

Urban mobility for all, approach adopted by cities in Papua new Guinea

La mobilité urbaine pour tous: Une approche adoptée par certaines villes en Nouvelle-Guinée.

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ABSTRACT: Measures in three urban areas to improve public transport facilities and parking provisions, viability of introducing parking or cordon charges, employment of auxiliary policemen to maintain cleanliness and security and traffic management measures to improve pedestrian and vehicle sharing of urban space are discussed in this paper.

RESUME : cet exposé examine les mesures prises dans trois centres urbains afin d'améliorer les prestations du transport public et les possibilités de stationnement, la viabilité d'un système de stationnement payant et de péages, l'emploi d'auxiliaires de police pour veiller au maintien de la propreté et à la sécurité, ainsi que les mesures de gestion de la circulation visant à améliorer le partage de l'espace urbain entre les piétons et les véhicules.

1. INTRODUCTION

The National Capital District (sometimes referred to as Port Moresby), Lae (the industrial centre and the second largest town) and Mt. Hagen (the capital of the Highlands region) have applied similar principles to improve urban mobility and security. The approach adopted is presented below with specific reference to Lae.

The National Capital District is the administrative centre of Papua New Guinea (Fig One). The only significant international airport in the Country is situated in here. Demand for air transport from Jackson's Airport, Port Moresby is high because of its isolation in terms of land transport to the rest of the country and because of the operation of businesses from their head offices from NCD. National Capital District has a resident population of 370 thousand. There are 62,000 vehicles operating within the District.

Lae is Papua New Guinea's second largest city and is the primary industrial centre. It has a population of about 160,000. There are nearly 21,000 vehicles within the City. It is the focal point of a major road network centered on the Highlands Highway. The Highlands Highway and Lae deep water port

strategically placed on the Huon Gulf, serves not only the Morobe Province but also the increasingly

important agricultural and mining centers of the Highlands region. The extended catchment area contains a population of over 2 million.

The capital of the Highlands Region is Mount Hagen. It has a population of 62,000. There are nearly 6,500 vehicles operating within the City.

All three cities have applied similar principles to improve urban mobility and security for the users of town centre and their vehicles. They include the following improvements:

Development of bus stations spread throughout the City with associated distribution of routes, introduction of cleanliness and efficiency of operation.

Employment of auxiliary policemen to prohibit spitting of buai (betel nut juice), maintain cleanliness, improve security to vehicles and town centre users and to administer proper traffic management and parking facilities.

A self sustaining means of revenue for continued maintenance of security, cleanliness and traffic control.

At present, Lae is the subject of a major road upgrading and reconstruction project supported by funding from the National Government and AusAid.

Appropriate traffic management measures are to be introduced in the area in conjunction with road upgrading and reconstruction works.

Therefore it is appropriate that Lae City is used as the typical example to discuss various methodologies adopted.

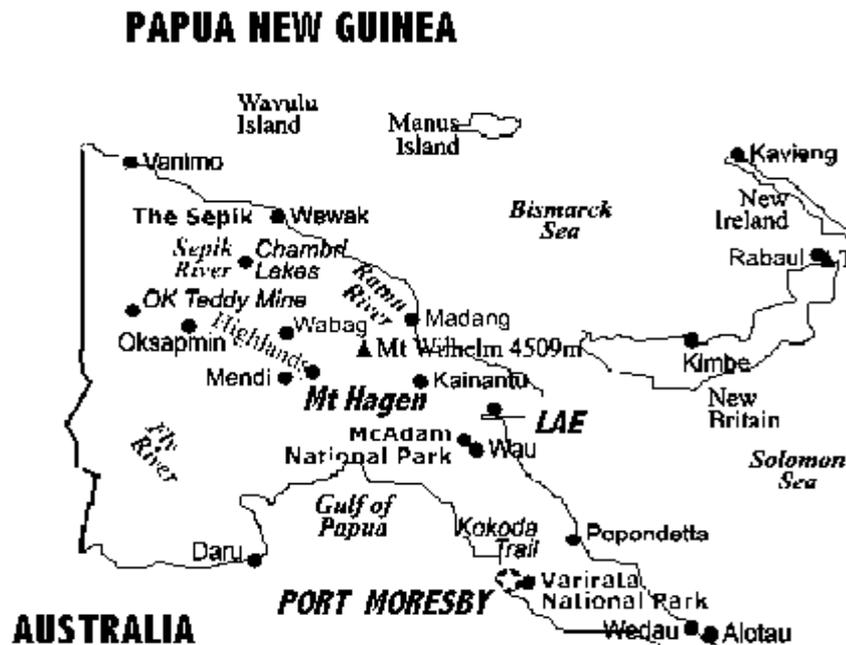


Figure 1. Location of Papua New Guinea and relative positions of Lae, Port Moresby and Mt.Hagen

2. SOCIO-ECONOMIC GROUPS AND STRUCTURE OF MOBILITY

The catchment area in all three towns contains diversified population groups. Diversification is more prominent in Lae because of its industrial base and since the City has easy access to 60 per cent of the population of PNG. Port Moresby exhibits similar characteristics to Lae while the population of Mt. Hagen is less dependant on export trade to the world market. The vehicle-ownership rate in Lae is 1 in 4 households while the rest of the population depends on PMVs for their daily travel.

In the rest of the present section, the socio-economic characteristics of these population groups and the structure of transport modal split will be discussed.

1.1 Socio-Economic Group One A (SEG I-A)

They are the indigenous, rural population living several miles outside the town. They depend on semi-subsistence agriculture, growing vegetables for the local market and on fishing.

In the traditional culture, the housewife in addition to raising a large family is expected to grow her own vegetables. They regularly produce in excess of

their needs so that the ladies can sell sufficient market produce to purchase imported goods such as tin fish, kerosene, utensils and cloths.

The ladies normally travel to the town markets on a Friday and return the same day or the next. Their mode of transport is the 3.5 tonne, open-back truck, referred to as a rural PMV.

SEG I-A consists of 10 to 20 per cent of a typical, day time, Friday population of the Town.

1.2 Socio-Economic Group One B (SEG I-B)

They also originate from the same villages as SEG I-A. However, SEG1-B are essentially men who produce coffee, cocoa, oil-palm fruits, chili and coconut for the market economy. Several of them own their trucks individually or in family groups. The trucks are operated as rural PMVs and for their own business. This group consist of no more than 2 per cent of the day time population in town.

1.3 Socio-Economic Group Two (SEG II)

They are the citizen population of Papua New Guinea who are actively employed in the market economy including public service employment. They live within the urban area and the outlying villages. Together with their family, they consist of nearly 45 per cent of the urban, day time population. Nearly 30 per cent of SEG II own and operate their vehicles. In addition, a significant proportion of this category have access to employer-subsidized transport for their journey to work and return home. The remain-

ing 70 percent of SEG II travel by privately owned and operated, urban PMVs. They travel on a daily basis to work in town, shopping, to attend schools, hospitals and other services. Passengers always expect to sit while travelling by bus.

Generally, the urban PMVs are 25 seat Toyota Coaster buses or similar. They are operated as small, private, businesses. The driver and the off-sider are paid about 3 to 5 % of the collection. The business is cut-throat and the competition is fierce.

1.4 *Socio-Economic Group Three (SEG III)*

This category is mainly non-citizen, expatriate, employees and the economically successful citizens. They are substantially dependent on the market economy for their survival. These urban dwellers consist of 5 to 10 per cent of the population and will have access to more than one vehicle at any time for their private use. They hardly ever step into a PMV.

1.5 *Socio-Economic Group Four (SEG IV)*

They live in squatter settlements, in provincial groups in the outer fringes of the urban area. They consist of about 15 to 30 per cent of the day time population of the town. They work in SEG III households as house-meri and garden-boys or find other as casual employment in the market economy. However, cycling or walking distances in excess of about 2 km is unusual. They essentially depend on the urban buses for their transport.

1.6 *Socio-Economic Group Five (SEG V)*

This category, about 10 per cent in all, is the traditional land-owners of the town. In addition to convenient access to all urban amenities, they enjoy the traditional rights of landowners which include significant financial benefits. At the same time, they have the ownership of some of the fertile or otherwise valuable land in the area. An estimated 30 per cent of them have ownership of private vehicles or operate PMVs for a profit.

3. PROBLEM IDENTIFICATION AND ALTERNATIVE SOLUTIONS.

The following approaches were used to identify landuse-transportation problems within the City and discuss the viability of possible solutions.

- Discussions and site visits by the consultant (the present author), accompanied by the Lae City Authority staff. The approach was useful to understand existing problems and the City Council's philosophy on landuse and transportation development.

- A number of independent site visits by the consultant to observe problem areas.
- Discussion with a large number of 3rd and final year undergraduate students who were employed as surveyors on the project.
- Analysis of interview surveys and a variety of other traffic survey results and comments.

4. DATA COLLECTION AND ANALYSIS

A primary source to confirm the problems identified and the proposals presented in Section 2 was the Top Town User Interview Survey. The survey was completed over a 3 day period as follows: Thursday (19), Friday (20) and Saturday (21) February, 1998.

The following additional data was collected during the same period as the Interview Surveys throughout the Top Town area:

- Details of off and on-street car-parks and parking duration survey.
- Classified counts at all major junctions together with extended period automatic counts.
- Speed flow surveys.
- Vehicle delays at junctions.
- Vehicle delays at pedestrian crossings.
- Registration number surveys of all vehicles entering and leaving the Top Town area.
- Accident analysis.

Top Town user survey

Interviews were completed for visitors to the town and a selection of employers and employees. The aim was to collect similar information from the various town center users but the questionnaires were suitably formatted to reflect the needs of the various groups.

Each questionnaire contained 36 questions in 5 sections to collect as following information:

- Location of interview sites and other general information: It is important to ensure that the location is not biased in favour of one group of people; for example public transport users.
- Information regarding the interviewee such as age, sex, nationality, employment details and if the person has a private parking space in town. It is important to be particularly tactful in asking questions in this section.

With respect to employment details it is important to differentiate between locally employed citizens, citizen tourists, unemployed citizens, expatriates and foreign tourists.

A number of people has more than one employment. In this respect the primary occupation of a housewife may be to look after the home. However in her spare time she may grow and

sell garden produce in Town. Her employment as a market trader must be accurately reflected.

- Information regarding the present trip: They include the main purpose of the trip and the mode of transport. Invariably a significant percentage of interviewees will have more than one purpose for visiting the town and it is important to identify the main purpose of the visit and other secondary purposes.

Particularly with respect to bus passengers, it is important to record the routes taken which will give an opportunity to rationalize the bus routes and bus bay locations for future benefits of the passengers.

- Personal views on existing bus services and general appearance of top town: Information was collected on the convenience of the routes, frequency of services, cleanliness, perceived security, efficiency and courtesy with respect to bus travel.

Views on specific infrastructure proposals and route relocation that are intended to be implemented in the short term were also collected.

- Views on parking, driving and general appearance of top town: Views on parking and general traffic flow problems, charging for parking (or cordon charging as an alternative) to improve security and specific views on a number of traffic management measures were collected in this section.
- Other concerns: In this section interviewees were given sets of specific questions relating to general traffic flow and safety considerations as pedestrians and on general environment and facilities in town as regular users of the area.

A limited opportunity was also given at the end of the interview for people to make open-ended comments and suggestions for improvement.

The success of the user survey and other data collection depends on the quality of the survey staff.

They must understand the purpose of each question and extract appropriate answers while not encouraging open-ended discussions. Satisfactory training of qualified staff is important for successful data collection. The data was collected by undergraduate civil engineering students and technicians from the authority, supervised by professional engineers.

Undergraduates were employed to analyze the data. Cross tabulations and statistical analysis were completed for the interview surveys to typically assess the following:

- Socio-economic details
- Trip details
- Willingness to pay for parking and security services.

- Views on specific traffic management schemes.
- Views on environmental and landscaping proposals and town center services.
- Open ended comments which were used to identify any common thread in specific shortcomings.

36 tables were produced to assess the significance of various pieces of data contained in the mobility survey. A 1 page micro-summary of the results is given in Appendix 1.

The rest of the data was used for technical analysis of specific proposals. In this respect it is important to realise that decisions are not made to simply satisfy the needs of a single majority, powerful or vociferous group.

5. IMPROVEMENTS TO PUBLIC TRANSPORT OPERATIONS

Improvements involve development of bus-bays and associated infrastructure, enhancement of crew efficiency and courtesy and re-design of bus-routes.

5.1 *Development of bus-bays*

On the basis of the information collected from surveys, it is clear that the total capacity of the Central Bus Station is somewhat lower than that required to meet the peak demand. However, the problem appears to be that "the bays are used by urban buses mainly to pick-up and drop-off passengers. The buses do not pull into the bus bay with the intention of waiting there for any significant lengths of time".

Passenger movement and demand is concentrated in the bays nearer the exit. The bus drivers crowd near the exit to pick-up the passengers and make a quick getaway.

There is uncontrolled competition to pick-up passengers. However, a semblance of control is brought about by the bus drivers themselves, who purposely block the competition from overtaking them. Drivers who arrive early force competing buses to be held behind the queue in order for previous arrivals to fill first. In effect, the first three buses block the bus-bay and the two lane dual carriage-way exit thus ensuring that priority is given on a "first come-first served" basis to load passengers and leave, before the next lot of buses are promoted to the top of the queue.

Some in-orderly competition is demonstrated where buses at times stop at unauthorized places such as pedestrian-crossings to load passengers and by those who cross over the central reserve to pick up the odd passenger outside the delineated bus bay area.

Buses stop in front of pedestrian crossings to pick up passengers while a queue of vehicles wait behind them impatiently.

5.2 *Proposals to improve bus operations*

The following solutions have been considered:

- Provision of additional bus bays at the same site.
- Enactment of by-laws and education to ensure that bus operators and passengers behave in an orderly manner and look after the facilities provided.
- Transfer of selected routes to alternative bus bays.

5.2.1 *Provision of additional bus bays at same site*

A proposal to widen the existing bus bay is contained in the Proposed Redevelopment of Central Avenue and Landscaping plan. The proposal is to increase the width to 40.5 metres, providing a 2 lane dual carriage-way, an entry/ exit lane, 2 additional roll-over bus bays to cater for 40 buses, a waiting area and walkway for passengers on each side of the road. The plan was not recommended by the present author for the following reasons:

- The proposal as presented is expensive.
- Additional lanes are unlikely to improve the situation since the problem is not one of capacity limitations of bus bays. PMV operators block the bay exits to ensure that an apparently fair competition is maintained by loading and leaving the bus-bay on a first-come, first-serve basis.
- Additional lanes will only increase the number of lanes of buses moving forward at any one time and emerging on the busy exit road, thus increasing the propensity of accidents.

1.6.2 *Enactment of by-laws*

By-laws are unlikely to be successful unless the PMV operators appreciate that fair competition is being maintained, in other words buses are served with passengers on a first-come, first-serve basis.

Bus-inspectors may be employed in order to ensure that buses wait for their passengers on a single file. However, it cannot be justified for the following reasons:

- In all the apparent chaos, there is at present some order and fair play for the bus operators, which is maintained without the employment of inspectors.
- Employment of bus inspectors is expensive and is likely to reduce efficiency of operation. There is likely to be resentment amongst the operators for the proposal.
- Employment of "Street Wardens" may be justified in order to prohibit general traffic infringements such as loading of passengers at the pe-

destrian crossing and to keep the area clean and tidy.

A proposal, which includes the employment of auxiliary police (street wardens) will be discussed later in the present paper.

5.2.3 *Transfer of selected routes to alternative site*

The existing bus-bay is insufficient to cater for passengers during the peak hours. There is justification to transfer some of the routes for the following reasons:

- Transfer will ensure quicker turn-round of unloading and loading.
- Passengers will find it easier to identify the correct bus for their journey.
- Nearly all the buses complete the Eriku - Town - Market, the busiest segment irrespective of their origin and destination. Therefore, having an additional bus-bay on the other end of the Top Town can help passengers by reducing the walking distance.
- Limited spreading of bus routes within the Top Town area will help spread PMV traffic flows and hence the infringement of by-laws such as loading of passengers at pedestrian crossings.

6. EMPLOYMENT OF AUXILIARY POLICE

Security, cleanliness and traffic flow especially, vehicle parking were identified as major problems in all three towns.

In Lae, taxi service has been abandoned for the past 16 years and PMVs do not operate after 7.00 P.M. due to rascal activities. Customers expect to park close to their business destinations where private security is employed by business houses to take care of customer's vehicles. The situation is exacerbated due to the tendency of employees and others with long term business in Town occupying the limited number of spaces sought after by shopping and bank customers.

The feasibility of employing auxiliary policemen to improve security, cleanliness and to control traffic is discussed in the present section. The duties of the auxiliary police will be as follows:

- Supervise and collect relevant charges for parking or entry at specified times, into a cordon.
- Supervise and issue infringement notices for offences such as spitting buai, dropping rubbish, unauthorized street vending, selling goods in prohibited places, selling prohibited goods, vandalizing public property and drawing graffiti and reporting vehicle accidents and theft.
- Additionally, the contractor is authorized to employ persons to provide vehicle cleaning services for payment, to operate a clean public toilet and

shower facilities for a nominal charge, provide basic amenities for villagers who are stranded in town and by arrangement with Telikom to operate public telephone kiosk service.

The revenue collected is kept by the contractor for the provision of the above services. However, the authority for enforcement rests with the City Authority and ultimately with the courts. The contractor is charged a fixed management fees by the Authority for the overall supervision of the service and to enforce decisions which are challenged.

1.7 Cost of operation of auxiliary police services

Parking charges or a nominal charge for vehicles entering the town centre cordon were examined as possible alternatives. The primary requirement in either option is that the revenue should meet the cost of collection, provision of street wardens and management together with limited profit for the operator. In order to identify public preferences, several alternative tariff plans for parking and cordon charging were presented during the interview surveys.

It is estimated that the very minimum manpower requirements needed to introduce an Auxiliary Police service in the Top Town area of Lae City will be 24 street wardens supervised by a coordinator. Our calculations will be based on the assumption that this number of wardens will be sufficient to supervise cleanliness and provide security to Top Town users and their vehicles.

The cost of operating a basic level auxiliary police service is given in Table 1.

Table 1. Cost of operating a basic level police service

	Kina
Annual wages & payments for 24 auxiliary policemen @ 180.00 per fortnight =	112,320.00
Cost of employing one Coordinator =	12,000.00
Sub-total =	124,320.00
Allow for organization, payments to City Authority and profit to the contractor @ 100 per cent of sub-total =	124,320.00
Total contract value =	248,640.00
TWO HUNDRED AND FORTY EIGHT THOUSAND SIX HUNDRED AND FORTY KINA.	

In this respect it is worth noting that 12 auxiliary policemen is the bare minimum requirement to provide security and collect revenues.

In Mt. Hagen, 40 policemen are employed to cover the whole City. In the Port Moresby City, it is estimated 232 wardens working in 25 teams will be required to enforce the proposals.

The viability of meeting this expense from parking or cordon charges will be discussed in the next section.

7. REVENUE GENERATION FOR SERVICES

Alternative means for generating the necessary revenues for the provision of the services are to implement;

- A pay parking scheme or
 - A cordon charging scheme
- for vehicles entering the Top Town area.

1.8 Parking scheme

The proposal is to introduce pay-parking scheme through out Top Town. Parking ticket booths for sale of tickets for vehicles entering Top Town will be installed at 6 approach roads leading to the Top Town. Also, season tickets may be purchased at nominated centres including the City Council offices. Parking tickets will be displayed on the windscreen. Auxiliary policemen will be employed to sell the tickets at the booths and also to inspect the displayed tickets. They will also work as street wardens and security guards for parked cars, public properties and for the general safety of public.

The favored option for car-parking charges, supported by 32 per cent of the drivers is 50 toea for the first hour, then K1.00 per day. An additional 29 per cent preferred free parking for the first 30 minutes, then K2.00 per day. On the basis of parking surveys, it is estimated that either of the parking tariff may be implemented to meet the revenue requirements. Parking needs to be charged during the week days to meet the requirements. Free parking together with security measures may be implemented during the weekends.

1.9 Cordon-charging scheme

In this case, all vehicles except PMVs and others specifically exempted will be charged throughout the day from 8.00 to 16.00 hours for entering a cordon surrounding the Top Town. A fairly generous estimate of 25 % of vehicles entering the cordon is allowed exemption from paying charges for entering the cordon. Such exemption may be granted for Government and local level government vehicles, emergency vehicles and vehicles of those residents living within the cordon. Arrangements would be made for frequent visitors entering the cordon, such as delivery vehicles to purchase annual season tickets at substantially discounted prices.

It is estimated that the total annual revenue collected from a unit charge of 10 toea for an entering vehicle would be 142,000 Kina which compares well with the yield from parking charges of just over 150,000 Kina from either of the two tariff plans.

Non-financial considerations for the two alternative forms of charging are listed in Table Two.

Table 2. Arguments for selecting Parking vs. Cordon charging

Parking charges	Cordon charging
Easily understood & readily accepted by most users.	Less capital and labour intensive to administer but not readily accepted by all
Provide additional security for parked vehicles as auxiliary police have to inspect each vehicle regularly to check for parking tickets displayed on the wind screen.	Less capital and labour intensive to administer but reduced security for parked vehicles.
Favours the rich who may have Private parking spaces in Top Town.	It will discourage through traffic flow in Top Town. But through traffic flow is at present estimated to be only 4 percent of total flow.

8. CONCLUSION

A traffic scheme covering the whole Town, including ban on consumption of liquor and street fighting and bye-laws to prevent raising of pigs and poultry in town has been in operation in Mount Hagen for the past 3 years. It has been shown that the scheme has achieved break-even during the past few years.

9.

the purpose. The auxiliary policemen should be given suitable uniforms, two way radios to summon assistance where necessary and appropriate official stationary and closer supervision. The scheme in the NCD is unlikely to be financially viable, however it has the support of the local business community.

The scheme for Lae is under consideration by the City Council. A tender calling for the services of a private contractor to implement the programme in the Top Town is likely to be called in the near future. The proposal for Lae includes improvement and provision of additional bus stations, several traffic management and associated road improvement schemes, improvement to parking facilities and introduction of parking charges (or cordon charging) and employment of auxiliary police service to enforce cleanliness, security and other services.

10. ACKNOWLEDGEMENTS

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11. REFERENCES

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A pilot programme covering selected areas of the National Capital District was implemented on 1st July, 2000, coordinated by the Director (Law and Order) . The Director is of opinion that for the scheme to be successful the auxiliary policemen should be responsible people respected by the public. He is not satisfied that unemployed youths may be suitable for

Appendix 1. Micro summary of mobility survey results

	1	2	3	4	5	6	7
Employment	Public employee	Private employee	Private Business	Make/sell artifacts	Student	Housewife	Other

Num interviewed	75	104	35	29	35	20	57			
% Interviewed	21	29	10	8	10	6	16			
Comments	In total, 355 people were interviewed of which 60 (11 %) were expatriates.									
Work location	Top town	Taraka/ Unitech	2 Mile Mumeng	Eriku	Wharf/ Voco Pt	Other Lae	Out of Lae			
Num interviewed	110	69	42	17	28	67	22			
% Interviewed	31	19	12	5	8	19	6			
Comments	In the case of housewife or unemployed, work location is the same as house.									
	1	2	3	4	5	6	7			
Main trip purpose	Work in Town	Part time work	Sell artifacts	Shopping/ private	Walk to oval	Walk other	PMV change			
Number interviewed	72	53	18	159	11	24	18			
% Interviewed	20	15	5	45	3	7	5			
Mode of Travel	On foot	M/C	Private car or van	Office vehicle	PMV Off-duty	PMV employee	PMV pax.			
Number interviewed	22	4	50	40	31	38	170			
% Interviewed	6	1	14	11	8	10	48			
Views on car parking and improvements.	30 min. free, then 2.00/day	50 t for 1 st hour, then K1.00/day	50 t for 2 hours, then K1.00/day	K1.00 for 2 hours, then K2.00/day	Maintain free parking					
Number interviewed	103	115	48	24	65					
% Interviewed	0.29	0.32	0.14	0.07	0.18					
Frequency of visits to town/ week	1 or less		2	3	4	<4				
Frequency selected before charges (Per cent)	156 (44)		95 (27)	24 (7)	35 (10)	45 (13)				
Frequency selected after charges (Per cent)	151 (43)		63 (18)	29 (8)	21 (6)	90 (25)				
Number out of 355 (%) for/ against the given traffic management	Remove Best Buy ped-xing	Close 1/2/3/14 junction	R/A at Coronation Drive with				Various locations, Each insignificant on their own			
			7 th St.	4 th St.	6 th St	2 nd St.				
			173	155	155	141		121	59	111
			49	44	44	40		34	17	31
No	128	140	142	57	152	193	145			
Marks 1 to 5 & frequency for 14 other improvements summarized as weighted sum										
	Beautify town	Reduce thro vehicles	Improve roads	Reduce all veh.	Clean Town	Reduce accidents	Improve security			
Σ(Marks * Frequency)	855	804	725	592	561	334	286			
	Pedestrian facilities	Street lights	Rest places	Improve junctions	More phones	Clean Toilets	Taxi, & others			
Σ(Marks * Frequency)	241	205	152	151	146	114	81			