Bertha Retreat

Transport Impact Assessment

Pniel

November 2020

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SUMMARY SHEET

Report Type	Transport Impact Assessment
Title	Bertha Retreat
Location	Pniel
Client	Boschendal
Reference Number	ITS 4261
Project Team	Lynne Pretorius, Pr. Eng
	Carla Sequeira
Contact Details	Tel: 021 914 6211
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It is herewith certified that this Transport Impact Assessment was undertaken by a professionally registered transport engineer, Ms Lynne Pretorius, Pr.Eng, and prepared according to the requirements of the South African Traffic Impact and Site Traffic Assessment Manual.

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REPORT - SUMMARY TABLE

This Transport Impact Assessment is reported only in a summary table instead of a lengthy report to assist review and interpretation of the results. This summary table includes all the relevant information that is normally contained in a report. It should be sufficient for review and interpretation of the expected transport impacts as well as the comprehension of the required measures to mitigate the transport impact. If any more detail is required please contact the authors.

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ABBREVIATIONS

COTO	Committee of Transport Officials
Ha	Hectare
HCM	Highway Capacity Manual
LOS	Level of Service
NMT	Non-motorised Transport
SATGR	South African Trip Generation Rates
SQM	Square Meters (m^2)
TIA	Transport Impact Assessment
V/C	Volume to Capacity Ratio
WCG	Western Cape Government

Transport Impact Assessment

Bertha Retreat, Pniel

1 Purpose of Study	The purpose of this study is to determine the transport impact of the proposed Bertha Retreat in Pniel. This TIA is being done in support of the application for consent for a portion of Portion 11 of Farm 1674, Paarl at Boschendal.
2 Locality *Refer to Figure A1 (Appendix A)*	The Bertha Retreat will be situated just north of Pniel in the Dwars River Valley. It is situated south of the R45 (MR191) and east of the Helshoogte Road (MR172/R310) in Pniel. It will be situated on the eastern side of the Boschendal Estate, east of the Dwars River.
3 Land Use *Refer to Figure A2 (Appendix A)*	The site currently consists of unoccupied labourers cottages. A 50-seater conference centre, accommodation facilities (34 beds) and a teaching space and library that can accommodate 52 people is proposed.
4 Existing Roadways	The existing roadways in the site vicinity are summarised below: <u>R45 (MR 191):</u> Provincial Main Road: One lane per direction, with paved narrow shoulders and no sidewalks. <u>Helshoogte Road (MR 172/R301):</u> Provincial Main Road: One lane per direction, with paved sidewalk located on the eastern side of the road. <u>Lanquedoc Main Road:</u> One lane per direction, no shoulder and no sidewalks. This reduces to one travel lane over the Dwars River Bridge. One directional traffic flow is maintained over the Dwars River following a first-come, first-cross principle. Speed humps on either sides of the bridge. <u>Ou Wapad:</u> It is a gravel road, located within a 6m wide servitude, which traverses over Boschendal owned property, gated at both ends.
5 Analyses Hours	The traffic analyses are based on weekday a.m. and p.m. peak hours. The following peak hours are representative of the study area: • Weekday a.m. peak hour: 07:00 to 08:00 • Weekday p.m. peak hour: 17:00 to 18:00
6 Scenarios Analysed	The following scenarios were analysed to determine the transport impact of the proposed development: 1. 2020 Existing conditions 2. 2025 Background traffic conditions (2020 existing traffic conditions plus expected traffic growth based on a 5-year traffic horizon) 3. 2025 Total traffic conditions (2025 background traffic conditions plus development trips) The traffic growth assumptions used to analyse future scenarios are discussed in Section 10.

<table>
<tr>
<td>7 Study Intersections (existing control)
Refer to Figure A3 (Appendix A)</td>
<td>The scope of the analyses for the TIA included the intersections summarised in Table 1. Refer to Figure A3 in Appendix A for the existing lane configuration and intersection controls.

Table 1: Study Intersection
<table>
<tr><th>No.</th><th>Name</th><th>Existing Control</th></tr>
<tr><td>1</td><td>Helshoogte Road/Lanquedoc Main Road</td><td>T-junction</td></tr>
<tr><td>2</td><td>Lanquedoc Main Road/Ou Wapad</td><td>Priority Control</td></tr>
</table></td>
</tr>
<tr>
<td>8 Existing Intersection Operations
Refer to Figure A3 (Appendix A) & Appendix B</td>
<td>New traffic surveys were not conducted for this study, as the Covid-19 pandemic has caused a significant reduction in traffic volumes. Historical traffic volumes were thus used, as this is a better representation of the traffic volumes along the road network.

Historical surveys (2018) along Lanquedoc Main Road was available and 2018 traffic volumes along Helshoogte Road were obtained from the Western Cape Government Road Network Information System (RNIS, 2018). Refer to Appendix B for the Helshoogte Road traffic volumes. The traffic volumes along Helshoogte road were used to determine the north-south split at the Helshoogte Road/Lanquedoc Main Road intersection. The growth rate of 3% per annum, as discussed in Section 10, was applied to the 2018 traffic volumes to obtain the 2020 traffic volumes.

The intersections in the study area were analysed to determine the level of service (LOS), delay per vehicle (in seconds) and volume per capacity (V/C) for each intersection in the peak hour. Refer to Figure A3 in Appendix A for the weekday a.m. and p.m. peak hour traffic operations for the existing traffic conditions. Based on the results of the analyses, all the intersections are operating satisfactorily with no capacity conditions being experienced.

Approximately 250 vph cross the existing single lane Dwars River Bridge in both directions and operate under give-way conditions. This acts as a pinchpoint in the local street network. Assuming a PHF of 0.85, this results in about 3 veh per minute crossing. Although further analyses indicate that the delay is only 2.2 seconds per vehicle.</td>
</tr>
</table>

<table>
<tr><td>9 Approved Developments/ Latent Rights</td><td>The Agterdam Cottages is a proposed development in the study area, which is currently awaiting approval. This development also forms part of Boschendal. The Agterdam Cottages are situated on the western side of the Helshoogte Road. Refer to Table 2 for the trip generation of Agterdam Cottages.

Table 2: Trip Generation of the Background Developments
<table>
<tr><th>Proposed Developments</th><th>In</th><th>Out</th><th>Total</th></tr>
<tr><td>Agterdam Cottages</td><td>6</td><td>6</td><td>12</td></tr>
</table>

The Agterdam Cottages have been taken into consideration for this study.</td></tr>
<tr><td>10 Traffic Growth
Refer to Appendix B</td><td>Traffic growth rates are used to estimate the future traffic. A historical traffic growth of approximately 3% per annum on average has been experienced along the Helshoogte Road between 2001 and 2018. This is based on traffic data managed by the Western Cape Government (WCG), (RNIS, 2020). Refer to Appendix B for the growth rates along Helshoogte Road. Accordingly, these growth rates were applied to the existing traffic counts to estimate the traffic for the future scenario.</td></tr>
<tr><td>11 Future Road Upgrades
Refer to Appendix C</td><td>Stellenbosch Municipality is currently planning on upgrading the Lanquedoc Main Road between Pniel and Kylemore. Phase 1 of this upgrade has been designed. Refer to Appendix C for the proposed cross sections and layout plan of the Lanquedoc Main Road.

This upgrade will include the widening of the road, a sidewalk, a cycle lane, the re-alignment and widening of the one directional bridge to a two-lane bridge and the upgrade of the Lanquedoc Main Road/Ou Wapad intersection from a priority control intersection to a roundabout.

Stellenbosch Municipality has indicated that the upgrading of the bridge is a priority and they are not sure when the remainder of the road will be upgraded. As it is uncertain at this stage when the Ou Wapad intersection will be upgraded, it was not taken into consideration for this development.</td></tr>
<tr><td>12 Background Traffic Conditions
Refer to Figure A4 (Appendix A)</td><td>The 2025 background traffic conditions scenario analyses the existing traffic after applying a 3% per annum traffic growth rate on the Helshoogte and Lanquedoc Main Road over five years.

Similarly to the analyses results for the existing conditions, none of the study intersections experience capacity constraints during the weekday a.m. and p.m. peak hours. Refer to Figure A4 in Appendix A for the respective peak hour background intersection operation results.</td></tr>
</table>

13 Site Access *Refer to Figure A6 (Appendix A) & Appendix D*	Access to the development is proposed off the Ou Wapad. The Ou Wapad access is currently controlled with a gate located 96m from Lanquedoc Main Road. It is expected that the access control will be retained. Furthermore, the storage length available between the access and the intersection is sufficient. The existing Ou Wapad intersection on Lanquedoc Main Road is a skew intersection. However, site investigations confirmed that the shoulder sight distance along the Lanquedoc Main Road is sufficient. The Lanquedoc approach road is also stop-controlled. No upgrades are proposed to this intersection, other than surfacing the bellmouth area. The future proposed roundabout will just improve the operations. The Bertha Retreat access is located approximately 490m from the access gate on the Ou Wapad. The current existing accesses along the Ou Wapad is shown in Figure A6 in Appendix A. The existing access to the site is staggered by about 15m c/c from the access road to the Delta Farm (Old Piggery). It is proposed that the proposed access to the Retreat be aligned in the future with the Delta Farm (old Piggery) access road, if the Delta Farm is developed further.
14 Trip Generation Rates and Development Trips	For the purpose of trip generation it is assumed that the vehicle trips will be generated by the conference attendees. The guest accommodation provided is for the sole purpose of the conference attendees. The teaching space and library can accommodate 52 people. However, this is for local people in the region and it is expected that they will either walk to the facility or arrive via bus/ shuttle. Accordingly, the teaching space and library are not included in the trip generation. All trip generation rates used to determine the expected development trips are from the South African Trip Data Manual (COTO TMH17, 2013). The expected development trips for the Bertha Retreat is summarised in Table 3. It is assumed that the development will only generate trips during the a.m. peak hour as conferences usually end between 15:00-16:00 which is outside the p.m. peak hour. The trips generated by the Bertha Retreat staff will be negligible. *Table 3: Trip Generation* **Land Use** / **Rate** / **In** / **Out** / **Trips In** / **Trips Out** / **Total Trips** **Conference Centre** / 0.5 trips/seat / 90% / 10% / 25 / 3 / 28 Based on the trip generation rates provided in the COTO Manual, approximately 30 total trips is expected to be generated by the development during the a.m. peak hour. These trips were assigned through the network to determine the impact of the development on the operations of the external road network.

	It is expected that a lower number of trips will be generated by the development, as provision can be made for the conference attendees to be transported to the development by means of a bus or a shuttle service as well. The additional 30 vph also roughly translate to a vehicle crossing the bridge every 2 minutes.
15 Trip Distribution *Refer to Figure A5 (Appendix A)*	The expected trip distribution used in the traffic model for the development was as follows: • 53% north via Helshoogte Road • 47% south via Helshoogte Road The above distribution, as well as the assignment of the development trips through the study intersections, are illustrated in Figure A5 in Appendix A for the respective peak hours.
16 Total Traffic Conditions *Refer to Figure A5 (Appendix A)*	The 2025 total traffic conditions scenario analyses the background traffic condition plus the development trips assigned and distributed through the road network. Based on the intersection capacity analyses, all of the study intersections can expect to operate satisfactorily during the respective a.m. and p.m. peak hours. No capacity road improvements are thus required to accommodate the additional development trips. However, the bellmouth of the Lanquedoc Main Road/Ou Wapad intersection layout is currently substandard and requires improvement. This is further discussed in Section 17 below. Refer to Figure A5 in Appendix A for the respective peak hour total intersection operation results.
17 Geometric Improvements	Site observations confirmed that the current intersection bellmouth at the Lanquedoc Main Road/Ou Wapad intersection is sub-standard. The bellmouth of the eastern leg must be formalised. This will guide the vehicles along the eastern leg to stop at 90° at the intersection, which will improve their sight distance as well. It is proposed that the bellmouth area be surfaced.
18 Non-Motorised Transport	No additional pedestrian and cycling facilities are required for the proposed development. The Ou Wapad is a private gravel road and visitors to the farm will be able to walk along the Ou Wapad under these local traffic volume conditions. Stellenbosch Municipality is also planning to provide sidewalks as part of the future upgrade of the Lanquedoc Main Road.

19 Public Transport	There are public transport services in the form of mini-bus taxis available along the Helshoogte Road, as well as internal Boschendal shuttle services. A bus turning route is proposed south of the development, as the Ou Wapad is too narrow for the bus to turn around. The bus will need to alley dock by means of reversing into the gravel road, and then driving out again. Refer to Figure 1 for the proposed bus route. *Figure 1: Proposed Bus Route*
20 Parking	A parking rate of 0.25 bays per seat is required in accordance with the Stellenbosch Municipality Zoning Scheme (Stellenbosch Municipality, 2019). A minimum of 14 bays is required on site. The development is proposing 24 parking bays which is sufficient.
21 Conclusion & Recommendations	**Road Network** <u>Existing (2020) and Background (2025) Traffic Conditions</u> All the intersections are currently operating at acceptable LOS and will continue to do so in the future. No mitigation measures are recommended as part of these analyses scenarios. The existing single lane Dwars River Bridge, operates under give-way conditions, and acts as a pinchpoint in the local street network with very little vehicle delays. However, Stellenbosch Municipality is planning to upgrade the bridge in the near future, funding permitting.

	<u>Access</u> Access to the development is proposed off the Ou Wapad, by means of a controlled access situated 96m from the Lanquedoc Main Road/Ou Wapad intersection. The bellmouth area of the access must be surfaced. It is further proposed that the proposed access to the Retreat on the Ou Wapad be aligned in the future with the Delta Farm (old Piggery) access road, if the Delta Farm is developed is developed further. <u>Development Trips</u> It is expected that a total of 28 trips (25 in/3 out) be generated by the proposed development during the a.m. peak hour. <u>2025 Total Traffic Conditions</u> All the study intersections will operate at acceptable traffic conditions from an intersection capacity point-of-view with the addition of the development trips on the external road network. No mitigation measures are thus recommended as part of these analyses scenarios, other than surfacing the bellmouth area of the Ou Wapad on Lanquedoc Road. **Pedestrian and Cycling** No additional pedestrian and cycling facilities are recommended for the proposed development. **Public Transport** A bus route is proposed north-east of the development for the bus to turn around. **Parking** A total of 24 parking bays will be provided by the development. This is acceptable as it is more than the required 14 bays. **Conclusion** It is concluded that the expected development traffic will have a low impact on the external road network and no road improvements are required from an intersection capacity point-of-view. However, the bellmouth at the Lanquedoc Main Road/Ou Wapad intersection must be surfaced. It is therefore concluded and recommended that the development can be approved from a transport perspective.

REFERENCES

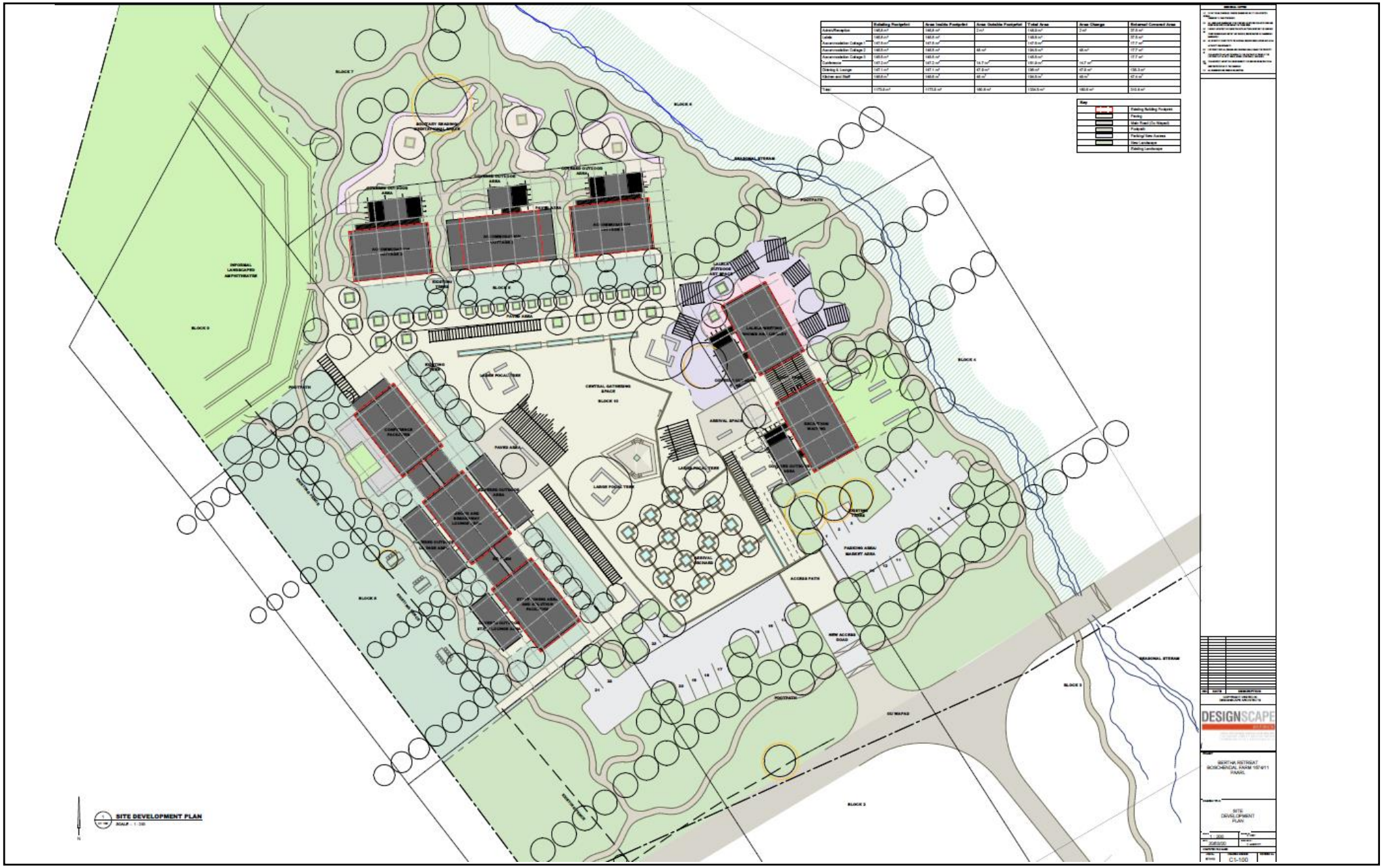
1. South African Trip Data Manual, TMH17, Version 1.1, COTO, September 2013
2. Stellenbosch Municipality, Zoning Scheme By-law, September 2019
3. Western Cape Government, Road Network Information System, https://rnis.westerncape.gov.za/rnis/rnis_web_reports.main, 2020

Appendix A

Figures

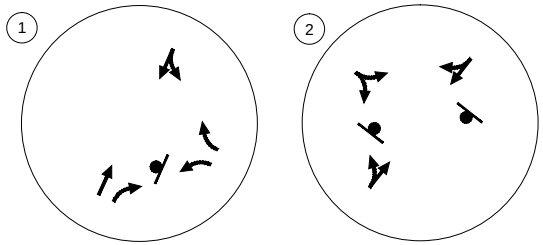
PROJECT:	FIGURE:	NUMBER:
Bertha Retreast	Locality Plan	A1

G:\4261 TIA Bertha Retreat, Boschendal\11 Drawings, Figures & GIS\CAD\4261 Bertha Retreat_LP_CN_2020-06-18.dwg

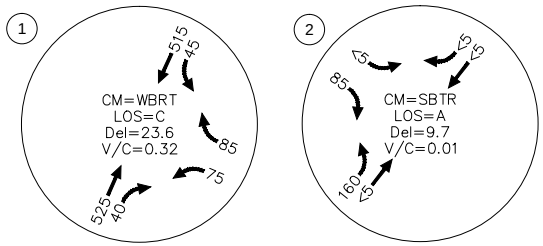


PROJECT:	FIGURE:	NUMBER:
Bertha Retreat	Site Development Plan	A2

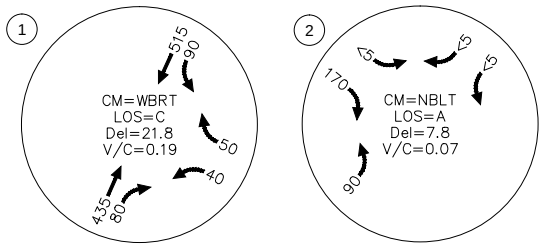
LANE CONFIGURATION



AM PEAK HOUR



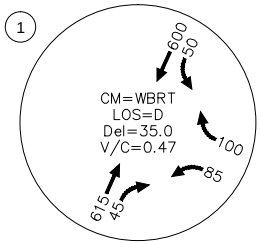
PM PEAK HOUR

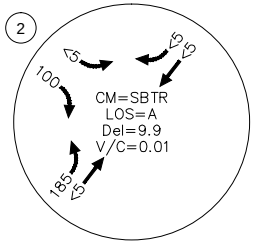


NOTE:
TRAFFIC VOLUMES WERE ADJUSTED TO COMPENSATE FOR THE COVID-19 CONDITIONS

PROJECT:	FIGURE:	NUMBER:
BERTHA RETREAT, BOSCHENDAL	EXISTING (2020) LANE CONFIGURATION AND WEEKDAY AM AND PM PEAK HOUR TRAFFIC CONDITIONS	A3

AM PEAK HOUR





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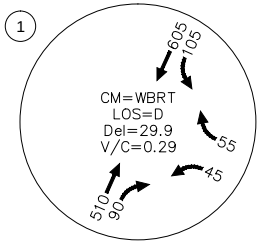
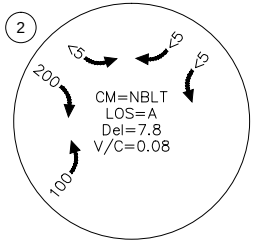
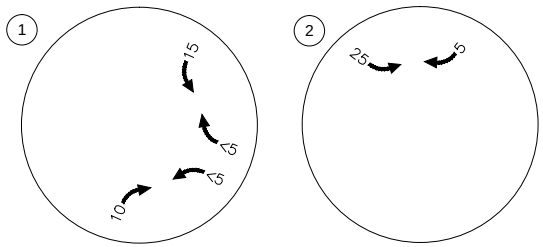




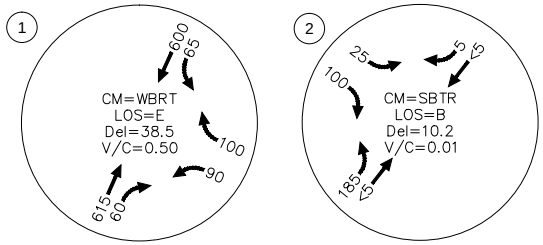
PROJECT:	FIGURE:	NUMBER:
BERTHA RETREAT, BOSCHENDAL	BACKGROUND (2025) WEEKDAY AM AND PM PEAK HOUR TRAFFIC CONDITIONS	A4

TRIP GENERATION	IN	OUT	TOTAL
AM PEAK HOUR	25	3	28

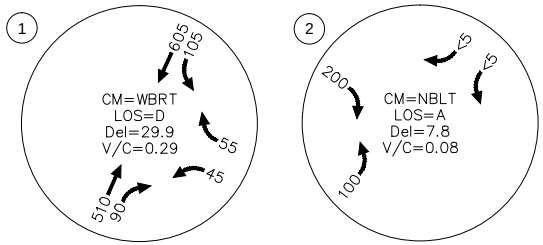
TRIP GENERATION



AM PEAK HOUR



PM PEAK HOUR



PROJECT:	FIGURE:	NUMBER:
BERTHA RETREAT, BOSCHENDAL	DEVELOPMENT TRIP GENERATION, DISTRIBUTION AND TOTAL (2025) WEEKDAY AM AND PM PEAK HOUR TRAFFIC CONDITIONS	A5

PROJECT:	FIGURE:	NUMBER:
Boschendal Estate	Existing Accesses along the Ou Wapad	A6

Appendix B

RNIS Data

Traffic Counts

Time	Light	Heavy	Taxis	Buses
00-01h00				
01-02h00				
02-03h00				
03-04h00				
04-05h00	27	2	0	0
05-06h00	128	6	10	2
Sub-Totals	**155**	**8**	**10**	**2**
06-07h00	463	39	39	4
07-08h00	1040	49	25	5
08-09h00	577	61	10	1
09-10h00	581	50	11	0
10-11h00	715	81	8	2
11-12h00	682	63	6	6
12-13h00	807	85	8	5
13-14h00	706	45	16	3
14-15h00	774	57	22	5
15-16h00	798	55	7	4
16-17h00	984	49	16	3
17-18h00	1001	35	22	6
Sub-Totals	**9128**	**669**	**190**	**44**
18-19h00	559	22	35	1
19-20h00	357	9	15	0
20-21h00	239	3	1	1
21-22h00	186	3	3	0
22-23h00				
23-24h00				
Sub-Totals	**1341**	**37**	**54**	**2**
Totals	**10624**	**714**	**254**	**48**

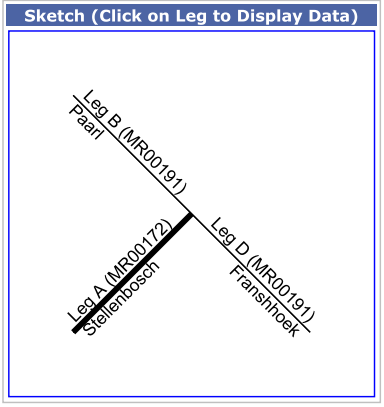
Station AADT's

	Light	Heavy	Taxis	Buses
	10305	**693**	**246**	**47**
Total	**11291**			

Station Data

Station No	**4245A**
Road No	**MR00172**
Km Distance	**15.76**
Count Date	**15/02/2018**
Hours Counted	**18**
Day Counted	**Thursday**
Counted by	**C**
Expansion Factor	**0.97**
Night Factor	
Stratum	**BA**
Peak Hour Ratio	**11.10**
Total AADT	**11291**

Sketch (Click on Leg to Display Data)



Print

Print

Intersection

Diagram

Growth Rate

Growth Rate Chart

Historical Data

< 2018/02/15 >

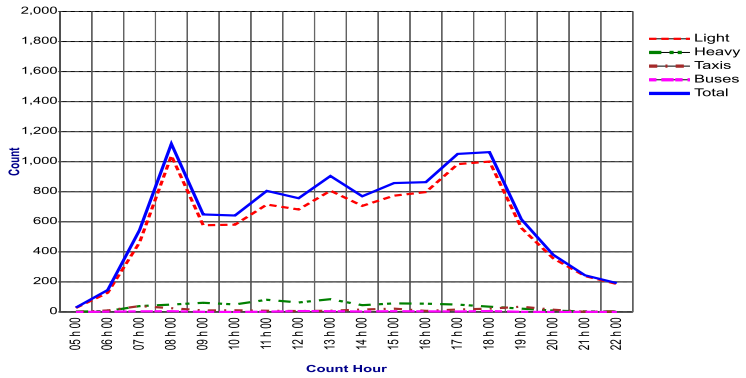
Exit

Station Data

Station Counts Chart

☑ Light ☑ Heavy ☑ Taxis ☑ Buses ☑ Total

Stratum Pattern



Western Cape Government
BETTER TOGETHER.

Growth Rate Chart

Station Data

Road Number:	**MR00172**
Km Distance:	**15.76**
Growth Rate: (Based on the last 5 available counts)	**5.37**
Recalculated Growth Rate: (Based on Selected Counts)	**5.37**
Node:	**4245**
Leg:	**A**

Count Dates

1980-01-01
1984-08-01
1987-08-10
1992-08-08
2000-05-29

>
<
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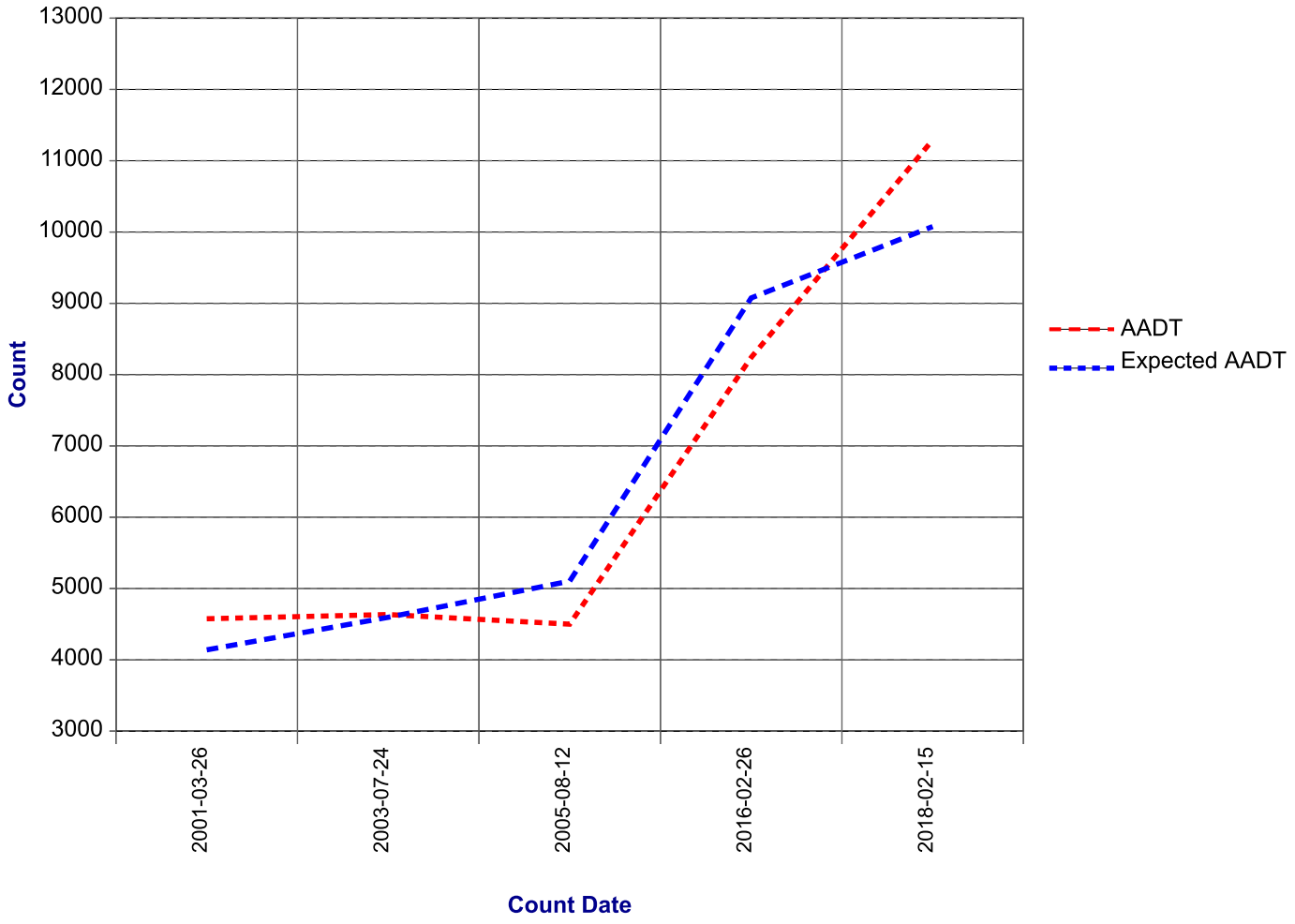
2001-03-26
2003-07-24
2005-08-12
2016-02-26
2018-02-15

Print

Exit



Western Cape Government
BETTER TOGETHER.

Growth Rate Chart

Station Data

Road Number:	**MR00172**
Km Distance:	**9.22**
Growth Rate: (Based on the last 5 available counts)	**3.20**
Recalculated Growth Rate: (Based on Selected Counts)	**3.20**
Node:	**4244**
Leg:	**C**

Count Dates

1979-01-01
1983-01-01
1986-06-01
1993-05-08
2000-03-02

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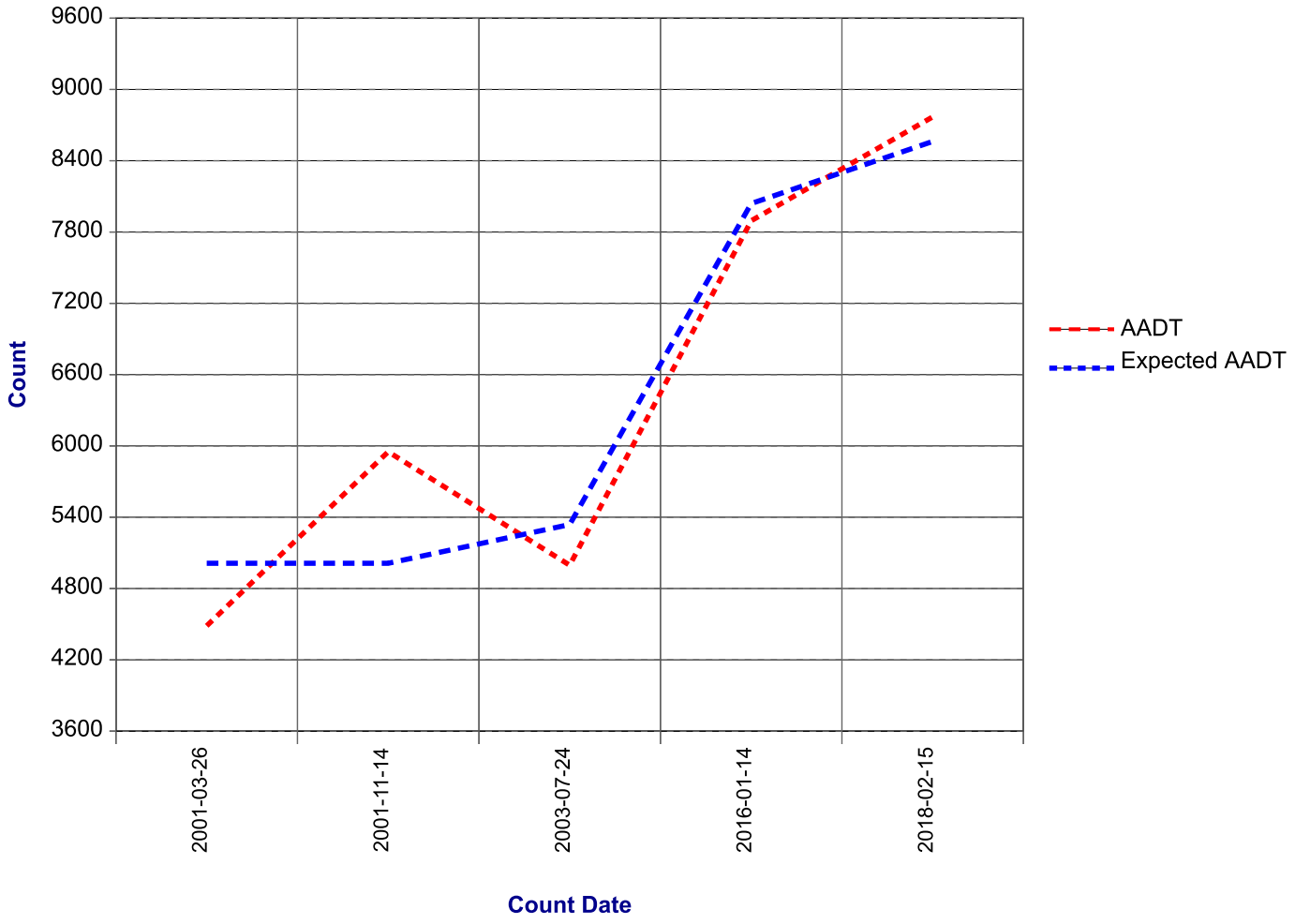
2001-03-26
2001-11-14
2003-07-24
2016-01-14
2018-02-15

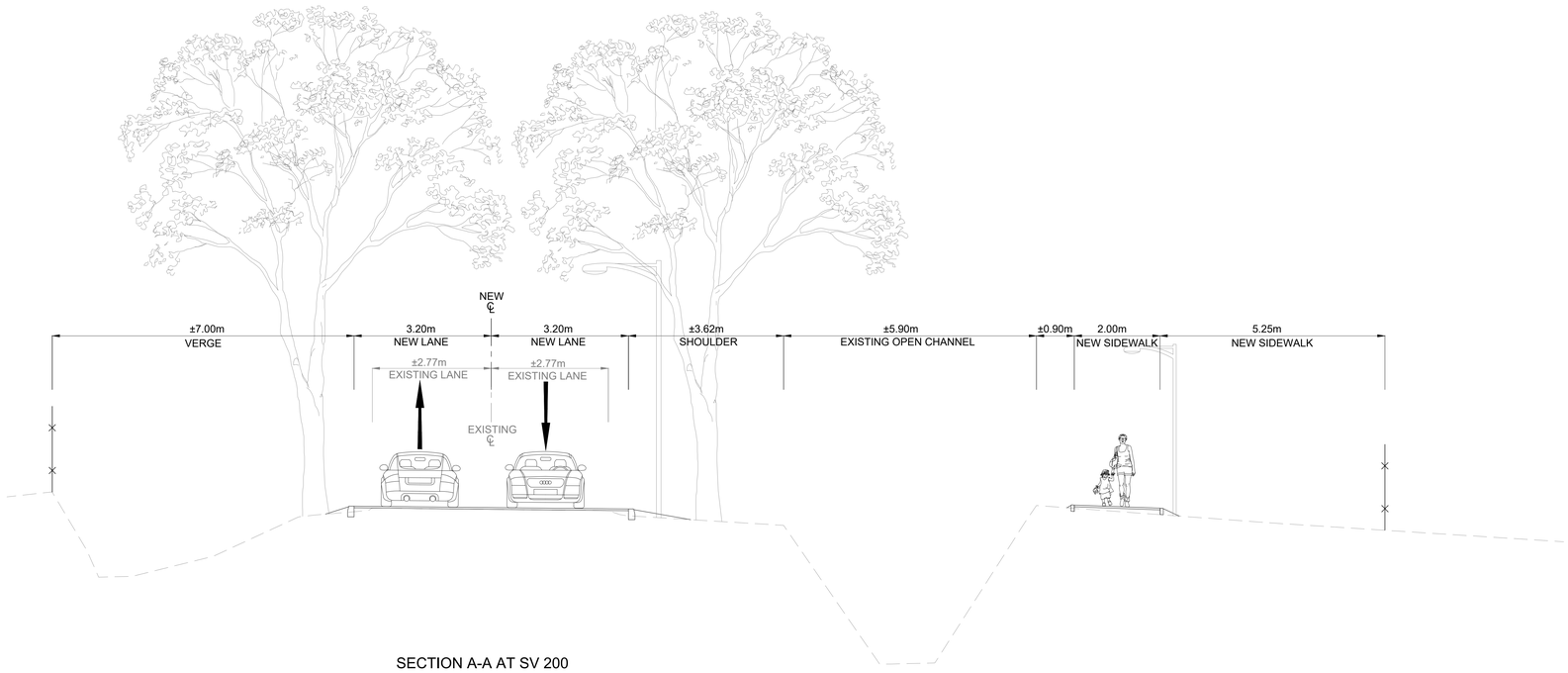
Print

Exit

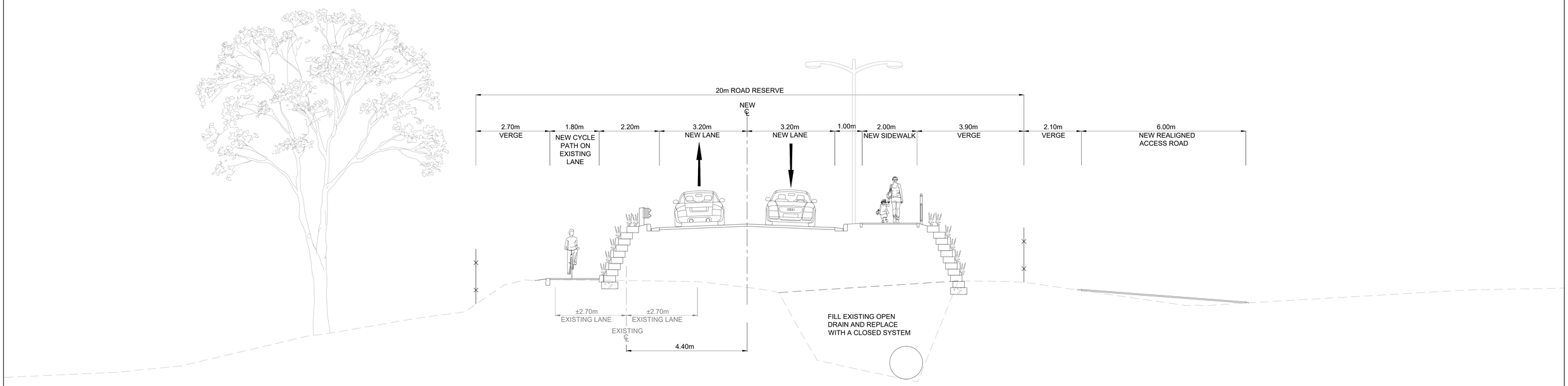


Appendix C

Lanquedoc Main Road Upgrade Designs



SECTION A-A AT SV 200



SECTION B-B AT SV 460

FOR INFORMATION

DRG. No.	DRAWING TITLE
REFERENCE DRAWINGS	

DRG. No.	DRAWING TITLE
REFERENCE DRAWINGS	

REV	DESCRIPTION	DATE	REV BY	CHKD
A	ISSUED FOR INFORMATION	04.11.2019	IB	IB
REVISIONS				

DESIGNED	J. vd SPUY
DRAWN	J. vd SPUY
CHECKED	I. BRITTEN

APPROVED

PROJ. PRINCIPAL:

SIGNATURE: DATE:

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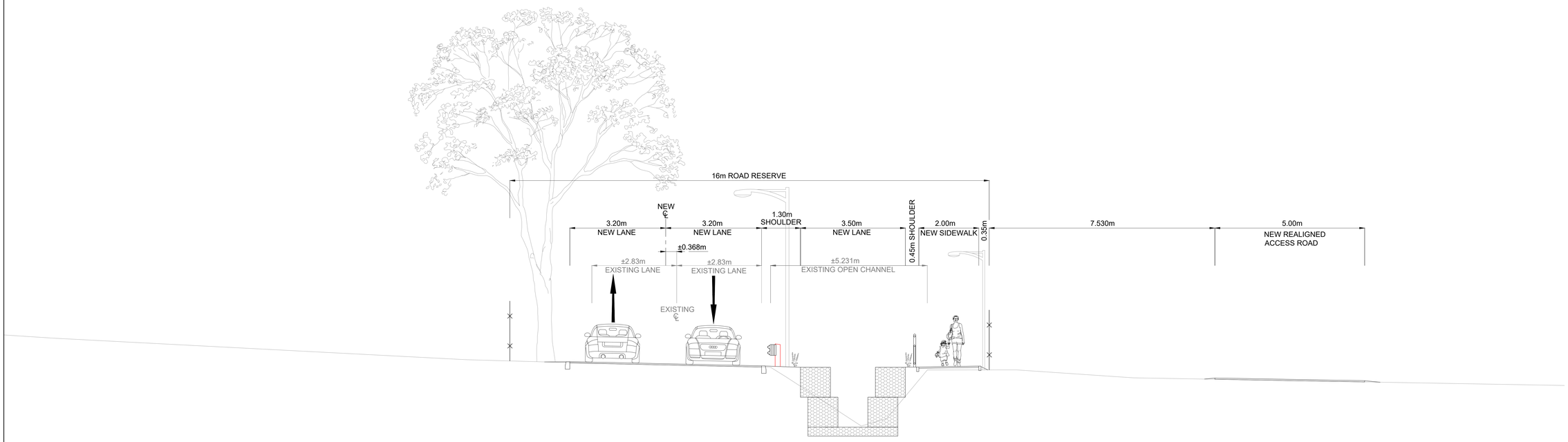
MUNICIPALITY • UMASIPALA • MUNISIPALITEIT

PROJECT/DRAWING TITLE

UPGRADING OF LANQUEDOC ACCESS ROAD AND BRIDGE

TYPICAL CROSS SECTIONS

SCALE	SHEET
1:1000	1 OF 2
CONTRACT No.	PROJECT No.
B/SM 28/16	MD3137.CPT
DRAWING No.	REV
MD3137-1300-01	A



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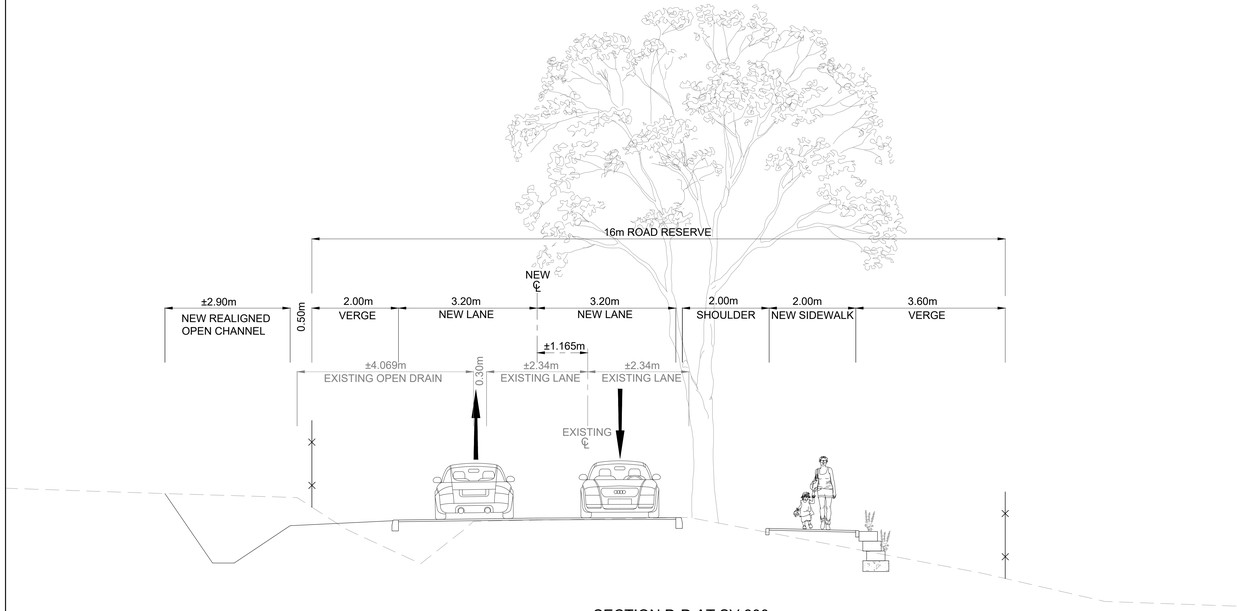

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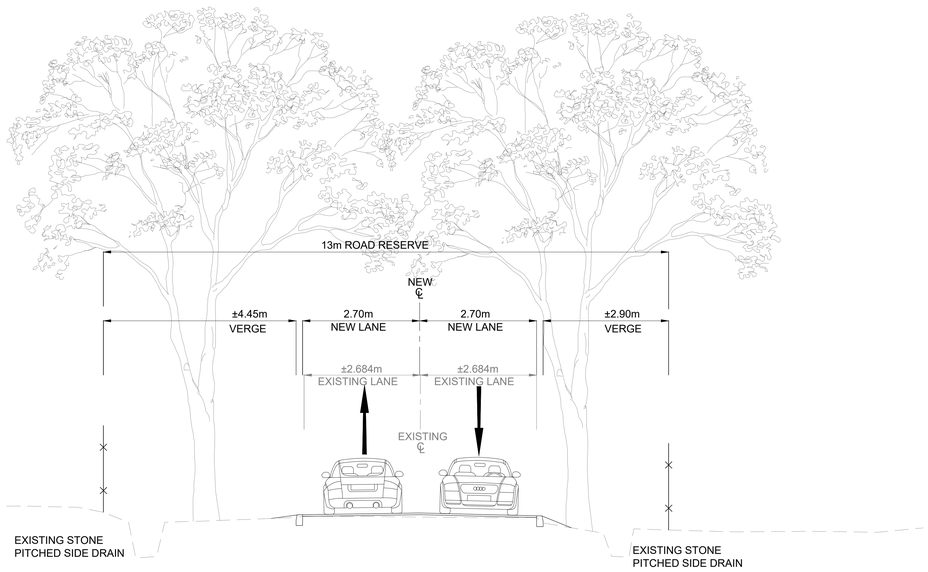

SECTION E-E AT SV 1100

FOR INFORMATION

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REFERENCE DRAWINGS	

REV	DESCRIPTION	DATE	REV BY	CHKD
A	ISSUED FOR INFORMATION	04.11.2019	IB	IB
REVISIONS				

DESIGNED	J. vd SPUY	
DRAWN	J. vd SPUY	
CHECKED	I. BRITTEN	

APPROVED

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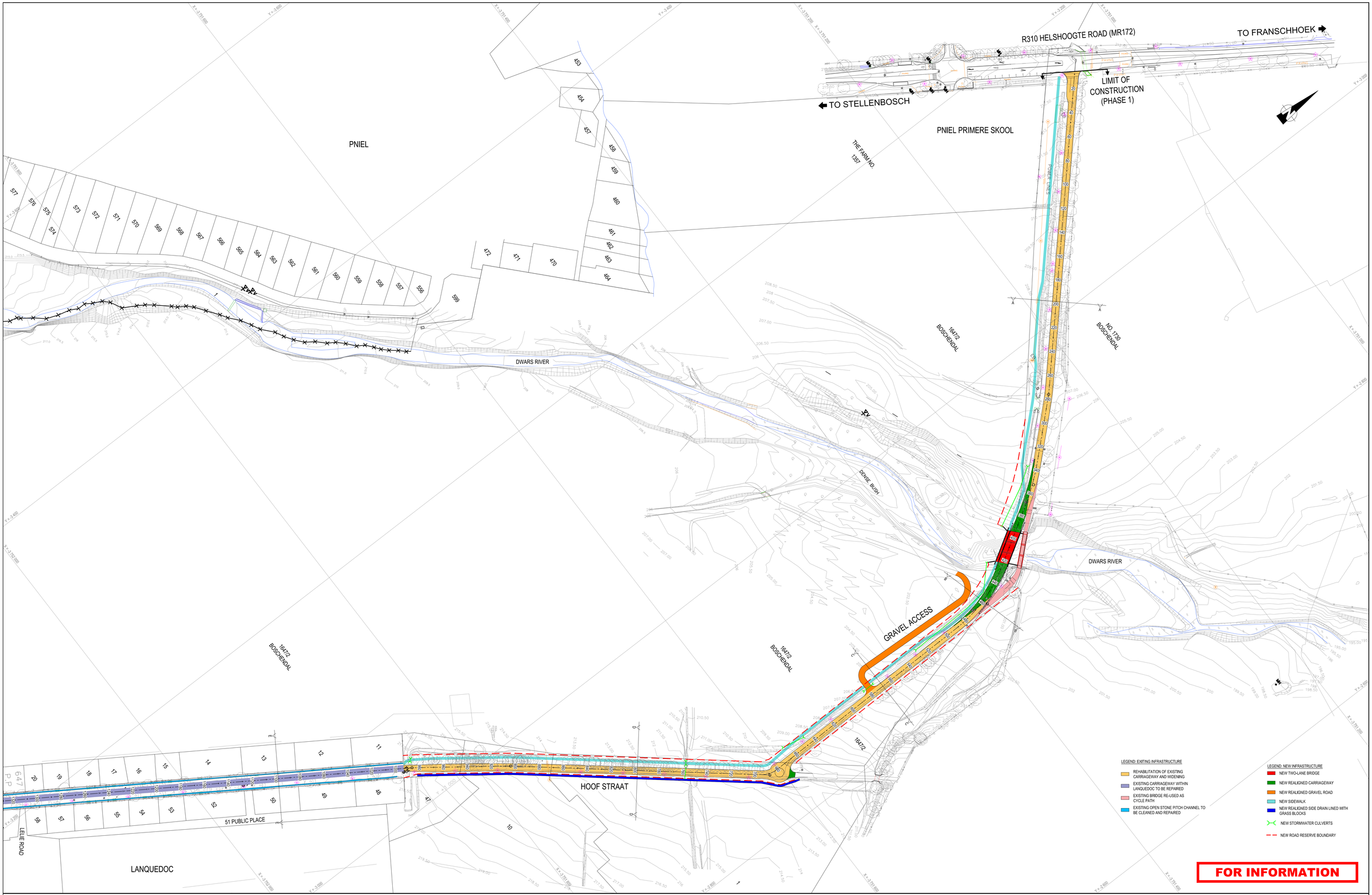
PROJECT/DRAWING TITLE

UPGRADING OF LANQUEDOC ACCESS ROAD AND BRIDGE

TYPICAL CROSS SECTIONS

SCALE	SHEET
1:1000	2 OF 2
CONTRACT No.	PROJECT No.
B/SM 28/16	MD3137.CPT
DRAWING No.	REV
MD3137-1300-02	A



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REFERENCE DRAWINGS	

DRG. No.	DRAWING TITLE
REFERENCE DRAWINGS	

REV	DESCRIPTION	DATE	REV BY	CHKD
A	ISSUED FOR INFORMATION	04.11.2019	IB	IB
REVISIONS				

DESIGNED	J. vd SPUY
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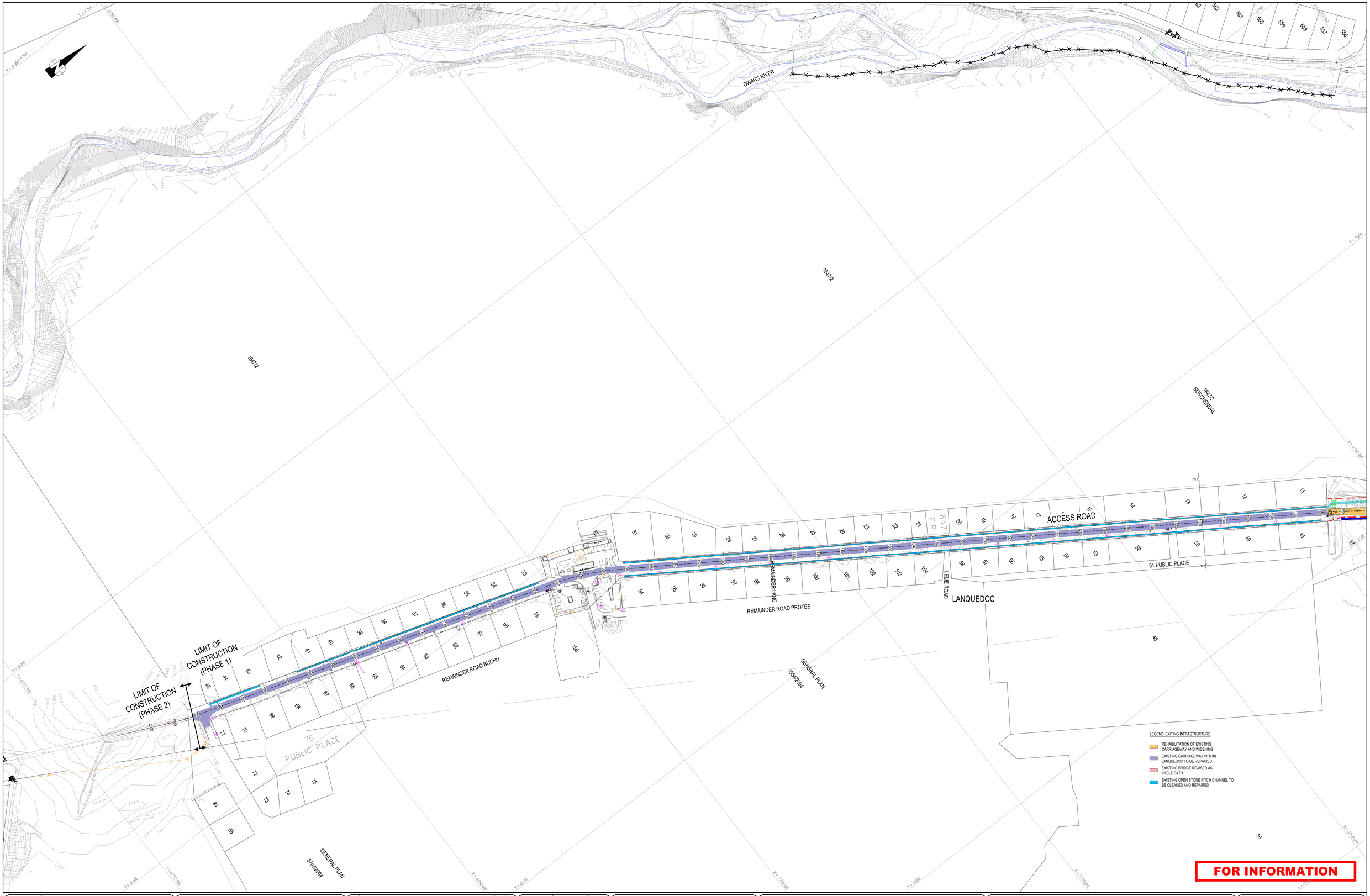
PROJECT/DRAWING TITLE

UPGRADING OF LANQUEDOC ACCESS ROAD AND BRIDGE

LAYOUT PLAN SV 0.00 TO SV 1000.00 (SHEET 1 OF 2)

SCALE	SHEET
1:1000	1 OF 2
CONTRACT No.	PROJECT No.
B/SM 28/16	MD3137.CPT

DRAWING No.	REV
MD3137-1500-01	A



DRG. No.	DRAWING TITLE

REFERENCE DRAWINGS

DRG. No.	DRAWING TITLE

REFERENCE DRAWINGS

REV	DESCRIPTION	DATE	REV BY	CHKD
A	ISSUED FOR INFORMATION	04.11.2019	IB	IB

REVISIONS

DESIGNED	J. vd SPUY
DRAWN	J. vd SPUY
CHECKED	I. BRITTEN

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PROJECT/DRAWING TITLE

UPGRADING OF LANQUEDOC ACCESS ROAD AND BRIDGE

LAYOUT PLAN SV 1000.00 TO SV 2000.00 (SHEET 2 OF 2)

SCALE	SHEET
1:1000	2 OF 2
CONTRACT No.	PROJECT No.
B/SM 28/16	MD3137.CPT
DRAWING No.	REV.
MD3137-1500-02	A

Appendix D

Photos

One directional bridge over the Dwars River with speedhumps at the entrances

Shoulder Sight Distance in direction of Lanquedoc

Shoulder Sight Distance in direction of bridge

Ou Wapad

Entrance to Ou Wapad

Lanquedoc Main Road/Ou Wapad intersection