

Urban insertion of surface public transport

Trams and pedestrian crossings *Planning principles*

The "Urban insertion of surface public transport" factsheet series deals with questions of planning, street design and signage related to the interface between transport systems and other uses of public space.

This factsheet covers pedestrian crossings over tram tracks (both dedicated-lane tram systems and tram systems in general traffic areas).

It aims to explain the key challenges, clarify existing regulations, rules and practices, and set out the key planning principles necessary to meet these challenges.

It does not cover pedestrian areas or pedestrian-priority zones (where the concept of pedestrian crossings does not apply), as well as intersections with greenways or crossings over dedicated bus lanes.

IUTCS



1. Pedestrian behaviour and the specific features of tram track crossings

1.1. Pedestrian behaviour and needs

For a pedestrian travelling from point A to point B, the process of crossing a road lane is a secondary task to his/her main task, i.e. the route taken through the public space. The pedestrian is more concerned about the rest of the journey, and his/her reason for this journey, than about the crossing itself.

Risk-taking when crossing a road lane is dependent on waiting times and optimisation of the distance that the pedestrian has to travel. The pedestrian's primary source of information when making the journey is visual. At crossings, pedestrians assess approaching vehicles and the presence of traffic lights.



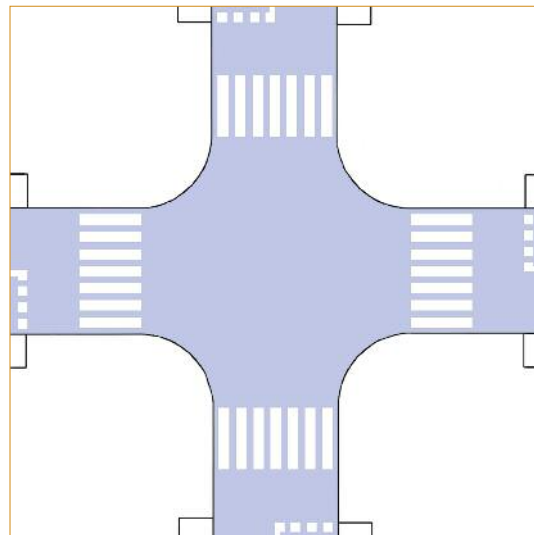
The presence of tram tracks is a secondary component of pedestrians' route

When the pedestrian crossing passes over a tram track or road lane, it must meet the following criteria:

- **Relevance of the crossing**

The location of the pedestrian crossing must be commensurate with the needs of pedestrians, and must reflect their preferred route. It must be positioned in such a manner that it is consistent with the main areas of pedestrian traffic flow and points of interest.

Other than in exceptional circumstances, crossings at junctions must cover all legs of the intersection.



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In linking sections, crossings must only be installed where there is a genuine, observed need (high pedestrian flow volumes and/or poor visibility conditions, for example). The aim must be to avoid unauthorised crossings.



Continuous pedestrian crossing leading to a lateral tram site

At stations, pedestrian crossings should generally be located at each end, enabling users to reach the station, while ensuring that other pedestrians are able to cross to the other side of the road.

- **Safety**

Safety is improved through good understanding of the space and the corresponding procedures, adequate visibility (see UISPT factsheet no.1, “Trams and visibility: existing issues and rules”), and the simplicity of the crossing. The crossing must be as short and clear as possible, while ensuring that pedestrian flows are channelled effectively.

- **Practicality of the route**

The practicality of the route is particularly important for people with reduced mobility, especially wheelchair users and the visually impaired. It helps to improve the comfort of all pedestrians and to make the crossing more attractive.

1.2. The specific features of tram track crossings

Different priority rules apply between pedestrians and vehicles, and pedestrians and trams (see §2. The regulatory framework).

Crossings over dedicated tram lanes are more complex and more difficult for pedestrians to understand. Studies¹ have shown that pedestrians perceive crossing tram tracks as less safe than crossing a road.

The direction of travel may differ, since trams may travel in the opposite direction to the general traffic, and a tram may travel in either direction on a single track.

Trams have specific features: they are quieter than other vehicles, have less effective brakes than a road vehicle, and are guided by rails, making it impossible for them to adopt avoidance manoeuvres.

Pedestrian crossings over tram tracks pose specific difficulties for people with various disabilities (motor, visual, mental or cognitive disabilities).

For example, the fact that trams are so quiet may pose problems for visually impaired pedestrians.

2. The regulatory framework

Article R110-3 of the French Highway code states that **the general rules of the code do not apply to trams**. — As such, the general provision by which a road vehicle must give way to a pedestrian crossing the road at an authorised crossing point (art. R415-11) is not applicable to trams.

The tram therefore has priority over pedestrians, except where there are illuminated signs managing this conflict. This provision is consistent with the specific features of trams, as indicated in §1.2.

Markings do not indicate priority:

Contrary to popular belief, statutory markings do not confer any specific priority on pedestrians using a pedestrian crossing.

Pedestrians are required to use these crossings if there is one within 50 metres of their location. However, they must cross carefully at all times, taking into account visibility and vehicle distance and speed, and must obey traffic lights (art. R412-37).

In terms of accessibility, the continuity of the mobility chain is a requirement under the French law of 11 February 2005 and its order of 15 January 2007, implementing decree no. 2006-1658 of 21 December 2006 concerning the technical instructions for the accessibility of roads and public spaces. The tram must not hamper this continuity, and pedestrian crossings across tram tracks must meet the regulatory requirements and standards governing accessibility tools and systems (e.g. tactile paving strips, beeping light signals, etc.).

Road signage is governed by the order of 24 November 1967 concerning signage equipment for roads and motorways and the interministerial instruction on road signs (IISR). These texts govern the definition, use, form and location of road signs, and for dynamic signs, the manner in which they operate.

Pedestrian crossings are covered in particular by the 4th and 5th sections (static signage), the 6th section (traffic lights), and the 7th section (markings) of the IISR.

(1) Pedestrian crossings at axial and lateral sites - CETE Méditerranée - M. Millot, 2011 and 2013.

3. Planning principles

3.1. General traffic areas

In this particular case, the tram travels on the road, in the same direction as the vehicles, and without any specific segregation.

The tram adapts to the general context and to the development constraints of a traditional road (yet retains priority over pedestrians, see §2).

As such, it is recommended to use statutory markings for pedestrian crossings along the entire road, in order to manage conflict between pedestrians and other vehicles. This also helps to make the layout and planning clearer for users.

Central separators should not be used as pedestrian refuges if they are not wide enough to fulfil such a purpose (see §3.2.2).



Pedestrian crossing in a general traffic area

The statutory minimum width for a pedestrian crossing over a road is 2.50 m. In practice, these crossings are generally 4.00 m, and the exact width should be adapted to the context.

3.2. Dedicated lanes

In this case, the lanes are reserved exclusively for the tram.

The layout and signage must make it possible to identify the tracks that the pedestrian needs to cross, and the various sequences of the crossing over the entire road.

Where tram tracks are shared with a specific vehicle category (e.g. buses or taxis), these lanes should be treated in the same way as dedicated lanes, since these are not general traffic areas but reserved sites in which tram-related instructions take precedence.

3.2.1. Differentiation of spaces

The layout must clearly distinguish between dedicated pedestrian spaces (pavements, refuges) and the road lanes that pedestrians are required to cross. It must also be clear, to pedestrians, that the priority system differs between road lanes and tram lanes.

The most effective differentiation method is to use different surface coverings for different spaces. If there is insufficient differentiation between the tram tracks and the road on a straight section, the crossing itself must be highly contrasting.

There must be a clear break in the statutory markings on the tram tracks, and the crossing path should ideally be clearly identified to ensure that pedestrians are correctly guided and channelled.



Differentiation of spaces using surface coverings and markings

The width of tram track crossings must be consistent with the width of crossings over the adjacent roads (see §3.1. general traffic areas).

The tram track crossing may be offset in relation to the road crossing (creation of a staggered crossing) to differentiate between the road and the tram track. Specific measures may be taken to slow down pedestrians and, where possible, to place them opposite the oncoming vehicle on the closest track.

Effective channelling of pedestrians is essential at offset crossings, and in certain specific configurations such as crossings used regularly by young children, or where there is an adjacent cycle crossing (the offset layout can be used to guide cyclists through specific hazards and to reduce their speed).

However, the use of barriers or other mechanisms must be justified in terms of:

- the risk of a user becoming “trapped” between the barrier and the tram
- the risk that the system will be bypassed - an item of street furniture that places an excessive restriction on the natural flow of pedestrians is likely to be bypassed, thereby resulting in more hazardous behaviour than would have been the case if the system were not in place.

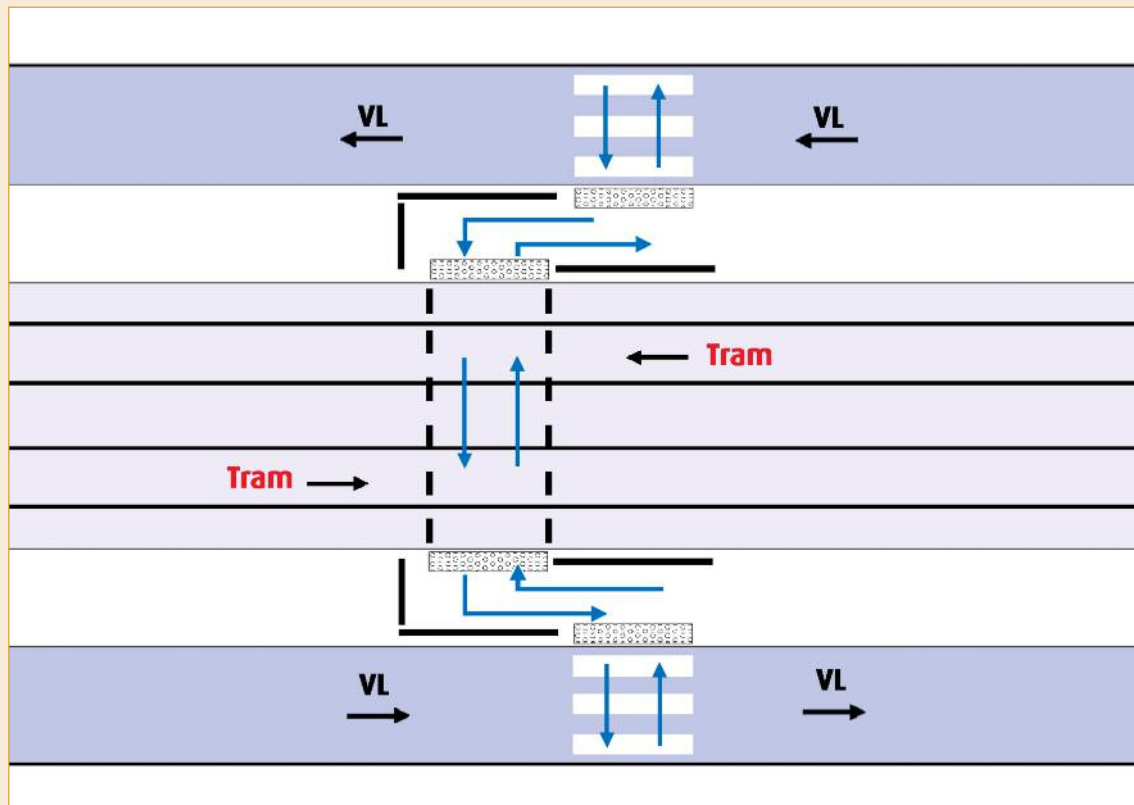
Furthermore, the use of barriers reduces the amount of space available to pedestrians.



Staggered layout

Pedestrian crossing layout with central tram site

The general rule in which the pedestrian should face the tram cannot always be applied in this case. Moreover, depending on the context, the direction of the staggered crossings may differ, especially across roads with heavy traffic flow.



3.2.2. Use of refuges

Refuges are used to differentiate between the spaces that pedestrians need to cross, giving pedestrians information about the complexity of the crossing and reducing the crossing distance. **Where a tram lane is present, these refuges should ideally be located between the road lanes and the tram tracks**, except in specific circumstances (see §3.5).

The refuges must be sufficiently large and suited to the context, and in particular to the expected pedestrian flow.

A width of 1.50 m is insufficient since this does not provide enough space for a pedestrian with a pushchair or a bicycle. **As such, refuges should be at least 2.00 m wide**, as recommended in Cerema guides on urban developments. Refuges must be fitted with tactile paving strips.



Pedestrian crossing with adequate refuges fitted with tactile paving strips

3.3. Static road signs

It is not compulsory to install vertical signs at pedestrian crossings across tram tracks.

However, C20c signs may be used to indicate crossings.

It may be useful to install a plaque stating that the tram travels in both directions, especially where there is only a single tram track, or where the tram track is located on a one-way street.



The C20c board and the plaque may be combined or used separately



Road signs must be placed beyond the tram tracks

3.4. Illuminated (and audible) signs

Illuminated signs are used to manage certain types of conflict, by temporally separating incompatible user flows (light vehicles/pedestrians, light vehicles/trams/pedestrians, etc.).

3.4.1. Possible types of sign

Two types of illuminated sign may be used to manage pedestrian crossings across tram tracks, subject to the provisions of the 6th section of the IISR:

- The **R12 signal** is designed to manage road crossings. By extension, it can also be used for crossings over dedicated tram lanes. Crossings in general traffic areas must necessarily be managed using the R12 signal, as must crossings across both dedicated lanes and road lanes when managed together (see §3.4.3 crossing phases).
- The **R25 signal** may only be used for crossings over dedicated lanes reserved exclusively for regular public transport services, including trams. This signal is used to differentiate the lanes and to avoid potential confusion due to multiple figurines at successive crossing points (tram lanes and road lanes). When R25 signals are lit, they give a clear message to the pedestrian, making them more likely to check traffic conditions before crossing.



R12 signal



R25 signal

French accessibility regulations require the installation of beeping light signals, and specific recommendations have been issued in this respect¹. For more information, readers should refer to the Cerema factsheet entitled "Road crossings for blind and visually impaired users - junctions with at least one crossing fitted with R25 signals".

3.4.2. Rules governing the use of illuminated signs at dedicated lane pedestrian crossings

The pedestrian's understanding of the illuminated sign is directly linked to his/her understanding of the space.

The space must be laid out in such a way that the pedestrian is able to fully understand the corresponding illuminated sign, and is able to answer the following questions:

- Does the sign concern the lane that I am preparing to cross?
- Am I authorised to cross this lane?

Where the crossing over a dedicated lane is not managed by an illuminated sign, the pedestrian may seek information about this lane from the next road lane, leading to potential error².

There is also a risk of confusion if R12 signals are used exclusively to manage the crossing over the dedicated lane.

As a general rule, **all crossings over road lanes and the tram tracks must be fitted with illuminated signs, if this type of system is used.**



Pedestrian crossing with illuminated signs across road lanes and the tram tracks

NB: Pedestrians are only likely to obey illuminated signs if they are credible, and if they are timed and scheduled in an effective manner, with successive phases between different users.

(1) Beeping systems are not shown on the diagrams in this factsheet for simplification purposes.

(2) Pedestrian crossings at axial and lateral sites - CETE Méditerranée, 2011 and 2013 - M. Millot.

- **At junctions:**

If an illuminated sign is used for crossings over road lanes running parallel to the tram, the tram lanes crossing will also be managed by these signs (including where there is a station adjacent to the junction).



Pedestrian crossing at a station equipped with illuminated signs, due to its location at a signal controlled junction.

Pedestrian crossings across tram tracks adjacent to a road crossing managed with barriers must be handled in line with the principles set out above.

- **At isolated crossing points**

(excluding junctions):

An illuminated sign must be used in the event of poor mutual visibility, heavy road traffic flow with high speeds, and/or heavy pedestrian flow. In certain cases, exemptions to the general rule under which illuminated signs must be fitted to the entire crossing (road lanes and tracks) may apply:

- At pedestrian crossings next to a station, and not at a junction, a decision may be taken not to use illuminated signs for the crossing across the tram track(s). This decision must be taken following a detailed analysis of the environment of the crossing, the manner in which the crossing is used, and the operation of the traffic lights on the road lanes (on-demand phase, cycle linked to another junction, etc.).
- Conversely, a decision may be taken to use illuminated signs exclusively for the crossing over the tram tracks. In such cases, the **use of R25 signals is highly recommended.**

3.4.3. Crossing phases

In this case, the number of crossing phases relates to the total number of green phases necessary for the pedestrian to cross the entire tracks and road.

- **Single-phase crossing**

A single-phase crossing helps to avoid the confusion associated with reading multiple figurines. However, this can lead to excessively long crossing times. It also poses signal credibility issues, especially when the pedestrian and vehicle lights are on red at the same time.

Single-phase crossings are only possible for total crossings not exceeding 12.00 m in length, otherwise the total crossing time would be excessive. Other than in certain specific circumstances (see §3.5), refuges must be created. These refuges are not simply designed to hold pedestrians during waiting phases (see §3.2.2)

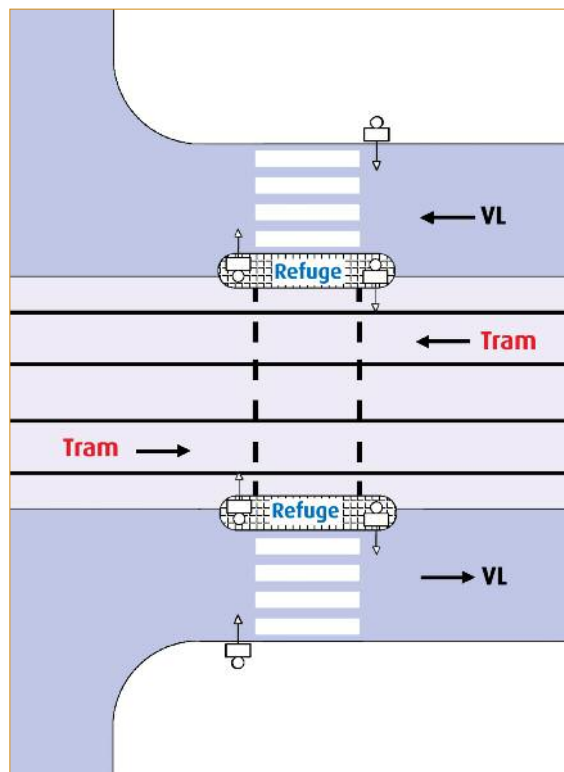


Single-phase crossing: the illuminated signs for road lanes and the tram tracks are coordinated

• Multiple-phase crossing

Multiple-phase crossing systems help to enhance the credibility of signage, since the use of different signs on the road crossing and the tram tracks crossing are more likely to be obeyed. Specific analysis should be conducted in each case to determine which illuminated signs should be coordinated, and which signs should differ.

Where the crossing is managed in multiple phases, refuges are essential for holding pedestrians during the interim waiting phases.



Multiple-phase crossing: there is a clear separation between the illuminated signs for the road lanes and the tram tracks, with R25 signals used in the example opposite

Cycle crossings adjacent to the pedestrian crossing

The objectives of the cycle crossing are as follows:

- To force cyclists to slow down or stop (especially at crossings not managed by an illuminated sign) and to guarantee mutual visibility.
- To clearly distinguish between the successive road and tram lanes, so that cyclists are aware of the changing priority regimes.



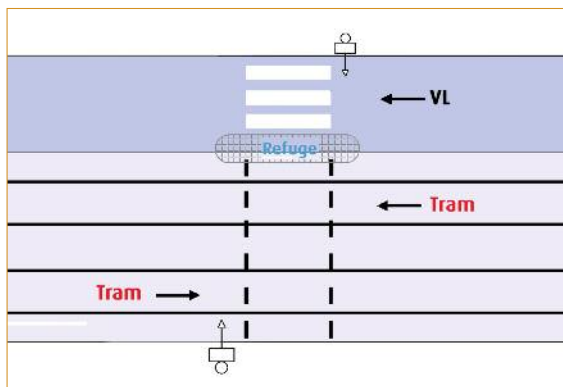
Cycle crossing adjacent to a pedestrian crossing

- The cycle crossing must be as perpendicular to the tram track as possible, in order to avoid potential falls. Ideally, the angle should be no less than 60°.
- Identification of crossings:
 - In general traffic areas and on road lanes, the cycle facility recommendations apply.
 - For dedicated lanes, continuous markings for cyclists will only be placed on the trackbed itself, to clearly distinguish between the tracks and the road lanes. A decision may be made to use a specific material for the crossing.
- Illuminated and audible signals: where an illuminated sign is used for the crossing, an R12 or R25 signal is sufficient. This signal must be placed such that it is visible to the cyclist, both before and during the crossing.

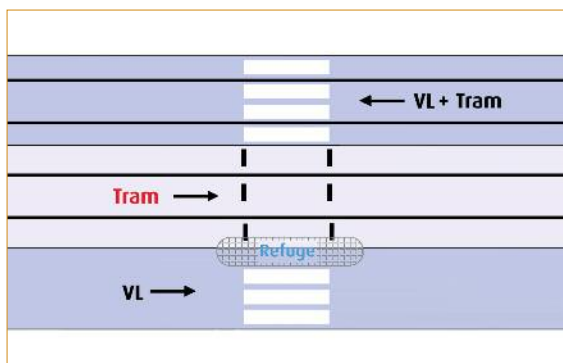
3.5. Implementation of planning principles in specific cases

3.5.1. Crossings in confined spaces

Where the available space is limited (width of less than 12 m), it is difficult to create a refuge between the tram tracks and the road lanes (configuration with one (or two) tram track(s) in a dedicated lane and one (or two) road lane(s) or a tram track in a general traffic area).



Configuration with a total width of less than 12 m: one light vehicle lane and two tram tracks (removal of the refuge should be determined on a case-by-case basis).



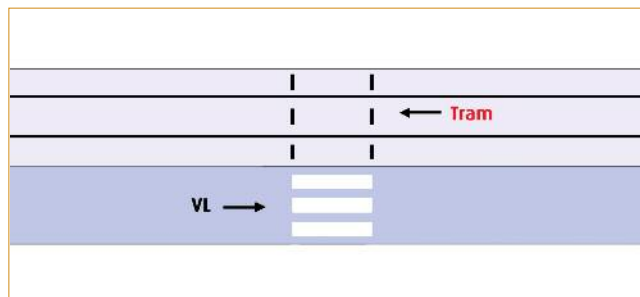
Configuration with one tram track in a dedicated lane and one light vehicle lane + one light vehicle and tram lane in a general traffic area (removal of the refuge should be determined on a case-by-case basis).

The decision not to create a refuge must be based on an assessment of tram and road vehicle flows and speeds. Where there is no genuine pedestrian refuge, it may be beneficial to retain additional space or an island between the tram tracks and the road lane, without tactile paving strips.

Where there is no refuge and the crossing is managed using illuminated signs, it must necessarily be a single-phase crossing.

Where space is extremely limited, it becomes impossible to create a refuge. However, the total length of the crossing is less than 8 m. Generally speaking, this situation is acceptable due to the prevailing traffic conditions (low road traffic volumes, one-way road and/or single track, limited speeds).

This configuration is often encountered with a road lane (or a general traffic lane) and a tram track in a dedicated lane.



Confined space with one road lane and one tram track in a dedicated lane

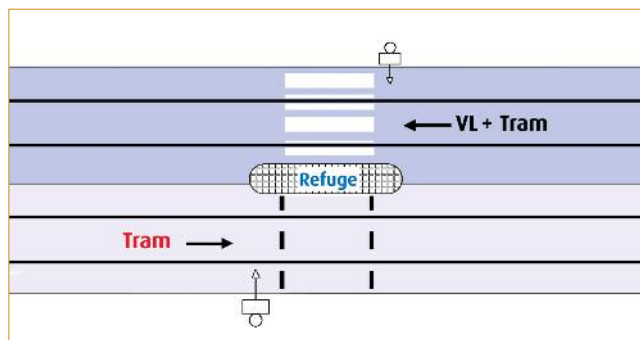
3.5.2. Pedestrian crossings at combined general traffic areas and dedicated lanes

In some cases, one tram track may be in a dedicated lane, while the track travelling in the opposite direction is in a general traffic area.

The crossing over the general traffic area is managed in the same way as a road crossing (statutory markings, R12 illuminated sign).

The crossing over the dedicated lane is managed in the same way as other dedicated lane crossings (materialised crossing, no marking, R12 or R25 illuminated sign).

Wherever possible, a refuge should be created, thereby establishing a multiple-phase crossing. If this is not possible for technical reasons, the crossing must be managed under a single-phase configuration, using R12 signs.

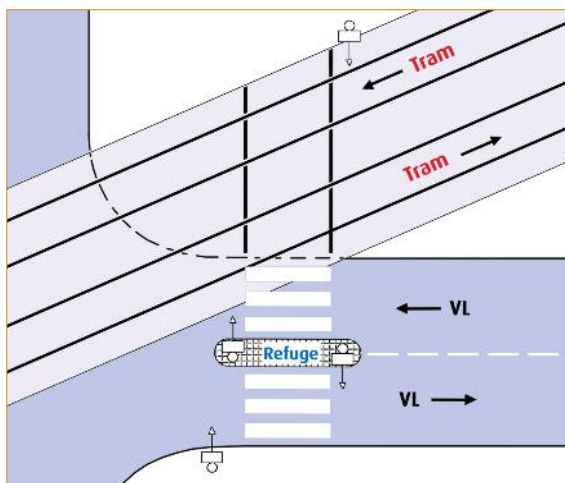


3.5.3. Crossing at a junction with tram lane partially interrupting a road lane

Where the tram line curves, the track is no longer parallel to the adjacent road lane. In many such cases, it is impossible to create a refuge.



Dedicated lane tram track interrupting a road lane



This generally occurs at and around junctions where the tram changes direction or location (axial/lateral). Efforts may be made to locate pedestrian crossings away from the junction, but this is not always possible, given the preferred routes that pedestrians wish to take.

The result is a mixed configuration (general traffic area/dedicated lane). In such cases, the above-mentioned principles applicable to materialisation of the crossing should be applied:

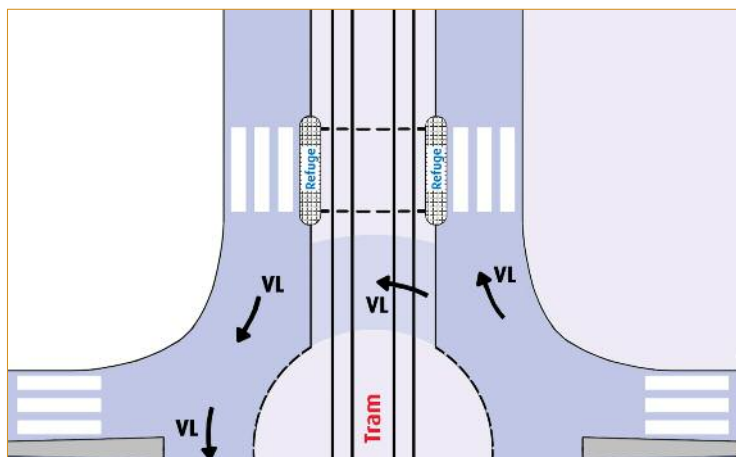
- Statutory markings on the road lane (see § 3.1) and materialisation of the crossing over the tram tracks (see § 3.2). ;
- A single-phase crossing arrangement, where illuminated signs are used.

NB: This configuration is only acceptable provided that the crossing distances are not excessive (less than 12 m), and the geometry of the junction or the location of the line may need to be revised accordingly.

3.5.4. Pedestrian crossings at roundabout entry/exit points

The general recommendations on pedestrian crossings at roundabouts, as set out in Certu's "Urban intersections" guide and repeated in the 2008 Certu-STRMTG "Roundabouts and trams" guide, apply.

Pedestrian crossings are normally located approximately 3 m from the "give way" line on each branch, except where visibility requirements dictate otherwise.



Pedestrian crossing at a roundabout entry/exit point

The **general principles governing designation of the crossing and refuges** detailed above (see § 3) also apply:

- Statutory markings on the road lane and identification of the crossing over the tram tracks.
- Creation of refuges between the tram lanes and the road lane, and between road lanes travelling in the opposite direction in the event of a lateral site.

Pedestrian crossings over road lanes adjacent to roundabouts are not specifically managed. **If the roundabout is fitted with illuminated signs to manage conflicts between trams and vehicles, the pedestrian crossings across the tram tracks may also be managed by illuminated signs. In such cases, the R25 signal is strongly recommended to avoid confusion.**

Bibliographical references

Regulations

- French highway code
- Law no. 2005-102 of 11 April 2005 on equal rights and opportunities, participation and citizenship of people with disabilities, and its implementing decree
- Interministerial instruction on road signs
- NF P98-351 Access. Integration of people with disabilities. Tactile surfaces

... in the UISPT series

- Cerema factsheet UISPT-01
"Trams and visibility: existing issues and rules", December 2014

Other documents

- *Guide carrefours urbains* (Urban intersections guide), Certu, 2010
- *Guide d'aménagements de voirie pour les transports collectifs* (Guide to road layouts for public transport), Certu, 2000
- *Giratoire et tramways* (roundabouts and trams) guide, Certu /STRMTG, 2008
- *Les bandes d'éveil de vigilance, implantation sur la voirie* (Tactile paving strips, use on the road), Certu, 2010
- *Les cheminements de voirie pour les personnes aveugles et mal voyantes, carrefours comportant au moins une traversée équipée de signaux R25* (Road crossings for blind and visually impaired users - junctions with at least one crossing fitted with R25 signals), Cerema factsheet - Rapam-09, May 2015
- Study entitled *Traversées piétonnes matérialisées sur sites axiaux et latéraux de tramway* (Pedestrian crossings at central and lateral sites) Marine Millot, Cete Méditerranée, 2011 and 2013

Factsheet no. 02 Trams and pedestrian crossings Planning principles

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