

PREPARATION OF CURRENT PUBLIC TRANSPORT RECORDS IN GAUTENG (with Special Reference to Intelligent Provincial-Wide GIS Systems)

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1. INTRODUCTION

The National Land Transport Interim Arrangements Act, 1998, required metropolitan and services councils to prepare a record of public transport operations in their areas of jurisdiction by 31 December 1998. The contents of these records are described in Government Gazette Notice 847 of 1998. In essence the information required deals with public transport demand and supply for the different public transport modes.

In Gauteng, current public transport records (CPTRs) have been prepared for each of the six metropolitan transport areas (MTAs) in the Province, namely:

- ♦ Greater Pretoria Metropolitan Council
- ♦ Greater Johannesburg Metropolitan Council
- ♦ Eastern Gauteng Services Council
- ♦ Western Gauteng Services Council
- ♦ Khayalami Metropolitan Council
- ♦ Lekoa Vaal Metropolitan Council

The total cost for the preparation of the six CPTRs amounted to more than R6 million.

A joint co-ordination committee was established during 1998 to co-ordinate the various initiatives. In general some progress has been made towards uniformity in data capture and reporting through this process. In October 1998 the co-ordinating team was asked to assist in the compilation of a GIS base map for the whole of Gauteng. This has been achieved. The team is currently in the process of establishing a province-wide GIS based passenger transport information system, which is to be informed by each of the six CPTRs

The purpose of this paper is, firstly, to report on the preparation of CPTRs in Gauteng; the processes followed, work done by the co-ordination committee and some comments on the quality of the CPTRs. Secondly, the preparation of the GIS-based Gauteng provincial-wide CPTR is discussed, including some technical information on hardware and software issues and the future development of the system.

Thirdly, some information about public transport in Gauteng is given. Information from recent origin-destination surveys done by Greater Pretoria Metropolitan Council was used in addition to that available from the various CPTRs.

Fourthly, some suggestions are made with regard to the future review and improvement of the CPTRs.

The paper culminates by giving some concluding remarks.

2. PREPARATION OF CPTRs IN GAUTENG

2.1 Purpose of CPTRs

The purpose of the preparation of CPTRs is given in Notice 847 of 1998 as follows :

“The primary objective is to identify over- and under-supply by route and route section so that –

- ♦ the core city can make suitable recommendations to the LRTB with regard to applications for permissions.
- ♦ the LRTB can dispose of applications for permissions on the basis of sound information.
- ♦ the core city can develop the strategies for the short to medium term and prioritise projects for the rationalisation and improvement of services.
- ♦ the core city can plan the preparation of tenders in the knowledge of their potential impact on other services.”

Of importance is the fact that CPTRs were never intended to be used for the design of public transport services – its application is strategic of nature except for making recommendations regarding permit applications where the detail of passenger numbers and capacities by route is to be taken into account.

2.2 Co-ordination of CPTRs

The preparation of CPTRs was initiated by the national Department of Transport in early 1998. Transport Authorities had to prepare business plans, which were intended to kick-start the transport planning process. These so-called “TPR2 Fast Track Projects” covered basically four areas namely :

- ♦ the capturing of public transport supply and capacity utilisation information (CPTRs);
- ♦ a summary of relevant transport policy;
- ♦ consideration of the rationalisation of bus services; and
- ♦ the conversion of permits to permissions (life long permits need to be changed to time-based contractual agreements, henceforth the word "permission" which denotes this aspect).

The primary focus of all the business plans generally was the preparation of the CPTRs. Transport Authorities were later notified of the approval of their business plans where after consultants were appointed and work started with the preparation of the CPTRs roughly by middle 1998.

A co-ordination committee was established by October 1998 with the aim to co-ordinate the preparation of CPTRs in the province. The establishment of a strong co-ordination function was considered justified considering the achievement of the following :

- ♦ Adequate recording of cross-municipal boundary public transport within the province.
- ♦ Standard presentation of information for all modes and facilities.
- ♦ Standard means of permit conversions in terms of route descriptions and interpretation of information.

The approach was to achieve co-ordination through a variety of mechanisms, including :

- ♦ co-ordination meetings, attended inter alia, by officials from Gautrans, the Metropolitan and Services Councils, the Permit Board, the Provincial Taxi Registrar and the Cross Border Agency;
- ♦ creating communication channels and contacts with external sources;
- ♦ achieving compatibility between different GIS/information systems;
- ♦ aiming to achieve similarity in survey procedures and programmes, as well as a route coding system; and
- ♦ co-ordination of delivery dates and format of output information.

Since April 1999, the terms of reference of the co-ordination committee has been expanded and it now also co-ordinates the preparation of Integrated Transport Plans (ITPs) and other planning within the province.

The efforts of the committee to co-ordinate the preparation of the CPTRs were, generally, only partially successful; probably the major reason was due to the fact that it only started to function after certain surveys and other work related to the CPTRs had already been started. The ideal would have been to design the data collection and storage on a provincial-wide basis to ensure comparability and uniformity in contents and quality – this however did not take place.

Despite the specified target date of December 1998, given in the National Land Transport Interim Arrangement Act, completed CPTRs were submitted only from April 1999 until February 2000. Documentation was provided both in a hard-copy as well as in electronic format. All authorities concentrated primarily on the preparation of the CPTRs, with much less time spent on the other parts of their business plans, e.g. the preparation of rationalisation plans received attention from only half of the six authorities.

General observations regarding the extent and quality of the CPTRs are the following:

- ♦ information on bus and mini-bus taxi capacities and capacity utilisation appears to be well captured generally; clearly a lot of energy was spent in the different areas on the surveys relating to the capturing of this information;
- ♦ most CPTRs consisted of many volumes and files; the impression is, however, that in some cases any information that was readily available was included to make up volume, whether or not such information was really required or useful;
- ♦ information on either side of the boundary of adjacent areas seldom correlate; this again emphasised the importance of better planning and co-ordination prior to actual data collection; and
- ♦ different methods and techniques were used in the different areas to collect data as well as on different times and dates – this makes it extremely difficult to compare

information, and makes the information suspect if it is to be used at the detail level for example to consider permit applications.

It appears that authorities had similar difficulties with the capturing of some of the information. Permit details for both bus and mini-bus taxi services were difficult to get. Information on the utilisation of rail services was clearly also problematic to obtain. What is also interesting are the differences in successes and failures in data collection if the different areas are compared with each other. Data which is successfully captured in one area is in some cases very poorly captured or even completely missing in another.

The above discussion highlights some of the areas in which improvements are required when undertaking the next round of CPTR surveys. Especially in Gauteng much more emphasis will have to be placed on getting reliable and compatible information. This means on the one hand advanced planning of surveys on a provincial-wide basis and, on the other hand, a much more focussed approach where less information is captured but with a greater confidence in terms of accuracy and reliability. This information must also be more focussed on the various decisions that need to be made, as the value of any information gathered is how successfully it can be used in deployment.

3. **INTEGRATED PROVINCIAL-WIDE CPTR**

Existing transport areas in Gauteng are not functional. Extensive transport interaction takes place between transport areas, especially in the south of the province. The need to create one provincial-wide CPTR to which all authorities will have access, is therefore obvious.

3.1 **Process Followed**

The following process was followed to create the provincial-wide information system:

Initially, the need for a common reference or datum was identified. For this purpose, geographic data obtained from the metropolitan and services councils and from two private institutions, were combined into a GIS basemap. In parallel to this process, agreement was reached at the co-ordination meetings on getting some uniformity as far as naming conventions, formats and capturing principles are concerned.

CPTR information obtained in electronic format was thereafter loaded onto the basemaps resulting in all the public transport routes being geographically linked on street block level. This enables any user to merely click on any particular road link of his choice and he would immediately see all the routes running along that particular link. Options for selecting origins, destinations and place names were also included. Selecting an origin, destination or a pair of these would return a response showing all the relevant routes passing through these points.

As far as the dissemination of information is concerned, it was decided to use the internet. Information can be accessed via a standard alphanumeric interface, or via a mapping interface running on the browser. The system is still in its embryo stage but already requests for passwords and access to the system have been received. Currently the system is being checked for errors and ease of use. The next step would be to consider the integration of the provincial-wide CPTR with other systems on the provincial level. Also a very important step is the: "how to use the information". Guidelines and criteria that can

assist in evaluating data and making choice decisions needs to be developed as a matter of urgency. The national Department of Transport is apparently attempting to appoint consultants to address these issues. The advantage of the internet is that the integration between systems which use open database connectivity (ODBC) compliant databases is a lot easier, provided that the network connectivity has been addressed. An ODBC compliant database adheres to the open database connectivity protocol and allows seamless data exchange.

3.2 **Problems Encountered**

Two major problems were encountered during the whole process of preparing the integrated CPTR. These were: the lack of uniformity and; the incompleteness of information.

The **lack of uniformity** caused a lot of duplicate work to be done, due to the fact that information for every single metro was captured in a different format. This does not imply software packages, but rather naming conventions, time of capture, volume of information, etc. Upon the receipt of these electronic datasets, they were carefully sifted through to try and identify the different datasets that were used when compiling the CPTR, and matching them up with similar datasets was extremely important as it would form the basis for future comparative evaluation of the information.

Numerous problems also surfaced on the geographic side. The definition of route sections was unclear and interpreted differently by each metro. The spatial referencing of each stop was incomplete or in some cases missing. This made it extremely difficult to determine where passengers boarded or alighted and influenced the accuracy with which statements on travelling distance and utilisation could be made.

During this process of comparing the different datasets it became evident that there was an **inconsistency** with regard to the **volume** and **type** of data that was captured. Although the TPR2 requirement stipulated what information should be surveyed, this information could not always be captured due to a variety of reasons. In some instances it was simply the case that information got misplaced somewhere along the way and found again upon inquiry. All of this unfortunately had an impact on time constraints.

Other problems which was encountered was the changing nature of the base geographic data. Although a basemap for Gauteng was created, it was distributed at a time where several of the Metros had almost finished their CPTR capturing processes, therefore other datasets were used. Transforming their work onto the Gauteng base seemed like an unnecessary duplication of effort.

3.3 **Hardware/Software Issues**

Issues involving hardware and software can be covered mainly under the topic of network connectivity and line speed. For the system to operate effectively the user has to have a reasonable connection to the internet. Although a 56 kbps modem will be sufficient, users on a 64 kbps leased line which is crowded will have to have patience when using the system. It is envisaged that, in time, the system will become truly distributed, in that the information pertaining to a certain metro will be stored locally on a server at that metro. The server will be accessed from the Gautrans server or the server where the site resides, to

provide the information as requested by the user. To the user it will seem as if all information is provided by the same machine, while at the back-end multiple machines on multiple sites will be involved. This should improve the speed issue. Another issue which will hopefully be resolved by the end of April will be that of the requirement of downloading a plug-in before maps can be viewed. At 1.7 Mb, this can take as long as 15 minutes, far too long a wait for internet users. Finally, perhaps not a hardware or software issue, is the level of basic computer and internet literacy the operator has. It has been found that all users are not as well versed with the technology and that due to user error they can not obtain the results they require.

4. PUBLIC TRANSPORT IN GAUTENG

4.1 Information Used

Information from the various CPTRs in Gauteng have only recently been obtained and is presently largely untested. Only some limited use could be made of the information at this stage but the quality of the information should improve rapidly over time as problems are identified and rectified.

However, additional surveys were carried out in the Pretoria region which updated their origin-destination data base. This information has been used for research purposes by Gautrans and very interesting results have been obtained in terms of the public transport trip-making characteristics of the region.

4.2 Information Obtained from the Gauteng CPTRs

Annexure A contains an overview of relevant public transport information extracted mainly from the Gauteng CPTRs. This overview was only recently compiled and its' contents is still to be confirmed (and expanded), through contact with each of the relevant authorities. It is anticipated that such verification will be done in due course and that an updated version be made available during the SATC.

Also note the large number of gaps in the table. It was found to be very difficult in some cases to aggregate information from the detailed tables in the CPTRs to a global or average for a specific region. Again this appears to be an oversight in the present specification for the preparation of a CPTR, which needs to be addressed.

Despite the present uncertainty about the level of accuracy of the CPTRs, the information contained in Annexure A nevertheless makes interesting reading. Some of the more important indicators of the extent and nature of public transport in Gauteng, are as follows:

- Total daily public transport trip generation: approximately 3 million passenger trips
- Public transport modal split:
 - taxi 57%
 - bus 19%
 - rail 24%
- Capacity utilisation: varies from under supply of bus services in some areas to an over-supply of rail services in general. Taxi services appears to be generally in balance with the demand for it
- Approximately 51 000 mini-bus taxi vehicles were identified in the province. In WGSC 66 percent of the taxis were not legally registered to operate within the area

- Taxis operate over approximately 1600 routes and utilise about 560 ranks
- Waiting times during peak periods varies extensively but is typically between 0 and 20 minutes
- Taxi fares are typically between R2,00 to R5,00 per trip, compared to an average third class rail fare in Gauteng of approximately R1,20 for a passenger trip in 1998.
- There are 31 bus operators in the provinces, transporting approximately 568 000 passengers daily

A comparison of the public transport trip generation of the different areas is given in Table 1.

Table 1 : Public Transport Trip Generation by Area

Area	Population*	Daily passenger trips	Trips / 1000 population
EGSC	1 834 600	379 000	205
GJMC	2 524 400	1 065 000	420
GPMC	1 247 000 **	890 000	715
WGSC	638 500	258 000	405
LVMC	609 200	183 200	305
KMC	511 900	208 000	405
Total	7 365 600	2 983 200	405

* Source: Stats SA, Census 1996

** This figure relates only to the population within the municipal area of GPMC

It will be noted that, on average, about 400 trips per 1 000 population are typically made on a daily basis in Gauteng. The high trip generation of GPMC appears to be out of line, but this can probably be explained by the much larger population served by public transport in this area - an estimated population of 2,4 million people live within GPMC's public transport catchment area, giving a daily trip generation of 370 trips per 1000 population, which is close to the average.

Table 2 below, gives the trip purpose of morning peak taxi passengers as measured in two areas namely KMC and WGSC respectively. The large difference in the mobility needs of the urban area (KMC) in comparison to that of a more rural area (WGSC) is evident.

Table 2 : Trip purpose of Taxi Passengers

Trip purpose	KMC	WGSC
Work	90	39
Shopping	1	26
Education	-	13
Health	-	7
Home	5	-
Other	4	15

Information Obtained from the Pretoria Origin-Destination Surveys Information from the Pretoria origin-destination surveys carried out in 1999, revealed very interesting characteristics of public transport trip-making in this area. The research done with this information attempted to determine trip generation by all public transport modes, in relation to various socio-economic characteristics of users. Two of the most obvious relationships tested are shown on Figure 1 and 2, namely :

- ♦ public transport trips vs household income
- ♦ public transport trips vs number of cars per household

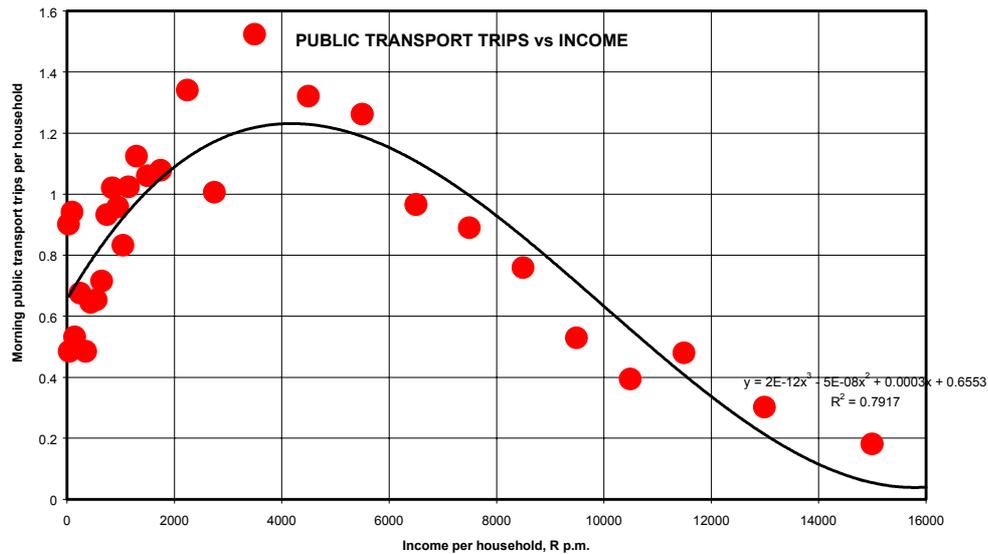


Figure 1 : Public Transport Trips vs Household Income

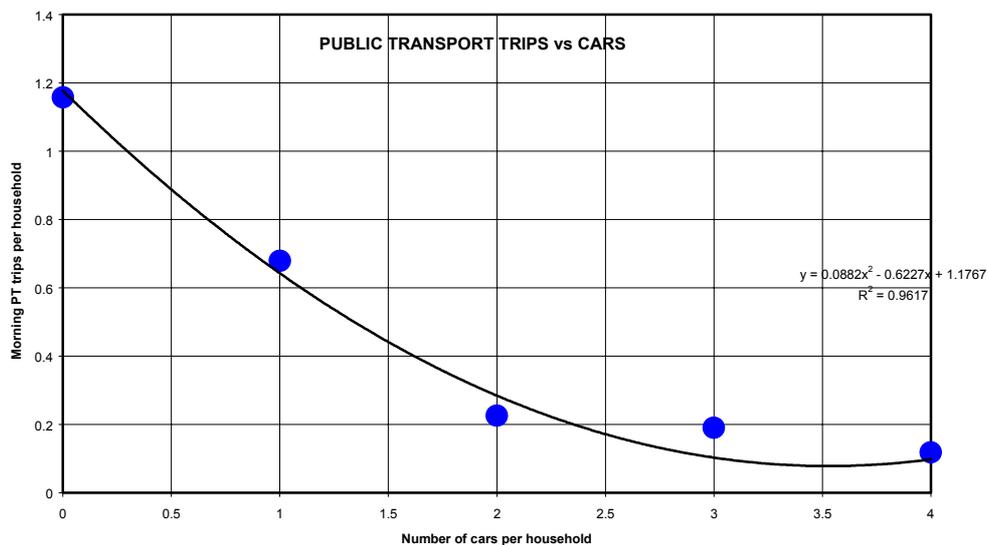


Figure 2 : Public Transport Trips vs Number of cars per household

In both cases the behaviour is as expected. Figure 1 shows low public transport usage also by the very poor. Public transport use initially increases with income and peaking at roughly an income of R4000 per household per month, with approximately 1,2 trips being made per household in the morning peak at that income level. Trips made by public transport then decreases fairly rapidly with increasing income, becoming insignificant at household income of R12 000 per month and more.

Figure 2 shows the rapid decrease of public transport tripmaking with an increase in car ownership. Note that with households owning one car, tripmaking has already reduced by roughly 50% compared to households with no cars. Communities with two or more cars per household on average, make very little use of public transport.

5. REVIEW OF CPTRs

The existing national (and provincial) planning guidelines, requirements and procedures have largely been taken over from similar processes being applied in other countries, and in the first world in particular. This also applies to the CPTRs. The existing guidelines are therefore based on established and tested procedures. Transport planners are therefore, comfortable with the planning procedures as they read at present.

Experience in Gauteng (and also to a certain extent in other provinces), however, highlighted a number of concerns related to the transport planning processes as presently being applied. These include :

- ♦ the value of the planning processes not being understood by the communities and many politicians, because of the lengthy and unwieldy process followed;
- ♦ the rapid decrease in the available human resources at transport authorities to carry out the planning;
- ♦ the Moving South Africa strategy and action agenda has not yet been taken up in the planning process; and
- ♦ information systems such as the CPTRs are very expensive and not sufficiently focussed on accuracy, reliability and the capturing of the appropriate information.

Generally, transport planning in South Africa is done extensively and comprehensively. Unfortunately, the present process has become too big to be manageable, given our scarce resources, i.e. both in terms of available funding and human resources.

It is suggested that a much more moderate but more focussed approach towards planning be adopted – this sentiment also applies to the future review of the CPTRs.

It is believed that the present rather elaborate specification for the preparation of CPTRs should be drastically trimmed. Only the information which is essential to be captured on a regional basis and which is absolutely necessary for either planning, regulation and control, or monitoring purposes, must be included in the future updating of CPTRs. Other measures to improve on the quality of the CPTRs should also be considered, such as :

- ♦ doing surveys more incrementally and systematically according to a manageable programme;
- ♦ introducing checks and testing procedures during surveys for the purposes of quality assurance; and
- ♦ ensuring similar survey methods and procedures throughout South Africa.

We cannot afford the luxury anymore of capturing information just because it might be useful. Hopefully we still have sufficient resources to do the bare minimum – let's do it then right.

6. CONCLUSIONS

The preparation of CPTRs in Gauteng resulted in the establishment of a provincial-wide public transport information system which describes the public transport status quo fairly well at the strategic level. However, there are numerous concerns about the extent of the CPTRs (they've become too large to be manageable), the quality and reliability of some of the information and the extent to which information captured in the different areas are compatible.

A new approach is proposed according to which :

- ♦ the future updating of CPTRs should be more focussed (with only the bare minimum of information being captured);
- ♦ surveys should be done more incrementally and according to a strict programme, in order to allow for the testing and checking of information; and
- ♦ specific and concise procedures on the sampling, collection, manipulation and storage of information be prepared to ensure comparable and reliable information.

A more humble and modest approach is considered more appropriate given the present circumstances and obstacles in South Africa.

7. REFERENCES

1. National Land Transport Interim Arrangements Act, Act 19256 of 1998, Government Printer, Pretoria.
2. Requirements and Format for Preparation of Current Public Transport Records by Core Cities, Notice 847 of 1998, Government Gazette No. 18925, Government Printer, Pretoria.
3. TPR2 Fast Track Co-ordination Project, Present Status and Way Forward, Report prepared for the Gauteng TPR2 Co-ordination Committee, Pretoria, May 1999.
4. Lekoa Vaal, Current Public Transport Record, July 1999. Consisting of 2 volumes, namely:
 - Volume 1 : Final Report
 - Volume 2 : Appendices
5. Khayalami Metropolitan Council, Current Public Transport Record, December 1998. Consisting of 4 volumes, namely:
 - Volume 1 : Facility, Service and Count data
 - Volume 2 : Associations and Routes
 - Volume 3 : Passenger Needs, Requirements and Priorities
 - Volume 4 : Bus, Rail and Metered Taxi Services
6. Greater Pretoria Metropolitan Council, Current Public Transport Record, May 1999. Consisting of 12 volumes, namely:
 - Volume 1 : Summary Report
 - Volume 2 : Metered-taxi Services Supply on Capacity
 - Volume 3 : Bus Services / Capacity Utilisation
 - Volume 4 : Rail Services / Supply and Demand Capacity (Annexures)
 - Volume 5 : Rail Services / Supply and Demand Capacity (Final Report)
 - Appendix A : Route Description
 - Appendix B : Rank Information
 - Appendix C : Rank Passenger & Taxi Counts-Departures
 - Appendix D : Rank Passenger & Taxi Counts-Arrivals
 - Appendix E : Rank Waiting Times & Queue Lengths
 - Appendix F : Corridor Counts
 - Appendix G : Passenger & Taxi Counts at Pick up Points
7. Western Gauteng Services Council, Current Public Transport Records, 1999. Consisting of 8 volumes dealing with the three modes of transport.
8. Greater Johannesburg Metropolitan Council, Current Public Transport Records, August 1999. Consisting of 10 volumes, namely:
 - Volume 1 – 4 : Minibus-Taxis
 - Volume 5 : Heavy Rail Report
 - Volume 6 – 10 : Bus
9. Eastern Gauteng Services Council, Current Public Transport Records, July 1999. Consisting of 9 volumes, namely:
 - Volume 1 : Summary of Corridor Counts
 - Volume 2 : Passenger and Taxi Arrivals at Ranks
 - Volume 3 : Passenger and Taxi Departures at Ranks
 - Volume 4 : Task Memorandum
 - Volume 5 : Bus Utilisation Information
 - Volume 6 : Bus Supply Information
 - Volume 7 : Railway Supply Information
 - Volume 8 : Minibus-Taxi Supply Information
 - Volume 9 : Minibus-Taxi Utilisation Information

ANNEXURE A
OVERVIEW OF PUBLIC TRANSPORT IN GAUTENG

OVERVIEW OF PUBLIC TRANSPORT IN GAUTENG: EXTRACTED MAINLY FROM CPTR REPORTS (INITIAL ASSESSMENT)								
PUBLIC TRANSPORT INDICATOR		EGSC	GJMC	GPMC	KMC	LVMC	WGSC	TOTAL
GENERAL								
1	MODAL SPLIT							
1.1	Taxi passengers (total number of daily passenger trips)	283000	600000	383600	120000	130000	197500	1714100
1.2	Bus passengers (total number of daily passenger trips)	36000	280000	224000	2000	23200	2800	568000
1.3	Rail passengers (total number of daily passenger trips)	60000	185500	282400	86000	30000	57700	701600
1.4	Total number of daily passenger trips	379000	1065500	890000	208000	183200	258000	2983700
1.5	Taxi (% passengers using mode)	75	56	43	58	71	77	57
1.6	Bus (% passengers using mode)	9	26	25	1	13	1	19
1.7	Rail (% passengers using mode)	16	18	32	41	16	22	24
2	CAPACITY UTILISATION (%)							
2.1	Taxi (%)	<100	-	<100	-	71	61	-
2.2	Bus (%)	83	-	65	-	<100	126	-
2.3	Rail (%)	35 - 120	30	<30 to 50	20	20-50	33	-
TAXI								
3	TAXI ASSOCIATIONS AND OPERATIONS							
3.1	No. of taxi associations about which Council has knowledge	14	95	-	12	22	25	-
3.2	No. of members of known taxi associations	-	-	-	-	1806	-	-
3.3	No. of taxi associations registered with Prov Registrar	-	-	32	-	-	16	-
3.4	No. of members of registered associations	-	-	-	-	-	1250	-
4	TAXI VEHICLES							
4.1	No. of vehicles identities surveyed	19000	9188	13447	2500	2994	3827	50956
4.2	No. of vehicles operated by members of registered association	-	-	-	1813	-	1737	-
4.3	No. of vehicles not registered in area	-	-	-	-	-	2530	-
5	TAXI RANKS							
5.1	No. of taxi ranks in area	107	191	97	54	33	80	562
5.2	Total no. of holding bays at ranks	-	1469	-	1097	-	1824	-
5.3	Total no. of loading bays at ranks	-	-	-	608	562	630	-
6	TAXI ROUTES							
6.1	No. of individual taxi routes operated	318	476	245	150	135	283	1607
7	DAILY TAXI TRIPS							
7.1	Total number of taxi vehicle trips	24228	32450	54494	9100	79543	21766	221581
7.2	Total number of taxi passenger trips	283000	600000	383600	120000	130000	197500	1714100

OVERVIEW OF PUBLIC TRANSPORT IN GAUTENG: EXTRACTED MAINLY FROM CPTR REPORTS (INITIAL ASSESSMENT)

PUBLIC TRANSPORT INDICATOR		EGSC	GJMC	GPMC	KMC	LVMC	WGSC	TOTAL
8	QUALITY ASSESSMENT: TAXIS							
8.1	Average waiting time of taxi passenger (minutes)	-	-	-	0 to 20	16 to 20	12	-
8.2	Average total travelling time of taxi passenger (minutes)	-	-	-	64	-	37	-
8.3	Average transport cost for taxi commuters per trip (R,c)	2 to 3.5	3	2 to 5	-	4	3.38	-
8.4	Average number of transfers per passenger journey	-	-	-	-	-	1.56	-
8.5	Average trip distance: taxis (km)	-	-	-	-	13.4	-	-
BUS								
9	BUS OPERATIONS							
9.1	No. of bus operators	7	6	3	7	3	5	31
9.2	No. of buses operating in area	271	-	-	-	-	21	-
9.3	No. of bus routes operated	550	-	744	67	226	15	-
9.4	No. of daily bus trips	809	-	5300	-	401	36	-
9.5	No. of daily bus passenger trips	36000	280000	224000	2000	23200	2800	568000
9.6	No. of bus ranks	40	-	-	4	59	8	-
9.7	Average trip distance (km)	-	-	-	-	30 to 40	-	-
9.8	Average trip time (minutes)	-	-	-	-	60	-	-
9.9	Average bus fare per trip (R,c)	-	-	-	-	6.23	-	-
RAIL								
10	RAIL OPERATIONS							
10.1	No. of rail routes operated	8	6	6	2	2	2	26
10.2	No. of services operated per weekday (both directions, both routes)	-	-	320	458	115	105	-
10.3	No. of rail passenger trips (both directions)	60000	185500	282400	86000	30000	57700	701600
10.4	Average occupancy / train trip	-	-	883	188	261	550	-
11	RAIL INFRASTRUCTURE							
11.1	No. of train stations	64	54	61	10	15	17	221

NOTES

Ref. No.	Note
	EGSC
10.3	Rough estimate from rail utilisation statistics.
	GJMC
1.1-1.4	Estimated with input from consultants responsible for CPTR preparation.
5.2/5.3	Holding and loading bays combined.
	GPMC
2.1	Capacity utilisation - taxis - between 20% to 50% of routes have an over supply of taxis.
2.3	Capacity utilisation - rail - for morning peak period.
9.4-9.5	No. of daily bus trips and passengers - surveys covered period 04h00 to 10h00, assumed daily volumes are twice surveyed volumes.
	KMC
2.3	Estimated from tables.
4	Vehicle registration numbers recorded for each destination / trip - no total.
5.2/5.3	Holding and loading bays specified for only 47 ranks, although 54 ranks were observed.
7.1	No. of vehicles arriving and departing for each separate destination - no total.
7.2	No. of passengers arriving and departing for each separate trip - no total.
8.3	Different fares are specified per individual destination - no average cost calculated.
9.3	Estimated figure - excludes routes being operated by Hire-a-Bus.
10.3	Estimated from tables.
	LVMC
2.2	Capacity utilisation - bus - rough estimate from tables.
5.3	Loading bays at ranks - not sure whether figure includes holding bays.
6.1	No. of routes - route numbers were allocated to only 65 of the 135 observed routes.
7.1/7.2	No. of taxi pax (daily) - estimate after discussion with consultant.
10.3	Estimated from daily route section patronage.
	GENERAL
11.1	Obtained from Gauteng Rail Passenger Transport Status Quo Assessment, 1998.

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Years of Experience 27

Academic Qualifications	BSc Eng (Civil) University of Pretoria	1973
	BSc Eng (Hons) University of Pretoria	1978
	MEng (<i>Cum Laude</i>) University of Stellenbosch	1985
Professional Membership	Member, South African Association of Consulting Engineers	1991
	Member, South African Institution of Civil Engineers	1977
	Registered Professional Engineer, South African Council of Professional Engineers, Registration No. 770199	1977

KEY QUALIFICATIONS

From 1973 to 1979 employed by the former City Council of Roodepoort.

From 1979 to 1984 seconded to the Department of Transport as a member of the Metroplan Consortium advising the Department on the implementation of the Urban Transportation Act, Act 78 of 1977.

From 1984 - stationed in Johannesburg - worked on various studies in Transport and Traffic Engineering.

Specific expertise - Traffic policy and legislation, traffic impact studies, area traffic planning, public transport, and bicycle and pedestrian facility needs.

Became Associate of BKS in March 1982, Specialist Engineer Associate in April 1988 and Director in July 1989. Was promoted to Head of Transportation Engineering, Johannesburg office, in October 1991. Was appointed Head of Transportation Division (North) in October 1998.