

10 ROADS & TRANSPORTATION

SUMMARY:

- Roads have a direct impact on urban development – and it is useful to think in terms of the entire transport system, not just the road network.
- The transport system can be compared to the human body:
 - roads network = blood vessels
 - traffic = blood
 - vehicles and passengers = blood cells;
 - destinations = organs and muscles.
- The transport network has to accommodate a wide variety of different users, all with different reasons for travel and destinations, but all using the same road space. So the main objectives of transport planning are:
 - to improve accessibility
 - to ensure the efficient flow of traffic
 - to support public transport
- The road network should be planned as a *road hierarchy*, which categorises roads according to their function - no clear hierarchy is a recipe for traffic congestion and accidents.
- Land use planning can help through the sensible location of major traffic generating uses and creating residential areas which are by-passed by distributor roads.
- Unnecessarily wide road reserves should be resisted - land can be used more productively by adopting more modest road widths appropriate to the expected volume of traffic.
- Providing facilities for public transport will benefit the majority of urban the population that has no access to private transport.
- Roads can be developed incrementally, like all infrastructure. It is important in new development areas to ensure that road reserves are kept free of encroachment.
- Airports and airstrips are best located close to urban areas, and not at remote sites away from the urban area.

Introduction

10.1 The roads - and the vehicles that use those roads - have a very direct impact on the form, structure and direction of urban development. They link all the various activity centres, without which the activities would not function efficiently. But urban management needs to take wider view than thinking just about roads, and think about the whole transport system.

10.2 We can think of the transport system like the human body:

- The road network is like the network of blood vessels;
- The traffic is like the blood, the mass of vehicles that are transported along the blood vessels (= road network);
- The individual vehicles and their passengers are the blood cells, transported in the blood to their desired destinations;
- The destinations are the organs and muscles in the body, that depend on the arrival of the blood cells (= vehicles and passengers) for their effective operation

10.3 The detailed planning, design and implementation of roads and transport projects will be undertaken by specialist roads and transport engineers. But all UM staff should have a good understanding of the general principles involved so that they can ensure that the planning of roads and transport matches broader urban management objectives.

Objectives of transport planning

10.4 The main objectives of transport planning are:

- To facilitate **accessibility** - to give easy access to all destinations within the town and to more distant destinations.
- To ensure the **efficient flow of traffic** - this is about the smooth flow of traffic to reduce journey times, and not about pure speed: speeding traffic means more road accidents.
- To support **public transport** - the type of vehicular travel used by the majority of urban residents.

Who uses the road network?

10.5 The transport network has to accommodate a wide range of users, vehicles and movements, all of which use the road space in a particular way. This includes:

- Pedestrians
- Motor-cycles
- Cars
- Vans/pickups
- Buses
- Emergency vehicles (e.g. police vehicles, ambulances)
- Heavy equipment (e.g. bulldozers, military vehicles)
- Pedal cycles
- Hand/animal-drawn carts
- Taxis
- Minibuses
- Trucks

10.6 The many different users, all engaged on different types of journeys all using the same roads - and when the number of users is greater than the **capacity of the network**, the likely result is **traffic congestion**.

10.7 The term **traffic** is commonly used to refer to **vehicles** - but more important than the vehicles themselves are the people or goods inside those vehicles - since these are who/what determine the reason for the journey being made. In order to plan transport effectively, we need to understand what is actually happening on the transport network.

10.8 **Traffic congestion** (or a traffic jam) usually occurs at a particular point on the road network where the volume of traffic exceeds the capacity. This is often at a road junction where traffic movements cross each other; but it can occur where a road narrows, and vehicles slow down to merge into the smaller amount of road space.

Transport planning

10.9 Transport planners use complicated computer techniques for analysing traffic movements, forecasting growth in traffic, and planning how to improve traffic flows. These involve studying factors such as *origin and destination*, *journey purpose*, *journey duration* and *mode of travel*,

based on extensive traffic surveys and interviews with travellers.

- 10.10 These techniques are not currently available to MoPIs - but we need to adopt a simplified version of this type of thinking to identify improvements to the transport network that will make a real difference.

Road hierarchy

- 10.11 The urban road network is planned as a **road hierarchy** - this means that roads are categorised according to their function and capacity. It involves separating roads serving different purposes:
 - **distributor roads:** through-roads or roads going from one part of the town to another, in which ease of movement is given priority over access to individual plots.
 - **access roads:** providing access to individual activity centres or plots, so through traffic is discouraged.
- 10.12 If there is no hierarchy, all roads will act as through roads, distributors, local access roads, street markets, play areas and meeting places etc, all at the same time. The result is chaotic circulation, which leads to traffic congestion and traffic accidents - the condition that exists in many towns in South Sudan.
- 10.13 It may be **difficult to impose a hierarchy** onto the existing road network. But certain roads can be designated as distributors, with restricted frontage access and on-street parking so as to improve the flow of traffic. Simultaneously, certain areas can be defined for 'access only', where through traffic is discouraged or prevented.
- 10.14 It is easy to create a hierarchy in new development areas - this is done at the planning stage, and will lead to more efficient and safer traffic circulation, and improve the quality of the local environment.

Land use planning can help traffic circulation

- 10.15 Like any infrastructure, the road network needs to be **progressively upgraded** to improve the flow of traffic around the town and improve accessibility - widening roads, building new roads, installing traffic lights etc. But land use planning - i.e.

deciding where major lands uses are located - also has a crucial role to play.

- 10.16 Uses or activities that **generate a large volume of traffic** (e.g. government offices, hospitals, colleges, and major commercial centres) should be located on or near a distributor road and easily accessible by public transport. If they are located on remote sites, a long way from the main road network, an expensive new access road has to be constructed or they will remain inaccessible.
- 10.17 Similarly, land use planning can help create **attractive residential areas**, ensuring that main distributor roads are routed around these areas, not through them, so that heavy traffic does not disturb the quality of domestic life.

Road reserve widths

- 10.18 Table 8.1 shows **typical road reserve widths** for five categories of road. Note that this includes footpaths: given the current low levels of private vehicle ownership and the large number of pedestrian trips, footpaths should be planned as an integral part of the transport network.

Table 8.1: Typical urban road reserve widths

| Road Category | Road Function | Reserve width |
|--------------------------------|------------------------------|---------------|
| Major Road/Highway | Arterial/Primary Distributor | 30 - 40 m |
| Minor Road | Secondary Distributor | 20 - 30 m |
| Minor Road | Local Distributor | 10 - 20 m |
| Local Street | Access Road | 8 - 12 m |
| Non-mechanised transport route | Pedestrian/Cycle/Cart Access | 3 - 6 m |

- 10.19 New development layouts often plan **unnecessarily wide road reserves**, e.g. residential areas with road reserves 30-40m wide. There are two major objections:

- Wide roads encourage fast traffic, which increases the risk of accidents.
- They take up large amounts of land for 'non-productive' use.

Drainage

10.20 Drainage is a very important component of road construction - it helps durability and performance.

- **Unmade earth roads** and gravel/murrum surfaced roads deteriorate very rapidly if no drainage is provided to remove rainwater from the road surface. And a degraded road surface can severely disrupt the flow of traffic.
- **Asphalt roads** also need good drainage, but for a different reason: the volume of surface water run-off in heavy rain can make the road surface dangerous, and it can cause flooding onto adjacent plots.

10.21 Water run-off removed from the road surface must be fed into drains alongside the road. These in turn must be connected to mains drainage network, to ensure that the water is removed entirely from the area.

➡ 8 - Drainage

Traffic management

10.22 Upgrading the road network does not rely only on new construction. A variety of techniques are used to manage the flow of traffic in order to facilitate ease of traffic movement and create conditions that promote road safety - for pedestrians, drivers and passengers. This is called **traffic management**.

10.23 This includes elements such as:

- traffic lights
- speed limits
- junction design
- speed bumps (raised strips across road to slow speeding traffic)
- road markings (lane demarcation, stop lines etc)

- signage (warnings, directions etc)
- parking restrictions

10.24 Traffic management is an essential part of transport planning - it is used to ensure that the road network operates at optimum efficiency. There is an important role for the traffic police to ensure that regulations and directions are correctly observed.

10.25 Providing **pedestrian footpaths along main roads** is important to assure the safety of pedestrians (who otherwise have to walk in the carriageway) and to facilitate the flow of vehicular traffic (cars do not have to avoid pedestrians in the carriageway).

Public transport

10.26 The majority of the urban population relies on **public transport for essential journeys**. This includes buses, minibuses, taxis and motorbikes, because very few people have access to a private vehicle - so improving the conditions for public transport brings benefits to large numbers of people, especially the lower income groups.

10.27 Facilities that need to be provided for public transport include:

- bus/minibus station - located at major interchanges;
- taxi stands;
- lay-bys - space created at side of road for buses/minibuses/taxis, to prevent stopping public transport vehicles blocking the traffic flow;
- Bus stop shelters - to protect waiting passengers from sun/rain.

Incremental development

10.28 As with all infrastructure components, incremental development can be used for roads when the funds are limited. This can follow three phases:

- Demarcation of road reserve, with no civil works
- Grading plus gravel/murum surface
- Asphalt surface

10.29 In new development areas, it is important to reserve the land required for the complete road network, and that it is kept free of development and encroachment. This avoids the need to acquire land compulsorily at a later date, after it has already been developed.

AIRPORTS & AIRSTRIPS

10.30 These do not fall into the normal definition of urban management - but air transport is crucial to the national and regional development of South Sudan, and has a significant development impact on the main towns.

10.31 The technical planning, design and implementation of air transport facilities are the responsibility of the Ministry of Transport, Directorate of Air Transport **CHECK**.
 ¶ Ministry of Transport

10.32 Airport/-strip **location** is an important issue. Many of the existing facilities in State capitals and other towns are under review. It is expected that new facilities will be required where existing facilities are sub-standard based on the civil aviation criteria. In some cases, where the volume of traffic demands, there will be pressure to move from compacted gravel runways to asphalt or concrete runways.

10.33 A commonly expressed view is that a new location should be far away from the town due to:

- **Noise** - disturbance to urban residents created by over-flying aircraft;
- **Danger** - the hazard caused by possible air crashes on take-off or landing.

10.34 The advantages of a distant location are offset by the distance travelled to reach the facility. The current locations near built-up

areas mostly do not present any operational issues, either in terms of noise or accident hazard.

10.35 There are numerous examples in Africa and elsewhere of busy airports located in or near built-up areas (e.g. Wilson Airport, Nairobi - one of the busiest airports in Africa based on number of daily flights), where the noise and accidents risk are considered to be acceptable because of the advantage of easy access.

10.36 The **disadvantage** of a distant location lies in **accessibility**. Given the realities of air travel in South Sudan, there are no strict timetables. Much time is wasted hanging around air facilities waiting for a plane to leave or arrive. Large numbers of vehicles are used to transport passengers and meters/greeters.

10.37 If the facility is close to the town:

- people can hear when a plane has landed - prompting them to go to the airport); vehicles have a short distance to travel (using less fuel);
- they can easily return to base if there is a known delay.

10.38 If the facility is a long way out of town:

- vehicles will have a much longer journey, using more expensive fuel;
- passengers and meters/greeters are not able to return to base, so are obliged to waste more time hanging around waiting.

10.39 So the **strong case for a location close to the town** is based on:

- convenience for passengers and meters/greeters
- reduction of waste - people's time and fuel.