

NON-MOTORISED MEANS OF TRANSPORT IN URBAN AREAS

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ABSTRACT

Public transport projects which introduce lanes exclusively for public transport generally address the three major types of sustainable development issue: environmental, social and economic. They allow the reallocation of spaces dedicated to the different functions of urban roads, particularly by limiting the space used by private cars.

These transport projects now provide an opportunity to develop real routes for non-motorised means of transport. In urban spaces, which are often very restricted, pedestrian and bicycle traffic must be integrated with as much care as tramways or other road vehicles.

The local government authority of the Hauts-de-Seine *département* – which is the client for the urban development and infrastructure work on the T8 tramway line in the Greater Paris area – has incorporated the project within a policy of sustainable development and Environmental Quality in which the question of non-motorised travel is strongly underlined.

The project is currently at the design stage, and the project manager is responsible for designing the development project with the aid of an Environmental Quality multicriteria analysis “filter”. This preventive approach is aimed directly at users (particularly pedestrians and cyclists), offering them a real choice between different means of transport and creating a pleasant, functional environment for living.

INTRODUCTION

For many years, public transport authorities in major urban areas have been faced with increasing car traffic in city centres and in outer city areas. This trend is probably due in part to the increasing provision of urban infrastructures that facilitate individual motorised means of transport.

For some years, urban transportation planners have been studying ways to persuade car drivers to leave their cars and to use public or non-motorised means of transport in order to limit congestion in city centres.

Local government authorities are, therefore, now interested in developing and integrating non-motorised means of transport in the design of new urban planning projects.

With this in mind, the French Ministry of Transport recently launched an action programme called “*Une voirie pour tous*” (“The road is for everyone”), which could cover the following range of topics in Paris: promotion of non-motorised means of transport, a “quiet neighbourhoods” operation, improvements on public transport systems, new tramway, etc.

The arrival of the future T8 tramway on the RD 906 road in the Greater Paris region (in the Châtillon, Clamart and Meudon areas) is another example of this proactive policy. The General Council of the Hauts-de-Seine *département* – which is the client for this project – incorporated this project within a sustainable development policy that takes into account the integration of non-motorised transport along the future corridor created by the tramway. The planned scheme – currently at the preliminary design stage – takes into account the existing constraints and provides for maximum improvement of the functionality, quality and safety of non-motorised transport infrastructure.

1 NON-MOTORISED MEANS OF TRANSPORT

1.1 What is a non-motorised means of transport?

Travel on foot, by bicycle and all non-motor-powered means of transport (such as roller skates/blades, scooter, or skateboard) are commonly grouped together under the general term of non-motorised means of transport. This term is therefore used for all means of transport that are solely human-powered.

These means of transport are generally used for travelling short distances or for reaching a nearby public transport facility.

Note that such means of transport (particularly walking) represent more than half the total daily journeys, which emphasizes the rather irrational use of the car for short distances.

1.1.1 *Pedestrian accessibility*

The usual distance that people walk is between 500m and 1km, i.e. "local travel". The greatest constraints for the pedestrian are often due to the coexistence with vehicle traffic. These include noise nuisance, an affect of being cut off, having to wait at traffic lights or to make a detour at crossroads, etc.

Considering the short distances travelled on foot, pedestrian accessibility requires public spaces to be clearly identifiable and easy to use, and the most comprehensive possible networking of the many different routes and means of transports.

Pedestrians must be taken into account in all urban planning, and not only in areas around schools or public buildings. Places that create pedestrian traffic are centrally placed neighbourhoods, business parks, leisure areas, schools, residential areas and areas for taking leisure walks.

Pedestrian access standards must comply with the access requirements of people with reduced mobility. After the publication of Decree No. 2006-1658 on the 21st of December 2006, any new development must incorporate specific changes to allow access by people with reduced mobility. Similarly, the Act of Parliament No. 91-663 dated the 13th of July 1991, is aimed at facilitating accessibility to roads by disabled persons, followed by Decrees 99-756 and 99-757, any new developments or developments that involve modification of a road since 1999 must include audio repeater signals at pedestrian crossing lights to facilitate the circulation of the blind and the visually impaired.

1.1.2 *Accessibility for cyclists*

The bicycle is an efficient means of transport for distances of 1 to 3 km, or even 4 to 5 km. At an average speed of 15 km/hour in an urban environment, a cyclist can travel 3 km in 12 minutes.

The slope of the road is not a dissuasive obstacle. It is acceptable to have to climb through a height of 40 m to 50 m once on the route.

From an ergonomic and behavioural viewpoint, cyclists choose their routes by finding a compromise between efficiency, pleasure and safety. According to whether they give priority to one or other of these three factors, a particular cyclist may look for a direct route, even if it is via a road with heavy traffic, or may prefer to go via streets with less traffic or where there are nicer views or less noise.

Therefore, to attract all types of cyclists, the cycle track network must go via direct routes and also via streets with light traffic. All too often, cycling developments and facilities are copied from a pedestrian approach and are therefore not clearly identifiable.

1.1.3 *Accessibility to public transport*

Travel via public transport systems necessarily involves a sequence of journeys – for example, a journey on foot or by bicycle followed by a journey in a public transport system, with an additional final journey on foot (or by bicycle).

Public transport systems and non-motorised means of transport cannot be approached and designed without bearing this in mind.

1.2 What is the advantage to the cityscape and to daily life?

By taking non-motorised means of transport into account in conceiving future urban planning developments, the city can be recomposed on a human scale.

Since the years after the Second World War, cities were built or developed around the motor car, leaving very little room for pavements (which became gradually narrower as carriageways widened). Travel on foot and by bicycle was not facilitated by appropriate developments. It was dangerous, particularly for bicycles, because of the mix with car traffic. Cycling was also looked down upon by people with preconceived ideas, who sometimes saw it as a slow, outdated means of transport.

It is now clear that these means of transport are extremely efficient, and are often faster than motorised transport in a dense urban setting.

Self-service two-wheeler hire systems are developing rapidly in several cities such as Rennes and Lyon, and now in Paris, where the planned system will be the world's largest.

By taking two-wheelers into account in urban planning, a new urban composition based on the sharing of space can be planned.

Non-motorised means of transport are a major advantage from environmental and health viewpoints, since they limit the nuisances created by motor traffic (noise, air pollution, etc.). For some time, studies have advocated walking or cycling as physical exercise for people during their daily travel, and as a way of keeping their bodies in shape in a society where people are, increasingly, confined to one place and do not have enough time for physical activities.

1.3 What makes the developments and facilities for non-motorised means of transport attractive?

Until now, the measures taken have been generally limited to increasing the safety of users of non-motorised means of transport or to providing them with routes that are, in fact, often incomplete and full of obstacles. Priority must now be given to a more comprehensive approach and to the attractiveness and comfort of the cycle routes.

For these purposes, certain principles must be taken into account in order to make routes attractive for the targeted type of travel.

1.3.1 *Pedestrians*

From a technical point of view, the following principles must be promoted:

- Establish functional and spatial continuity of cycle routes.
- Make the coexistence of pedestrians with automobiles more pleasant in the public space of the street, which is the main centre of city life, by reducing the traffic speeds on main urban roads – adopting a general speed limit of 50 km/hour – and creating 30 km/hour (or even 15 km/hour) limits on frontage roads and in residential neighbourhoods.
- Give preference to pedestrian routes and pedestrian crossings that are on a single level, and always provide lower pavements at pedestrian crossings.

- Provide sufficient unobstructed width on pavements, particularly by improving the layout of street furniture, which is too all often positioned in an unorganised manner, creating obstacles on pavements.
- Provide traffic islands at least 2 m wide to allow pedestrians and cyclists to safely cross roads in two stages.
- Improve lighting of public spaces to give a feeling of safety at night.
- Provide enough benches, large enough for people with impaired mobility who, on a daily route, need places to stop and rest.
- Highlight routes that pass through landscaped areas or serene environments
- Preserve and add trees, which, by their presence and their variety, are an asset for the quality of life. Coordinated design of the management and addition of trees is important for enhancing pedestrian routes and public spaces.
- Create landmark places by developing generous, pleasant public spaces where people can meet and relax.
- Provide audio signals at pedestrian crossings to facilitate the journeys of the blind and the visually impaired.

1.3.2 *Cycling*

A cycle path should be designed to be uniform and continuous. Many cyclists do not like to have to use a cycle track for 50 m, continue along a bicycle lane for 100 m, then return to the carriageway without any specific facility for 100 m, and then continue along another bicycle lane, and so on. They often prefer to use a simpler, continuous route on the carriageway, even if it has no special facility for them.

1.3.3 *Access to public transport*

In order to make interconnections between different transport systems attractive, it is important to take the following points into account when designing new developments:

- The quality of access: Pedestrian and cycle routes must converge towards other forms of public transport e.g. train stations/bus stops. Their quality depends on factors such as the visibility of the route (it should be continuous, straight and clearly-identifiable), its width (1.4 m of unobstructed width should be considered an absolute minimum, or 3.5 m if the route is also used by cyclists), the environment through which it passes (fences or areas of greenery), and the lighting conditions, etc.
- The road-crossing conditions: Most stations/stops are located on or near traffic routes. In this case, what provision is made for people crossing the road? Is the road crossing placed so that it closely follows the shortest natural route? Is one crossing enough, or are two crossings required, one on each side of the station/stop ? If the crossing has traffic lights, what priority is given to pedestrians? Are the traffic lights triggered immediately, or are they operated as part of a road traffic control sequence?
Pedestrian waiting times at crossings should be kept to a minimum, otherwise pedestrians become impatient and force their way across, reducing pedestrian safety and making it more difficult to manage traffic at a crossroads or junction (e.g., if a pedestrian crossing request button is incorporated needlessly into the traffic lights).
- Design and layout of the stop: A bus or tram stop is a waiting place. It should be designed and laid out to be friendly and pleasant. Apart from the ergonomic and aesthetic qualities of the shelter itself, the inhospitable roadside character of certain stops can sometimes be reduced simply by a little greenery, a wider pavement, or the fact of not being jammed between two backlit advertising panels while one waits.
- Conditions of switching between bicycle and public transport: There are a number of interconnections, particularly between rail systems and the bicycle (which is a usual

means of access). Therefore bicycle parking spaces must be provided immediately beside the stops, with secure fastening points.

2 INTEGRATION OF NON-MOTORISED MEANS OF TRANSPORT IN THE DESIGN OF A DEDICATED PUBLIC TRANSPORT CORRIDOR PROJECT

2.1 Inclusion of an Environmental Quality approach in a project for integrating the T8 tramway in the Greater Paris area

Nowadays, projects must be incorporated into a sustainable development approach, which means the impact of a project on the environment must be taken into consideration. For the building industry, the High Environmental Quality approach attempts to meet these requirements. Among other things, studies are being conducted to adapt this method to areas other than buildings in future.

The General Council of the Hauts-de-Seine *département* – which is the client for the urban developments of the Châtillon – Vélizy section of the tramway line – has deliberately managed the operation in line with this sustainable development and Environmental Quality (EQ) approach. This experimental approach is based on four complementary aspects: eco-design, eco-construction, eco-management and good governance, in which the matter of non-motorised travel is strongly stressed.

The project is currently at the design stage, and the project manager (Setec TPI, associated with the town-planning firm Reichen et Robert et associés) is responsible for designing the development project with the aid of an Environmental Quality multicriteria analysis “filter”. This preventive approach is aimed directly at users (particularly pedestrians and cyclists), offering them a real choice between different means of transport and creating a pleasant, functional environment for living.

Below is an extract of the multicriteria table particularly concerning non-motorised travel. (Figure 1)

Topics	Principles	Measures taken
Offer a real choice between the different means of travel	1.1. Encourage people to walk	Create high quality continuous routes - pleasant, comfortable, safe, adapted to non-motorised travel.
		Create green corridors
	1.2. Promote use of the bicycle	Create continuous cycle routes
		Make junctions safe
		Facilitate bicycle parking
	1.3. Make the public transport system more attractive	Create high quality waiting platforms - pleasant, comfortable and safe
		Create a quality service which is both attractive and competitive
		Reorganise the public transport network to facilitate intermodal transport
		Facilitate users' access to the range of transport

Figure 1 - extract of the Environmental Quality multicriteria table

2.2 General presentation of the project's developments

2.2.1 Principles of design and layout

The project is mainly on the RD906 secondary road, which passes through the municipal districts of Châtillon (a dense urban area) and Clamart (a less dense urban area that includes business parks).

The tramway cannot be introduced without radically changing the layout and introducing a new hierarchical order of spaces. The integration of a tramway platform – which is around 5.50 m wide on a straight stretch – involves a comprehensive study of the various means of transport for all developments along the tramway line.

In this type of project, the tramway platform is integrated to the detriment of the space dedicated to motor cars. This limits individual motor traffic while facilitating circulation of public transport systems.

Therefore, in the end, along most of the length of the line, there is a carriageway containing 2 traffic lanes (with 3 lanes at junctions to allow vehicles to turn left), i.e., one lane in each direction, for maximum hourly traffic of around 1,300 vehicles in each direction.

Concerning the rest of the developments, the principle is to keep pavements as wide as possible, while maintaining existing access for local residents.

The platform layout is generally “semi-lateral”, i.e., there is firstly a pavement, then the main carriageway, the platform and, lastly, an area of traffic calming that includes a frontage road with a 30 km/hour speed limit, cycle traffic and the pavement for pedestrians.

Here are two examples of integration with this layout principle:

First case:

Existing layout (Figure 2):

- Pavement around 3 m wide on the edge of buildings, including trees, with or without parking spaces.
- Frontage road bordered by two lines of trees.
- Wide carriageway, with 4 traffic lanes.

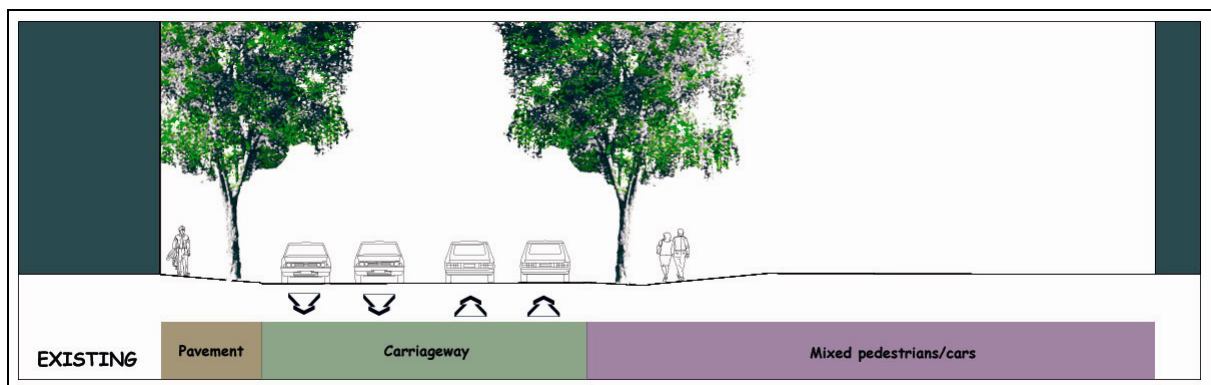


Figure 2 –Diagram of existing layout (first case)

Proposal (Figure 3):

- Pavement at least 3 m wide.
- Two-lane carriageway, with a longitudinal parking strip that becomes a traffic lane at junctions, to allow vehicles to turn left.
- Tramway platform with mineral surfacing in this case (because of the heavy urban traffic),
- Area of traffic calming including a frontage road with a 30 km/hour speed limit, a longitudinal parking strip, a pavement and provision for bicycles. Bicycle traffic is shared between (a) traffic in the direction of the frontage road and (b) contraflow traffic on a bicycle lane. There are also two lines of trees.

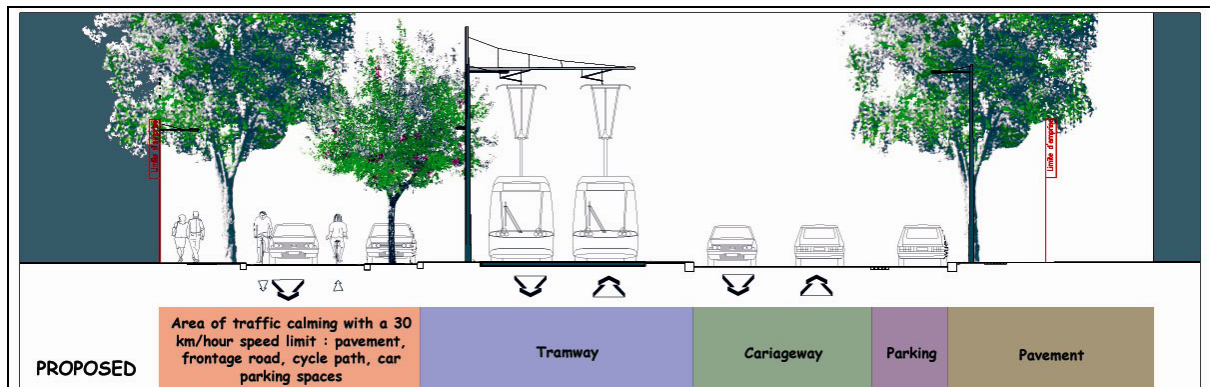


Figure 3 – Proposal for first case

Second case:

Existing (Figure 4):

- Pavement on the edge of buildings, around 8-9 m, including trees,
- Very wide carriageway, with 4 traffic lanes.

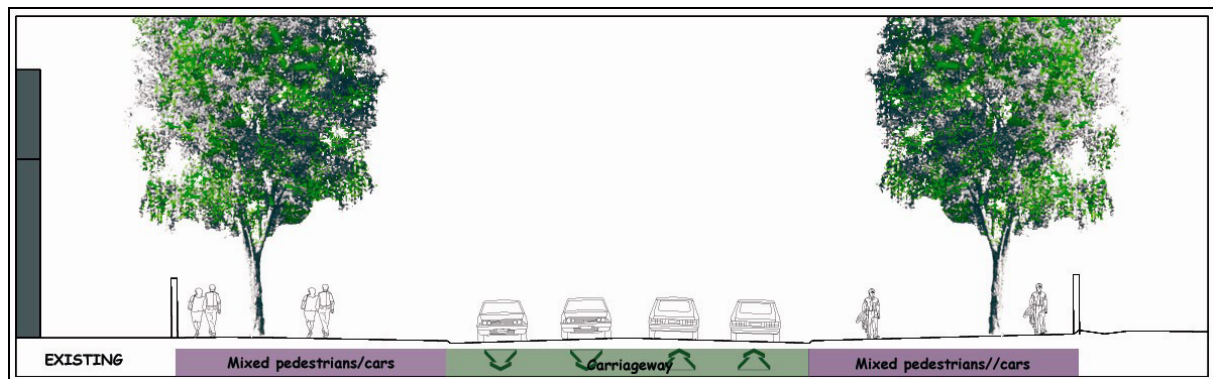


Figure 4 – Diagram of existing layout (second case)

Proposal (Figure 5):

- Pavement at least 3 m wide,
- Two-lane carriageway, with a longitudinal parking strip that becomes a traffic lane at junctions, to allow vehicles to turn left.
- Tramway platform with a planted surface (because of the less dense urban context, and which integrates better into a landscaped development),
- Area of traffic calming, including a frontage road with a 30 km/hour speed limit, a longitudinal parking strip, a pavement and provision for bicycles. Bicycle traffic is shared between (a) traffic in the direction of the frontage road and (b) contraflow traffic on a bicycle lane. There are also two lines of trees.

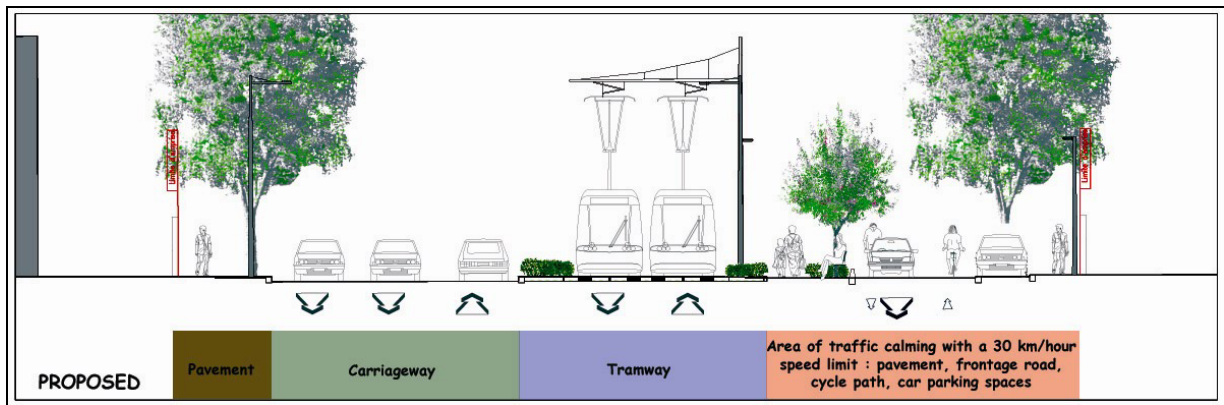


Figure 5 – Proposal for second case

2.2.2 Consideration of the various Environmental Quality criteria concerning the provisions for non-motorised travel in the project.

2.2.2.1 Encourage people to walk

Principles to be complied with:

- Create high quality routes that are pleasant, comfortable, safe, suitable for people with reduced mobility, and continuous
- Create green corridors.

Corresponding improvements:

- Comfortable pavement widths (at least 1.40 m, but generally more than 3.00 m),
- Width of traffic islands: 2 m (Figure 6),
- Continuous routes along buildings (Figure 6),
- Connections between continuous routes and adjacent routes (transverse streets/roads), crossings across main roads at junctions (Figure 6).

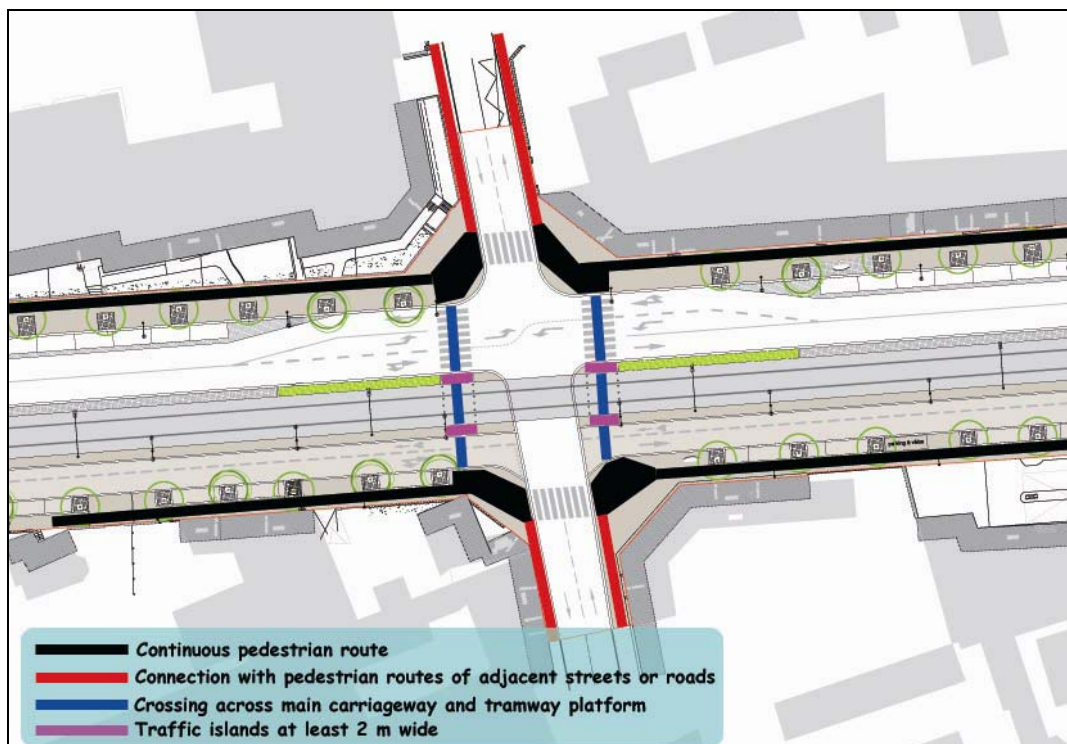


Figure 6 – Schematic diagram of pedestrian circulation at a junction

- Provision of facilities to allow continuous access by people with reduced mobility along the entire line, with the kerb height limited to 2 cm above road level¹, visibility of routes given high importance, including the use of tactile paving slabs for the blind and visually impaired and safe pedestrian crossings on the main street provided by traffic lights.
- Creation of social areas by providing squares and urban parks at strategic points along the length of the project, which can act as landmarks (Figures 7 & 8).

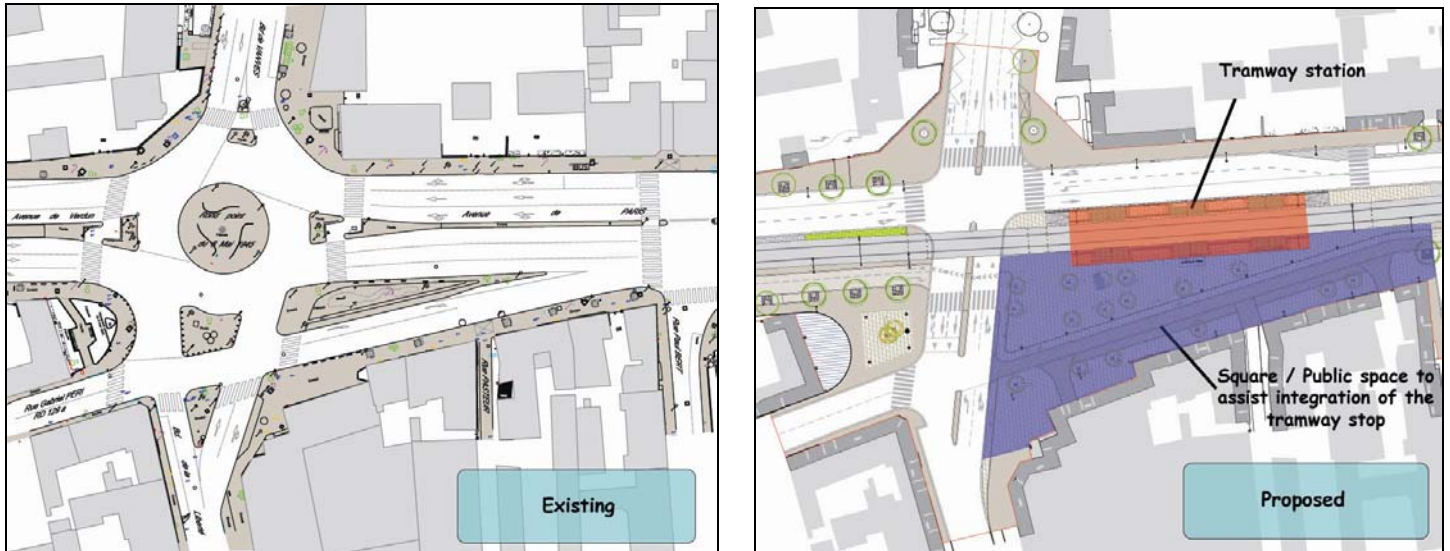


Figure 7 – Example of creation of an urban space



Figure 8 – Location of urban spaces created along the route of the tramway

- Uniform lighting along the length of the project, without poorly lit areas that create insecurity.
- Widespread application of the 30 km/hour area in frontage roads to provide an area of traffic calming where bicycles, pedestrians and cars can mix, creating a certain degree of safety for users.

- Conservation of as many existing lines of trees as possible and creation of additional lines of trees, to contribute to the project's landscaped atmosphere by punctuating these tree-lined areas along the whole route (Figures 9, 10 & 11).



Figure 9 – Existing landscaping

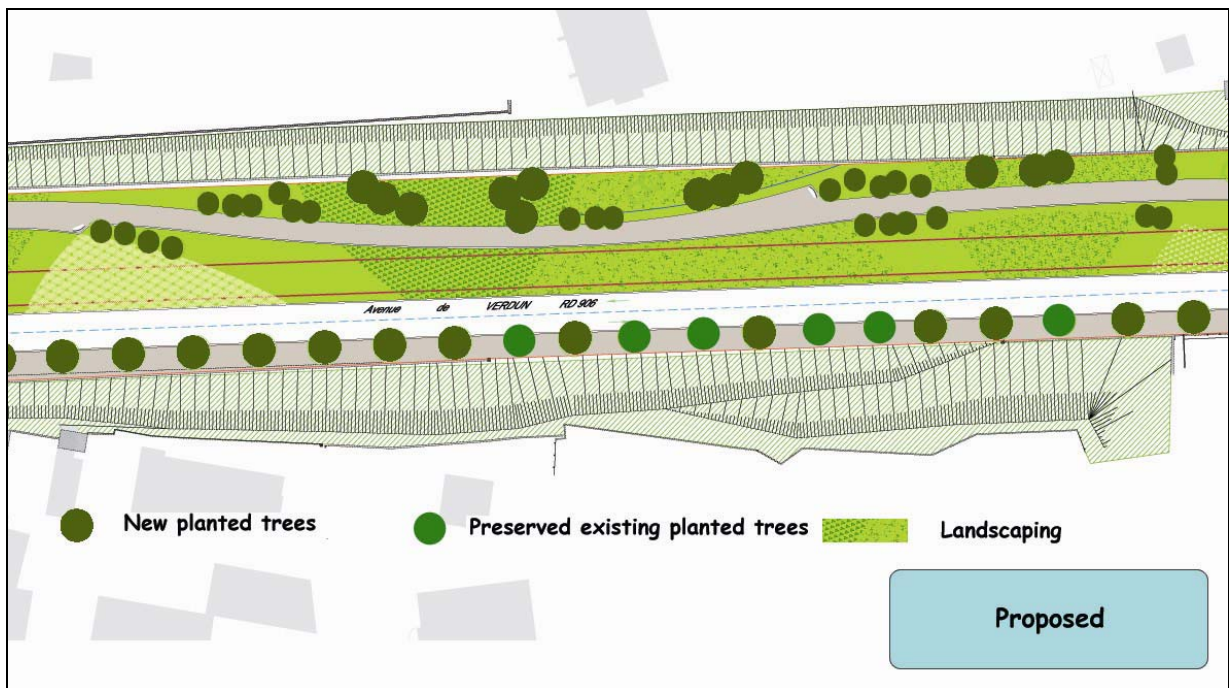


Figure 10 – Proposed landscaping



Figure 11 – Perspective view of the proposed development

2.2.2.2 Encourage use of the bicycle

Principles to be complied with:

- Create continuous cycle routes,
- Make junctions safe,
- Facilitate parking of bicycles.

Corresponding improvements:

- Continuous cycle routes: Based on (a) the principle of inclusion in a frontage road (shared with other traffic in the same direction, and in a bicycle lane for contraflow traffic), (b) a two-way cycle track on the pavement, or (c) a mixed pedestrian/bicycle area, when external constraints do not allow us to create a two-way cycle track and a comfortable pavement (Figure 12).

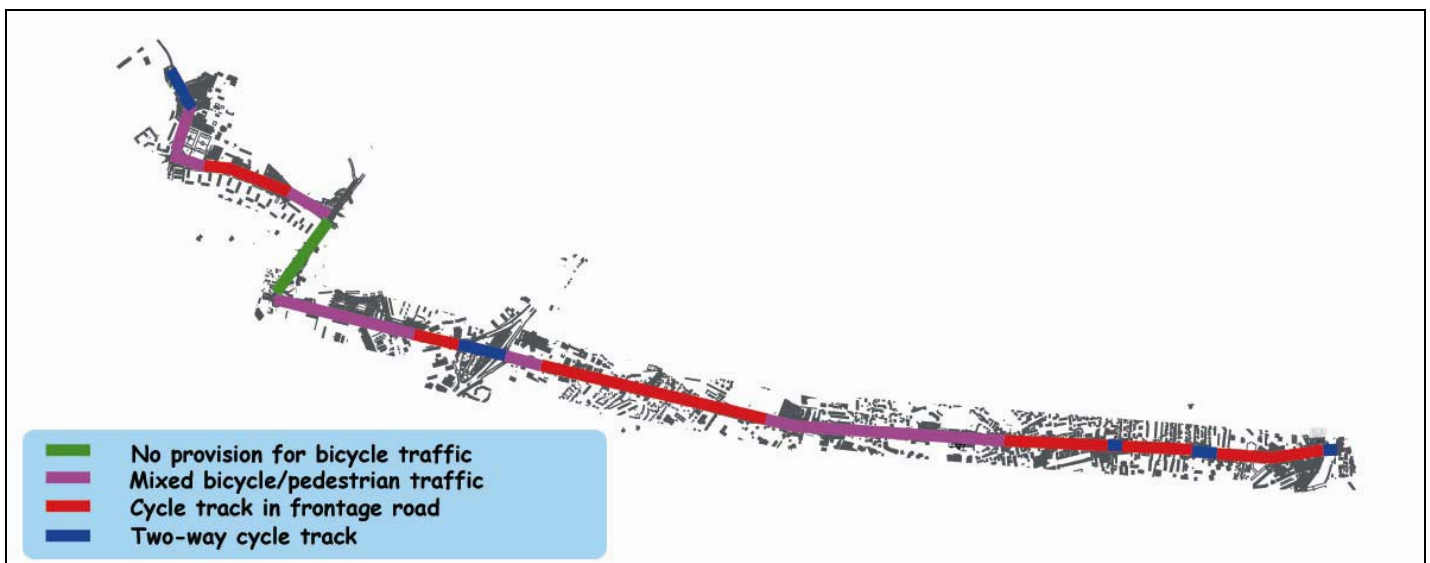


Figure 12 – Diagram showing different types of cycle facilities along the tramway route

- At junctions, cyclists cross at the same time as pedestrians, and a number of bicycle slip lanes are created to allow cyclists to turn left.
- Concerning parking areas, final parking places have not yet been determined at the current stage of the project's design. It is envisaged to position them mainly at tramway stops, social meeting areas and other public amenities.

2.2.2.3 Make the public transport system more attractive

Principles to be complied with:

- Create waiting platforms of high quality that are pleasant, comfortable and safe.
- Create a quality of service which is both attractive and competitive.
- Reorganise the public transport system and facilitate intermodal transport (switching between different means of transport).
- Facilitate the access of users to the different forms of transport available.

Corresponding improvements:

- Comfortable width of waiting platforms, at least 3m, with certain platforms designed as "pavement waiting platforms". (Figure 13).
- Visibility of stations, with street furniture positioned to obtain comfortable widths of pedestrian routes (Figure 13).
- Access to waiting platforms at stops via ramps at each end of the platforms: if the layout is restricted, the waiting platforms must be still accessible by people with reduced mobility via ramps on at least one side of each station (Figure 13).

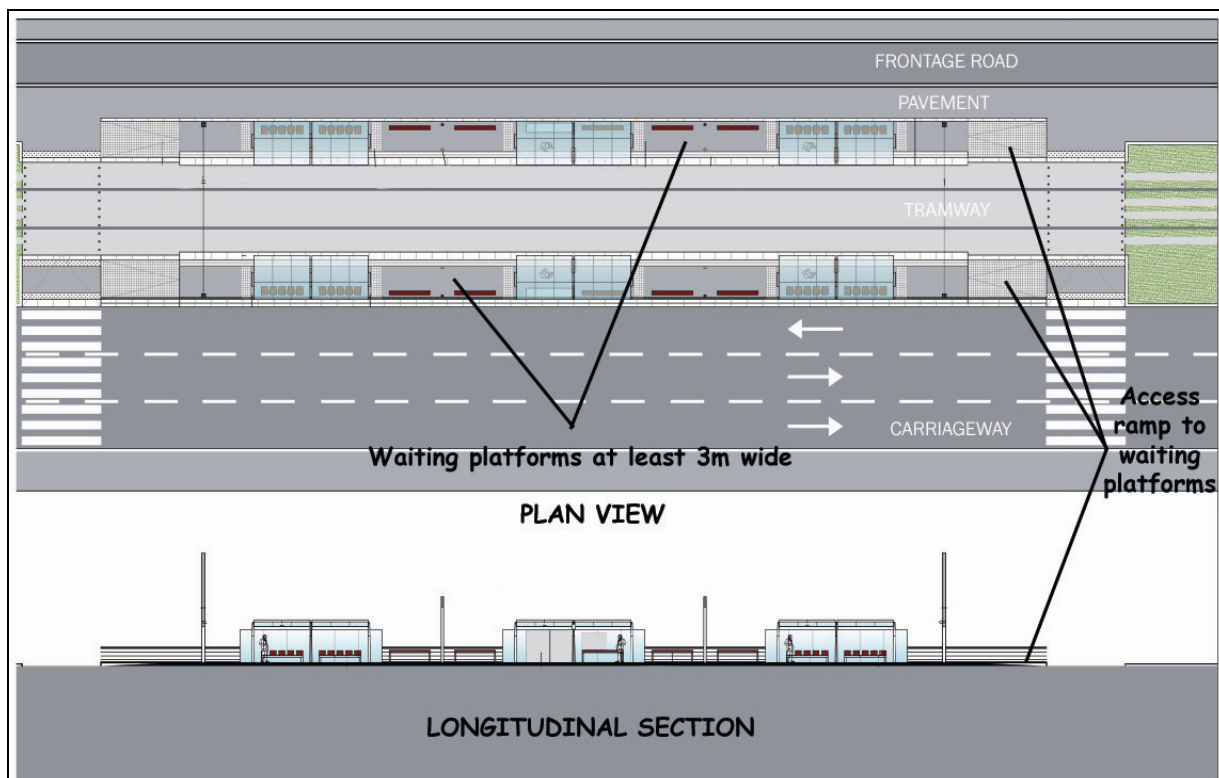


Figure 13 – Plan view and longitudinal section of a typical tramway station

2.2.2.4 How can we improve non-motorised means of transport in this type of project?:

- Promote non-motorised means of transport and provide signage for routes:
Facilitating orientation by appropriate signage of routes (for both pedestrians and cyclists), providing information using special maps and organising events focusing on non-motorised means of transport can all facilitate and foster the use of pedestrian and cycle routes.

Conclusion

A new approach to public space is being developed. The planning developments and facilities created exclusively for the motor car over the past half-century reached their peak at the end of the twentieth century. The congestion of city centres and outer city areas was inevitable. The place of the pedestrian and the cyclist was reduced greatly; however there were still specific developments for these means of transport. In the 1990s, planners became aware of this issue, and they aimed to reverse the trend and give the city back to pedestrians and cyclists.

This “revolution” requires the limitation of car traffic in order to favour public transport and non-motorised means of transport.

Developments that favour non-motorised means of transport are now an integral part of the approach to major urban planning projects such as the creation of an urban tramway.

REFERENCES

1. Setec TPI – Reichen et Robert et Associés (2006). Preliminary design for integration of the Châtillon – Vélizy T8 tramway