GAUTENG PROVINCE
Department: Roads and Transport
REPUBLIC OF SOUTH AFRICA

GEOMETRIC ROUTE CLEARANCE REPORT

TRANSPORTATION OF A 20t AIRCRAFT FROM THE O R TAMBO INTERNATIONAL AIRPORT TO THE SAA MUSEUM AT RAND AIRPORT

PROJECT NUMBER J4628

NOVEMBER 2016

Report prepared by

ARC
AFRICA ROUTE CLEARANCE CONSULTANTS

on behalf of

SAA MUSEUM SOCIETY

and

Transcor

This document is Copyright protected ©

AFRICA ROUTE CLEARANCE
CONSULTANTS
(Formerly Bott Drennan Maud)

14 Villa Valencia Office Park
No. 4 Anemoon Str.
Cnr. Monument Rd.
Glen Marais Ext 1.
P.O. Box 2001
Kempton Park, 1620
South Africa

TEL: +27 11 979 0416-9
FAX: +27 11 979 0430/2
E-Mail: admin@arc.za.com

JOB REFERENCE NUMBER – J4628 – TO BE QUOTED ON ALL CORRESPONDENCE

DATE : 30 November 2016
TO : Gauteng Provincial Government – Department of Transport
ATTENTION : Mr Jose Heredia

GEOMETRIC ROUTE CLEARANCE FROM O R TAMBO INTERNATIONAL AIRPORT IN KEMPTON PARK TO THE SAA MUSEUM IN GERMISTON FOR THE TRANSPORTATION OF A 20 TON AIRCRAFT. LENGTH = 20.0m, WIDTH = 8.90m, HEIGHT = 4.20m LADEN HEIGHT = 5.40m.

We have been appointed by the **South African Airways (SAA) Museum Society** to clear the route from O R Tambo international Airport in Jet Park to the SAA Museum in Germiston for the transportation of a 20 ton Aircraft with dimensions of L = 20.0m x W = 8.90m x H = 4.20m, **giving a Laden Height of 5.40m.**

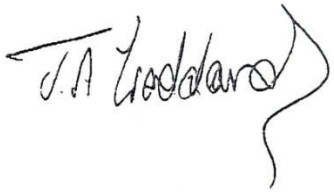
Transcor will transport the 20 ton Aircraft on their 6 Axle Martin 'Extendable' Trailer Combination – **Registration Number: ND581035**

ARC have satisfied themselves that the load width of 8.90m, can be safely accommodated through the proposed route.

ARC are satisfied that the bridge structures on the proposed route, can safely carry the imposed loading which is well within the AV Registration of the Trailer Combination.

The transportation of the 20 ton Aircraft is due to commence on Sunday – 22 January 2017.

Yours faithfully
ARC - Africa Route Clearance Consultants



J A Goddard Pr Eng

CONTENTS.

1. Executive Summary.

1.1 Introduction.

1.2 Overall Findings.

1.3 Overall Recommendations.

2. Route Selection.

2.1 Point by Point Route Description

2.2 **GEOMETRIC ROUTE REPORT**

2.3 **ROUTE INVENTORY**

2.4 Map

3. Clearances

3.1 Provinces / Municipalities

3.2 Bridges

3.3 Eskom

3.4 Telkom

APPENDICES

A. Trailer Drawings

B. Stability Report.

1. EXECUTIVE SUMMARY

1.1 Introduction

Africa Route Clearance Consultants (ARC) was appointed by the South African Airways Museum Society, to carry out a Route Survey and prepare a Geometric Route Clearance Report for the transportation of a 20 ton Aircraft from O R Tambo International Airport to the SAA Museum at the Rand Airport.

It is proposed at this time that the load will be transported in the early hours of Sunday the 22th of January 2017 using the following vehicle combination arrangement as supplied to ARC by TRANSCOR:

6 x 4 T/Tractor, 6 axle Martin `Extendable` Trailer.

Dimensions for the Load are;

Length	17.0m;
Width	**8.90m (Main Abnormality);**
Height	4.20m,
Weight	20 tons.

Dimensions for the overall laden combination;

Overall Combination Length:	17.90m,
Overall Combination Width:	**8.90m (Abnormal)**,
Overall Combination Height:	5.40m (Abnormal),
Gross Combination Mass:	75.160 tons (Abnormal).

1.2 Overall Findings

The route was physically inspected by ARC on the 26th of November 2016.

Particular attention was paid to the following features during the route inspection:

- Road visual condition along the route;
- Geometric clearance for road furniture;
- **Overhead limitations;**
- **Width limitations;**
- Tracking through road intersections and constrained sections of the proposed route.

The findings from the Route Survey as detailed in this report are that the proposed route is feasible and capable of safely accommodating the passage of the load on the proposed trailer combination.

1.3 Overall Recommendations (Applicable at Time of Transportation)

It is recommended that:

- Speed limits indicated on the abnormal load permit are to be observed.

  Speed is to be further reduced at:
  - Defective sections of road;
  - Sharp horizontal curves;
  - Sections of road works;
  - Highlighted overhead restrictions.

- Traffic Police escorts will be provided, as per Abnormal Load Permit Requirements, throughout the route.

  The Transporter`s own escort vehicles and personnel will provide additional assistance. The escort vehicles will carry the requisite warning systems, including flashing lights, flags and warning signs, in accordance with A/V Permit regulations.

- All relevant authorities will be notified in advance of the proposed load movement, and supplied with details of the load and vehicle configuration, the intended route, and the proposed movement schedule. This communication will be coordinated by ARC.

- It is imperative that the transporter has studied this route clearance report and relayed to the driver the following;

  - Low overhead clearances,
  - **Width Restrictions requiring sections of contra-flow travel,**
  - Travel through high density / informal settlements.

2. ROUTE SELECTION

2.1 Point by Point Route Description

The proposed route from O R Tambo International Airport to the SAA Museum at Rand Airport is as follows:

1. The load will be lifted by a Mobile Crane over the O R Tambo Technical boundary wall and loaded onto the Trailer Combination in the yard adjacent to the boundary wall.

2. The Trailer Combination will then proceed 55m on the service lane road to the exit gate of the yard at co-ordinates -26.141599, 28.221909.

3. Exit the yard via the service gate and turn left onto Jones Road.

4. Continue on Jones Road negotiating two right hand bends and continue through the Griffiths Road intersection.

5. Negotiate the left hand curve.

6. Continue on Jones Road over the Taljaard Road intersection.

7. Negotiate the right hand bend.

8. At the T-Junction perform a **contra-flow right hand turn via the slip road** onto Ridge Road and proceed on the correct (left) side of Ridge Road.

9. Continue on Ridge Road.

10. At the Traffic Signals, turn left via the **'slip road'** onto Rondebult Road.

11. Cross over the N12 - Freeway and continue on Rondebult Road.

12. At the Traffic Signals with North Rand Road (M44) intersection, **cross over this intersection and proceed in a 'contra-flow direction'** on Rondebult Road.

13. Negotiate the overhead advertisement board.

14. Negotiate the overhead cantilever advertisement board.

15. At the Traffic Signals with 1st Road, **cross over the intersection and return to the correct side of the road** and continue on Rondebult Road.

16. **Negotiate the Overhead Pedestrian Bridge Structure.**

17. At the Traffic Signals cross over Rietfontein Road (R21) and continue on Rondebult Road (R21)

18. At the Traffic Signals, turn right onto Main Reef Road (R29).

19. At the Traffic Signals, turn left via the **'slip road'** onto Wit Deep Road.

20. Cross over the Road-Over-Rail Bridge.

21. At the Traffic Signals, turn right onto Lower Boksburg Road (M53)

22. Continue over two Railway Level Crossings.

23. At the Traffic Signals, turn left onto Joubert Street.

24. Cross over Road-Over-Road and Rail Bridge.

25. **Negotiate the overhead aerial cable (lowest point on route).**

26. Negotiate the overhead cantilever road sign.

27. At the Traffic Signals with Chachet Road turn right.

28. At the T-Junction with Dakota Crescent turn left.

29. At the right hand bend cut diagonally right across the pavement / gravel area between the transformer box and trees.

30. 60m before the wooden frame (entrance to the SAA Museum) turn left towards the **'Yellow Gate'** of the SAA Museum.

31. At the **'Yellow Gate'** turn left and drive parallel to the fence of the SAA Museum Yard.

32. Stop next to the end of the fence for off-loading of the Aircraft.

2.2 The proposed route and geometric clearances are as follows:

Exit the yard gate and turn left onto Jones Road.

Jones Road widths.

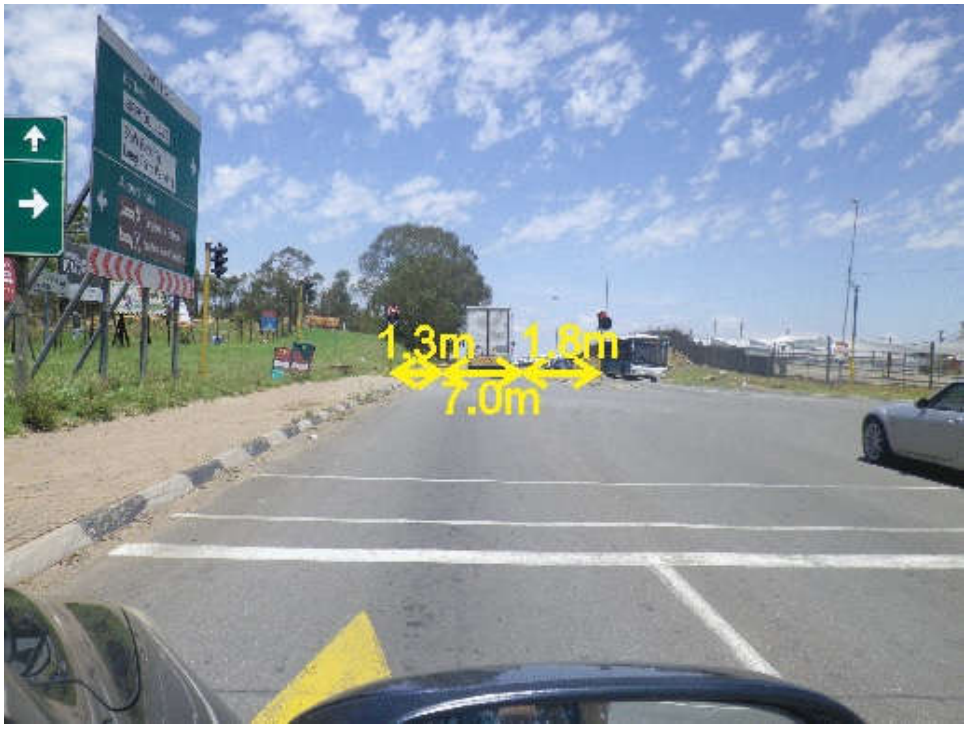
Negotiate the right hand bend.

Road width on Jones Road at the SAA Technical (SOC) Entrance.

Negotiate the right hand bend.

Negotiate overhead advertisement board.

Continue on Jones Road through the Griffiths Road intersection.



Negotiate the left hand curve.

Continue on Jones Road over the Taljaard Road intersection.

Road surface deteriorates (roadworks) and road width narrows to 8.50m, total clearance of 12.0m.

'Concrete New Jersey Barriers' on left hand side and wooden posts on right hand side of the road.

CAUTION: Negotiate the 'Transnet Sign' on left hand side and avoid the leaning telephone pole on right hand side. Road width = 8.50m, total clearance = 12.0m. (Maneuver left side then right side to avoid).

Negotiate right hand bend – balustrades on left hand side and fence on right hand side.

At the T-Junction perform a **'contra-flow' right hand turn via the 'slip road'** onto Ridge Road and proceed on the correct (left) side of Ridge Road.

Ridge Road width.

Ridge Road narrows to 8.0m – clearance with shoulder = 12.0m.

Ridge Road widens with slip lane – clearance = 12.0m.

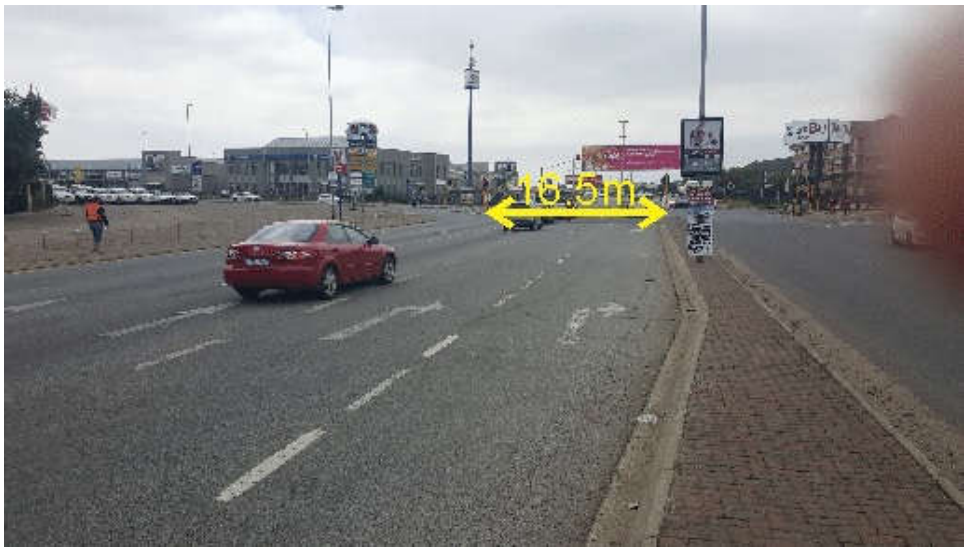
At the Traffic Signals, turn left via the **'slip road'** onto Rondebult Road.

Rondebult Road width –clearance with shoulder = 12.80m.

At the Traffic Signals continue straight on Rondebult Road over the N12 – Freeway on-ramp intersection.

Continue straight on Rondebult Road over the N12 - Freeway Bridge.

At the Traffic Signals with North Rand Road (M44) intersection, **cross over this intersection and proceed in a contra-flow direction** on Rondebult Road.



Rondebult Road widths.

Rondebult Road widths.

Negotiate the overhead advertisement board.

Negotiate the overhead advertisement board.

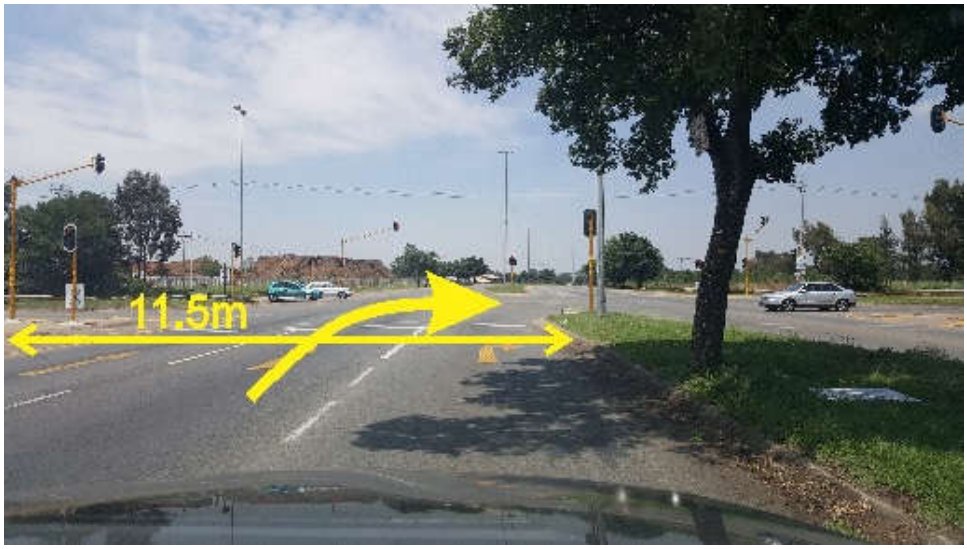
At the Traffic Signals with 1st Road, **cross over the intersection and return to the correct side of the road** and continue on Rondebult Road.

Negotiate the Overhead Pedestrian Bridge Structure.

At the Traffic Signals, cross over Ravenswood Street.

At the Traffic Signals cross over Rietfontein Road (R21) and continue on Rondebult Road (R21).

At the Traffic Signals, turn right onto Main Reef Road (R29).



Main Reef Road (R29) –Road width (Pothole on left hand side).

At the Traffic Signals, cross over Pretoria Road.

At the Traffic Signals, cross over Field Street.

At the Traffic Signals, cross over Main Street.

At the Traffic Signals, turn left via the **'slip road'** onto Wit Deep Road.

Wit Deep Road – Surface Deteriorates.

Cross over the Road-Over-Rail Bridge.

At the Traffic Signals, cross over Princess Avenue.

At the Traffic Signals, turn right onto Lower Boksburg Road (M53).

At the Traffic Signals, cross over Simon Bekker Road.

At the Traffic Signals, cross over Knights Road and continue with Tide Street.

Tide Street – cross over the Road-Over-Rail Bridge.

At the Traffic Signals, cross over Railway Street.

At the Traffic Signals, cross over Victoria Street.

At the Traffic Signals, cross over President Street and continue on Power Street (M44).

At the Traffic Signals, cross over Webber Road.

At the Traffic Signals, turn left onto Joubert Street.

Cross over the Road-Over-Road and Rail Bridge

CAUTION: Negotiate overhead cable (Min height = 5.40m) and cantilever road sign (5.750m).

At the Traffic Signals, cross over Chapman Road (M48) and continue on Russel Road.

At the Traffic Signals with Chachet Road, turn right.

Chachet Road.

At the T-Junction with Dakota Crescent turn left.

At the right hand bend cut diagonally right across the pavement / gravel area between the transformer box and trees.

60m before the entrance to the SAA Museum turn left towards the 'Yellow Gate'.

At the 'Yellow Gate' turn left and drive parallel to the fence of the SAA Museum yard.

Stop next to the end of the fence for off-loading of the Aircraft.

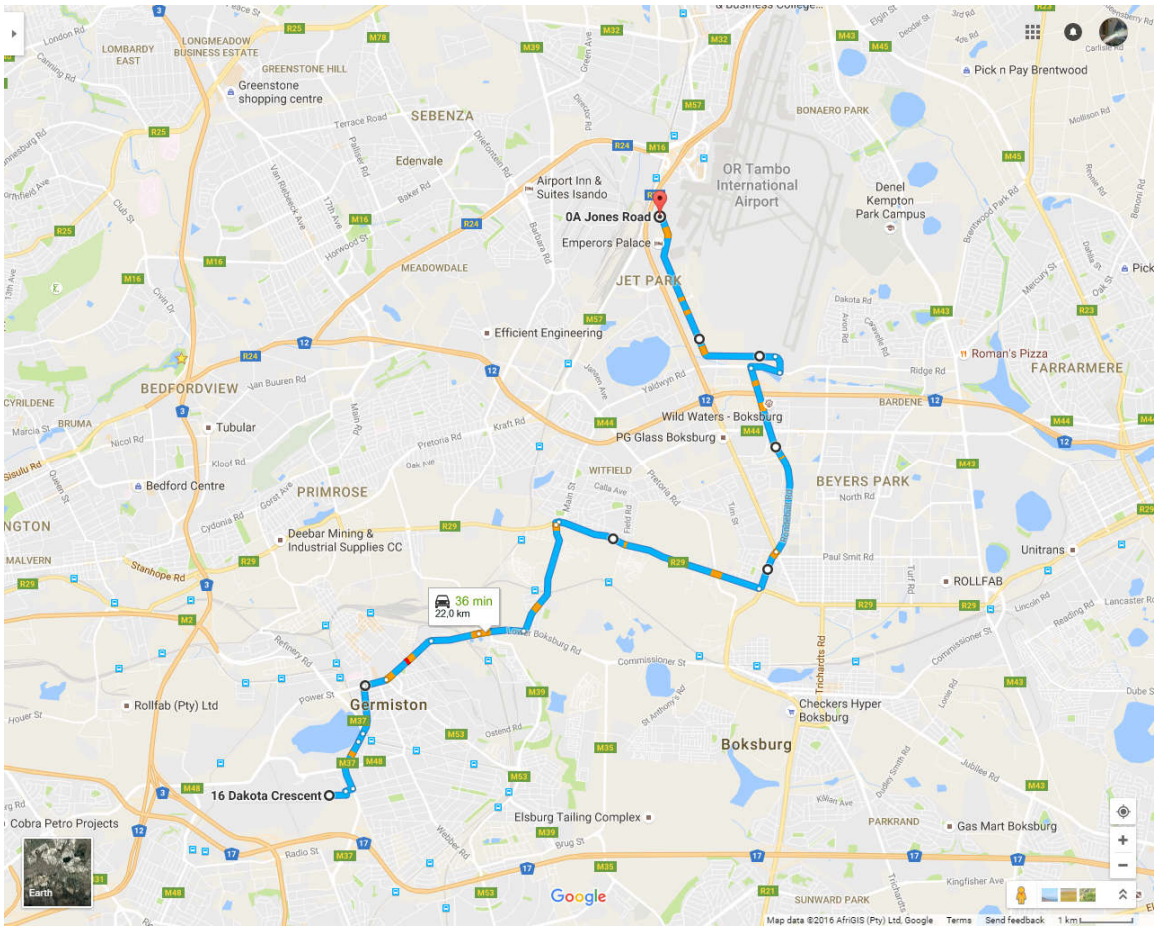
2.3. Route Inventory.

Trip Meter (km)	Item	Height (m)	Road Width (m)	Max Width (m)
km 0.00	The load will be craned over the O R Tambo Technical boundary wall and loaded onto the trailer combination in the yard adjacent to the boundary wall. The combination will proceed 55m on the service lane road to the exit gate of the yard at co-ordinates -26.141599, 28.221909.	CLEAR	22.0m	22.0m
km 0.00	Exit the yard service gate and turn left onto Jones road.	CLEAR	8.50m	13.50m
km 0.10	Negotiate right hand bend	CLEAR	8.50m	12.50m
km 0.40	Negotiate right hand bend	CLEAR	CLEAR	CLEAR
km 0.80	Cross over intersection at Emperors Palace	CLEAR	CLEAR	CLEAR
km 0.90	Negotiate overhead advertisement sign	5.70m	CLEAR	CLEAR
km 1.30	Traffic Signals cross over Griffiths road intersection	CLEAR	7.00m	10.10m
km 1.70	Negotiate Traffic lights	CLEAR	CLEAR	CLEAR
km 2.80	Negotiate left hand curve	CLEAR	CLEAR	CLEAR
km 3.00	Cross over Taljaard road intersection	CLEAR	15.00m	17.90m
km 3.20	Road deteriorates and narrows to 8.50m - Wooden Post on Right hand side	CLEAR	8.50m	12.0m
km 3.40	**CAUTION**			
***	**Negotiate Transet sign on left hand side and leaning pole on right hand side**	CLEAR	**8.50m**	**9.50m**
km 4.10	Negotiate Right Hand Bend - Balustrades on left hand side and fence on right hand side	CLEAR	7.50m	11.80m
km 4.40	At the T-Junction perform a contra-flow right hand turn via the slip road onto Ridge Road and proceed on the correct (left) side of Ridge road.	CLEAR	5.00m	CLEAR
km 4.90	Traffic Lights turn left via the slip road onto Rondebult road	CLEAR	8.00m	17.50m
km 5.20	Cross over N12-Freeway Bridge	CLEAR	7.50m	9.60m
km 5.50	At the Traffic Signals with North Rand Road (M44) intersection, cross over this intersection and proceed in a contra-flow direction on Rondebult Road.	5.70m	CLEAR	16.50m
km 6.10	Overhead advertisement sign	7.00m	CLEAR	CLEAR
km 6.40	Overhead advertisement sign	6.30m	CLEAR	CLEAR
km 6.60	At the Traffic Signals with 1st Road, cross over the intersection and return to the correct side of the road and continue on Rondebult Road.	CLEAR	CLEAR	10.00m
km 7.30	Negotiate overhead pedestrian bridge	5.70m	CLEAR	10.00m
km 7.90	Pothole on left hand side	CLEAR	CLEAR	CLEAR
km 8.40	Cross over Rietfontein Road (R21)	CLEAR	CLEAR	CLEAR
km 9.10	Traffic Signal Turn Right on Main Reef Road (R29)	CLEAR	CLEAR	CLEAR
km 10.00	Traffic Signal cross over Pretoria Road	CLEAR	CLEAR	CLEAR
km 10.30	Negotiate trees on both sides of the road	CLEAR	CLEAR	CLEAR

Trip Meter (km)	Item	Height (m)	Road Width (m)	Max Width (m)
***	**Informal settlement on left hand side - beware of pedestrians and stray animals for 2km**	CLEAR	CLEAR	CLEAR
km 11.80	Traffic Signal cross over Field Street	CLEAR	CLEAR	CLEAR
km 13.00	Traffic signal cross over Main Street	CLEAR	CLEAR	CLEAR
km 13.10	Traffic Signal turn left via "Slip Road" onto Wit Deep Road	CLEAR	CLEAR	CLEAR
km 13.5	Negotiate Left Hand Bend	CLEAR	CLEAR	CLEAR
***	**Informal settlement on left hand side - beware of pedestrians and stray animals for 800m**	CLEAR	CLEAR	CLEAR
km 14.20	Road surface deteriorates	CLEAR	CLEAR	CLEAR
km 14.30	Cross over road-over-rail bridge	CLEAR	CLEAR	10.00m
km 15.30	T-Junction turn right into Lower Boksburg Road (M53)	CLEAR	CLEAR	CLEAR
***	**Potholes after exiting corner on left hand side**	CLEAR	CLEAR	CLEAR
km 15.80	Traffic signals Simon Bekker Road	CLEAR	CLEAR	CLEAR
km 16.10	Traffic Signals cross over Knights Road and continue on Tide Street	CLEAR	CLEAR	CLEAR
km 16.30	Cross over road-over-rail bridge	CLEAR	CLEAR	CLEAR
km 16.90	Cross over railway level crossing	CLEAR	CLEAR	CLEAR
km 17.10	Cross over railway level crossing	CLEAR	CLEAR	CLEAR
km 17.40	Cross over Crown Street	CLEAR	CLEAR	CLEAR
km 17.60	Traffic Signals cross over Victoria Street	CLEAR	CLEAR	CLEAR
km 17.70	Traffic Signals cross over President Street and continue with Power Street (M44)	CLEAR	CLEAR	CLEAR
km 17.90	Traffic Signals cross over Webber Road (M49)	CLEAR	CLEAR	CLEAR
km 18.30	Traffic Signals turn left into Joubert Street	CLEAR	CLEAR	CLEAR
km 18.90	Cross over road-over-road and rail	CLEAR	CLEAR	CLEAR
km 19.40	Cross over William Hills Avenue	CLEAR	CLEAR	CLEAR
km 19.50	**CAUTION**			
***	**Overhead aerial cable**	**5.4**	CLEAR	CLEAR
km 19.60				
***	**Canti-lever road sign**	**5.75**	CLEAR	CLEAR
km 19.70	Traffic signals - cross over Chapman Road (M48).	CLEAR	CLEAR	CLEAR
km 20.20	Traffic Signals turn right Chachet Road	CLEAR	CLEAR	CLEAR
km 20.30	T-Junction with Dakota Crescent, turn left	CLEAR	CLEAR	CLEAR
km 20.40	At the right hand bend cut diagonally right across the pavement / gravel area between the transformer box and trees.	CLEAR	CLEAR	CLEAR
km 20.60	60m before the wooden frame (entrance to the SAA Museum) turn left towards the Yellow Gate. At the Yellow Gate turn left and drive parallel to the fence of the SAA Museum Yard. Stop next to the end of the fence for off-loading of the aircraft.	CLEAR	CLEAR	CLEAR

2.4. Map

Proposed Route indicated in Blue



3. Clearances

3.1 Bridge Clearance Letter

ARC are satisfied that the bridge structures on the proposed route, can safely carry the imposed loading which is well within the AV Registration of the Trailer Combination

3.2 Eskom Clearance

No Eskom Clearance is necessary as the Laden Height does not exceed 5.80m.

3.3 Telkom Clearance

No Telkom Clearance is necessary as the Laden Height does not exceed 5.50m.

3.4 Trailer Drawings

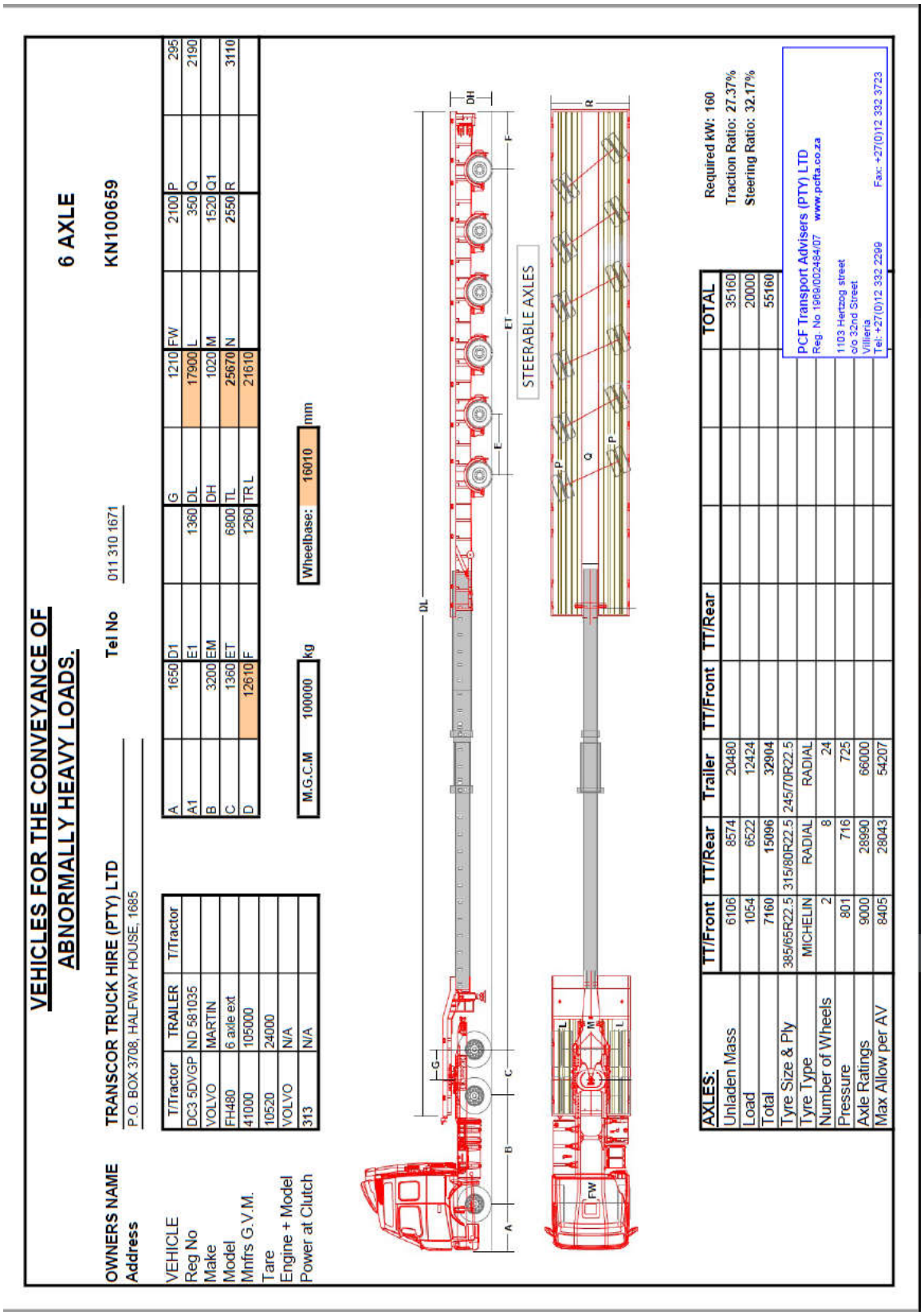
See appendix A

3.5 Stability Calculation

See appendix B

APPENDICES

APPENDIX A
Trailer Drawing


VEHICLES FOR THE CONVEYANCE OF ABNORMALLY HEAVY LOADS.
6 AXLE
OWNERS NAME TRANSCOR TRUCK HIRE (PTY) LTD
Tel No 011 310 1671
KN100659
Address P.O. BOX 3708, HALFWAY HOUSE, 1685
VEHICLE
Reg No
Make
Model
Mnfrs G.V.M.
Tare
Engine + Model
Power at Clutch
T/Tractor TRAILER T/Tractor
DC3 5DVGP ND 581035
VOLVO MARTIN
FH480 6 axle ext
41000 105000
10520 24000
VOLVO N/A
313 N/A
A 1650 D1
A1 E1
B 3200 EM
C 1360 ET
D 12610 F
G 1360 DL
6800 TL
1260 TR L
1210 FW
17900 L
1020 M
25670 N
21610
2100 P
350 Q
1520 Q1
2550 R
295
2190
3110
M.G.C.M 100000 kg
Wheelbase: 16010 mm
STEERABLE AXLES
AXLES: TT/Front TT/Rear Trailer TT/Front TT/Rear TOTAL
Unladen Mass 6106 8574 20480 35160
Load 1054 6522 12424 20000
Total 7160 15096 32904 55160
Tyre Size & Ply 385/65R22.5 315/80R22.5 245/70R22.5
Tyre Type MICHELIN RADIAL RADIAL
Number of Wheels 2 8 24
Pressure 801 716 725
Axle Ratings 9000 28990 66000
Max Allow per AV 8405 28043 54207
Required kW: 160
Traction Ratio: 27.37%
Steering Ratio: 32.17%
PCF Transport Advisers (PTY) LTD
Reg. No 1968/002484/07 www.pcfta.co.za
1103 Hertzog street
c/o 32nd Street
Villieria
Tel: +27(0)12 332 2299 Fax: +27(0)12 332 3723

APPENDIX B
Stability Report

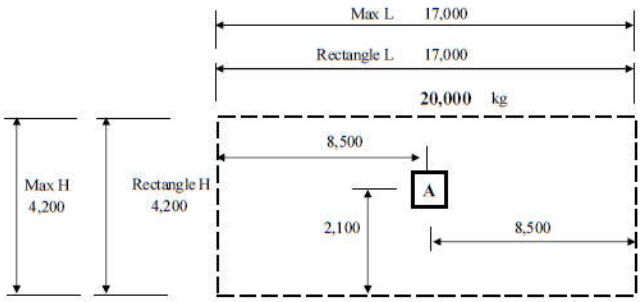
LOADING DIAGRAM

x dc35dv+nd581035-a1 Reference jdpTCOR

TRANSCOR TRUCK HIRE (PTY) LTD

Load detail - AIRPLANE				Combination Detail
Length	Width	Height	Mass	Semi Trailer
17,000	8,900	4,200	20,000	KN300501 ND581035
				Dolly
				x x
				Truck Tractor(s)
				KN100438 DC35DVGP
				--- ---
				--- ---
				--- ---
				--- ---
				--- ---
				--- ---
				--- ---
				--- ---
				--- ---

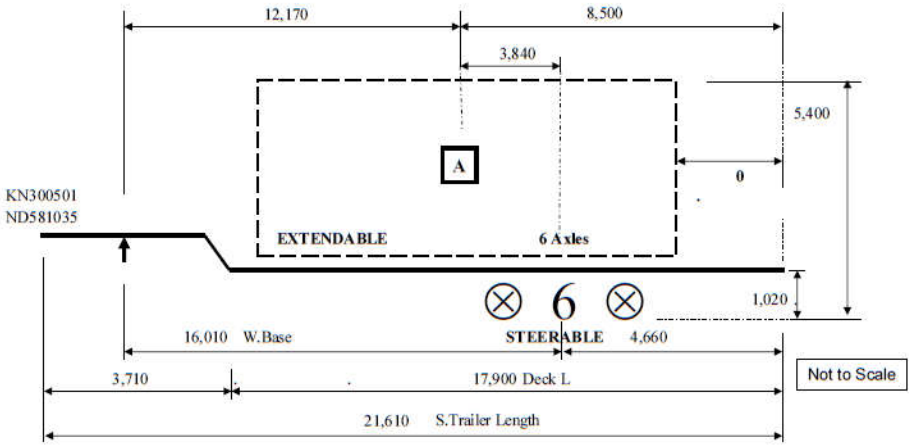
Loading diagram & Assumptions for the AIRPLANE



CENTRE OF GRAVITY
Length - Centre
Height - Centre

The CG of the AIRPLANE 'A' is a conservative position.

Due to the loading method of the AIRPLANE the loaded height will be increased by 180 mm ..



This AIRPLANE
Loaded onto this semi trailer combination as shown schematically above will present no problems with regard to stability.
and the STEERING RATIO will be 35% and the TRACTION RATIO will be 23%

Disclaimer : The final responsibility with regard to the safe loading, securing and transportation of the AIRPLANE remains with the transport company and any deviation from the above recommendations may lead to instability.

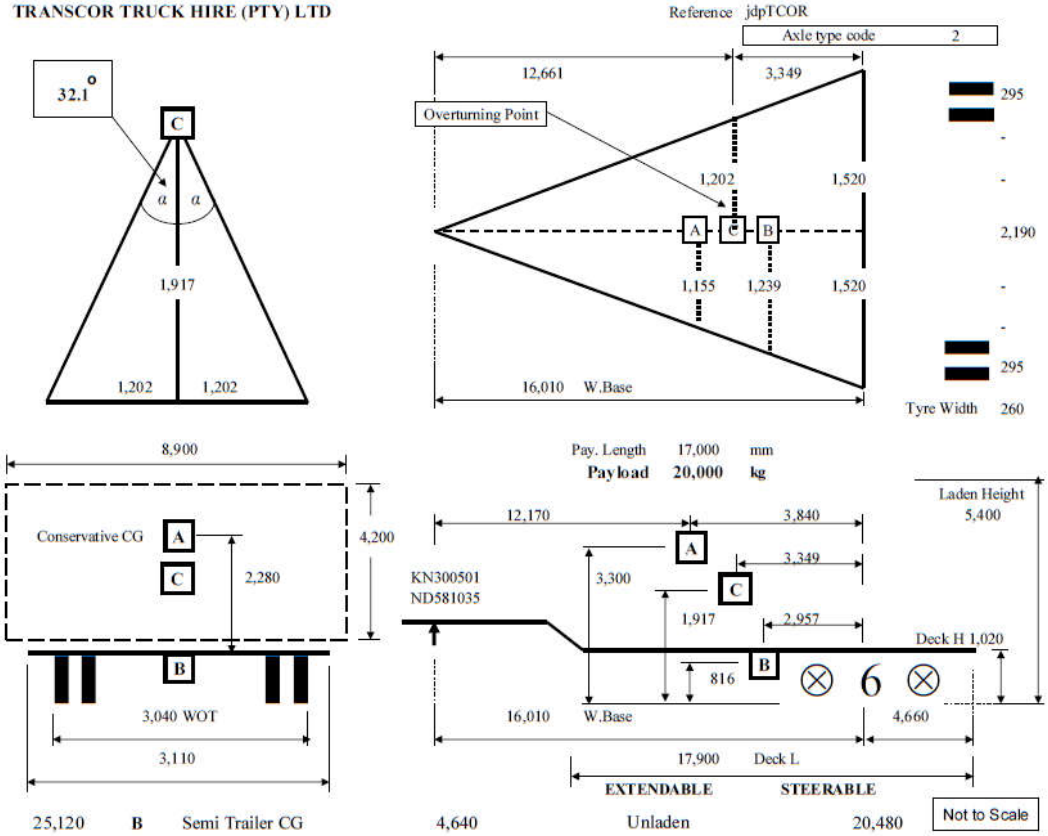
OTTO VAN GRIETHUYSEN 24-Nov-16
BSc. BIng. (Mech.) Pr Eng

STABILITY x dc35dv+nd581035-a1 AIRPLANE

TRANSCOR TRUCK HIRE (PTY) LTD

Reference jdpTCOR

Axle type code 2



25,120	B	Semi Trailer CG	4,640	Unladen	20,480
20,000	A	Payload CG	4,797	Payload	15,203
45,120	C	Combined CG	9,437	Total	35,683

Due to the loading method of the AIRPLANE the loaded height will be increased by 180 mm ..

.

Angle of Safety

Angle of Safety = Arctan(1202 / 1917) **32.1°** **> 15.0° at overturning point**

The above Angle of Safety will present no stability problems.

Width Ratio - Load / Outside Tyres 2.93 < 3 - Stability Side Angle Check - Not Required

WIND

Assume that wind acts on a rectangle of Width "W", Height "H" and at a height of "HG" from ground level

From the loading diagram the following applies.

W = 17.000 H = 4.200 HG = 3.300

From the shape of the AIRPLANE this is a conservative view

Overturning Moment

OTM with a Factor of Safety FoS 2.0 Drag coefficient (Cd) 1.0 and a wind Pressure þ

OTM = W x H x HG x Pressure x Cd x FoS ∴ **OTM = 471.2 x þ kNm**

Rectifying Moment

RM = MASS x g x Overturning Dist

45.120 9.81 1.202 ∴ **RM = 532.1 kNm**

Wind pressure (RM equal to OTM) **at overturning point**

þ = RM / OTM ∴ **þ = 1.13 kN/m² - Maximum wind pressure**

Speed = SQRT(þ x 21638 / Cd) **156 Km/h - Maximum wind speed**