



TMH 16
Volume 1

**South African Traffic Impact and
Site Traffic Assessment Manual**

Version 1.0
August 2012

Committee of Transport Officials

**TECHNICAL METHODS
FOR HIGHWAYS**

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Volume 1**

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Site Traffic Assessment Manual**

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Compiled under auspices of the:

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Technical Methods for Highways:

The Technical Methods for Highways consists of a series of publications that are in the nature of manuals in which methods are prescribed for used on various aspects related to highway engineering. The documents are primarily aimed at ensuring the use of uniform methods throughout South Africa.

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Synopsis:

The manual contains requirements for Traffic Impact Assessments (TIAs) and Site Traffic Assessments (STAs) in South Africa. Requirements are provided for aspects such as responsibilities and submission of traffic assessments as well as assessment standards. The manual is published in two volumes; the first volume consisting of general requirements while assessment standards and requirements are published in the second volume.

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Preface

The manual contains requirements for Traffic Impact Assessments (TIAs) and Site Traffic Assessments (STAs) in South Africa. Requirements are provided for aspects such as responsibilities and submission of traffic assessments as well as assessment standards. The manual is published in two volumes; the first volume consisting of general requirements while assessment standards and requirements are published in the second volume.

In terms of this manual, Traffic Impact Assessments (TIAs) must be undertaken when:

- 1 An application is submitted for a change in land use and;
- 2 The highest total additional hourly vehicular trip generation (including pass-by and diverted trips) as a result of the application exceeds 50 trips per hour.

Site Traffic Assessments (STAs) must be undertaken when:

- 1 An application is submitted for the erection of a building or other structure (roads and other) on a site for which a Site Development Plan (SDP) is required.
- 2 Proposals are made for transportation facilities (roads and other) in a township during Township Establishment.

Single dwelling units are exempted from the above requirement when access is obtained from a Class 5 road, and the access is to the satisfaction of the Municipality. However, the Municipality may require a STA when there is concern regarding the safety of the access.

The requirements of this manual only relate to technical considerations and a traffic assessment which may be acceptable in terms of this manual does not imply any approval or otherwise of the land-use application itself. It also does not imply approval of any mitigating measures proposed in the assessment and such measures may be subject to further detailed investigations. Should such further investigations indicate that the proposed measures are not feasible the Municipality may require that a new assessment be submitted based on alternative proposals.

Definitions

Applicant means any person or entity legally empowered to apply for a development, as defined in relevant legislation.

Assessor means the professional engineer or technologist who undertakes a traffic assessment on behalf of the Applicant. Such professional must have the qualifications as prescribed in this manual.

Connection means the connection between two services. In the case of roads, this is the junction or intersection between different roads.

Development means any lawful procedure whereby a township is established, a property is subdivided, a property is consolidated, the lawful land use of a property is changed or a combination of one or more of the foregoing.

Engineering Service Contribution Policy. The engineering service contribution policy of the Municipality.

External Roads. Roads classified as external by the Engineering Service Contribution Policy of the Municipality.

Internal Roads. Roads classified as internal by the Engineering Service Contribution Policy of the Municipality.

Municipality means the municipality responsible for the provision of municipal engineering services.

Traffic Impact Assessment (TIA). The assessment of the impact of a proposed change in land use on the transportation system.

Site Development Plan (SDP). A plan that the Municipality requires of a land owner intending to erect or alter any building or structure on a site.

Site Traffic Assessment (STA). The assessment of accesses, the site circulation system and transportation facilities proposed in a Site Development Plan or during Township Establishment.

Township Establishment. The establishment of a township in terms of relevant legislation.

Traffic Assessment Standards and Requirements Manual. The *TMH 16 Volume 2 South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual* of COTO (Committee of Transport Officials), South Africa.

Trip Data Manual. The *TMH 17 South African Trip Data Manual* of COTO (Committee of Transport Officials), South Africa.

1 Introduction

1.1 Aim of manual

- 1.1.1. The aim of the manual is to establish uniform and consistent requirements and standards for Traffic Impact Assessments and Site Traffic Assessments in South Africa. Requirements are provided for the scope and contents of the assessments while standards are provided for acceptable traffic impacts.
- 1.1.2. The basic aim of this manual is to ensure sustainable development by ensuring that adequate transportation is available. Traffic assessments have a key role to play in the creation of sustainable developments that will be able to stand the test of time. Key elements of sustainable development include more efficient utilisation of land, managing land development to reduce the need to travel and promoting more sustainable and efficient forms of transport (such as public transport, walking and cycling).
- 1.1.3. Traffic Impact Assessments (TIA) are required to determine the traffic impact of a land development proposal and whether such development can be accommodated by the transportation system. Transportation and land development are inescapably related and Traffic Impact Assessments are required to ensure that the impact of land development can be accommodated by the transportation system. An inadequate transportation system will lead to congestion and result in deterioration of traffic safety, as well as a diminished quality of life and a reduced economic viability of development. The purpose of traffic assessments is to support sustainable development by protecting the overall integrity of the transportation system for the benefit of all users. Neither public nor private interests are served if transportation systems are needlessly degraded due to poor development planning and control. An efficient, reliable and safe transportation system will in fact unlock and enhance land development potential.
- 1.1.4. Site Traffic Assessments (STA) are required to assess the expected operational conditions of transport facilities proposed in a Site Development Plan or during Township Establishment and to establish whether such facilities will be able to safely and efficiently accommodate current and future traffic. Inadequate site or township transport facilities may not only affect public safety on the site or in the township itself, but could have significant overflow impacts on the wider transportation system which could contribute to congestion and traffic safety problems on the public road network. It is also necessary to ensure that site and township facilities are properly integrated with the surrounding transportation system, particularly with the public transport system.
- 1.1.5. Environmental Impact Assessments often require Traffic Impact Assessments as part of the application. The requirements of this manual can also be used for such purposes, with the necessary changes and amendments where required.

1.2 Legal Framework

1.2.1. The Constitution of the Republic of South Africa empowers a Municipality to govern, on its own initiative, the local government affairs of its community, subject to national and provincial legislation. According to the constitution, the Municipality has executive authority in respect of, and has the right to administer, inter alia, the local government matters listed in Part B of Schedule 4 and Part B of Schedule 5, which includes municipal roads. The Municipality also has the right to exercise any power concerning a matter reasonably necessary for, or incidental to, the effective performance of its functions.

In terms of Section 152(1) of the Constitution, the objects of local government include, inter alia, to ensure provision of services to communities in a sustainable manner and to promote social and economic development. Section 153 emphasises that in its budgeting and planning processes, the Municipality must give priority to the basic needs of the community and to promote social and economic development of the community.

1.2.2. Municipal development planning in South Africa is regulated by the Municipal Systems Act (Act No 32 of 2000). This act requires the preparation and adoption of Integrated Development Plans (IDPs) to guide and regulate all planning and development in the Municipality. The National Land Transport Act NLTA (Act No 5 of 2009) requires the integration of land transport planning with the land development process and the preparation of integrated transport plans which constitutes the transport component of the integrated development plans of municipalities. These integrated transport plans include the regulation and provision of transport infrastructure for all modes of transport. According to the National Land Transport Act, property developments within a transport area are subject to traffic impact and transport assessments.

1.3 Engineering Service Contribution Policy

1.3.1. This manual must be read together with the Engineering Service Contribution Policy of the Municipality. Where such policy has not been adopted by the Municipality, then the requirements described in the *TMH 15 South African Engineering Service Contribution Manual for Municipal Road Infrastructure* of COTO (Committee of Transport Officials) will apply for the purposes of this manual.

1.3.2. The Engineering Service Contribution Policy of the Municipality defines responsibilities with regard to the provision of, and contributions to, road infrastructure by developments in municipalities. The policy establishes the road infrastructure for which the contributions are required, the classification of internal and external services, the responsibilities of the Applicant and the Municipality respectively and the methodology for determining the contributions. The Applicant is responsible for the installation and provision of internal engineering services while the Municipality is responsible for the installation and provision of external services. The Applicant, however, will contribute to the cost of the external engineering services.

- 1.3.3. This manual on traffic assessments may not be used for establishing any responsibilities with regard to the provision or contributions to engineering services, either with regard to roads under jurisdiction of the Municipality or any other authority. Such responsibilities are solely determined by the Engineering Service Contribution Policy and this manual will have no bearing on such responsibilities.

1.4 Responsibility for traffic assessments

- 1.4.1. In terms of this manual, the Applicant is fully responsible for the Traffic Impact and Site Traffic Assessments, including the cost of undertaking such assessments. This responsibility, however, is restricted to the assessments described in this manual and the Applicant shall not be responsible for undertaking any assessments that would normally form part of the master planning of the Municipality (as described in this manual).
- 1.4.2. The Municipality is responsible for the master planning required to accommodate developments in general and for implementing transportation systems and improvements that are required to serve the wider community. This master planning includes the planning of the major road network consisting of Class 1 to 3 roads. In situations where the required master planning has not been undertaken, provision is made in the manual for allowing the Applicant to undertake the planning on behalf of the Municipality, but the Applicant will be allowed to deduct the cost of such planning from the engineering service contribution.

1.5 Other authorities

- 1.5.1. In terms of this manual, traffic assessments shall not be restricted to transportation infrastructure under the jurisdiction of the Municipality alone and the impact of a proposed development on infrastructure under the jurisdiction of other municipalities and road authorities must also be assessed (depending on the extent of the study area as required by this manual - refer to Appendix A).
- 1.5.2. The requirements and standards of this manual shall be applicable to all assessments irrespective of the authority and the Applicant will not be responsible for any additional assessments or complying with any requirements other than those prescribed in this manual.
- 1.5.3. The traffic assessments will take the master planning of other authorities into account where such master planning is available. However, when such master planning is not available or has not been undertaken, these authorities cannot expect the Applicant to undertake an impact assessment for the transportation infrastructure of the authorities.

1.6 Multimodal transport

- 1.6.1. One of the purposes of this manual is to promote multimodal transport, including public transport, walking and cycling. Measures are therefore required that will enhance the attractiveness and encourage usage of such modes.
- 1.6.2. In terms of this manual, the Applicant will be responsible to provide certain infrastructure and facilities that are in support of multimodal transport. These facilities, however, will be restricted to those that can be reasonably expected of the Applicant and which can be implemented at the time of development.
- 1.6.3. Standards are provided in this manual in support of multimodal transport. These standards are aimed at ensuring that a high standard of services and facilities are provided for such transport.

1.7 Overview of the Manual

- 1.7.1. The manual contains requirements for Traffic Impact and Site Traffic Assessments that must be undertaken when required. Requirements for when such traffic assessments must be undertaken are also provided.
- 1.7.2. Requirements related to aspects such as responsibilities, submission and review of traffic assessments are provided in the main body of the manual, while the technical requirements are provided in appendices and in other manuals. Appendix A contains general requirements for traffic assessments while requirements for traffic demand estimation are provided in Appendix B.
- 1.7.3. Assessment standards and requirements are provided in the *TMH 16 Volume 2 South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual* of the Committee of Transport Officials (hereinafter called the Traffic Assessment Standards and Requirements Manual).
- 1.7.4. Requirements for the qualification of persons that may undertake traffic assessments are also provided in the manual. Assessing the impact of traffic is a specialised engineering field that requires detailed knowledge as well as professionalism. In terms of this manual, such assessments may thus only be undertaken by professionals with the qualifications specified in the manual.
- 1.7.5. Similar requirements are also given for persons that will review traffic assessments on behalf of the Municipality. These requirements also apply to any reviews that are undertaken by other authorities.

1.8 Standards and Requirements

- 1.9 Requirements are provided in this manual for the scope and contents of traffic assessments. Standards and requirements for the impact of traffic on transportation infrastructure are provided in the Traffic Assessment Standards and Requirements Manual. All assessments must be undertaken in terms of the requirements of this manual as well as the Traffic Assessment Standards and Requirements Manual.

- 1.9.1. It is a specific stipulation of this manual that the Municipality will not require the assessment of any impacts nor prescribe any standards or requirements other than those prescribed in this manual and in the Traffic Assessment Standards and Requirements Manual. This requirement is also applicable to assessments that must be undertaken for infrastructure under the jurisdiction of other authorities.
- 1.9.2. It is the responsibility of the Municipality to ensure that the standards and requirements are applied uniformly to all developments. No relaxation of the requirements should be allowed, except as described below.
- 1.9.3. The requirements of this manual and the Standards and Requirement Manual are aimed at ensuring an efficient and safe transportation system. The intention is that these requirements and standards should be complied with as far as possible. It is, however, recognised that there may be circumstances where these requirements cannot be met. A relaxation of the requirements may be considered by the Municipality if the deviation from the requirements can be motivated, provided that adequate cognisance is given to the need for a safe and efficient and safe transportation system. Particular care must be taken to ensure that the safety of the users of the system is not compromised.

1.10 Manual for Traffic Impact Studies

- 1.10.1. This manual may be used in place of the Manual for Traffic Impact Studies of the Department of Transport (DOT) published in 1995 (Report No 93/635).
- 1.10.2. Some of the more important differences between the two manuals include the following:
 - i) **Warrants for traffic impact assessments.** The DOT manual requires that traffic impact studies must be undertaken for developments that generate more than 50 peak hour trips, although a traffic impact statement may be submitted for developments that generate less than 150 trips. The 50 trip threshold is retained in this manual but a full traffic impact assessment is required for all developments.
 - ii) **Site Traffic Assessments.** The DOT manual does not require site traffic assessments as required by this manual.
 - iii) **Master planning.** The DOT manual does not explicitly require master planning to be in place before traffic assessments can be submitted.
 - iv) **Extent of study area.** The extent of the study area in this manual is smaller than that of the DOT manual due to the introduction of master planning as a requirement in this manual.
 - v) **Assessment standards.** The standards according to which impacts are assessed have significantly been expanded in this manual. Requirements for public transport and non-motorised forms of travel have also been given greater prominence.
 - vi) **Professional qualifications.** The professional qualification requirements for both assessors and reviewers have been expanded in this manual.

2 Traffic Assessments

2.1 Integrated Development and Transport Planning

- 2.1.1. Traffic assessments must be undertaken against a background of the greater development and transportation planning of the Municipality. Assessments cannot be undertaken in isolation without reference to such planning.
- 2.1.2. The Municipal Systems Act (Act 32 of 2000) requires that the Municipality must compile an Integrated Development Plan (IDP). In terms of the act, a core component of the IDP is the Spatial Development Framework (SDF) which must include the provision of basic guidelines for a land use management system for the Municipality. These frameworks can range from broad regional plans for the Municipality as a whole, down to detailed plans at precinct level that indicate proposed land uses at erf level.
- 2.1.3. An Integrated Transport Plan (ITP), as described in the National Land Transport Transition Act (2000), is used to formulate the vision, policies and strategies of a Municipality with regard to transport and to list the transport projects to be carried out over a five-year period. According to the Act, transport planning must be integrated with the land development process and must form an essential part of the IDP.
- 2.1.4. In terms of this manual, the municipality may require that certain development and transportation master planning must be in place before traffic assessments can be undertaken and submitted. Some of the required planning may have been undertaken as part of the above integrated development and transport planning of the Municipality and may thus already be available. Where not available, the required planning must be completed before traffic assessments can be submitted. Provision is made in this manual for allowing the Applicant to undertake such planning on behalf of the Municipality when the planning is not available or has not been undertaken. Applications for development cannot be delayed by the lack of master planning in the Municipality.
- 2.1.5. The requirements related to master planning described above and in the following sections of this chapter are also applicable when assessments are required of roads and transportation infrastructure under the jurisdiction of other authorities, except that traffic assessments may be undertaken even if master planning is not made available by other authorities. Applicants shall not be penalised by the lack of such master planning by either the Municipality or by other authorities.

2.2 Traffic assessment levels

- 2.2.1. Transportation planning is undertaken on different levels for different purposes and to address different needs. On the macro level, planning is undertaken with the purpose of establishing a development and transportation framework or master plan while more detailed levels of planning are undertaken with the purpose of undertaking detailed traffic assessments and establishing engineering designs.
- 2.2.2. The above implies that planning and assessments must be undertaken on both the macro and more detailed levels. The following planning and assessment levels are provided for in this manual:
- a) Master planning, the planning that must be undertaken by a Municipality in support of land development. The following planning is required:
 - i) Planning required for the development of a *Spatial Development Framework*.
 - ii) *Transportation Master Planning* required for the planning of transportation facilities that are required to serve an area. The master planning must guide the transportation facilities, including the road network, that will be required to sustain development.
 - iii) *Traffic Management Planning* that is aimed at protecting residential and other sensitive areas against traffic intrusion and other related problems resulting from developments and inadequate transportation infrastructure.
 - b) Traffic assessments, the assessments that must be undertaken by Applicants. The following assessments are required:
 - i) *Traffic Impact Assessment*, the assessment required to assess the traffic impact of a proposed change in land-use rights.
 - ii) *Site Traffic Assessment*, the assessment of transportation facilities and site accesses proposed in a Site Development Plan or during Township Establishment.

More information on the above master planning and traffic assessments is provided in the following sections.

2.3 Master planning

- 2.3.1. Master planning is the planning that must be undertaken by the Municipality and which must be in place before traffic assessments can be undertaken and submitted. In terms of this manual, the Municipality is responsible for such master planning. The master planning also includes certain traffic studies that must be undertaken to support the planning.
- 2.3.2. All master plans must be approved by the Municipality or relevant authority at an official level required by the Municipality or authority. Master plans that have not been approved have no standing, but could be considered by the Applicant when undertaking traffic assessments.

- 2.3.3. The master planning should be undertaken for the planning horizon adopted by the Municipality. This planning horizon for a particular area should preferably be selected as the year in which developments in the area are expected to be fully completed and stabilised.
- 2.3.4. The following master plans and frameworks should be developed by the Municipality and made available to Applicants:
- a) Spatial development frameworks.
 - b) Traffic management plans.
 - c) Road network master plans.
 - d) Functional road classification plans
 - e) Access management plans or frameworks.
 - f) Public transport plans.
 - g) Traffic demand models.
- 2.3.5. Spatial development frameworks are required to show the planned land uses for the area, including land which has not been developed. Such frameworks are particularly required for areas where there is a significant potential for development or changes in land use.
- The level of spatial planning must be commensurate with the level of information required to inform the infrastructural planning and traffic assessments at an appropriate level of detail. It must be possible to determine and quantify the land use for a particular site from the spatial framework.
- The spatial frameworks should also avoid referring to broad zoning categories, contained in land use management and town planning schemes and should preferably identify specific land-use categories, as opposed to zoning categories, envisaged for an area (i.e. offices, shops, factories, warehouses, single dwelling houses, multiple dwelling units/flats, etc.).
- 2.3.6. Traffic management plans are required to show measures that are required to effectively protect residential and other sensitive areas against traffic intrusion and other traffic related problems resulting from land uses provided for in the spatial development frameworks or from insufficient transportation infrastructure.
- 2.3.7. Road network master plans are used to show the major road network and related facilities required to accommodate the land uses provided for in the spatial development frameworks. The plans shall, as a minimum, cover all Class 1 to 3 roads, including roads under jurisdiction of other authorities. These plans must, inter alia, show the required road widths to accommodate the spatial development frameworks. The plans must also show intersection and, where appropriate, positions from where property access may be obtained from.
- 2.3.8. Functional road classification plans are used to show the functional classification of roads in an area (Class 1 to 5 roads). The plans are required for the purpose of determining engineering service contributions as well as traffic assessments. The standards and requirements for traffic assessments are related to the functional classifications of roads and traffic assessments cannot be undertaken without such plans being available. The functional classifications may also be indicated on the road master plans.

- 2.3.9. Access management plans or frameworks are used to indicate the requirements and conditions according to which access may be provided. Such plans or frameworks are particularly needed on roads that do not currently fully comply with intersection spacing and separation requirements of the Traffic Assessment Standards and Requirements Manual, or where retrofit measures are required.
- 2.3.10. Public transport plans are required in areas that depend significantly on public transport. The plans must show all public transport facilities in an area, including public transport routes and termini. Traffic assessments in such areas cannot be undertaken, nor can reductions for trip generation rates be made, unless such plans are in place.
- 2.3.11. Traffic demand models are used to determine the current as well as the future expected traffic demand on the road network. These models must be used during the master planning process to assess whether the proposed road network can accommodate the future spatial development framework for an area, including new land use rights. Where possible, the demand models should fully account for all land use rights that have been approved but not yet fully exercised for an area. The models will at least cover all Class 1 to 3 roads on the road network, including those under the jurisdiction of other municipalities and authorities.
- 2.3.12. The master planning must include the assessment of the impact of the spatial development framework on the transportation infrastructure under jurisdiction of other authorities. Where other authorities will be affected, it is the responsibility of the Municipality to address such impact in consultation with the other authorities.

Where such authorities have not been consulted during the master planning, these authorities can object to applications on the basis that the impacts on their transportation infrastructure were not adequately addressed during the master planning. In situations where the master planning has not been undertaken by a Municipality, the authorities can also object to applications on this basis.

Master planning must respect the Constitutional principles of cooperative government and inter-governmental relations and authorities should, inter alia, a) cooperate with one another in mutual trust and good faith, b) assist and support one another, c) inform one another of and consult one another on matters of common interest, d) adhere to agreed procedures and e) not encroach on the geographical, functional or institutional integrity of government in another sphere.

- 2.3.13. As an absolute minimum, the following master plans shall be in place before traffic assessments can be submitted:
- Functional road classification plan.
 - Access management plans or frameworks on roads that do not currently fully comply with intersection spacing and separation requirements or where retrofit measures are required to provide access.

In addition to this plan, the following master plans must be in place where appropriate before traffic assessments can be submitted:

- Spatial development frameworks in areas where significant changes in land use are expected in either the short or long-term future.

- Road network master plans in areas where upgrading of the major road network is required to accommodate developments.
- Public transport plans in areas which significantly depend on public transport.
- Traffic management plans for the protection of sensitive areas where such areas will be affected by developments.

It is not a requirement that traffic demand model must be available and the Municipality may allow traffic assessment without such model being in place. It is, however, important to note that the traffic assessment will not be able to fully account for aspects that should be assessed by means of the traffic model.

2.3.14. In addition to the above master planning, the Municipality will also maintain a searchable database of Traffic Impact Assessments and Site Traffic Assessments. This database as well as the assessment reports must be made available electronically (preferably on the internet) at no cost to Applicants. Where such a database or reports are not made available, there will be no obligation on the Applicant to take such assessments into account.

2.3.15. In terms of this manual, the Municipality is responsible for the development of the master plans as described above. In situations where the master planning has not been undertaken, and where such master planning is required by the Municipality, the Municipality may enter into an agreement with the Applicant to undertake the required planning on behalf of the Municipality as provided for in the Engineering Service Contribution Policy.

In situations where assessments are required for roads and transportation infrastructure under the jurisdiction of other authorities, the assessments will only be undertaken when the minimum required master plans are available. Other authorities cannot expect the Applicant to undertake master planning on their behalf or to undertake assessments without such master planning in place. However, where an Applicant undertakes master planning on behalf of the Municipality, such master planning will be undertaken in consultation with the other authorities.

2.3.16. In situations where an application is made for a development that will result in land-use rights significantly exceeding or deviating from the land use provided for in the spatial development framework, the Applicant will be required to wait for the next cycle of planning during which the proposal may be considered, evaluated and possibly provided for by the Municipality. The Applicant may, however, make an offer to the Municipality to undertake the required work at an earlier time, in which case the Applicant will be responsible for the costs involved. The required investigations and studies will be determined by the Municipality and are not specified in this manual. This requirement is NOT applicable to other municipalities and authorities.

2.4 Traffic Impact Assessments

- 2.4.1. The purpose of Traffic Impact Assessments (TIAs) is to investigate and assess the feasibility of accommodating the impact of a proposed change in land-use rights on the road and transportation system. An acceptable assessment means that the proposed change can be accommodated to an acceptable standard by the transportation system, possibly with the implementation of mitigating measures or improvements. However, an acceptable traffic assessment does not necessarily imply any approval or otherwise of the land-use application itself.
- 2.4.2. A TIA shall be submitted whenever an application is made for a change in land-use rights, subject to certain thresholds provided in this manual. The assessments shall be undertaken and reviewed in accordance with the requirements of this manual.
- 2.4.3. In situations where an application is made for a development that will result in land-use rights exceeding or deviating from the land use provided for in the spatial development framework, the master planning will have to be amended as specified in the previous section. The required investigations and studies for such amendment will be determined by the Municipality and are not specified in this manual.
- 2.4.4. The specific objectives of a TIA are to determine:
- a) The local impact of a proposed change in land use on the road and transportation system surrounding the development.
 - b) Whether it is possible to accommodate the proposed change in land use, with or without the implementation of mitigation measures, within acceptable norms specified in this manual.
 - c) The mitigation measures and improvements that may be required to accommodate the proposed change, including:
 - i) Demand-side mitigation measures aimed at reducing traffic generation, such as mixed-use developments and reducing the size or changing the type of the development.
 - ii) Supply-side mitigation measures aimed at improving transportation infrastructure, such as roads and public transport infrastructure.
 - d) The estimated cost of the required improvements and services.
- 2.4.5. It is important to note that the purpose of a TIA is essentially that of a feasibility study. The assessment must therefore be undertaken to the detail and depth required to determine the impact of the proposed land use change and to demonstrate that the proposal can be accommodated by the road and transportation system in terms of the requirements of this manual, possibly with proposed mitigation measures. However, the design of such measures together with the assessments required by such design is specifically excluded from the scope of TIAs.
- 2.4.6. Regarding the design of mitigation measures, it is important to note that the Municipality is responsible for the design and provision of external services while the Applicant is responsible for the design and provision of internal services, as defined in the Engineering Service Contribution Policy.

- 2.4.7. Where required, the TIA will indicate mitigation measures and transportation facility improvements that may be required to accommodate the proposed change in land-use rights. It is, however, important to note that the purpose of this approach is to indicate that at least one feasible solution exists to accommodate the impact of the proposed change. Alternative mitigation measures may be developed during further investigations and assessments once the change in land use has been approved.
- 2.4.8. The mitigating measures proposed in the TIA are subject to further detailed engineering investigations. Should such further investigations indicate that the proposed measures are not feasible the Municipality may require that a new TIA be submitted based on alternative proposals.
- 2.4.9. An approved TIA is valid for a period of five (5) years from the date of the assessment. If the applied change in land use is not promulgated within this period, a new assessment shall again be submitted.
- 2.4.10. Where a development will be undertaken in phases, the TIA shall include a description of these phases as well as an assessment for each of the phases. When a Site Development Plan is submitted which substantially deviates from these phases, the Applicant must address the traffic impact of such deviations in the Site Traffic Assessment.

2.5 Site Traffic Assessments

- 2.5.1. The purpose of a Site Traffic Assessment (STA) is to assess whether transportation facilities proposed in a Site Development Plan (SDP) or for a township during Township Establishment meet the standards and requirements prescribed in this manual. SDPs are plans that the Municipality require of a landowner intending to erect or alter any buildings or other structures on a development site.
- 2.5.2. The STA involves only the site or township that is being developed and covers the site or township transportation facilities as well as accesses to the site or township. The primary purpose of the assessment is to evaluate proposed accesses, on-site roads, parking provision, loading facilities, public transport facilities, pedestrian arrangements and other transportation facilities.
- 2.5.3. The Applicant is responsible for undertaking the STAs. Such assessments may be submitted as part of the TIA when application is made for a change in land-use rights. The Applicant may, however, also first submit the STA at a later stage.
- 2.5.4. The STA cannot be used to motivate changes in land-use rights. For this, a TIA must be undertaken. The STA involves the exercising of approved rights.
- 2.5.5. An approved STA is valid for a period of five (5) years from the date of the assessment. If the site development is not completed within this period, a new assessment shall be submitted.
- 2.5.6. Where a STA is submitted for a development that is undertaken in phases, and where the STA deviates significantly from the phasing provided for in the TIA, the Applicant must address the traffic impact of such deviations in the STA.

2.6 Traffic assessments thresholds

- 2.6.1. Requirements on when Traffic Impact Assessments and Site Traffic Assessments must be undertaken and submitted are provided in this section.
- 2.6.2. A Traffic Impact Assessment shall be undertaken and submitted when an application is made for a change in land use and when the highest total *additional* hourly vehicular trip generation (including pass-by and diverted trips) as a result of the application exceeds 50 trips per hour.
- 2.6.3. A Site Traffic Assessment shall be undertaken and submitted whenever:
- a) An application is submitted for the erection of a building or other structure (roads and other) on a site for which a Site Development Plan (SDP) is required.
 - b) Proposals are made for transportation facilities (roads and other) in a township during Township Establishment.
- Single dwelling units are exempted from this requirement when access is obtained from a Class 5 road and the access is to the satisfaction of the Municipality. However, the Municipality may require an assessment when there is concern regarding the safety of the access.
- 2.6.4. Requirements for the undertaking and preparation of the different levels of traffic assessments are provided in Appendix A to this manual.

2.7 Copyright of assessments

- 2.7.1. When a traffic assessment report is submitted in terms of this manual, the Applicant and Assessor (author of the report) gives permission, in terms of South African laws and regulations pertaining to copyright, to the Municipality or any other authority to copy or reproduce the report and distribute or otherwise make the report available to any person, body or organisation.
- 2.7.2. The above permission includes making the report available electronically to the public through an internet website.

3 Qualifications and Responsibilities of Assessors

3.1 Professional qualifications

3.1.1. This manual recognises that traffic assessments are specialised and complex engineering studies that require detailed knowledge of the fundamental principles in the fields of civil, transportation and traffic engineering.

It also recognises that the cost of assessments depends on the extent of the assessments and that considerable judgement must be exercised for assessments to be sufficiently comprehensive without being excessively complex or costly.

The manual also recognises that Assessors could be under pressure to minimize the impacts of a proposed development. Traffic assessments thus require a particularly high level of responsibility and ethical standard that is typically associated with professional registration.

The Manual for Traffic Impact Studies of the Department of Transport (DOT) published in 1995 (Report No 93/635) also required that traffic assessments should only be undertaken by registered engineers OR technologists with training and experience in the field of traffic engineering. This requirement has been expanded on for the purposes of this manual.

3.1.2. In terms of this manual, therefore, a traffic assessment shall be prepared by, or under supervision of, Assessors with minimum qualifications as described below. Note that persons that do not have the required qualifications are still allowed to prepare traffic assessments, but under the supervision of qualified Assessors.

3.1.3. For the purposes of defining the required qualifications of Assessors, traffic impact and site traffic assessments are first subdivided into the following three levels of complexity:

- a) Relatively low level of complexity applicable to developments that comply with all of the following requirements:
 - i) The additional total hourly vehicular trip generation of the development, including pass-by and diverted trips, is less than 500 trips during the peak hour.
 - ii) All accesses are obtained from Class 4 or 5 roads.
 - iii) The roads from which accesses are obtained are operating at a Level of Service of C or better during the peak hour.
- b) Medium level of complexity applicable to developments that comply with all of the following requirements:
 - i) The additional total hourly vehicular trip generation of the development, including pass-by and diverted trips, is between 500 and 1500 trips during the peak hour.

- ii) All accesses are obtained from Class 3 to 5 roads.
 - iii) The roads from which accesses are obtained are operating at a Level of Service of D or better during the peak hour.
 - c) High level of complexity applicable to all other developments.
- 3.1.4. The required qualifications of the Assessor depends on the level of complexity of a traffic assessment:
- a) Relatively low level of complexity. Assessors shall be registered as a professional engineer (Pr Eng) or a professional engineering technologist (Pr Tech Eng) with the Engineering Council of South Africa (ECSA).
 - b) Medium level of complexity. Assessors shall have the qualification in a) above as well as one of the following two qualifications:
 - i) A four-year undergraduate degree in Engineering (as evaluated by the Engineering Council of South Africa), or
 - ii) A postgraduate degree or diploma in traffic and transportation engineering.
 - c) High level of complexity. Assessors shall have the qualification in a) above as well as both of the qualifications listed in b) above.
- 3.1.5. In terms of the *Rules of Conduct for Registered Persons published by the Engineering Council of South Africa*, the Assessor may only undertake work for which their *education, training and experience* have rendered them competent to perform. Therefore, in addition to the qualification requirements above, the Assessor must also have sufficient experience in traffic assessments or in work related to such assessments.

3.2 Professional responsibilities

- 3.2.1. All traffic assessments shall be signed and certified by a professional engineer or technologist with the required qualifications as specified above.
- 3.2.2. The Assessor who signs and certifies the traffic assessment takes responsibility for the assessment as far as that:
 - a) The assessment is correct and free of technical errors.
 - b) The assessment has been undertaken fully in terms of the requirements of this manual and covers all aspects and impacts as required in this manual.

3.3 Code of Conduct

- 3.3.1. The *Rules of Conduct for Registered Persons published by the Engineering Council of South Africa* must be complied with when traffic assessments are undertaken.
- 3.3.2. With specific reference to traffic assessments, conduct could be considered unethical when any known adverse operational or safety impacts are not addressed by or omitted from the assessment or report.

- 3.3.3. In situations where unethical conduct or conduct may have occurred that may be detrimental to the public health, safety or interests, the Municipality or the Applicant, as the case may be, should inform the Engineering Council of South Africa in this regard.

3.4 Conflict of interest

- 3.4.1. The *Rules of Conduct for Registered Persons published by the Engineering Council of South Africa* advises against professional work that can be considered as a conflict of interest. In cases where professionals provide a service to the Municipality regarding the planning and design of the road network or the preparation of master plans, integrated development plans, integrated transport plans or spatial development, it is considered to be a conflict of interest if such professionals act on behalf of applicants for changes in land use in the same geographical area.
- 3.4.2. If there is any possibility that a conflict of interest might exist, the professional should receive written confirmation that the Municipality is satisfied that there is no conflict should the professional carry out work in the same field or area for a different client.

4 Application and Approval process

4.1 Review of traffic assessments

- 4.1.1. The application and approval process must ensure that traffic assessments are undertaken in accordance with the standards and requirements prescribed in this manual and that a fair assessment has been made of impacts and the need for mitigating measures or transportation improvements.
- 4.1.2. While this manual requires that traffic assessments must be undertaken by persons with certain qualifications, it also recognises that traffic assessments should preferably be reviewed by qualified persons (or under supervision of such persons). In terms of this manual, therefore, a traffic assessment should preferably be reviewed by, or under supervision of, a person who has the qualifications required for Assessors.
- 4.1.3. In situations where a dispute should arise between the Applicant and a reviewer that does not have the required qualifications, the Applicant will have the right to request a review by a qualified professional.
- 4.1.4. Where the Municipality has a lack of qualified professionals, the Municipality may consider employing a panel of consulting engineers with the required qualifications to undertake the required review.
- 4.1.5. Where the above panel is not available, the Applicant may offer to finance and appoint a qualified consulting engineer and subtract the cost of the review from the engineering service contribution, provided that the consultant is approved by the Municipality and reports directly to the Municipality and not to the Applicant.
- 4.1.6. In all cases, the review shall be undertaken in terms of relevant legislation and rules of conduct applicable to professionally registered persons.

4.2 Application process

- 4.2.1. Assessors are encouraged to liaise and communicate with the Municipality (as well as other authorities) early in the application process. The main purpose of the liaison is to obtain all the information relevant to an application that must be provided by the Municipality as described in this manual. The Municipality may also be in a position to provide information on critical issues that may affect the application and which should be taken into account in the traffic assessment. Such liaison can save much wasted time and effort.
- 4.2.2. Traffic assessment reports shall be submitted as prescribed by the Municipality. Information on the application process will be made available at the request of Applicants or Assessors.

- 4.2.3. The Assessor will submit a total of four (4) paper copies to the Municipality as well as one (1) electronic copy in Portable Document Format (PDF) format. The electronic copy must include all images, plans and diagrams. The Municipality will make copies of the report available to other municipalities or authorities for comment.

4.3 Review process

- 4.3.1. The Municipality will designate a review officer that will be responsible for the review of the traffic assessment and preparing a response to the application.
- 4.3.2. The Municipality will distribute copies of the traffic assessment report to the following for comment:
- a) The designated review officer.
 - b) Various departments in the Municipality.
 - c) Other authorities such as adjacent municipalities as well as provincial and national road authorities.
- 4.3.3. All comments on the assessment, including those made by other authorities, must be directed to the review officer. The officer will be responsible for collating all the comments and for the preparation of a single response on behalf of the Municipality and other authorities.
- 4.3.4. The Municipality shall respond to the Applicant not later than 90 days after the submission date of all required documentation. Should the Applicant not receive a response within this period, a written notice must be submitted to the Municipality. Should no response be received within a further 30 days, it shall be assumed that the Municipality has no comment on the assessment as submitted by the Applicant.
- 4.3.5. The response will indicate one of the following:
- a) The assessment is referred back for a review of the completeness or correctness of the assessment in terms of the requirements of this manual.
 - b) There are objections against the assessments.
 - c) There are no objections against the assessment, possibly subject to certain conditions.
- 4.3.6. Where there are objections against the assessment, the reasons for the objections will be provided. Objections may be based on considerations such as the following:
- a) Impacts of the development are unacceptable in terms of the requirements or standards of this manual and there are no reasonable measures available to mitigate the impacts.
 - b) Excessive cost of the required mitigating measures or transportation improvements, relative to the engineering service contribution as well as the average cost of road construction.
 - c) Inadequate funding available by the Municipality for the implementation of proposed mitigating measures.

- 4.3.7. In the evaluation of the costs, the Municipality should also consider the benefits of the proposed development. Social and economic development benefits as well as future tax income may be substantial and could warrant the additional cost of the required transportation infrastructure.
- 4.3.8. An assessment shall not be rejected on the basis of requirements and standards not contained in this manual. The Applicant will not be responsible for any additional assessments or complying with any requirements and standards other than those prescribed in this manual.
- 4.3.9. The fact that a traffic assessment is acceptable or that no objections have been made against the assessment does not imply any approval or otherwise of the land-use application itself. It also does not imply approval of the proposed mitigating measures as such measures are subject to further detailed engineering investigations. Should such further investigations indicate that the proposed measures are not feasible the Municipality may require that a new assessment be submitted based on alternative proposals.

5 References

COTO, 2012, South African Engineering Service Contribution Manual for Municipal Road Infrastructure, TMH 15, Committee of Transport Officials, Pretoria.

COTO, 2012, South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual, TMH 16 Volume 2, Committee of Transport Officials, Pretoria.

Department of Transport, 1995, Manual for Traffic Impact Studies, Report No 93/635, Pretoria.

Appendix A

Requirements for Traffic Assessments

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A.1 Requirements for Traffic Assessments

A1.1 Introduction

- 1.1.1 Requirements are provided in this appendix for the preparation of the following types of traffic assessments:
- a) Traffic Impact Assessments (Chapter 2).
 - b) Site Traffic Assessments (Chapter 3)
- 1.1.2 A number of general requirements applicable to both types of assessments are provided in this chapter. Specific requirements are provided in the subsequent chapters.

A1.2 General requirements

- 1.2.1 Applicants are encouraged to prepare traffic assessment reports in the sequence given in the following chapters of this appendix. This will significantly simplify the approval process, which would be beneficial to the Applicant.
- 1.2.2 The traffic assessment should only include information pertinent to the assessment and superfluous information should not be provided. The Assessor may assume that the assessment will be reviewed by persons knowledgeable in the field of traffic assessments. Detailed explanations of assessment methodologies are therefore not required. Applicants are particularly requested not to repeat information given in this manual or in other handbooks or manuals on traffic assessments, unless there is a specific need for including such information.
- 1.2.3 All assumptions must be properly motivated and the assessment may NOT contain any unsubstantiated assumptions. It may also not take an advocacy position which is aimed at discrediting the aims and requirements of this manual. The study must be an objective analysis of traffic impacts in terms of the requirements of this manual.
- 1.2.4 Whenever possible, data should be presented in tables and diagrams rather than narrative text. The preparation of such tables and diagrams are at the discretion of the Assessor, except where required otherwise in this manual.

A.2 Traffic Impact Assessments

A2.1 Introduction

- 2.1.1 Requirements are provided in this chapter for the preparation of Traffic Impact Assessments.
- 2.1.2 Traffic Impact Assessments shall be undertaken when an application for a change in land-use rights is submitted. Thresholds for undertaking the assessments are provided in the main body of this manual.
- 2.1.3 Traffic Impact Assessments shall only be undertaken for roads and transportation facilities under the jurisdiction of the Municipality or another authority. The impact assessment may also include internal township or site roads, particularly when there is a concern that these roads may not be able to accommodate traffic demand. Otherwise, such roads can be assessed in a Site Traffic Assessment.

A2.2 Traffic Impact Assessment cover

- 2.2.1 The Traffic Impact Assessment must be provided with a cover page that provides information identifying the traffic assessment.
- 2.2.2 The following information must be shown on the cover page:
 - a) Municipality name.
 - b) Type of assessment e.g. Traffic Impact Assessment.
 - c) Particulars of the town planning application, e.g. township name or amendment scheme number.
 - d) Erf numbers and farm names.
 - e) Date of report.
 - f) Name and address of the Assessor and/or firm.

A2.3 Cover letter

- 2.3.1 A cover letter shall be bound into the assessment (first page following the cover) that includes the following certification:

It is herewith certified that this Traffic Impact Assessment has been prepared according to requirements of the South African Traffic Impact and Site Traffic Assessment Manual.

- 2.3.2 The letter shall be signed by a person qualified to undertake traffic assessments. The following information must be provided for this person:
- a) Name, address and telephone numbers.
 - b) ECSA Registration and registration number.
 - c) Academic qualifications.

A2.4 Development particulars

- 2.4.1 The following information must be provided for the development:
- a) Trade name of the development (where available).
 - b) Erf numbers and farm names.
 - c) Street address of development, including suburb.
 - d) Reference to the land-use application (where available).
- 2.4.2 A location plan must be provided showing the location of the development. The location plan must be at a scale and detail that sufficiently identifies the context of the surrounding land and roads.
- 2.4.3 Where applicable, references to any previously submitted and approved traffic assessments for the property must be provided.
- 2.4.4 The following information must be provided for the existing land-use rights (exercised and not exercised) as well as the land-use rights applied for:
- a) Total site area in m².
 - b) Floor Space Ratio (FSR), Floor Area Ratio (FAR) and Gross Leasable Area (GLA).
 - c) Size of development per land use type and in the units specified in the Trip Data Manual.

The Traffic Impact Assessment shall be undertaken for the exact and actual land-use rights for which application is made. No assessment shall be submitted or accepted if the assessment is made for different land-use rights.

In situations where application is made for an optional range of land-use rights, the assessment shall be undertaken for the combination of land-uses with the worst impact. The assessment report must address this issue and show how this worst impact has been determined.

- 2.4.5 Information must also be provided on the expected date and phasing of development. For each phase, the following information must be provided:
- a) Envisaged date of implementation.
 - b) Size of development per land use type per phase of development.
- 2.4.6 The report shall refer to the master plan on which it relies and must include a statement on whether the total land-use rights applied for comply with the spatial development framework for the area. Where application is made for land-use rights exceeding or deviating from those provided for in the master planning, it may be necessary to amend the master planning for the area.

A2.5 Primary study area

2.5.1 The Traffic Impact Assessment methodology has the limitation that it is suitable for the assessment of local impacts only and not for wider impacts. The assessment of wider impacts must be based on an evaluation in which the cumulative impact of all developments is taken into account. More advanced traffic modelling techniques are also required to account for aspects such as trip distribution and traffic assignment.

The following requirements for the extent of the study area are based on a consideration of the limitations of the TIA methodology, acknowledging that a development still has a significant impact beyond the study area. Such impact, however, cannot be addressed by means of the traffic impact assessment methodology and must be addressed as part of the master planning.

2.5.2 The study area is an area from which transportation elements are selected for the Traffic Impact Assessment. Differentiation is made between primary and secondary study areas. The transportation elements to be included in the primary study area are defined in this section while the elements to be included in the secondary study area are defined in the following section.

2.5.3 The elements to be included in the primary study area shall be selected as follows:

- a) Accesses to the site. All accesses (vehicle, pedestrian and cyclist) to the site. Such accesses are also included in the study area of Site Traffic Assessments.
- b) External roads. Elements from roads classified as external according to the Engineering Service Contribution Policy *on which the development is likely to have an impact or which may not meet the requirements of the Traffic Assessment Standards and Requirements Manual*.

These elements shall be restricted to Class 4 and 5 roads in the vicinity of the development up to the first Class 1 to 3 roads that can be reached by the Class 4 and 5 road network from the development, up to and including the first connection(s) on the Class 1 to 3 roads.

The elements shall be restricted to those within a maximum distance of 1.5 km from the accesses to the site, measured along the shortest routes to the accesses, provided that there is at least one intersection within this distance. Where there is no such intersection, the distance will be extended to include at least one intersection.

Judgement may be exercised by the Assessor in selection the elements that must be included in the study area (including the first intersection on Class 1 to 3 roads).

- c) New or improved external roads. Where new external roads or improvements to existing external roads are proposed (irrespective of the class of road), such roads shall be included in the study area irrespective of the above requirements.

- d) Public transportation, pedestrian and cyclist facilities that fall within the study area as defined above.
 - e) Sensitive areas. All roads in residential and other sensitive areas on which the proposed development is likely to have a significant impact. Judgement may be exercised in the identification of such elements.
- 2.5.4 The Assessor may also include roads classified as internal township or site roads in the study area, including connections (junctions or intersections) between the internal and the external roads.
- 2.5.5 The extent of the study area is determined irrespective of the responsible authority or municipal boundaries. The study area may thus extend over more than one municipal area and include roads under the jurisdiction of other authorities.
- 2.5.6 Information must be provided in the report on the extent of the study area as well as the elements of the transportation system that have been selected for assessment. Where appropriate, a schematic plan of the study area should be provided showing the study area and the selected elements.

A2.6 Secondary study area

- 2.6.1 The primary study area defined in the previous section is adequate for most land uses except those that require the transport of *heavy goods*. For land uses that require transportation of such goods, the primary study area must be extended to include a secondary study area as defined in this section.
- 2.6.2 Examples of land uses that normally require heavy goods transportation include heavy industrial/manufacturing and mining. Examples of heavy goods include quarried or mined materials, heavy machinery and heavy products. Mined materials include sand, clay, kaolin, ores and minerals while heavy machinery include machinery used for mining, power generation and the production of goods. Heavy products include bricks, concrete products and refined metals.
- 2.6.3 The secondary study area must include all roads that will be used for the transport of the heavy goods to or from a development over the full length of the trips (from origins up to destinations). The assessment to be undertaken in this secondary area, however, will be limited to an evaluation of the impact of the heavy goods transport as required by the Traffic Assessment Standards and Requirements Manual.
- 2.6.4 In order to establish the roads to be included in the secondary study area, an assessment must be made of the origins or destinations of the heavy goods transport. The routes that will be followed must be determined and included in the impact assessment.
- 2.6.5 It is a requirement of this manual that approved routes together with proposed mitigating measures must be defined in the Environmental Management Plans for construction, operation, demobilisation and rehabilitation of the development.

- 2.6.6 Should a change in the approved routes be required in the future, an amended Traffic Impact Assessment will be required. The Environmental Management Plans will also have to be amended to include approved changes.

A2.7 Background information

- 2.7.1 The report must include information on all transportation facilities and land developments that are relevant to the assessment.
- 2.7.2 The transportation facilities for which information must be provided include, inter alia, the following:
- a) Existing roads, streets, interchanges, intersections and property accesses, together with number of lanes and type of intersection control e.g. stop, yield, roundabout or traffic signal.
 - b) Public transport, pedestrian and cycling networks and facilities.
 - c) Planned changes to transportation facilities that are likely to be implemented in the area during the time horizon for which the traffic assessment is undertaken.
- 2.7.3 The report must also include, or refer to, any relevant information that is made available by the Municipality. Such information may include the following:
- a) Spatial development framework.
 - b) Road network master plan.
 - c) Functional road hierarchy plan.
 - d) Traffic management plan.
 - e) Public transport plan.
 - f) Modelled traffic demand.
 - g) Other traffic impact and site traffic assessments in the area.
- 2.7.4 Where appropriate, the above information can be shown on a schematic diagram of the study area. Use can be made of appropriate colours and symbols on the diagram, for example the following:
- a) Functional road classification and authorities can be indicated by means of lines with different colours.
 - b) Road lanes can be indicated by means of arrow symbols indicating turning movement directions per lane.
 - c) Traffic control measures at intersections and accesses can be indicated by appropriate symbols.

A2.8 Site investigations

- 2.8.1 It is a specific requirement of this manual that the site shall be visited to undertake the investigations required for the assessment. Information on the site investigation must be provided in the assessment
- 2.8.2 It is recommended that a photographic record of existing transportation facilities and land development in the area be included in the assessment report.

A2.9 Traffic demand estimation

- 2.9.1 Where elements of the transportation system within the study area have been identified that may be affected by traffic demand and may not meet capacity requirements, including environmental capacity requirements for residential and other sensitive areas, as specified in the Traffic Assessment Standards and Requirements Manual, traffic demand must be estimated for such elements.
- 2.9.2 The traffic demand must be determined in accordance with the requirements of Appendix B. Where a traffic demand model is available, the traffic demand estimates of the model may be used. When not available, the methods described in the appendix must be used to estimate the traffic demand.

A2.10 Demand-side mitigation

- 2.10.1 Consideration should be given to mitigate the impact of a proposed development by means of demand-side measures. Such measures are generally preferred over supply-side improvements.
- 2.10.2 Only demand-side measures that can be implemented at the time of the application may be considered. These measures include, but are not limited to:
- a) Mixed-use developments.
 - b) Public transport service availability.
 - c) Reduction of the size, or changing the type of land use.

A2.11 Proposed improvements

- 2.11.1 In situations where it is not possible to fully mitigate the impact of a proposed development by means of demand-side mitigation measures, improvements to the transportation system may be required. In such cases, at least one set of feasible mitigation measures must be proposed. The inclusion of such measures in the assessment, however, does not imply that these measures will necessarily be implemented and that other measures or improvements may be identified during subsequent investigations.
- 2.11.2 The proposed improvements shall be listed in the assessment report and information provided on each proposed improvement.
- 2.11.3 Where appropriate, information on the proposed mitigating measures must be shown on a schematic diagram of the study area. Use can be made of appropriate colours and symbols to show the information.
- 2.11.4 Where new roads, intersections and other transportation facilities, or improvements to existing facilities are proposed that do not comply with the requirements of this manual, schematic plans or diagrams must be provided of such facilities showing the elements that do not comply with the requirements.
- 2.11.5 Where assessments are undertaken for traffic signals, information must be provided on the traffic signal settings that were used in the impact assessment.

The information must include the cycle length, signal phasing, signal timing and pedestrian timing requirements.

- 2.11.6 Where new roads or widening of existing roads are proposed, information must be provided on the proposed road reserve and roadway widths (including sidewalk widths). Such information can be provided in tabular form or on a schematic diagram.
- 2.11.7 Where new or changes to existing roundabouts (including traffic and mini-circles) are proposed, information must be provided on the number of lanes, roundabout diameter and circulating road width. Any additional road reserve that may be required must be indicated on a schematic diagram.
- 2.11.8 Where new or changes to existing interchanges are proposed, information must be provided on the proposed layout as well as any additional road reserve that may be required.
- 2.11.9 Where traffic management measures are required to protect residential and other sensitive areas, information must be provided on the measures that must be implemented. These measures shall be implemented in consultation with the affected community.

A2.12 Traffic Impact Assessment

2.12.1 The Traffic Impact Assessments must be undertaken for the following scenarios:

- a) Design horizon year assessments, undertaken with the purpose of establishing the mitigating measures that are required to accommodate the development.

The assessments must be undertaken for the design horizon year and hours as specified in Appendix B, for the “with” development scenario and the following two situations:

- i) “Without” proposed mitigating measures, undertaken to show the need for mitigating measures.
 - ii) “With” proposed mitigating measures, undertaken to show whether the proposed measures will be effective in addressing the impacts of the development.
- b) Planning horizon year assessments, undertaken with the purpose of establishing whether it will be physically possible to accommodate the proposed as well as future developments provided for in the spatial development frameworks of the Municipality.

The assessments must be undertaken for the planning horizon year and hours as specified in Appendix B, for the “with” development scenario, but only for the situation “with” mitigating measures. This assessment is only undertaken to show whether it would be physically possible to accommodate future developments. It is not necessary to undertake the assessment for the situation “without” mitigating measures.

- 2.12.2 The impacts of the proposed change in land use shall be assessed in terms of the standards and requirements provided in the Traffic Assessment Standards and Requirements Manual. The assessments that are required are specified in the appendix.
- 2.12.3 Particular attention shall be given to impact standards that cannot be complied with. In such circumstances, the deviation from the standards shall be adequately motivated and the consequences of not meeting the standards discussed and evaluated. Adequate cognisance and attention shall be given to the need for an efficient and safe transportation system.

A2.13 Improvement costs (external services)

- 2.13.1 Where improvements are proposed to roads that are classified as external in terms of the Engineering Service Contribution Policy, an estimate of the cost of such improvements must be provided.
- 2.13.2 The cost estimate must be based on the cost components described in the Trip Data Manual, using average cost rates published annually by the Municipality. These cost rates, however, must be adjusted for specific conditions applicable to the specific proposed improvements. The costs must be determined at the date of the Traffic Impact Assessment, without adjustment for future cost escalation.

A2.14 Engineering Service Contributions

- 2.14.1 The Traffic Impact Assessment must include an estimate of the engineering service contribution to external roads for which the Applicant is responsible in accordance to the Engineering Service Contribution Policy of the Municipality.
- 2.14.2 The contribution must be estimated at the date of the Traffic Impact Assessment without adjustment for future cost escalation. The actual contribution payable will be escalated and determined in accordance to the Engineering Service Contribution Policy.

A2.15 Conclusions and recommendations

- 2.15.1 The report must reach a conclusion on whether the proposed land-use change can be accommodated by the transportation system, possibly with mitigating measures.
- 2.15.2 Recommendations must be provided on the following:
- a) The change in land use which can be accommodated.
 - b) Phased implementation together with improvements required to accommodate each phase of the development.
 - c) Proposed type and location of erf accesses.

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- d) The improvements, changes and mitigation measures that are required, subject thereto that these improvements or measures may be amended in subsequent investigations. Recommendations must also be made for any improvements required to accommodate heavy goods transport.
- e) Elements of the road network master plan that should be implemented in support of the development.
- f) Traffic management measures that must be implemented to protect residential or other sensitive areas.

A.3 Site Traffic Assessments

A3.1 Introduction

- 3.1.1 Requirements are provided in this chapter for the preparation of Site Traffic Assessments.
- 3.1.2 Site Traffic Assessments shall be undertaken when an application is submitted for the erection of a building or other structure (roads and other) on a site for which a Site Development Plan (SDP) is required or when proposals are made for transportation facilities (roads and other) in a township during Township Establishment, subject to certain thresholds provided in this manual.
- 3.1.3 All references to roads and transportation facilities in this chapter will refer to site facilities and accesses.

A3.2 Site Traffic Assessment cover

- 3.2.1 The Site Traffic Assessment must be provided with a cover page that provides information identifying the traffic assessment.
- 3.2.2 The following information must be shown on the cover page:
 - a) Municipality name.
 - b) Type of assessment e.g. Site Traffic Assessment.
 - c) Particulars of the SDP or Township Establishment.
 - d) Erf numbers and farm names.
 - e) Date of report.
 - f) Name and address of the Assessor (including name of firm).

A3.3 Cover letter

- 3.3.1 A cover letter shall be bound into the assessment (first page following the cover) that includes the following certification:

It is herewith certified that this Site Traffic Assessment has been prepared according to requirements of the South African Traffic Impact and Site Traffic Assessment Manual.

- 3.3.2 The letter shall be signed by a person qualified to undertake traffic assessments. The following information shall be provided for this person:
- a) Name, address and telephone numbers.
 - b) ECSA Registration and registration number.
 - c) Academic qualifications.

A3.4 Development particulars

- 3.4.1 The following information must be provided for the development:
- a) Trade name of the development (where available).
 - b) Erf numbers and Farm names.
 - c) Street address of development, including suburb.
- 3.4.2 A location plan must be provided showing the location of the development.
- 3.4.3 Where applicable, references to any previously submitted and approved traffic assessments, including traffic impact assessments, for the property must be provided.
- 3.4.4 Information must be provided on the size of the development (in units specified in the Trip Data Manual as well as Gross Leasable Area) for the following land uses:
- a) Existing land-use rights.
 - b) Land-use rights that is being exercised.
 - c) Total available land-use rights for the development.
- 3.4.5 The report shall include a statement on whether or not the land-use rights being exercised significantly deviates from those provided for in the Traffic Impact Assessment. In such cases, the Applicant must address the impact of such deviation in the Site Traffic Assessment.

A3.5 Study area

- 3.5.1 The study area of a Site Traffic Assessment shall include all roads and transportation facilities on the site as well as site accesses. Within the study area, the following transportation elements must be selected for assessment:
- a) All accesses to the site, even when such accesses have been assessed during a Traffic Impact Assessment.
 - b) All proposed new roads or transportation facilities, or improvements to existing roads or facilities on the site (including public transport, pedestrian and cyclist facilities).
 - c) All elements of the site transportation system that are likely to be affected by traffic demand and which may not meet the requirements or the Traffic Assessment Standards and Requirements Manual. Judgement may be exercised in the selection of such elements.

- 3.5.2 Information must be provided on the elements of the transportation system that have been selected for assessment. Where appropriate, a schematic plan of the study area may be provided showing the study area as well as the location of the elements selected for assessment.

A3.6 Required information

- 3.6.1 Information on transportation facilities and land developments in the area that is relevant to the assessment must be provided in the report.
- 3.6.2 The transportation facilities for which information must be provided includes the following:
- a) Existing roads, streets, interchanges, intersections and accesses, number of lanes and type of intersection control e.g. stop, yield, roundabout or traffic signal.
 - b) Public transport, pedestrian and cycling networks and facilities.
- 3.6.3 The proposed township layout or site development plan with adequate detail of aspects assessed during the assessment must be provided in the report.
- 3.6.4 Where applicable, sufficient detail of architectural proposals including plans and elevations must be also provided to illustrate the proposed development.
- 3.6.5 Vehicle turning paths must be shown on the township layout or site development plan at critical locations where the design of the transportation may be affected by the paths. The turning paths must be shown for the normal use design vehicle as well as the design vehicle that may occasionally use the facility.

A3.7 Site investigations

- 3.7.1 It is a specific requirement of this manual that the site shall be visited to undertake the investigations required for the assessment. Information on the site investigation must be provided in the assessment report.
- 3.7.2 It is recommended that a photographic record of existing transportation facilities and land development that directly affect the proposed development be included as an appendix to the report.

A3.8 Traffic demand estimation

- 3.8.1 Where elements of the transportation system have been identified that may be affected by traffic demand and may not meet capacity requirements, including environmental capacity requirements, as specified in the Traffic Assessment Standards and Requirements Manual, traffic demand must be estimated for such elements.
- 3.8.2 The traffic demand must be determined in accordance with the requirements of Appendix B.

A3.9 Site traffic assessment

3.9.1 The Site Traffic Assessment must be undertaken for the following scenarios:

- a) Design horizon year assessment, undertaken with the purpose of establishing whether the proposed site circulation system will be able to accommodate the proposed development.

The assessment must be undertaken for the design horizon years and hours as specified in Appendix B and for the “with” development and “with” site circulation system scenarios.

- b) Planning horizon year assessments, undertaken with the purpose of establishing whether it will be physically possible to accommodate all the land-use rights of the development.

The assessment must be undertaken for the planning horizon year in which all land-use rights will be exercised, the hours as specified in Appendix B and for the “with” development and the future “with” site circulation system scenarios.

3.9.2 The proposed site transportation improvements shall be assessed in terms of the requirements of the Traffic Assessment Standards and Requirements Manual. The required assessments are specified in the manual.

A3.10 Conclusions and recommendations

3.10.1 The report must reach a conclusion on whether the proposed Site Development Plan or transportation facilities proposed for a town ship complies with the requirements of this manual.

3.10.2 Recommendations must be provided on all aspects that must be addressed in the Site Traffic Impact assessments in accordance to the requirements of this manual.

3.10.3 Where phased developments are involved, particular care must be taken to ensure that future phases of the development will comply with the requirements.

Appendix B

Traffic Demand Estimation

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B.1 Traffic Demand Estimation

B1.1 Introduction

- 1.1.1 The estimation of traffic demand is an important element of a traffic assessment. Such traffic demand must be estimated where transportation elements have been identified that may be affected by increased traffic demand or changes in traffic patterns. This includes residential and other sensitive areas that may be affected by such traffic demand or patterns.
- 1.1.2 Traffic demand must be estimated for all the modes of transport that may be affected by the proposed development.

B1.2 Overview of the methodology

- 1.2.1 The methodology for estimating traffic demand described in this appendix is a combination of "traffic growth" and "build-up" methods. The future traffic demand is estimated by applying a growth rate to existing traffic counts and by accumulating the trip generation of other expected developments, including those that have been approved but not yet fully implemented.
- 1.2.2 The methodology is suitable for micro-level assessments on a local level, but it is not appropriated for area-wide demand estimation. The method is applicable for smaller study areas and not for estimating traffic demand on the major Class 1 to 3 road network. Such traffic demand should preferably be estimated by means of a traffic demand model, but where such a model is not available, the demand can be estimated by means of the methodology described in this appendix, but the estimate will only be approximate.
- 1.2.3 One of the limitations of the methodology is that it is difficult to take diverted and transferred trips into account. These trips are therefore often ignored, but this could result in an overestimation of traffic demand on certain routes. The methodology described in this appendix allows for such trips, but the method is approximate and requires a considerable degree of judgement.
- 1.2.4 Another limitation of the methodology is that it is also difficult to take trip distribution into account. A methodology is provided for this purpose, but the methodology also requires a significant degree of judgement.

B.2 Traffic Demand Parameters

B2.1 Assessment years

2.1.1 Traffic assessments must be undertaken for the following horizon years:

- a) Design horizon year.
- b) Planning horizon year.

2.1.2 The design horizon year is the year selected for determining transportation improvements that are required to accommodate the proposed development.

Transportation improvements must be designed for a horizon year of 5 years. This horizon year is measured from the date of the application, provided that all required documentation has been submitted by this date. Otherwise, the horizon year is measured from the date of submission of all required documentation.

In situations where the development is implemented in phases over a period longer than 5 years, the assessment must also be undertaken for the years in which each phase will be completed.

For Site Traffic Assessments, the design horizon year must account for the development that will be implemented in accordance to the application and the above design horizon year on the external road network.

2.1.3 The planning horizon year is the year selected for determining whether it is physically possible to accommodate the development together with future traffic growth. This analysis is not used for determining the transportation improvements required to accommodate the proposed development.

The planning horizon year must be selected as one in which all developments in the study area are expected to be fully completed and developments in the area have stabilised. Planning horizon years of 20 years are typically used in municipal planning but longer periods may be required.

For Site Traffic Assessments, the planning horizon year must account for the total land-use rights of the development together with the above planning horizon year on the external road network.

B2.2 Assessment hours

- 2.2.1 The assessment must be undertaken for the hours during which the combined effect of background and development traffic will result in the highest traffic demand. More than one analysis hour may be required depending on the combination of traffic flows.
- 2.2.2 The assessment hours must be selected from normal or abnormal days of the year or both, as follows:
- a) In urban areas, the assessment hours must be selected from normal days, except when land uses are specifically focussed on abnormal days, such as holiday resorts.
 - b) In rural areas, the assessment hours must be selected from both the normal and abnormal days.
- 2.2.3 Normal days are days of the year during which the traffic pattern tends to be stable and where these patterns are not affected or influenced by a) abnormal but predictable events such as school and public holidays (including influenced days), or b) exceptional and unpredictable events, such as road closures, construction, accidents and adverse weather conditions. Assessments may be undertaken for normal and abnormal days but not on exceptional days.
- 2.2.4 For normal days, the analysis is undertaken for a specific hour of the week, such as Weekday AM peak, Friday PM peak, Saturday peak, etc. Any normal day of the year can be selected for such analysis, except in areas near to large retail centres where the analysis should be undertaken for the end of the month (or a day following and as near as possible to the end of the month).
- Alternatively, the 15th highest *normal* day hourly flow of the year (the flow which is only exceeded in 14 other hours in normal days of the year) can be used for the analysis, in which case this flow will be applied to all assessment hours of the week. This approach will be followed where appropriate and the flow is made available by the Municipality or another authority.
- 2.2.5 For abnormal days, the assessment hours will be selected from the abnormal days specified and provided by the Municipality. It is not be the responsibility of the Assessor to determine these days.
- Alternatively, the 30th highest hourly flow of the year (the flow which is only exceeded in 29 other hours of the year) can be used for the analysis, in which case this flow will be applied to all assessment hours of the week. This approach can be followed where appropriate and the flow is made available by the Municipality or another authority.
- 2.2.6 A definition of Normal and Abnormal days is provided in the Trip Data Manual.

B2.3 Peak hour factors

- 2.3.1 The peak hour factor is defined as the hourly volume divided by the peak 15-min flow rate (four times the 15-min traffic count) within the peak hour, both measured in units of vehicles per hour.
- 2.3.2 The peak hour factor used in the analysis must be estimated as follows:
 - a) For traffic streams that consist mostly of development traffic, the peak hour factor applicable to the development traffic.
 - b) For other traffic streams, the typical peak hour factor for roads or streets near or adjacent to developments of the same type.
- 2.3.3 Peak hour factors are provided in the Trip Data Manual for the above situations. Where peak hour factors are not available, the peak hour factor may be estimated from traffic counts and adjusted for future year demand.

B.3 Background Traffic Demand Estimation

B3.1 Introduction

- 3.1.1 Background traffic is the existing and future traffic on the road network, excluding traffic generated by the development.
- 3.1.2 The background traffic is estimated by means of a combination of “traffic growth” and “build-up” methods. On Class 1 to 3 roads, the traffic demand should preferably be obtained from a traffic demand model where such a model is available. If not available, then the method described in this chapter may be used.
- 3.1.3 The method is based on traffic counts and applies either a growth rate to such counts, or accumulates trip generation from other expected developments. A combination of the two methods can also be used.

B3.2 Traffic counts

- 3.2.1 The following information must be provided on traffic counts undertaken or obtained during the study:
 - a) Name of intersection
 - b) Date counted
 - c) Day of the week
 - d) Day class (Normal, Abnormal, Exceptional)
 - e) Congestion levels noted during the count.
 - f) Name of person that supervised the traffic count.
- 3.2.2 The required traffic counts must be undertaken for the selected assessment hours. Traffic must be counted in 15-minute intervals during the peak period. The count should start before and end after the peak hour to allow determination of the peak hour period.
- 3.2.3 Traffic is mostly counted at intersections, but traffic counts may also be required on links. At intersections, traffic is counted per turning movement.
- 3.2.4 On roads that carry a significant volume of heavy or public transport vehicles (more than 10% of the total traffic), a vehicle classification count must be undertaken, differentiating between the different vehicle types.
- 3.2.5 Traffic counts shall be undertaken under supervision of a competent person who is responsible for the quality of the counts. This person may not be involved with the traffic counts and must only be involved with the supervision of the counts.
- 3.2.6 When traffic is congested, preference must be given to obtaining the required traffic demand from a model. Where such model is not available, an estimate must be made of the traffic that is diverted or which is travelling outside the peak-

hour (due to peak-hour spreading). The adjustment depends on the degree to which traffic is congested in the area.

The adjustment can be made by adding the growth in queue length over the peak period to the traffic volume in the corresponding period, but additional adjustments must also be made for diverted traffic and peak-hour spreading.

- 3.2.7 Traffic counts up to two (2) years old may be used in the assessment, provided that no changes have occurred during this period that may have significantly affected the traffic demand.

B3.3 Traffic growth

- 3.3.1 Appropriate growth rates must be used for the estimation of future background traffic. Growth rates are only applied to traffic counts and not to the trip generation rates of developments since such rates are determined for fully occupied developments.
- 3.3.2 The appropriate growth rate depends on the expected growth in the area in which the development is located as well as the degree to which approved but not yet exercised developments as well as future development in the area are taken into account in the assessment. Lower growth rates are used when such developments and rights are taken into account.
- 3.3.3 Typical growth rates are provided in the Trip Data Manual. These rates must be adjusted depending on the degree to which other land development in the area is taken into account. In areas dominated by large existing developments and where a significant proportion of the traffic is generated by such developments, the traffic is not expected to experience a high growth rate.
- 3.3.4 The growth rate must be applied from the date of the traffic count to the year of analysis.

B3.4 Existing exercised land-use rights

- 3.4.1 Where a development has existing land-use rights that have been exercised and were a growth rate is applied, the trip generation of the exercised rights must be estimated and subtracted from the traffic counts before any growth is applied.
- 3.4.2 The trip generation of existing exercised land-use rights must be determined using the same methodology for estimating the trip generation of the new rights, taking pass-by, diverted and transferred trips into account. Since the trip generation of the existing rights is subtracted from existing traffic, the trip generation study for the application must be undertaken for the full development, including existing and new rights.

B3.5 Trip generation by other developments

- 3.5.1 Other developments as well as future potential development in the area must be taken into account in the estimation of future background traffic. The following developments must be taken into account:
- a) Approved developments that have not yet been fully implemented. The traffic demand of such developments must be established from traffic impact assessments that have been submitted for the developments. The Municipality will make such assessments available to the Assessor.
 - b) Developments that are likely to occur during the study horizon of the traffic assessment. The Municipality must provide estimates of the future traffic demand that may be generated by such development.
- 3.5.2 The traffic demand due to the above developments are accumulated and added to the traffic counts. No growth rate is applied to the traffic demand estimated for these developments. The growth rate used in the analysis also depends on the extent to which such other developments are taken into account.
- 3.5.3 The Municipality is responsible for providing the above data. Where such data are not available, there will be no obligation on the Assessor to take such developments into account. In such cases, use will only be made of the traffic growth rate to estimate future traffic demand.

B3.6 Redistribution of background traffic

- 3.6.1 In situations where a development proposal may result in a diversion of background traffic, such diversion must be taken into account as part of the “with” development scenario.
- 3.6.2 The report must include a determination of the likely diversion of background traffic as a result of the proposal.

B.4 Trip Generation

B4.1 Trip generation rates

- 4.1.1 Trip generation rates are measured in units of trip ends, with either an origin or a destination at the development. It is the sum of in- and outbound traffic to and from a development.
- 4.1.2 Trip generation rates are provided in the Trip Data Manual for a range of land-uses. Where an application is made for an optional range of land-uses, the land-use combination with the worst or highest impact shall be taken into account in the assessment.
- 4.1.3 Where a development consists of different land-uses, the trip generation must be determined for each land-use and added together. The total trip generation of a multi-use development, however, may be lower than the sum of trip generations of individual land uses allowing the total trip generation to be reduced based on the method and requirements provided in the Trip Data Manual.
- 4.1.4 The traffic analysis is based on the average trip generation rates and percentage pass-by trips for a specific land-use type as provided in the Trip Data Manual. The use of average rates will tend to balance out the effect of variation between different developments. On accesses to developments, the Assessor may use a higher trip generation rate to account for a possibility that the development may attract more trips than the average.
- 4.1.5 The trip generation shall NOT be adjusted to account for the spreading of traffic demand during the peak period as a result of prevailing congested traffic conditions on the road network. The trip generation rate already accounts for some spreading of traffic demand as a result of factors such as variable working and travel times. Allowing for spreading due to congestion does not reflect actual traffic demand and would exacerbate the existing congested conditions. Furthermore, spreading out of traffic demand due to congestion is a dis-benefit to users and must be assessed and evaluated as a negative traffic impact and a deterioration in level of service.
- 4.1.6 No growth rate is applied to the trip generation of a development since trip generation rates are established for fully matured developments.
- 4.1.7 The trip generation must be determined for the following scenarios:
- a) Development with existing exercised rights when such rights exist.
 - b) Development with total rights, including new rights.

The additional trip generation is the difference between the trip generation for the above two scenarios.

B4.2 Modal split

- 4.2.1 The Trip Data Manual provides for a reduction in trip generation in areas with a low level of vehicle ownership or near transit facilities. Provision is also made for walking trips in mixed-use developments. No further adjustment is therefore required for modal split.
- 4.2.2 The reduction in the trip generation rate will reduce the need to implement road improvements, but additional facilities to accommodate the other modes of transport (public transport or walking) may or will be required. This impact must be addressed as part of the traffic assessment.

B4.3 Trip types

- 4.3.1 For purposes of traffic assessments, trips can fundamentally be classified as of pass-by, diverted, transferred and primary trips. While some of these trip may not necessary be new on the wider road network, they are all new on the accesses to a development. The trips can therefore NOT be deducted from the trip generation of a development but must be addressed as part of the trip distribution process. More information on the required methodology is given in the next chapter.
- 4.3.2 Trips may also be classified as internal or external. Internal trips are trips that occur fully within a study area while external trips are those outside the study area of which cross the boundary of the study area. Such trips can also not be determined by adjusting the trip generation rate and can only be determined after trips have been distributed and assigned to the road network. The internal trips are then determined as those assigned internally to the study area.

B.5 Trip distribution and assignment

B5.1 Introduction

- 5.1.1 Traffic generated by the development must be distributed and assigned to the road network to allow determination of the traffic demand per traffic stream or turning movement.
- 5.1.2 Where a development consists of different land uses with trip generation characteristics that differ significantly, the trip distribution and assignment must be undertaken separately for each land use. A separate study may also be required for the distribution and assignment of existing exercised rights where such rights differ from the applied rights.

B5.2 Trip types

- 5.2.1 For purposes of trip distribution, trips can fundamentally be classified as the following types:
 - a) Pass-by trips.
 - b) Diverted trips.
 - c) Transferred trips.
 - d) Primary trips.
- 5.2.2 Only primary trips are considered to be new trips on the road network, while pass-by, diverted and transferred trips are already on the network and are only new on certain segments of the network. The trips cannot be deducted from the trip generation of a development but must be addressed as part of the trip distribution process, as described in the following sections.

B5.3 Pass-by trips

- 5.3.1 Pass-by trips are existing (background) trips already on the road network directly adjacent to the point(s) of access to the site and where the traffic can turn directly into or out of the site. The site is not a primary destination and is only visited during the process of visiting a primary destination. Pass-by trips are therefore not new on the road network and only affect existing traffic patterns at the accesses to the development.
- 5.3.2 The pass-by trips can be estimated by means of factors provided in the Trip Data Manual. These factors are used to determine pass-by trips as a percentage of the total trip generation of the development. The pass-by trips may also not exceed a certain percentage of the background traffic (as described in the Trip Data Manual).

- 5.3.3 The percentage pass-by trips is distributed in proportion to the volumes of traffic passing the different accesses to the development. The percentages are then assigned to specific turning movements on the accesses. The process involves deducting traffic from some turning movements (negative percentages) and adding traffic to other turning movements (positive percentages).

B5.4 Diverted trips

- 5.4.1 Diverted trips are existing (background) trips already on the road network (the site is not the primary destination) but not directly adjacent to the accesses to the site. The trips are similar to pass-by trips, except that they have to deviate to other roads to obtain access to the site. Diverted trips will tend to return to their original route and continue to their original destinations after visiting the development. The diverted trips will thus only be new on certain segments of the road network, but not on the roads from which they are diverted.
- 5.4.2 For smaller study areas, diverted trips can be considered to be primary because the trips would be new to the study areas. For larger areas, however, the trips should be taken into account in the analysis.
- 5.4.3 The diverted trips can be estimated by means of factors provided in the Trip Data Manual. These factors are used to determine diverted trips as a percentage of the total trip generation of the development. The diverted trips may also not exceed a certain percentage of the background traffic (as described in the Trip Data Manual).
- 5.4.4 Diverted trips cannot be distributed in proportion to the traffic volumes on the roads from which the trips are diverted since the diversion is also affected by the distance over which the diversion occurs. Such diversion must therefore be estimated on the basis of local knowledge of traffic in the area.
- 5.4.5 Diverted trips can NOT be diverted from roads adjacent to the development. Pass-by trips are used to account for such diversion.
- 5.4.6 The diversion percentages are assigned to specific routes and turning movements on the network. The process involves deducting traffic from some routes (as negative percentages) and adding traffic to other routes or turning movements (as positive percentages).

B5.5 Transferred trips

- 5.5.1 Transferred trips are trips that are already present on the road network and which are visiting similar developments near to the proposed development and which have the potential of transferring or switching their destination to the proposed development. These trips are different from pass-by and diverted trips in that trips are wholly or partly transferred from one development to another.
- 5.5.2 For smaller study areas, transferred trips can be considered to be primary because the trips would be new to the study areas. For larger areas, however, the trips should be taken into account in the analysis. The number of new trips on

the road network can be significantly overestimated if such diversion or transfer is not taken into account.

- 5.5.3 No factors are available for the estimation of transferred trips and these factors must be estimated based on a local knowledge of traffic patterns and developments in the area.
- 5.5.4 The transferred trips must be estimated as a percentage of the total trip generation of the development. These percentages are then assigned to specific routes and turning movements on the road network. The process involves deducting traffic from some routes (as negative percentages) and adding traffic to other routes or turning movements (as positive percentages).

B5.6 Primary trips

- 5.6.1 Primary trips are trips which are new to the study area and which have the site as the primary destination. The trips can be determined by subtracting pass-by, diverted and transferred trips from the trip generation of a development. For smaller study areas, diverted and transferred trips may be considered to be primary since they are likely to be new in the study areas.
- 5.6.2 The trip distribution of primary trips may be determined by one of the following models or methods:
 - a) Gravity model. According to the gravity model, trip distribution is proportional to the relative magnitude of origin and destination zones, and inversely proportional to the travel time between the zones.
 - b) Analogy method. Uses the directional distribution observed at another similar development in the vicinity of the site.
 - c) Surrogate method. Uses available socio-economic data to determine trip origins and destinations.

Trip distribution may not be based on traffic counts in the vicinity of the development, unless it can be shown that such counts are indicative of the likely trip distribution for the development.

- 5.6.3 The gravity model requires information on the relative magnitude of origin and destination zones as well as travel times between zones. The basic formula for the gravity model is as follows:

$$P_{ij} = \frac{A_j / F_{ij}}{\sum_k A_k / F_{ik}}$$

With:

- P_{ij} = Proportion of trips between zones i and j
- A_j = Attractions in zone j (or k)
- F_{ij} = Friction factor between zones i and j

The friction factor is related to the travel time between zones. Various functions are available for the friction factor, such as the following:

$$F_{ij} = t_{ij}^2$$

In which t_{ij} is the travel time between zones.

- 5.6.4 For smaller study areas, it is recommended that trip distribution should be estimated manually, using one of the above methods based on knowledge of local conditions.
- 5.6.5 For large study areas, however, a detailed analysis should be undertaken based on the gravity model. In such an analysis, an origin-destination matrix should be developed showing the trip distribution between origins and destinations. Constraint must be enforced on the matrix to ensure that the total trip productions and attractions do not exceed those calculated by means of trip generation rates. An iterative process is normally required for this purpose. The calculations are normally undertaken by means of software but can also be undertaken manually.
- 5.6.6 The primary trips must be estimated as a percentage of the total trip generation of the development and these percentages are then distributed and assigned to specific routes on the road network.

B5.7 Traffic assignment

- 5.7.1 Traffic assignment involves determining the percentage of traffic that will use specific routes in the network. The traffic assignment is made with consideration to logical routings, available roadway capacity, right-turn movements, travel times and other relevant factors.
- 5.7.2 The traffic assignment must be undertaken in terms of percentages of the trip generation of a development. The percentages must be shown on a schematic diagram of the study area. Where traffic is deducted from particular routes or turning movements, the percentages must be shown as negative quantities, but otherwise as positive quantities.
- 5.7.3 Separate diagrams are required for each of the following trip types:
 - a) Pass-by trip distribution
 - b) Diverted trip distribution
 - c) Transferred trip distribution
 - d) Primary trip distribution

In all cases, the percentages must be shown for the in- and outbound traffic movements.
- 5.7.4 The assigned traffic volumes are determined by multiplying the trip generation rate of the development with the assigned percentages.

B.6 Total Traffic Demand

B6.1 Introduction

- 6.1.1 Total horizon year traffic demand must be estimated for the design as well as planning horizon years.
- 6.1.2 The total traffic demand is determined by first estimating the background traffic and then adding the trip generation of the development to this background traffic.
- 6.1.3 The background (“without” development) traffic demand is estimated as follows:
- a) Traffic counts are used to estimate current demand.
 - b) From the traffic counts, subtract the trip generation of the existing exercised rights of the development.
 - c) The resultant traffic is then grown using an appropriate growth rate (where required).
 - d) Traffic from other developments and future development is added to the grown traffic to determine future background traffic (where appropriate).
- 6.1.4 The total “with” development traffic demand is then estimated as follows:
- a) Where necessary, the future background traffic is first redistributed to accommodate proposed changes to the transportation system.
 - b) The total trip generation of development, including existing and new rights, is then added to determine the “with” development traffic.

B6.2 Required information

- 6.2.1 The following information on traffic demand must be provided for each horizon year and peak hour that is assessed. This information must be provided per turning movement or stream of traffic.
- a) Background traffic (“without” development traffic)
 - i) Existing peak hour traffic (counts).
 - ii) Adjustments of traffic counts for congestion.
 - iii) Trip generation of development with existing exercised rights.
 - iv) Peak hour traffic less trip generation with exercised rights.
 - v) Future traffic growth.
 - vi) Traffic from other developments.
 - vii) Total future background traffic.

- b) "With" development traffic
 - i) Redistribution of future background traffic due to development.
 - ii) Total trip generation of development, including new rights.
 - iii) Total "with" development traffic.

6.2.2 The above data may be provided in tables while the following data may be shown on schematic diagrams (at the discretion of the Assessor):

- a) Existing peak hour traffic (traffic counts).
- b) Total traffic demand estimates for the "with development" scenario and for each horizon year.

B.7 Multimodal Traffic Demand

B7.1 Introduction

- 7.1.1 Traffic demand for public transport, walking and bicycle modes of transport must be estimated where transportation elements involving these modes have been identified that may be affected by such traffic demand.
- 7.1.2 The multimodal traffic demand estimation will mostly be required in areas with low vehicle ownership or where a development is located near to public transport facilities. In other areas, this demand estimation may be required for land uses that attract large volumes of pedestrians or public transport (such as educational developments, sports stadiums or central business districts).
- 7.1.3 In situations where the multi-modal demand is relatively low, the assessment of the impacts may be made qualitatively without estimating the actual traffic demand. A quantitative assessment, however, will be required when the demand for the other modes already approaches or exceeds system capacity or where the development itself is expected to generate high levels of travel.

B7.2 Demand estimation

- 7.2.1 The quantitative multimodal traffic demand must be estimated using information provided in the Trip Data Manual on the expected trip generation rates (including pass-by trips) of such modes. Where such information is not available, there will be no obligation on the Assessor to undertake a quantitative multimodal analysis. A qualitative analysis, however, will still be required.
- 7.2.2 The estimation of pedestrian or cycling traffic demand may be undertaken using the methods described in the previous chapters. This implies that pedestrian and bicycle traffic must be counted, future background traffic estimated, trips generated and assigned and the total future development traffic determined.
- 7.2.3 For public transport, however, the demand estimation will be restricted to the estimation of the additional traffic that will be generated by the development. This implies that no counts need to be undertaken and future background public transport demand will not be estimated. The Municipality is responsible for making information available on the spare capacity of the public transport system to accommodate developments.
- 7.2.4 Information on multimodal traffic demand similar to that required in the previous chapters must be provided. The information may also be shown in schematic diagrams.