Treating bicycle ‘car dooring’ collisions

The following table provides a brief overview of the treatments and their appropriateness in certain road environments.

Table 1: Overview of treatments and their use in certain road environments

	Treatments to eliminate bicycle ‘car dooring’ collisions				
Road Use Classification (including SmartRoads Road Use Hierarchy categories)	Relocation of car parking	Relocation of cyclists	One-way protected lanes	Two-way protected lanes	Off-road paths
Preferred traffic route	●	●	●	●	●
Tram priority route	●	●	●	●	●
Bus priority route	●	●	●	●	●
Pedestrian priority area (or network)	●	●	●	●	●
Bicycle priority route	●	●	●	●	●
Traffic route	●	●	●	●	●
Freight route	●	●	●	●	●
Collector road (without specific traffic priority)	●	●	●	●	●
Local road (without specific traffic priority)	●	●	●	●	●

KEY:

● Appropriate ● May be appropriate ● Unlikely to be appropriate

Table 2: Overview of treatments and their use in certain road environments

	Treatments to reduce bicycle 'car dooring' collisions		
Road Use Classification **(including SmartRoads Road Use Hierarchy categories)**	Anti-dooring lanes	Bicycle streets	Lane sharing
Preferred traffic route			
Tram priority route			
Bus priority route			
Pedestrian priority area (or network)			
Bicycle priority route			
Traffic route			
Freight route			
Collector road (without specific traffic priority)			
Local road (without specific traffic priority)			

KEY:

 Appropriate  May be appropriate  Unlikely to be appropriate

Figure 2 illustrates a number of treatment options that are available for different operating speed roads. For full details regarding a treatment's potential at different operating speeds, please refer to the detailed section for each treatment.

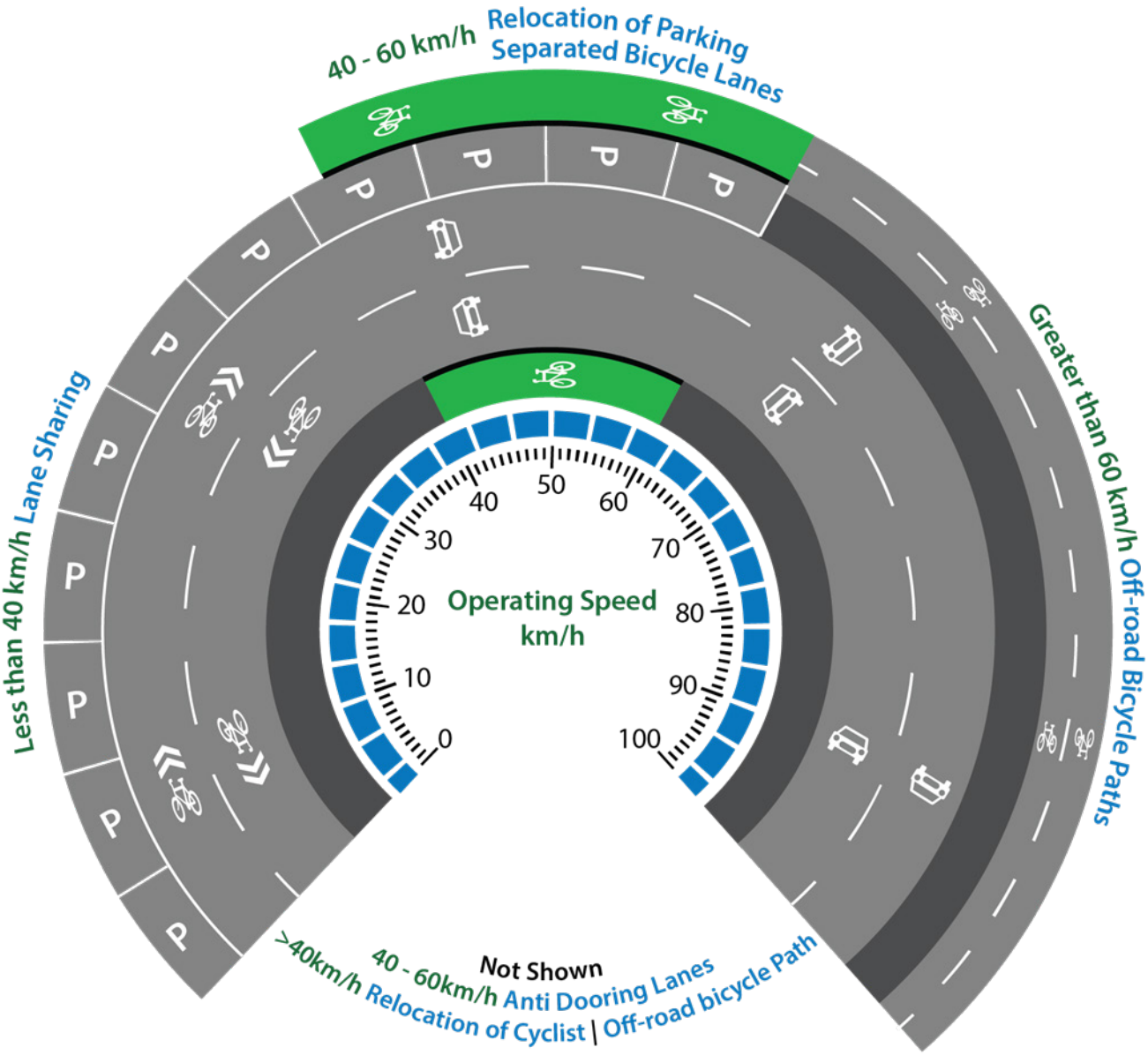
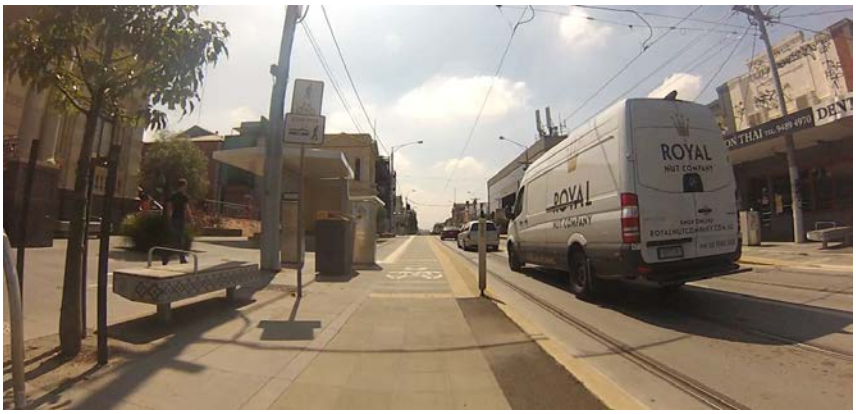


Figure 1: Treatment options based on operating speed

Relocation of parking



High Street, Northcote

Brief description	
This treatment refers to the removal of on-street car parking spaces to mitigate the risk of car dooring. As vehicles will no longer be able park alongside cyclists under this treatment, the issue of dooring is virtually eliminated. Improvements to nearby public transport facilities could also be considered as another way to compensate for the loss of parking.	
Potential locations	• Roads with large volumes of cyclists, including roads identified as bicycle priority routes under the VicRoads SmartRoads strategy. • Roads with a history of conflict between bicycles and parked vehicles. • Roads with a relatively small number of commercially zoned premises. • Areas where off-street parking is already provided. • Narrow roads that may not have enough space for other treatment options and therefore cannot safely manage multiple road users with competing needs.
Considerations	• On-street parking is generally the responsibility of local governments (municipal councils). • Relocation of parking to local roads may cause congestion issues as some local roads may not be designed for large volumes of traffic. In addition, this may lead to safety issues for all road users. • Encouraging vehicles to use off-street parking facilities may lead to an increase in crashes at entries and exits to parking facilities. • Relocation of on-street car parking may be a difficult treatment to implement due to resistance from local traders (and nearby residents).
Supporting treatments	• Fully separated bicycle lanes.
Pros	• Virtually eliminates the risk of car dooring by removing the conflict between bicycles and parked vehicles. • Provides more space on the carriageway for bicycle specific infrastructure. • May increase cycling participation due to improvements in safety. • Relocation of on-street car parking leads to a more economical use of road space as it allows all forms of transport to flow more efficiently and safely.
Cons	• Parking may need to be provided in other locations, which may be costly to establish due to acquisition of land and construction. • Off-street car parking facilities may lead to more crashes between cyclists and vehicles when vehicles enter and exit driveways. • Without a well considered plan, nearby residential streets may become congested with parked vehicles leading to potential safety and amenity issues for all road users.
Further reading	• Austroads Guide to Traffic Management Part 11: Parking (2008). • VicRoads Supplement to Austroads Guide to Traffic Management Part 11 (2015).

Provision of alternative cycling routes

Bicycle bypass through road closure on Canning Street, Carlton North

Brief description

This treatment refers to relocating cyclists from busy streets onto local roads with lower volumes of traffic and lower parking turnover. It reduces car dooring by encouraging cyclists to travel through lower risk routes.

Potential locations	• Roads where a secondary, parallel option for cyclists is available. • Roads with a history of conflict between bicycles and parked vehicles. • Roads with large volumes of cyclists, including roads identified as bicycle priority routes under the VicRoads SmartRoads strategy. • Collector and distributor roads that form part of a preferred traffic route or tram priority route under the VicRoads SmartRoads strategy – it may be desirable to move cyclists from these roads. • Narrow roads where it may be difficult to install bicycle specific infrastructure.
Considerations	• Enhancement of this treatment is possible by encouraging motorist to avoid local roads through traffic calming and diversions. • Preferred routes for cyclists should flow and offer continuity. • Significant effort should be directed towards encouraging cyclists to use local roads. • Opposition from riders where cyclists are to be banned from preferred traffic routes. • Impact on local residents on the parallel route (e.g. in mobility and access to properties).
Supporting treatments	• Warning signs. • Narrower parking spaces. • Parked vehicle turnover reduction.
Pros	• Removes cyclists from areas of high car parking turnover and relocates them to local roads. • Less interaction between cyclists and through traffic which may improve safety of cyclists.
Cons	• May increase the potential for crashes on local roads that may see an influx of cycling traffic. • Treatment is only viable for roads that have a nearby, parallel road. • Does not provide cyclists with direct access to popular destinations along the main road.
Further reading	• Austroads Guide to Traffic Management - Part 8: Local Area Traffic Management (2016). • VicRoads Supplement to Austroads Guide to Traffic Management Part 8 (2015).

One-way protected bicycle lanes

One-way protected bicycle lane on Wellington Street, Collingwood

Brief description

A one-way protected bicycle lane is a style of bicycle infrastructure that positions the bicycle lane between parked cars and the footpath, with physical separation from through traffic and/or the parking lane. It virtually eliminates the risk of dooring as bicycles are not forced to ride in between moving traffic and parked vehicles.

Potential locations	• On bicycle priority routes as defined in the VicRoads SmartRoads strategy. • Wide roads which may have a necessity for on-street parking. • Roads with a history of conflict between bicycles and parked vehicles. • Routes used by commuters. • Roads with large volumes of cyclists. • Where parking is required during peak times.
Considerations	• Sight distance may be an issue at driveways and intersections where cyclists may be obscured by parked cars. • Due to potential conflicts between riders and motorists at signalised intersections, provisions in traffic signal phasing may be required to give cyclists priority and ensure safety of riders. • Motorists who have parked their cars are required to cross bicycle traffic to access the footpath. This may lead to an increase in crashes involving pedestrians. • Where there is little separation between the bicycle lane and parking lane, there is a risk of cyclists colliding with open doors on the left passenger side of the vehicle. • Provision of infrastructure to allow mobility impaired users to cross the bicycle lane between the footpath and parking bay.
Supporting treatments	• Warning signs. • Narrower parking spaces.
Pros	• Removes bicycles from the vicinity of car doors on the driver's side of the vehicle. • Physically separates cyclists from moving (motorised) traffic. • Connects easily to other on-road bicycle lanes and infrastructure.
Cons	• May lead to conflicts at intersections and property access points (driveways) where vehicles turn across the bicycle lane, which is escalated by the lack of visibility due to parked cars and other road furniture obstructing motorists' views. • Additional road space may be required through redistribution of road reserve or land acquisition.
Further reading	• Austroads Guide to Road Design Part 3: Geometric Design (2016). • VicRoads Supplement to Austroads Guide to Road Design Part 3. • VicRoads Design Guidance for Strategic Cycling Corridors. • Cycling Aspects of the Austroads Guides (2014).

Two-way protected bicycle lanes

Two-way protected bicycle path on Beaconsfield Parade, Middle Park

Brief description

This treatment is similar to one-way protected bicycle lanes but with both directions of bicycle traffic riding on one side of the road. Two-way protected bicycle lanes virtually eliminate the risk of dooring by removing cyclists from a position between parked cars and moving traffic.

Potential locations	• Roads with limited space where one-way protected bicycle lanes in each direction are not feasible. • Roads with a history of conflict between bicycles and parked vehicles. • Roads with large volumes of cyclists, including roads identified as bicycle priority routes under the VicRoads SmartRoads strategy. • Roads where there is an unbalanced flow of bicycle traffic (e.g. towards the city in the morning peak).
Considerations	• Sight distance may be an issue at driveways and intersections where cyclists may be obscured by parked cars. • Motorists who have parked their cars are required to cross the bicycle lane to access the footpath. • Difficult for cyclists to access the other side of the road (i.e. the side which does not have the two-way protected bicycle lane) • Due to potential conflicts between riders and motorists at signalised intersections, provisions in traffic signal phasing may be required to give cyclists priority and ensure safety of riders. • Provision of infrastructure to allow mobility impaired users to cross the bicycle lane between the footpath and parking bay.
Supporting treatments	• Warning signs. • Narrower parking spaces.
Pros	• Uses less road space than one-way protected bicycle lanes. • Removes bicycles from the vicinity of car doors on the driver's side of the vehicle. • Physically separates cyclists from moving (motorised) traffic.
Cons	• May lead to an increase in head-on crashes between cyclists. • Motorists who have parked their cars are required to cross bicycle traffic to access the footpath. This may lead to an increase in crashes involving pedestrians as they may not be used to looking both ways for cyclists. • May lead to conflicts at intersections and property access points where vehicles turn to cross the bicycle lane. • Cyclists only have direct access to destinations on one side of the road.
Further reading	• VicRoads Design Guidance for Strategic Cycling Corridors. • Cycling Aspects of the Austroads Guides (2014)

Off-road paths

Capital City Trail, Carlton North - has bicycle priority at intersection to minimise stopping and starting for cyclists

Brief description
This treatment refers to encouraging cyclists to use off-road facilities adjacent to the road instead of riding on roads where there is a risk of dooring.

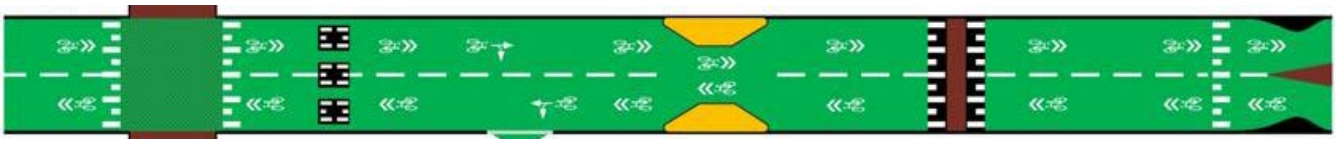
Potential locations	• Wide roads with land available either on the side of road or in the centre of the road (e.g. large medians on divided roads). • Where full separation from the traffic lane is required due to unsafe features on the road for cyclists. • Roads near parkland. • Near schools, parks and other facilities used by children. • Along commuting routes.
Considerations	• Impact of mixing pedestrians and cyclists needs to be assessed at individual locations given the potential for collisions between the two modes. • Priority at intersections needs to be carefully considered and clearly signed to ensure cyclists and motorists know who has priority. At some road crossing points, it may appropriate to give cyclists priority over motor vehicles. • Some cyclists may continue to use roads even when off road paths are provided. • Off-road bicycle paths may be an attractive option for families, children and inexperienced cyclists. • In areas where cyclists may be travelling at high speed or commuter routes with larger volumes, separation from pedestrians may be necessary. • The potential need for land acquisition in order to construct an off-road facility. • Requirement for lighting especially on routes with night / dusk usage.
Pros	• Easy to link up with existing off-road bicycle paths and two-way protected bicycle lanes. • Virtually eliminates the risk of car dooring by relocating cyclists on to an off-road facility. • Full separation between cyclists and motor vehicles. • Offers a safe and comfortable environment for most cyclists especially those lacking experienced or confidence (e.g. children).
Cons	• May lead to conflicts with vehicles entering and exiting driveways. • Shared paths may increase the number of crashes involving pedestrians. • The potential need for land acquisition in order to construct an off-road facility.
Further reading	• Austroads Guide to Road Design - Part 6A: Pedestrian and Cyclist Paths (2009). • Cycling Aspects of the Austroads Guides (2014).

Anti-dooring lanes

Glenferrie Road, Hawthorn

Brief description	
Anti-dooring lanes or dooring buffers are similar to conventional bike lanes positioned between on-street parking and the through traffic lane, however they have a small buffer between the parking lane and the bicycle lane to encourage cyclists to ride out of the “door zone” and closer to the traffic stream.	
Potential locations	• Narrow roads that do not have enough space for other treatments options. • Roads with large volumes of cyclists, including roads identified as bicycle priority routes under the VicRoads SmartRoads strategy. • Roads with a history of conflict between bicycles and parked vehicles.
Considerations	• A door can swing out to approximately 1.2m from a vehicle, therefore it is important to leave a substantial buffer to the preferred riding zone. • May be an improvement for roads with a small budget for projects or for roads that lack space for the other primary treatments. • This treatment may not be perceived as ‘safe’ by inexperienced cyclists. • The style of the buffer, whether through pavement markings or lane lines, should be in a format that can be easily interpreted by cyclists and motorists. • Reducing the speed along the road – whether through the speed limit and/or the operating speed
Supporting treatments	• Warning signs. • Narrower parking spaces. • Parking turnover reduction.
Pros	• Pavement marking may act as a reminder for cyclists to be aware of car doors when they are riding down a potentially risky section of road. • Can improve positioning of cyclists on the carriageway, as they are further away from parked vehicles. • May help to encourage safer overtaking of cyclists as motorists will be forced to slow down due to the narrower road environment and move further away from the cyclist to pass.
Cons	• May push cyclists closer to through traffic, which may be uncomfortable for cyclists who are inexperienced or lacking confidence. • On roads with trams, this treatment may push cyclists further towards trams, which may increase the chance of a collision with a pedestrian and/or tram.
Further reading	• Austroads Guide to Road Design - Part 3(2016).

Bicycle Streets



Example of a bicycle street

Brief description

Bicycle streets are roads where bicycles are given priority over motor vehicles. Bicycle riders are encouraged to ride in the general traffic lane whereby other vehicles are expected to share the traffic lane with bicycle riders.

Potential locations	• Undivided two lane roads where the operating speed is less than 40 km/h. • Roads with a low volume of traffic. • Roads with a substantial number of inexperienced bicycle riders. • Local areas with a high number of cyclists. • Where off-road bicycle facilities is not practicable. • Roads with a narrow width.
Considerations	• Reducing the operating speed on the bicycle street route (to below 40 km/h) • Signs are required to highlight to all road users that bicycles have priority over motor vehicles and may be present in the centre of the lane. • Removal of parking along the bicycle street to ensure cyclists (and other traffic) is not impeded by parking movements - also the risk of car dooring would be removed. • Cyclist confidence and safety in sharing the lane with general traffic. • Mixing cyclists and motorists may lead to conflict if differential speeds are high making this treatment more appropriate on low-speed roads.
Supporting treatments	• Approach deflection at intersection/roundabout. • Raised platforms. • Static signage. • Bicycle activated warning signs. • Kerb extensions (narrowing of roadway). • Raised pedestrian crossings and/or zebra crossings. • Pedestrian refuges.
Pros	• The use of sharrows and green painted roadway may assist in raising awareness of cyclists. • Provides guidance for cyclists to "claim the lane" and encouraging riders to ride in the more prominent position on the road • Provides reassurance to cyclists that they are on designated cycle routes in the absence of segregated cycle paths. • Traffic calming measure assists in lowering the operating speed along the road thus reducing the risk of serious injury in the event of a collision between road users.
Cons	• Although bicycle streets have the ability to raise awareness of cyclists, there is still the possibility of a collision between a vehicle and cyclist. • Motorists may become frustrated by cyclists 'blocking' lanes and the perceived additional travel time. • Mixing with cars may be confronting for cyclists who are very inexperienced or lacking confidence. • May lead to an increase in rear end crashes between cyclists and motor vehicles.
Further reading	• Austroads Guide to Traffic Management - Part 8: Local Area Traffic Management (2016). • VicRoads Supplement to AS 1742.9:2000 (2015) – details on sharrows. • Western Australia "Bicycle Boulevards": http://www.transport.wa.gov.au/activetransport/safe-active-streets-program.asp

Lane sharing at intersections

Bicycle symbol (sharrow) to indicate lane sharing at roundabout on Highett Street, Richmond

Brief description
This treatment refers to moving cyclists into the centre of the traffic lane at individual intersections and encouraging cyclists to mix with through traffic. The objective of this treatment is to position cyclists as far away as practicable from parked cars. This is sometimes referred to as “taking the lane”. For the application of lane sharing along an entire street, refer to the ‘bicycle streets’ treatment above.

Potential locations	• Roads with a low volume of through traffic. • Low speed roads with operating speed of less than 40 km/h (in addition, there is a low differential speed between cyclists and motor vehicles). • Roads with a history of conflict between bicycles and parked vehicles. • Roads with large volumes of cyclists.
Considerations	• Reducing the operating speed of the road. • Community acceptance and understanding of lane sharing. • Cyclist confidence and safety in sharing the lane with general traffic. • May not work on congested roads where cyclists may choose to filter between stationary traffic and parked cars regardless of lane markings. • Mixing cyclists and motorists may lead to conflict due to differentials in speed. • Implementing a ‘bicycle street’ where cyclists have priority over motor vehicles along a road.
Supporting treatments	• Warning signs. • Parking turnover reduction.
Pros	• Encourages cyclists to ride in the most prominent position in the lane. • Cyclists may be more visible to drivers behind them, which may increase driver awareness. • Positions cyclists further from the door zone by encouraging them to ride in the centre of the traffic lane. • Provides unison with current approach taken for cyclists entering certain single lane roundabouts.
Cons	• May only be used on low (operating) speed roads where the speed differential is lower between bicycles and cars. • Motorists may become frustrated by the perception that cyclists are blocking lanes. • Mixing with cars may be confronting for cyclists who are inexperienced or lacking confidence.
Further reading	• Austroads Guide to Traffic Management - Part 8: Local Area Traffic Management (2016). • VicRoads Supplement to AS 1742.9 (2015).

Warning signs and pavement markings

G9-57 watch for bicycles sign

W6-7 bicycle warning sign

Brief description

This treatment refers to the installation of warning signs and pavement markings to encourage cyclists to be vigilant around parked cars and to encourage them to ride further away from parked cars to assist in reducing collisions.

Potential locations	• At locations where a new treatment has been installed and where not all road users may be familiar with the operation of the new treatment. • Roads with a history of conflict between bicycles and parked vehicles. • Roads where the presence of cyclists is not expected. • Busy shopping areas with high vehicle turnover.
Considerations	• Positioning of the sign is crucial. Signs need to be prominently located in order to be seen by the relevant audience. • Pavement markings need to be carefully considered so as not to confuse road users of the intended message. The message needs to be clear and concise. In some situations, a static sign may provide a clearer message given that it is at the driver's eye level. • The message and design of the sign should be consistent and clear without any ambiguity. • Practitioners need to be aware of the overall impact of the sign or pavement marking – monitoring and evaluation may be required to assess the overall effectiveness of the sign or pavement markings. • The use of signs and pavement markings should not be seen as the 'solution' to address the issue of collisions between cyclists and motor vehicles. Signs and pavement markings play an important role in raising awareness of potential collisions and, to be effective, should only be used in conjunction with the primary treatments listed in this document.
Pros	• May improve positioning of cyclists on the carriageway. • Signs and pavement markings play an important role in raising awareness of potential collisions. • Low cost to implement.
Cons	• As a standalone measure, not as effective as physical treatments such as those that separate cyclists from parked vehicles / through traffic. • Limited research has been conducted to confirm effectiveness of certain signs and pavement markings
Further reading	• Australian Standards AS 1742.9 (2008) - details on bicycle signs. • VicRoads Supplement to AS 1742.9 (2015) - details on bicycle signs. • Australian Standards AS 1743 (2016) - details on signing principles.

Narrower parking spaces

Brief description
This treatment refers to reducing the width of on-street parking spaces which may improve parking discipline and therefore provide more space on the carriageway for cyclists.

Potential locations	• Roads that serve multiple road users with competing needs. • Narrow roads with limited space. • Busy shopping strips where bicycle infrastructure is to be provided or additional space is to be made on the road for cyclists.
Considerations	• Narrower parking bays may encourage motorists to park closer to the kerb. • May provide more space for cyclists to pass parked vehicles safely without travelling into the traffic stream. • May be relatively easy to implement and could be used in unison with anti-dooring lanes. • Possibility to make parking bays longer to reduce the number of movements required to enter a narrow parking space. • Under road rule 211 of the Road Safety Road Rules 2009, vehicles which are wider than the marked bay are legally allowed to park in the bay. As a result, these vehicles will encroach into the roadway and cause a hazard to passing cyclists. • Possible opposition from local traders in the event parking spaces are removed.
Pros	• Gives cyclist more space between parked cars and moving traffic. • Relatively easy and inexpensive to introduce. • May provide a more effective use of carriageway width.
Cons	• Does not eliminate risk of dooring, simply gives cyclists more space to avoid doors. • Potential for more manoeuvrers by vehicles entering the parking space which may result in more collisions with cyclists.
Further reading	• AS 2890.5: Parking Facilities: On-street parking (1993) – details on parking bay dimensions.

Parking turnover reduction

Brief description

This treatment refers to extending the amount of parking time for on-street car parking to reduce vehicle turnover. This may lead to a decrease in the amount of doors being opened as there will be a less number of different vehicles using a parking bay.

Potential locations	• Roads in shopping areas where there are parking restrictions (especially with short parking time restrictions). This supporting treatment may not be appropriate for: • Parking spaces abutting supermarkets or convenience stores where there is naturally a high amount of parking turnover.
Considerations	• On-street parking is the responsibility of local governments and therefore individual council policies may prevent the implementation of this treatment. • Easy and inexpensive to implement but may not have significant impact in reducing the number of crashes involving car doors. • Further trials and/or research may be conducted to measure effectiveness of this treatment if necessary.
Pros	• The number of vehicles entering and exiting on-street car parking spaces may be reduced and therefore the number of door opening events may also be reduced.
Cons	• Decreases the probability of dooring occurring rather than offering physical safety improvements.