



# TRAFFIC / TRANSPORT ECONOMIC INPUT ON ALTERNATIVE OPTIONS FOR THE SOUTHERN ALIGNMENT OF THE R300 RING ROAD IN CAPE TOWN

## 1 INTRODUCTION

Over the last twelve months there has been considerable discussion regarding the preferred or optimum alignment for the southern section of the R300 (commonly referred to as the R300 Southern Alignment). In terms of these discussions and in terms of the most recent developments, it is understood that five alternative options have been tabled and are presently being debated, these options being:

- a) **The Original Penway Option** as proposed by the Peninsular Expressway Consortium (Penway) which extends the existing R300 at Vanguard Drive firstly in a westerly, thereafter a southerly direction and finally a westerly direction whereupon it follows the alignment of False Bay Coastal Arterial (refer to d below) and runs east to west just north of the township of Strandfontein before linking into Steenberg Road and terminating at the Westlake Interchange of the Simon van der Stel Freeway.
- b) **Alignments A & B** which are variations of the original option and which for their greater part follow the alignment of the original option as outlined above but which, in the area between Strandfontein and Sea Winds / Lavender Hill East, follow more southerly alignments which lie to the south of the Cape Flats Sewerage Works and just north of Baden Powell Drive.
- c) The **CCT Option 2A** which rather than develop an entirely new road as is the case in a) and b) above, promotes the development of an upgraded and realigned Baden Powell Drive. In entertaining this option, it is recognised that the development / improvement of access links to/from Baden Powell (e.g. the development of Princess Vlei Parkway and Vanguard Drive Extension) also forms part of this option.
- d) The **CCT Option 3** which comprises the False Bay Coastal Arterial which runs east-west just to the north of Strandfontein and which also requires the development of the access links referred to in c) above.



In order to examine the pros and cons of the above options it was necessary to undertake relevant traffic, transport economic and road engineering design work. This note examines the merits of the options in traffic and transport economic terms whilst parallel work, reported elsewhere, is being undertaken on the road engineering design implications.

## 2 ASSESSMENT METHODOLOGY

In order to assess the traffic and transport economic merits of the above alternative options, each option was tested using the R300 model. Traffic and transport economic assessments were then conducted using the outputs from these model tests / runs.

## 3 RESULTS

### 3.1 TRAFFIC

Traffic assignments for the five road network options outlined Section 1 above are presented in Table 1 hereunder.

**Table 1 : Assignment Results**

Southern Alignment Options				
	A.M. Peak Hour Volumes			Representative Daily Volume
	Westbound	Eastbound	Total	
Original Penway Option				
• Southern Alignment	1337	1022	2359	15920
• Baden Powell (existing)	921	228	1149	7760
<b>TOTAL</b>	<b>2258</b>	<b>1250</b>	<b>3508</b>	<b>23680</b>
Alignment A				
• Southern Alignment	1114	823	1937	13070
• Baden Powell (existing)	925	258	1183	7990
<b>TOTAL</b>	<b>2039</b>	<b>1081</b>	<b>3120</b>	<b>21060</b>
Alignment B				
• Southern Alignment	1195	883	2078	14030
• Baden Powell (existing)	968	274	1242	8380
<b>TOTAL</b>	<b>2163</b>	<b>1157</b>	<b>3320</b>	<b>22410</b>



<b>Southern Alignment Options</b>				
	<b>A.M. Peak Hour Volumes</b>			<b>Representative Daily Volume</b>
	<b>Westbound</b>	<b>Eastbound</b>	<b>Total</b>	
• Southern Alignment	-	-	-	-
• Baden Powell (upgraded)	1698	752	2450	16540
<b>TOTAL</b>	<b>1698</b>	<b>752</b>	<b>2450</b>	<b>16540</b>
<b>CCT OPTION 3 (False Bay Coastal Arterial)</b>				
• False Bay Coastal Arterial	1490	1045	2435	16440
• Baden Powell (existing)	725	207	932	6290
<b>TOTAL</b>	<b>2219</b>	<b>1254</b>	<b>3367</b>	<b>22730</b>

Expanding on the above and in terms of analysing the prevailing trip origin/destination demands in more detail, model plots were compiled to illustrate the trip origin/destination demands or movements that would be accommodated on the three primary network options (i.e. the Original Penway Option, the CCT Option 2 A and the CCT Option 3). Details of these plots are shown in Figures 1, 2 and 3 attached.

Examination of the information provided in Figures 1, 2 and 3 clearly shows that south of the Philippi Link Corridor there are two predominant east-west flows, these being an east-south-west demand from the existing R300 in the east to Steenberg, Retreat, the Steenberg and Simon van der Stel corridors and Muizenberg in the west and an east-west demand along the coast primarily between Khayelitsha and Muizenberg.

Further examination of the information contained in Figures 1, 2 and 3 in conjunction with that contained in Table 1 shows that as a result of the two dominant origin/destination demands referred to above, it is not surprising that the Options including the Southern Alignment or alternatively the False Bay Coastal Arterial cumulatively carry more traffic in the east-west direction. In this regard and examining the results in Table 1 in particular, it is evident that if the Southern Alignment is not built (and using the Original Penway Option results as an example), then some 1301 of the 2359 vehicles which would have used the Southern Alignment will divert to an upgraded Baden Powell Drive (i.e. 1149 existing, plus 1301 equalling 2450 vehicles, the assignment result for an upgraded Baden Powell Drive) and the balance namely 1058 vehicles will divert to other east-west links lying to the north. Alternatively using the False Bay Coastal Arterial (Option 3) as an example, the corresponding figures are 1518 vehicles diverting to an upgraded Baden Powell and 917



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Figure 1



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Figure 2



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Figure 3



vehicles diverting to other east-west links.

In highlighting that the options including the Southern Alignment or alternatively the False Bay Coastal Arterial carry more traffic than the Baden Powell option, it is worth noting that the traffic work undertaken for the CCT Strategic Planning Report entitled “Reassessment of Metropolitan Road Network Muizenberg East” and highlighted in Figures 6, 7 & 8 of this report, reached a similar finding. Based upon this information and that provided above, it becomes somewhat evident that all options do not fulfil the mobility function to the same degree.

Whilst the above results show the False Bay Coastal Arterial option carries more traffic (i.e. 2435 vehs/hr) when compared to the Original Penway option (i.e. 2359 vehs/hr), this is because the Original Penway Option excludes the Westpoort link to the R300 Southern Alignment. If this link is included, therefore facilitating greater access for the Mitchells Plain area to the west, the demand on the R300 Southern Alignment option increases from 2359 veh/hr to 2720 veh/hr.

Whilst the information contained in Table 1 and Figures 1, 2 & 3 clearly demonstrates the value of developing two routes which can most directly serve the prevailing traffic demands, one must also emphasise the negative implications if only one route (e.g. an upgraded Baden Powell Drive) is developed. In this regard and with reference to Figure 2 (not forgetting that this plot only shows the traffic which would use an upgraded Baden Powell Drive, that is, it does not illustrate the network implications of the other 1058 vehs/hr or 917 vehs/hr referred to above which would divert to other routes) it is therefore important to note the double-loading effect on Vanguard Drive south of the R300/Vanguard Drive interchange and on Prince George / Princess Vlei Parkway and the circuitous nature of the travel patterns. Whilst these characteristics reinforce the need to improve access links to Baden Powell Drive if it is upgraded (i.e. not only the development of the Princess Vlei Parkway and Vanguard Drive Extension but also Vanguard Drive just south of the R300 / Vanguard Drive Interchange) they also highlight the non-optimal or less economic manner in which an upgraded Baden Powell Drive manages or accommodates the required east to west mobility function.

In addition to the above, there are other concerns with respect to the Baden Powell Drive option that need to be acknowledged this being:



- a) The provision of one route, namely an upgraded Baden Powell Drive, as opposed to two routes, namely the Southern Alignment or False Bay Coastal Arterial and an existing Baden Powell Drive, minimises the distribution of traffic into the south west area. As a result of concentrating these access/egress movements at one point rather than two, the congestion implications of the Baden Powell Drive upgrade option, particularly in the Muizenberg area, will be much greater.
- b) Based upon the assignment results for the Baden Powell Drive option, the theoretical a.m. peak hour demand on this link in the year 2000 (i.e. theoretical in the sense that this demand assumes a network including a completed Philippi Link and a completed R300 northern section) is 2450 veh/hr (1698 veh/hr in the peak direction and 752 veh/hr in the non-peak direction). Future traffic growth in the CCT is presently being reviewed, however, present indications are that ongoing traffic growth is substantial. This being the case, a 4% to 5% per annum traffic growth rate for the period 2000 to 2010 can be deemed as being realistic. If such growth rates do prevail, then the best prediction for the 2010 a.m. peak hour demand on an upgraded Baden Powell Drive is 3625 – 3990 veh/hr. Bearing in mind that the upgrade proposal for Baden Powell Drive entails upgrading this road to a four lane expressway, it can therefore be concluded that by 2010 such a facility will be running at capacity in peak hours. Based on this perspective one can therefore further conclude that the Baden Powell Drive upgrade option is not a medium, never mind a long term solution and that even in terms of being a short term solution it is, for the reasons outlined above, the poorest option in terms of addressing the mobility function.

With respect to Alignments A & B, the benefits of developing a second route are significantly reduced primarily because of the close location of these alignment options to Baden Powell Drive. Since these two alignment options are considerably longer than the Original Penway Option, they will most likely also be more expensive. The reduced benefits realised by Alignments A & B in conjunction with their potentially higher costs therefore makes them less desirable options. For this reason they should only be entertained further if they exhibit environmental advantages which are deemed to outweigh their traffic and transport economic disadvantages.

### **3.2 TRANSPORT ECONOMIC PERSPECTIVE**

Until such times as more information becomes available on the capital and ongoing rehabilitation and maintenance costs of the different options, the transport economic work



detailed herein simply examines, in general terms, the economic operating costs of the Original Penway Option and CCT Option 2A. In so doing the analysis traces the path of the traffic using these network options and calculates cumulatively, the operating costs of this traffic per its origin/destination characteristics.

Results in the above regard are presented in Table 2 below. In Scenario 1 the results reflect the benefits of the Original Penway Option if one only accounts for the traffic that would divert to Baden Powell Drive only, whilst Scenario 2 takes into account the benefits of the Original Penway Option if one takes into account all diverting traffic (i.e. that diverting to Baden Powell Drive and also that diverting to more northerly east-west routes).

**Table 2 : Annual Benefits of Original Southern Alignment**

Scenario	Excluding Time Benefits	Including Time Benefits
1	R5,58m per annum	R15,20m per annum
2	R10,12m per annum	R28,56m per annum

#### 4 CONCLUSIONS

The work detailed herein highlights that there will be traffic benefits resulting from the development of the Original Penway Option as per its original concept, these being related to the fact that this route can, in a direct manner, accommodate traffic demands from the existing R300 in the east, to areas such as Steenberg, the Retreat Industrial area and the Steenberg and Simon van der Stel corridors in the west.

If the Original Penway Option is not developed, the traffic demands outlined above will have to use other less direct routes, such as an upgraded Baden Powell Drive. As a result of assessing the implications if this traffic has to use less direct routes, the benefits of developing the Original Penway Option can be identified. The results of such an assessment, which are presented in Table 2 herein, show that the benefits of developing the Original Penway Option will be substantial, being in the order of R5,58m to R10,12m per annum if time benefits are excluded, and between R15,20m and R28,56m per annum if time benefits are included.

As a consequence of the above, it can be concluded that a road built along the alignment of the False Bay Coastal Arterial, be it the original CCT proposal (Option 3) or the Original Penway Option will best serve the require east-west mobility function in the area lying south of the Philippi Link. Whilst other options can be entertained in this regard (e.g. an upgraded Baden Powell Drive), it is clear that this option in particular does not address the



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mobility function directly, economically or optimally nor can it be viewed as an option which can address medium and long term traffic demands/needs.

Comparisons between the Original Penway Option and the False Bay Coastal Arterial Option (Option 3) do not reveal dramatic differences. The latter attracts marginally greater traffic demands but if the Westpoort Link is included in the former option, than the resulting amended Original Penway Option, attracts the greater traffic demand. However, a downside of the False Bay Coastal Arterial is the double loading affect on Vanguard Drive. For this reason it is concluded that the development of the Original Penway Option with the Westpoort Link included, is preferable to the False Bay Coastal Arterial Option.