ALTERNATIVE ROAD BASED PUBLIC TRANSPORT BETWEEN JOHANNESBURG AND PRETORIA

Romano Del Mistro and Louis Roodt

Department of Civil Engineering, University of Pretoria

INTRODUCTION

"While branded by some as unrealistic, the project that has captured the imagination of the public is the proposed R7-billion high speed train between Pretoria and Johannesburg. One of the most significant projects South Africa has seen in the last few years, the train will provide more than 42 000 jobs during the construction phase alone, while the train link is expected to lead to a 0,4 % to 0,5% increase in Gauteng's GDP" (Engineering News 2001)

Although the project is well known, detailed information about it is very scant. This is probably due to inter alia the political process of approvals, the need for fair competition between future private sector bidders, etc. Nevertheless, there is a need for some public debate of a project of this scale.

The aim of this paper is to examine how effective other transport modes would be in delivering the proposed service. This is not being done to propose another mode, since the rail mode might serve to achieve objectives other than those of transportation, but to investigate the case of a transitionary phase of public transport between the present situation and the operation of the proposed high-speed train service.

To this end the paper briefly outlines the understanding by the authors of the proposed SDI-Gautrain project; and then describes a road-based public transport alternative (including the feeder services and modal interchange facilities) for the Pretoria to Johannesburg route as well as the financial estimates for this service.

THE SDI – GAUTRAIN PROJECT

The Route

Figure 1 shows the context of the Gautrain project. Construction is expected begin in 2003 and the first trains should be running by 2006 (van der Merwe, 2000; IMESA, 2001).

It consists of two lines namely (IMESA, 2001):

a) Pretoria to Johannesburg, a distance of approximately 50 km.
   A number of end-points and alignments have been considered. Of specific interest at the Pretoria end are the two options:
   i) From Centurion via the CBD to Hatfield (i.e. giving impetus to the Pretoria Ring Rail proposal

ii) Alternatively from Centurion via Menlyn to Hatfield, also tying in with the Ring Rail proposal but providing a station in the eastern suburbs

At the Johannesburg end discussion must obviously include the debate as to whether the cost of extending the rail to the CBD through tunnels is cost effective. Stations are to be located at Hatfield, Pretoria CBD, Centurion (Lake), Midrand, Sandton, Rosebank and Johannesburg CBD.

b) The link between Sandton and the JIA; a distance of approximately 16 km; with a station at the Johannesburg International Airport terminal

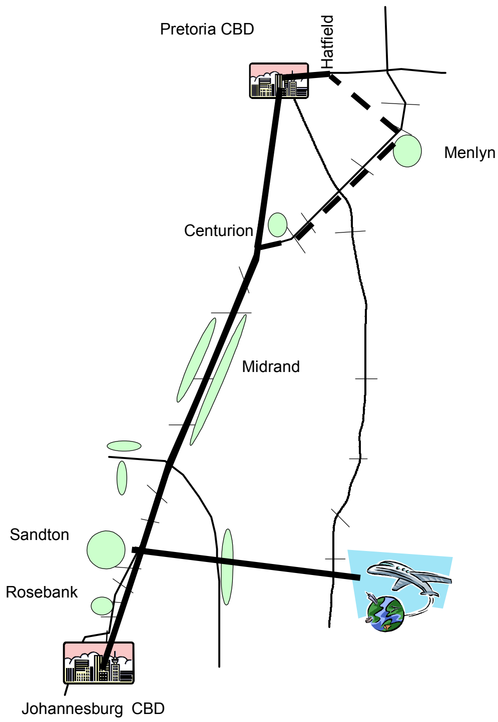


FIGURE 1 SDI-GAUTRAIN PROJECT

Service quality

The references quote the intention to provide a high-speed rail service operating at speeds of between 160 and 180 km/h (van der Merwe, 2000); the trip between Johannesburg and Pretoria taking 38 minutes (IMESA, 2001). The high-speed train is considered to be the appropriate technology that is tried and tested, will create a unique image and is sustainable and cost effective over the life of the vehicle (van der Merwe, 2000). Trains will operate at 10 minute intervals in sets of 4 coaches (van der Merwe, 2000).

Ridership

IMESA (2001) quotes an expected ridership potential of 70 000 passengers per day “which is well over the international norm for the introduction of new rail services”. This is to be seen in the context of the volume of vehicles on the N1 - Ben Schoeman Freewayexceeding 150 000/day while other roads are experiencing volume/capacity ratios greater than 0,80 and vehicular traffic is growing at 7% per annum (van der Merwe, 2000).

Costs and benefits

The capital cost of the project has been estimated at R7-billion (Engineering News, 2001). The fare is expected to be higher than present public transport fares. In fact the service is aimed at attracting car users who would be willing to pay commercial fares if the service is excellent and the travel time competitive (van der Merwe, 2000).

The high-speed train is expected to have a number of other benefits; the following being commonly quoted:

- Contribute to economic development. Engineering News (2001) quotes an impact of between 0,4% and 0,5% of the GDP of the province.
- Creation of jobs. IMESA (2001) writes that the project has the potential to cerate and sustain 42 000 direct jobs and a further 39 000 indirect job opportunities downstream. Engineering News (2001) is a little more conservative quoting that more than 42 000 jobs will be created during the construction phase alone.
- Emphasis will be placed on facilitating appropriate commercial development around stations
- Provide the opportunity for SMMEs (IMESA, 2001).
- Create improved transport services for tourists and airport passengers.
- By attracting motor car users away from their cars it will reduce congestion on the Ben Schoeman Freeway and other major roads in the region and thereby reduce pollution.

Another more fundamental benefit of the train project is that highlighted by IMESA (2001) in quoting from a parliamentary statement by Minister Omar " Rail and only rail can move high volumes of passengers quickly, safely, with minimal pollution and on a sustainable long term basis. Its fixed infrastructure not only provides tangible evidence of government 's commitment to public transport but also provides the natural backbone for an integrated transport policy in which buses and taxis extend the reach of the system".

ROAD-BASED TRANSITIONAL PUBLIC TRANSPORT SERVICE: PRETORIA TO JOHANNESBURG

From the SDI-Gautrain proposal

The following aspects from the SDI Gautrain proposal were taken into account in developing the road-based transitional PT service:

- The service is aimed at attracting private car users.
- The service must be of a high quality and achieve competitive travel times.
- The service uses 4-coach trains at 10 minute intervals in the peak hour; i.e. a maximum of 4200 one-way passengers in the peak hour; which is equivalent to 70 000 passengers travelling in the two directions per day.

The Road-based alternative

Since the SDI-Gautrain proposal is aimed at attracting the car users, the road-based transitional alternative is routed along the N1 –M1 freeways between Lynnwood Road in Pretoria and Riviera Road in Johannesburg (A distance of 51.5 km). While this might not look identical to the SDI-Gautrain proposal it serves the areas to and from where the majority of car trips are being made at present. It is on the conceptual alignment of the Gautrain proposal alternative that passes through Menlyn to Hatfield. It is recognized that it does not reach the central business districts of Pretoria and Johannesburg; but this aspect needs to be confirmed when the final phasing programme of the SDI-Gautrain proposal is published. In any case, the road-based alternative is being presented here as a transitionary service between the present situation and when the train service comes into operation.

Modal interchanges will be provided to serve the areas intended to be serviced by the stations as proposed in the SDI-Gautrain project.

The line-haul service

The line-haul service is to be provided:

- By high quality air-conditioned 50-seater buses able to travel at 120 km/h. These are estimated to cost R1,5million each.
- At a minimum frequency of 5 minutes for 12 hours and 15 minutes for the remaining 5 hours of the daily service.
- Using dedicated HOV lanes located along the median of the freeway and with terminals at the ends of the route.

This arrangement is generally possible within the present road cross-section. (It must be anticipated that no objections would be raised by the National Roads Agency as it is supportive of Government's policy to promote public transport use).

Two operational difficulties are envisaged with this arrangement; namely:

- The need for the buses to merge with the traffic to negotiate the N1/R28 interchange.
- The need for buses to merge with the traffic to exit the freeway so as to return in the opposite direction. This problem is shown diagrammatically in Figure 2 and a tentative solution is also shown in this figure.

Both these situations are not considered unusual for freeway travel by high-speed buses; although the ideal would to be able to avoid this manoeuvre. (This is an aspect that would need to be investigated further if the service was to be implemented instead of the proposed train service or if the volume of buses was closer to the capacity of the HOV facility.)

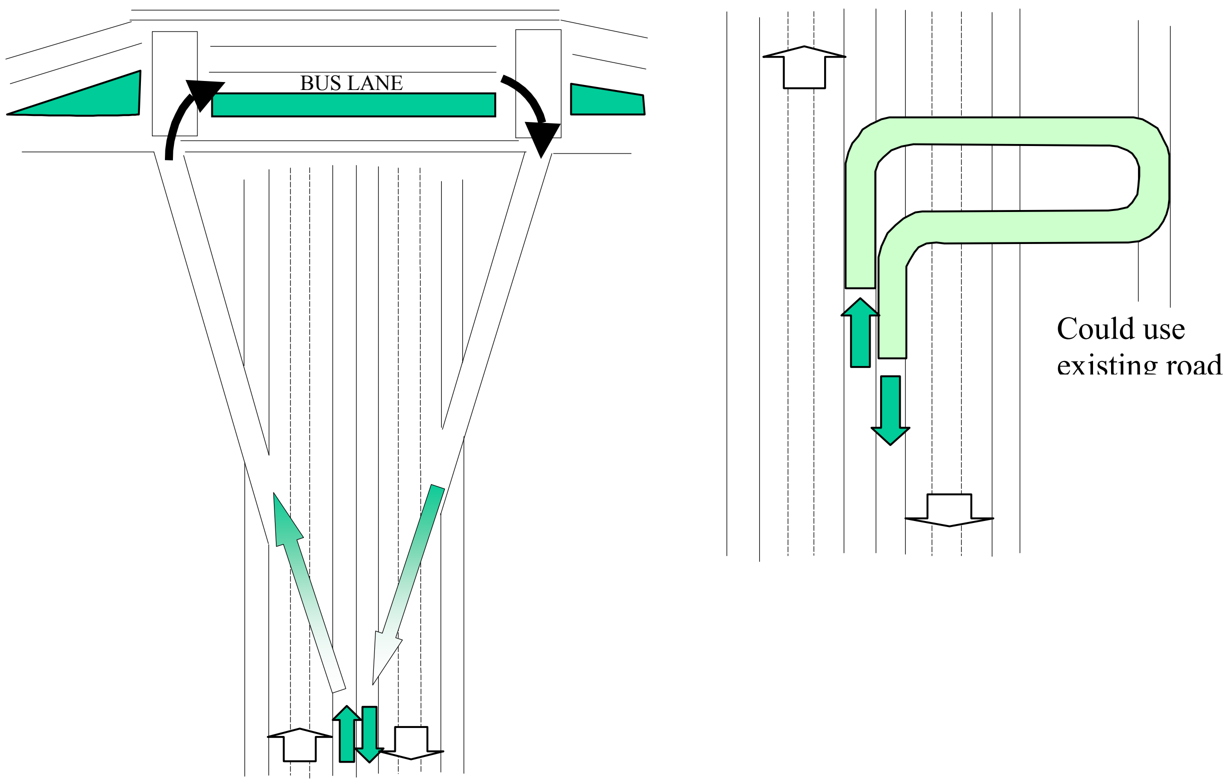


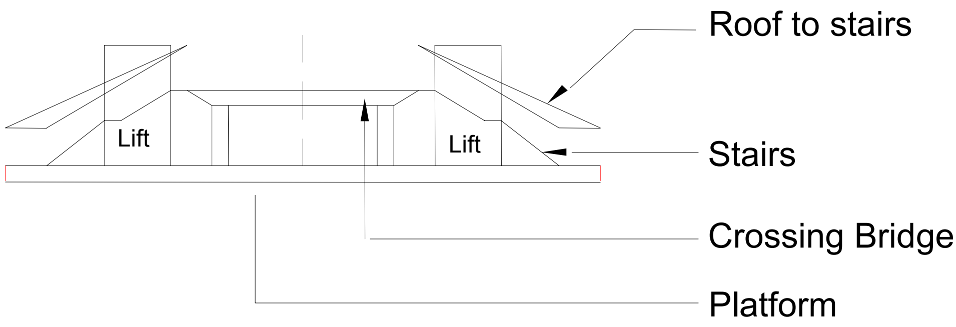
FIGURE 2: PROPOSED TERMINAL ARRANGEMETNS FOR THE LINE HAUL SERVICE IN THE HOV ALONG FREEWAY MEDIAN

Modal interchanges

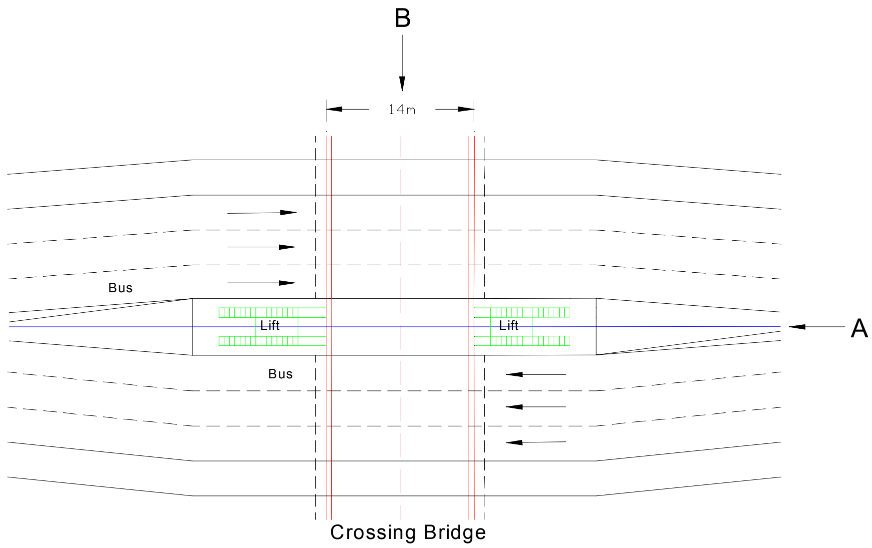
Modal interchanges are to be located at Lynnwood Road, Dely Rd (Instead of Atterbury Road), John Vorster Road, New Road, Grayston Road, Glenhove Road and Riviera Road. A typical treatment of these interchanges is shown diagrammatically in Figure 3. From this it can be seen that the passengers will embark from and alight onto a platform on the freeway that is connected to the platform (on the bridge above that is used by the feeder service) via stairs and a lift (to accommodate those passengers with dissabilities). The entire interchange facility will be covered to protect the passengers from the rain and the wind. In some cases toilet facilities will be provided, but with the intended frequency of service these will probably not be necessary. The cost of one of these interchanges is estimated at R3million. The bus operation would be managed by an ITS system to minimise vehicle queuing and platooning and passenger delays.

Feeder service

The feeder service would be provided either by air-conditioned minibuses with a capacity of 8 passengers (Estimated to cost R140 000 each.) or where warranted by an upgraded version of the *recapitalisation programme* minibuses with a capacity of 18 passengers. These would operate at a minimum frequency of 5 minutes in the peak period and 15 minutes in the off peak. (With experience it might be possible to use ITS to make it evolve into a more cost-effective dial-a-ride type service.).



Cross-section A



Plan view

FIGURE 3: CONCEPTUAL MODAL INTERCHANGE FACILITY

The routing of the feeder service is shown diagrammatically in Figure 4. From this it can be seen that the route will pass through the modal interchange on the bridge over the freeway then pass through a parking area associated with a nearby shopping centre. This will provide the opportunity to operate a park-and-ride or kiss-and-ride facility. The minibus would then travel through the residential area to a maximum of 4 km and then return to the parking area and modal interchange crossing to the other side of the freeway. (The distance between the proposed modal interchange at Lynnwood Road and Hatfield is approximately 4 km; and the route could travel through the Technology Hub, which is another of Gauteng’s SDI projects.)

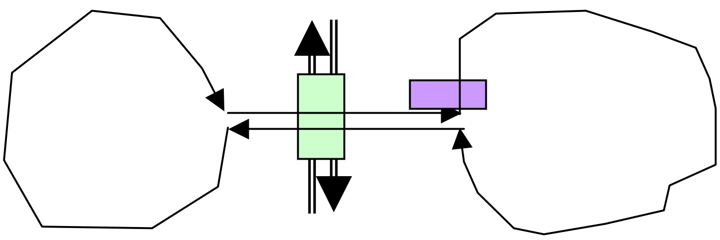


FIGURE 4: TYPICAL FEEDER SERVICE

COMPARISON OF ALTERNATIVE PUBLIC TRANSPORT SERVICES

Calculating the cost of the line-haul service

The cost of the public transport service was estimated using the model developed for Durban Metropolitan Council (Durban, 1999). This model is able to calculate the following values for a public transport route:

- Capital cost of the infrastructure and the vehicles.
- The annualised value of these capital costs.
- The annual operating cost.
- The cost per passenger (as well as the cost per passenger km and per space-km offered).
- The annual energy consumption.

Obviously, the model requires values for the performance and cost parameters; such as:

- Capital cost of the vehicle, as well as the refurbishment costs and the frequency of the refurbishment.
- Capital cost of the way, the terminals, the stops and the depot.
- The cost of capital; i.e. interest rate and life of the capital item.
- Vehicle operating speeds, and acceleration and deceleration rates.
- Vehicle operating costs; in terms of fuel, fixed cost (cost/vehicle/year) and variable cost (cost/veh-km).
- Rate of fuel consumption; and energy value per unit of fuel.

The relevant vehicle operating parameters are shown in Table 1.

TABLE 1: VEHICLE OPERATING PARAMETERS

Vehicle Operating Characteristics	Train/4	LRT/3	Bus	Feeder
Travel speed arterial(km/h) in peak	160	120	120	50
Stop spacing on route (km):	8.5	8.5	8.5	1
Acceleration: (m/s^2)	0.3	0.3	0.6	1
Deceleration: (m/s^2)	0.7	0.8	0.8	1.5
Passenger handling time(sec/passenger)	0	0	8.5	21
Vehicle Stop Time (sec)	20	20	0	
Time spent to turn vehicle(min)	6	3.5	1	0
Maximum Acceptable Volume/Capacity ratio	0.9	0.9	0.9	0.9
Vehicle capacity(standing is not allowed)	677	510	50	8

The train is assumed to be a high-speed train. The LRT is assumed to also be operating in a totally dedicated right of way. The bus and the minibus are assumed to match the high-speed train in quality. In the case of the bus this includes a relatively high speed and comfort and in the case of the minibus it is comfort (i.e. 8 passengers/minibus). The minibus recapitalisation programme offers significant financial opportunities but these appear to be best suited to less up-market operating environments and as such are not considered in this analysis. The minibus is considered to operate on arterials and collectors; hence its relatively low operating speed.

Table 2 lists the capital cost parameters used in the analysis. This information has been developed from available information from the Durban study (1999) and adjusted to account for inflation and the higher standards that would be considered to compare with those of the high-speed train. (A more in-depth study would permit more accurate cost estimates; although these could, in any case, only be verified when tenders was called). (The LRT values are considered tentative at this stage since they are not based on South African experience nor a wide data base.)

TABLE 2 CAPITAL COST PARAMETERS

Capital costs	Train/4	LRT/3	Bus	Feeder
Cost per vehicle(Rm)	50.7	36	1.5	0.14
Cost of refurbishment(Rm)	6.5	7.2	0.375	0
Time to refurbishment(years)	12	7.5	10	5
Life after refurbishment(years)	12	7.5	8	0
Stand-by fleet(%)	5	5	5	10
Interest rate(%)	16	16	16	16
Residual Value(%)	10	10	15	15
Number of refurbishments per vehicle	3	3	1	0
Capacity per lane(Veh/h)	20	50	300	600
Cost of way(Rm/lane-km)	12.675	9.75	1.3585	1.3585
Life of way(years)	40	30	20	20
Cost land (Rm/lane.km):	0.299	0.299	0.299	0.299
Interest rate(%)	16	16	16	16
Cost of Terminals(Rm/10000 peak hour pass.)	2.025	0.67	0	
Minimum cost of terminal (Rm)	0	0	76050	11700
Life of terminals(years)	30	30	30	1
Interest rate(%)	16	16	16	20
Cost of stops(R/stop)	6.357	1.62	3	
Life of stops(years)	30	30	30	0
Interest rate(%)	16	16	16	16
Cost of depot (Rm/train)	8.58	80		
Life of depot(years)	30	20	153.4	0
Interest rate(%)	16	16	30	20

Table 3 shows the operating cost parameters used in this analysis.

TABLE 3 OPERATING COST PARAMETERS

Operating Cost	Train/4	LRT/3	Bus	Feeder
Energy consumption(Mjoules/veh.km)	61.6	118.8		
Fuel Consumption (litres/100km)	0	0	40	18
Percentage additional mileage as dead mileage (%)	2	10	15	7.5
Cost of energy(R/Mjoule) (peak)	0.063	0.063		
Cost of energy(R/Mjoule) (off-peak)	0.0825	0.0825		
Cost/litre of fuel (Rands)			3.2	4
(Remaining)Cost/veh.km(R)	4.77	24.63	1.755	0.042
Cost/veh/year(Rm)	0.537	4.065	0.1794	0.062
Cost/routekm./year (Rm)	0.078	0	0.0598	0.046
Cost/terminal/year (Rm)	0.871	0	0.1	0
Cost/station(stop)/year (Rm)	0.871	0	0.1	0

Estimating the passenger volumes

It needs to be pointed out that the proposed service does not follow the entire route of the proposed SDI Gautrain for reasons given above. Furthermore, this analysis did not have the mandate nor resources to estimate the patronage in detail. As such, its estimates of demand are based on the present traffic flows measured along the N1 at the permanent counting station (CTO Site 011) between 8 January 2001 and 25 February 2001. Only the weekday volumes were used to calculate the average weekday hourly traffic flows as shown in Table 4.

The table shows that 58 000 vehicles travel in the one direction every day. This would represent a passenger volume of, at most, 75 400 per day; with the peak hour volume being in the order of 8300 passengers at that point. The table also shows the peaking values to be 11, 10 and 8 percent in the peak three hours to (referred to in the remainder of this paper as *private peaking*). Earlier work (Durban, 1999) on public transport passengers has shown far heavier peaking values with values for the peak three hours found to be 25,18.10 percent (referred to in the remainder of this paper as *public peaking*)

TABLE 4: AVERAGE HOURLY WEEKDAY FLOWS ON N1 AT HALFWAY HOUSE (CTO Site 011)

	Northbound		South bound	
	Volume	%	Volume	%
0	272	0.5	205	0.4
1	142	0.2	117	0.2
2	99	0.2	90	0.2
3	77	0.1	84	0.2
4	118	0.2	178	0.3
5	422	0.7	1008	1.8
6	2230	3.9	5952	10.8
7	3129	5.4	4619	8.4
8	2850	4.9	4617	8.4
9	3470	6.0	3818	7.0
10	3514	6.1	3482	6.3
11	3564	6.2	3513	6.4
12	3563	6.2	3623	6.6
13	3673	6.3	3576	6.5
14	3826	6.6	3569	6.5
15	4530	7.8	3581	6.5
16	6091	10.5	3730	6.8
17	5912	10.2	3086	5.6
18	4556	7.9	2247	4.1
19	2421	4.2	1597	2.9
20	1465	2.5	1038	1.9
21	1110	1.9	781	1.4
22	915	1.6	625	1.1
23	610	1.1	423	0.8
Total 19	57851	100.00	54885	100.00
Peak hour		11		
Second peak hour		10		
Third peak hour		8		
16 other hours		4.4		

The proportion of passengers that will use the public transport service will depend on the relative advantage of the public transport mode over the private transport mode. These aspects would include travel time, convenience at the trip ends and cost. An estimate could be made through techniques such as stated preference. (This paper actually outlines a relatively inexpensive road-based public transport option that could be considered as a pilot service able to improve the estimate of patronage). Any project that improves the traffic conditions (e.g. additional road capacity) will also discourage the use of public transport. The other factor affecting the number of passengers using public transport will be the number of people moving along the corridor. This is a function of the land use pattern along the corridor.

To overcome the need to estimate the exact passenger volumes and also to show how passenger volume affects the appropriateness of a mode it is proposed to estimate costs for peak hour volumes of 1000, 2000, 5000 and 10 000 passengers under private and public peaking conditions.

Comparing the cost of alternative public transport modes.

The literature suggests that public transport investment can be assessed using a range of criteria. These include capacity, cost and environmental damage. Furthermore, cost can also be assessed in a number of ways. In this paper only the following will be considered:

- Capital cost
- Annual operating cost;
- Cost per passenger and
- Operating cost per passenger

From a capacity point of view all three modes would be able to cope with the passenger demand if a dedicated right-of-way was also provided for the LRT and bus modes; as is required for the train mode.

Table 5 shows the estimated capital investment over an analysis period of 40 years; for the range of peak hour volumes under the two peaking conditions.

TABLE 5 CAPITAL COST OF ALTERNATIVE PUBLIC TRANSPORT MODES (Rmillion)

	One-direction peak hour passengers											
	1000			2000			5000			10000		
Peaking	Train	LRT	Bus	Train	LRT	Bus	Train	LRT	Bus	Train	LRT	Bus
Private	1980.5	1670.5	278.0	1980.7	1670.6	362.6	1981.3	1789.9	794.9	2311.7	2444.9	1396.4
Public	1980.5	1670.5	271.7	1980.7	1670.6	350.0	1981.3	1789.9	704.0	2245.8	2325.9	1214.7

From this it can be seen that:

- Rail is by far most expensive in terms of capital investment
- This relative difference declines as patronage increases
- Even at 10 000 one-direction passengers in the peak hour the cost difference is of the order of R1000 million (This could be equated to loan repayment of at least R100 million a year). At 2000 one-direction passengers in the peak hour the difference in capital cost investment between train and bus services is of the order of R1,6billion (i.e. equivalent to at least R160 million /year)
- The costs are affected by the peaking characteristics. The costs remain almost the same for train because the supply is prescribed by the minimum frequency rather than the passenger demand.

Table 6 shows the average cost per passenger for the four volume and two peaking conditions. This value is based on sum of the annualised capital cost and the annual operating cost which is divided by the total number of trips made per year.

TABLE 6 AVERAGE COST PER PASSENGER (Rands)

	One-direction peak hour passengers											
	1000			2000			5000			10000		
Peaking	Train	LRT	Bus	Train	LRT	Bus	Train	LRT	Bus	Train	LRT	Bus
Private	61.67	66.57	13.44	30.84	33.28	9.81	12.37	15.14	8.49	7.25	11.73	7.76
Public	156.99	169.44	28.59	78.50	84.72	19.34	31.41	36.73	15.25	17.51	24.97	13.40

From this table it can be seen that:

- As the passenger volume increases the cost per passenger declines significantly.
- The peaking characteristic has a significant effect on cost/passenger. This is due to the relatively lower peaking value for *private peaking* conditions (being 11% of 19-hour day) as compared to the 25% of 19-hour day applicable to *public peaking* conditions.
- Under *private peaking* conditions and at 10000 passengers in the peak hour, the cost per passenger by train is marginally less than that estimated for bus. But at volumes of 2000 passengers in the peak hour the difference is significant; being over R20,00 for the *private peaking* conditions and almost R60,00 under *public peaking* conditions. (Further study is required to establish the passenger volumes that will use public transport and the peaking characteristics that will apply; unless this has already been done in studies to date for the SDI-Gautrain.)

Table 7 shows the estimated annual operating cost when the annualized value of the capital investment is excluded from the analysis. Table 8 shows this value as it relates to the cost per passenger.

TABLE 7 ANNUAL OPERATING COSTS (Rmillion)

	One-direction peak hour passengers											
	1000			2000			5000			10000		
Peaking	Train	LRT	Bus	Train	LRT	Bus	Train	LRT	Bus	Train	LRT	Bus
Private	36.72	96.71	34.39	36.72	96.71	61.76	37.64	128.27	154.11	52.60	254.55	301.20
Public	36.72	96.71	22.81	36.72	96.71	38.60	36.72	108.91	92.79	41.07	168.26	178.57

TABLE 8 OPERATING COST PER PASSENGER (Rands)

	One-direction peak hour passengers											
	1000			2000			5000			10000		
Peaking	Train	LRT	Bus	Train	LRT	Bus	Train	LRT	Bus	Train	LRT	Bus
Private	6.73	17.73	6.31	3.37	8.87	5.66	1.38	4.70	5.65	0.96	4.67	5.52
Public	17.14	45.13	10.64	8.57	22.57	9.01	3.43	10.16	8.66	1.92	7.85	8.33

The effect of passenger volume and peaking is immediately obvious from these tables. Under public peaking conditions train is less costly in terms of only operating costs than bus for peak hour volumes greater than 2000 and under private peaking conditions it is less costly for peak hour volumes exceeding 1000.

The last cost that is compared is the environmental cost. A simple surrogate value for this is the amount of energy consumed; since one can argue that energy production converts into pollution when it is used and also requires the consumption of scarce resources (regardless where the energy conversion occurs) The estimated amount of energy consumed annually is shown in Table 9.

TABLE 9 COMPARISON OF ENERGY CONSUMPTION (10^9 Mjoules)

	One-direction peak hour passengers											
	1000			2000			5000			10000		
Peaking	Train	LRT	Bus	Train	LRT	Bus	Train	LRT	Bus	Train	LRT	Bus
Private	114	236	144	114	236	287	119	327	719	200	646	1437
Public	114	236	72	114	236	144	114	253	361	129	344	721

Train is always more energy efficient except for volumes lower than 1500 peak hour passengers under *public peaking* conditions. Pollution values will follow the same pattern.

Feeder services

Table 10 shows the cost estimates for feeder services for a range of peak hour volumes ranging from 100 to 1000 one-way passengers in the peak hour. Peaking has no effect on the capital cost; but it does have a significant effect on the cost/passenger.

TABLE 10: COST OF FEEDER SERVICES

	20-year analysis				40-year analysis			
	One-direction peak hour passengers							
Peaking	200	500	1000	2500	200	500	1000	2500
Capital cost (Rmillion)								
Private	7.44	15.82	28.79	89.23	11.08	25.04	46.68	129.76
Public	7.44	15.82	26.28	89.23	11.08	25.04	46.68	129.76
Average cost / passenger (R/trip)								
Private	2.33	2.16	2.06	2.31	2.29	2.12	2.03	2.27
Public	4.75	4.32	3.82	4.70	4.65	4.22	3.98	4.61

(The increase in the cost/passenger at volumes of 2500 in the peak hour is due to the model including the cost of dedicated road infrastructure required to achieve these volumes).

Discussion of the road-based service

Table 11 summarises the cost components of the train and bus alternatives for the peak hour volumes of 2000 and 5000 one-direction passengers in the peak hour under the *private peaking* conditions (as could be the case if the present motor vehicle users were to be attracted away from their vehicles. On the basis of cost, the advantages of the bus alternative is obvious.

TABLE 11 SUMMARY OF COSTS OF PROPOSED ROAD-BASED SERVICE

	Peak hour passengers			
	2000		5000	
	Train	Bus	Train	Bus
Capital cost (Rmillion)				
Line haul	1980.7	362.6	1981.3	794.9
Feeder	79.1		144.0	
Total	2059.8	441.6	2125.3	938.9
Average cost/passenger (Rands)				
Line haul	34.17	9.87	13.71	8.58
Feeder	2.16		2.06	
Total	36.33	12.03	15.77	10.64

(The increase in the cost/passenger at volumes of 2500 in the peak hour is due to the model including the cost of dedicated road infrastructure required to achieve these volumes).

However, there are many arguments in favour of the proposed train service. The two main arguments relate to:

- Only the train can cope with the anticipated passenger demand. This depends on the volume of passengers that can be expected to use the train service; and in-depth stated preference type surveys have probably been done to estimate the expected patronage. But it should not be overlooked that road-based modes can also carry peak hour volumes in excess of 15 000 one-direction passengers in a dedicated facility.
- Rail gives greater confidence to private sector investors as it shows government's commitment to the corridor and there is a greater likelihood therefore that private investment will follow (Walmsley and Perrett,1992). This argument however begs two questions. Firstly, development will only follow the rail investment if there is regional growth. In the case of this corridor, (van der Merwe (2000) reports that this is the fastest growing area in South Africa). The second question is whether it is then actually necessary to invest in rail; since development will occur in any case as it is the fastest growing region in South Africa; (unless the passenger volumes are such that they either warrant train services because of capacity or because of cost).

At the same time, this paper also indicates that road-based public transport mode is a viable alternative to train for this corridor provided that there is the same political will to provide a dedicated right-of-way. It is acknowledged that cost is not the only criteria on transport decisions are taken. In fact, in a corridor research project presently underway, Oranje (2001) has identified 54 objectives that can be proposed for the implementation of a corridor project. So it is quite possible that objectives, known to provincial government, could make the train project more desirable than a road-based alternative. Or alternatively that studies have shown a real probability of peak hour one-way public passenger volumes being achieved of at least 8 000 (if private peaking conditions apply) or at least 15 000 (if public peaking conditions apply).

More importantly, the paper provides a useful strategy. It is proposed that a high-quality high-speed bus service operating in the median on dedicated lanes passing motorists delayed in the adjacent lanes will provide a very visible public transport alternative to the private motor car. If this public transport service is also accompanied by a well organized feeder service using high-quality and frequent minibuses; then this will provide a very good pilot service for the proposed train service. The one question that cannot be answered with absolute certainty in the planning phase of a project is how many car users will actually switch from car to public transport. This can be measured by means of the transitionary road-based public transport service proposed in this paper. The service should initially be based on a peak hour passenger volume of 2000. The capital cost involved relates to the acquisition of buses and minibuses, and the construction of terminal ramps and bus stops as outlined before. The buses can be utilized elsewhere when the train service comes into operation and the minibuses can be re-routed to serve as feeders to the train stations. The estimated cost of the facilities is R21million plus lane re-striping and where necessary carriageway widening. The estimated cost of providing the service can easily be recouped in a fare of between R15 and R20 (which is probably envisaged for the train service).

CONCLUSIONS AND RECOMMENDATIONS

The paper outlined a road-based alternative to the proposed SDI-Gautrain between Pretoria and Johannesburg. It argued that based on the goals stated for the Gautrain project its best alignment would be between the eastern suburbs of Pretoria and the north-eastern suburbs of Johannesburg. Resources did not allow a detailed analysis of the road-based public transport alternative to the SDI-Gautrain and instead a strategic anlaysis provides the basis for this paper.

The paper suggests that adequate capacity and cost are the main criteria on which a choice of mode should be made. But it is acknowledged that objectives privy only to the provincial government might also exist.

However it is acknowledged that for the road-based service to be operationally viable it will require the stated commitment to public transport to be exercised on the road and that the authorities display the same political will to implement the road-based project as has been displayed to date to implement the SDI-Gautrain.

If these stepping stones are in place, and if the best estimate of future patronage is not absolutely certain that this will exceed 10 000 one-direction passengers in the peak hour, then it is considered essential that the road-based alternative be evaluated in greater detail as a real alternative to the SDI-Gautrain. At the same time the road- based public transport service able to cope with 2000 peak-hour one-direction passengers (or the figure that best matches stated preference survey and patronage modelling work done to date) be instituted as a way of measuring/estimating the expected patronage.

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ALTERNATIVE ROAD BASED PUBLIC TRANSPORT BETWEEN JOHANNESBURG AND PRETORIA

Romano Del Mistro and Louis Roodt

Department of Civil Engineering, University of Pretoria

SHORT CV FOR ROMANO DEL MISTRO

Professor Romano Del Mistro holds qualifications in civil engineering and town and regional planning from the University of Cape Town, a post graduate diploma in transportation engineering from the Institution of Highways and Transportation, and a doctorate in town and regional planning from the University of Pretoria. He is registered as a professional engineer and town and regional planner. He has worked in local government, research and private practice before returning to academia; He is presently in the Department of Civil Engineering at the University of Pretoria. He has published and presented numerous papers both in South Africa and overseas. His experience and research interests focus on traffic safety, public transportation, the relationship between city structure and transport demand and low cost urban infrastructure. He is married to Sandra and they have two daughters, Nicola and Lisa.