

## 1. Background

*“Transportation is one of the tools required by civilised man to bring order out of chaos. It reaches into every phase and facet of our existence. Viewed in historical, economic, environmental, social and political terms, it is unquestionably the most important industry in the World. Without transportation, you cannot operate a grocery store or win a war. The more complex life becomes, the more indispensable are the elements of transportation systems.”* (Ref. 1)

The issue of transportation funding is critical in view of the competing demands being placed on Government and Local Authority resources. The transportation industry in South Africa is receiving less and less financial support from the public sector and if the transportation infrastructure in the urban environment is to be maintained and improved, funds need to be generated from alternative sources. The user-pay principle has long been an acceptable point of departure in the negotiating process between potential developers requiring access to and usage of the surrounding transportation network and Local or Metropolitan Authorities as custodians of such road networks. The crux of any successful argument lies in the ability to provide technical backup for this process of negotiation between custodians and benefactors.

The concept of cost apportionment is not new and in the field of transportation, it stems from the desire to collect revenue from the benefactors of transportation infrastructure, whose operations are made possible and enhanced by the existence of such infrastructure. Generally the benefactors tend to be private organisations who are placed in a favourable position as a result of the provision of transport facilities, the cost of which has been paid either by others, namely, government or local authorities, or even a combination of the private sector and government.

As government funds became more scarce and priorities in South Africa change, diverting funds away from the transportation sector, clearly any value captured from the private sector offers an opportunity for the improvement of existing transport facilities as well as the provision of vital links required in the transport network.

## 2. Introduction

Traffic impact studies carried out for significant developments and high intensity traffic generators often indicate the need for modifications to the road networks serving such developments. These modifications may range from minor intersection improvements adjacent to a development through to significant improvements on the major road network.

If the approval for the development to proceed is dependant on network modifications being carried out, the developer is often willing to contribute a certain amount to the major road network improvements whilst still carrying out the modifications to the road network immediately adjacent to the proposed development to provide access. When these major road network improvements also form part of the local authority’s transport network, or alternatively, they act as a catalyst for further development in the adjacent area, then the developer is often in a situation where he is funding infrastructural improvements, part of which should be borne by either the local authority or subsequent developers. On the other hand, it is often found that the local authority bears all the costs without any contribution from the development generating the traffic. It is reasonable to expect that there should be an apportionment of costs of the implementation of the infrastructural network between all those who benefit from it’s implementation.

The issue is, however, not that simple. In a situation where an area has an approved land use structure plan along with its associated approved transport plan, the existing and planned transportation network has a given carrying capacity. Development that takes place in the immediate area served by that network should be monitored in such a way that once an application for development has been made and approved, bulk contributions towards the costs of major road infrastructure could be levied.

The bulk contribution would be an amount determined for a certain land use within a specific transportation area in accordance with an approved structure plan. Should an application be received for a development where the proposed land use differs from that envisaged in the structure plan, then, if the proposed land use is acceptable, the developer or applicant would be liable to pay the normal rateable bulk contribution for this type of development plus a superfee determined by analysing the additional load that the development might place on the network. This superfee might also be based on the premature utilisation of spare capacity that the development would bring about.

In terms of the Port Elizabeth City Council's Town Planning Zoning Scheme, all land in its Municipal area is zoned to permit certain activities. This allows the orderly development of the City to take place and for Municipal services to be provided in terms of a known development plan. In particular, the planning of the transportation system depends on the type of land use which exists and is proposed throughout the city. For example, commercial developments generate more traffic that must be accommodated on the road system, than office development of an equivalent floor area. Traffic generated by existing and future developments in terms of the existing Zoning Scheme, whether fully developed or not, is catered for as part of the planning process.

In the case of medium and large scale development proposals that are likely to generate traffic on the adjacent municipal road network in excess of that of the original zoning, a condition is imposed for the developer to prepare and submit for approval a Traffic Impact Study. Traffic accommodation measures arising from the study must be implemented to the account of the prospective developer, since they arise as a direct result of a land use change and not as a result of natural growth in traffic volumes. This includes the provision of new access to the prospective development. In certain cases where other developments in the same vicinity are imminent, or where the road network is already congested, costs may be shared between the developers and the City Council.

Normal property rates, paid by businesses, contribute towards the maintenance and provision of infrastructure that is required in terms of a City's historical land use zonings. In the case of rezonings, rates paid in accordance with the new approved land use do therefore not significantly cover the cost of facilitating the rezoning in terms of the upgrading of the road network. Of special concern to a City Council is the cumulative effect that the continuous process of changes in land use will have on a City's road network. When analysing the effect that land use changes have on the surrounding road network, their cumulative effect on the network as a whole must be considered in order to quantify the improvements that will be required.

The principle of developers being required to contribute to the cost of road and traffic improvements has worked to the mutual benefit of the Port Elizabeth City Council and developers in the accommodation of traffic and the provision of access. In most cases there has been an element of cost sharing involved, whereby the City Council has accepted the responsibility to improve and maintain the major road network and the developers the responsibility for the provision of local access and road improvements to solve congestion caused by the development. This has allowed new developments to proceed which would otherwise not have been permitted because of their impact on the road system.

### 3. National Demonstration Project

Initial research into cost apportionment for transport infrastructure was conducted under the auspices of the Research and Development Advisory Committee of the South African Department of Transport as Project Number 89/99/1, titled; A Procedure for Cost Apportionment of Road Infrastructure as a Result of a Change in Land Use (Ref. 2,3 and 4). This project was carried out over a two year period, in the 1989/90 and 1990/1991 financial years and can be summarised as follows:

- The first step was an international literature survey. This was followed by a local survey whereby questionnaires were sent to local authorities, developers and organisations associated to development.
- The next step involved a study tour to the USA during which various officials were interviewed on specific cost apportionment procedures that were identified.
- Following the study to the USA, a steering committee comprising representatives from all levels of government as well as the private sector was formed to debate the problems associated with cost apportionment procedures and to discuss and debate alternative procedures.

On completion and documentation of the above project, the Research and Development Advisory Council of the South African Department of Transport (RDAC) approved the implementation of the procedure at local authority level, as Project Number 91/332, titled: “A procedure for Cost Apportionment of Road Infrastructure as a Result of A Change in Land Use : Implementation” (Ref. 5). Subsequently it was agreed that the procedure be implemented by the Midrand Town Council.

Midrand Town Council provided an ideal opportunity since its jurisdiction covers roads of urban, provincial and national status, which enabled the procedure to be tested extensively. The aim of the Midrand project was to provide a tool whereby the capital contributions required from developers could be calculated with relative ease. At the same time the method had to be flexible enough to allow for regular updates and to provide for constantly changing land use and road network conditions.

Following the successful implementation of a cost apportionment system for Midrand, the Centurion City Council embarked on a cost apportionment project that was implemented in 1995, followed by investigation and implementation of the Port Elizabeth system in August 1997.

### 4. System Principles

The apportionment of road network costs is based on a simple concept; road users must pay proportionally for the road network that is required and used by them.

The implementation of the Port Elizabeth cost apportionment system is based on the principles that:

- i. developers pay bulk contributions/levies towards the costs of the road network in proportion to the impact that their particular development will have on the road network, and

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- ii. developers do not pay contributions/levies towards the road network capacity that is not used by them.

In order to comply with the above main principles and to ensure successful delivery of the objective to provide an equitable and affordable system, the Port Elizabeth cost apportionment system was designed in accordance with the following design criteria:

- i. A cost apportionment levy will be imposed on changes in land use in proportion to the impact that a particular land use change will have on the transportation system and will only apply to the portion of road capacity utilised by the proposed development and for its access requirements.
- ii. All cost apportionment levies must be dedicated to the provision of new road network infrastructure. In effect the Port Elizabeth City Council is bound to utilise contributions paid for the stated purpose i.e. to improve the transport network. It was thus necessary to establish a dedicated fund for this purpose.
- iii. Determination of contributions be based on the cost of transportation network improvements that could realistically be implemented over a period of ten years in terms of the Port Elizabeth City Council's Capital Budget. It must however be accepted that the actual rate of implementation will be dependant on local development trends.
- iv. The cost of roads to be re-constructed for maintenance purposes be excluded. (Such roads already provide capacity and access.)
- v. External financing, when available, be used to off-set the total cost of a project for the purpose of determining contributions.
- vi. A reduction in standards and hence construction cost, will only be made when it can be technically justified.
- vii. The cost of the access component of projects in developing residential areas be excluded since this is normally part of the overall development cost and is only required for access to such areas.
- viii. In the case of large developments (exceeding 2 500 m<sup>2</sup> Gross Leasable Area), a Traffic Impact Study will normally be required. Traffic accommodation measures pertaining to local access and capacity improvements for such a development arising from such a study must be implemented at the developer's cost. In addition a cost apportionment levy is payable in respect of traffic generated on the overall, broader road network.

The Methodology and the procedure for determining the requirements that must be met by a proposed new development in terms of the conformity of such a development, the need for a Traffic Impact Study, the class of study required, the requirements for updating the Transportation Plan and payment of the cost apportionment levy, is summarised in the flow chart in Figure 1 (Ref. 5).



## 5. Use of Emme/2 in the Port Elizabeth Cost Apportionment System

**The Port Elizabeth Emme/2 Model;** The emphasis in the utilisation of Emme/2 in the Port Elizabeth Metropole is based on a practical and workable model that fulfill specific needs of particular projects. Emme/2 as a versatile state-of-the-art transportation modelling technique is ideally suited for use in cost apportionment systems. The use of a theoretically sound modelling technique is of utmost importance to the success of a cost apportionment system.

The Port Elizabeth Emme/2 model adopts a conventional four step modelling procedure, namely Pursue Trip Generation, Trip Distribution, Modal Split, followed by Network Assignment. Demographic projections vary enormously due to unpredictable factors such as in-migration from rural areas, projected economic growth within the region, the effect of Aids on population growth, the availability of Government subsidies, etc., all of which negify against any precision in forecasting, even ten years hence. This has necessitated a very broad brush planning approach with low road, high road scenarios. As an example, population predictions within the Port Elizabeth Metropolitan Area for the year 2020, range from 2,4 million to 3,0 million and economic growth from a possible recession to as high as 6%. Notwithstanding, it is considered that the modelling undertaken to date in the Port Elizabeth Metropolitan Area has had a very positive and beneficial impact on the land use/transportation planning of a rapidly growing metropole.

Roads within the Emme/2 model's network are classified according to six broad categories ranging from freeways down to urban streets, with volume delay functions based on the general BPR function and capacities derived from measurement or based on HCM methodology. Trip distribution is effected using an entropy model which yielded the best goodness of fit of observed versus modelled trip length frequencies. Modal split varies enormously between low income communities which are public transport captive with minimal private accessibility, to the other extreme of 100% car usage in certain high income groups. Hopefully, but not necessarily, this imbalance will be rectified in time. A high public transport modal split is strived towards in terms of the South African Government's Transport policies, especially in terms of the recently launched Moving South Africa Initiative. It must however be accepted that a significant swing towards private cars can be expected which could impact dramatically on the demand for road space in future.

An auto assignment is effected by a straightforward equilibrium assignment with bus and mini-bus taxi trips being pre-loaded onto the network. Estimates of fuel consumption by vehicle class are also computed as an aid in the decision making process.

The Port Elizabeth Metropolitan Emme/2 Transport Model covers a total area of some 910 km<sup>2</sup> incorporating the City of Port Elizabeth and the two Town of Despatch and Uitenhage. The model consists of 450 zone centriods (currently being upgraded to 650), 820 regular nodes and a total of 3326 directional links. When comparing the Emme/2 1995 base year model, for an existing metropolitan population of 1,3 million persons, with a total of 460 road traffic counts, a regression coefficient of 0,92 is attained, which indicates a high level of base year accuracy. This accuracy in itself provides confidence in the use of the model for the forecasting of future transport scenarios as well as a basis for defense, whenever the cost apportionment system is challenged.

**Use of the Emme/2 Model for Cost Apportionment;** The Long Term Road Network of the PEMET Transportation Plan is based on the Emme/2 transportation model. The future land use proposal in the various development zones in Port Elizabeth were identified and the Emme/2 model run for specific projected development scenarios. The deficiencies in the existing road

network and alternative upgrading options to solve the future problems were also identified and modelled.

As a first step the estimated transport infrastructure required in the first 10 years towards the forecast period was identified on the Emme/2 network. This was followed by the identification of a set of two-way links, or a combination of one way links, which were representative of the road network elements that required upgrading or construction.

The necessary information is obtained from the Emme/2 Model through exercising the Select Link option utilising the previously identified links, which corresponds to the identified road network elements. In the process, an impact matrix is determined which describes the percentage impact on each identified road network element from the individual development zones. An extract of the Port Elizabeth Emme/2 network, showing certain identified links, is shown in Figure 2.

It is important to realise that the technical success of the cost apportionment system lies in the Emme/2 Model's ability to accurately predict the impact of vehicle trips generated from specific development zones on each node of the particular identified network elements. The relative ease with which an impact matrix can be constructed from the output obtained from the Select Link option is also a great advantage.

## **6. The Port Elizabeth Project**

The Port Elizabeth cost apportionment project was tackled in two phases. Stanway Edwards Ngomane and Associates, consulting transportation engineers, were appointed in February 1996 to carry out a comprehensive study in Port Elizabeth and to describe the need for a cost apportionment system in the Port Elizabeth Metropolitan Transport area. This included the review of existing practices and to produce a policy that could ultimately be accepted as a Provincial Standard by the Provincial Government of the Eastern Cape Province, this process culminated in a report titled; PEMET: Project PL34: Cost Apportionment Procedure, October 1996 (Ref. 8). Following the approval of this policy document, Stanway Edwards Ngomane and Associates were again appointed to aid the Port Elizabeth Core City Engineer's Department in the implementation phase of the Port Elizabeth cost apportionment system. This project produced a report titled; PEMET: Project PL34.1: Cost Apportionment Procedure - Implementation, May 1997 (Ref. 9).

Both phases of the Port Elizabeth project were funded from the Consolidated Metropolitan Transport Fund of the Port Elizabeth Metropolitan Transport Board, which essentially funds metropolitan transport expenditure in the Port Elizabeth area.

The project received final approval from the Port Elizabeth Metropolitan Transport Board on 26 February 1997 and final approval for implementation on a municipal wide basis was granted by the Port Elizabeth City Council's Executive Committee on 19 August 1997. At the same time it was also decided that a dedicated fund be created, namely the Transportation Development Fund, into which all cost apportionment fees be deposited and interest accrued on an annual basis. This effectively meant that all applications for a change in land use, received after this date, were subjected to payment of a cost apportionment fee, termed a transportation development levy, as calculated in terms of the cost apportionment system.

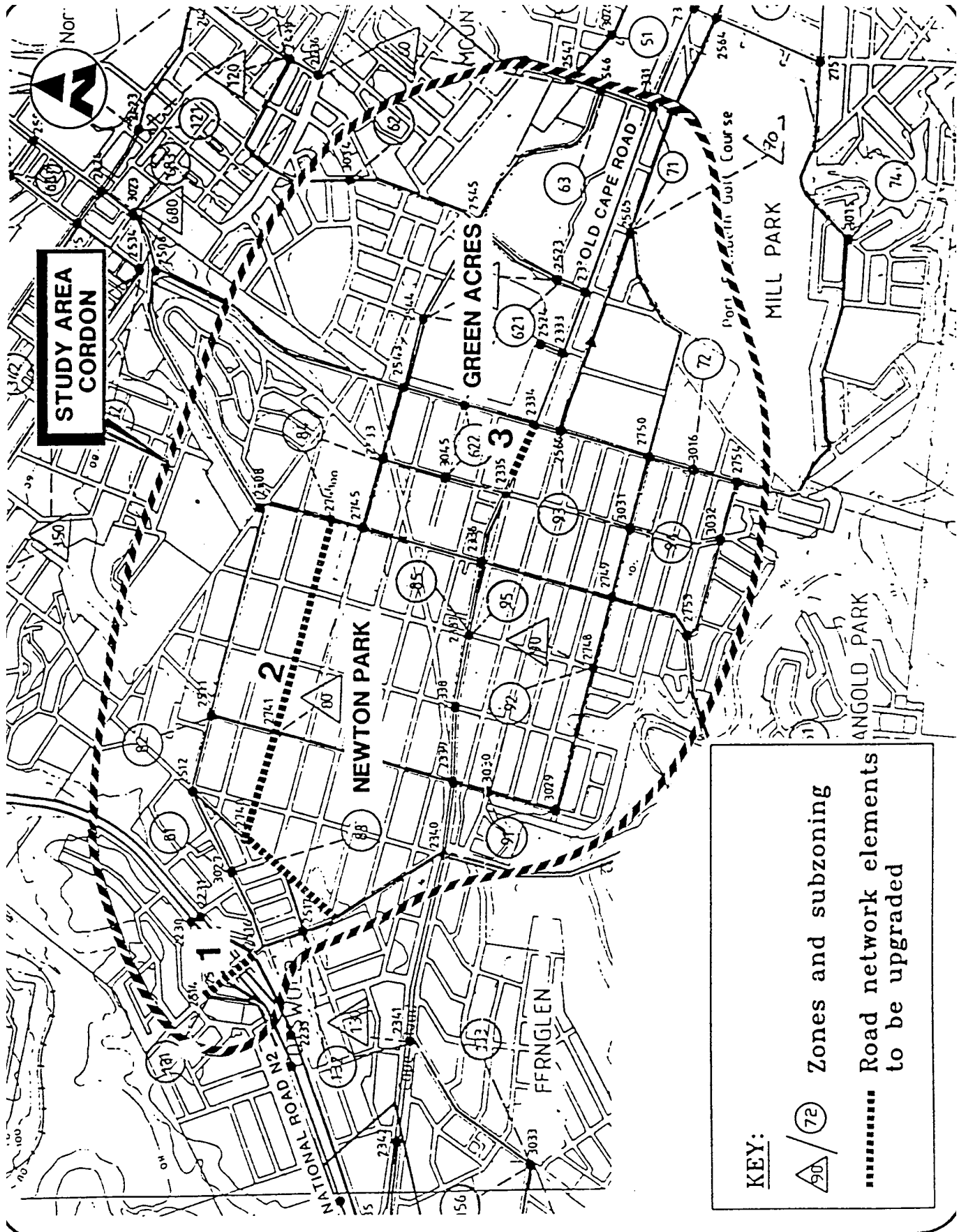


Figure 2 : Extract of Port Elizabeth Emme/2 Network

## 7. The Cost Apportionment Spreadsheet

**Data Manipulation;** The determination of cost apportionment of construction costs of elements of the road network consists of a number of relatively simple calculations which are repeated for every element. Most of the calculations consist of the manipulation of data represented in the form of matrices. To simplify these calculations, all data manipulations are performed on a Microsoft Excel spreadsheet. All the data obtained from the Emme/2 Select Link procedures were converted into ASCII files and transferred to the Microsoft Excel spreadsheet. Annexure C contains an extract from the Microsoft Excel spreadsheet.

As can be seen from the spreadsheet format, the calculations for costs and percentages follow a very similar format that allows simple manipulations of data contained in the spreadsheet. Cells that should not be altered are protected to prevent accidental changes to the data base. Other data, for example more accurate costs of network improvements, can be altered directly on the spreadsheet and the new total contribution of the developer will automatically be updated with the latest information.

**Use of the System;** As more accurate data becomes available, the spreadsheet (impact matrix) may be updated to reflect the latest available information. The initial estimates of expropriation costs and construction costs may not be accurate, however, these can be altered at any time and the entire spreadsheet will be upgraded accordingly.

With any major alteration to the design year it will be necessary to re-evaluate the Emme/2 model. The modelling data determines the percentage influence that a traffic zone has on the different elements of the road network. When the road network changes significantly, it will affect the traffic flows on the road network and therefore the percentage influence that the traffic zones have on each element. The decision as to whether a major upgrade of the system is required or not will depend on the magnitude of the changing element, such as major land use changes or major additions or deletions from the road network. It is anticipated that it will be necessary to undertake a major upgrade of the cost apportionment system at least every five years, which will incorporate an Emme/2 model upgrade, revised Select Link runs and cost revisions.

**A typical determination of the cost apportionment** for a development stemming from a change in land use, will be executed by feeding the following information into the cost apportionment spreadsheet:

- i. Description of the location, type and size of the development. (This does not affect the results of the bulk contribution determined, but should be included for reference purposes.)
- ii. The date of the application, or the date on which the bulk contributions become payable.
- iii. The zone number where the development is located according to the zone plan used for the Emme/2 model. In this regard macro development zones have been created which consists of a combination of Emme/2 zones conveniently enclosed in a development cordon where similar impact can be expected on the surrounding road network. The original 450 zones in the Port Elizabeth Emme/2 model were reduced to 21 major development macro zones, which exclude zones in the towns of Uitenhage and Despatch.
- iv. The peak period trip generation as determined by a traffic impact study, or from the application of standard trip generation figures, that was carried out for the development or rezoning.

- v. The daily trip generation as determined by the traffic impact study, or from the application of standard trip generation figures, that was carried out for the development or rezoning.

If a Traffic Impact Study is not available in terms of items (iv) and (v) above, then the standard trip generation should be determined based on the trip generation rates as recommended by the South African Department of Transport in their document titled; South African Trip Generation Rates, 2nd Edition, March 1994 (Ref. 7).

## 8. Implementation Aspects

From a transportation point of view, changes to the zoning scheme to accommodate a more intense land use, will generate additional unforeseen traffic that has to be accommodated on the existing road network by upgrading existing facilities or by providing new infrastructure. When a change in land use is approved, there are two distinctive implications that could result in improvements in the road system being required:

- i. Improvements to increase the capacity of the road system and restore it to its original potential before the development. In certain cases where other developments in the same vicinity are imminent and may have a cumulative impact on the road network, or where the road network is already congested, costs may be shared between the various developers and Council.
- ii. Improvements to provide access to new developments. The costs of roads required for access are an integral part of a development and must be met by the developer.

The above costs for roads required for access can be seen as an integral part for the success of the development and must therefore be met by the developer. Improvements to the road carrying capacity of the existing road network, cannot only be for the account of the developer and must be shared between the developer, other potential developers and the City Council.

To apply the cost apportionment procedure, the road network in Port Elizabeth was divided into the two separate functions described above, i.e. that of access (the basic network), and that of capacity during peak periods. The minimum network is defined as that of access. Typically, this would mean that one or two lanes in either direction depending on the off-peak traffic volumes. The costs of the access network are shared by all daily users deriving benefit from the access network. Each developer contributes towards the costs of each element in the network in the same proportion as the number of vehicles from that developer's particular zone using that element.

The capacity network is defined as the additional network elements required to provide sufficient capacity during peak periods. Typically this would include turning lanes, traffic signals, etc. Developers contribute towards the costs of each capacity element in direct proportion to the peak capacity used by the vehicles generated by the development, which is independent of the total number of vehicles using that element during the peak traffic period.

During the above processes of access and capacity proportion calculations there may be unused capacity still available on the road network known as "spare capacity". The cost of the "spare capacity" is carried by the local authority and may be redeemed by permitting additional development, thereby allowing more traffic on the network and consequently receiving further bulk contributions from developers. However, no developer contributes towards capacity costs

that are not used by vehicles from his development. Figure 3 shows the relationship between traffic, costs, access and capacity, as described above.

Vehicles traveling to different locations within the municipal boundary make use of different road network elements. These road network elements have different costs depending on the complexity of their design, construction, location, etc. It therefore stands to reason that the cost to travel to different locations within the municipal area will vary. The bulk contributions per vehicle therefore vary from zone to zone depending on the location of the development and the proximity of more expensive road elements.

A developer's total bulk contribution is made up of the sum of the contributions towards each element of the daily access and peak capacity networks used by the vehicle traveling to and from the particular development. Annexure A provides a definition of symbols and formulae used in the determination of the costs and rates indicated in Figure 3, whilst Annexure B provides typical examples of cost apportionment levies calculated.

## 9. Present Legislative Framework Regulating Development

The calculation and payment of contributions towards any engineering service should be included in the formal application process within the existing relevant laws, ordinances, regulations and by-laws.

In South Africa there are three levels of legislation that could influence the imposition of levies, namely:

- i. Acts - applicable to the Republic.
- ii. Ordinances - applicable to the specific Province.
- iii. By-Laws - applicable to the specific local authority.

Cost apportionment contributions must be levied in terms of existing legislation. In the South African context there are essentially three sections of legislation that can be utilised for this purpose, namely;

- Municipal Ordinance 20 of 1974 that deals with actions with regard to the recovery of costs related to the upgrading of Municipal services.
- The Land Use Planning Ordinance (LUPO) No. 15 of 1985, which describes a "contravention levy" dealing with the process to determine a levy for developments that does not conform to an approved land use plan. The legislative system provides the tool to enable the local authority to enforce the payment of contributions for roads from developers.
- The Urban Transport Act No. 78 of 1977, in particular Section 21 (1)(b).

In Port Elizabeth the cost apportionment system was introduced primarily in respect of the major metropolitan road network that is defined in the Port Elizabeth Metropolitan Transport Plan, approved by the Port Elizabeth Metropolitan Transport Advisory Board and the Eastern Cape Provincial Government. The Transport Plan in turn is produced in terms of the Urban Transport Act (no. 78 of 1977) (Ref. 10). Section 21(1)(b) of this Act makes provision for the imposition of levies determined or approved by the Premier of the Province, in accordance with an approved Transport Plan.



## 10. Approval of the System

The implementation of a Cost Apportionment System for the City of Port Elizabeth, in respect of all applications for changes in land use, was approved by the Port Elizabeth City Council's Engineering and Safety Services Committee on 4 August 1997 and its Executive Committee on 19 August 1997. At the same meetings it was also resolved that a dedicated fund be created, namely the Transportation Development Fund, into which transportation levies (contributions required in terms of cost apportionment) be paid and interest be accrued to the fund on an annual basis.

The Port Elizabeth Metropolitan Transport Area's Transport Plan Update, which contains a provision for the introduction of a transportation development levy in the Port Elizabeth Metropolitan area, is approved by the Premier of the Eastern Cape Province on an annual basis as part of the Provincial Cabinet's approval of metropolitan transport expenditure and projects.

## 11. Problems Experienced in Implementing the System

A transportation cost apportionment system by the very nature of the topic is viewed by developers as a possible stumbling block. The need for developers to be required to contribute towards road improvements that does not necessarily abut their properties are rarely understood in the absence of a visible information campaign.

The following are some of the more pronounced problems that were experienced with the implementation of the Port Elizabeth cost apportionment system;

- Reluctance by developers to accept the system, especially smaller and once-off developers. The system also presented new found problems for business property speculators.
- Initial contribution amounts charged were too high in relation to the possible scale of business developable.
- The large number of small zones in the Emme/2 model caused differences in the contributions calculated. This sometimes caused variations in the rate charged in a growing business area that was made up of a series of smaller zones in the Emme/2 model for accuracy from a traffic modelling perspective.
- For speculative reasons developers applied for too high floor space indexes (bulk factors), which in turn caused excessively high cost apportionment levies.
- Perception by officials and politicians that the levies can be used for road improvements and upgrades that are not listed as projects in the cost apportionment system.
- The implementation of a cost apportionment system requires intense on-site control to prevent illegal land uses. It can be argued that the implementation of a system that requires yet another fee to be paid to the local authority, will encourage illegal land uses. This problem is compounded in Port Elizabeth due to the lack of a municipal prosecutor and already overloaded building inspectors who have to control the system in developing business areas.
- The implementation of the cost apportionment system generated an incredible amount of queries and complaints that tied up scarce staff resources.

## 12. Solutions to Problems

The successful implementation of a cost apportionment system will rely heavily on managerial support at the highest levels of the implementing local authority as well as political support from especially the City Councilors in whose wards land use changes are taking place. The following are solutions to the problem issues identified above;

- During the approval process of the system it is necessary to provide adequate technical information to all decision makers, including local City Councilors, to ensure that they fully understand how other role players, such as developers, will perceive the system. This can be achieved through a presentation of the system to the decision makers prior to the actual City Council meeting where the system is to be approved.
- In order to set realistic cost apportionment levies, the list of roads to be implemented or upgraded was reduced to an absolute minimum based on an achievable program.
- The Emme/2 zones were reviewed and macro zonal areas identified. These macro zones are a combination of all zones within an identified cordon of business development. The impact matrix in the cost apportionment spreadsheet was also adjusted.
- A public participation campaign that fully explained the principles and advantages of the system to the public was undertaken. During a series of public participation meetings on transport related issues, where the need for a cost apportionment system was introduced to the general public, it was found that the general public were very much in favour of such a system. The introduction of a cost apportionment system was especially welcomed in areas where large scale changes in land use occurred. In these areas residents were obviously being affected, in so far as traffic congestion and increased noise and air pollution on “their” roads were concerned.
- Brochures, especially designed at informing developers and members of the public making application for a change in land use, were produced and made available at public counters.
- To avert applicants applying for floor space indexes (bulk factors) in excess of what was required for the particular development, municipal staff dealing with such applications were instructed to inform and negotiate accurate floor space indexes with applicants.
- Problems associated with the demand placed on staff requirements can only be resolved in the longer term. Proper training of especially clerical staff to deal with day to day queries and the provision of quotations must be given a high priority, otherwise the specialist technical staff responsible for the design and implementation of the system will be burdened with the day to day administration of the system.

Discussions with larger development corporations indicated a positive attitude towards the implementation of a cost apportionment system. This was primarily due to the existing system that required large scale developments to implement road improvements in accordance with the outcome of a traffic impact study or negotiations with the relevant local authority. On the other hand the smaller developers were not being required to fund any significant improvements, yet their accumulative effect in many cases, can lead to greater problems than isolated large scale developments.

### **13. Conclusion**

Road transport is a key element to economic growth in Port Elizabeth and indeed South Africa as a whole. It is therefore essential that effective means be implemented to provide the necessary means to fund essential transport infrastructure. Although various alternatives have been investigated by South African Metropolitan Authorities, such as fuel levies, parking levies and vehicle license levies, to name a few, the principle of user-pay as a motivational basis is the only generally acceptable point of departure.

In conclusion it can be stated that the Cost Apportionment system implemented in the Port Elizabeth Municipal area is seen as a fair, equitable and legally defensible means of determining the bulk contributions that should be paid by developers towards road network infrastructure in Port Elizabeth. It is based on a logical and technologically sound procedure that incorporates a reliable transportation model and realistic road network improvements.

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