- **Street trees:** Street trees are an essential element in a high quality pedestrian environment. Not only do they provide shade, they also give a sense of enclosure to the sidewalk environment, which enhance the pedestrian's sense of walking in a protected environment.
- **Pedestrian scale design:** Large highway–scale signage reinforces the general notion that pedestrians are out of place. Signage should be designed to be seen by the pedestrian. Street lighting should likewise be scaled to the level of the pedestrian, instead of providing light poles that are more appropriate on high-speed freeways. Components such as street furniture, vistas and landmarks should be incorporated into designs to help make walking routes intersecting.
- **Continuity:** Pedestrian facilities are often discontinuous, particularly when private developers are not encouraged to link on-site pedestrian facilities to adjacent developments and nearby sidewalks or street corners. New developments should be designed to encourage pedestrian access from nearby streets. Existing gaps in the system should be placed on a prioritized list for new sidewalk construction.
- **Clearance:** Vertical clearance above sidewalks for landscaping, trees, signs, and similar obstructions should be at least 2.4 m (8ft). In commercial areas and central business districts (CBD), the vertical clearance for awnings should be 2.7 m (9 ft). The vertical clearance for building overhangs that cover the majority of the sidewalk should be 3.6m (12ft).

Most footpaths within the road reserve lie between the edge of the roadway and the frontage of adjacent private property. There are four distinct zones within this area and it is important to distinguish between the total width and the width of the zone likely to be used by pedestrians (the through route)

When determining the width of the frontage or street furniture zone, a 'shy distance' of 0.15 m should apply from any object next to the through route. This area should then be excluded from the through route width as it is unlikely to be used by pedestrians. For example, if a lamp post is near the through route, the shy zone would be the area next to it. This area would then be included in the zone where the lamp post is located and the through-route width would be reduced.

In off-road environments the same principles apply, however, one or more of the zones in the following table may be absent or duplicated on the opposite side of the through route.

Table-8.20*: Zone wise Purpose*

Area	Purpose
Kerb Zone	• Defines the limit of the pedestrian environment. • Prevents roadway water run-off entering the footpath. • Deters vehicles from using the footpath. Is a major tactile cue for vision impaired pedestrians.
Street furniture zone	• Used for placing features such as signal poles, lighting columns, hatch covers, sandwich boards, seats and parking meters. • Can be used for soft landscaping/vegetation. • Creates a psychological buffer between motorized vehicles and pedestrians. • Reduces passing vehicles splashing pedestrians. Provides space for driveway gradients.
Through route (or clear width)	The area where pedestrians normally choose to travel (this should be kept free of obstructions for all times).
Frontage zone	The area that pedestrians naturally tend not to enter, as it may contain retaining walls, fences, pedestrians emerging from buildings, 'window shoppers' or overhanging vegetation.

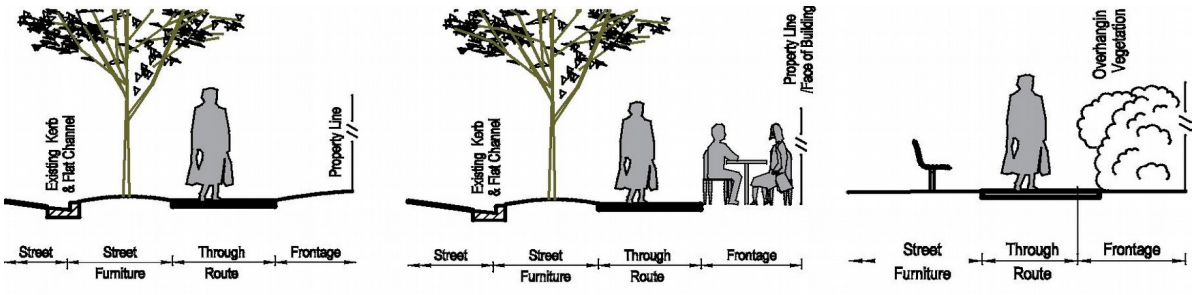


Figure 8.15: Arrangement of zone over hanging vegetation

Width of zones

The width of the various footpath zones will depend on the environment and those to which the route connects. Following table has minimum widths that apply to typical pedestrian and vehicle flow conditions.

Table-8.21*: Minimum footpath dimensions Location*

	Maximum pedestrian flow	Zone				Total
		Kerb	Furniture	Through route	Frontage	
Primary roads in pedestrian districts	80 p/min	0.15 m	1.2m	2.4 m +	0.75 m	4.5 m
CBD						
Alongside parks, schools and other major pedestrian generators						
Local roads in pedestrian districts	60p/min	0.15m	1.2m	1.8m	0.45m	3.6m
Commercial/ industrial areas outside the CBD						
Collector roads	60 p/min	0.15 m	0.9 m	1.8 m	0.15 m	3.0 m
Local roads in residential areas	50 p/min	0.15 m	0.9 m	1.5 m	0.15 m	2.7 m
Absolute minimum*		0.15 m	0.0 m	1.5 m	0.0 m	1.65 m
# Consider increasing this distance where vehicle speeds are higher than 55 km/h.						
* Only acceptable in existing constrained conditions and where it is not possible to reallocate road space.						

All new and improved developments should comply with the above widths. The typical cross section of footpath has been given below.

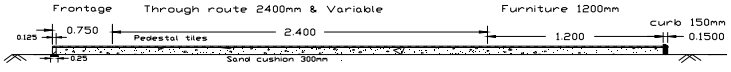


Figure 8.16: Cross section of Proposed Footpath

Passing places

Where through route width is constrained to less than 1.5 meters wide, passing places should be provided – but only where it is not possible to widen the footpath over a longer distance, and never as a low-cost alternative to a full-width footpath. The advantages of passing places are:

- two wheelchairs can pass each other
- walking pedestrians can pass stationary pedestrians, such as those waiting to use a crossing or waiting for public transport.

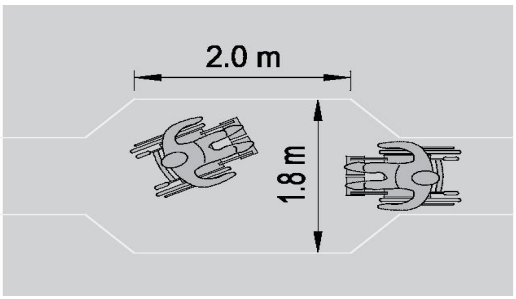


Figure 8.17: Dimensions of wheelchair passing place

Overhead clearance

To prevent head injuries to pedestrians, footpaths shall have a vertical (overhead) clearance over their entire width (including the street furniture and frontage zones) that is free of all obstructions,

such as vegetation, signs and shop awnings. Following table shows the minimum overhead clearances.

Table-8.22: Overhead clearance

Scenario	Clearance
Ideal clearance	2.4 m
Absolute minimum*	2.1 m #
* Only acceptable in constrained existing environments.	
# The clearance shall never be less than this, even for a short distance.	

Gradient

The gradient of a through route is the slope parallel to the direction of travel. Movement becomes more difficult as gradient increases. Following table shows the three parameters that should be assessed when considering the gradient required. Parameters can be calculated using the procedure outlined at the end of this section.

Through routes in existing developments may have gradients higher than the maximums in table below where the mean gradient exceeds the maximum value, the through route should ideally be redesigned as a ramp, which includes rest areas. This allows maximum through-route gradients of up to eight percent while still remaining accessible to wheelchair users. Where this is not possible, and the through route is next to a road, the mean and maximum gradients should be no more than that of the adjacent roadway.

Table-8.23: Through-route gradients

Parameter	Definition	Maximum Value
Mean gradient	The change in vertical elevation measured between two points.	5%
Maximum gradient	The change in vertical elevation measured at 0.6 m intervals along a route.	8%, over a distance no greater than 9 m. Gradients greater than this are not suitable for wheelchair users.
Rate of change of gradient	The total variation in slope measured at 0.6 m intervals along a route.	13%

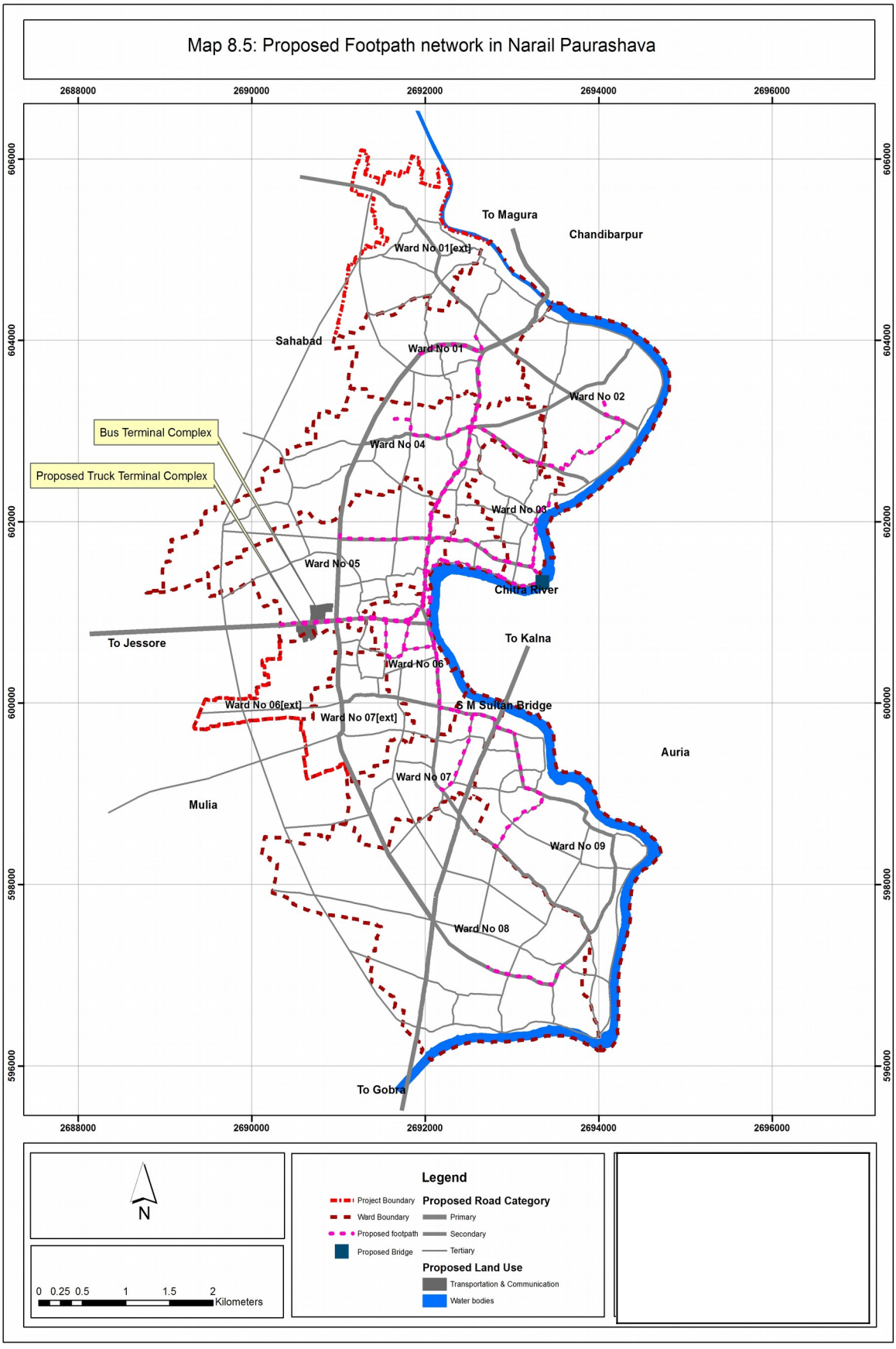
8.4.2.4 Other Transportation Facilities

a. Culverts and Bridges

Culverts should normally be no longer than 6m spans. Bridges should be used if the gap exceeds 6m spans.

Culverts and bridges shall be designed with H20S16 loading. The design of bridges and culverts is outside the scope of this master plan, but it is obvious that safety and capacity will be affected if the road cross-section is not maintained across these structures. The key points to consider are:

- Carriageway and shoulder narrowing are particularly dangerous on high-speed roads;
- If the shoulder is not continued across the structure, NMVs will move out onto the carriageway in front of fast-moving vehicles and there may be accidents;
- Footways are conventionally provided on structures with parapets, but the accident risks at the site need to be assessed carefully especially where footways can only be provided by omitting the shoulders; take account of the relative volumes of pedestrian and NMV traffic, the speed and volume of motorized traffic and the length of the span;
- Where there are significant pedestrian and NMV flows the best solution is to separate them from fast-moving vehicles with a safety barrier.
- Where there are very high pedestrian and very high NMV flows separate footways and NMV lanes should be considered;
- To design new bridges for a minimum of two lanes on all roads including feeder/ tertiary roads - where, exceptionally, a single lane bridge is planned the carriageway should be a maximum of 3.7m wide between kerbs in order to avoid confusion over whether the bridge is for one-way or two-way traffic.


Map 8.5: Proposed Footpath network in Narail Paurashava
2688000
2690000
2692000
2694000
2696000
606000
604000
602000
600000
598000
596000
To Magura
Chandibarpur
Ward No 01[ext]
Sahabad
Ward No 01
Ward No 02
Bus Terminal Complex
Ward No 04
Proposed Truck Terminal Complex
Ward No 03
Ward No 05
Chitra River
To Jessore
To Kalna
Ward No 06
Ward No 06[ext]
Ward No 07[ext]
S M Sultan Bridge
Auria
Ward No 07
Mulia
Ward No 09
Ward No 08
To Gobra
N
0 0.25 0.5 1 1.5 2
Kilometers
Legend
Project Boundary
Ward Boundary
Proposed footpath
Proposed Bridge
Proposed Road Category
Primary
Secondary
Tertiary
Proposed Land Use
Transportation & Communication
Water bodies