

Integrating the Tramway with the Highway

In this section you will find guidance on the general design, layout for integration of the tramway with the highway.

The guidance below is in line with the **Traffic Signs and General Directions and Traffic Signs Manual**.

- Where the tramway is located in a highway and sharing traffic lanes with other road users, its design and construction should allow it to be used safely by those other road users.
- Where the tramway runs along the highway, crosses it, or is otherwise close to it, provisions to promote compatibility between trams and other road users should be incorporated into the tramway highway design.
- The arrangements for normal operating conditions and for emergency situations should be clearly defined for the type of infrastructure over which trams are operating. These should include any appropriate audible and visible warnings, and evacuation and control procedures in case of emergencies. Provisions must be made during any road or tramway maintenance operations for the safe movement of pedestrians and other highway users.
- In areas of integrated on-street tramways, trams may run in a traffic lane with other road vehicles and so they will be subject to Traffic Regulation Orders (TROs). In areas of segregated on-street tramways where trams may run in a space immediately adjacent to traffic lanes in either side reservation or in central reservation, TROs may also be required.
- In areas where trams are segregated from other traffic lanes in central or side reservations, normal highway signage and lineage is not necessarily used, as these are tram only areas.
- It is important to use prescribed signs and where necessary use TROs to ensure that enforcement is possible to deter other road users from entering tram only areas.

For further guidance on signage see the Signing and Marking of Tramways and Highway Interface section **here**.

It is important that appropriate measures, capable of enforcement are taken to prevent other road vehicles entering areas of a tramway that is segregated from other traffic lanes. This may be done, for example, by using bollards between tracks or the provision of tram gates.

TROs may be used to exclude most road vehicles and cycles apart from those which are permitted, for example, for access to frontages or for road sweepers etc.

Particular attention should be paid to the design of road junctions and locations where the form of tramway alignment changes, for example, from side to central reservation, or from integrated to segregated on-street tramway.

Alignment Considerations

The alignment of the tramway should take into consideration the following (not exclusively):

- the road layout, for example intersections, roundabouts etc
- pedestrian footways and crossings
- cyclists and cycle lanes
- the needs of frontages for access and property maintenance (this may include those not immediately on the highway but whose main / only access may be affected)
- public utilities and access requirements if it is identified that these cannot be undertaken with the tramway in (normal) operation
- tramway clearances - for more on this see the **Tramway Clearances** section and **here**
- the permitted minimum radii of horizontal and vertical curvature, the combinations thereof and the other engineering constraints for the tramway and its trams.
- the location and design of **tramstops**
- the location of overhead electric traction equipment and other fixed structures. See the **Electric Traction Systems** section for more information.
- drainage.

Road Intersections

In the design and operation of an on-street tramway, it is particularly important to recognise that the behaviour of other road users (including pedestrians) will influence the safety of the tramway. Therefore the design and operation may need to consider likely deliberate actions and errors of judgement by other road users. A risk assessment may indicate that signage and / or markings are an appropriate control measure at some locations. The degree of signing or signalling may require permitted enhancements in accordance with the TSM.

Tramway Intersections with Other Roads

At-grade intersections of tramways with other roads are road traffic junctions, and must not get confused with the definition of a railway level crossing (in the Level Crossings Act of 1983).

The arrangements for controlling the tramway and other road traffic at an intersection should be co-ordinated. At intersections with minor roads, the tramway should be regarded as if it were the major road even if the relative volume of traffic suggests otherwise.

The design of junctions should take account of good practice and recommendations on visibility splays in highway design guidance. Information can be found in documents such as the **Design Manual for Roads and Bridges**, or the **Department for Transport (DfT) Manual for Streets 2007**

The maximum permitted approach speed of trams to intersections may have to be limited so they can negotiate the junction safely. The approach speed to an intersection should enable a tram to stop safely if the intersection is obstructed. The place from which the intersection first comes clearly into view and then remains in view for the tram driver should be identified, so that the available braking distance can be established. The permitted maximum speed should be based on this distance and normal service braking rates.

Where a tram is being integrated into an existing highway and the maximum prescribed indivisibility splay cannot be achieved, speeds lower than the highway design speed may be required.

The visibility splay for a tram driver should be calculated from the driver's fixed seat position to a set-back measured from the SE, and not from the kerb line.

It is helpful if the view of the intersection includes the Stop or Give Way highway lines on the other approaches. This aids the tram driver in their judgement as to the likely movements of other vehicles.

Where a segregated on-street tramway runs immediately alongside a carriageway or in a central reservation between carriageways and it intersects another road, the intersection should be signalled or signed.

At each highway intersection there should be an assessment of the risks to road traffic turning across the tramway. This should aim to highlight issues such as, for example, OHLE poles adjacent to crossings that could trap a road vehicle in the event of a collision with a tram or to identify the potential for signage to be mounted on poles with frangible bases.

Where a segregated on-street section of tramway runs parallel to one side of a road but some distance from it, and a side road crosses the tramway tracks before joining the main road, a risk assessment should be conducted to establish whether signalling the road junction is necessary.

The road traffic signals and signs required for the protection of at-grade crossings on tramways are prescribed in the **TRSGD** and further guidance is also provided in **LRG 2.0**. Such signals should be controlled by a road traffic light signal controller which has approved for tramway use by the Highways England. The detailed arrangements should be agreed with the appropriate Highway Authority.

Road junctions and intersections with on-street tramways should be treated in a way similar to a normal road layout. This should comply with the appropriate advice from the DfT as set out in the **Manual for Streets Signals** should also be provided where a turning road vehicle may momentarily encroach on an adjacent tram due to end or centre throw.

Signs giving warning of the presence of trams should be provided and details of these are in the **TRSGD** and in **LRG 4.0**.

Where road traffic signals are provided, the tram should have a level of precedence agreed with the Highway Authority.

Off-Street Tramway Intersections with the Road

Intersections between a road and an off-street tramway should be treated as if they were intersections between a minor road on which the road traffic is travelling, and a major road on which the tram is travelling and has priority, regardless of the volumes of road and tram traffic.

Conventional three-aspect signals for road vehicles and the tramway equivalent for trams should be used as described in **Signing and Marking of Tramways and Highway Interface**.

A non-signalled intersection between an off-street tramway and a road should be signed as if the tramway were the major road. Stop or Give Way signs should be provided on the road approaches for road traffic, with the Tram sub-plate applied as appropriate (as shown in Diagram 778.1 of the **TSRGD**). If necessary, the relevant warning sign and speed restriction sign should be provided on the tramway approaches.

Visibility from the minor road carrying the road traffic should comply with the **DfT Manual for Streets 2007**.

Pedestrian Footways and Crossings

In streets which have high densities of pedestrians, the pedestrians should be encouraged to use defined crossing points over the tram tracks. The crossings should have dropped kerbs and appropriate tactile marking and designed so that they are obviously the safest point to cross the tramway.

Where safe pedestrian routes are defined, there should be clearly recognised features to aid identification which may include, for example, the type of paving, signing, pedestrian signals, dropped kerbs, pedestrian guard rails or planters. This identification also needs to consider those with visual or other impairments.

Crossing points on a tramway should be co-ordinated with the crossing points of any shared or adjacent carriageways. On off-street tramways, the preferred arrangement is to separate entirely the crossing points for any road from those for the tramway, but if not separate, the arrangements for pedestrian crossings of on-street tramways should be used over those used for a road crossing.

All designated crossings of tram tracks should be designed and operated with the needs of mobility and visually-impaired people in mind.

Standard TSRGD pedestrian signals should be used at places where the normal passive signing at pedestrian and other foot crossings is inadequate. Any need for signalling and / or audible warning will depend on factors such as visibility and tram and pedestrian traffic flow.

Where the platforms or tramstops lie in the centre of the road and those boarding or alighting from a tram have to cross one or more lanes of road traffic to reach or leave the

designated access point for the tramstop or platform, those crossing points should be treated as pedestrian crossings.

Careful consideration should be given to both visibility of pedestrians by tram drivers (and other road traffic) and visibility of approaching trams (and other vehicles) by pedestrians.

Further guidance on non-motorised user crossings of tramways is given [here](#).

Crossing Layouts

Where reasonably practicable, the crossing over the tram track should not be aligned with any other separately-signalled pedestrian crossing or separate zebra crossings.

Where fencing or pedestrian guard rails are required, they should be provided to highway design principles that guide pedestrians to face oncoming trams before they enter the crossing hazard zone, or to direct their attention to pedestrian crossing lights.

Part or all of such pedestrian crossings may be unsignalled if the circumstances at the site allow. For example, if the visibility along the tram tracks is good, it may be possible to dispense with pedestrian signals when other circumstances (such as a high volume of adjacent road traffic or obstructions) would dictate that the road crossing would be signalled. At other places it may be necessary to provide pedestrian signals across the tramway, but a zebra crossing may be sufficient across the road.

Pedestrian Crossings Connected to Tramway Signals Linked to Approaching Trams

Where the tramway crossing can be separated from the remainder of the highway crossing by the provision of refuges, or where the pedestrian crossing movement is parallel to the road over tram tracks only, i.e. where an off-street or segregated on-street tramway crosses or enters a road, an audible warning of an approaching tram should be given.

The warning should be visual for consistency with highway practice. A conventional red / green man pedestrian signal should be used where there are signals controlling tram or road traffic at the location concerned.

Audible warnings should only be provided at crossings where this would be consistent with highway practice for such locations.

The design of any tactile surfaces should follow [DfT guidance](#).

Cycle / Tramway Interface

If cycles are to share the same highway as trams, then there should be appropriate facilities for cycles to make crossing movements and to traverse tramstops. If this is not possible then alternative cycle routes should be provided by:

- placing a separate cycle lane adjacent to the footway,
- by providing an alternative direct route, or
- providing a one-way cycle lane within the carriageway.

If it is practicable, discontinuities in cycle lanes due to the presence of tramstops should be avoided, as experience shows that there is likely to be misuse by cyclists who may follow their desire lines, even where this leads them to cross rails at shallow angles.

Kerbside cycling refuges may need to be considered on long, steep routes and on the approach to tramstops.

Particular care should be taken to avoid pinch points with cycle lanes along the route.

Where side platforms are provided, careful consideration of the impact on cyclists is necessary.

Where cycle lanes cannot be provided, the clearance between rail and kerb should be a minimum of 1000 mm, and consideration should be given to the removal of obstacles from that area, for example, by the provision of drainage incorporated into the kerbs. This clearance is intended to provide a clear route for cyclists in the absence of trams, and combined with the removal of obstacles from that area, reduces the likelihood of sudden movements by cyclists towards the tramway. It is not intended to provide clearances for trams to pass by cyclists.

One-way cycle lanes should be clearly marked and signed as such and accompanying road vehicle parking and loading prohibitions, (TROs) will be required.

Where a cycle lane is provided, to avoid the risks from unauthorised parking of road vehicles fouling the SE, the width of the cycle lane (between the kerb and the nearest edge of the line, as shown in Diagram 1049B of the **TSRGD**) should not be greater than 1000 mm, and the edge of the line nearest to the tram track should be at least 200 mm from the SE.

Where it is necessary for cycle lanes to cross tram tracks, these intersections should be, as far as possible, at right angles to the tracks. Where the achieved crossing angle is less than 60°, consideration should be given to alternative crossing layouts and other measures that mitigate the risks faced by cyclists. These could include additional road markings to show the recommended routes across junctions for cyclists.

In addition to the local Highway Authority, local cycling groups may be able to provide useful information in relation to local cycle routes and relative user levels in addition to feedback on the most effective cycle route solutions for the tramway route under development.

General guidance on cycle issues is found [here](#).

The management of safe cyclist approach to tramways may require the co-operation of the Highway or Roads Authority to place signs and road markings on approach routes under their control. Safe cycling should be considered by promoters at an early stage to ensure appropriate Powers are contained with any TWA Order for TROs and other measures.

Frontages

The needs of premises fronting the tramway for access, loading and maintenance, should be carefully assessed, including those who do not front the tramway but whose only access

to the highway is immediately onto the tramway. This consideration should be made when siting overhead line equipment (OHLE).

It may be necessary to provide dedicated loading / unloading and private parking bays as existing and / or alternatives in another location to avoid the potential for the Tramway Path to become obstructed by vehicles.

Obstructing a tram track can normally be made an offence under the Powers authorising the construction and operation of the tramway (for example within a TWA Order) or by means of relevant by-laws.

Where the tramway crosses entrances to or exits from premises, it should not be necessary to erect warning signs at each such location. Road traffic signals may be necessary at busy locations or where sight lines are inadequate.

If the location where a tramway crosses an entrance where there are likely to be drivers unfamiliar with the area (for example a hospital or visitors to a factory), warning signs may be required.

Public Utilities

Public utilities in or under the highway should, where possible, be accessible while trams are operating. Any access covers should have their nearest edge at least 500 mm from the edge of the SE. Where pipes and cables have to pass under the track, they should be ducted or sleeved before the tracks are laid, to facilitate maintenance or renewal.

The design of the tramway should be designed in consultation with the relevant public utility owners from an early stage of development.

Further information in relation to current is provided [here](#) and in **LRG 15.0 Stray Current Management Guidance**.

In relation to Electromagnetic Compatibility (EMC), guidance is provided in **LRG 3.0 Guidance Management of Electromagnetic Compatibility**.

Changes Between Segregated and Integrated On-Street Tramways and Off-Street Tramways

Where a tramway joins, leaves or runs alongside a carriageway, it should be identified by appropriate signing, carriageway markings or traffic signals in accordance with the **TSRGD**.

Access to the off-street or segregated on-street sections of tramways by road vehicles other than trams should be deterred by traffic signs, which may be supplemented by TROs or bylaws etc.

Suitable treatment of the road surface leading to a wholly segregated section of track, for example, ballast, flexible or frangible bollards between the tram tracks (potentially with a lower than normal clearance to the tram being permissible) or isolated cobbles set into the

surface, may also help to clearly identify the tramway and encourage compliance with the signs.

Tramway Path

The tramway path is the area reserved for a moving tram in its environment. It is derived from the SE by adding the minimum appropriate clearance. It therefore depends upon the SE and the nature of the operational environment and the structures and features within this environment.

It is important at an early stage to determine a tram's SE at various speeds. This is particularly relevant for low speed areas, such as through platforms, to ensure that overlycautious clearances are not adopted.

The path of an on-street tramway should be clearly marked where it is not easily apparent from the carriageway or kerbs and where it would be useful either to tram drivers or other road users to do so (including where there is on-street parking). Where such marking is necessary, this may be achieved by the use of colour, texture or differences of levels to enhance visibility, and should be consistent with the prescribed markings shown in the **TSRGD**.

If yellow dot markings are to be continued through any yellow box markings at junctions, this marking may require an amendment to the yellow box markings.

If more than one type of tram is to be used on a system, the tramway path at any point should be determined by the characteristics of the tram type that has the widest SE at that point.

Where two tracks are parallel to each other or converge, they should be enclosed within a single tramway path.

Kerbs may be required to separate a segregated on-street track from an adjacent carriageway unless road vehicle barriers or a similar measure are installed to separate road vehicles from oncoming trams, or to protect against collision of road vehicles with isolated lineside structures.

Pedestrian Protection Arrangements

Pedestrian guard rails may be used to direct pedestrians to safe crossing points. These guard rails should be appropriately set back from the tramway to avoid creating trapping points.

Fencing should be provided at places on the tramway where there is a significant risk to pedestrian safety. Access to the track, except at designated crossings, should be discouraged as far as possible.

Appropriate forms of deterrent paving may be used to discourage both pedestrian and vehicular access to appropriate areas of the tramway.

In areas where pedestrians have access, or where there is street furniture, adjacent infrastructure or access for tramway infrastructure maintenance, tram operating speeds should be designed to reflect the requirements for line of sight operation.

Further guidance on pedestrian issues can be found [here](#).