West Yorkshire Mass Transit: Design Philosophy

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West Yorkshire Combined Authority

West Yorkshire Mass Transit Design Development Partner
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Contents

Executive summary

West Yorkshire Combined Authority (the Combined Authority) has produced an in-depth Transport Strategy which sets out its bold vision for a world-class, integrated transport system. The key objectives of the 2040 strategy are based on enhancing the region's Economy, Environment, and People & Places. The strategy aims to connect people to jobs, brings businesses closer together, gets goods to local, national and global markets, provides opportunities for education, training and investment, and reduces social exclusion so that everyone benefits from economic growth.

The Mass Transit system is about moving people effectively across the poly-centric West Yorkshire region, and thereby supporting the delivery of the Strategy vision.

The Transport Strategy is set alongside a wider context, notably, the target to deliver a net zero carbon economy for the Leeds City Region by 2038. The Mass Transit system will support aspirations to make West Yorkshire greener, more inclusive and better connected. The system itself should be delivered in such a way as to maximise the benefits while minimising the risks both from a carbon and wider sustainability perspective.

This Design Philosophy sets out how the Mass Transit strategy and vision will be delivered by providing the framework for the development of designs for a bold and ambitious Mass Transit system. It defines an approach that requires designers to consider a priority order for the transport network, utilising Mass Transit as a facilitator for transformational change, ensuring that walking, cycling and the value of place are given priority over the needs of the car.

This Design Philosophy is underpinned by the other Mass Transit system strategies. This includes the Approach to Placemaking which prioritises place and the people who use those places, making sure that Equalities needs are considered from the outset, that the Sustainability and Carbon Strategy are at the forefront of decision making and that opportunities for Green Infrastructure in its widest sense are sought out and embedded into the design.

This Design Philosophy sets out how the benefits of a Mass Transit system can be maximised when the system provides a fast, efficient, reliable, and preferred alternative to the private motor vehicle. It briefly sets out what such a system could look like in its broadest sense and explains some of the system terminology.

The document then outlines some of the design challenges and issues which need to be considered in order to deliver an effective region wide Mass Transit system. These difficult decisions will relate to how, where and what type of system corridor is needed so it is segregated from general traffic, and how that could be achieved within the different places that the system passes through.

1. Introduction

1.1 Context

The West Yorkshire Transport Strategy 2040 sets out a bold vision for a world-class, integrated transport system which is vital to West Yorkshire's role as a competitive, inclusive economy. It aims to connect people to jobs, bring businesses closer together, get goods to local, national and global markets, provide opportunities for education, training and investment, and reduce social exclusion so that everyone benefits from economic growth.

The Transport Strategy 2040 sets out ambitions for a transport system that serves the needs of businesses and residents as well as enhancing prosperity, health and wellbeing for people and places across West Yorkshire. It also considers the necessity to provide 21st Century infrastructure that will support the City Region to grow and compete globally, so it is able to meet the ambitions of the Leeds City Region Strategic Economic Plan and the Government's emerging Industrial Strategy.

The Strategy is focused on West Yorkshire and recognises the importance and impact of links with the wider Leeds City Region. The Transport Strategy 2040 vision is:

> *To enhance business success and people's lives by providing modern, world-class, well-connected transport that makes travel around West Yorkshire easy and reliable.*

The key objectives that the strategy sets out to realise this vision are:

- **Economy:** Create a more reliable, less congested, better connected transport network
- **Environment:** Have a positive impact on our built and natural environment
- **People and place:** Put people first to create a strong sense of place.

The Strategy aims to reduce traffic emissions to near zero, tackle the damaging impacts of climate change on homes and businesses and reduce road accidents, aspiring to 'zero tolerance' of transport-related deaths with a desire to be known as a great, safe place for cycling and walking.

An ambition to create a 'world class public transport' system is outlined in *The Transport Strategy*, with the delivery of a Mass Transit strategy for the City Region outlined as a key action. *The West Yorkshire Mass Transit Vision 2040* details the Combined Authority's bold ambition to build a modern, world-class public transport system, using new forms of advanced Mass Transit. Key objectives include:

- Connecting West Yorkshire's important places;
- Supporting economic recovery;
- Improving health and wellbeing;
- Supporting levelling up to help rebalance the economy;
- Helping to combat climate change and provide climate resilient infrastructure.

The Mass Transit Vision identifies four design principles which should form the basis of Mass Transit proposals in the West Yorkshire region:

- People first;
- Environmental responsibility;
- Better connected;
- Celebrating West Yorkshire.

1.2 Design Philosophy

This Design Philosophy document sets out the framework for the development of designs for a bold and ambitious Mass Transit system for West Yorkshire which delivers against the aims and objectives of *the West Yorkshire Transport Strategy 2040 and West Yorkshire Mass Transit Vision.*

This document defines a design approach which requires designers to consider a priority order for the transport network which places walking and cycling first and equal to a Mass Transit system. In doing so, the needs of the car no longer take priority over the needs of other transport users or the value of place.

The Design Philosophy does not provide technical guidance and standards which are contained in the associated West Yorkshire *Mass Transit Design Guide.*

1.3 Approach to the Environment, People and Place

This document should be read in conjunction with the following documents which provide further guidance to designers.

They are fundamental to the *Design Philosophy*, should be considered from the outset as an integrated part of the design process and should be considered as essential for the delivery of the Mass Transit Vision objectives. A short summary of the design principles of each is set out below in Figure 1.

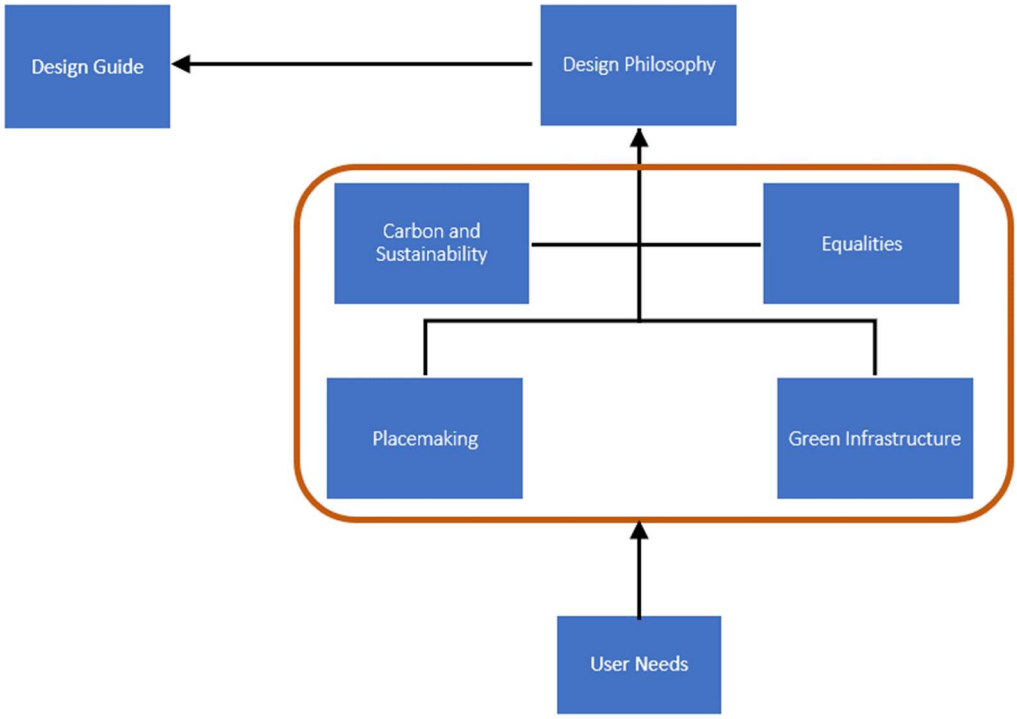

Figure 1. Approach to the Environment, People and Place

- *The Approach to Placemaking:*

Understanding the places that the Mass Transit system connects and passes through is central to the transport system and it must enhance or transform places, not impose Mass Transit infrastructure upon them. West Yorkshire is defined by a range of distinct places and a sound understanding of these characteristics is needed so the MT systems design responds to context and avoids ubiquitous design solutions. Understanding the people, including their social and cultural values, who use the places which the Mass Transit connects and passes through is essential for delivering places that are accessible, active, comfortable and sociable. The essential principles that designers need to consider in delivering good places are centred around health and wellbeing, connectivity, place identity and resilience.

- Equalities needs:

The Combined Authority have a public sector equality duty to have due regard to eliminate unlawful discrimination, advance equality of opportunity between people, and foster good relations between those who share a protected characteristic and those who do not. Our approach to design follows best practice, aligning to the RIBA Stage 2 design. The aim is to ensure that the Combined Authority has demonstrable due regard for the duties from the outset of design options. The aim is to achieve positive outcomes for the protected characteristic groups.

- Sustainability and Carbon Strategy:

The Leeds City Region has a target to achieve a net zero carbon economy by 2038. The Mass Transit Sustainability and Decarbonisation Strategy supports this vision by ensuring the Mass Transit system itself will be delivered in such a way as to maximise the benefits and minimise the risks both from a carbon and wider sustainability perspective.

Designers need to work towards delivering the stated sustainability outcomes, derived from existing policy and the United Nations Sustainable Development Goals: Climate Resilience, Biodiversity and Natural Capital, Inclusive Growth, Health and Wellbeing, Pollution, Waste and Resources, Energy and Carbon.

The Mass Transit Vision states that the system will be net zero during operation and maintenance and should work towards net zero during construction. These are ambitious targets and represent an opportunity for designers to drive low carbon innovation in the construction industry. Carbon will need to be considered by the designers at the 'first principles' stage of the System and be fundamental to all design decisions.

- Green Infrastructure

Green Infrastructure is the use of naturally regulating systems to create a robust and sustainable development and is a way of bringing together many of the outcomes that are required for environment, people and place. The three naturally regulating systems of biodiversity, water, and soils need to be allowed to naturally function and self-regulate, so that the many benefits can be delivered.

Designers must address two principles to create good green infrastructure: connectivity and multifunctionality, and these need to be considered from the beginning of the design process, to achieve the benefits of green infrastructure.

1.4 Relevant Standards and Guidance

The *Design Philosophy* draws on existing standards, guidance and best practice documents relating to the design of urban streets, traffic signs, pavements, public realm etc. A non-exhaustive list of these national and local guidelines is outlined in Section 1.3 of the *West Yorkshire Mass Transit Design Guide.*

This is a design document to assist the design of typical corridor scenarios and layouts. Whilst all corridors will have individual challenges, this document does not purport to address all scenarios. Any constraints in cross section will require a case-by-case approach to design.

2. Why Mass Transit?

2.1 Local Transport Challenges

The aim of the West Yorkshire Mass Transit programme is to transform travel in the region with a series of new interconnected transportation networks between population centres and commercial districts. This is fundamental to addressing current issues with movement and congestion, which are projected to exaggerate with forecasted population growth.

The current levels of motor traffic on the roads in the West Yorkshire region and the impacts of this traffic are a concern for the health of the local economy and of communities. Furthermore, increasing demand for travel is likely to be characterised by longer distances and more dispersed commuting and business trips.

The shift to electric cars, although a positive step forward from the perspective of zero carbon emissions and particulate pollution at point of use, there is still a constraint of road space accommodating the volume of private vehicles.

The *West Yorkshire Transport Strategy 2040* highlights a number of challenges which must be overcome to deliver a successful regional transport system. They are:

Transport Capacity & Performance

- Strategic transport connections to the UK's major cities are aging and face increasing demands for travel;
- Traffic congestion on motorway corridors, junctions and routes into the urban centres is impacting on business costs and the accessibility of labour markets;
- Bus journeys are being slowed down and their reliability impacted by road congestion and long dwell times from on-bus payments;
- There is severe crowding on trains in the busiest periods, with services to and from Leeds having some of the worst crowding nationally;
- Car parking at rail stations is insufficient and there are limited bus park and ride options into centres;
- Poor access to key development sites and gateways, including Leeds Bradford Airport, is holding back job creation and house building;
- Poor walking and cycling infrastructure is providing little protection from motorised traffic and is discontinued at difficult places where it is needed the most.

Environmental

- Climate change: there is a slower rate of carbon reduction in the transport sector than in other sectors;
- Poor air quality: the negative impacts of harmful pollutants produced by traffic is linked with a range of illnesses and premature deaths;
- Noise pollution: Exposure to harmful noise levels from road, rail and air transport, can cause mental health problems, poor performance at school and at work, and an increased risk of heart disease.

People & Place

- Over-reliance on car use is contributing to a rise in obesity, diabetes and coronary heart disease;
- Safety on the roads, in particular concerns for those walking, cycling and motorcycling;
- Heavy traffic flows create barriers to communities and the movement of young, elderly, frail and disabled people;

- Some roads are in poor condition with public dissatisfaction with defective roads and footpaths;
- A limited choice of travel options is restricting people's opportunities;
- Car dominance in town and city centres is impacting on the attractiveness of places.

The *West Yorkshire Transport Strategy 2040* concludes with a series of ambitions relating to Inclusive Growth, Environment, Health and Wellbeing; Road Network; Places to live and work; One System Public Transport; Smart futures; and Asset management and resilience.

These ambitions are supported by the Transport Strategy vision and objectives.

"We will enhance business success and people's lives by providing modern, world-class, well-connected transport that makes travel around West Yorkshire easy and reliable. We want a transport system that supports inclusive growth, serving the needs of businesses and people, and enhancing prosperity, health and wellbeing for people and places across West Yorkshire. This Transport Strategy provides the policy framework for the planning and delivery of improved transport infrastructure and services in West Yorkshire, to influence investment decisions to help deliver our vision and objectives".

2.2 Key Principles

A Mass Transit system is well positioned to transform journeys by moving large numbers of transport users between their origins and destinations. It can assist in the regeneration of the corridors and communities that it serves, whilst reducing private motor vehicle traffic and the associated environmental impacts. Successful implementation has the potential to meet the key objectives presented in the *West Yorkshire Mass Transit Vision document.*

For the greatest impact, a Mass Transit system must provide a **fast, efficient, reliable, and a lower cost-alternative** for users to the private motor vehicle. These four metrics are vital to ensure a significant modal shift, which in turn will result in a more efficient use of highway space.

The technology choice for each of the corridors is yet to be determined; and could be in the form of light rail, tram, tram-train or bus rapid transit or indeed future systems. Regardless of the technology selected, segregation is the core consideration when creating a fast, efficient, and reliable Mass Transit system.

Segregation can be achieved in two ways:

- **Full segregation –** this method will place Mass Transit into a dedicated corridor, away from the highway, where the conflict with other users will be reduced, allowing the Mass Transit to achieve full operational speeds.
- **Partial segregation –** this method will allocate dedicated space within the highway cross section, although operation will be unhindered by traffic congestion, operational speeds will be lower to reflect the potential interactions with other users (i.e. at junctions).

Where full segregation is difficult to achieve within the urban fabric of West Yorkshire, decisions will need to be made to create new space or reallocate the available space required to achieve Mass Transit system segregation. There may be instances where 'shared use' corridors with the Mass Transit system and other vehicles are necessary to maintain access or connectivity, but these should be the exception where all other alternatives have been considered. Where shared use corridors are proposed, measures including Traffic Regulation Orders will be implemented to give priority to Mass Transit vehicles wherever possible.

In many instances, existing highways will need to be utilised to host the Mass Transit system, and to achieve segregation it may be necessary to reallocate highway space, for example by the removal of on-street parking, restricting general traffic flow or entirely removing general traffic. The Mass Transit system will take priority in these scenarios, with the remaining users prioritised according to a Strategic Highway and User Hierarchy set out below.

- The Strategic Highway Hierarchy will be applied first to determine where space within the existing highway can be reallocated by firstly restricting general traffic.
- The User Hierarchy can secondly be applied to accommodate the required users within a corridor and maximise the use of the available cross-section width.

2.3 Strategic Highway Hierarchy

The local strategic highway network can be broken into four main tiers: Strategic Local Highway, Major and Minor Distributors, and Local Access Roads, each with their own characterises and purpose:

- **Strategic Local Highway Roads** – Principal A Roads, single and dual carriageway's that are designed to carry high volumes of motor vehicles as quickly, safely and efficiently as possible between large primary destinations that are used by local and some regional traffic.
- **Major Distributor Roads** - A Roads and some B Roads between major urban areas primarily used by local traffic. Some distributor roads may also incorporate primary bus routes with some frontage access and frequent junctions.
- **Minor Distributor Roads** - Roads linking between the main and secondary distributor network with frontage access and frequent junctions.
- **Local Access Roads** - Roads serving limited numbers of properties carrying only access traffic.

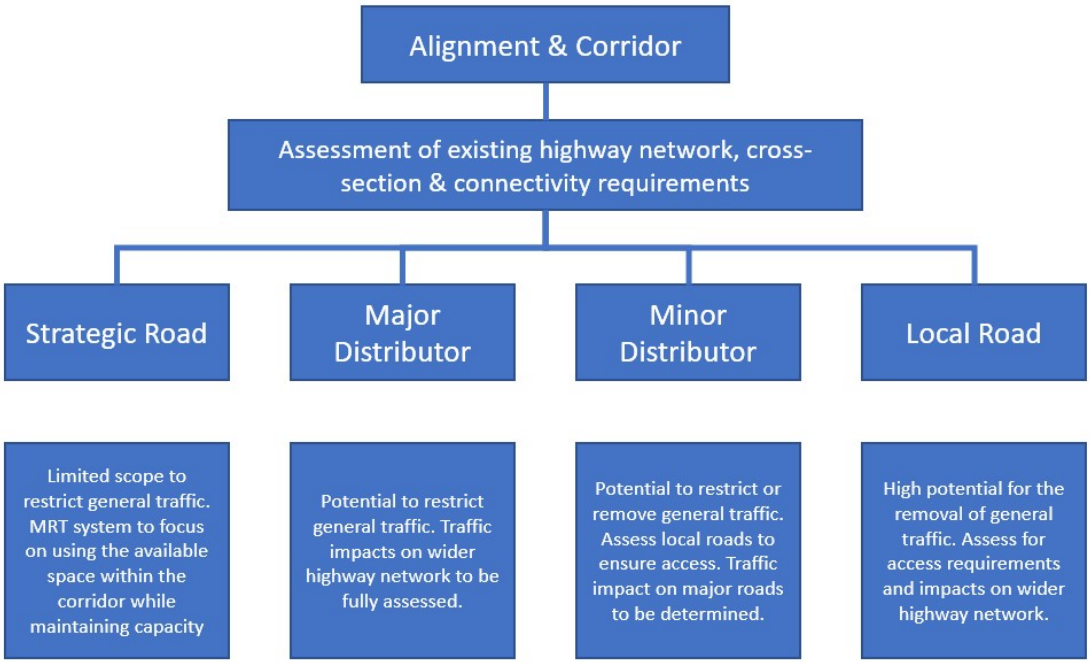

Figure 2-1. Strategic Highway Network Hierarchy

For these roads to accommodate a Mass Transit system, the designer must look at the characteristics of each of these roads and select the most appropriate typical Mass Transit cross-section and apply the *Design Philosophy* accordingly. Figure 2-1 demonstrates some the challenges and opportunities that will need to be made associated with each of the four tiers of the highway network.

2.4 User Hierarchy

A user hierarchy will be considered focussing on both the strategic movement of people en masse and the movement of people within a local area

2.4.1 The strategic movement of people en masse

The aspiration of the Mass Transit programme is to make a contribution to transformational change to travel patterns. As part of this there would be a movement towards more sustainable travel patterns and safer streets, with private motor vehicles being used far less frequently than at present because they are less convenient and flexible than other transport choices. This will require that Mass Transit is prioritised over other modes in some situations to ensure delivery of a system which can function effectively.

2.4.2 The movement of people within a local area

The design team will place the needs of those who are walking (and wheeling) and cycling first within a local area. By placing these needs above private motor vehicles it should not be interpreted as an anti-car stance, however, if the car remains a convenient, flexible, and comfortable choice, a proposed Mass Transit scheme will not achieve the modal shift required for transformational change.

Consideration will be given to people that are reliant on cars, for many users it is currently their only viable option for medium to longer distance journeys, or for journeys with multiple destinations not served by public transport networks. There are also practical considerations, such as the requirement to allow vehicular access to private property. Nevertheless, the needs of the private car should no longer take priority over the needs of other users or the value of place.

3. System Terminology

A Mass Transit system is a public transport system which is used for transporting large numbers of passengers between their origins and destinations.

This *Design Philosophy* has been written at an early conceptual stage of the project prior to the definition of a Mass Transit technology. The design process will allow for a corridor which is suitable for any one of the typical Mass Transit technology choices that are currently available, such as very light rail, light rail, tram, tram-train, or bus rapid transit, which will be defined at a later stage in the project. Regardless of the technology selected, the key to a successful Mass Transit system is an exclusive right of way, or segregation, which creates a fast, efficient, and reliable public transport system.

The images and descriptions below focus on light rail and tram systems. These are used to illustrate a range of issues only and do not reflect a preferred technology method.

3.1 Segregated Mass Transit Corridor

A segregated Mass Transit corridor is set aside for the exclusive use of Mass Transit vehicles. This provides a high-capacity and reliable service with the potential for higher line speed in less built-up urban areas. Where corridor width allows the introduction of bus laybys, a shared use Public Transport corridor can be implemented.

Where vehicular access is not required, the segregated Mass Transit corridor could accommodate a soft landscaping solution such as urban street trees, grass, and low-level planting as shown in Figure 3-1 below, which could also form part of a multifunctional green infrastructure solution. The advantage of soft landscape over a hard landscape is that the planting can absorb surface water run-off reducing the need for traditional drainage methods, trees can provide shade which lowers the average street temperature during more common extreme heat events and help to reduce the noise reflection of Mass Transit vehicles running on rails. Pedestrians can cross the grass anywhere they choose but the paved crossings stand out clearly, without the need for signs. Similarly, it's clear that cars and bikes are not meant to run on the grass, though emergency vehicles can do so if necessary (NACTO).

Figure 3-1. Mass Transit corridor with soft landscape (Bordeaux, France)

3.2 Segregated on Road Mass Transit Corridor

Figure 3-2 shows how a segregated-on road Mass Transit corridor is set aside for the exclusive use of Mass Transit vehicles and works in the same way as a bus lane which is separated from adjacent traffic with a solid white line on the carriageway. The segregated, on-road Mass Transit corridor restricts other modes of transport as per the Traffic Regulation Order (TRO). The TRO would be signed accordingly with road markings and signs that indicate which (if any) other vehicles are permitted to use the lane, such as buses, taxis, and motorcycles.

As with existing bus lanes in urban areas, there is the potential that other motor vehicles could abuse the segregated-on road Mass Transit corridor with illegal loading/unloading and delay any approaching Mass Transit vehicles. It is worth noting that buses can drive around any illegal loading/unloading with minimal delay, however, any track-based Mass Transit vehicle does not have this ability and would be delayed until the obstruction is removed. As a deterrent, enforcement systems could be considered to monitor vehicles illegally making use of the segregated-on road Mass Transit corridor.

Figure 3-2. Segregated on road Mass Transit corridor (Poznan, Poland)

3.3 Time Restricted Mass Transit Corridor

Figure 3-3 illustrates how time a restricted Mass Transit corridor (i.e. Public Transport Only corridor) works in the same way as a segregated-on road Mass Transit corridor with a timed restriction which restricts all other vehicles except public transport vehicles for a whole section of the corridor.

This type of corridor is typically used at busy commercial or neighbourhood corridors whilst allowing restricted vehicular access and deliveries at specific hours. As an example, Princess Street in Edinburgh is restricted to all vehicles except trams, buses, taxis, and cycles, with access for loading between the hours of 8pm and 7am.

Figure 3-3. Mass Transit corridor in shared corridor (Innsbruck, Austria)

3.4 Shared Use Mass Transit Corridor

Figure 3-4 shows a situation where a Mass Transit vehicle is delayed by congestion when there is no segregation from general through traffic.

In this situation, the Mass Transit system has the lowest transformative impact as all journey times are subject to other road users and will not meet the core objectives of fast, efficient, reliable, and cost-effective alternative to the private motor vehicle. These four metrics are vital to ensure a significant modal shift is achieved.

Mass Transit vehicles in shared running with general traffic should be used as a last resort when all other options have been exhausted, even for short sections.

Figure 3-4. Mass Transit corridor shared use corridor (yarratrams.com.au)

3.5 Traffic Signal Junctions

Where Mass Transit integrates with highway, traffic signal-controlled junctions will help to ensure the resilience and reliability by providing the greatest practicable level of priority. Phasing at junctions will be aligned to Mass Transit operation to ensure a flowing network and consistent journey times.

To provide pedestrian priority at traffic signal junctions, in densely populated areas, traffic signal timings will favour pedestrians over general traffic thus reducing pedestrian waiting times. The number of controlled crossing points will also where possible be reduced which simplifies the design of the junction and again will favour pedestrians above general traffic.

To achieve this objective, where possible, the layout of the junction will allow pedestrians to cross the street in a single, direct movement. Staggered/staged crossings will only be used in limited circumstances.

Cyclists can be fully segregated from pedestrians and all motor traffic, with an example from Manchester shown in Figure 3-5 below. This level of Mass Transit walking and cycling segregation at traffic signal junctions will become standard in order to provide the correct level of protection which is a requirement of Local Transport Note (LTN) 1/20 'Cycle Infrastructure Design'.

Figure 3-5. CYCLOPS traffic signal junction incorporating a mass transit corridor – Manchester

3.6 Cycle Lanes and Cycle Tracks

In the UK cities where Mass Transit has been reintroduced, cycling design guidance was limited and some schemes are now deemed not to have sufficiently considered the safety needs of cyclists during the design process. This is due to Mass Transit track (if used) becoming very slippery when wet and along with cycle wheels easily getting caught in the 'groove', which can cause cyclists to fall, causing injury.

Segregated facilities for cyclists shall be considered within Mass Transit corridors wherever width constraints allow. Any new facilities provided could be connected into the wider cycling network to provide safe and alternative routes for cyclists away from the Mass Transit corridor.

In situations where existing cycling facilities are being removed to enable sufficient width for Mass Transit and or providing segregated cycling facilities are not feasible due to width constraints, then cyclists can be encouraged onto parallel active travel routes using Quiet Streets or other existing cycling network where appropriate.

3.7 Quiet Streets

Where a segregated cycle facility is not feasible due to width constraint, a parallel route as close as possible should be investigated which prioritises cycling through adjacent Quiet Streets.

Quiet Streets provide an alternative parallel cycle route, a short distance from the main Mass Transit corridor. Such offline options should be lightly trafficked streets, with some on paths across parks and open spaces. Quiet Streets are low-intervention routes on road, with largely unsegregated cycling provision. The main interventions on most of the network will be direction signing, surfacing improvements, removing barriers such as chicanes and improving the flow of the route. There may need to be some removal of parking.

On busier local highway streets, additional segregated cycling infrastructure may be required to achieve the correct protection for cyclists, to comply with LTN 1/20.

3.8 Traffic Cells

In situations where the Mass Transit corridor runs through a dense residential area with frequent uncontrolled priority junctions which meet with the Mass Transit system, a rationalisation of motor vehicle access points to and from the Mass Transit corridor will be required to maintain a high level of safety, as every conflict point over the Mass Transit corridor increases the risk of collision and or delay.

One potential solution to discourage or remove through traffic from the Mass Transit corridor is the inclusion of a Traffic Cells. There are several ways to implement these, but the main principle is that access is still maintained for residents and businesses, but it is not possible, or significantly more onerous for traffic traversing through. With through-traffic removed, the streets see dramatic reductions in motor traffic levels and often speeds. While residents and businesses in a traffic cell can still complete all their journeys by car, some trips will be more circuitous. This, combined with far quieter, safer-feeling streets provides residents a greater level of amenity from their local streets and enables them to switch to more healthy ways of travelling, particularly for short journeys.

The implementation of traffic cells will cause varying degrees of inconvenience and displacement of traffic onto adjacent routes; therefore, the implementation of traffic cells will be carefully considered to ensure alternative routes are not unduly onerous, and wider network impacts are not disproportionate to the benefits.

3.9 Traffic Regulation Orders

Traffic Regulation Orders (TRO) are legal documents that restrict or prohibit the use of the highway network in certain situations, in line with The Road Traffic Regulation Act 1984. They assist Local Authorities to manage the highway network for all road users, including pedestrians and they aim to improve road safety and access to facilities. TROs will be implemented by the scheme to ensure the MT system is resilient and reliable, particularly in 'shared use' corridors where segregation is not feasible and priority.

A TRO can only be proposed for the reasons set out in the legislation and only if the regulations allow it to be signed and lined accordingly. Examples of TRO include:

- Speed limits;
- On-street parking restrictions;
- Weight limits;
- One-way streets and banned turns;
- Prohibition of Driving.

4. Indicative Typical Cross Sections

4.1 Typologies

The Approach to Placemaking sets out a number of generic typologies as corridors and nodes, each with distinct differences in their character and function. Each typology identifies the principles and differing spatial requirements to meet the social and cultural needs of the people within that typology.

Corridor Typology:

- Rural highway;
- Urban highway;
- Interurban highway

Node Typology:

- City & Town Centres;
- Local Centres

By grouping distinct places into specific typology types, analysis and design interventions can be focused on the actual needs of the end user of the streets and spaces, rather than the default engineering solution on how best to design for motor traffic.

The Approach to Placemaking sets out some of the essential and relevant place attributes for the various typologies. In addition, it identifies a range of the inherent landscape and townscape features which define the distinct characteristic of the places.

This assessment determines which user has priority in each of the individual typologies (highest priority at the top).

4.1.1 Corridors Typology

Rural Highway	Urban Highway	Interurban
Mass Transit	Mass Transit	Mass Transit
Segregated Cycle Track(s), or Shared Use Paths	Pedestrians	Segregated Cycle Track(s), or Shared Use Paths
General Through Traffic	Segregated Cycle Track(s)	General Through Traffic
Pedestrians	General Through Traffic	Pedestrians
Green Infrastructure	Green Infrastructure	Green Infrastructure

The **Rural Highway** corridors are typical standard roads that link up urban areas. They have little kerbside activity with long sections between junctions. These rural highway sections of corridor have traditionally ignored the needs of commuter cyclists, but there is a need for some form of segregated cycling facility as only confident cyclists will cycle on unrestricted high volume trafficked rural roads. With very low numbers of pedestrians, it may be possible in some situations to provide a shared use path for both pedestrians and cyclists (compared to dense urban areas).

Urban Highway corridors are the roads with traffic through built up areas with many competing demands in both residential and commercial areas. These links are often narrow and congested, with very high levels of kerbside activity, often with existing bus routes that are delayed due to heavy congestion.

Interurban Highway corridors are typical standard single or dual carriageway roads through urban areas. They have little kerbside activity with long sections between junctions, which may have a parallel access service road that serves residential frontages. These interurban sections of corridor have traditionally ignored the needs of pedestrian and cyclists alike, but there is a need for some form of segregated pedestrian and cycling facilities.

4.1.2 Node Typology

City Centres & Town Centres are traditionally the commercial high streets / office spaces etc. with very high pedestrians flows which are the centre for terminating public transport routes. They are rich in heritage and cultural centres, with varying architecture and materials with their own distinct characteristics.

The Local Centres are community focal points, they have independent local retail shops with frontages, medium pedestrian flows which are on public transport routes. They serve the important day to day needs of the community and can be associated with schools and other important local facilities.

All the nodes have their own key characterises which must be identified, protected and enhanced for a more liveable neighbourhood.

4.1.3 City Centre Worked Example

Figure 4-1 below is a typical cross-sectional design for a City Centre corridor with a segregated Mass Transit. At a local level, the needs of pedestrians are considered first; the footway widths are wide, with the expectation high footfall and active frontages. A segregated cycle track, along with public transport links (if required), public urban space, green infrastructure which can incorporate intermittent loading areas, with general through traffic last in the user list.

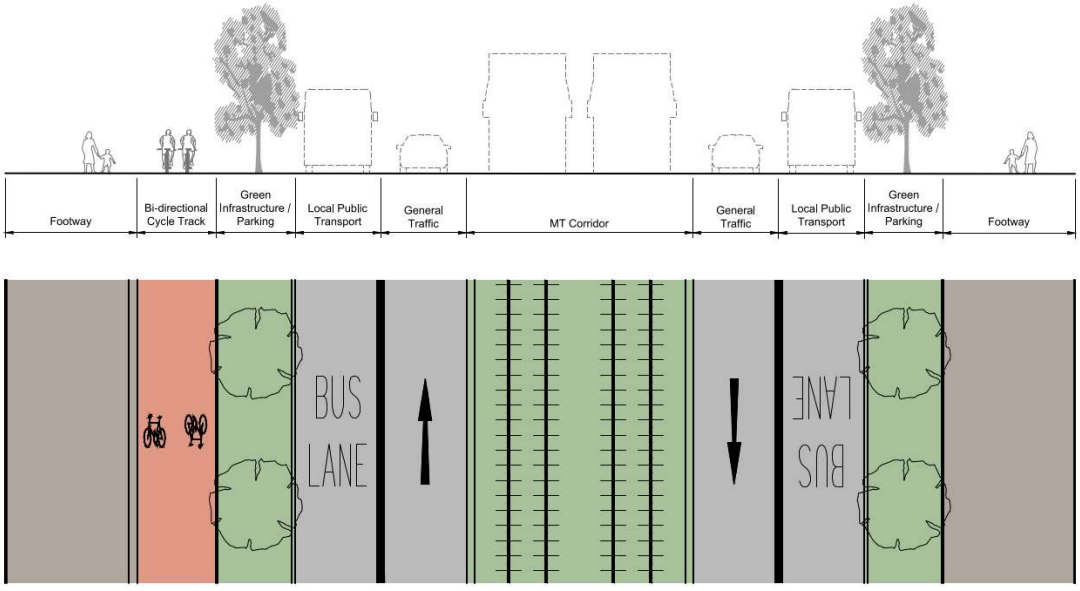

Figure 4-1. Typical city centre typology cross section

In many situations a wide corridor (to accommodate all the above) is not achievable and therefore the design solution will be dictated by the available effective width of the highway boundary.

Applying the principles of the user hierarchy, the corridor can be reduced by removing the general traffic lanes, which creates a new corridor as per Figure 4-2

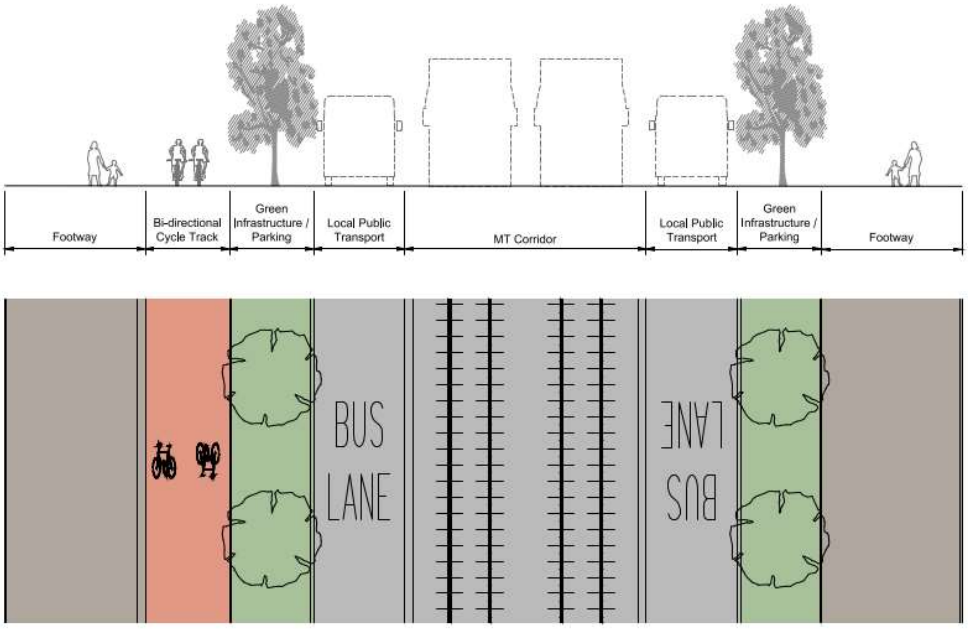

Figure 4-2. Typical city centre typology - reduced cross section

Further concessions can be made such as removing the segregated local public transport (either to be re-routed or share the same space as the Mass Transit vehicles) and placing them in the same space as Mass Transit to create a Public Transport Only corridor. Where space permits, the creation of intermittent parking / loading bays along with green infrastructure can be incorporated, as shown in Figure 4-3

Once a chosen cross section broadly fits with the available highway space, local pinch points can be designed out using the same principles of the user hierarchy.

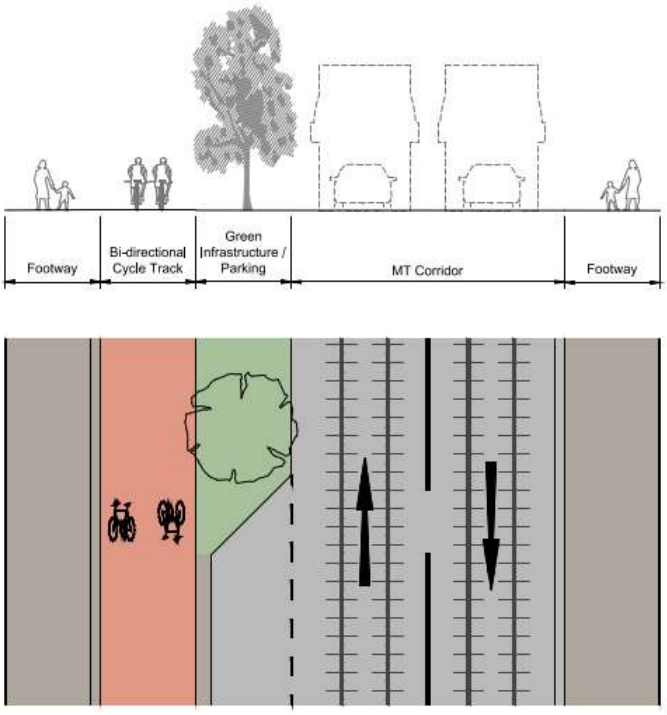

Figure 4-3. Typical city centre typology narrowed cross section

4.2 Example Mass Transit Corridors

4.2.1 Central Segregated Mass Transit Corridor

Figure 4-4 below is a typical cross-sectional design where a segregated Mass Transit corridor is integrated into existing highway. This situation is best suited to urban distributor roads where road space can be reallocated in favour of Mass Transit. As mentioned in Section 4.1.1, interurban sections of corridor have traditionally ignored the needs of pedestrian and cyclists alike, but this can be addressed with a segregated Active Travel corridor which can allow alternative transport mode into city / town centres.

The adjacent single trafficked lanes facilitate local access (albeit in a much-reduced capacity), however, in the event of a broken-down vehicle, traffic will be able to pass the blockage by using the hard paved segregated Mass Transit corridor adjacent before returning to the trafficked lane.

This layout provides a good level of spatial provision for pedestrians and cyclists as well as intermittent green infrastructure; parking / loading bays, where space permits.

In many situations a wide corridor (to accommodate all of the above) is not achievable and therefore the design solution will be dictated by the available effective width of the highway boundary.

Applying the principles of the user hierarchy, the corridor can be reduced by removing the Green Infrastructure / parking bays .

Further concessions can be made such as diverting the cycle track onto a parallel corridor noting that additional off-site measures will be required to meet the five core principles as set out in LTN 1/20 Cycle Infrastructure Design. Alternatively in densely populated areas where the needs of Active Travel are placed about General Traffic, a traffic lane could be removed instead thus creating a one-way road with bidirectional Mass Transit.

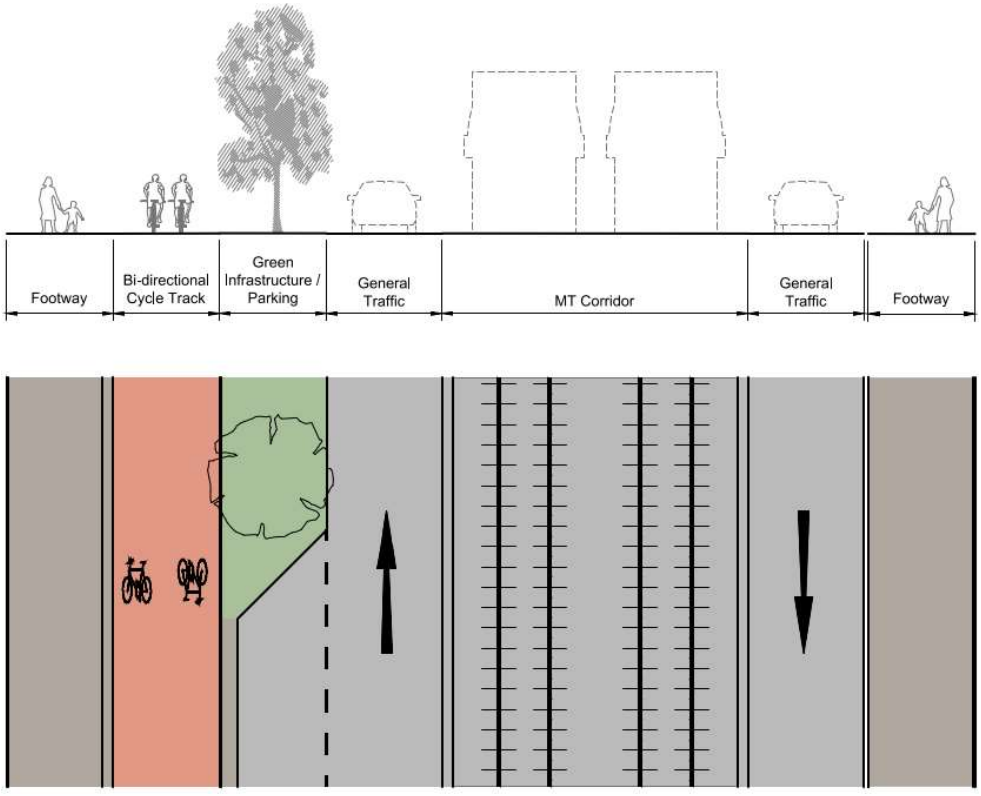

Figure 4-4. Central segregated Mass Transit corridor

4.2.2 Parallel Segregated Mass Transit Corridor

Figure 4-5 below is an alternative typical cross-sectional design where a segregated Mass Transit corridor is integrated into existing highway. This situation is best suited for dual carriageways where road space can be reallocated in favour of Mass Transit. As mentioned in Section 4.1.1, interurban sections of corridor have traditionally ignored the needs of pedestrian and cyclists alike, but this can be addressed with a segregated Active Travel corridor which can allow alternative transport mode into city / town centres.

One side of the dual carriageway can be assigned to Mass Transit, whilst the opposing side can be modified to a bi-directional, single carriageway road. The existing central median can therefore be removed to allow for intermittent green infrastructure; off street parking; loading bays; and pedestrian crossing points.

Careful consideration is required with regards to which side of the dual carriageway to allocate to Mass Transit, such as third-party accesses, uncontrolled side road junctions and traffic signal junctions.

Placement of the cycle track also requires careful thought, with regards to linking into the adjacent cycleway network and how to protect the cycle track from illegal parking / loading.

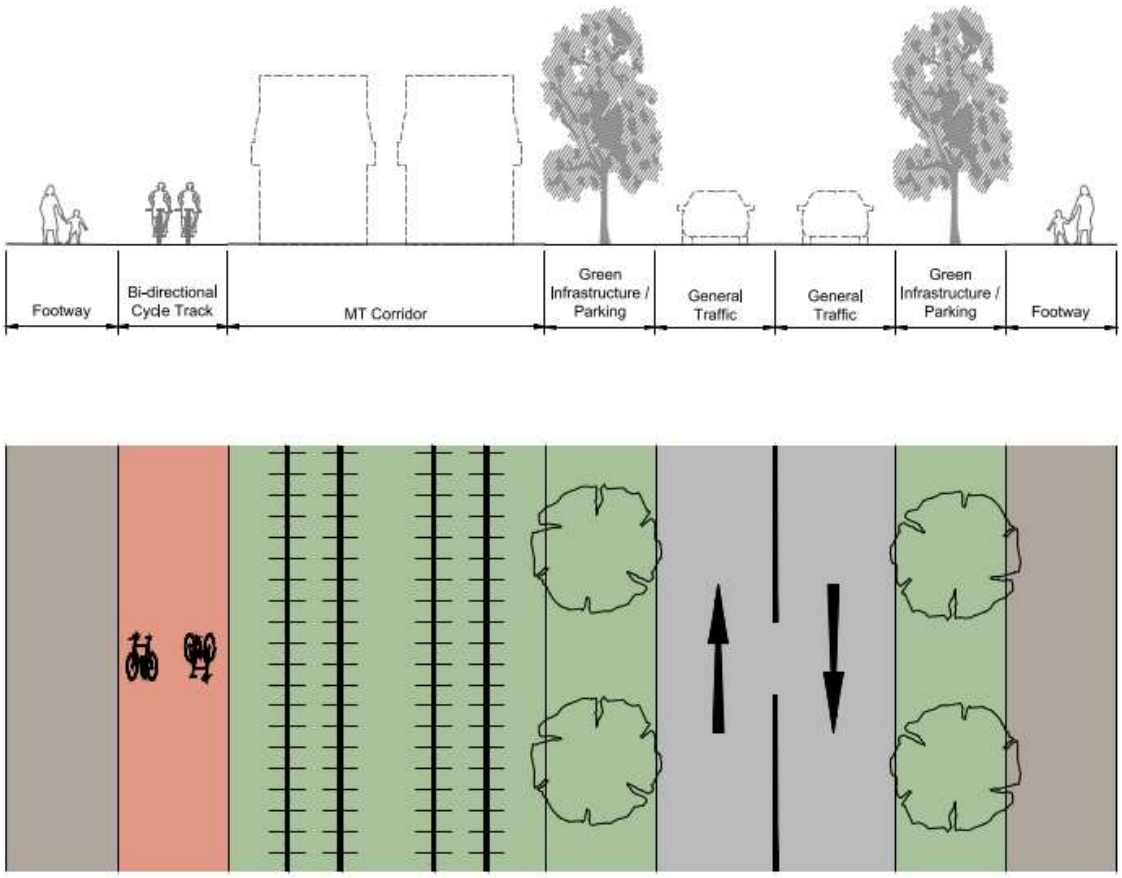

Figure 4-5. Parallel segregated Mass Transit corridor

In some situations, a wide corridor (to accommodate all of the above) is not achievable and therefore the design solution will be dictated by the available effective width of the highway boundary.

Applying the principles of the user hierarchy, the corridor can be reduced by removing the Green Infrastructure / parking bays .

Further concessions can be made such as diverting the cycle track onto a parallel corridor noting that additional off-site measures will be required to meet the five core principles as set out in LTN 1/20 Cycle Infrastructure Design. Alternatively in densely populated areas where the needs of Active Travel are placed about General Traffic, a traffic lane could be removed instead thus creating a one-way road with bidirectional Mass Transit.

4.2.3 Offline Segregated Mass Transit Corridor

The indicative typical cross section as per Figure 4-6 shows the scenario where the Mass Transit corridor is completely segregated from the highway and forms its own corridor alongside a segregated cycling track and footway. Pedestrian and cycling connections over the Mass Transit track will be achievable in locations with adequate line of sight uncontrolled crossings.

Planting could be located on the embankments which would screen the corridor from any sensitive visual receptors.

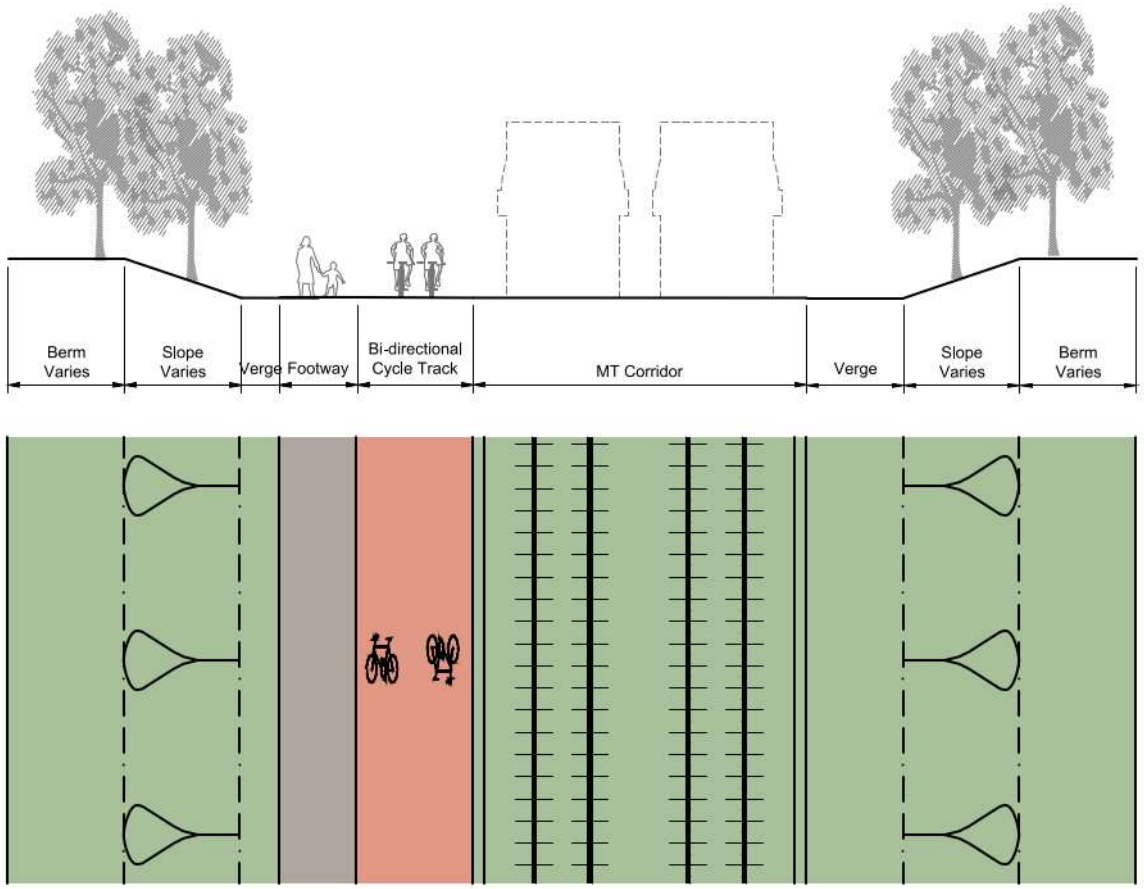

Figure 4-6. Offline segregated Mass Transit corridor

4.3 Segregated On-Street and or Shared Use Mass Transit Corridor

The indicative cross-sectional images Figure 4-7 below can be used in corridors with restricted width where full segregation is not possible. In those situations, the Mass Transit corridor will be located on the carriageway in three distinct scenarios:

- A segregated-on road Mass Transit corridor is set aside for the exclusive use of Mass Transit vehicles., such as in central urban areas where space is limited.
- A time restricted Mass Transit corridor (i.e. Public Transport Only (PTO) corridor) works in the same way as a segregated-on road Mass Transit corridor with a TRO which restricts all vehicles except public transport for a section of the corridor. This is typically used at busy commercial or neighbourhood corridors whilst allowing restricted vehicular access and deliveries at specific hours. As an example, Princess Street in Edinburgh is restricted to all vehicles except trams, buses, taxis, and cycles, with access for loading between the hours of 8pm and 7am.
- A shared use Mass Transit corridor are roads and streets where Mass Transit vehicles share the same road space with other road users with no Mass Transit priority as per Figure 4-7. In this situation, the Mass Transit system has the lowest transformative impact as all journey times are subject to other road users and will not meet the core objectives of fast, efficient, reliable, and cost-effective alternative to the private motor vehicle. Mass Transit vehicles in shared running with general traffic should be used as a last resort when all other options have been exhausted, even for short sections.

This cross-sectional layout has the dedicated central corridor removed with the associated green infrastructure and placemaking opportunities remaining for route continuity.

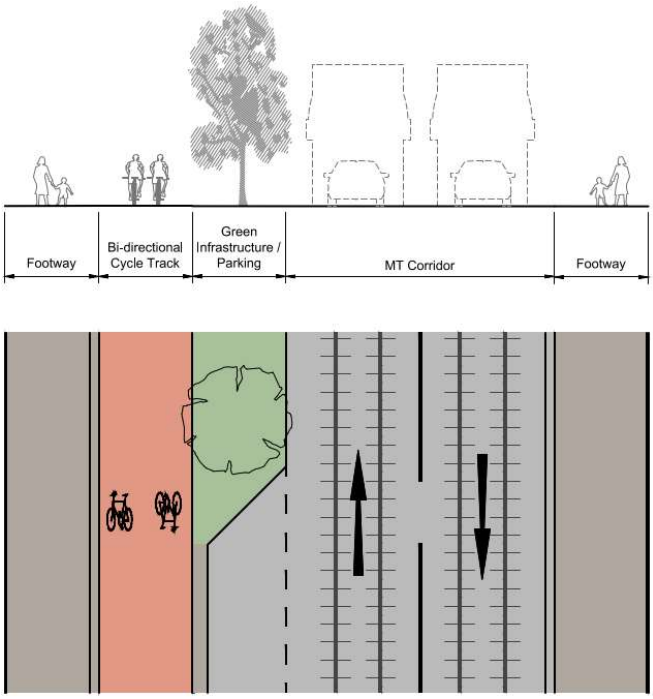

Figure 4-7. Segregated on-street or shared use Mass Transit corridor

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