensors will be powered by batteries and transmit data wirelessly via low-power radio technology.
- Access Point: FlexAP. Access point will be powered by Power over Ethernet, and provide detection data to a roadside traffic controller. The maximum distance between access point and roadside cabinet will be 100m.
- Repeater (when required) will be used to extend range to advance and mid-block detection, and can run on solar power, DC or battery. Sometimes more than 1 repeater is required for a site. Different repeaters have different coverage range.
- Access Point Controller Card (APCC) will be located in the RCB to receives, process, and relays data to local or remote traffic management system.

Both access points and repeaters require a 120° field of view (±60° in both elevation and azimuth from boresight) so should be appropriately oriented.

As this design is at Concept stage, no access point or repeaters are shown in the design drawings.

There is no VDS designed between CH2700 to CH 2900 based on the assumptions that there are existing vehicle detection devices for signalised intersections.

The locations of detecting sensors are shown in Table 6.7.

Table 6.6 Vehicle Detecting Sensors

Direction	CH	Quantity (pairs)
NB	220	3
	620	3
	1180	3
	1750	3
	2300	3
SB	220	2
	620	2
	1180	2
	1750	2
	2300	2

6.7 CONDUITS, PITS AND CABINETS

A communications and electrical conduit will be running through the whole corridor. The length of the backbone conduit will be approx. 2600m. The overall conduits required will be approx. 4 km.

The power conduits will be running through the corridor and will be connecting Point of Supply to DB, and DB to different devices. The overall conduits required will be approx. 4.3 km.

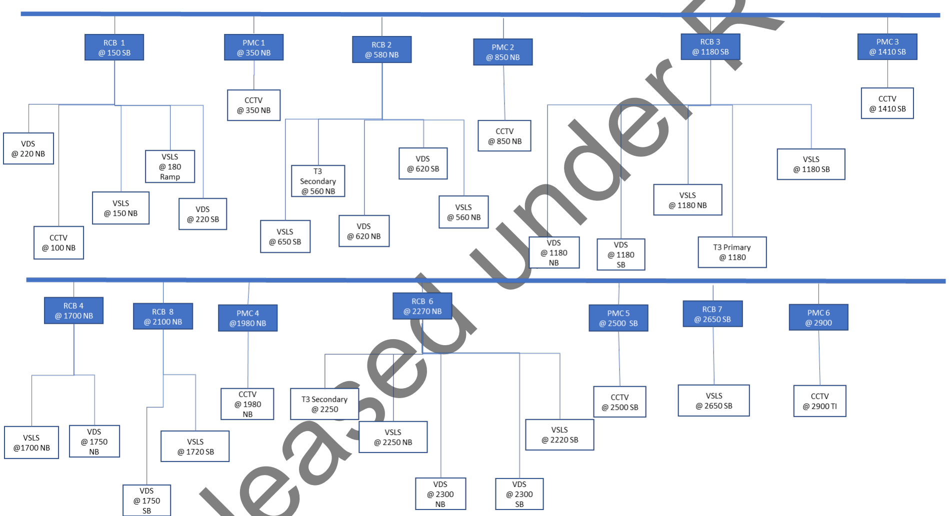
Electrical pits will be required every 100 m along the main conduit and at the DB as well as at the device.

Communication pits will be required every 100m along the backbone conduits, and at the RCB as well as the device. Storage pits are required near the joint of tail fibre and backbone fibre.

7. MAINTENANCE ACCESS

Due to the space constraints, lane closure will be highly likely to be required for device maintenance.

8. COMMUNICATION SCHEDULE



9. CAPITAL COST ESTIMATE

Please refer to SP1 Cost Estimate – ITS Standard Cost Estimate. The T3 Enforcement technology price are sought from specialist technology suppliers and based on the Toll Road projects in America.

s 38 [redacted]

At the direction of State Growth additional ITS devices beyond the minimum T3 lane requirements have been included (such as VSLS). Some of the devices on SB (e.g. VSLS, VDS and pits, conduits, and RCBs to support these devices), at the direction of State Growth, are considered as optional.

10. INDICATIVE TIMELINE OF IMPLEMENTATION

Table 10.1 shows the indicative timeline of ITS device implementation.

Table 10.1 Indicative timeline of implementation (ITS devices)

Tasks	Estimated duration
Business case	9 months
Technical Trial procurement	6 months
Technical trial	9 months
Procurement for full implementation	12 months
Construction	2 years
Testing	3 months
Commissioning	Milestone
Enforcement trial	6 months
Enforcement	Milestone

Appendix E Traffic Impact Assessment

DEPARTMENT OF STATE GROWTH

NOVEMBER 2020

Hobart City Deal Southern Projects Sub-Project 1 Southern Outlet Transit Lane

Traffic Impact Assessment

Question today
Imagine tomorrow
Create for the future

Hobart City Deal Southern Projects
Sub-Project 1 Southern Outlet Transit Lane
Traffic Impact Assessment

Department of State Growth

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REV	DATE	DETAILS
A	13/08/2020	Draft
B	13/11/2020	Final

	NAME	DATE	SIGNATURE
Prepared by:	s 36 [redacted]	13/11/2020	s 36 [redacted]
Reviewed by:	[redacted]	13/11/2020	[redacted]
Approved by:	[redacted]	13/11/2020	[redacted]

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GLOSSARY

AS2890.1:2004	Australian Standard for Off-Street Parking, AS2890.1:2004
bus priority	A facility to assist buses bypass traffic congestion by providing a separate space or through the use of technology to reduce bus delays, resulting in a more reliable and efficient service.
Driveway	That part of the vehicular access on a road lying between the edge of the carriageway and the abutting property boundary.
Metro Green Card	Tasmania's smart transport card to allow contactless fare payment system which removes the need for cash transaction when boarding a public transport service.
Park-and-ride	Location where people car park their vehicle and then complete their journey using public transport.
T3 (transit) lane	A traffic lane restricted to use by vehicles containing more than three people, as well as buses, taxis, hire cars, motorcycles, bicycles and emergency service vehicles.

ABBREVIATIONS

B-double	A truck and trailer combination consisting of a prime mover coupled with two trailers
CBD	central business district
DDA	Disability Discrimination Act
DoS	Degree of Saturation
HML	Higher Mass Limit
km/h	kilometres per hour
LoS	Level of Service
RACT	Royal Automobile Club of Tasmania

1 INTRODUCTION

1.1 PROJECT BACKGROUND

The Greater Hobart region's population and employment growth are putting increased pressure on its transport network. The growth of residential areas in Kingborough and the Huon Valley creates commuter pressures on the Southern Corridor (comprising Kingston, the Southern Outlet, and the Macquarie/Davey Street couplet) between Kingston and Hobart.

The Hobart City Deal Southern Projects (the Project) seeks to encourage modal shift in favour of public transport to address congestion and accessibility issues along the Southern Corridor. The Project is comprised of five sub-projects that together provide a comprehensive, multi-faceted approach:

- **Sub-project 1: Southern Outlet Transit Lane** (this study) – Concept design for a northbound transit lane on the Southern Outlet between Olinda Grove and Hobart/Macquarie Street. The lane will operate as a T3 lane for use by buses, private vehicles carrying three or more occupants, taxis, and emergency service vehicles.
- Sub-project 2: Macquarie/Davey Bus Priority – Concept design for bus priority measures on Macquarie and Davey streets that considers how to optimise bus operations while managing impacts.
- Sub-project 3: Kingborough Park-and-Ride – Concept design for park-and-ride facilities at two locations in the Kingborough municipality. The scope of work includes selecting two locations and developing any specific attributes of the facilities in collaboration with stakeholders. At the time of this report, two sites had been chosen – Browns Road, Firthside and Huntingfield terminus.
- Sub-project 4: Bus service plan for Southern Corridor – Developing a park-and-ride bus service model to support the two Kingborough park-and-ride facilities (sub-project 3), the Southern Outlet transit lane (sub-project 1), and the bus priority measures proposed for Macquarie and Davey Streets (sub-project 2). The bus service model will be focused on encouraging modal shift to public transport with the potential for new buses, bus routes, and stops.
- Sub-project 5: Southern Outlet Transit Lane – T3 Enforcement – Concept design and a concept of operations plan for the proposed T3 lane on the Southern Outlet (sub-project 1), including the recommended locations of enforcement devices, as well as technological and legal considerations.

The project objectives are to:

- Achieve modal shift for commuters using the Southern Outlet
- Improve public transport travel reliability along the Southern Outlet corridor
- Encourage multiple occupancy of private vehicles during peak periods of travel
- Improve public transport and passenger experience for Kingborough and Huon residents.

The key anticipated project benefits include:

- Improved public transport passenger experience for Kingborough and Huon residents
- Improved public transport travel reliability along the Southern Outlet and Macquarie/Davey streets
- Improved bus operations along Macquarie and Davey streets
- Better utilisation of transport infrastructure to address congestion
- Increased capacity along the Southern Outlet corridor
- Providing long-term solutions to meet future demand and address road safety related issues.

1.2 SUB-PROJECT 1 – SOUTHERN OUTLET

Sub-Project 1 involves the development of a concept design for a northbound transit lane on the Southern Outlet between Olinda Grove and Hobart/Macquarie Street providing the necessary modification opportunities on the carriageway.

As described above, the lane will operate as a T3 lane to allow use by high-occupancy vehicles, potentially improving their travel time reliability, and discouraging single-occupant vehicle trips to Hobart CBD.

1.3 THIS REPORT

This report assesses the potential traffic and transport impacts from the Project to support the proposed introduction of a northbound T3 transit lane on the southern outlet. Specifically, this report has the following objectives:

- Describe the existing conditions for all modes of transport in the study area including general access vehicles, freight, public transport (bus services and point-to-point transport) and active transport (bicycles and pedestrians).
- Describe the existing environment (road function, classification and operation) in the study area that will be affected by the construction and operation of the project.
- Describe the project in terms of its design elements, capacity and intended use.
- Assesses the impacts of the additional northbound lane in terms of its safety and efficiency of the surrounding road network.
- Recommend potential mitigation measures to manage identified traffic and transport impacts of the project and collaborate with the road designers on the measures that can be adopted in the design.

1.3.1 REPORT CHAPTERS

Section 1 Introduction: Describes the context of the Project in terms of how it fits into the state-wide planning proposed by StateGrowth, locality, objectives and benefits.

Section 2 Existing Conditions: Describes the existing condition of the road network, transport services and abutting developments affected by the proposed Sub-Project 1 Southern Outlet Transit Lane.

Section 3 Proposed Works: Describes the proposed Southern Outlet Transit Lane in terms of form, functionality and considerations made to achieve high-quality customer outcome.

Section 4 Impact Assessment: Provides an in-depth analysis of the Project's impacts during construction and during operation.

Section 5 Conclusions: Conclusion remarks on the assessment and recommended mitigation measures.

Note that the potential impact of Sub-Project 1 is linked to the impact of Sub-Project 2, in particular any changes to the capacity of the intersections of Southern Outlet with Davey Street and Macquarie Street. This study has assessed the impact of Sub-Project 1 (T3 transit lane on the Southern Outlet) in isolation. The assessment for Sub-Project 2 assesses the impact of changes at the Davey Street and Macquarie Street intersections, including their implications for traffic flow on the Southern Outlet.

2 EXISTING CONDITIONS

2.1 ROAD NETWORK

The Southern Outlet is the primary connection between Hobart CBD, Kingston and the southern communities in the Channel and Huon Valley.

Within the location of Sub-Project 1 (between Olinda Grove interchange and Macquarie Street), the Southern Outlet is a Category 1 State Road which functions as a primary freight and passenger road. It is a dual carriage highway, typically with two lanes in each direction, that is separated by a rigid concrete barrier. The posted speed limit is 80 km/h. However, this limit is reduced to 50 km/h on the approach to Davey Street, as it transitions to an urban environment of Hobart CBD.

In the northbound direction, an additional bus lane (third lane) starts approximately 1 km south of Davey Street. The bus lane on Southern Outlet ends approximately 150 metres south of its intersection with Davey Street where all three lanes become available for use by general traffic.

Sealed shoulders of approximately 2 to 3 metres wide are generally available on both sides of the road. However, this excludes several areas including adjacent the existing northbound bus lane and at the existing location of reverse curve immediately north of Olinda Grove interchange that do not have a shoulder wide enough for a vehicle. A breakdown area currently exists in the southbound direction approximately 1 km north of Olinda Grove interchange.

A typical layout of the Southern Outlet is depicted in Figure 2.1, concrete rigid barriers are typically used within the Sub-Project 1 location, although a Wire Rope Safety Barrier (WRSB) is used at some locations.

Figure 2.1 Southern Outlet typical layout

According to traffic surveys collected by the Department of State Growth, the Southern Outlet south of Davey Street currently has an average daily traffic volume of approximately 36,700 vehicles per day with heavy vehicles making up approximately 8.5 per cent of the total volume.

The traffic data from the Department of State Growth indicates that the Southern Outlet in the bounds of Sub-Project 1 operates within its effective capacity most of the day. However, due to the transition from a limited access freeway road to a signalised corridor, congestion is regularly experienced in the morning peak in the northbound direction. Irregular, but severe, congestion occurs when incidents happen on the Southern Outlet that can also affect other parts of the network.

The Southern Outlet continues further south to Kingston (Channel Highway/Algona Road roundabout). The road category and description of the Southern Outlet south of the boundaries of Sub-Project 1 are summarised in Table 2.1.

Table 2.1 Southern Outlet road network features outside of Sub-Project 1 boundaries

Section	Road hierarchy	Road features	Posted speed limit
South of Olinda Grove interchange to north of Huon Highway interchange	Category 1 – Primary freight and passenger roads connecting Tasmania	Dual carriageway Two lanes in each direction Landscaped median varies between 1.5–-20 metres wide with wire rope or W-beam barriers. Shoulder approximately 2–3 metres wide.	100 km/h
Huon Highway interchange to the Channel Highway/ Algona Road roundabout	Category 3 – Main access roads to Tasmania's regions, carrying less heavy freight traffic than regional freight roads	Dual carriageway One lane in each direction Median with wire rope safety barrier Shoulder approximately 1.5–2 metres wide throughout	80 km/h

2.2 TRAFFIC VOLUMES

2.2.1 SOUTHERN OUTLET TRAFFIC VOLUMES

Existing Annual Average Daily Traffic (AADT) data was obtained from the Department of StateGrowth *RoadsTas Traffic Stats* site. The data were collected in May 2019 at five different locations along the Southern Outlet. The data set is useful to provide an understanding of the traffic demand at various locations along the Southern Outlet.

The available sites and data are detailed in Table 2.2. This has been sorted in the order from southernmost location to northernmost location.

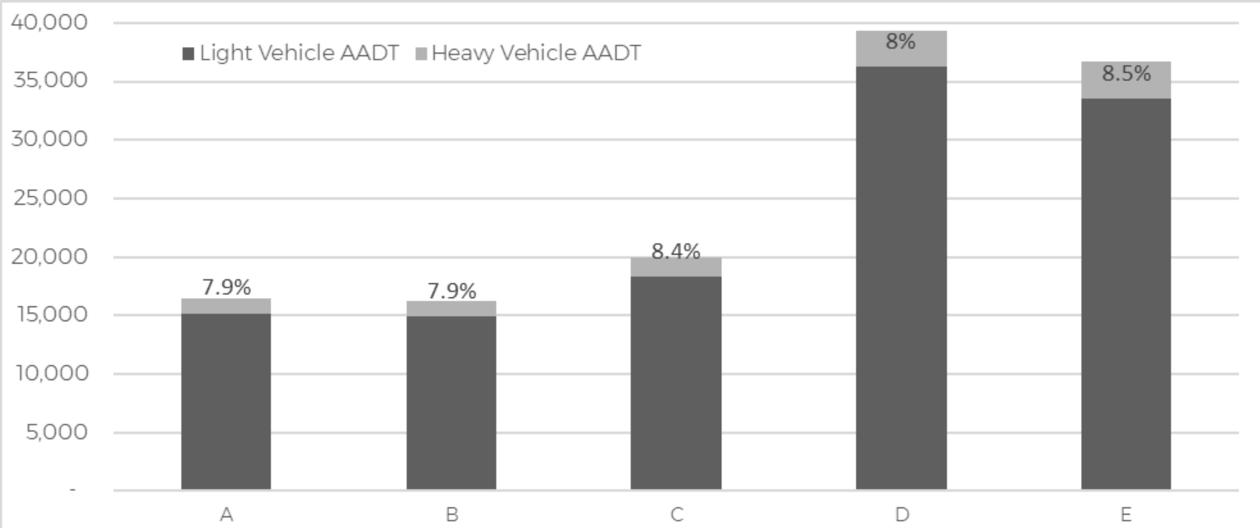
Table 2.2 Existing traffic counts on Channel Highway and Southern Outlet

ID	Location	Station number	Average Annual Daily Traffic (Total)	Truck volume (percentage of total)
A	Channel Highway (0.5 km south of Algona Road roundabout)	A0155140	16,483	1,302 (7.9%)
B	Southern Outlet (1 km north of Algona Road/ Channel Highway roundabout)	A0171140	16,211	1,281 (7.9%)
C	Southern Outlet (100 m south Huon Highway interchange)	A0171120	19,950	1,676 (8.4%)
D	Southern Outlet (1.9 km south of Olinda Grove)	A0171110P	39,370	3,150 (8%)
E	Southern Outlet (0.5 km south of Davey Street)	A0171100	36,656	3,116 (8.5%)

Source: http://www.geocounts.com/traffic/au/stategrowth

As shown in the table above, the traffic volume on the Southern Outlet increases from 19,950 vehicles per day south of Huon Highway to 39,370 at south of Olinda Grove. The high traffic volume is sustained to the south of Davey Street with 36,656 vehicles per day recorded at this location. With higher traffic volumes and increased density of the corridor, the travel time and the consistency of travel speed is expected to be reduced in this section of the Southern Outlet. The reduced reliability of travel time and speed during peak periods would also impact public bus services as they travel with general traffic prior to reaching the existing bus lane approximately 1 km south of Davey Street.

The data above is depicted in Figure 2.2. Location D: Southern Outlet (1.9 km south of Olinda Grove) has been selected for further hourly analysis to assist with understanding the traffic pattern throughout a typical day.



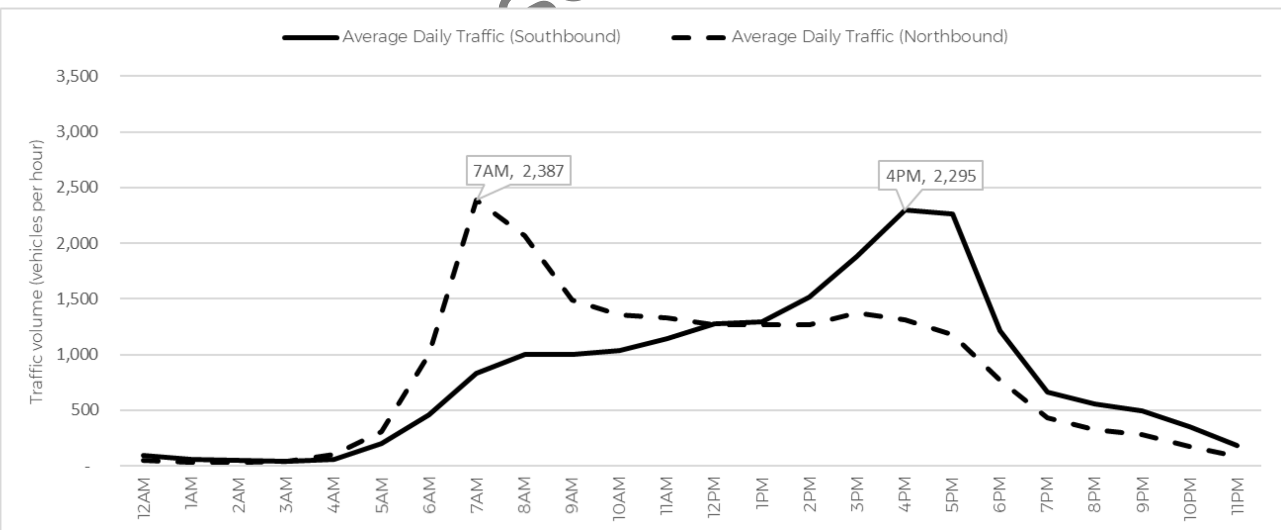
Source: *http://www.geocounts.com/traffic/au/stategrowth*

Note: refer to Table 2.2 for locations

Figure 2.2 Average Annual Daily Traffic along Channel Highway and Southern Outlet

2.2.2 AVERAGE DAILY AND WEEKDAY TRAFFIC

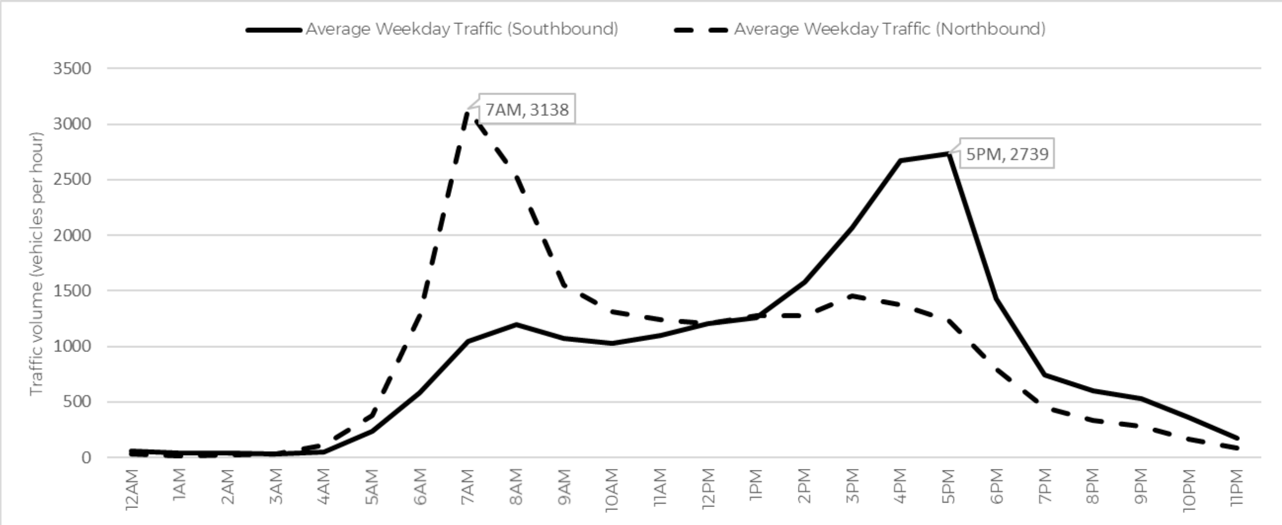
The average hourly traffic counts throughout a typical 7-day period (Average Daily Traffic [ADT]) and weekday only (Average Weekday Traffic [AWT]) period on the Southern Outlet south of Olinda Grove (Location D) are depicted in Figure 2.3 and Figure 2.4 respectively. These graphs separate the northbound and southbound direction and show a temporal traffic pattern with the AM peak traffic predominantly northbound (towards the Hobart CBD), and the PM peak traffic predominantly in the southbound direction.



Source: May 2019 Traffic Data from http://www.geocounts.com/traffic/au/stategrowth

Figure 2.3 Average weekly (7-day) traffic volume on the Southern Outlet south of Olinda Grove

The average weekday traffic depicted in Figure 2.4 has been shown to provide an understanding of weekday travel patterns. This Monday to Friday data is more relevant to the traffic volume experienced by the majority of commuters during a working week.



Source: May 2019 Traffic Data from http://www.geocounts.com/traffic/au/stategrowth

Figure 2.4 Average weekday traffic volume on the Southern Outlet south of Olinda Grove

Comparing the two graphs, it is noted that:

— The peak period of the weekday traffic data is shorter and more intense, indicating less traffic during the midday and night times.

— Northbound weekday traffic peaks from approximately 7.00 am to 8.00 am with 3,138 vehicles recorded in the hour. The average 7-day traffic recorded 2,387 vehicles within the same period indicating lower traffic on the weekend at this time.

— Southbound weekday traffic peaks at approximately 5.00 pm to 6.00 pm with 2,739 vehicles recorded in the hour. The average 7-day traffic recorded 2,295 vehicles within the peak period of 4.00 pm to 5.00 pm. This again indicates lower traffic on the weekend in the PM peak.

2.3 TRAVEL TIME

A travel time survey was carried out on Wednesday, 18 March 2020 during the AM peak (6.00 am to 9.00 am) and PM peak (3.00 pm to 6.00 pm). The surveys were organised prior to the impact of COVID-19 being realised nationally in Australia. The impact of COVID-19 to travel patterns during the survey periods are further discussed in section 2.3.1.

In this survey, two routes were surveyed:

— Inbound: from Southern Outlet (Olinda Grove on-ramp) to the intersection of Macquarie Street and Campbell Street

— Outbound: from the intersection of Davey Street/Campbell Street to the Southern Outlet Olinda Grove off-ramp.

The route and collection points are shown in Figure 2.5. The average travel time on the Southern Outlet inbound (northbound), in 15-minute periods, are shown in Figure 2.6 and Figure 2.7 for the respective surveyed morning and afternoon peak periods.

The inbound collection points to measure the travel time on the Southern Outlet are marked as Point 1 (at Olinda Grove interchange) and Point 2 (Davey Street/Southern Outlet intersection) in the northbound direction. This travel time has been analysed in detail to assess the impact of adding the proposed T3 transit lane.

Figure 2.5 Travel time survey scope

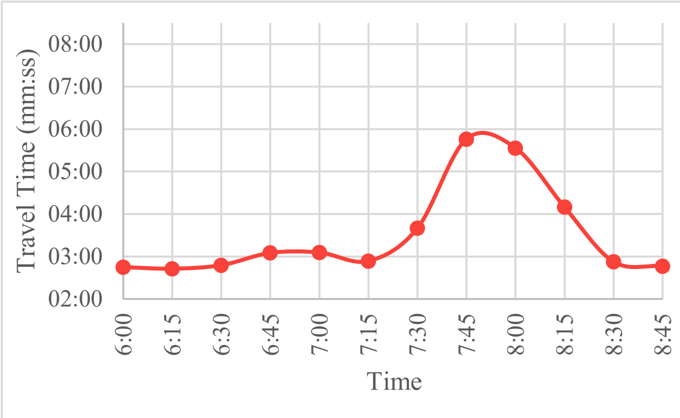


Figure 2.6 AM peak northbound travel time on Southern Outlet

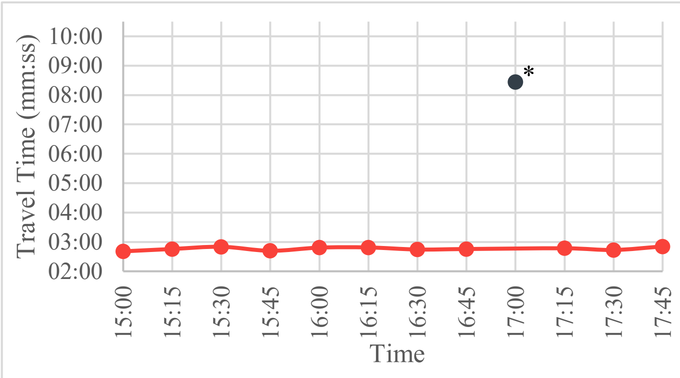


Figure 2.7 PM peak southbound travel time on Southern Outlet

*: outlier travel time data

From the survey and as shown in the graphs above, it was found that it generally takes approximately three minutes to travel on the Southern Outlet from the Olinda Grove interchange to the Davey Street intersection.

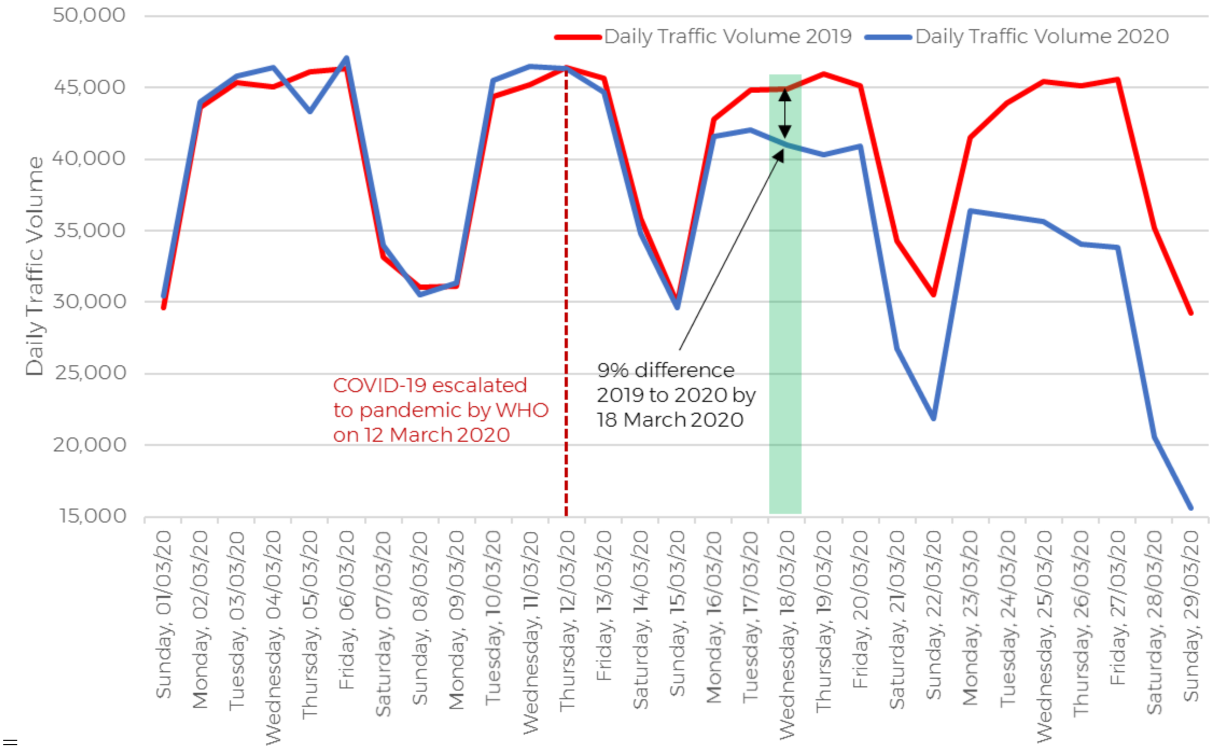
The AM peak travel times shown in Figure 2.6 indicate a peak period between 7.30 am to 8.30 am, where the travel times increase to approximately double (i.e. six minutes) of the typical travel time.

The PM peak travel times shown in Figure 2.7 indicate that the inbound travel times on the Southern Outlet were consistently recorded at under three minutes between Olinda Grove to Davey Street. The survey recorded a travel time of 8.5 minutes at 5.00 pm. However, given that this was recorded in isolation without any apparent cause of delay along this section of the Southern Outlet, this data is considered an outlier to the remainder of data set.

2.3.1 COVID-19 IMPACT

On 12 March 2020, the World Health Organisation (WHO) escalated the COVID-19 outbreak to a pandemic – six days before the travel time surveys. Following this announcement governments, businesses and individuals across Australia have implemented preventative measures to reduce the spread of COVID-19. Preventative measures implemented during COVID-19 has directly impacted travel behaviours.

To understand the impact of COVID-19, WSP analysed and compared traffic volume data collected from March 2019 and March 2020. As shown in Figure 2.8 overleaf, the analysis found that the changes in traffic volumes occurred gradually. By 18 March 2020, traffic volumes on the Southern Outlet were 9% less than a comparable day in 2019.



Source: *Department of State Growth traffic data, geocounts web site, a continuous counter on Southern Outlet located 1860 m south of Olinda Grove*

Figure 2.8 Graph showing the changing impact of COVID-19 travel restrictions on the Southern Outlet traffic volume – March 2019 compared to March 2020

The short-term and long-term impact of COVID-19 to travel demand and patterns are generally unknown at this stage, and is likely to remain uncertain for the next few years. It may result in reduced migration and therefore lower population growth, changes in work behaviour from a lasting increase in working from home may result in fewer commuter trips and increased on-line shopping may reduce recreational trips (but increase deliveries). A way forward was discussed with the Department of State Growth as follows:

— Proceed with traffic data collected March 2020 to build the traffic mesoscopic/microsimulation AIMSUN hybrid model as this is the most suitable and detailed data available to inform the project benefits and impacts.

— Consider sensitivity testing in addition to or in lieu of future demand scenario.

2.4 PUBLIC TRANSPORT

The Southern Outlet is a key north-south corridor connecting key growth area in the south to Hobart CBD for all vehicles. Table 2.3 overleaf summarises the existing bus routes use the Southern Outlet and weekday peak period frequency for bus services on the Channel Highway, the Huon Highway and in Kingston/Blackman's Bay.

Table 2.3 Bus routes and number of services using the Southern Outlet corridor

Corridor	Routes	AM peak inbound (arr. Hobart 6.00–9.00)	PM peak outbound (dep. Hobart 4.00–7.00)
Kingston and Blackmans Bay	407, 408, 409, 410, 411, 500	16	14
Channel Highway	412, 413, 415, 416, 417	8	8
Huon Valley	710, 712, 714, 716, 718, 719	5	5
Total		**29**	**27**

The number of inbound buses in the morning between 8.00 am to 9.00 am was counted at 17 buses, which equates to an average time between bus arrival of 3.5 minutes. The number of outbound buses in the afternoon between 5.00 pm to 6.00 pm was counted at 12 buses, which equates to an average time between bus arrival of 5 minutes.

2.5 ROAD AND FREIGHT NETWORK

As mentioned previously, the Southern Outlet is a Category 1 State Road. Category 1 Roads are Tasmania's major highways and are crucial to the effective functioning of industry, commerce and the community in Tasmania. They carry large numbers of heavy freight and passenger vehicles and are the key links supporting future economic development in Tasmania. The Southern Outlet is approved for use by:

- 23 m and 26 m long B-double vehicles
- Performance Based Standard (PBS) vehicle Level 2A
- 14.5 m long buses
- Increased Mass Limits (IML) and Higher Mass Limits (HML) vehicles
- Truck and dog trailer combination.

Heavy vehicles make up of approximately 8 per cent of the total traffic based on the counts undertaken in March 2020. The weekday average volume of small/medium rigid, heavy rigid and articulated vehicles (excluding cars) travelling in the northbound and southbound direction on the Southern Outlet are shown in Figure 2.9 and Figure 2.10 respectively.

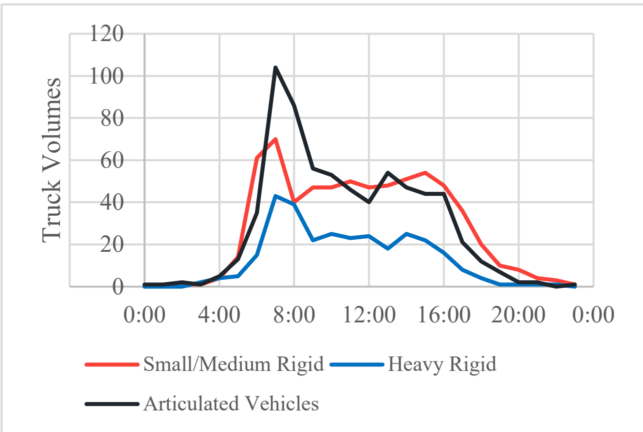


Figure 2.9 Northbound vehicle classification

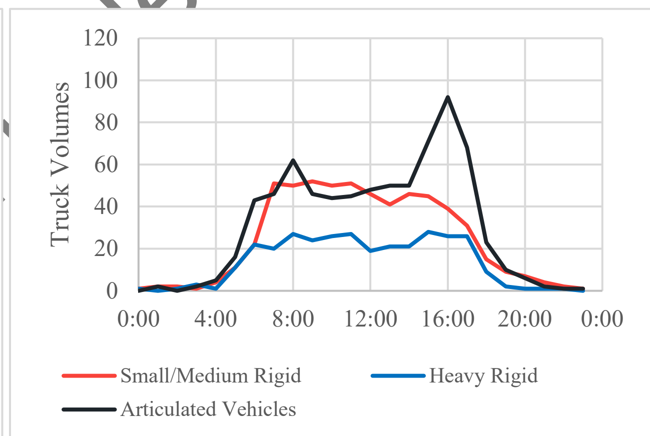


Figure 2.10 Southbound vehicle classification

The graphs generally depict a high proportion of articulated vehicles in the road network.

Additionally, to understand the impact of COVID-19 to heavy vehicle activities, the historical data from 2019 was checked which shows a consistent heavy vehicle proportion of 8 per cent on the road network. It is considered that the heavy vehicle proportion on the Southern Outlet is generally unaffected by COVID-19 travel restrictions.

2.6 PEDESTRIAN AND BICYCLE NETWORK

There are currently no pedestrian facilities along the Southern Outlet. A pedestrian underpass across the Southern Outlet currently exists connecting Richardson Avenue to Dynnyrne Road, Dynnyrne.

Existing traffic signs on the Southern Outlet indicate cyclists are permitted on the road, and are able to travel on the road shoulders for the most part. However, as discussed in section 2.1 above, there are several sections where no road shoulders exist to provide a separated travel lane for cyclists.

3 PROPOSED WORKS

3.1 PROPOSED WORKS OVERVIEW

Sub-Project 1 involves the development of a northbound transit lane on the Southern Outlet between Olinda Grove and Hobart/Macquarie Street. The lane will operate as a T3 lane to improve the travel time reliability of high-occupancy vehicles, and discourage single-occupant vehicle trips to the Hobart CBD.

The approximate location of Sub-Project 1, overview of widening works and current posted speed limit on the Southern Outlet are shown in Figure 3.1. The project starts at Olinda Grove overpass (CH0.00) and ends immediately north of Davey Street intersection (CH2809.28).

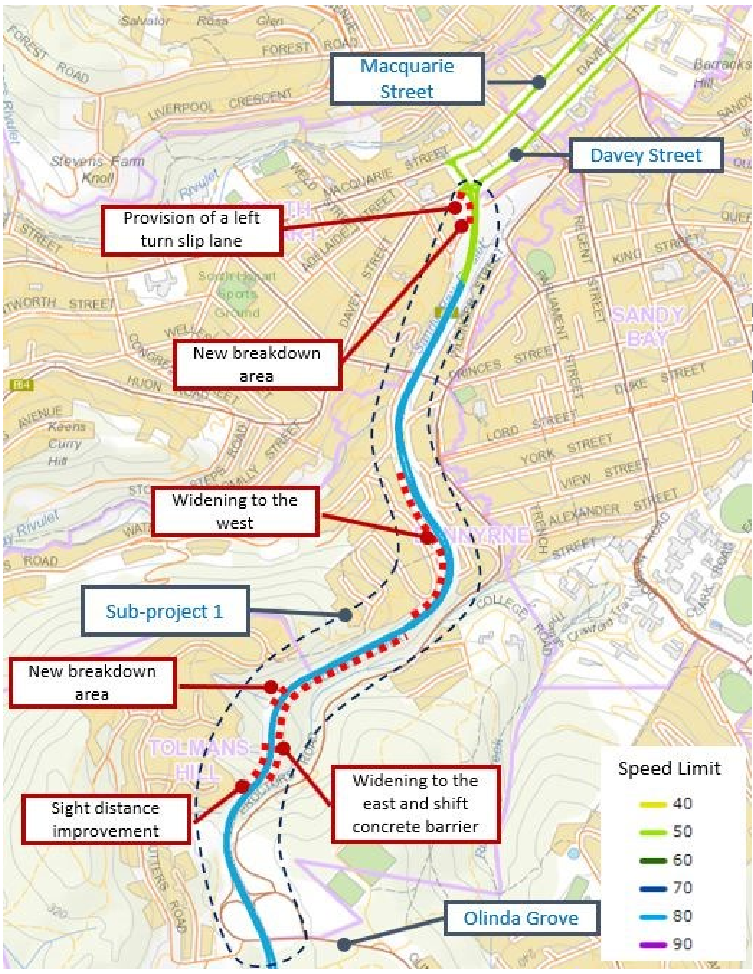


Figure 3.1 Southern Outlet Sub-Project 1 proposed works overview

In summary, the proposed works include:

- CH480: Develop bus lane north of Olinda Grove on-ramp merge.
- CH480–CH675: Widen the northbound shoulder lane to the western kerbside with works include pavement, kerb and gutter, and adjustments to drainage pits.
- CH580–CH1,400: Widen to the eastern kerbside and relocate the existing median concrete barrier to the east to provide the additional northbound lane through this section. The widening to the eastern side avoids a large rock cutting on the western side. Works include construction of retaining wall along eastern side of Southern Outlet, pavement, kerb and gutter, safety barrier relocation and adjustments to drainage pits.
- CH1,300–CH1,850: Widen to the western kerbside, which would include acquisition of several properties located between Dynnyrne Road and Southern Outlet. Works include construction of retaining wall, pavement, kerb and gutter, adjustments to drainage pits and re-establishing the pedestrian underpass to Richardson Avenue. The additional northbound lane will be matched to the bus lane currently exist approximately north of CH1,800.
- Widening works at various pockets along CH500–CH1,300 to construct breakdown bay, short sections of lane widening, left turn slip lane at Davey Street.

The concept design drawings for Sub-Project 1 can be found in Appendix A.

3.2 TYPICAL CROSS SECTION

Lane widths are proposed to be a minimum of 3.5 metres wide consistent with Austroads Guide to Road Design minimum width of general traffic lanes and to match with the existing lane widths along the Southern Outlet. A typical cross section where road widening is required along the eastern kerbside is shown in Figure 3.2.

A typical cross section where road widening is required along the western kerbside is shown in Figure 3.3. The location of retaining wall along the western kerbside has been designed to consider sight distance for vehicles travelling western kerbside lane.

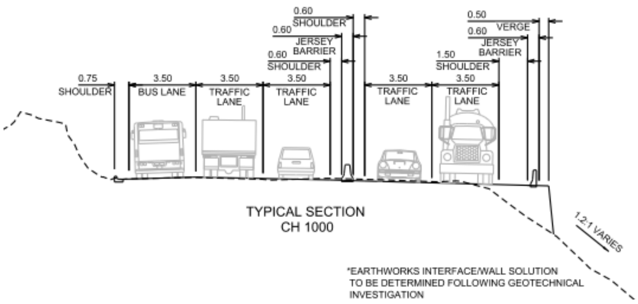


Figure 3.2 Typical cross section with widening to the east

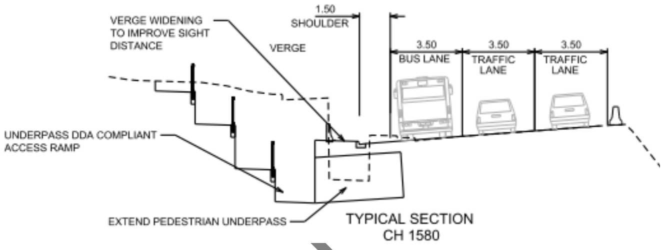


Figure 3.3 Typical cross section with widening to the west

3.3 CONSTRUCTION

Details of construction staging, traffic management and impacts have been included in the Construction Staging report for this project. Below is an overview of the four stages proposed to construct the additional northbound lane.

1 **Early works** are to be undertaken prior to the main road works to enable site set up activities relating to site compounds, clearing and utility protection.

2 In **Stage 1**, construction will predominantly take place in the eastern side of the Southern Outlet to widen the carriageway between chainage CH580 and CH1,400 as per the proposed design. A wider carriageway will enable traffic lanes to be moved as needed in Stage 2 to create space to relocate the concrete median barrier and eventually the formation of a northbound fifth lane at this section.

3 **Stage 2** works involve the relocation of existing median concrete barrier to the proposed locations including drainage pit adjustments between chainage CH580 and CH1,400. This work is to be undertaken following the completion of Stage 1 to ensure adequate width for traffic lanes and work area.

4 **Stage 3** works will take place in the western side between chainage CH1,300 to CH1,850 and will include construction of safety barrier, retaining wall, and works associated with the widening of the Southern Outlet.

5 **Stage 4** works will be predominantly on the western kerb side between CH500 to CH1,300. The works to be undertaken in Stage 4 include road widening works, breakdown bay, left turn slip lane at Davey Street, and other ancillary works required within the Stage 4 work area.

6 **Stage 5** works involve the provision of a dedicated left-turn slip lane at the south-western corner of Davey Street/ Southern Outlet intersection and construction of a breakdown bay on the western kerbside of the Southern Outlet between chainage CH2,500 and 2,600.

4 IMPACT ASSESSMENT

4.1 SOUTHERN OUTLET TRAFFIC CAPACITY

The project will involve increasing the traffic capacity of the Southern Outlet by creating an extra lane in the northbound direction. For buses using the existing bus lane, while they may share this lane with more vehicles, it will now be continuous, rather than ending before the Southern Outlet reaches Davey Street. There will, however, be a change in the traffic capacity of the Southern Outlet as it approached Davey Street.

The additional northbound lane will be used as a T3 transit lane to restrict its use by high-occupancy vehicles only including public buses, motor bike, taxi or private vehicles with three persons or more (including the driver). The T3 lane is enforceable under *Rule 156 Transit Lanes* of the *Tasmanian Road Rules, 2019*.

The T3 restriction aims to encourage greater efficiency of vehicle use (more people in less vehicles) and would be particularly beneficial for public bus services which would be used to support the park-and-ride facilities proposed in this project. Benefits of transit lanes generally include:

- Travel time savings
- Increase travel time reliability
- Have the potential to increase the person throughput of the lane
- Reduce in air pollution
- Cost savings of bus trip fare and use of park-and-ride facility compared to the cost of paid CBD parking.

The T3 transit lane will provide an attractive and reliable public transport option for customers residing in the Kingborough and Huon to travel to Hobart CBD.

Enforcement of transit lanes will be important to ensure appropriate use of the lanes to realise the benefits listed above. Sub-Project 5 of this project further details the concept of operations plan for the proposed T3 lane, including the recommended locations of enforcement devices, as well as technological and legal considerations.

4.1.1 EXAMPLE OF TRANSIT LANE UTILISATION

T3 transit lanes have been implemented world-wide for the benefits listed above. Literature studies in Sydney and Canberra have been undertaken to understand the potential percentage of vehicles allowed on T3 lanes and are further discussed below.

4.1.1.1 SYDNEY TRANSIT LANE STUDY

2010 data of T3 lanes in Sydney motorways and highways was analysed to gauge the utilisation and benefit of this type of facility. This data is presented as an example of potential benefits, noting that it may not reflect the driving behaviours in Hobart, Tasmania. The surveyed location are listed in Table 4.1.

Table 4.1 Survey location of T3 lanes in Sydney (Transport for NSW, 2010)

ID	Road name (direction of travel)	Section
1A	Victoria Road (AM inbound)	Cressy Road to Gladesville Bridge
1B		Gladesville Bridge to Lyons Road
1C		Lyons Road to Terry Street
2A	Military Road (AM inbound)	Burnt Bridge Creek Deviation (Condamine Street to Sydney Road)
2B		Sydney Road to Spit Junction
2C		Spit Junction to Ben Boyd Road
3A	Military Road (PM outbound)	Wycombe Road to Ourimbah Road
4A	Epping Road (AM inbound)	Balaclava Road to Pittwater Road
4B		Pittwater Road to Mowbray Road
5A	Epping Road (PM outbound)	Pittwater Road to Balaclava Road
6A	Pacific Highway (AM inbound)	Hotham Parade to Falcon Street

The utilisation, compliance and benefits of T3 lane rely on several factors, which may include the level of congestion on non-transit lanes, enforcement, bus stopping pattern and integration with the surrounding road network and land use.

Figure 4.1 depicts the utilisation of T3 transit lanes when compared to the adjacent non-transit lanes. The graph shows that T3 lanes typically carry less traffic compared to the general traffic lanes, and as such, can provide a quicker travel time.

The percentage of non-complying vehicles using the transit lane is also plotted on the graph, as there is some correlation to the volume difference of the two types of lanes. The graph shows that there are some roads with a higher percentage of non-complying vehicles using T3 transit lanes, resulting in little difference between the volumes on the two types of lane. This may indicate lack of enforcement at the location or a lack of community support for the facility and acceptance of non-complying behaviours. It also shows that the benefits of a transit lane can be eroded if it is not well-adhered to or enforced.

The graph also shows the percentage of legal T3 users as a percentage of the total traffic. This indicates the proportion of traffic volumes that are likely to benefit from the development of a T3 lane. The percentage indicate a range between 3 per cent to 22 per cent with an average of 8.7 per cent. The higher proportion of legal T3 users, ranging from 10 per cent to 22 per cent (average 15 per cent) are observed from the northern beaches area via Military Road which have limited public transport options (i.e. bus services only).

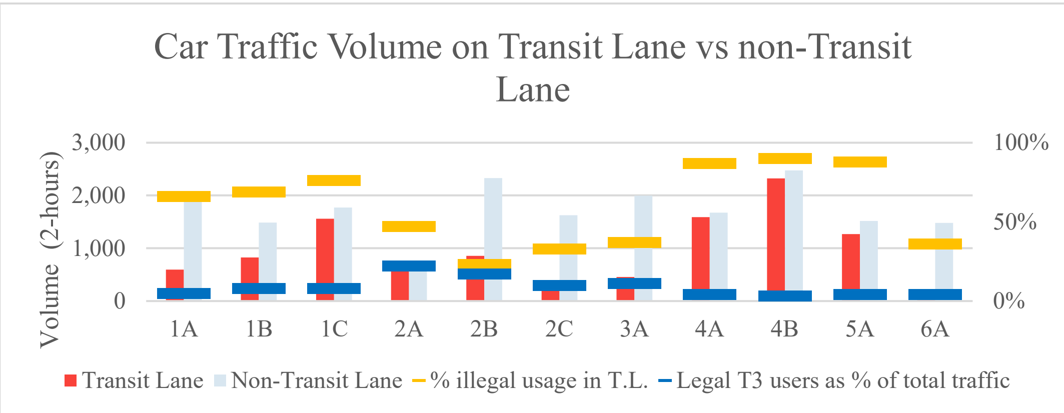


Figure 4.1 Average car volume on transit lane vs non-transit lane

Refer to Table 4.1 for locations.

Figure 4.2 shows a general pattern of benefits in the T3 lanes in terms of higher travel speeds that the road as a whole. However, there are differences, due to the circumstances of the particular road, including bus stopping pattern, enforcement, and integration with the surrounding road network and land use. The general observations are:

— The travel speed on transit lanes are generally higher, representing travel time benefits.

— Travel time benefit is generally improved with increased difference in car volumes between the two types of lanes. Travel time savings of up to 80 per cent can be seen in some locations. However, an average of approximately 30 per cent was recorded across all locations.

— Higher non-compliance in transit lane use, generally reduce the reliability of the transit lane.

— Slower speeds in the transit lane can be due to buses stopping, which slows down their travel time and the speeds of the other vehicles in the lane.

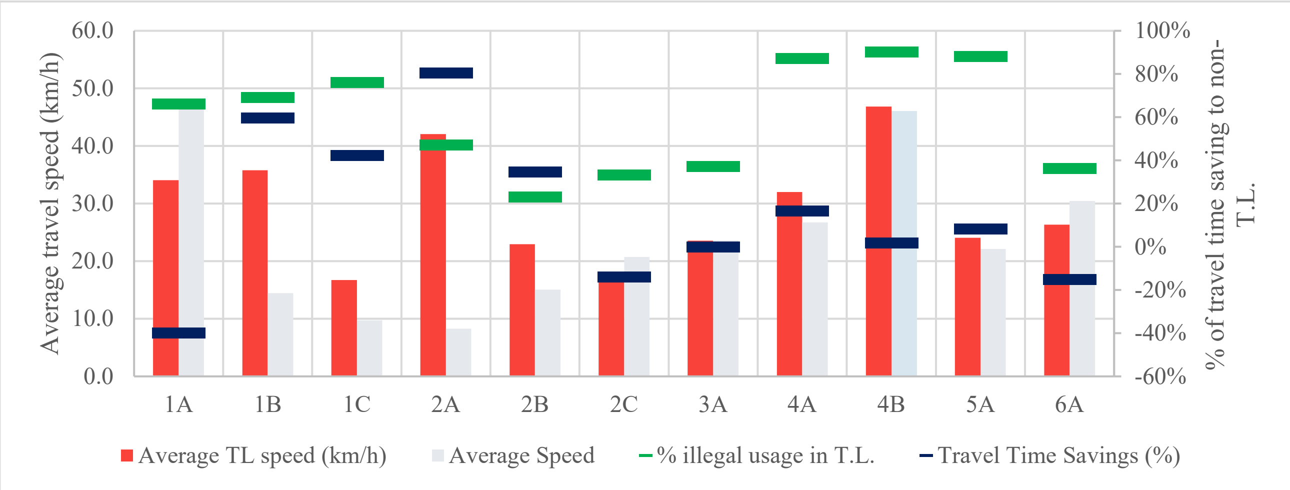


Figure 4.2 Relationship of transit lane travel time saving and average travel speed on non-transit lane

4.1.1.2 CANBERRA TRANSIT LANE STUDY

A study conducted in 2012 by AECOM titled *Transit Lane Warrants Study* investigated through vehicle occupancy and travel time surveys the benefits of transit lanes on arterial roads in Canberra. The results are depicted in Table 4.2.

Table 4.2 Vehicle occupancy survey and travel time savings results

Location	**Car (occupant)**			**Truck**	**Taxi**	**Motor Cycle**	**Bus**	**Total**	**Allowed T3%**	**Travel time savings**
	1	**2**	**+3**							
Flemington Road AM peak	780	283	87	30	3	18	21	1,222	11%	25%
Barry Drive AM peak	1,998	689	95	5	18	71	31	2,907	7%	24%
Adelaide Avenue AM peak	3,822	717	49	17	40	89	38	4,772	5%	8.3%
Adelaide Avenue PM Peak	3,342	667	57	4	41	88	41	4,240	5%	11.7%

The surveys indicate that in major arterial road network within Canberra, there are approximately 5–11 per cent of vehicles that would be able to travel on T3 lanes. The travel time saving benefit measured along the existing transit lanes can reach up to 25 per cent.

4.1.1.3 SUMMARY

The analysis of Sydney and Canberra data indicates that the benefits of a transit lane can be varied depending on several factors including the level of congestion in the adjacent general traffic lanes, the level of enforcement and the stopping patterns of buses. The Sydney examples are noted to be more urban arterial roads where the stopping of pattern of buses provides a natural disincentive for traffic to use the lane. The Canberra examples are generally limited access roads and are therefore closer to the Southern Outlet situation.

4.2 ASSESSMENT METHODOLOGY

To determine whether the Southern Outlet Transit Lane is likely to experience similar benefits to the Canberra and Sydney examples, the proposal concept design has been modelled in AIMSUN, a micro and meso-simulation transport modelling software capable in measuring the performance of the road network through the consideration of land uses, origin-destination trip matrix, road geometry and characteristics and road users' behaviours.

For this proposal, the microsimulation function of the AIMSUN software is used to model the build-up and dissipation of queues and their effect on surrounding congestion and travel times. This type of modelling can provide a better representation of queueing, congestion and delays for at-capacity urban networks.

The AIMSUN model was developed from the 2016 Hobart AIMSUN Mesoscopic Model (GHD). A section of the full model – the was "cut out" and refined for this project, shown by the green boundary in Figure 4.3. The cut model area was converted to a microsimulation pocket to model the changes to the Southern Outlet and Macquarie and Davey streets in more detail.

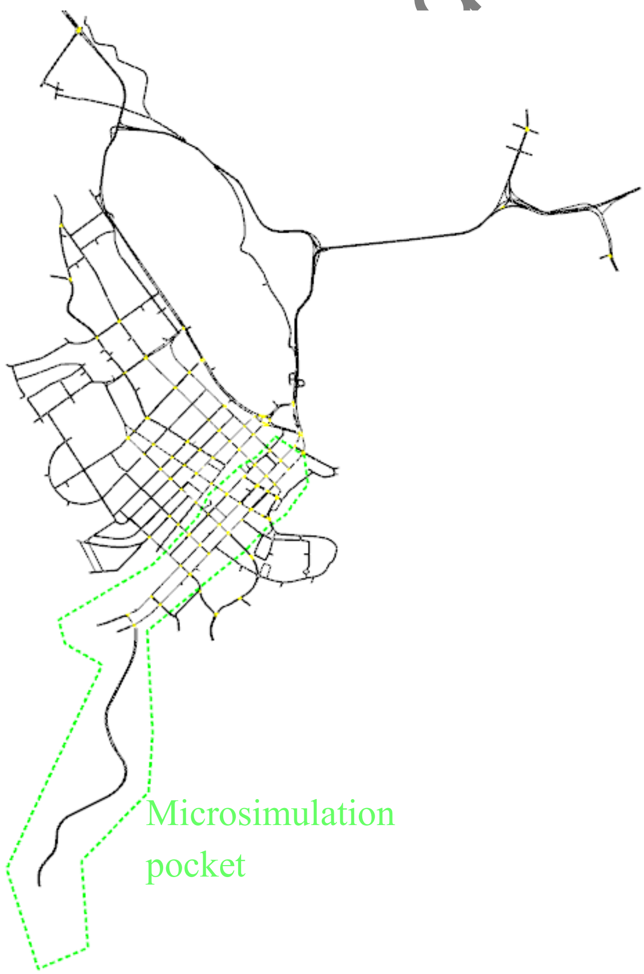


Figure 4.3 Hobart AIMSUN model and cut area for Southern Projects

The model covers both the weekday AM and PM peak periods. However, as Sub-project 1 only affects the northbound direction, then main impact of this project is in the AM peak. Key aspects of the model development include:

- The traffic demands in the microsimulation pocket were updated based on the March 2020 surveyed traffic data. Some temporary short truck trips associated with construction in Hobart CBD were removed.
- No changes to traffic signal timing and progression were made. However, the addition of extra green phase delays for turn movements were included to account for pedestrians crossing at signalised intersections.
- The 2016 bus schedules and dwell times were checked but not modified in the base model. When the project was added, additional bus services to match those proposed as part of the bus service model for the Southern Projects were included.
- With the project added, it was assumed that 15 per cent of the total vehicles could use the T3 lanes. This resulted in approximately 10 per cent of vehicles transferring into the T3 lane when it was available. The remaining 5 per cent of potential T3 lane users preferred to stay in the general traffic lanes because they were unable to make the lane changes in time.
- The Project model included both the Sub-project 1 northbound T3 Transit on the Southern Outlet and the Sub-project 2 bus lanes on Macquarie Street and Davey Street.
- The scenarios developed for the study to measure the impacts of the proposal are outlined in Table 4.3. In addition to the base and with project models, five sensitivity tests were run – three for the AM peak and two for the PM peak.

Table 4.3 Model Scenarios

Scenario	Peak	Network	Demand	Assumptions
Existing/Base	AM and PM	Base geometry as per existing on-site conditions	Base demand calibrated to March 2020 traffic counts	
Project Model	AM and PM	Project geometry as per concept design plans	Base demand calibrated to March 2020 traffic counts	The T3 lane has a utilisation of 10% (in line with a review of similar T3 lanes in Sydney)
Sensitivity tests				
Project Model with Trip Re-timing	AM Only	Project geometry as per concept design plans	Base demand with 20% of trips on the Southern Outlet currently arriving between 7.00 and 8.00 am shifting their departure time to 30 minutes earlier	
Project Model with Mode Shift	AM Only	Project geometry as per concept design plans	Base demand with Southern Outlet trips reduced by 150 cars an hour to account for new users of proposed bus services	Conservative – 40 seats per bus, new bus services will operate at 75% of seated capacity. Of those patrons, 75% were previously single occupancy vehicle drivers
Project Model with T3 Lane design change at Davey Street	AM Only	Project geometry as per concept design plans with modified T3 lane extents (end T3 lane where current bus lane ends)	Base demand calibrated to March 2020 traffic counts	

4.3 OVERALL RESULT SUMMARY

The modelled scenarios confirmed the following in the AM peak:

- The project would result in an improvement of bus travel with a reduction in travel time and more reliable travel time during most of the peak.
- If there is no change in travel behaviour, car travel will be slower as a result of some road capacity being transferred from general traffic to buses and high occupancy (T3) vehicles.
- However, the impact on T3 vehicles will be much less, promoting the use of car-pooling.
- The intersection of the Southern Outlet and Davey Street is the key valve for the Southern corridor network:
  - If too much traffic is allowed to enter the city, there will be added congestion within CBD streets with the proposed bus lane on Macquarie Street.
  - If too little traffic passes through, then the queues on the Southern Outlet become too long, blocking buses and T3 vehicles from entering the new transit lane.
- If the whole project, including the bus service changes and park-and-ride, can be successful in switching people from using their private vehicle to travel into the CBD this would lessen the impact of the physical changes on the Southern Outlet, Macquarie Street and Davey Street.
- The greatest improvement in overall performance is achieved if there is a time-shift of the peak period (peak spreading). If 20 per cent of cars travelling during the peak of the peak left 30 minutes earlier, the congestion and queuing impacts would be largely eliminated. Even if the change was less, the impact would still reduce the level of congestion and improve travel times.

4.4 TRAVEL TIMES

The impacts of the Project can be measured on how travel times change with and without the proposed changes. However, these should be considered in combination with how well it achieves the objectives of the Project.

The following sections compare the various modelling scenarios to gain an understanding of the potential benefits and impacts of the proposed project. A full set of travel time results by scenario can be found in Appendix B.

4.4.1 PROJECT VERSUS BASE

A comparison of corridor travel times with and without project (Sub-project 1 and Sub-project 2) during the AM peak inbound trip on the Southern Outlet and Macquarie Street is shown in Figure 4.4. During the calibration process, it was noted that the AM peak base model underestimated the severity of the observed short/sharp peak in AM demand. However, the overall travel time profile is representative of travel behaviour along the corridor.

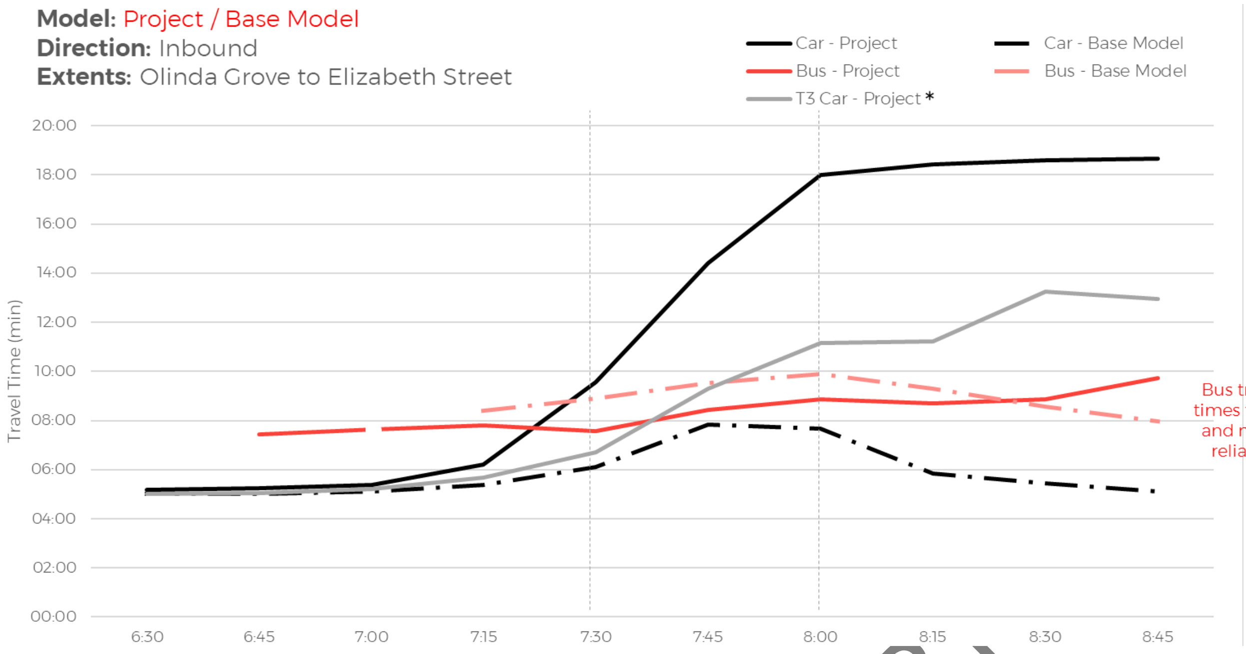


Figure 4.4 AM peak inbound Olinda Grove to Elizabeth Street – Travel time by mode – Project/Base model

Notes : *T3 travel times include all T3 vehicles, in the T3 and general travel lanes

The AM peak results indicate that at a corridor level (from Olinda Grove to Elizabeth Street):

- Buses are generally one to two minutes quicker with the project while cars are up to 13 minutes slower
- Buses are up to nine minutes quicker than general traffic
- T3 vehicles are up to seven minutes faster than general traffic.

To understand the impacts in more detail, the travel time results were broken down into two segments – the Southern Outlet between Olinda Grove and Davey Street, and Macquarie Street between the Southern Outlet and Elizabeth Street. Table 4.4 summarises travel times by these segments during two analysis time periods – 7.30 am–7.45 am and 8.00–8.15 am; these two time periods are indicated by grey vertical lines in Figure 4.4 and Figure 4.5. A comparison of travel times with and without project on Southern Outlet is shown in Figure 4.5.

Table 4.4 AM peak – Travel time by mode – Project/Base model

Time	Mode	Base travel time (minutes)			Project travel time (minutes)		
		Southern Outlet	Macquarie Street	Total	Southern Outlet	Macquarie Street	Total
7.30–7.45 am	Bus	03:02	05:53	08:55	02:20	05:14	07:34
	T3 Cars	03:20	02:47	06:07	03:32	03:10	06:43
	Cars	03:20	02:47	06:07	07:09	02:25	09:34
8.00–8.15 am	Bus	03:10	06:45	09:55	03:14	05:37	08:51
	T3 Cars	04:23	03:17	07:40	08:22	02:48	11:10
	Cars	04:23	03:17	07:40	14:55	03:04	17:59

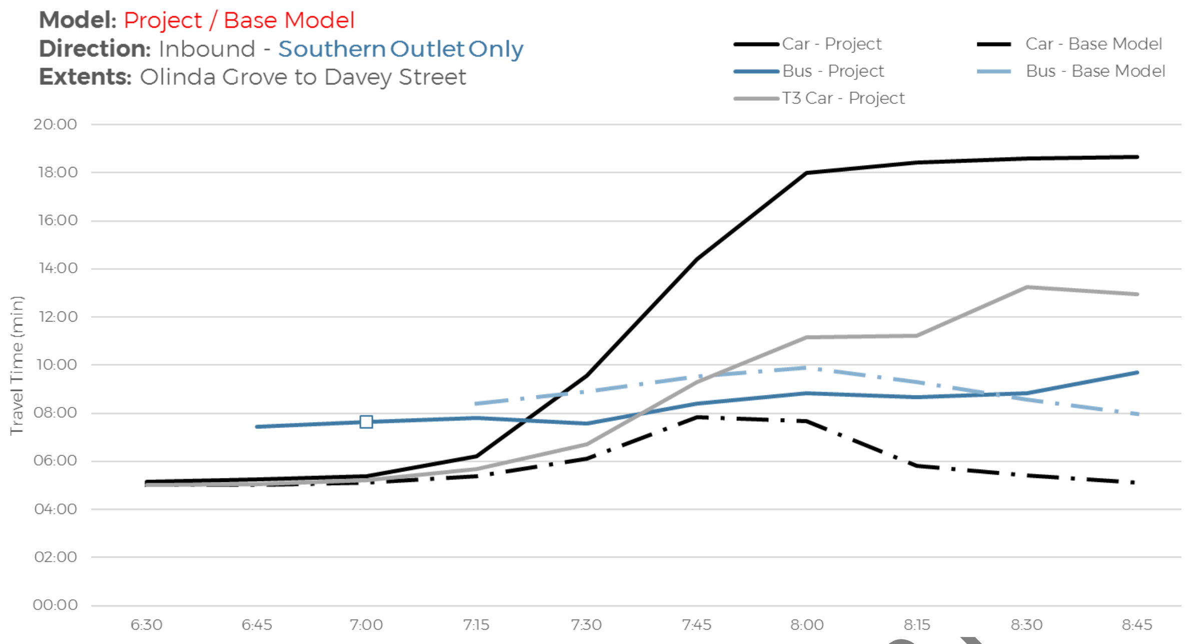


Figure 4.5 AM peak inbound Southern Outlet – Travel time by mode – Project/Base model

The results for the Southern Outlet are consistent with those for the project as a whole, with buses experiencing a travel time saving, cars experiencing longer travel times and T3 vehicles quicker than general traffic.

4.4.2 MODE SHARE CHANGE/REDUCTION IN DEMAND

One of the key objectives of the project is to drive a transport mode share change away from driving for trips to and from the CBD, especially during the weekday AM and PM peaks. To achieve this, the Project includes the package of works and initiatives outlined in section . Depending on their level of success, achieving this objective will reduce the impact of the project overall on travel times.

Figure 4.6 shows that the modest assumptions of passengers on the new inbound bus services changing from private vehicle trips would produce a reduction of approximately **one minute** for general traffic in the AM peak period.

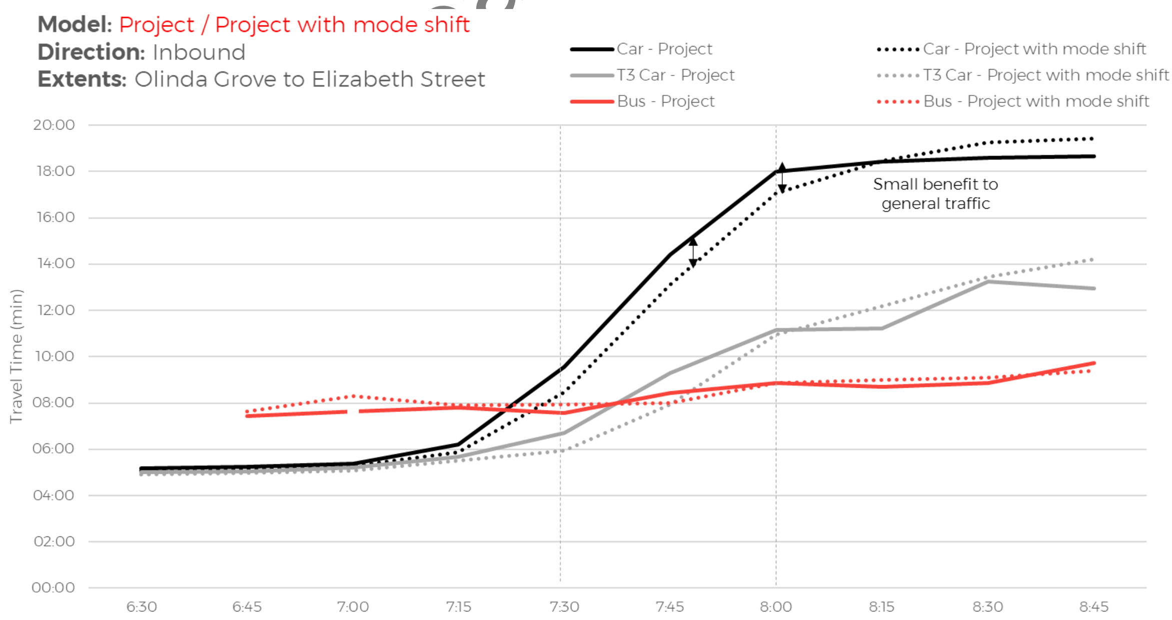


Figure 4.6 AM peak inbound Olinda Grove to Elizabeth Street – Travel time changes of with Project only compared to with Project and a transport mode-shift

Notes T3 travel times include all T3 vehicles, in the T3 and general travel lanes

4.4.3 AM PEAK TRIP RE-TIMING

The Project Model with Trip Re-timing scenario indicates that there can be a substantial reduction of the impact on car travel times if 20 per cent of vehicles departed 30 minutes earlier. Figure 4.7 shows that that the saving could be up to **four minutes** for general traffic compared to the “with Project”, which assumes no trip re-timing from the existing demand profile. The changes for T3 vehicles, while smaller at approximately **three minutes**, are still significant. The re-timing even improves the efficiency of bus services slightly.

The reduction in travel time modelled by this scenario occurs because the “flattening of the demand curve” helps manage the arrival pattern and spread the peak more efficiently across the available road capacity in the AM peak period. As shown in Table 4.4, the reduction in travel time is entirely on the Southern Outlet itself, because managing demand reduces the queueing impact.

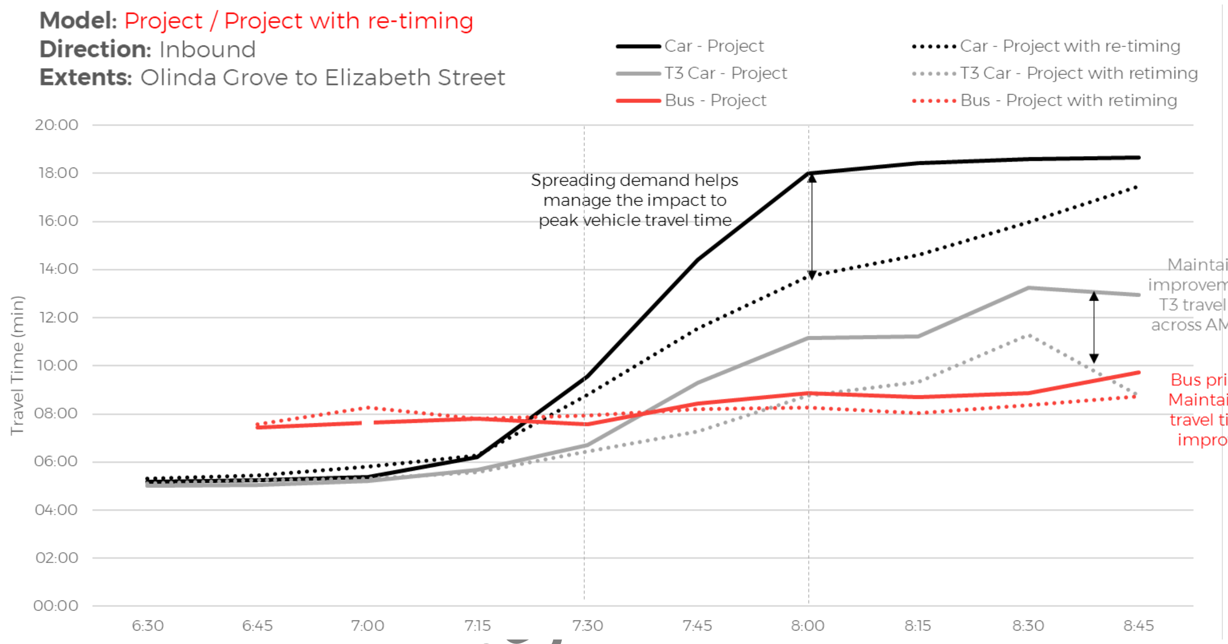


Figure 4.7 AM peak inbound Olinda Grove to Elizabeth Street – Travel time changes of with Project only compared to with Project and Re-timed trips

Notes T3 travel times include all T3 vehicles, in the T3 and general travel lanes

Table 4.5 AM peak – Travel time by mode – Project/Project with Re-timing

Time	Mode	Project travel time (minutes)			Project with Re-timing travel time (minutes)		
		Southern Outlet	Macquarie Street	Total	Southern Outlet	Macquarie Street	Total
7.30–7.45 am	Bus	02:20	05:14	07:34	02:30	05:26	07:56
	T3 Cars	03:32	03:10	06:43	03:10	03:16	06:26
	Cars	07:09	02:25	09:34	06:06	02:41	08:47
8.00–8.15 am	Bus	03:14	05:37	08:51	02:05	06:11	08:16
	T3 Cars	08:22	02:48	11:10	04:37	04:08	08:45
	Cars	14:55	03:04	17:59	09:48	03:55	13:43

4.4.4 PROJECT DESIGN CHANGES

A design change was tested in the AM peak to determine whether changes to the design could assist in addressing the largest impacts of the project while preserving the benefits of the project for buses. The reduction of traffic capacity to two general travel lanes at the intersection of the Southern Outlet and Davey Street has increased delays and queues for general traffic arriving from the Southern Outlet. The design change tested was to end the T3 lane at the current end of the bus lane, approximately 260 m south of Davey Street. This increases general travel lane capacity at the intersection, but reduces the bus and T3 vehicle priority.

The results of the AM design change at the Southern Outlet and Davey Street are compared to the “with Project” results in Figure 4.8. Ending the T3 lane before Davey Street and allowing general traffic to use the lane increases the capacity for general traffic at the expense of T3 vehicles and buses. It results in a **three minute** travel time saving for cars but a **two minute** penalty for buses (and a minor impact on T3 vehicles). However, because of the reduced capacity for traffic on Macquarie Street due to the bus lane, the Project still has an overall impact on the travel time for cars.

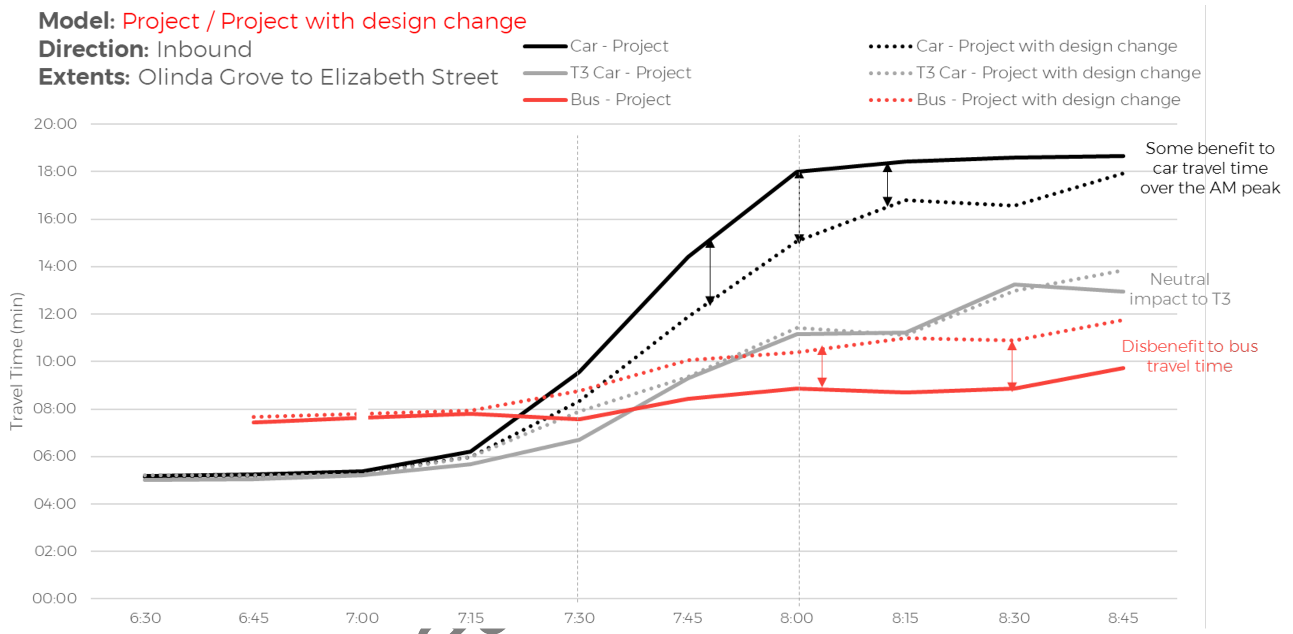


Figure 4.8 AM peak inbound Olinda Grove to Elizabeth Street – Travel time changes of with Project only compared to with Project and design change on Southern Outlet at Davey Street

Notes T3 travel times include all T3 vehicles, in the T3 and general travel lanes

Table 4.6 AM peak – Travel time by mode – Project/Project with T3 design change

Time	Mode	Project travel time (minutes)			Project with T3 Design Change travel time (minutes)		
		Southern Outlet	Macquarie Street	Total	Southern Outlet	Macquarie Street	Total
7.30–7.45 am	Bus	02:20	05:14	07:34	03:34	05:11	08:45
	T3 Cars	03:32	03:10	06:43	03:21	04:34	07:55
	Cars	07:09	02:25	09:34	03:52	04:28	08:21
8.00–8.15 am	Bus	03:14	05:37	08:51	04:52	05:32	10:24
	T3 Cars	08:22	02:48	11:10	06:07	05:18	11:25
	Cars	14:55	03:04	17:59	10:50	04:15	15:05

This scenario highlights the importance of the Southern Outlet and Davey Street intersection and how it acts as a "valve" to the CBD traffic network. As shown in Table 4.6, car travel times improve on the Southern Outlet because there are now three lanes for general traffic at this intersection, which means more vehicles can enter the network and the queue on the Southern Outlet is shorter. However, car travel times on Macquarie Street are slower because there is more congestion due to more vehicles entering the network.

4.5 INTERCHANGE OPERATION

The commencement of the proposed transit lane is north of where the northbound entry-ramp joins the Southern Outlet. This was the preferred design of the options considered below:

- Commence the T3 lane immediately before the Olinda Grove interchange: requires exiting vehicles to weave across the transit lane to get to the exit-ramp.
- Commence the T3 lane immediately after (north of) the northbound exit-ramp to Olinda Grove: requires vehicles entering from the entry ramp to weave across the transit lane to get to the general northbound lanes
- Commence the T3 lane immediately after (north of) the entry-ramp from Olinda Grove: a diverge from the left-most lane.

The commencement of the T3 lane immediately north of the entry-ramp from Olinda Grove minimises the interaction with the Olinda Grove interchange. It reduces the road safety risk resulting from weaving activities at the interchange if it had started before this point). Additionally, this option would minimise infrastructure works required to the Olinda Grove overpass. However, it offers less protection if the queue on the Southern Outlet extends to this point. As the likelihood of this occurring is low, the proposed design is preferred because of its safety advantages.

5 CONCLUSIONS

WSP Australia Pty Ltd has assessed the traffic and transport impact of the proposed additional northbound lane on the Southern Outlet which forms part of Sub Project 1 of the Hobart City Deal Southern Projects.

The works will require widening of the Southern Outlet to create a continuous third northbound lane. Widening will be predominantly undertaken along the eastern side towards south of the project site (i.e. CH580–CH1,400) and along the western side towards the middle of the project (i.e. CH1,300–CH1,850) with the transit lane connecting to the existing Bus Lane to intersections with Davey Street and Macquarie Street. Widening towards the eastern side was preferred to avoid risks associated with large rock cuttings on the Southern Outlet at Tolmans Hill. The widening on the western side at Dynnyrne will require property acquisition.

An assessment of the proposed changes has indicated that it would have benefits in terms of more efficient and reliable bus services, and faster journeys for T3 transit vehicles compared to general traffic, thus encouraging the use of higher occupancy vehicles. However, the project will have an impact on the performance of the road network, including increased queuing and travel times on the Southern Outlet in the AM peak for general traffic.

There are several measures that could be implemented to support the project and improve the performance of the road network for all users including:

- The expected take up of the new bus services will reduce traffic and reduce the magnitude of the impacts listed above. This can be enhanced by offering ticketing that encourages use for commuters who can use the services regularly.
- Shifting some trips to occur before (or after) the AM peak will result in significant reductions on congestion on the Southern Outlet. This can be achieved by encouraging businesses, Government departments and schools to stagger their start hours or through other Travel Demand Management strategies and communications.
- Adopting parking policies that acknowledge the new balance between the travel modes, with more people using the bus and using the park-and-ride facilities.
- Promote the new bus services and higher occupancy vehicle lane to local businesses to make CBD workers and shoppers aware of the new opportunities that may offer a better travel choice for their needs.
- Retiming of signals to match the new demand and improve traffic coordination.

The project overall is considered to have positive benefits to the Hobart transport network as it is likely to achieve the objectives and benefits listed in section 1. However, it is acknowledged that the design of the project on the Southern Outlet as it approaches Davey Street has significantly changed the operation of the Southern Outlet approach to the CBD by designating a priority lane for buses and T3 vehicles and reducing the capacity for general traffic to two lanes. This is considered reasonable because:

- These modes of transport (public transport and higher occupancy vehicles) offer additional capacity in the future with higher acceptance and take-up
- This capacity change controls the volume of traffic entering the CBD, providing benefits for pedestrians, cyclists and public transport – which further reinforces the mode shift away from private vehicle use.