SOUTH AFRICA ROAD FEDERATION

Non-Motorised Transport Practitioner's Course

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Session 11: NMT Facility focus areas in urban and rural areas

ANDREW WHEELDON
andrew@bicyclecities.info

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Lecture contents

1. Pedestrian and transit malls
2. Pedestrian streets & Traffic free zones
3. Urban schools
4. Industrial areas
5. Townships and informal settlements
6. Rural communities

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Pedestrian and transit malls

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TYPES OF PEDESTRIAN MALLS	
CLASSIFICATION	**DESCRIPTION**
Modified Street	One block of a conventional street is closed to vehicular traffic for the exclusive use of pedestrians.
Transit Mall	The street is closed to all traffic except buses and emergency services (and sometimes bicycles, delivery and refuse collection vehicles). Transit vehicles operate on a narrow right-of-way within the mall space.
Plaza or Interrupted Malls	Several blocks of a retail street are exclusively designated for pedestrian use, with cross streets left open to vehicular traffic.
Continuous or Exclusive Mall	A multiblock area, which may include more than one street, is exclusively designated for pedestrians, with the exception of emergency, maintenance and delivery vehicles.
Displaced Sidewalk Grid	A pedestrian walkway is developed away from the regular sidewalk grid through alleys, arcades, and/or lobbies within buildings.
Multi-level Mall	The multi-level mall – one or more levels built above and below grade – is an integral part of in-town renewal projects or commercial developments.

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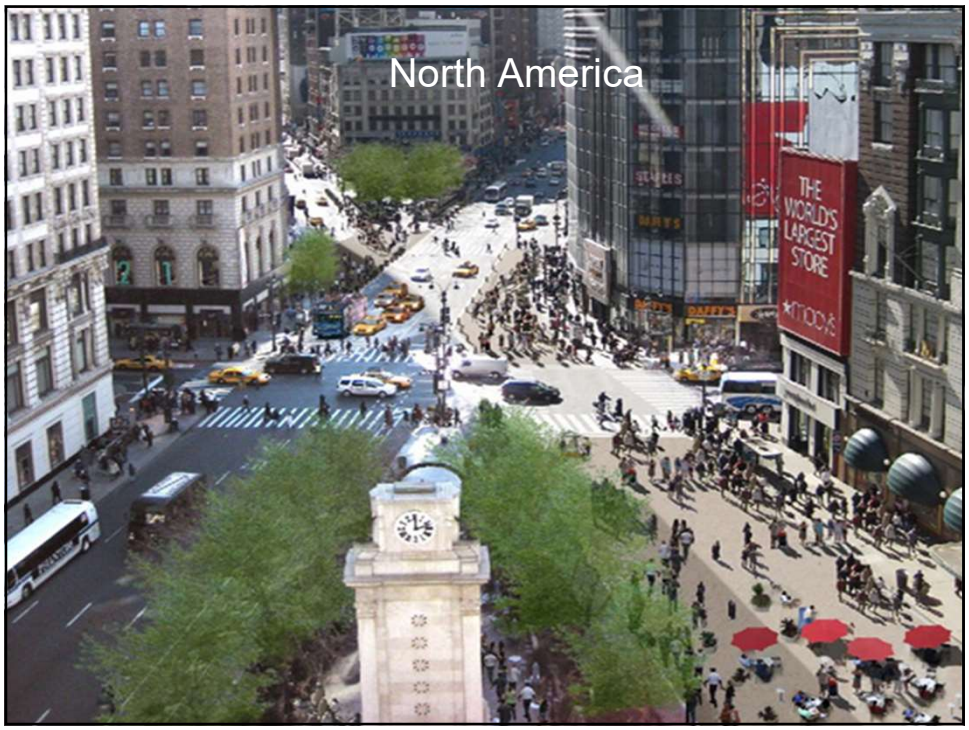

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South Africa

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South Africa

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Pedestrian malls vs Shopping malls

- Pedestrian malls (normally a converted street) are shopping precincts that are restricted for the exclusive (full or partial) use of pedestrians. Such malls provide important opportunities for increasing pedestrian travel.
- Delivery vehicles will only be allowed during certain times of day. Must always be accessible to emergency vehicles, such as fire brigade, ambulances, disruption of municipal services.
- For pedestrian malls to be successful, they must provide a viable and attractive alternative to large shopping malls.
- This is often difficult because shopping malls provide a variety of facilities, such as:
  - sheltered shopping areas,
  - parking provision,
  - separation between pedestrians and vehicles, etc.
- In order to succeed, it is important that similar facilities be provided at pedestrian malls.

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Pedestrian safety requirements

- The effectiveness and safety of a pedestrian mall can be improved by:
  - Pedestrian malls should be planned in conjunction with the street system and parking areas to ensure traffic safety.
  - Pedestrian malls should preferably not be intersected by main roads or streets. The potential for accidents is increased by such layouts, even if pedestrian crossings are provided across the streets.
  - Where malls are intersected by roads, the mall paving should be continued across the road – drivers are the guests in this area.
  - Pedestrian mall entrances/exits should provide a transition zone from the traffic free environment to the vehicular traffic area. Humans tend to adjust slowly, and the rapid transition between environments could lead to safety problems. One possible solution is to provide a parking area as a buffer between the mall and the street. Another solution would be to canalise pedestrians to desired pedestrian crossings.

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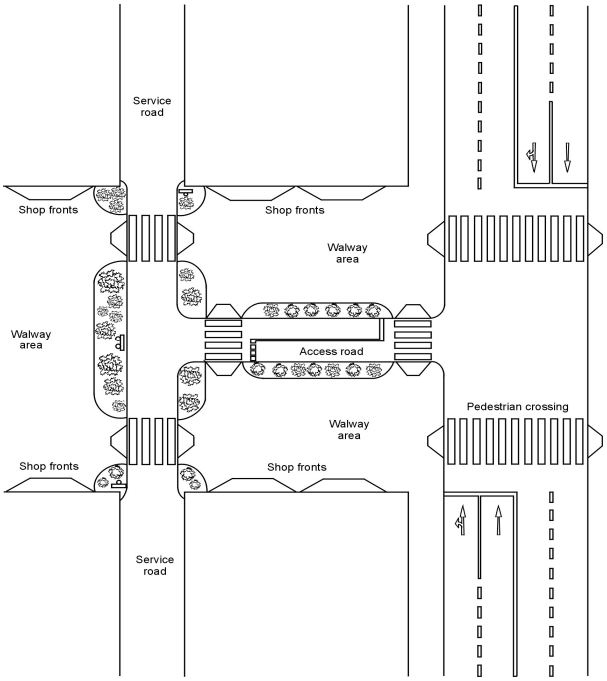

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Pedestrians & Cyclists in Transit Malls

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Pedestrian and cycle safety requirements

Pedestrian and Transit Malls Manual on Pedestrian and Bicycle Connections to Transit FTA Report No. 0111 AUGUST 2017

- This manual provides a compendium of best practices to help transportation professionals improve pedestrian and bicycle safety and access to transit, including information on evaluating, planning for, and implementing improvements to pedestrian and bicycle access to transit.
- In addition to covering key concepts such as access sheds, connected networks, and station area comfort, safety, and legibility, the manual covers needs specific to pedestrians, such as complete sidewalks and safe, convenient crossings, and to bicyclists, such as bicycle parking and on-transit accommodations.

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Pedestrian and cycle safety requirements (TCRP Report 175

Guidebook on Pedestrian Crossings of Public Transit Rail Services, 2015.

- Parking must never be allowed where a bus or train will enter a station area. On-street parking can also impede motorists from seeing pedestrians, so keeping parking areas away from transit service makes pedestrians visible and safe.
- Additional design features can make pedestrian spaces around transit safer:
  - Kerb extensions at a transit station can shorten crossing distances for pedestrians and make them more visible to oncoming traffic.
  - Median islands provide refuge for pedestrians as they cross a street to reach a transit station.
  - Perceived safety is also important - fewer pedestrians will use the station if it is not perceived to be safe.
  - Lighting is important, both to provide clear visual sightlines at night and for added security. Lighting is necessary for pedestrians to see the path they need to take to reach their destination, and for transit service to see pedestrians who are waiting at a stop, crossing the street or railroad tracks, or walking along a sidewalk. All crossings where pedestrian activity is expected at night should be illuminated, especially near transit stations. Transit operators need to be able to see pedestrians crossing the street or waiting at a station.

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Pedestrian streets & Traffic free zones

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Pedestrian streets & Traffic free zones

Streets closures during certain times of day

Car free zones, e.g. Delft

Road designs not favouring the car:

- Universal streets, Shared streets, Shared spaces, etc.
- Winkelerf
- Other design concepts

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Pedestrian streets

- Northbrook St., a pedestrian street, in Newbury U.K., established in 1998.
- Closed to automobile traffic from 10 am to 5 pm using electronic bollards.
- Absence of cars allows markets to regularly set up two-three times a week.

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Delft car-free city centre network servicing 68 acres

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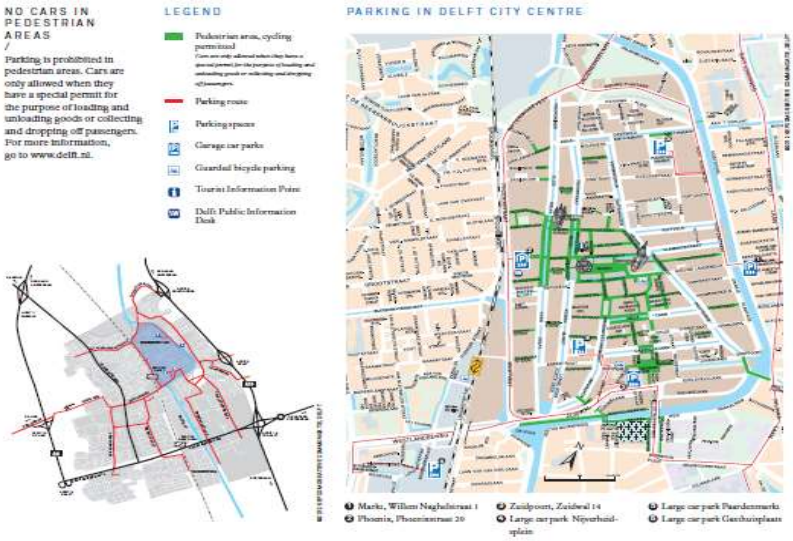
Delft car-free city centre network servicing 68 acres



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Dutch Winkelerf

- After the introduction of the "Woonerf" (residential precinct) principle in the Netherlands a lot of municipalities have been considering the implementation of a similar regime for their shopping areas.
- When a shopping-street is really used for "shopping" the environmental quality is very important, and accessibility is relatively less important.
- A "winkelerf", a way of improving the pedestrian quality of a shopping-street, without banning all traffic completely. Achieved by an environmental design that makes it obvious that priority lies with the pedestrian, and that car are permitted in the street as "guests".

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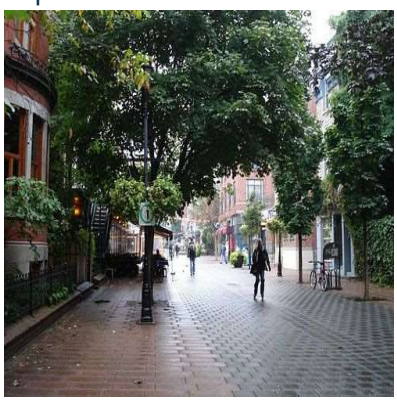
Universal Streets

- Universal Streets (Shared Streets, Shared Spaces, Controlled Chaos Streets, Naked Streets, Psychological Traffic Calming) are generally streets and intersections without traffic signals, signs, street markings, curbs, or traffic calming devices.
- Without a clear right of way, “motorists are forced to slow down to safer speeds, make eye contact with pedestrians, cyclists, and other drivers, and decide among themselves when it is safe to proceed.”



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Industrial areas

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Road networks in and around Industrial Areas

- Limited design guideline documents for NMT in industrial areas.
- Major part of the work force are captive users, using public transport, walk or cycle to industrial areas.
- Need for NMT facilities such as sidewalks and crossings, linking residential areas, public transport stops and industries.
- Special focus on NMT facilities around and towards public transport (rail, bus & minibus) required.
- Special sight distances requirements at intersections/ junctions because of presence of large volumes of heavy vehicles.

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Road networks in and around Industrial Areas

- Footways must be provided on both sides of the carriageway; the width of 2m may need to be increased to 3m in certain cases to cater for heavier pedestrian flows and shared cycle use. (https://www.eastsussex.gov.uk/media/1768/design_standards_for_industrial_roads.pdf
- Pedestrian Level of Service (LOS) - Consider Level E in industrial areas where large numbers of pedestrians move to and from public transport stops (rail and bus).

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Townships and informal settlements

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Disadvantage communities

- Typical problems
- Need for accessibility
- Lack of pedestrian infrastructure
- Encroachments blocking road reserves

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Disadvantage communities

- Most of the disadvantaged communities in urban and rural areas **lack adequate pedestrian and bicycle infrastructure** alongside roads and to cross roads safely.
- These communities, however, characterised by large volumes of pedestrians walking adjacent and on roads. **Vehicle ownership is typically low** and most people rely on walking as their basic mode of transport or public transport options (taxi, bus or rail).
- Road safety problems occur in informal settlements as well as in formalised townships. Informal settlements, however, typically experience **greater safety problems due to the lack of infrastructure** and particularly pedestrian facilities, and also because such settlements often occur adjacent to major roads due to the need for access to transport. In some cases, the settlements occur so near to the roads that encroachment of informal housing has occurred onto road reserves.
- Although transportation facilities have been provided in some townships, many of these facilities have not been property maintained or **neglected due to limited budgets**. Also applies to pedestrian facilities such as sidewalks and pedestrian crossings. In many townships pedestrian facilities are completely lacking.

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Typical problems in townships

- Various common problems are experienced in informal settlements as well as townships which have a negatively impact on road safety. These include:
  - The presence of hawkers and even small businesses in the road reserve blocking pedestrian sidewalks.
  - A further problem is the lack of drainage, or poorly maintained drainage, which force pedestrians onto the roadway.
  - Street lighting facilities either do not exist or are sometimes poorly maintained.
  - Limited open space, children playing in the roadway

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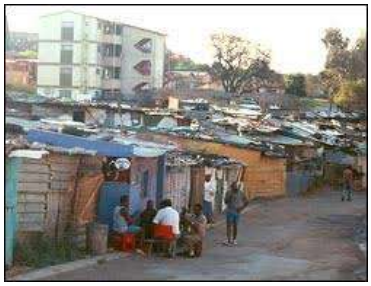
Typical problems in townships



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Need for accessibility

- The problem of pedestrians on freeways and major routes adjacent to informal settlements and townships exists in many areas due to need for accessibility.
- Appropriate interventions:
  - The provision of warning signs to alert drivers of the presence of pedestrians on the road and the reduction of the speed limit at the settlement.
  - The provision of grade separated pedestrian facilities (bridges or subways) where large numbers of pedestrians cross the road (especially freeways).
  - The channelization of pedestrians to specific crossing points is also a measure that can be considered. Various examples exist where brick and concrete walls have been provided to prevent pedestrians from crossing or entering the major road or freeway.
  - The routing of public transport into the informal settlements or townships to avoid the picking up of people on the freeway or major road.

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Lack of pedestrian infrastructure

- The lack of pedestrian facilities in informal settlements and in many townships is often a cause for many road safety problems.
- The most important facilities required in such areas include the following:
  - An internal network of pedestrian sidewalks and walkways based on pedestrian desire lines and major land uses generating pedestrian traffic in the area such as schools, sports fields, commercial centres, etc.
  - Pedestrian crossings are required at locations where the internal network of pedestrian walkways crosses major roads.
- Other important facilities required in such areas include:
  - Land uses such as schools and other pedestrian generators should be located away from major roads, or in such a way that major roads do not need to be crossed. If this is not possible, provision should be made for grade separation and the canalisation of pedestrians to these crossing points.
  - Roads should be designed in such a way that speeds would be limited. Where this is not possible, traffic calming measures should be included in the upgrading of settlements to safeguard pedestrians.

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Encroachments blocking road reserves

- In many informal settlements and townships, road reserves are utilised for a multitude of purposes that impact negatively on pedestrian safety. Some examples include:
  - Hawkers selling their goods adjacent to roads, blocking pedestrian sidewalks.
  - Small businesses operating on the sidewalk such as car maintenance, telephone booths, etc.
  - Shacks/houses built up to the edge of the road.
  - Minibus taxis using the sidewalk as bus stops or ranking areas.
  - Obstacles put on the walkway area such as boulders to protect properties against traffic.

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Encroachments blocking road reserves

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Measures to reduce encroachments

- Measures to be considered to ensure clear pedestrian sidewalks next to roads:
  - The relocation of hawkers and small businesses to designated areas, preferably near to public transport facilities.
  - The installation of barriers and fences such as brick walls to prevent the encroachment of shacks onto the road reserve.
  - The provision of barrier kerbs to prevent vehicles stopping on the sidewalks.
  - The lack of drainage systems or blocked road drains also often force pedestrians to walk on the roadway. Regular maintenance of such drainage systems would improve the plight of pedestrians walking alongside roads especially during inclement weather conditions.
  - Creation of public open spaces to get people and children out of the streets, e.g. Green spaces in Soweto, Dignified Places in Cape Town.

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Green spaces in Soweto

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Dignified Places in Cape Town

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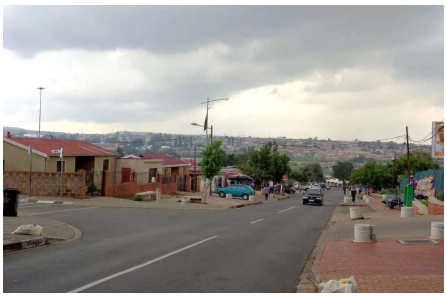
Sidewalk upgrades in Soweto - JDA



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NMT considerations in rural communities

- NMT challenges on rural roads
- NMT Design guidelines for rural roads
- Rural schools
- River crossings

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NMT Challenges on Rural Roads

- Research conducted regarding NMT casualties on rural roads showed that special attention should be given to NMT users (pedestrians, cyclists and animal drawn vehicles) to cross and move alongside roads at the following places:
  - Close proximity to towns (town fringes)
  - Rural schools
  - Densely populated rural areas (informal and formal).
  - Mining areas
  - Rural industries
  - Agricultural depots
  - Major roads at irrigation schemes and extensive agricultural areas.
- In rural areas very little provision is made for NMT users alongside roads. These groups must share rural roads with vehicles that can sometime travel at very high speeds.
- Fatality risk very high on rural roads because of high velocity of traffic. School children especially at risk.

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Lack of NMT infrastructure on rural roads

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Safety Considerations – Typical Safety Issues

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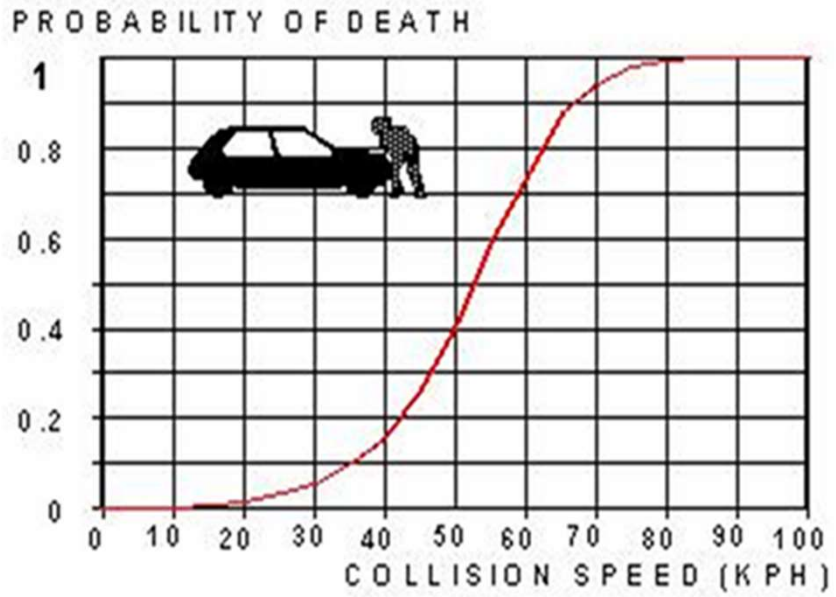

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NMT Challenges on Rural Roads

- Problem somewhat mitigated by the provision of paved shoulders that can be used by pedestrians, cyclists and animal drawn vehicles, but on many roads, only gravel shoulders are available.
- Narrow road bridges, cuttings and fills often also create problems for pedestrians and cyclists.
- Walking at night a risk factor. No/little lighting provided, drivers often blinded by the lights of other vehicles.
- Speeds also tend to be high at night, sometimes even higher than during the day.
- There is also probably a greater tendency for intoxication at night amongst all road users.
- School children especially are at risk along rural roads.
- All these factors contribute to a situation that is very dangerous for pedestrians and cyclists on many rural roads.

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NMT design considerations on rural roads

Town fringes and rural nodes

- **Examples of rural walkways**

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NMT design considerations on rural roads

Town fringes and rural nodes

Drainage requirements of sidewalks and road shoulders

- During rainy season, road shoulders along rural roads present several challenges to pedestrians if not well drained. Apart from road runoff onto the road shoulder, puddles forming on the road shoulders.
- Road runoff management
  - Proper management of road run-off is an important aspect to be considered and designed for to ensure that sidewalks are always passable and do not get flooded or littered by soil and debris during the rainy season.
- Various options are available ranging from subsoil drainage systems to mitre drains:
  - When the sidewalk is adjacent to the roadway, vertical kerbs will assist in channelling storm water to the nearest drain.
  - Where no subsoil drainage system is present, mitre drains will assist to channel storm water to specific locations along the roadway and across the walkway.

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NMT design considerations on rural roads

Town fringes and rural nodes

- **Drainage important to ensure walkable sidewalks during inclement weather conditions**

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NMT design considerations on rural roads

Town fringes and rural nodes

Examples of railings at sharp drop-offs

- When sidewalks are provided along rural roads on fills, pedestrians and cyclists must be protected against sharp drop-offs next to the sidewalk.

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NMT design considerations on rural roads

Town fringes and rural nodes

- Walkway could either be provided along the road side edge, at an intermediate position or along the road reserve edge.
- An intermediate location of the walkway is appropriate when future upgrading of the road is planned.
- Experience has shown that walkways along the road reserve edge are generally not popular because of security reasons and the need to access public transport.
- The positioning of the walkway will, however, largely depend on the features of the landscape (road on fill, steep inclines/declines, rolling or flat landscape) and existing roadside structures such as drainage furrows. If the road is on fill it might be more cost effective to provide it next to the roadway so save on earth works and construction costs.

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NMT design considerations on rural roads

Town fringes and rural nodes

- On narrow provincial roads where space is limited for pedestrians to cross on existing bridge structures, a separate crossing structure adjacent to the roadway, should be provided.

- The main design features of such structures are:
  - Approaches to the NMT bridge structure must be the same width as the bridge structure and flush with the sidewalk.
  - The bridge structure must have proper railings, 1m high and spaced at 100mm apart.
  - Danger plates should be displayed on the road way for vehicular traffic on both approaches to the structure.

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NMT design considerations on rural roads

Town fringes and rural nodes

- **NMT bridge on narrow roads**
- **Positioning of walkway for future road upgrade**

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NMT design considerations on rural roads

Rural schools

- Area around school entrances designed in such a manner to safeguard learners because of the modal mix experienced at schools.
- Important to cater for the different modes of travel as some learners will arrive by public transport (buses and minibuses), others by car and the majority on foot of by bicycle.
- It is essential to provide for the horizontal separation of motorised and non-motorised modes at school entrances.
- Younger learners still have certain physical limitations that increase their vulnerability in traffic, and primary schools therefore need special attention.
- Provide secure lock-up facilities at schools to ensure that bicycles are not stolen.

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NMT design considerations on rural roads

Rural schools

- Buses and minibus taxis are transporting children over longer distances to rural schools and it is therefore important to ensure that learners disembark/embark these vehicles at a safe location at rural schools, and so that other learners arriving by foot or bicycle are not endangered.
- Normally, depending on available space, the public transport stops should be provided on the far side of the school entrance to improve sight distance among all road users in the school zone.
- A bus shelter is also considered necessary to protect the learners against the elements while waiting for public transport.
- Speed limits at rural schools must not exceed 70 km/h at primary and 80 km/h at secondary schools.

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NMT design considerations on rural roads

- Design practices at rural schools

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Design practices at rural schools

- **Need for walkways and cycle lanes**. Survey of the travel modes of learners per grade to schools will indicate how many learners are walking or cycling to schools. Child casualty statistics must also be collected for the last three years within a distance of 5km from the schools.
- **Width of walkways**. Paved walkways at schools along rural roads should have a minimum width of 1,5 metres.
- **Length of walkways**. As a general norm, the sidewalk should be provided for at least 500 metre from the school entrance along the road in one or more directions (based on an origin/destination survey) after which the children tend to disperse into the rural areas.
- **Counts** to be conducted of scholars walking or cycling along the rural road to schools, which will indicate if the paved walkways should be extended beyond 500 metre.
- **Cross fall**. A minimum cross fall of 2 per cent (1:50) must be provided along the walkway to ensure proper drainage and accommodate persons with disabilities.

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Design practices at rural schools

- **Safe stops**. Buses and minibus taxis are transporting children over longer distances to rural schools and it is therefore important to ensure that learners disembark/embark these vehicles at a safe location at rural schools, and so that other learners arriving by foot or bicycle are not endangered.
- **Location of bus stop**. Normally, depending on available space, the public transport stops should be provided on the far side of the school entrance to improve sight distance among all road users in the school zone.
- A **bus shelter** is also considered necessary to protect the learners against the elements while waiting for public transport.
- **Speed limits** at rural schools must not exceed 70 km/h at primary and 80 km/h at secondary schools

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Design practices at rural schools

- **Bus bays at rural schools**

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Design practices at rural schools

- Safe waiting areas at bus bays

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Design practices at rural schools

- Walkways at rural school entrances

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Design practices at rural schools

High visibility signage at rural schools

- Rural roads are functioning as mobility routes linking long distance destinations and there is a need to alert drivers when sensitive areas such as schools and its surrounding feeder areas are traversed where learners/pedestrians are present adjacent to the road.
- Positioning of roadside furniture along rural roads, including road signs, must be positioned in such a way that it does not obstruct or endanger learners walking or cycling.
- When signs are positioned over the walkway, a minimum clearance height of 2,5m must be provided to cater for cyclists.

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Design practices at rural schools

- **High visibility signage at rural schools**

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Other road safety practices at rural schools

- Visibility of learners en-route to school along rural roads an important road safety consideration, especially in southern parts of the country where, because of latitude, many learners are walking to school before dawn.

- The use of reflective bands an important means to make learner more visible along rural roads. Various campaigns have been running at schools in the southern parts of the country to promote the use of reflective bands among learners.

- Other measures to address the safety problem are:
  - Differential speed limit could be applied in school zones (during certain times of day – morning and noon) to assist learners to cross roads in safer gaps.
  - Traffic wardens or traffic officers can be used at designated crossings points to assist learners to cross roads.
  - High visibility road signs must also be used to draw the attention of driver to the fact that learners are present alongside the road.

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River crossings in rural communities

- There is a need for pedestrian bridges across rivers and rural access roads in the rural parts of provinces such as KwaZulu Natal, Mpumalanga, Eastern Cape and Limpopo.

- The Integrated Rural Mobility and Access Programme (IRMA) of the Department of Transport aims to find innovative and sustainable solutions to challenges accessing social-economic opportunities by communities through the provision of appropriate and integrated rural transport infrastructure and services with adequate funding streams for maintenance and development (Mashiri, 2008).

- Includes provision of rural transport infrastructure such as pedestrian bridges across rivers, paths and low level bridges, and all weather road and footpath access to schools, clinics, shops and government offices.

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River crossings in rural communities

- In a submission to the Finance and Economic Development Portfolio Committee in 2006, for example, it was put on record that there was a need to build 146 river crossing bridges in KZN alone.
- The total number of river crossings required across the country is exceeding this figure by far. During the rainy season many rural communities are cut off from basic socio-economic facilities, jobs and schools.
- Learners and adults in deep rural communities very often have to cross rivers by wading through them. NMT suspension bridges or motorised bridges are options to reduce this inconvenience and risk during the rainy season.

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River crossings in rural communities

- Road and river bridges promoted in deep rural areas as part of the Integrated Rural Mobility Access (IRMA) strategy to make these areas accessible to all road users during the rainy season or flooding conditions.

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River crossings in rural communities

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River crossings – Design considerations

- Suspension NMT bridge structures considered a cost effective manner to improve pedestrian and learner mobility.
- Minimum width of the footbridge must be 2m. Wider bridges might be required depending on the number of pedestrians and cyclists that will be using them.
- Height of the handrails across the bridge must be a minimum of 1m.
- Railings must be spaced at a maximum width of 100 mm.
- Ramped access (with gradient not more than 5%) is preferred over stairs to make these bridges accessible for all users.
- Pedestrians and cyclists are sensitive to movement and deflection of suspension bridge structures. The design of the structure should therefore limit the amount of deflection under a live load.
- Entrances of these bridges must be designed to prevent animals or motorcycles from entering the bridge structure.

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