

Safe and Sustainable Street Design: Designing for All Street Users

A workshop for the City of Ljubljana, Slovenia

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Global Designing Cities Initiative

29th January, 2025



Designing for All Street Users



Global
Designing
Cities
Initiative

Safe and Sustainable Street Design

A workshop for the City of Ljubljana, Slovenia

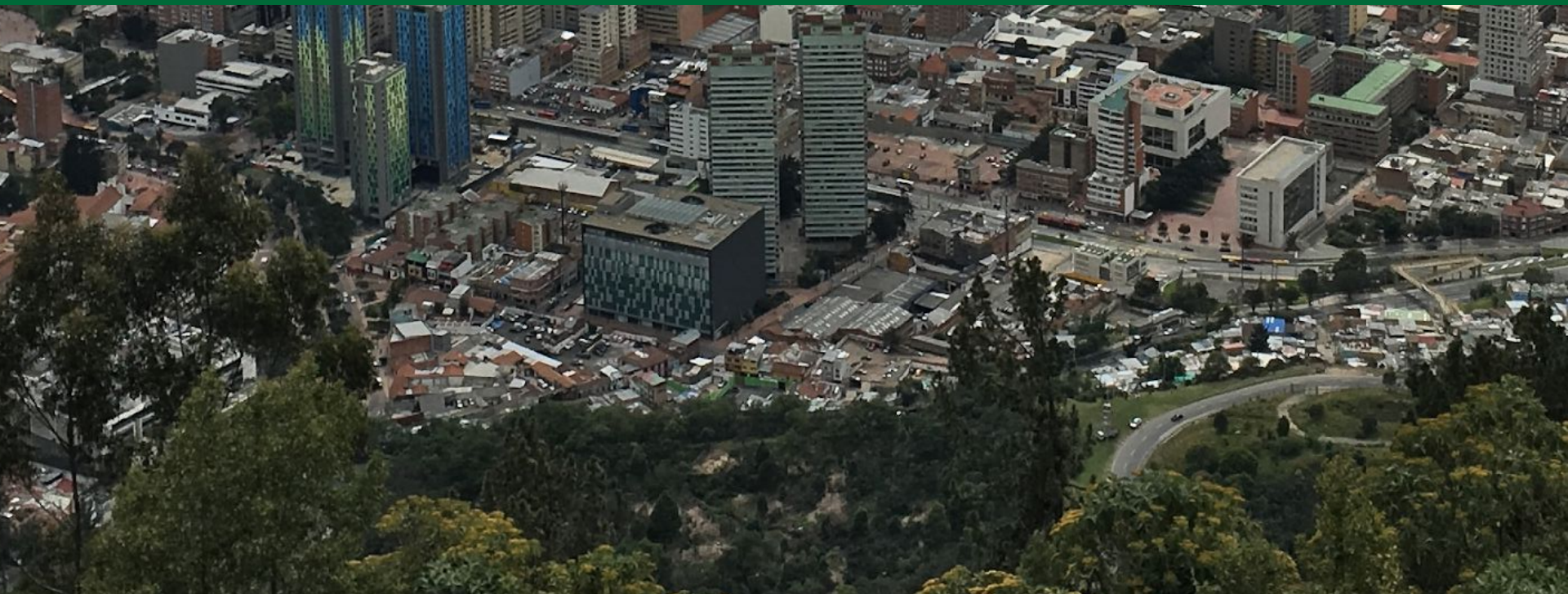
Marina Visic | Program Associate BICI

@GlobalStreets
globaldesigningcities.org

A new approach to street design



Designing for place



Designing for place



Built environment



Natural environment

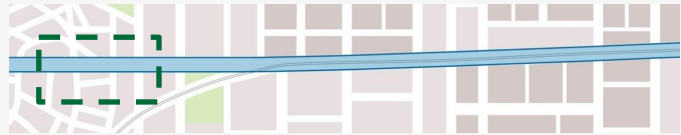


Social & cultural
environment



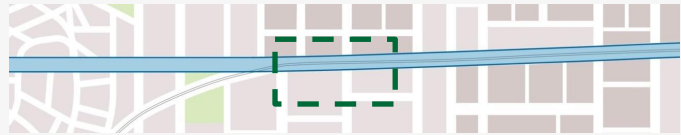
Economical environment

Context 1: Neighborhood Main Street

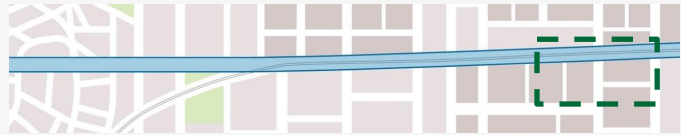


Context changes!

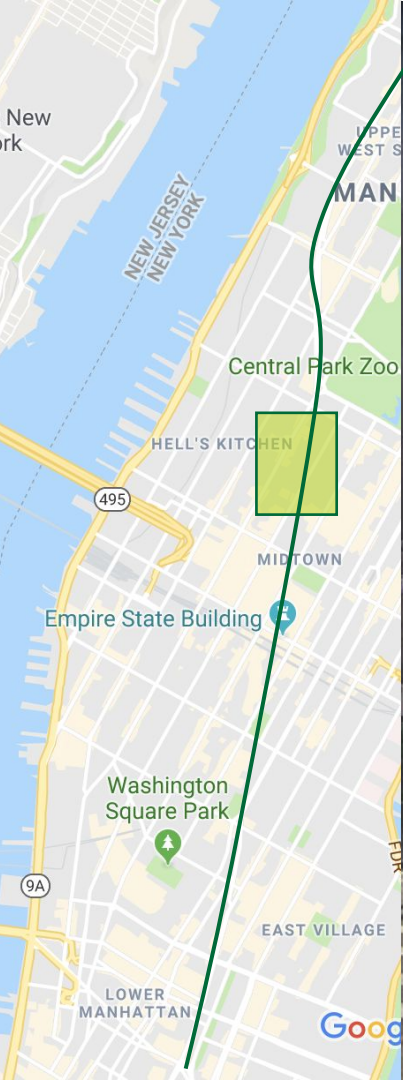
Context 2: Central Two-way Street



Context 3: Transit Mall









Designing for people



Pedestrians



Pedestrians

Cyclists



Pedestrians



Cyclists

Transit Users



Pedestrians



Cyclists



Transit Riders

Motorists



Pedestrians



Cyclists



Transit Riders



Motorists

Freight Operators and Service Providers



Pedestrians



Cyclists



Transit Riders



Motorists



Freight Operators
and Service
Providers

People Doing Business



Pedestrians



Cyclists



Transit Riders



Motorists



Freight Operators
and Service
Providers



People Doing
Business

How people get around in Ljubljana



13.3%



11%



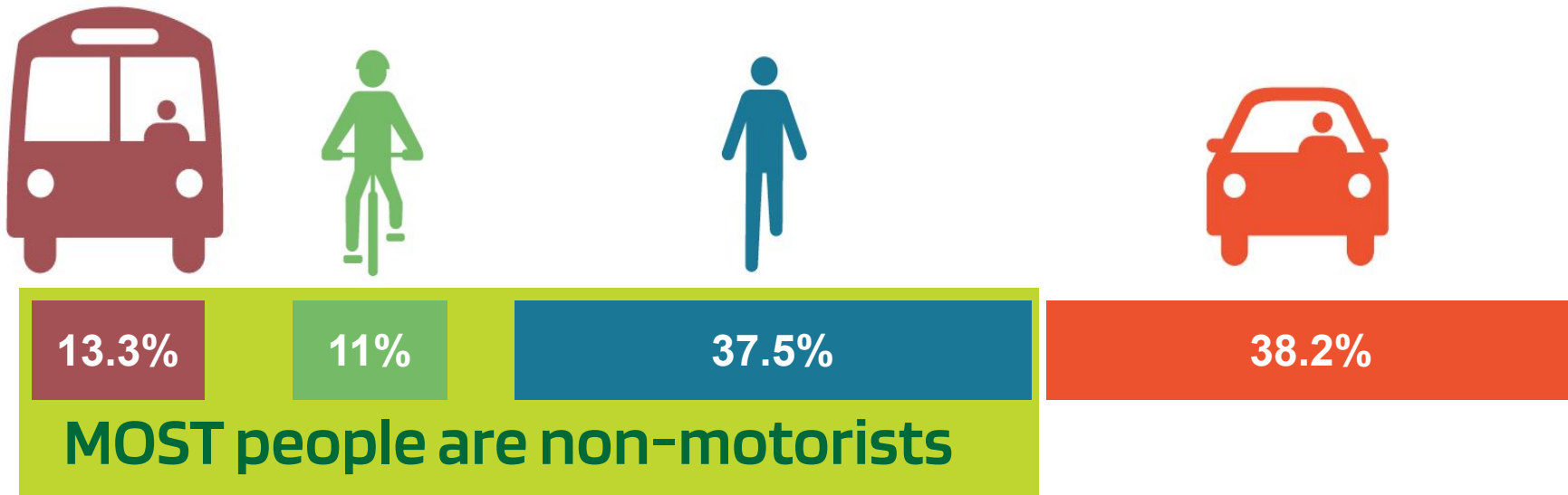
37.5%



38.2%

(Source: Sustainable Urban Mobility Plan of the Ljubljana Urban Region, A Survey of Travel Habits in the MOL and LUR, 2014)

How people get around in Ljubljana



(Source: Sustainable Urban Mobility Plan of the Ljubljana Urban Region, A Survey of Travel Habits in the MOL and LUR, 2014)

Designing for pedestrians

Designing for pedestrians

(we are all pedestrians!)

Pedestrian vulnerability and speed

Pedestrians **cannot** be made **safe**,
at **unsafe speeds** or **without facilities**
that serve them well.

Types and dimensions



0.75m



1.4m



1.2m



1.2m

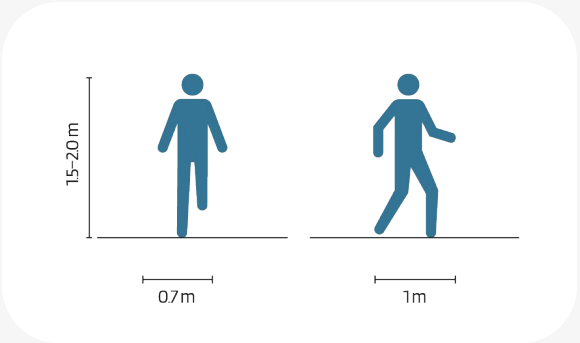
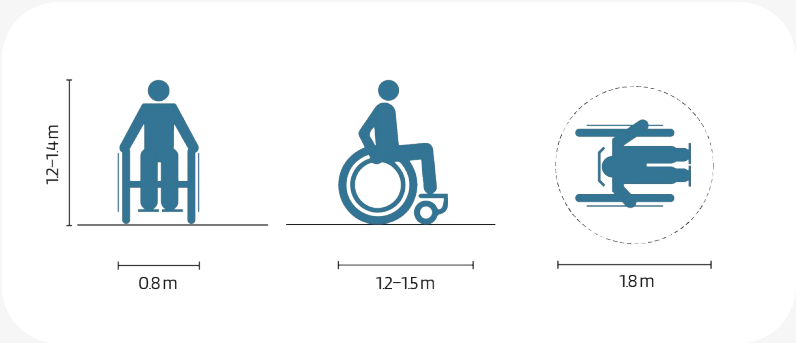
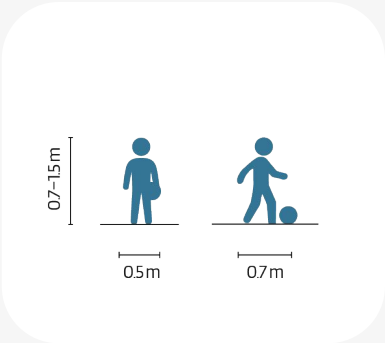


1.5m

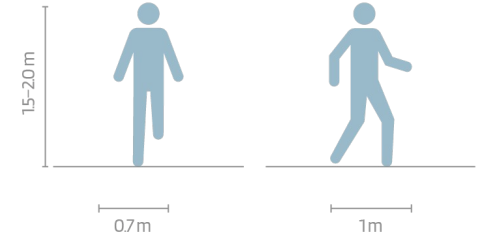
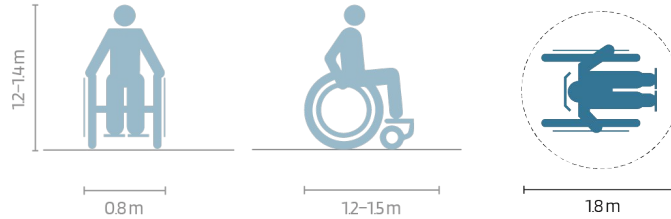
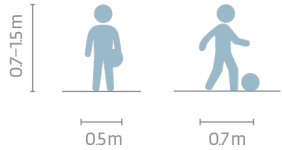


2.4-4.8m

Types and dimensions



Types and dimensions

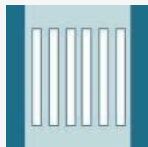


Write this number down

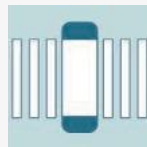
Elements



Sidewalks



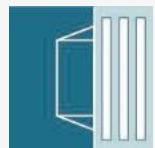
Pedestrian Crossings



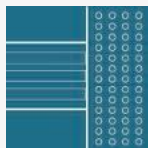
Pedestrian Refuge Islands



Curb Extensions



Accessibility Ramps



Vision-Impaired Guidance



Signage and Wayfinding



Pedestrian Countdown Signals + Clocks



Lighting



Seating



Water Fountains



Weather Protection



Curbs



Waste Receptacles



Active Building Edges



Trees and Landscaping

Elements



Sidewalks



Pedestrian Crossings



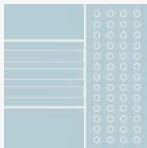
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Active Building Edges



Trees and Landscaping

Sidewalks zones



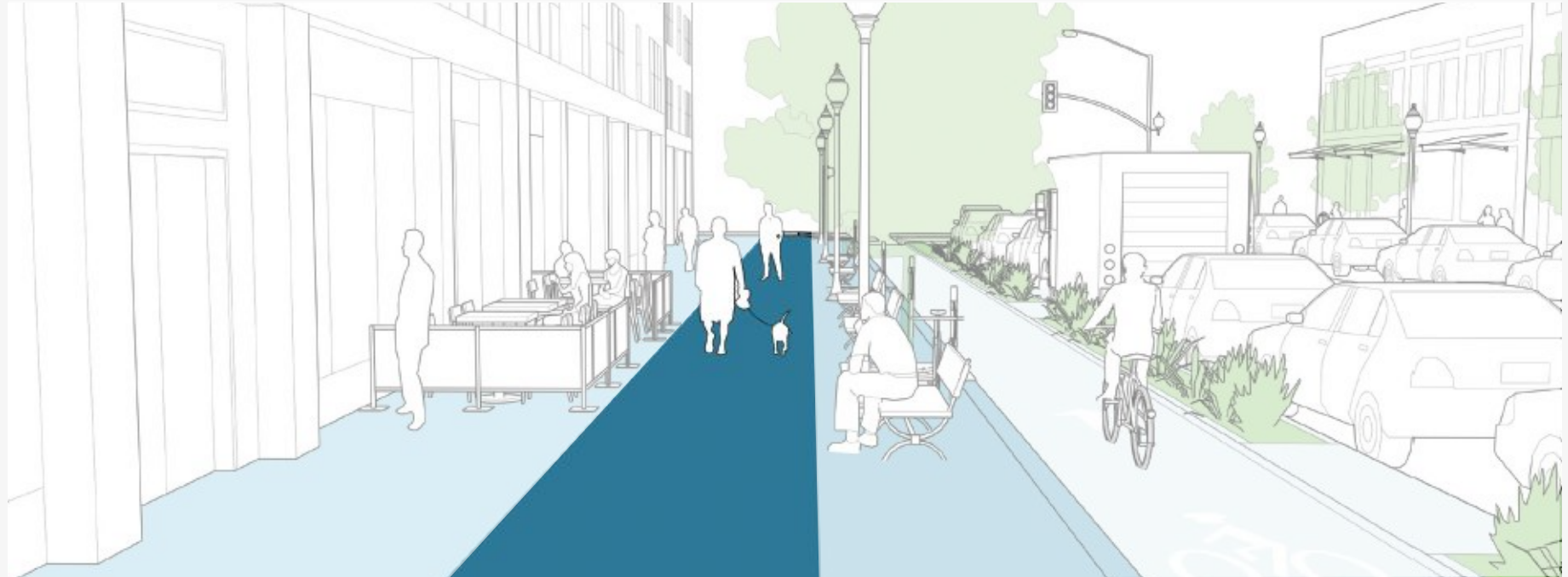
Frontage Zone
1m – 3.5

Clear Path
1.8 – 2.4 + (Residential)
2.4 – 4.5 + (Commercial)

Street Furniture Zone
1.5m – 2 m

Buffer Zone
Approx. 2 m – 2.5 m

Sidewalks zones



Frontage Zone
1m – 3.5

Clear Path
1.8 – 2.4 + (Residential)
2.4 – 4.5 + (Commercial)

Street Furniture Zone
1.5m – 2 m

Buffer Zone
Approx. 2 m – 2.5 m

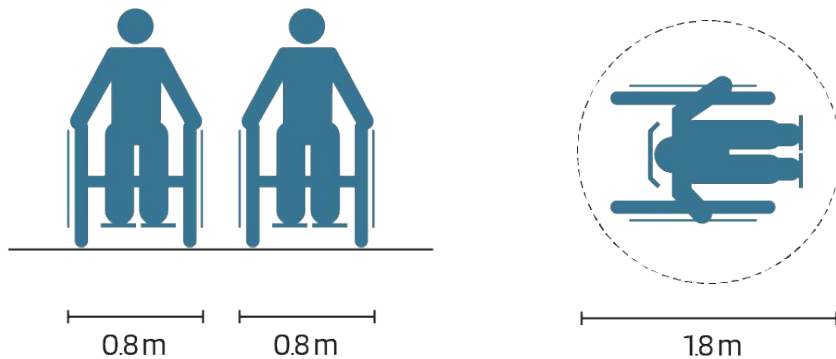
Clear path

The clear path should be at least
1.8–2.4 wide in residential settings and
2.4–4.5 wide in downtowns, school zones, or
commercial areas with heavy pedestrian volumes

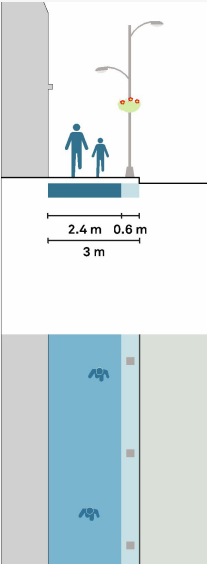
Clear path

Why 1.8 m absolute minimum?

To ensure that every sidewalk even in low volume residential areas is accessible to all types of users (and all types of wheelchairs)



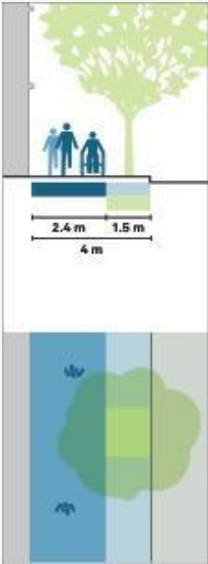
Sidewalks types



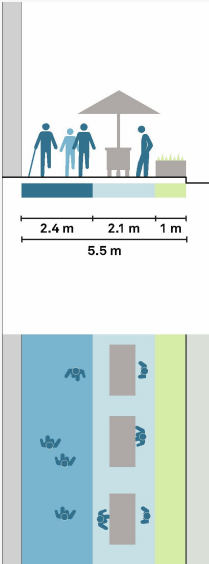
Residential
Sidewalk



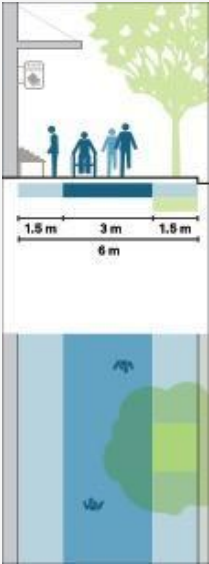
Residential
Ribbon
Sidewalks



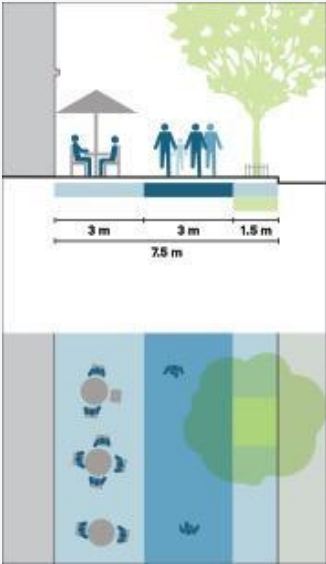
Residential
Sidewalk
with Trees



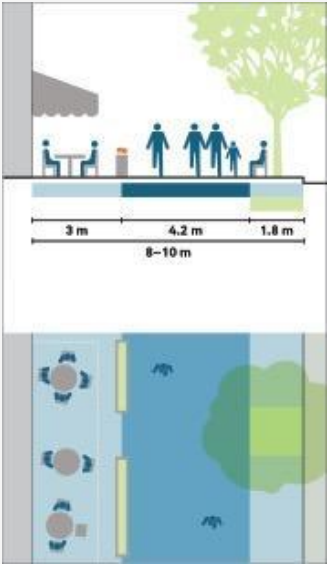
Neighborhood
Main Street 1



Neighborhood
Main Street 2



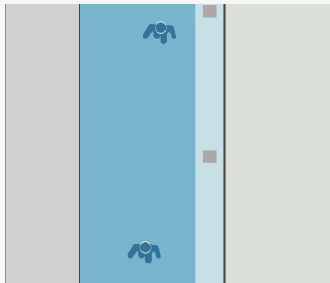
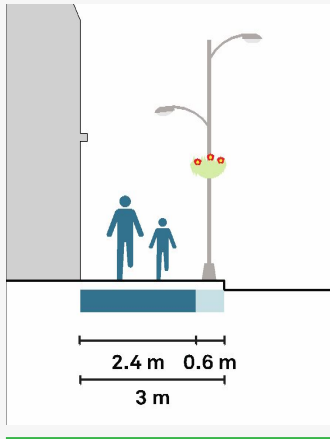
Medium Commercial
Sidewalks



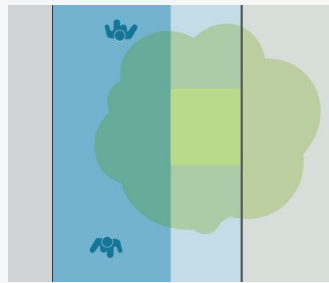
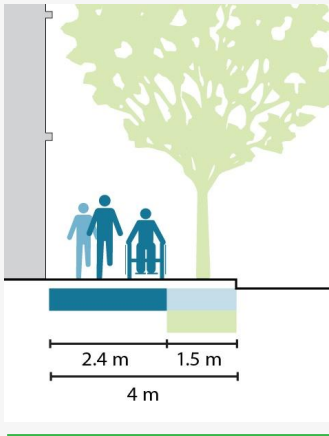
Large Commercial
Sidewalks

Residential

Residential
Sidewalk



Residential
Sidewalk with
Trees

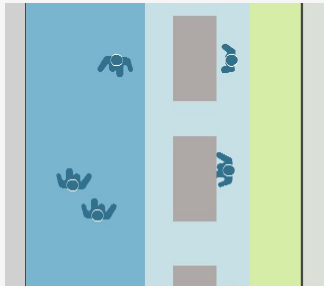
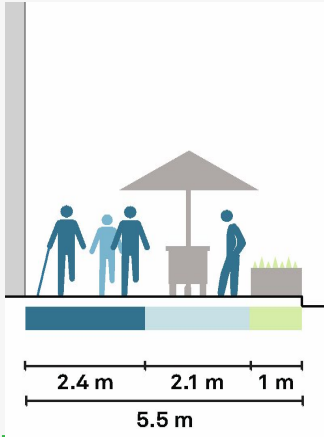


Residential

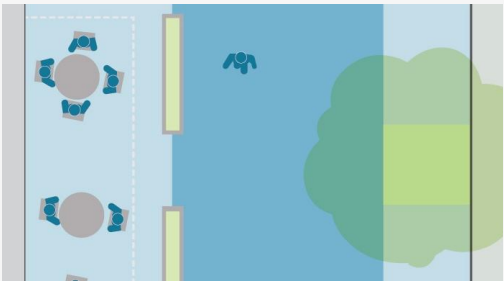
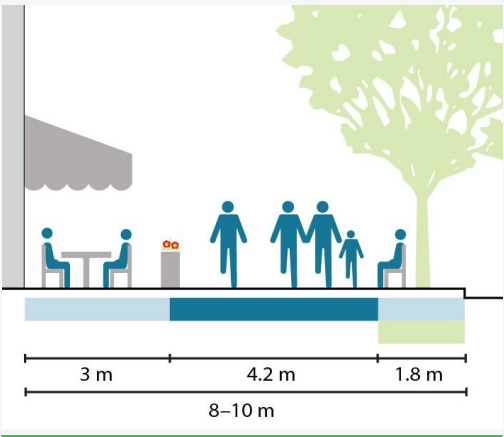


Commercial

Neighborhood
Street



Large Commercial
Sidewalks



Commercial



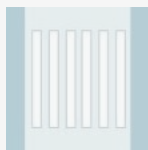
Commercial



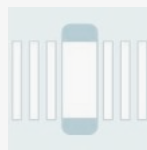
Elements



Sidewalks



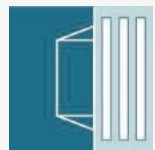
Pedestrian Crossings



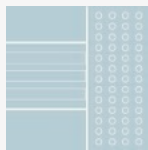
Pedestrian Refuge Islands



Curb Extensions



Accessibility Ramps



Vision-Impaired Guidance



Signage and Wayfinding



Pedestrian Countdown Signals + Clocks



Lighting



Seating



Water Fountains



Weather Protection



Curbs



Waste Receptacles

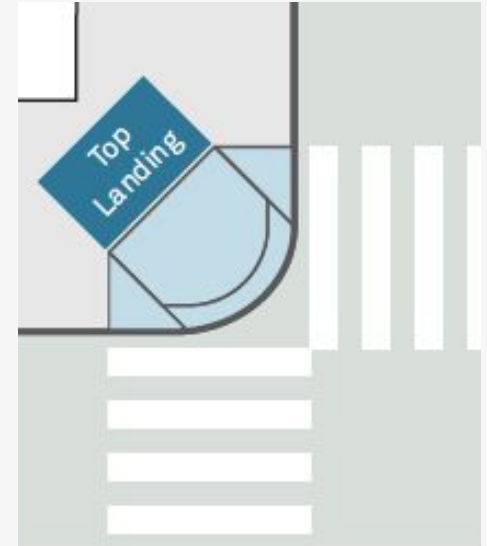
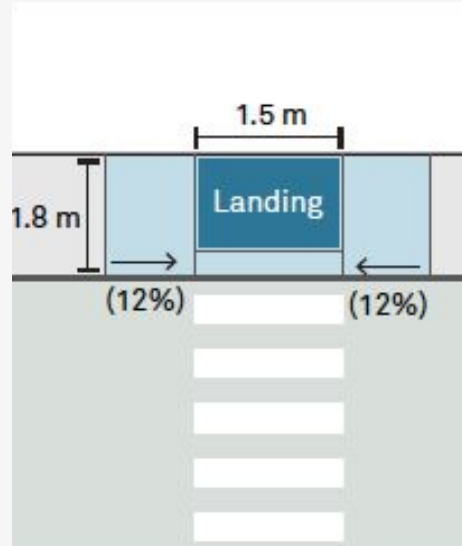
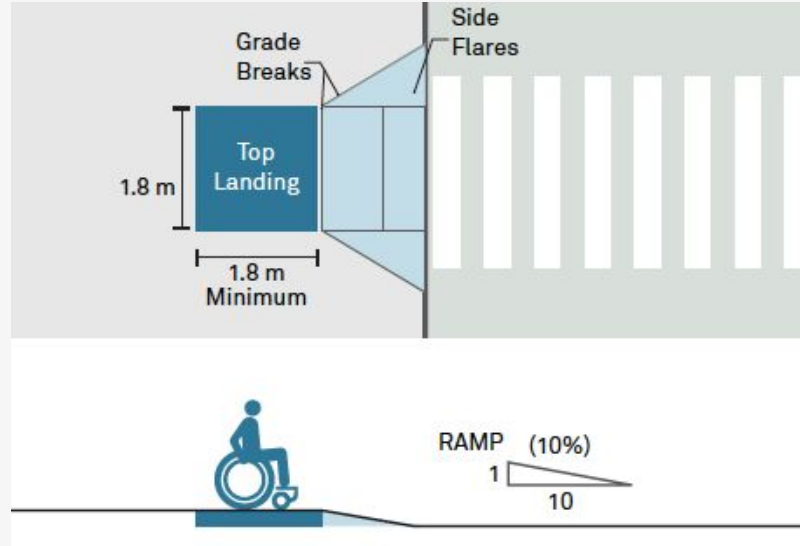


Active Building Edges



Trees and Landscaping

Accessibility Ramps



Can be designed in different ways according to the context.
Ramp slopes should not be 8-12%

Elements



Sidewalks



Pedestrian Crossings



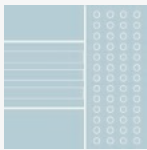
Pedestrian Refuge Islands



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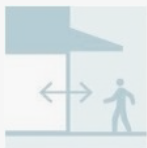
Weather Protection



Curbs



Waste Receptacles

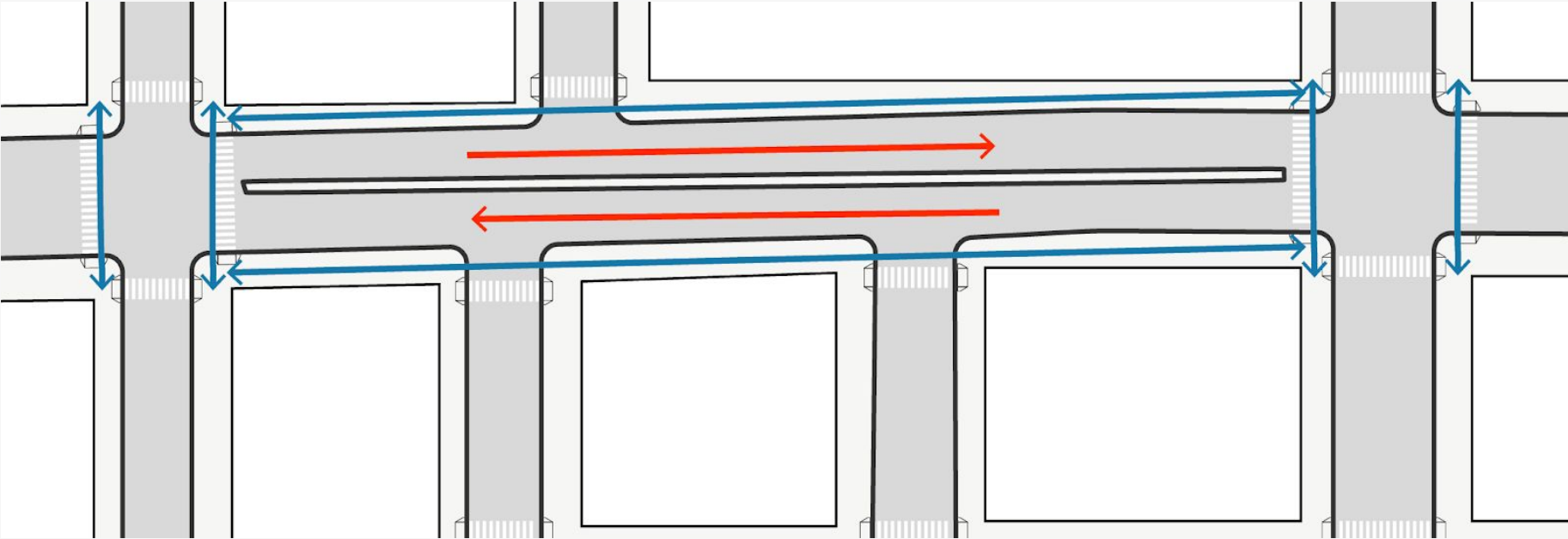


Active Building Edges

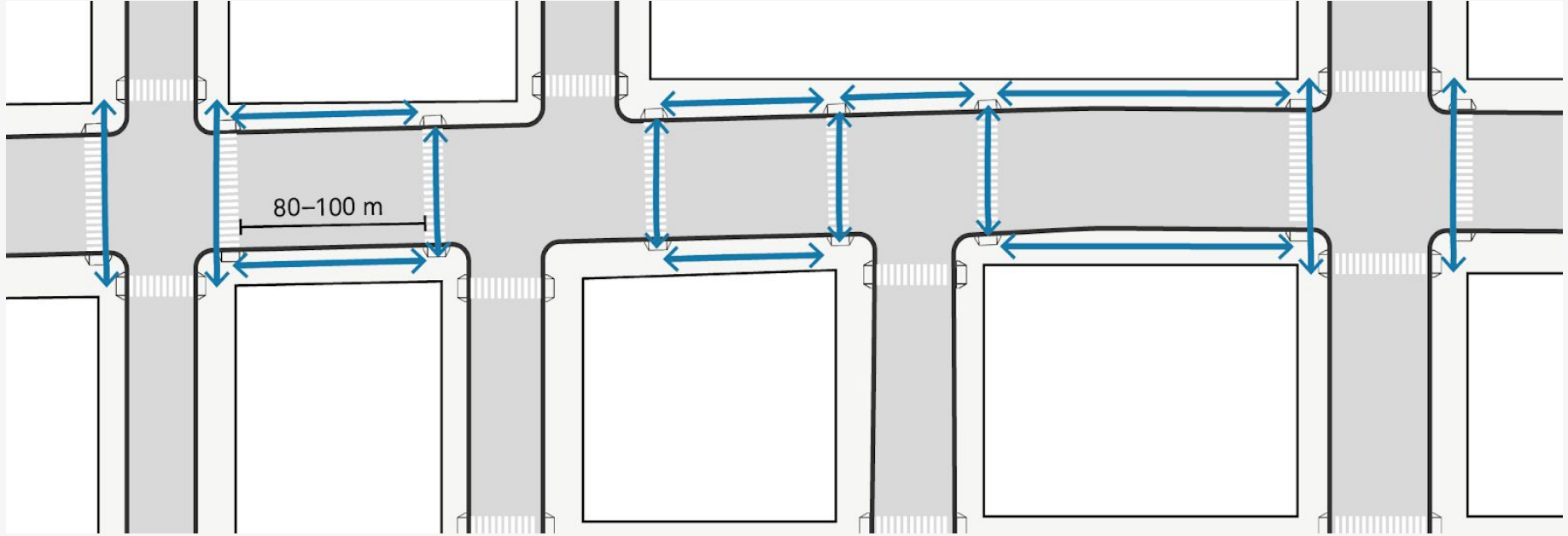


Trees and Landscaping

Spacing

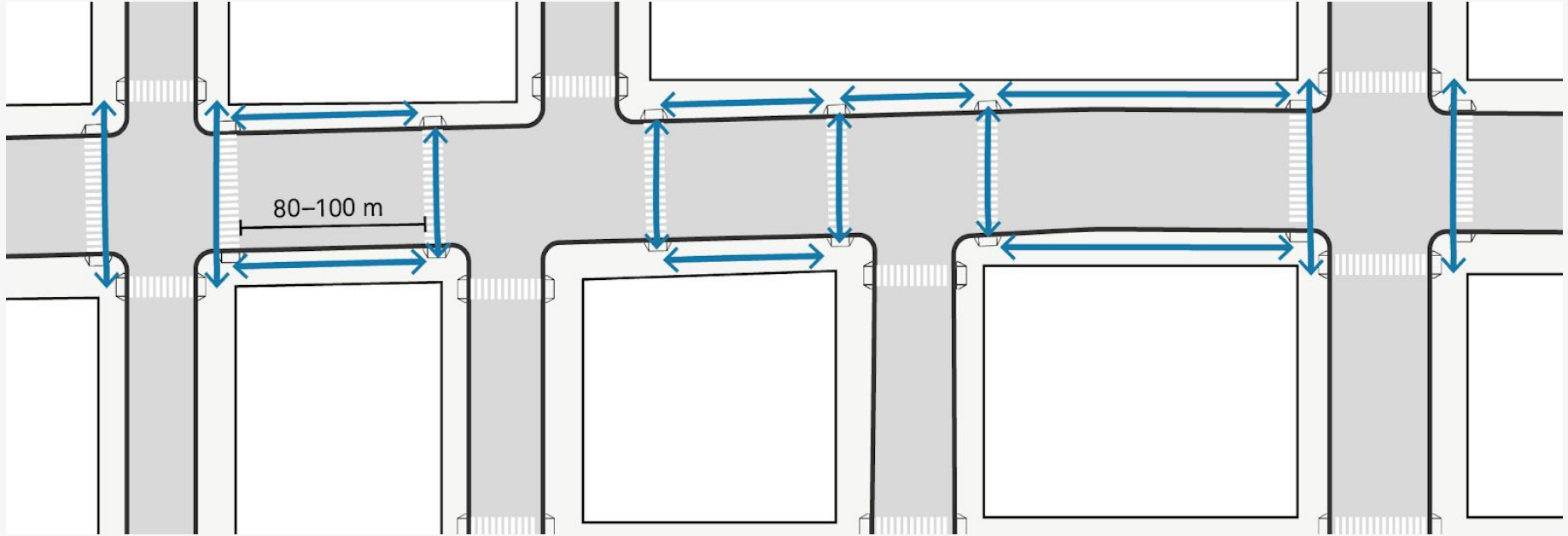


Spacing



Safe, accessible crossings should be provided every 80-100 m, and at all legs of an intersection, to ensure a connected walkable network.

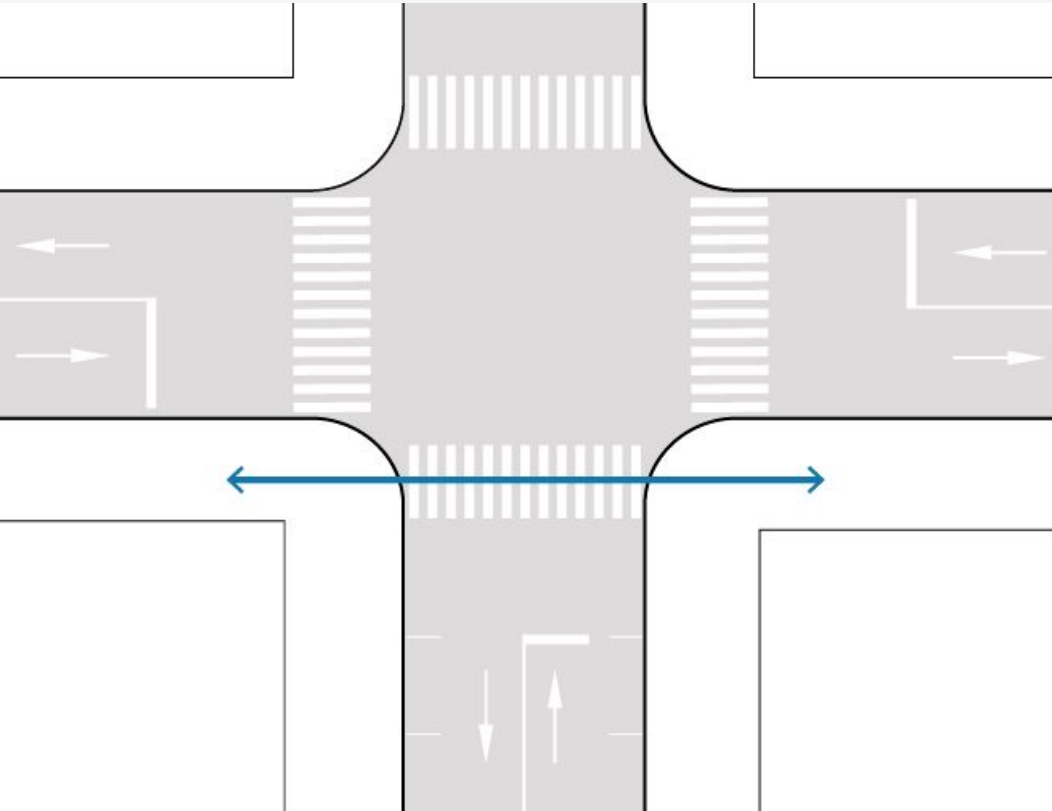
Spacing



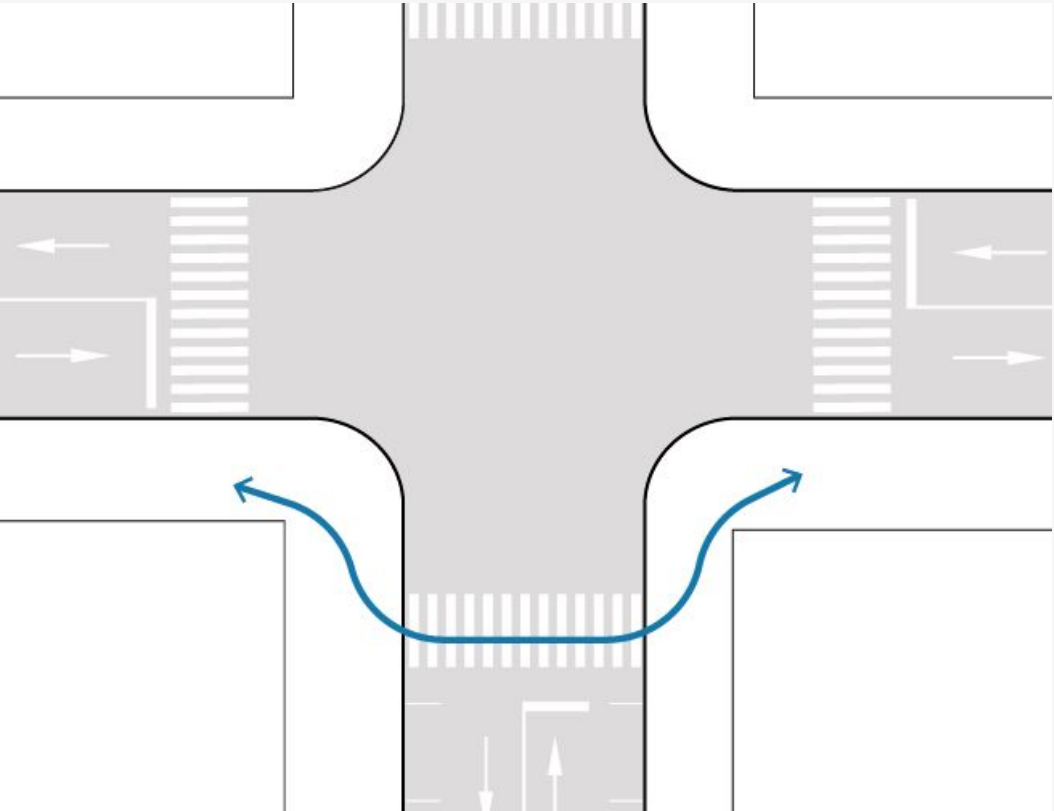
Safe, accessible crossings should be provided every 80–100 m, and at all legs of an intersection, to ensure a connected walkable network.

Crossings **over 200 m apart** must be **avoided** in urban contexts.

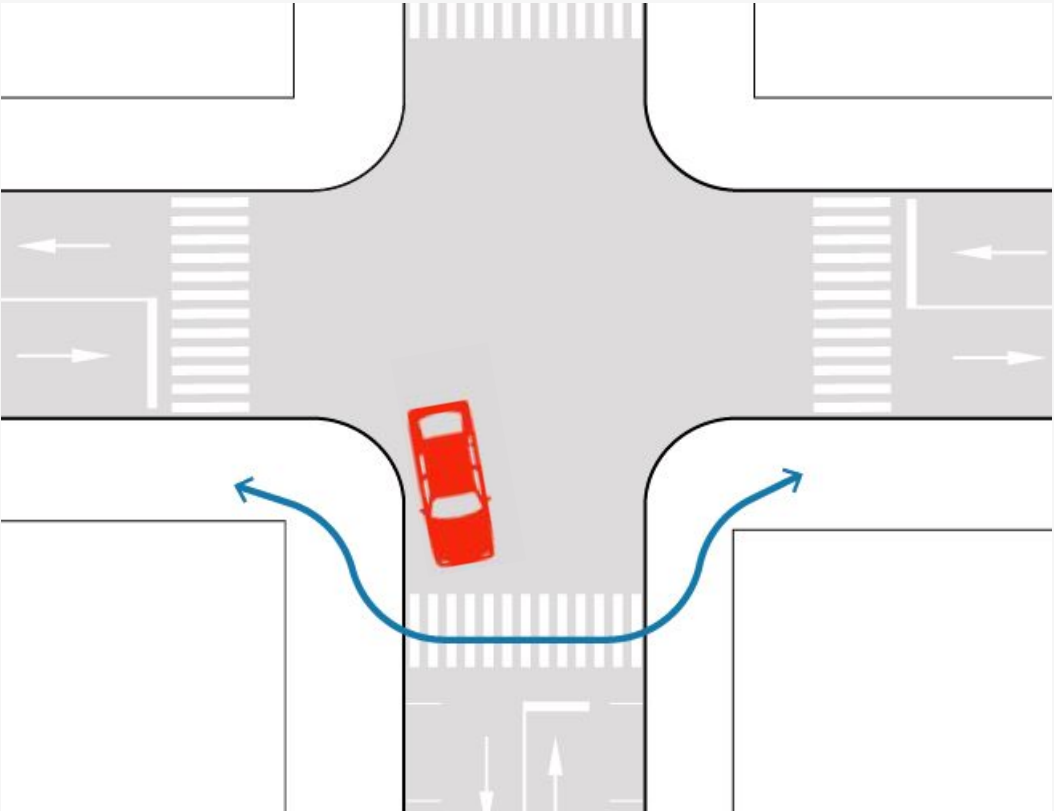
Alignment



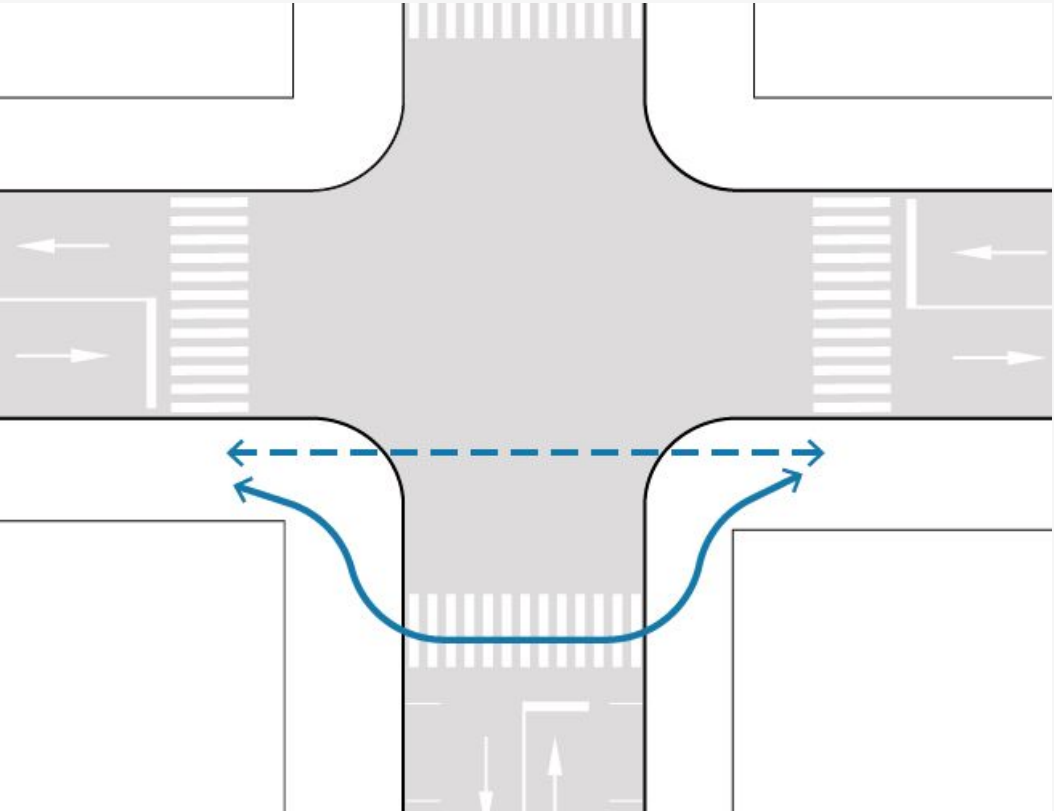
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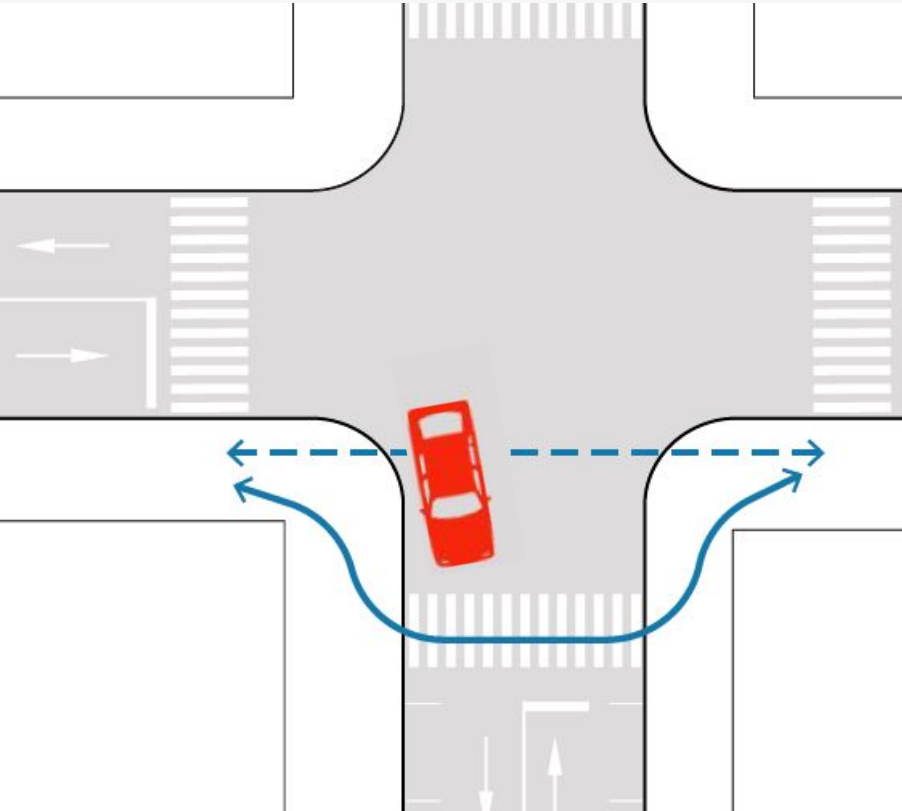
Alignment



Alignment



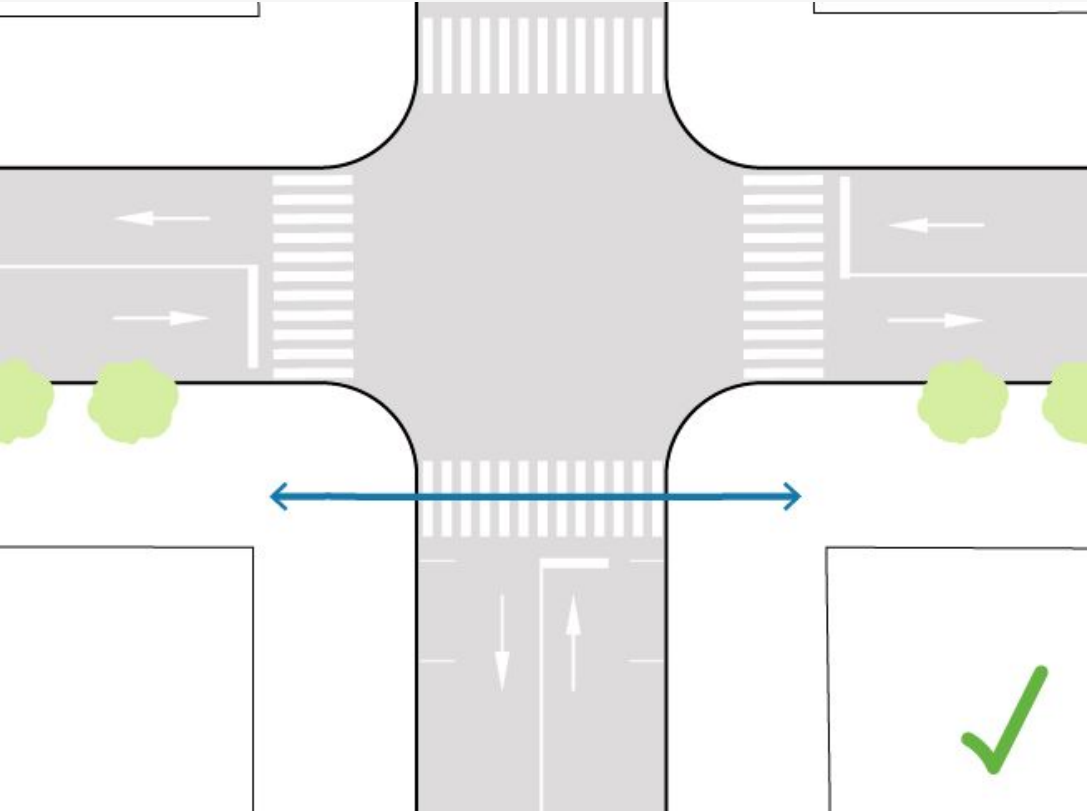
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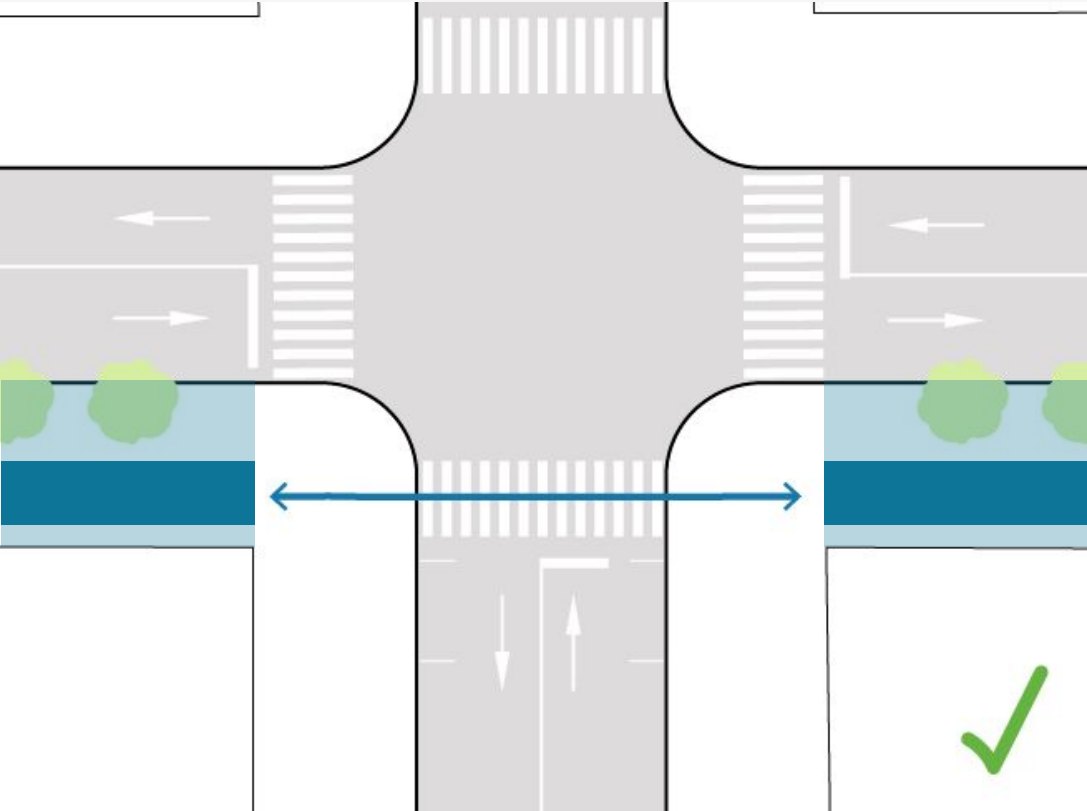
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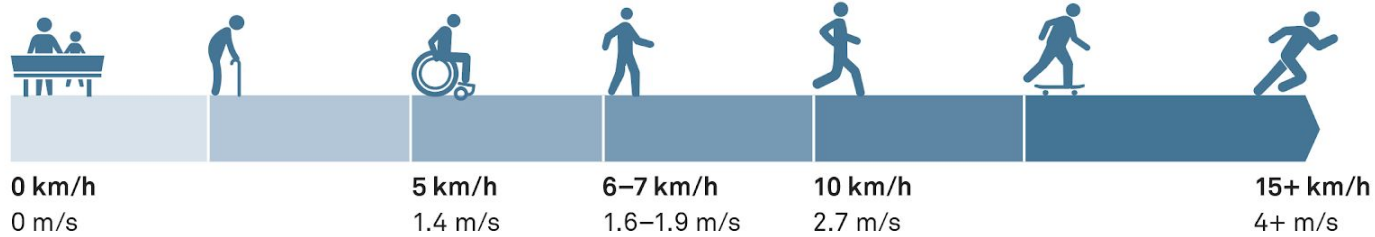
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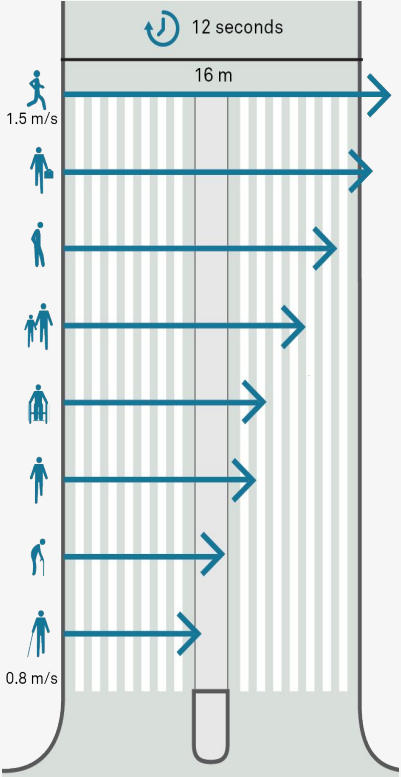
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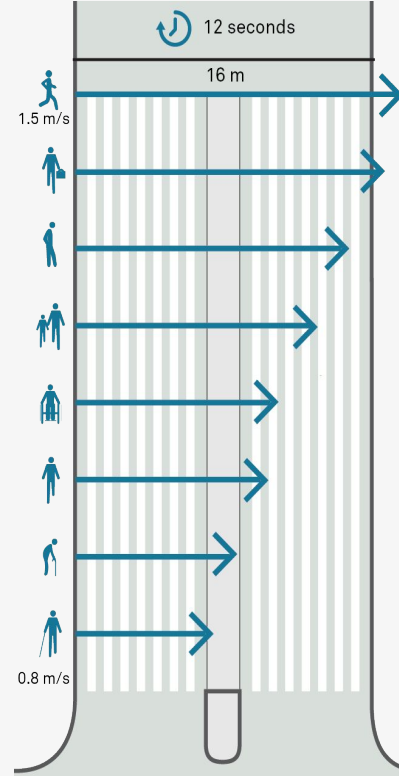
Speed



Walking speed



Walking speed



So we can
give pedestrians
MORE TIME
to cross, or...

We can give them
LESS DISTANCE
to cross...

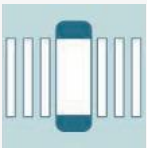
Elements



Sidewalks



Pedestrian Crossings



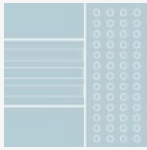
Pedestrian Refuge Islands



Curb Extensions



Accessibility Ramps



Vision-Impaired Guidance

Somewhere to wait



Signage and Wayfinding



Pedestrian Countdown Signals + Clocks



Lighting



Seating



Water Fountains



Weather Protection



Curbs



Waste Receptacles



Active Building Edges



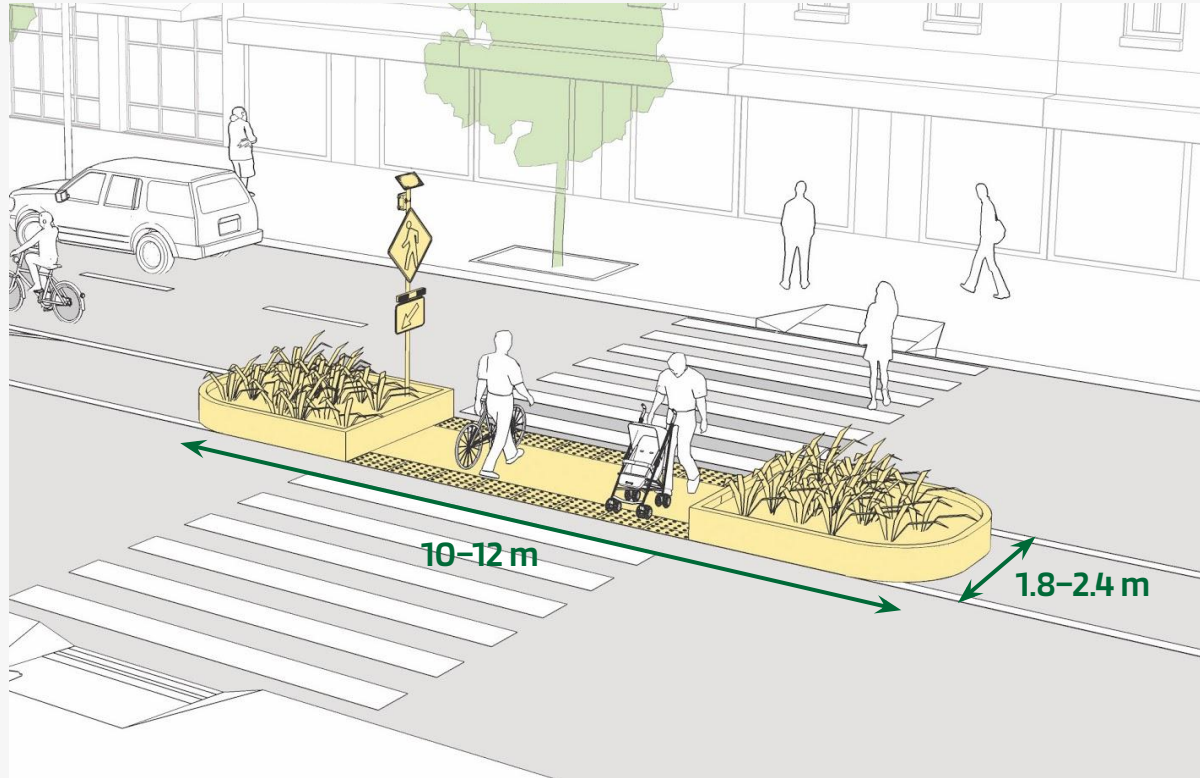
Trees and Landscaping

Refuge islands



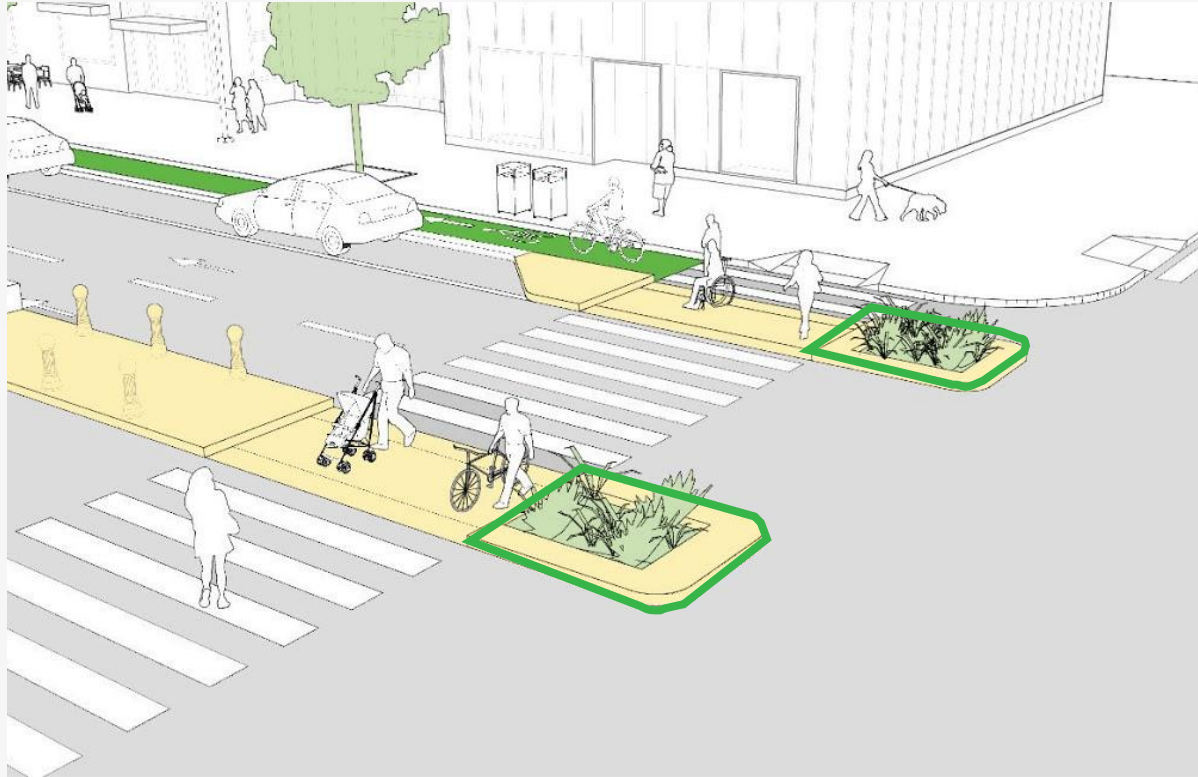
- Allow **two-stage** crossing
- To be installed when pedestrian has to cross **3+ lanes**

Refuge islands



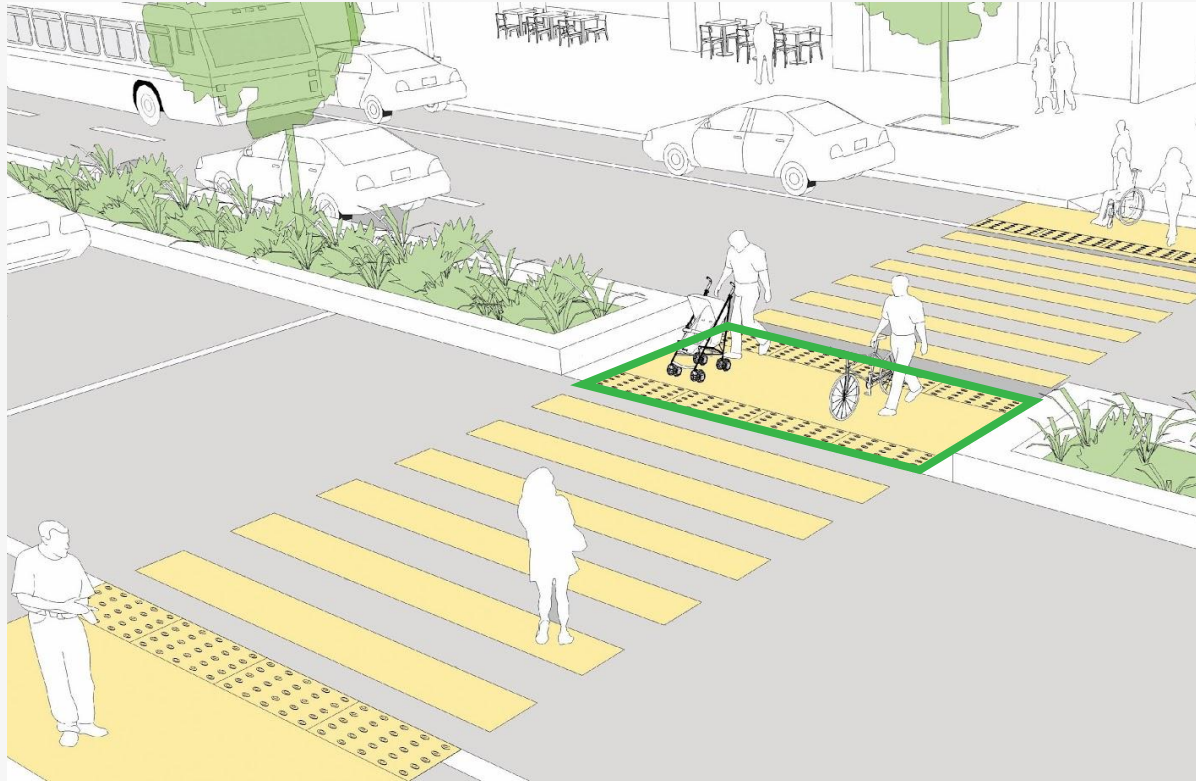
- Pedestrian refuge island should be at least **1.8 m** deep (preferred **2.4 m**)
- A pedestrian refuge island is ideally **10-12 m** long, providing enough protection at each end of the waiting space

Median tips



- This protects people waiting on the median from moving vehicles and slows turning motorists

Median cut-troughs



- Provided where there is a **significant pedestrian desire line** in front of transit stops and key destinations, or when the distance to the closest safe pedestrian crossing is more than 80-100 m

Elements



Sidewalks



Pedestrian Crossings



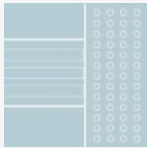
Pedestrian Refuge Islands



Curb Extensions



Accessibility Ramps



Vision-Impaired Guidance



Signage and Wayfinding



Reduce overall length of crossing

Countdown Signals + Clocks



Lighting



Seating



Water Fountains



Weather Protection



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Active Building Edges

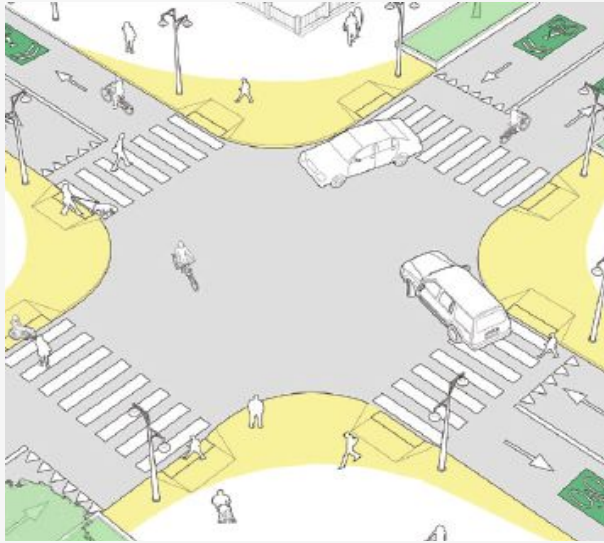


Trees and Landscaping

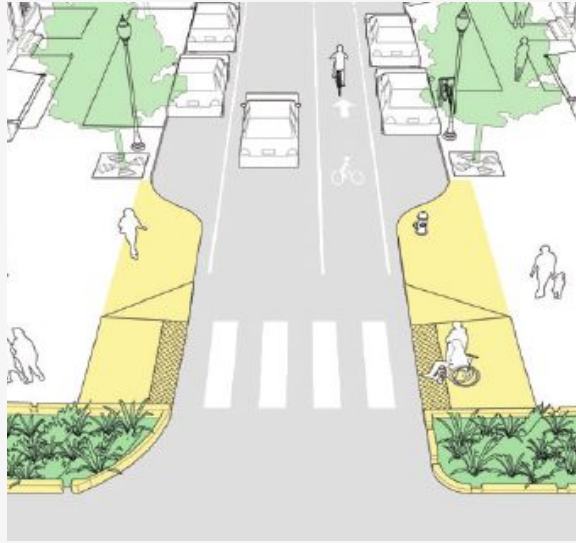
Curb extensions



Types



Corner Alignments



Bulb-Outs



Slip Lane Removal

Recap

Recap

Provide wide and continuous clear paths

Recap

- ✓ Provide wide and continuous clear paths

Recap

- ✓ Provide wide and continuous clear paths

Reduce overall length of crossing

Recap

- ✓ Provide wide and continuous clear paths
- ✓ Reduce overall length of crossing

Recap

- ✓ Provide wide and continuous clear paths
- ✓ Reduce overall length of crossing

Provide frequent opportunity to cross (100m)

Recap

- ✓ Provide wide and continuous clear paths
- ✓ Reduce overall length of crossing
- ✓ Provide frequent opportunity to cross (100m)

Recap

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- ✓ Provide frequent opportunity to cross (100m)

We like direct paths (to walk and cross!)

Recap

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- ✓ Reduce overall length of crossing
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Recap

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- ✓ Reduce overall length of crossing
- ✓ Provide frequent opportunity to cross (100m)
- ✓ We like direct paths (to walk and cross!)

Grade separated crossings

Recap

- ✓ Provide wide and continuous clear paths
- ✓ Reduce overall length of crossing
- ✓ Provide frequent opportunity to cross (100m)
- ✓ We like direct paths (to walk and cross!)
- ✗ Grade separated crossings

Recap

- ✓ Provide wide and continuous clear paths
- ✓ Reduce overall length of crossing
- ✓ Provide frequent opportunity to cross (100m)
- ✓ We like direct paths (to walk and cross!)
- ✗ Grade separated crossings

Obstructions

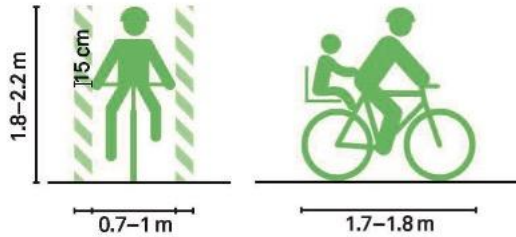
Recap

- ✓ Provide wide and continuous clear paths
- ✓ Reduce overall length of crossing
- ✓ Provide frequent opportunity to cross (100m)
- ✓ We like direct paths (to walk and cross!)
- ✗ Grade separated crossings
- ✗ Obstructions

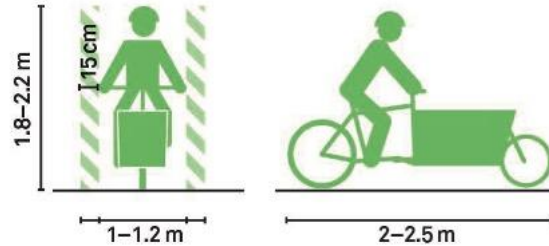
Designing for cyclists

Types and dimensions

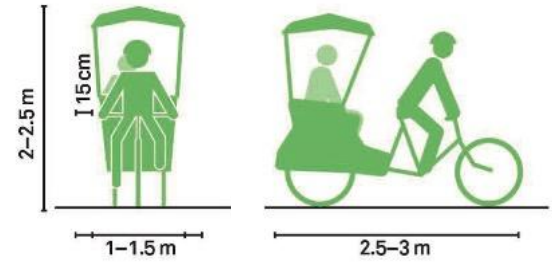
Bicycle



Cargo bike



Tricycle / Cycle rickshaw



Redefining “the cyclist”



Redefining “the cyclist”



Redefining “the cyclist”



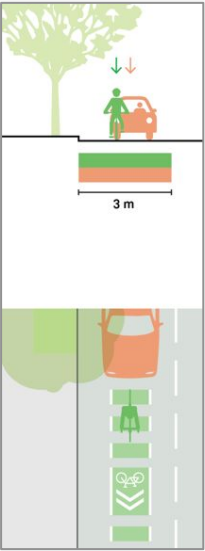
Designing for All Ages and Abilities



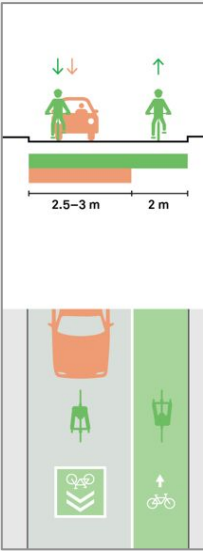
Designing for All Ages and Abilities



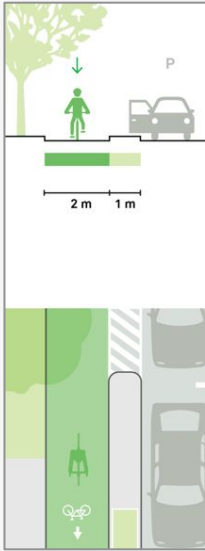
Types



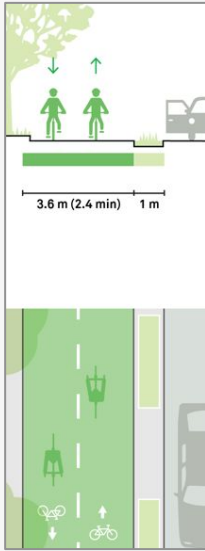
Cycle Street



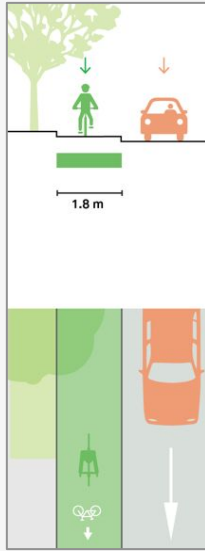
Contraflow
Cycle Street



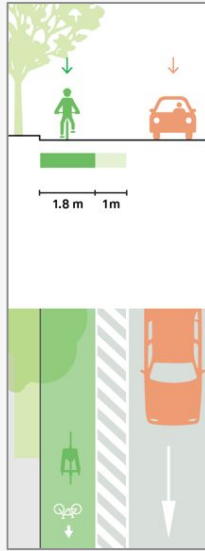
Protected
Cycle Track



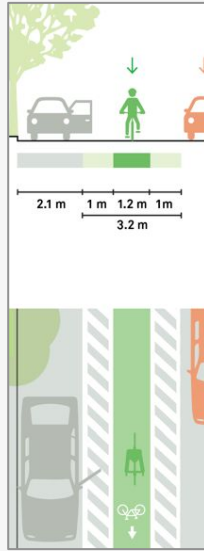
Bidirectional
Cycle Track



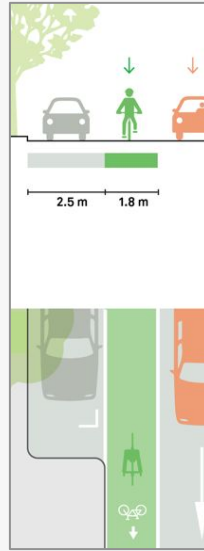
Raised
Cycle Track



Curbside
Buffered
Cycle Lane

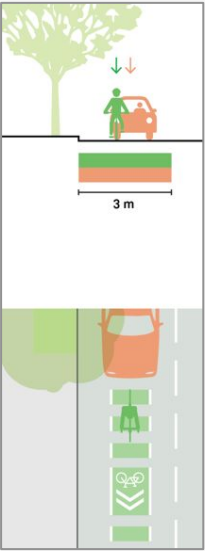


Buffered
Cycle Lane

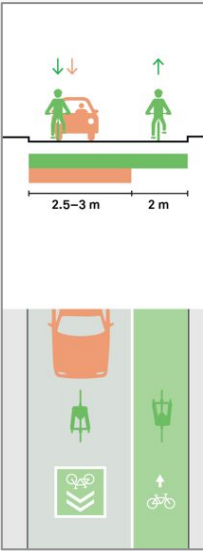


Unprotected
Cycle Lane

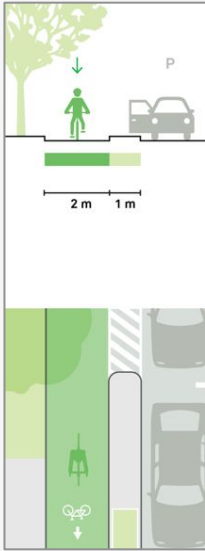
Types



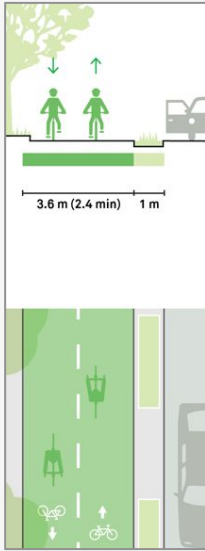
Cycle Street



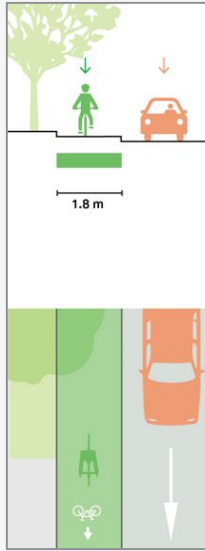
Contraflow
Cycle Street



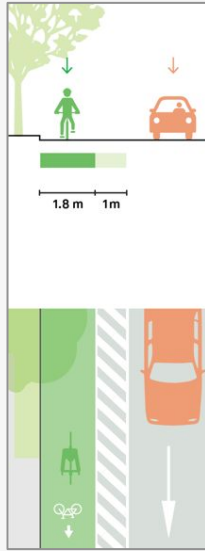
Protected
Cycle Track



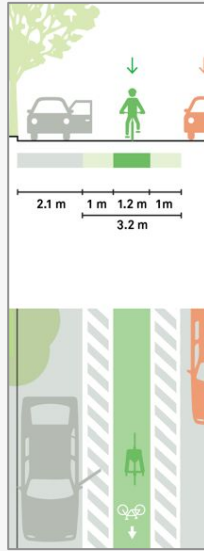
Bidirectional
Cycle Track



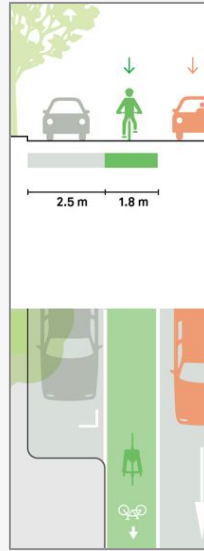
Raised
Cycle Track



Curbside
Buffered
Cycle Lane



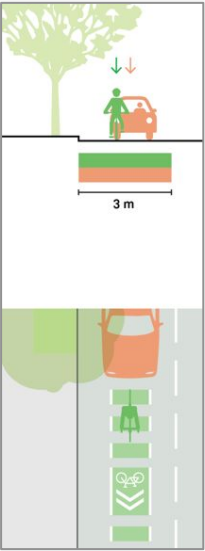
Buffered
Cycle Lane



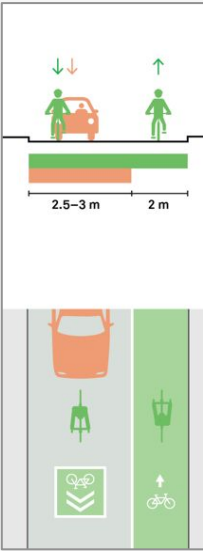
Unprotected
Cycle Lane

< 30 km/h
Share

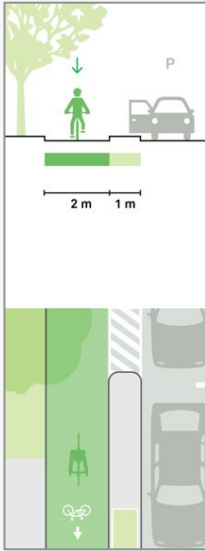
Types



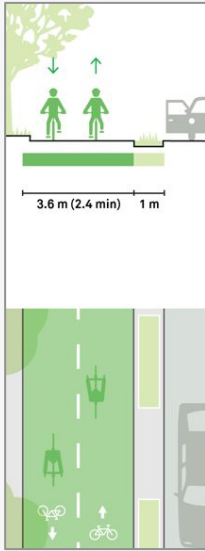
Cycle Street



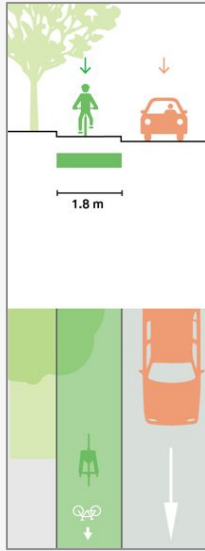
Contraflow
Cycle Street



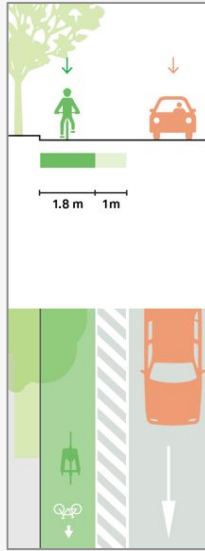
Protected
Cycle Track



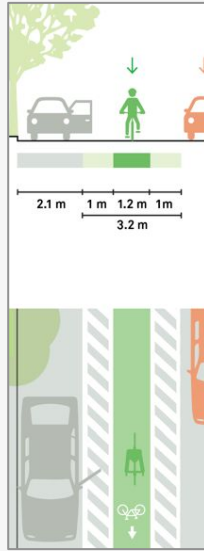
Bidirectional
Cycle Track



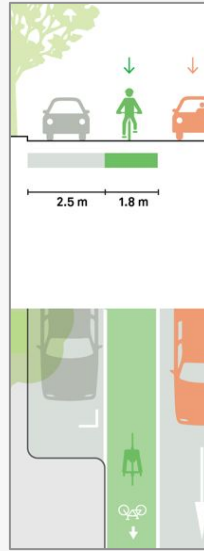
Raised
Cycle Track



Curbside
Buffered
Cycle Lane



Buffered
Cycle Lane

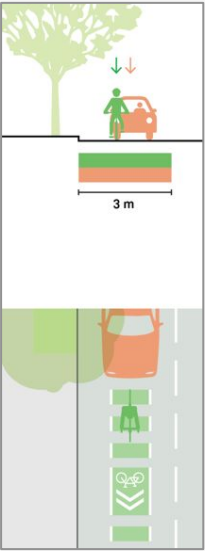


Unprotected
Cycle Lane

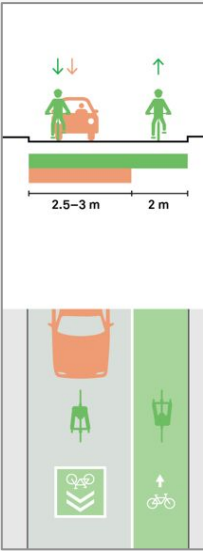
< 30 km/h
Share

> 30 km/h
Protect

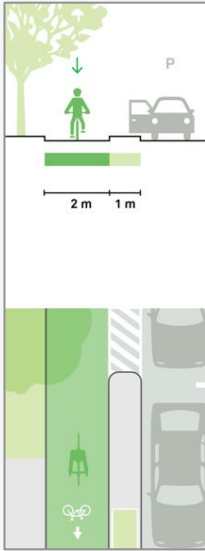
Types



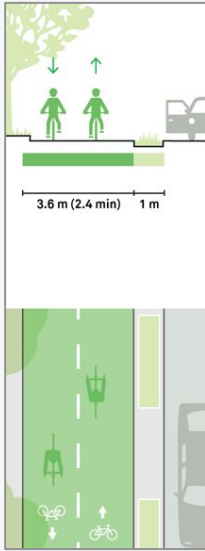
Cycle Street



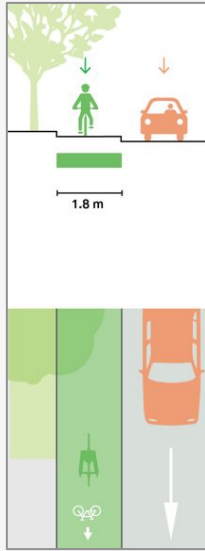
Contraflow
Cycle Street



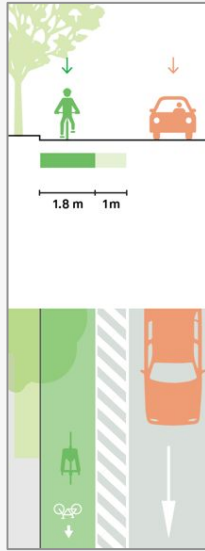
Protected
Cycle Track



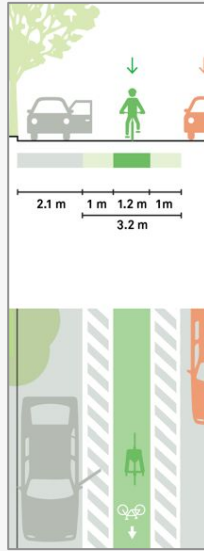
Bidirectional
Cycle Track



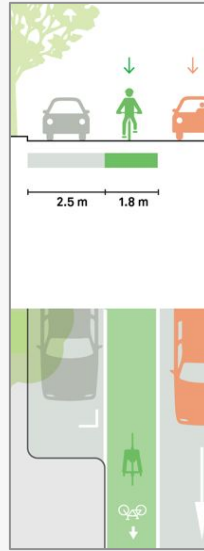
Raised
Cycle Track



Curbside
Buffered
Cycle Lane



Buffered
Cycle Lane



Unprotected
Cycle Lane

< 30 km/h
Share

> 30 km/h
Protect

30-40 km/h
Contextualize

Types



Cycle Street

Contraflow
Cycle Street



Protected
Cycle Track

Bidirectional
Cycle Track

Raised
Cycle Track



Curbside
Buffered
Cycle Lane

Buffered
Cycle Lane

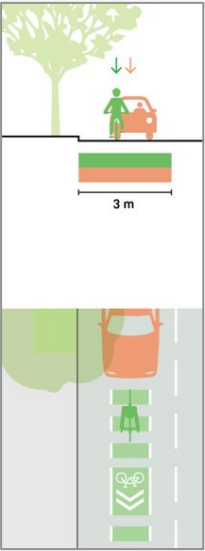
Unprotected
Cycle Lane

< 30 km/h
Share

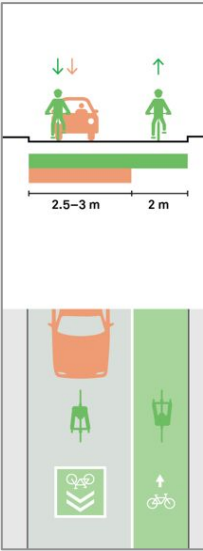
> 30 km/h
Protect

30–40 km/h
Contextualize

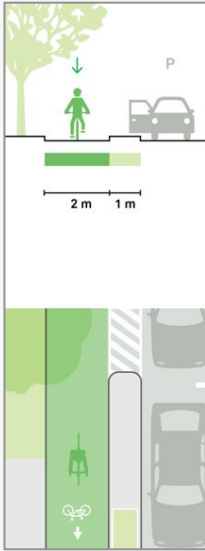
Types



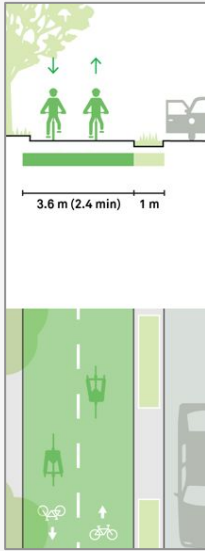
Cycle Street



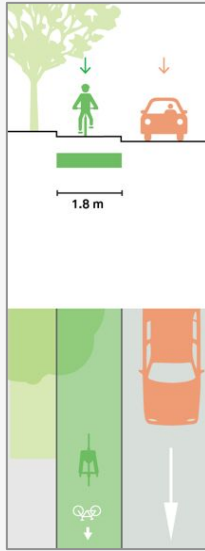
Contraflow
Cycle Street



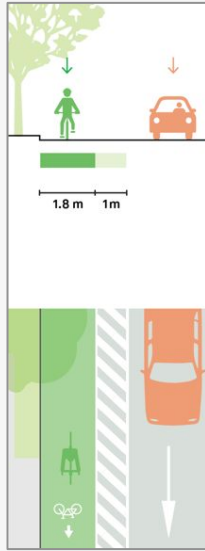
Protected
Cycle Track



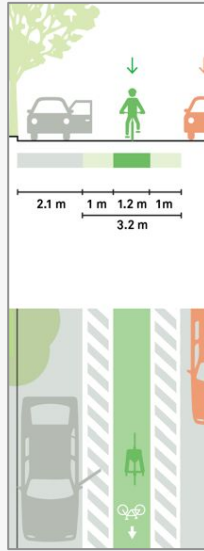
Bidirectional
Cycle Track



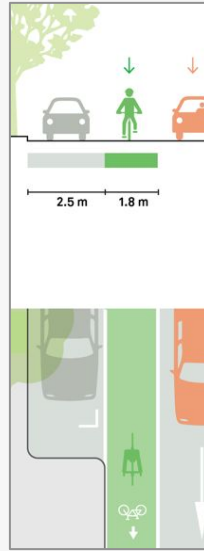
Raised
Cycle Track



Curbside
Buffered
Cycle Lane



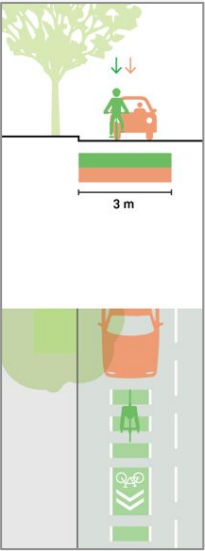
Buffered
Cycle Lane



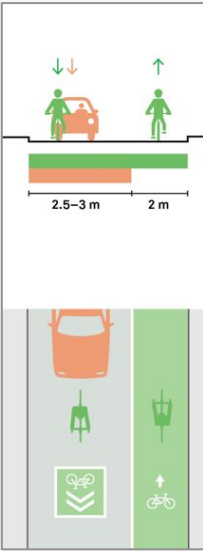
Conventional
Cycle Lane

Safe?

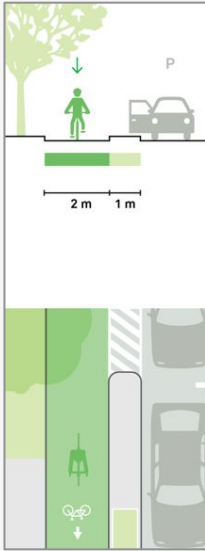
Types



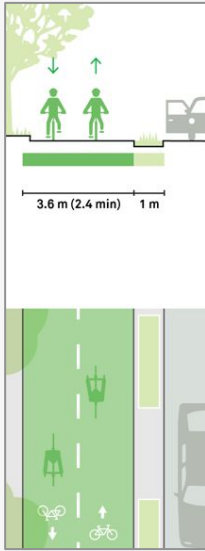
Cycle Street



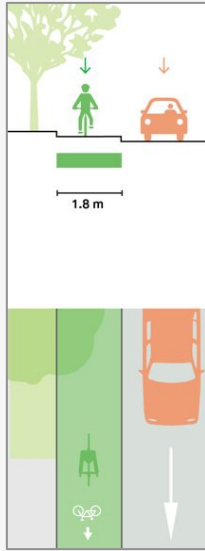
Contraflow
Cycle Street



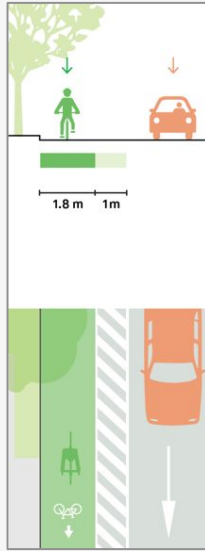
Protected
Cycle Track



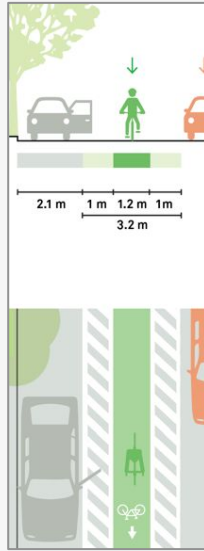
Bidirectional
Cycle Track



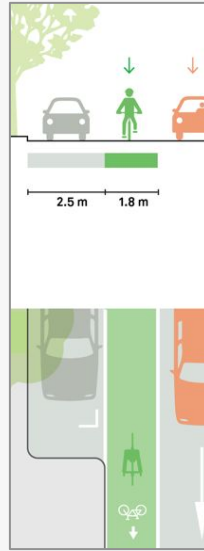
Raised
Cycle Track



Curbside
Buffered
Cycle Lane



Buffered
Cycle Lane

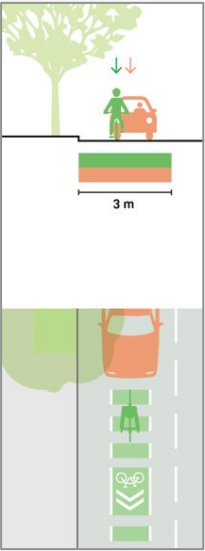


Conventional
Cycle Lane

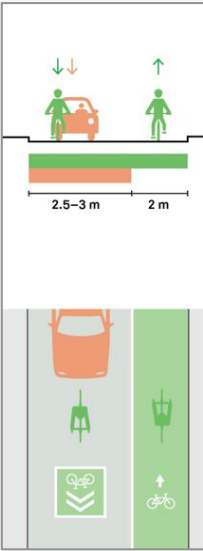
Safer

Safe?

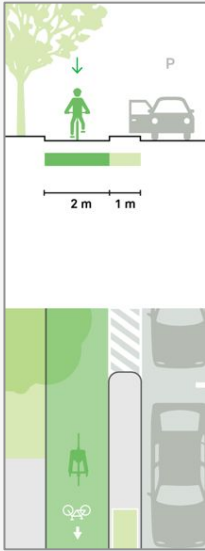
Types



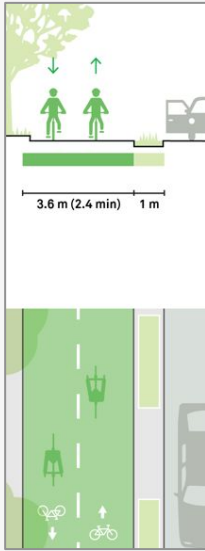
Cycle Street



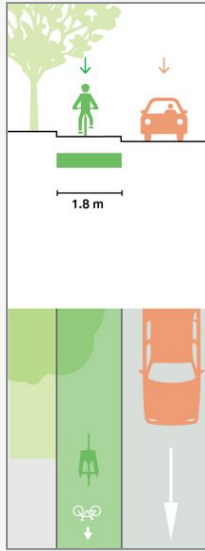
Contraflow
Cycle Street



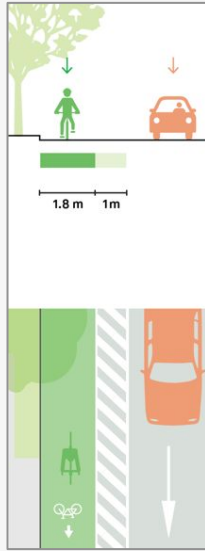
Protected
Cycle Track



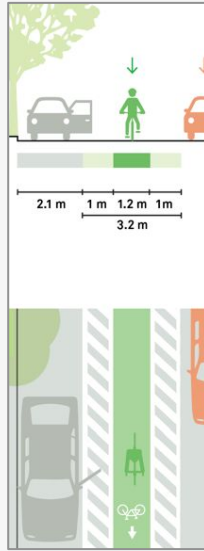
Bidirectional
Cycle Track



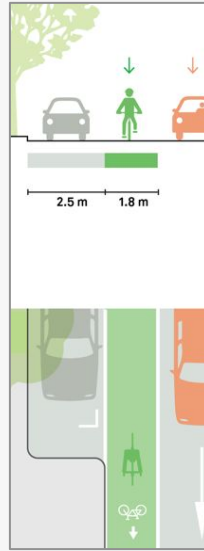
Raised
Cycle Track



Curbside
Buffered
Cycle Lane



Buffered
Cycle Lane



Conventional
Cycle Lane

Safest

Safer

Safe?

Basic geometry



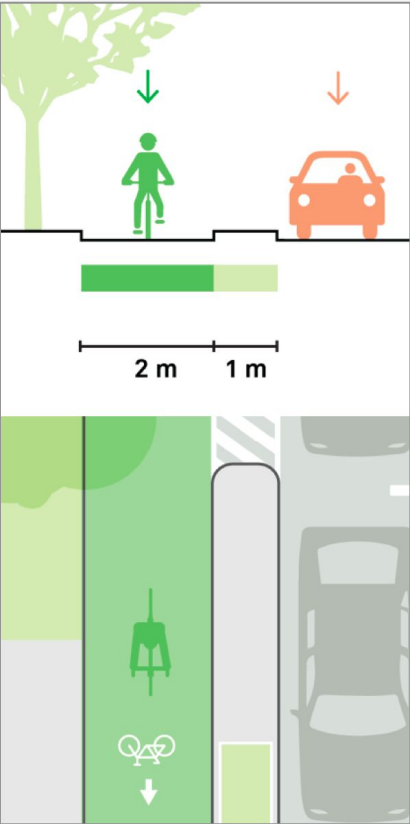
Curb Zone
1m – 3.5

Curb
||

Cycle Lane
Min. 1.8 m – 2 m

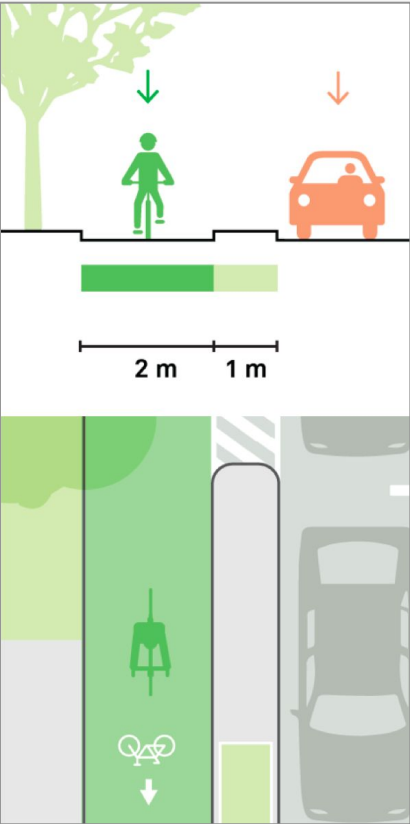
Buffer Zone

Protected Cycle Track

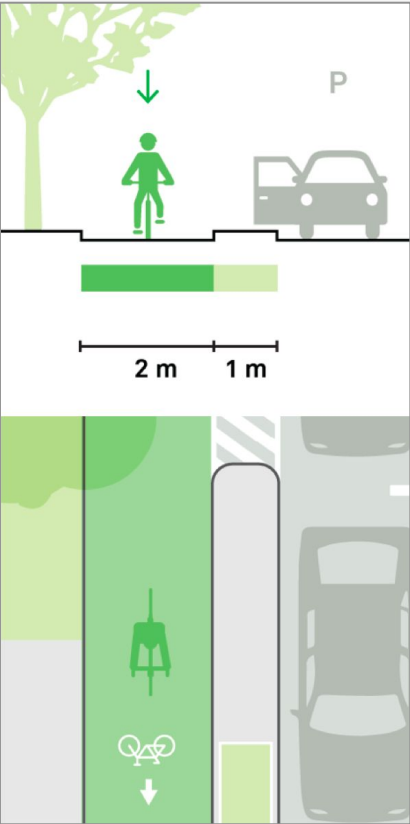


Bogotá, Colombia

Protected Cycle Track



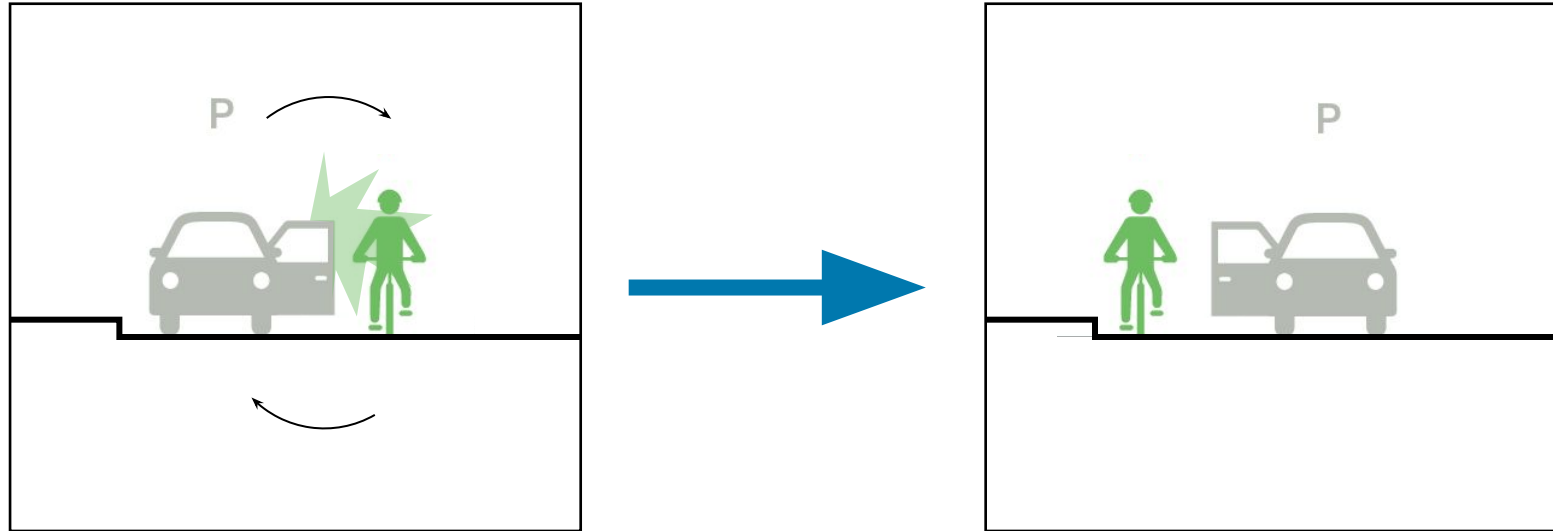
Parking Protected Cycle Track



NYC, USA

Cycle Facilities

Protected Cycle Track



Parking Protected Cycle Track



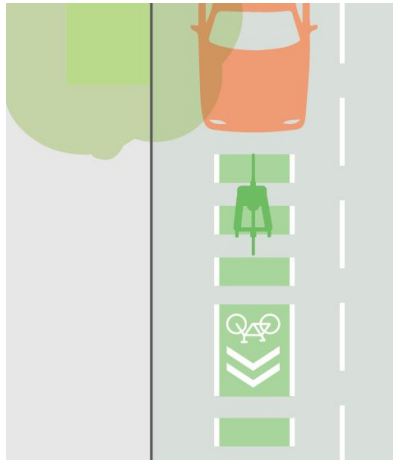
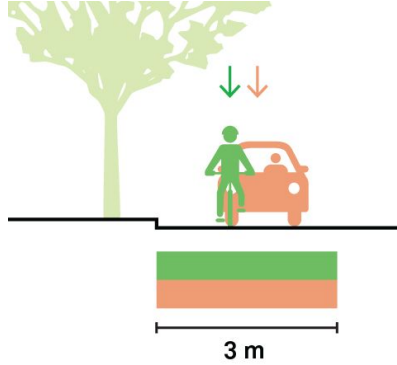
2nd Avenue
New York, USA



- 58% in injuries to all users
- 67% in pedestrian crashes
- 29% in speeding
- + 49% in retail sales

Cycle Facilities

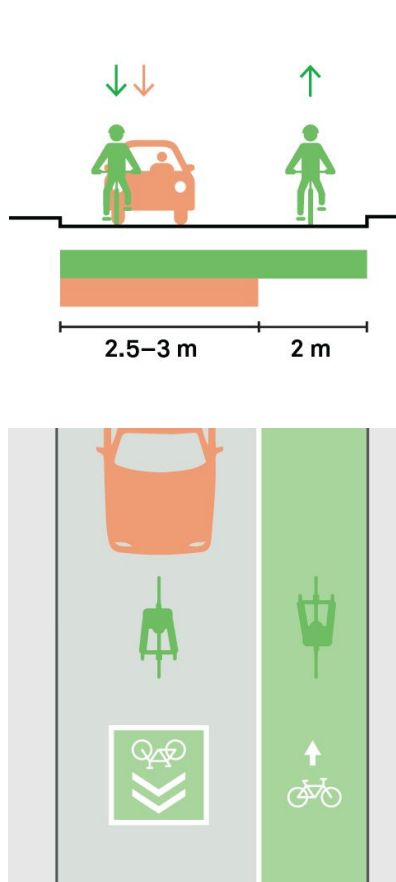
Cycle Streets



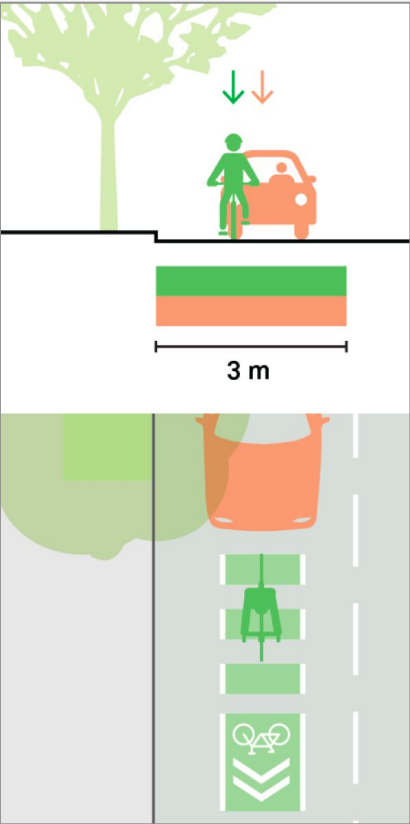
Amsterdam, NL

Cycle Facilities

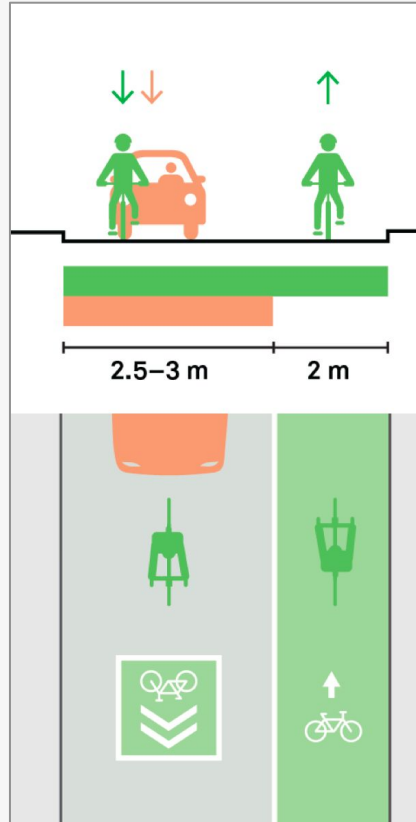
Contraflow Cycle Lanes



Cycle Streets

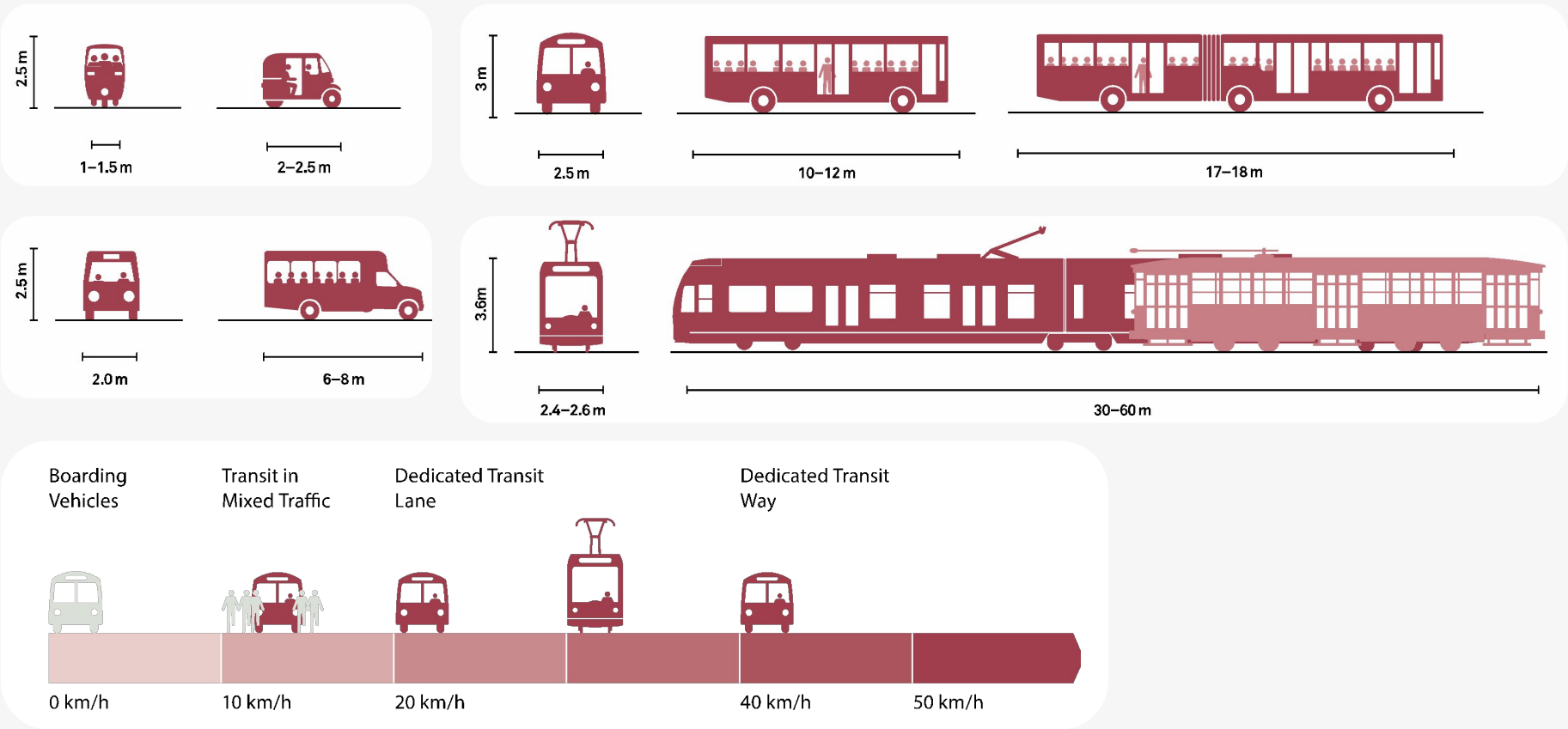


Contraflow Cycle Lanes



Designing for transit users

Speed, variations and dimensions



Transit facilities

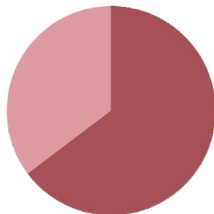
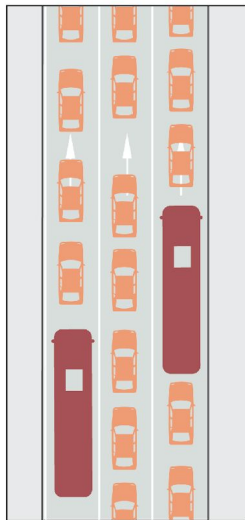


Curb Zone

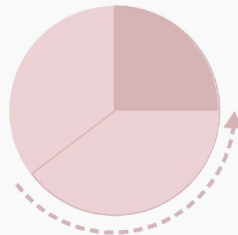
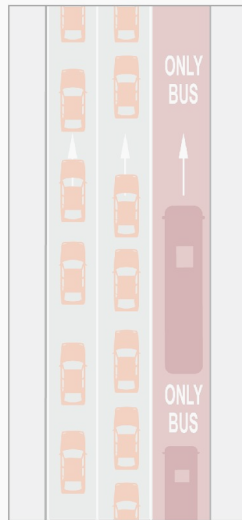
Dedicated Right-of-way

Buffer Zone

Safe travel time with dedicated transit facilities

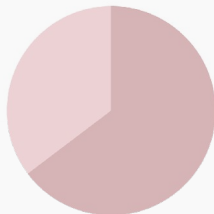
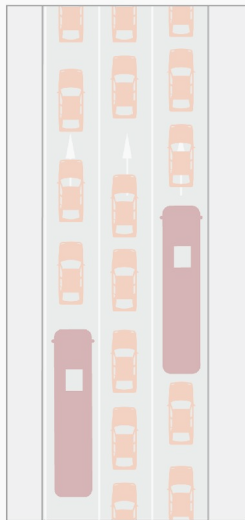


Transit stuck in congestion
**1000-2800
people/ hour**

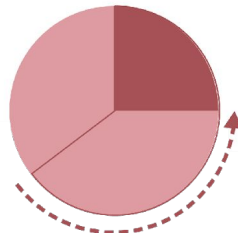
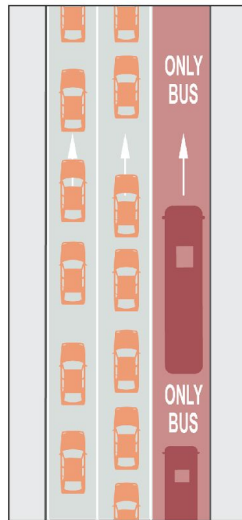


Transit given dedicated space
**4000-8000
people/ hour**

Safe travel time with dedicated transit facilities

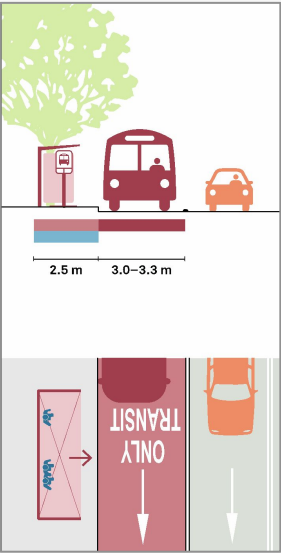


Transit stuck in congestion
1000-2800
people/ hour

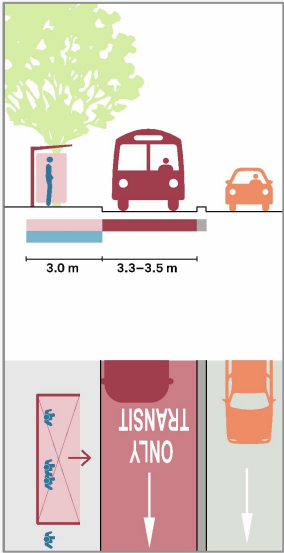


Transit given dedicated space
4000-8000
people/ hour

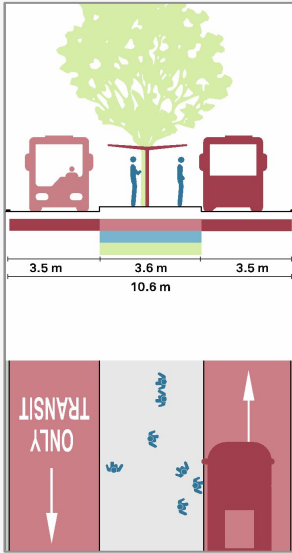
Geometry



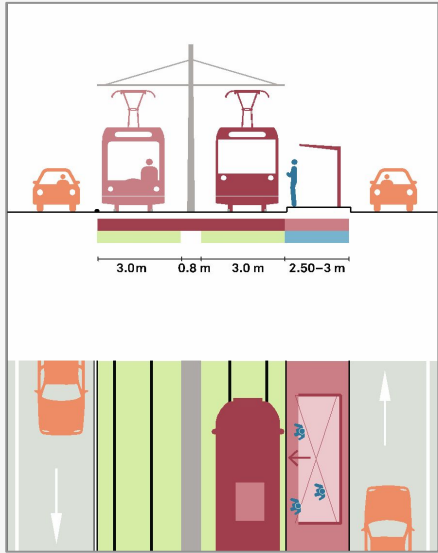
Side-Running
Dedicated Transit
Lane



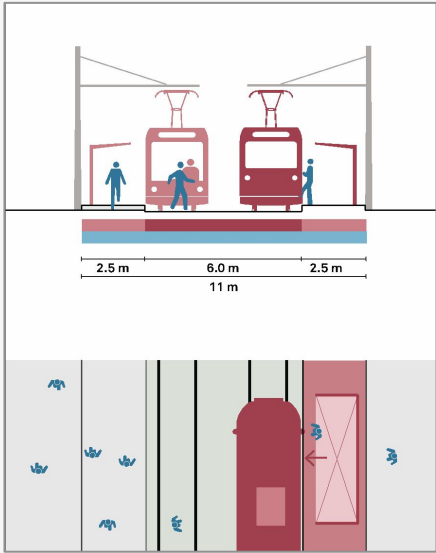
Side-Running
Transitway



Center-Running
Transitway with
Center Boarding



Center-Running Transitway with
Center Boarding



Transit Malls

Side-Running Dedicated Transit Lane



Chicago, USA

Side-Running Transitway



Medellin, Colombia

Center-Running Transitway with Side Boarding



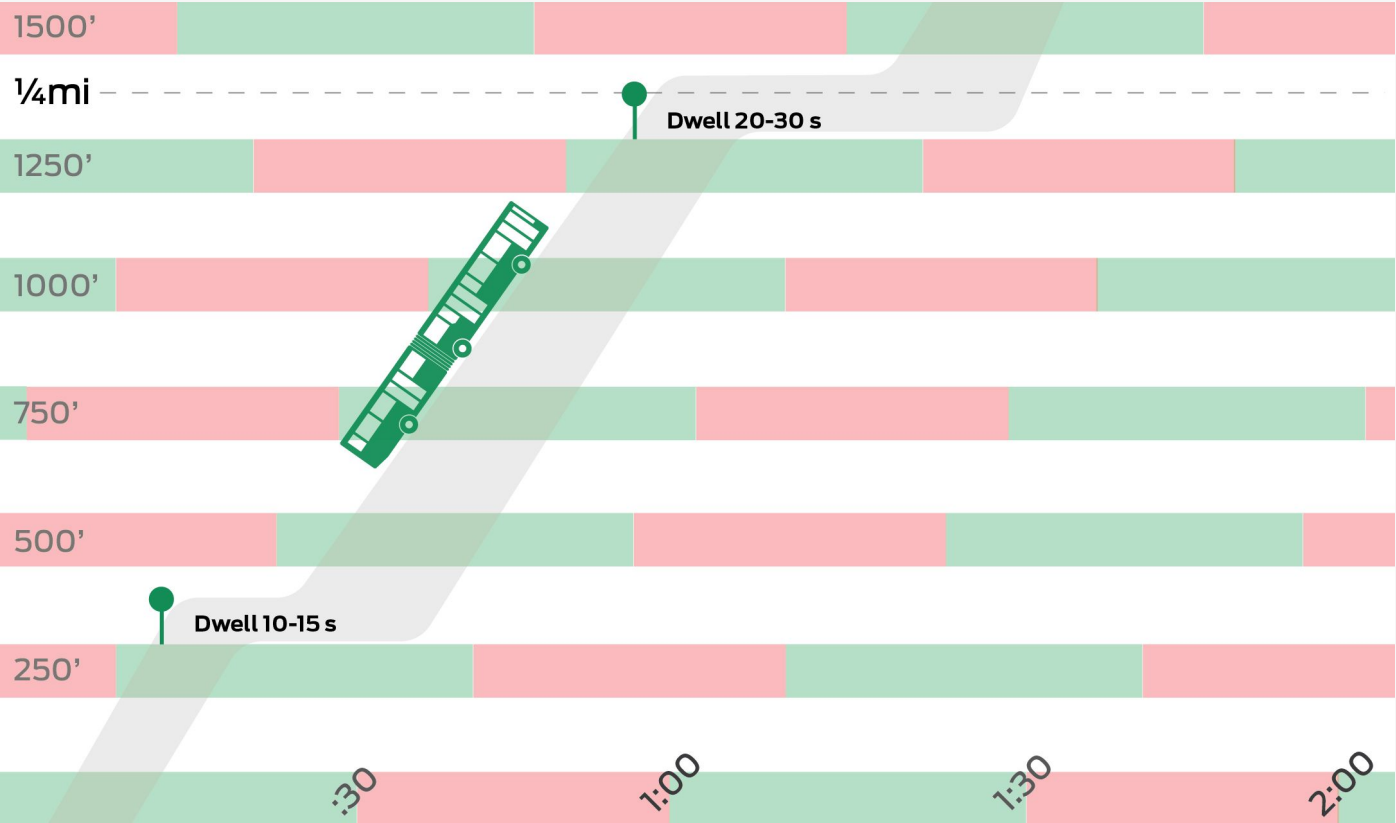
Nantes,
France

Transit Malls or Transit Streets



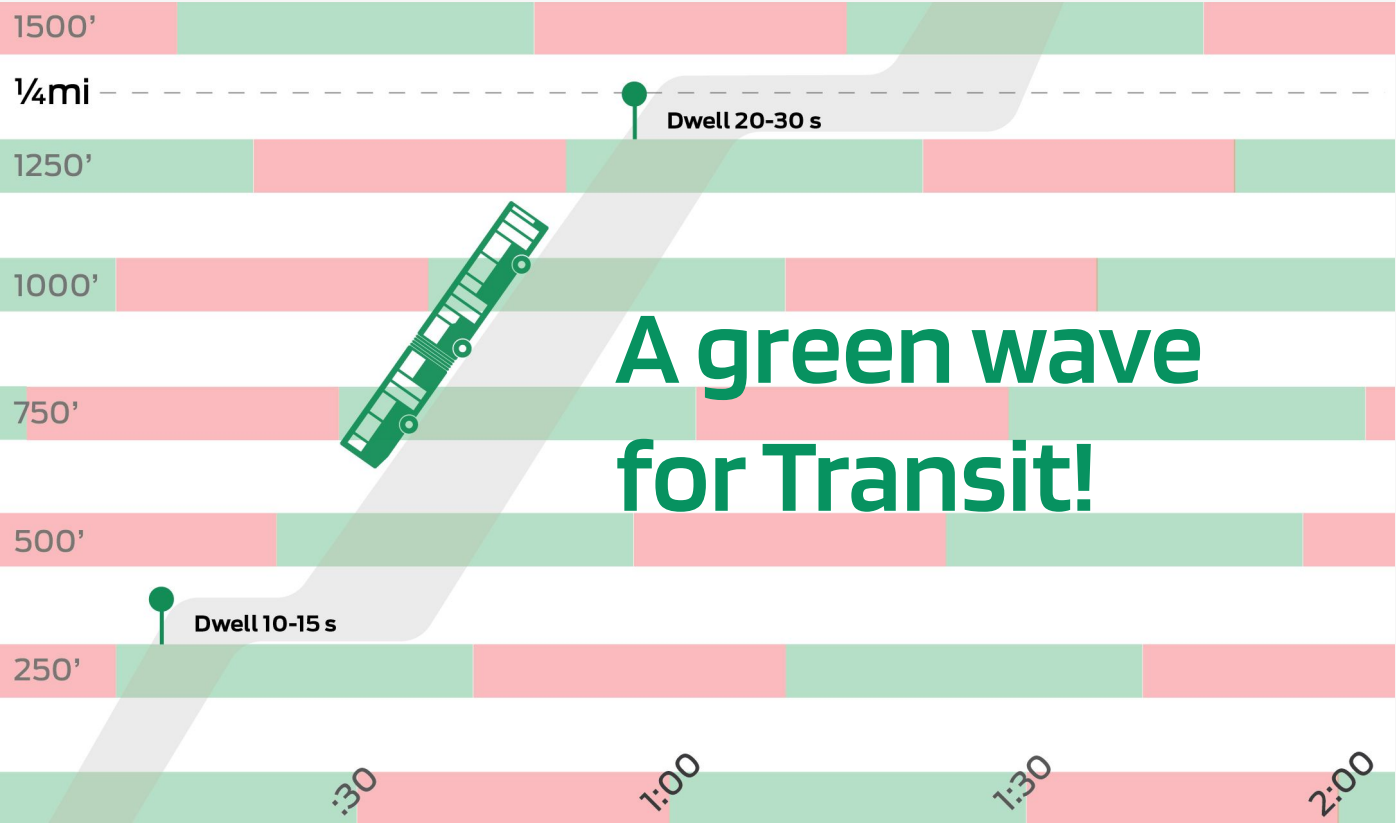
Bogotá, Colombia

Signal Progression



<https://nacto.org/publication/transit-street-design-guide/intersections/signals-operations/transit-signal-progression/>

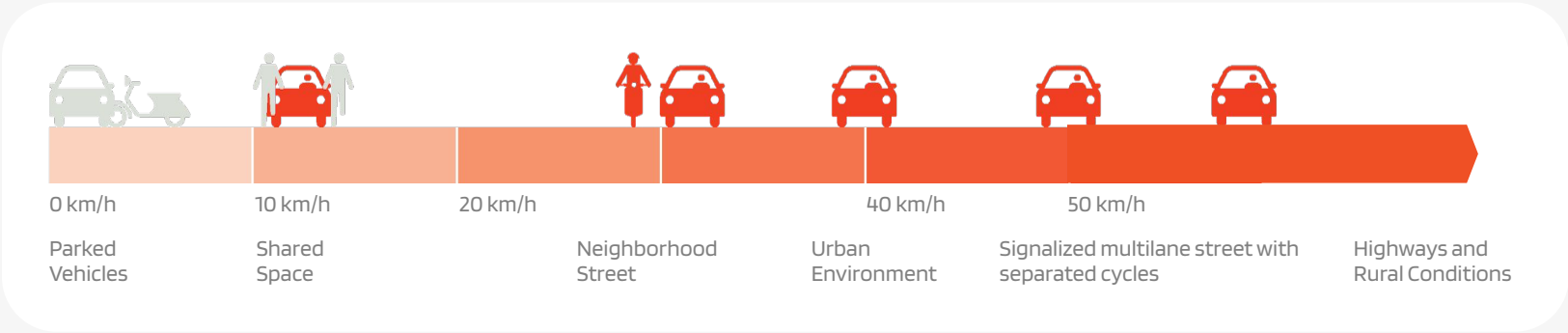
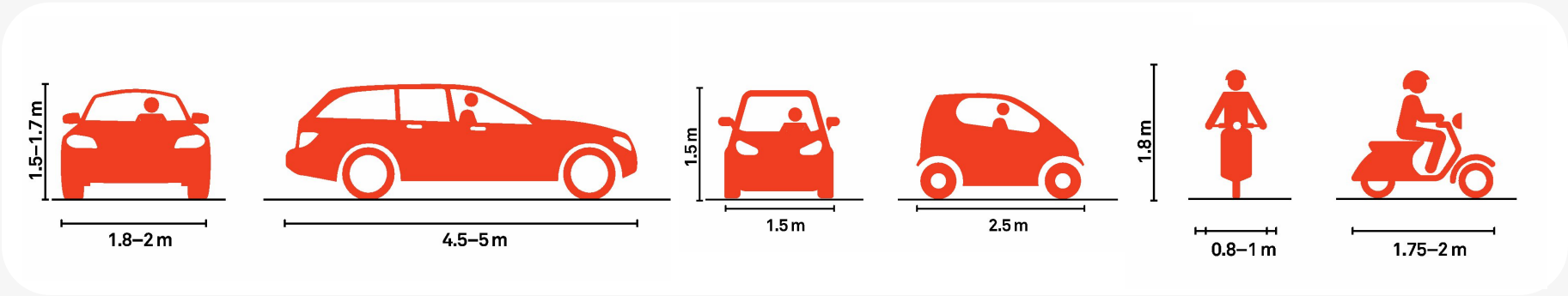
Signal Progression



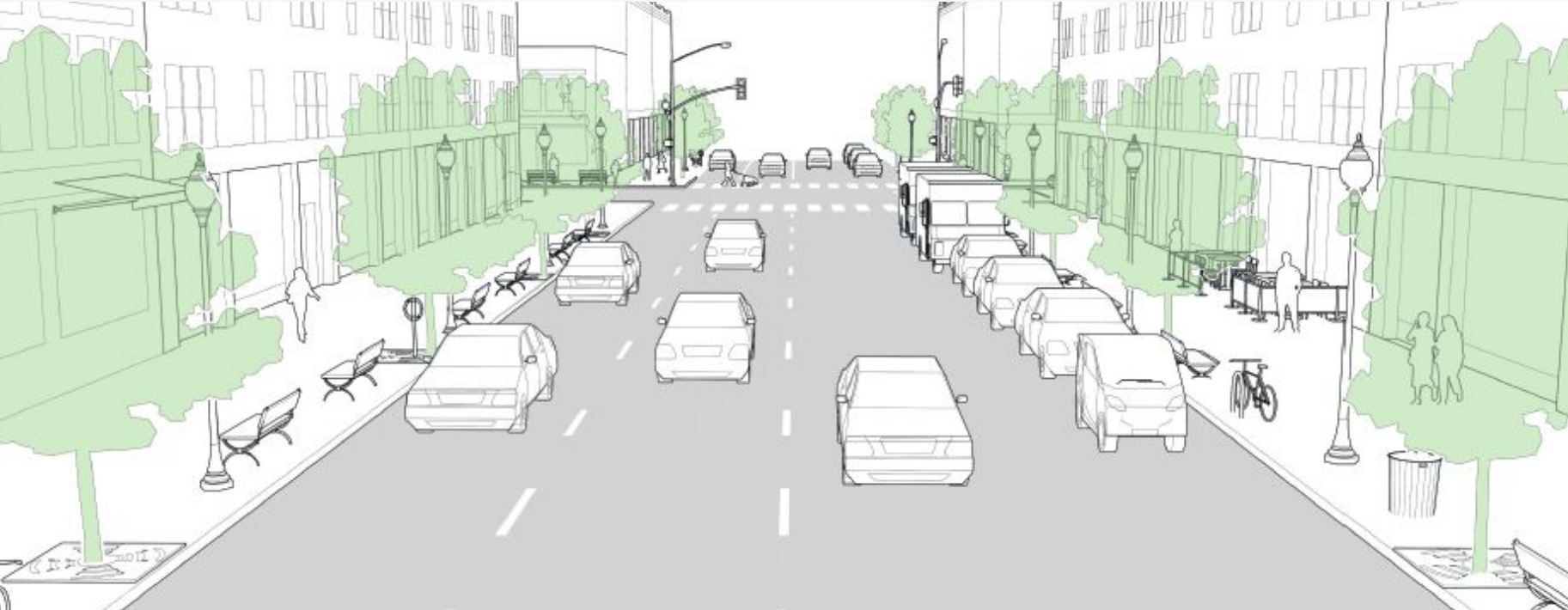
<https://nacto.org/publication/transit-street-design-guide/intersections/signals-operations/transit-signal-progression/>

Designing for motorists

Speed, variations and dimensions



Motorists



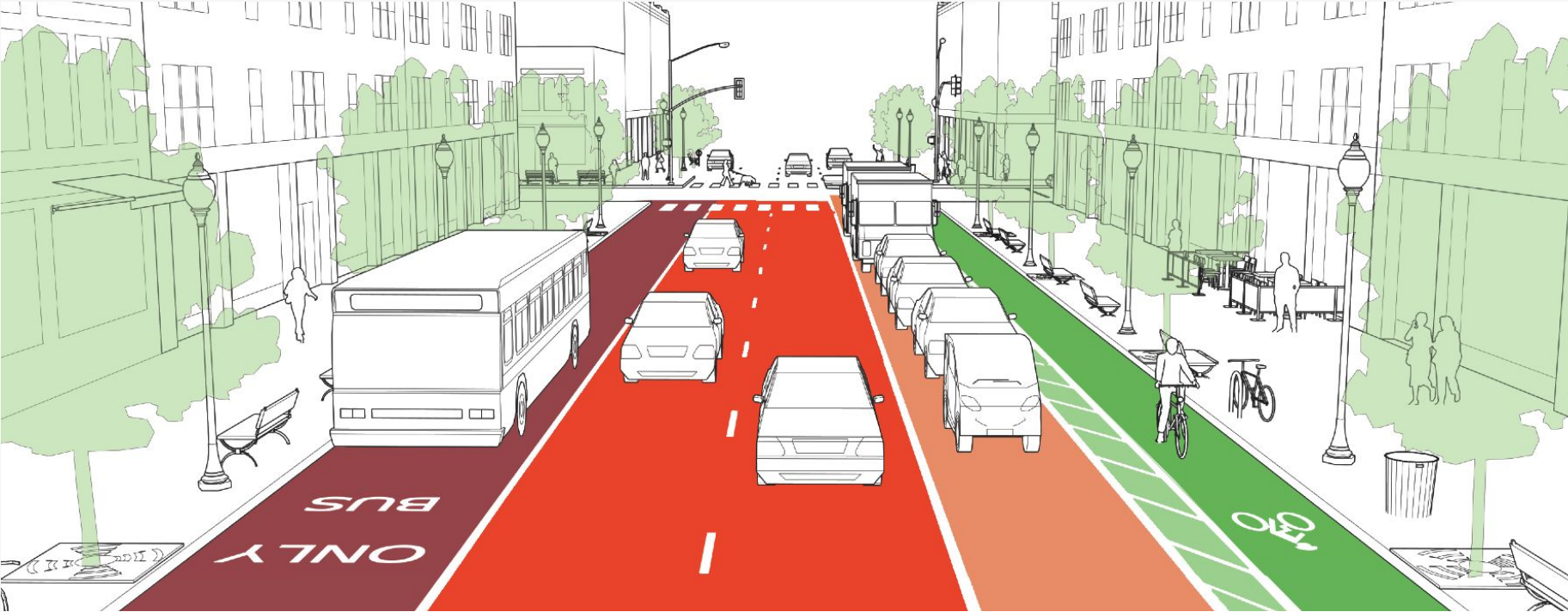
4 m

3.5 m

3.5 m

4 m

Motorists



3.5m

3m

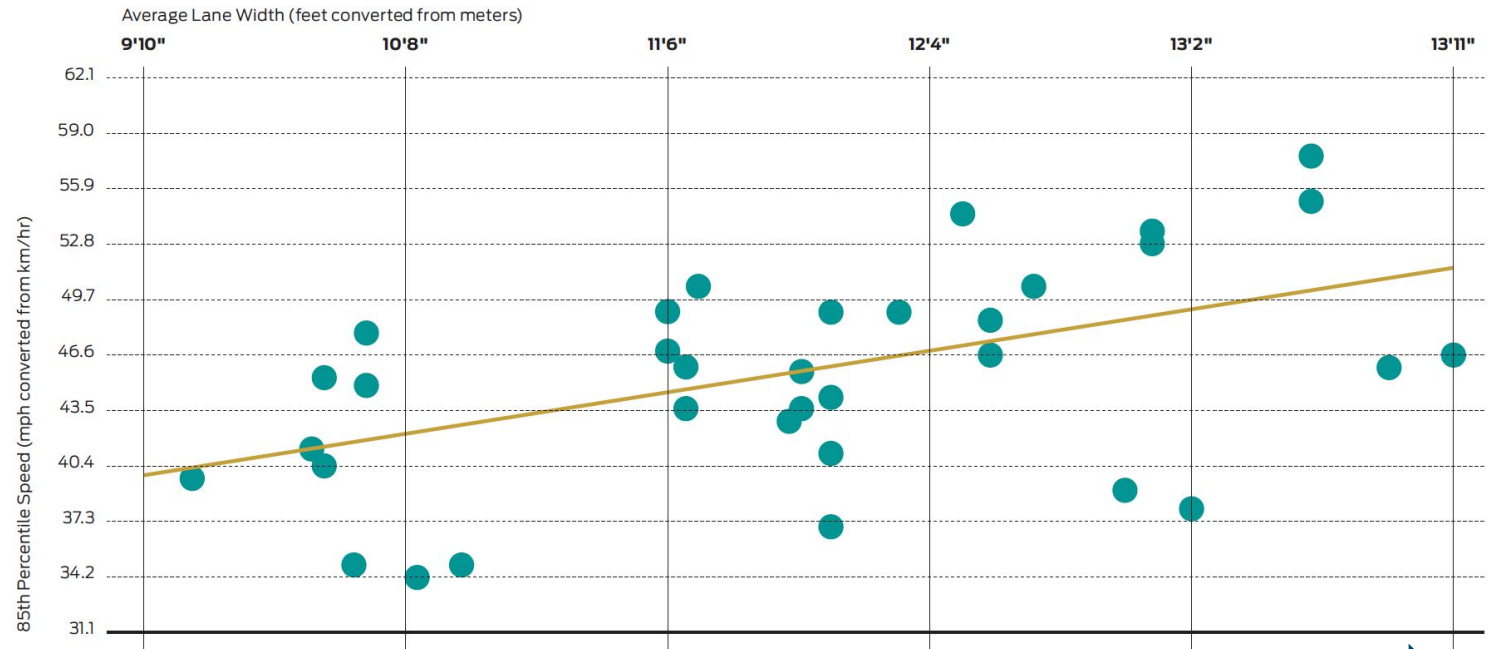
3m

1.8-2.5m

1m

2.1m

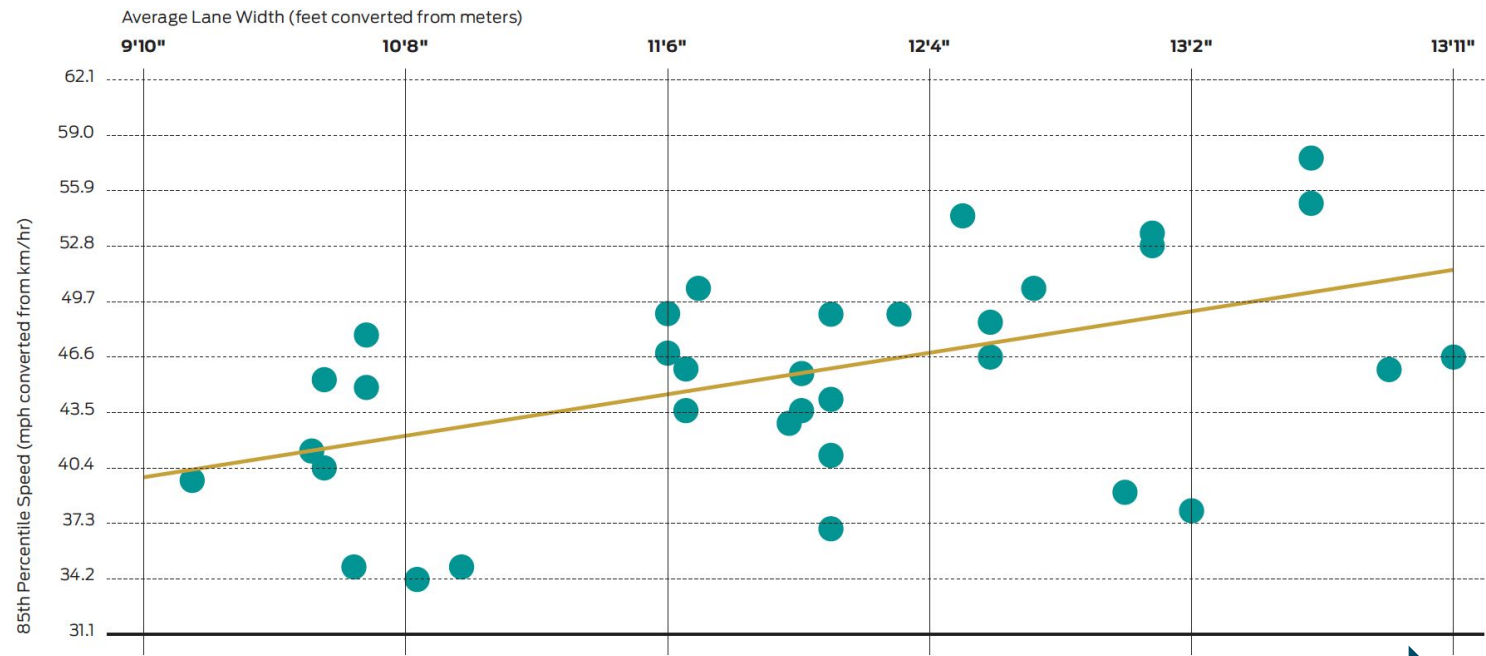
Wider travel lanes are correlated with higher vehicle speeds



Wider lanes



Wider travel lanes are correlated with higher vehicle speeds



Wider lanes = Higher speeds

Traffic calming measures – Lane narrowing

Why narrowing lanes?

Narrower lanes (3 m-wide)

- Are **safer**
- Encourage **slow speeds**
- Carry **more vehicles** (...or at least as much as wider lanes)

Toolkit of Traffic Calming Measures



Pedestrian crossings

Refuge islands

Toolkit of Traffic Calming Measures



Pedestrian plazas



Parklets

Toolkit of Traffic Calming Measures

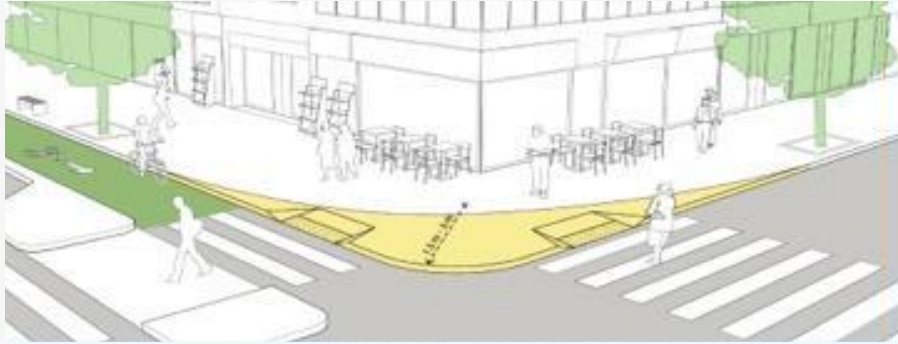


Mini-RoundABOUTs



Chicane

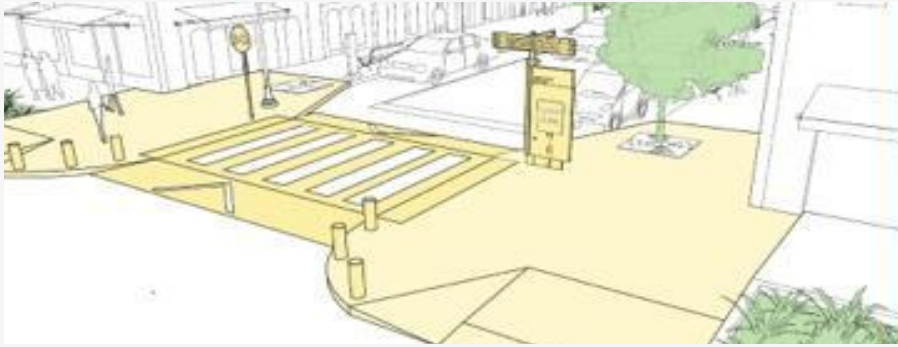
Toolkit of Traffic Calming Measures



Tighter Turning Radii

Curb Extensions

Toolkit of Traffic Calming Measures



Neighborhood Gateways

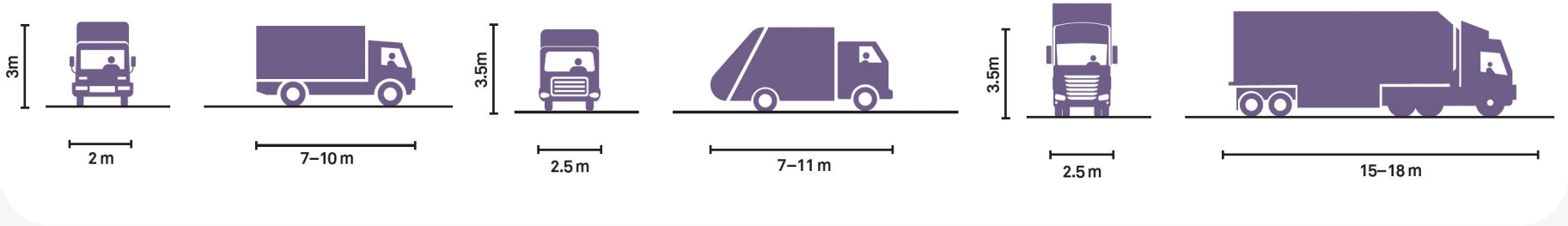
Raised Intersections

Recap

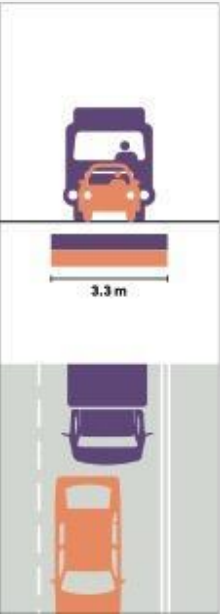
- ✓ Narrow lanes are safer and efficient lanes
- ✓ Manage speed through design!
(Make speeding uncomfortable)
- ✓ Give priority to vulnerable users
- ✗ Avoid highway design in urban context!!

Designing for Freight and Service Providers

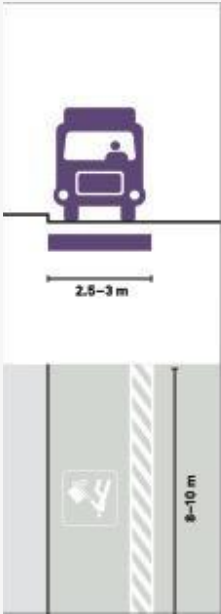
Speed, variations and dimensions



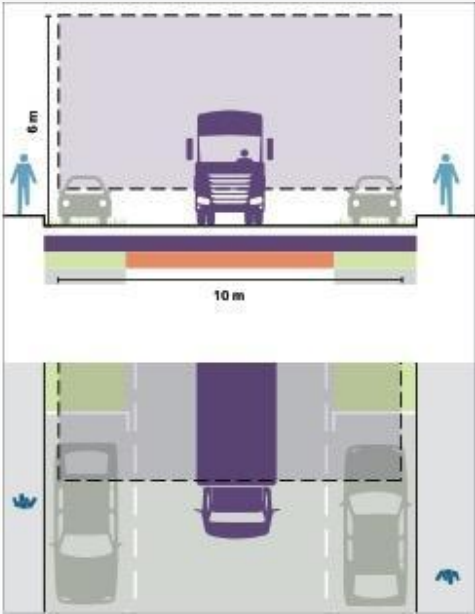
Geometry



Travel lanes

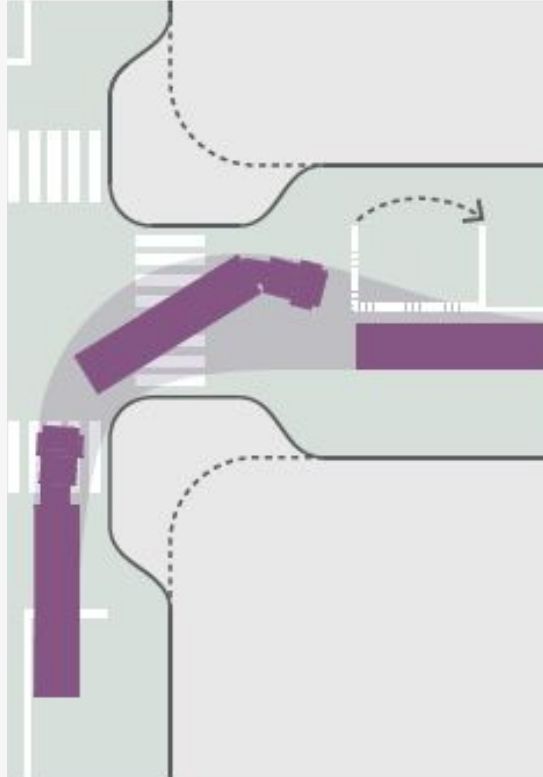


Loading Bays



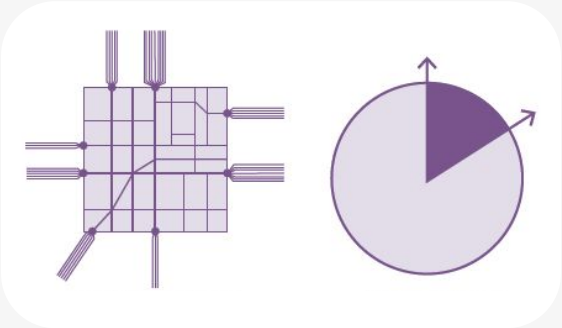
Oversized Travel Lanes

Corner Radii

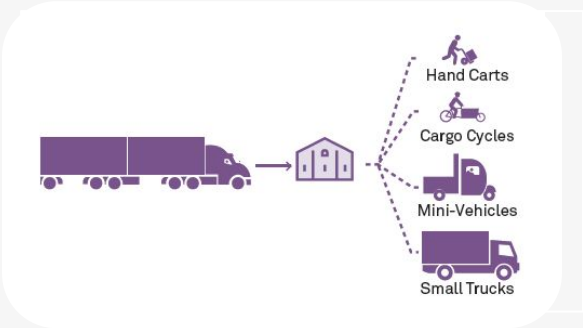


Geometric techniques such as a recessed stop bar can be used, without increasing the turn radius and allow larger vehicles to turn.

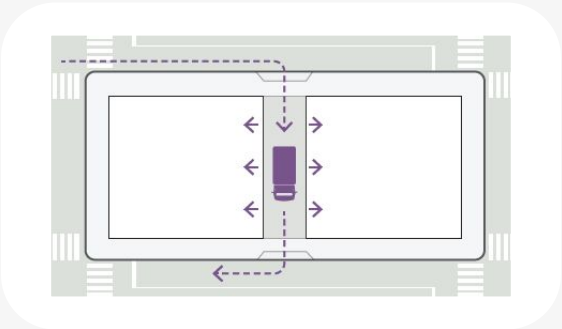
Managing space and time



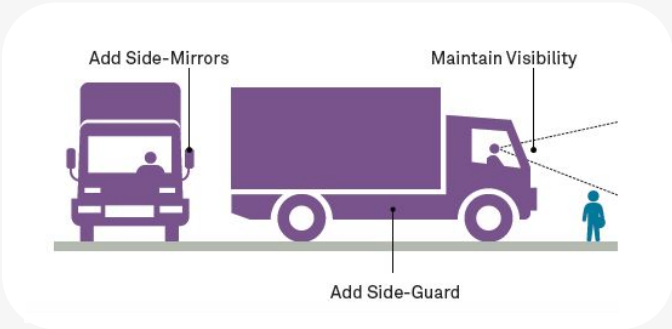
Network and time management



Consolidation and distribution centers



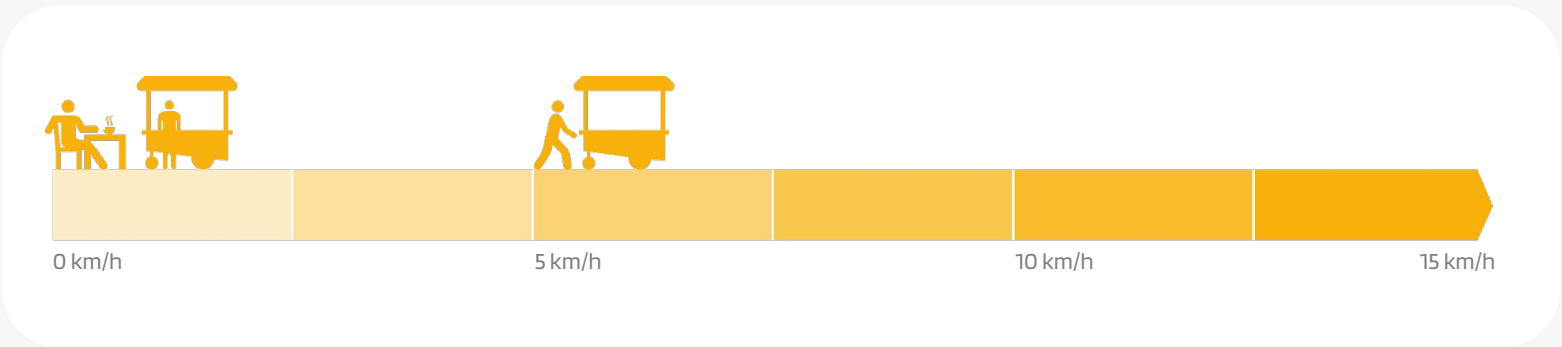
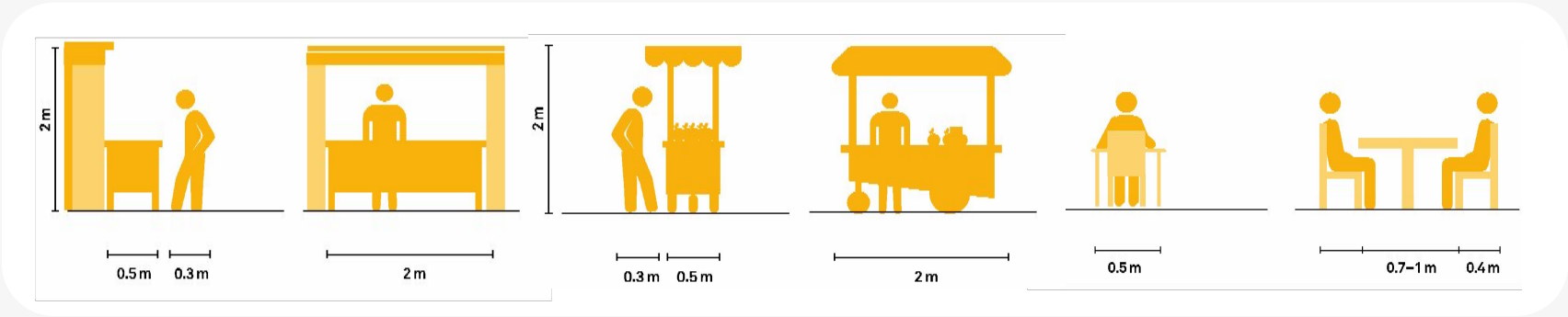
Service alleys



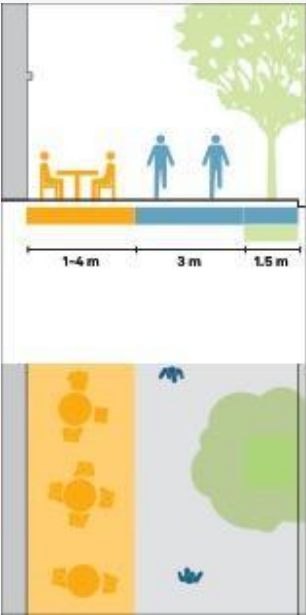
Safe freight vehicles

Designing for people doing business

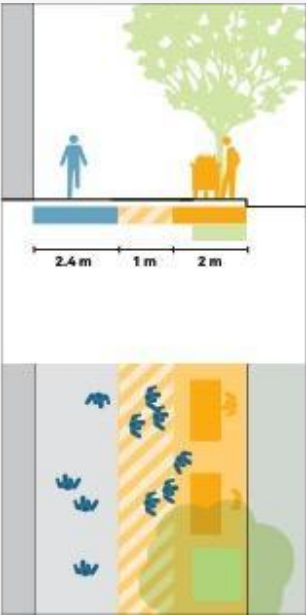
Speed, variations and dimensions



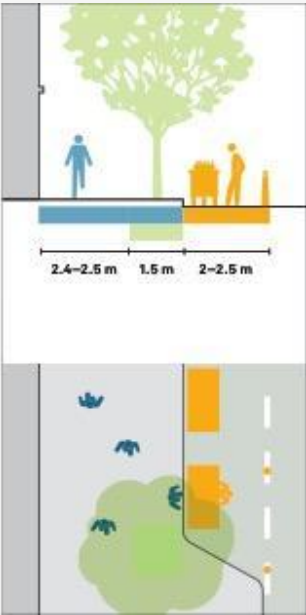
Geometry



Commercial use extensions



Vendors on sidewalks



Vendors in enhancement zone

Elements



Power



Water and
Waste



Lighting



Hours of
operation



Sitting
Guidance



Dedicated
Spaces

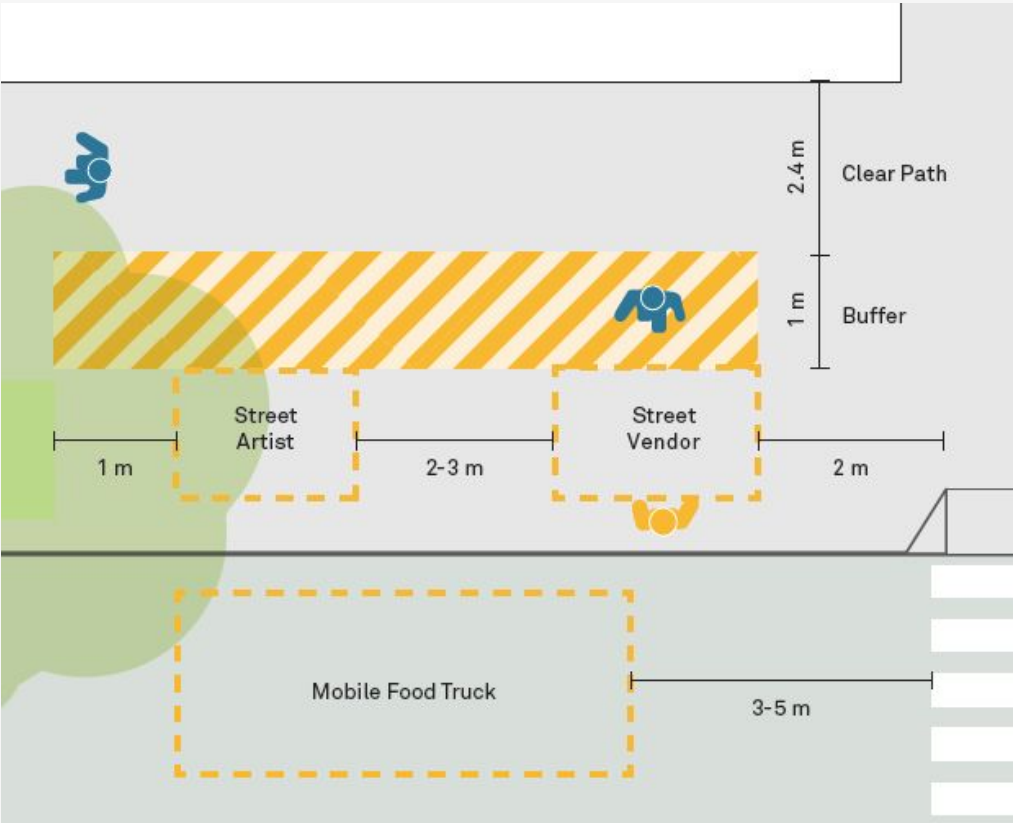


Seating



Storage

Siting Guidance



Siting Guidance



Recap

- ✓ People doing business make our cities thrive!
- ✓ Include them in your designs
- ✓ Anticipate their needs!

Design for all street users!



Pedestrians



Cyclists



Transit Riders



Motorists



**Freight Operators
and Service
Providers**



**People Doing
Business**

Design networks for all street users!



Pedestrians



Cyclists



Transit Riders



Motorists



Freight Operators
and Service
Providers



People Doing
Business

