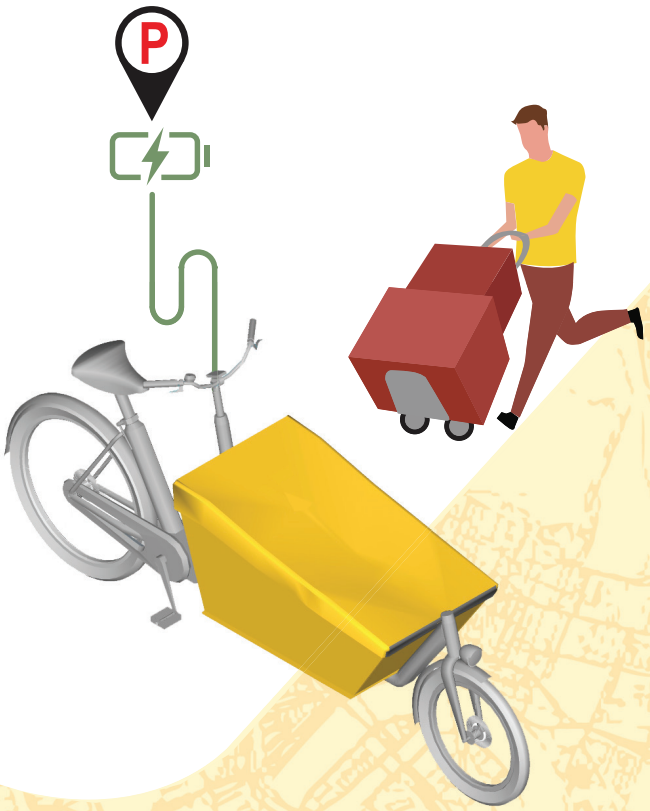
Space for Cargo Bikes



December 2023

Tour de Force

ARUP

This report is the result of a collaboration between Arup and Tour de Force with input from the City of Rotterdam.

Summary:

Cargobikes play a key role in promoting sustainability and more efficient use of space within urban logistics. Replacing van trips with cargobikes frees up space in densely populated urban areas. This research analyzes space for cargobikes through the lens of three layers from the "day in the life of a cargobiker": (1) the type of user, (2) the steps in the journey of a cargo biker, and (3) the area typologies. The result is a guide for municipalities that want to make room for cargobikes in urban logistics.

We would like to thank all the people who participated in this project for their input and advice

Client:

Tour de Force

Consultant:

Arup B.V

Date:

December 2023

Project Team:

Martin van Oosten

Paula Godoy

Naomi Kloostra

Graphic Design:

Thilini Warnakulasuriya

Cargo Bike expertise:

Jos Sluijsmans

Input from:

Municipality of Leiden

Municipality of Utrecht

Municipality of Rotterdam

MOSS courier

Cycloon courier

Bookstore Donner (Rotterdam)

Winery Platenburg (Rotterdam)

Tour de Force

ARUP

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1 Introduction

Cargo bikes are increasingly being used for supply and urban distribution. Packages are delivered to consumers from hubs, stores are stocked and orders are brought to people's homes by entrepreneurs. A 2022 report on the European cargo bike market shows that the average number of cargo bikes has more than quadrupled since 2019. This growth has also resulted in 3 times more employees per company. This growth can also be seen in the average turnover of cargo bike operators, which increased by about 76% in 2021 compared to the previous year. This growing trend is expected to continue in the coming years. Governments are keen to see and welcome this development of distribution with cargo bikes. Since space in inner cities is scarce, it makes sense that municipalities are interested in knowing how to integrate this modality into public space, or how to encourage the use of cargo bikes by creating "spaces for cargo bikes". This guidelines with design ideas is the result of a research done to answer this question.

This guide provides guidance to municipalities on how to provide space for cargo bikes to encourage sustainable logistics in inner cities. The goal is to help municipalities make decisions when designing public space and drafting policies and guidelines that are cargo bike friendly.

Because the term cargo bike can be interpreted more broadly, here we first define the term as used in this report.

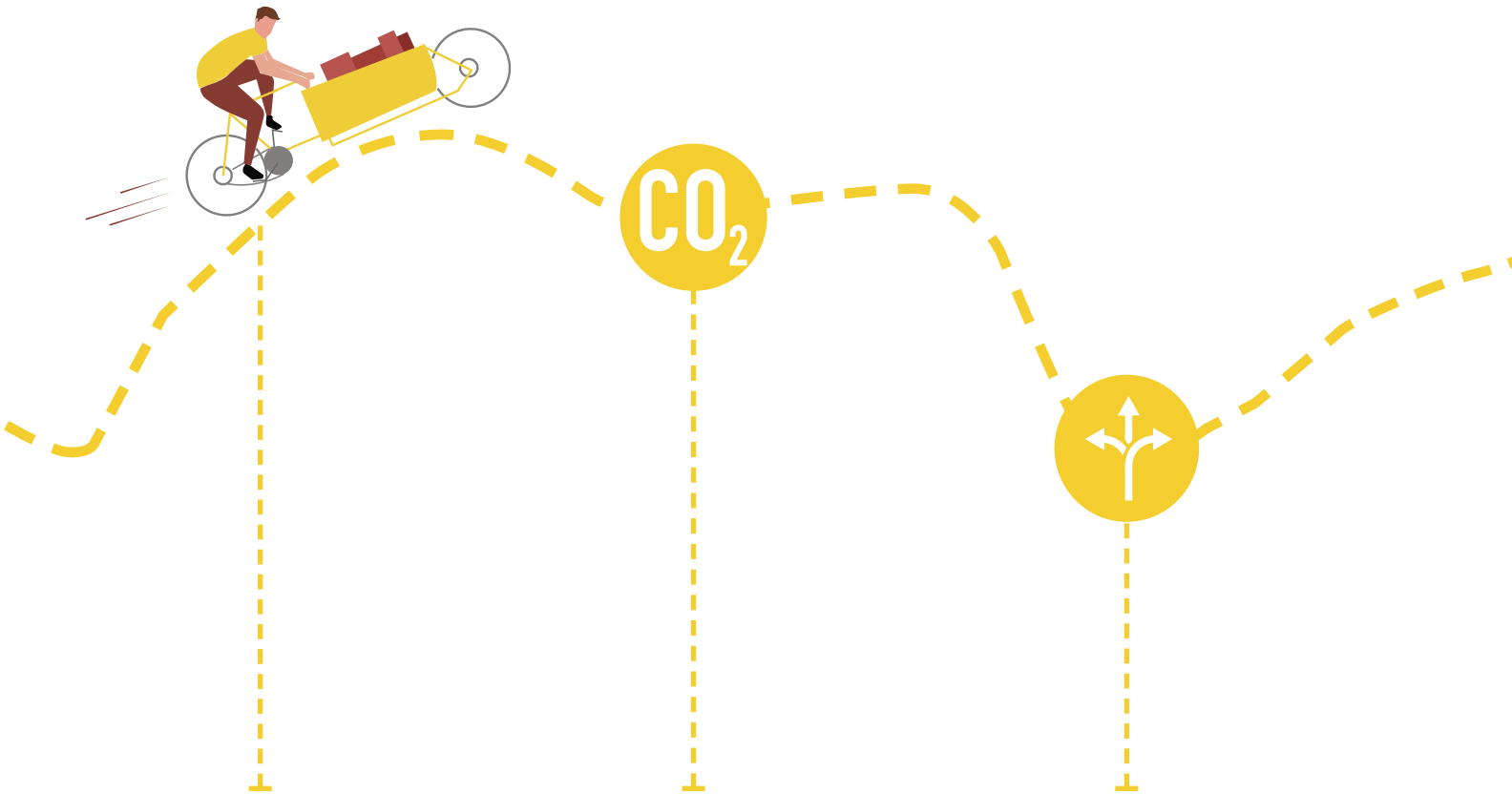
Cargo bikes are, often electrically powered, bikes specifically designed to carry loads, making them suitable for deliveries in the city. These are deliveries of goods and services.

1.1 Background and Context

With the rise of online shopping and the increasing demand for individual package delivery, there has been a growing need for effective and sustainable solutions for "last-mile" delivery. In this process, cargo bikes are playing an increasingly crucial role. Cargo bikes for logistics use can not only help reduce traffic pressure in cities worldwide, but they also contribute to a healthier living environment and better air quality. The drive to reduce emissions is high on the agenda of many European cities, with the introduction of zero-emission zones (ZE-Zones) from January 1, 2025[1] and zero-emission urban freight transport from 2030[2]. These measures require that deliveries in cities be made only emission-free. This creates significant opportunities for the use of cargo bikes. Besides the positive impact on cleaner transport in inner cities, it also frees-up the public spaces .

Here lies also directly the challenge: cargo bikes use public space and public roads in its own way. For example, in most situations cargo bikes are allowed to cycle on the bicycle path and are not obliged to use loading / unloading bays like trucks and delivery vans. In short, cargo bikes have a different demand for space in (inner) cities than current logistics modes.

Believing that cargo bikes are a welcome form of urban distribution and are becoming increasingly important in the distribution of goods in our urban centers, Tour de Force wants to focus on the space requirements of cargo bikes in (inner) cities. The loading / unloading, delivery of goods and parking / storing / charging of the vehicle are central to this. With an exploration of the spatial need and incorporation of (e-)cargo bikes for retailers and delivery services in urban centers, Tour de Force wants to lay a foundation for the conversation about facilitating a growing number of cargo bikes. With this guide, Tour de Force wants to offer municipalities a tool for making considered choices regarding the integration of the cargo bike in public space. It highlights and weighs various interests and functions in public space.



Last-mile delivery

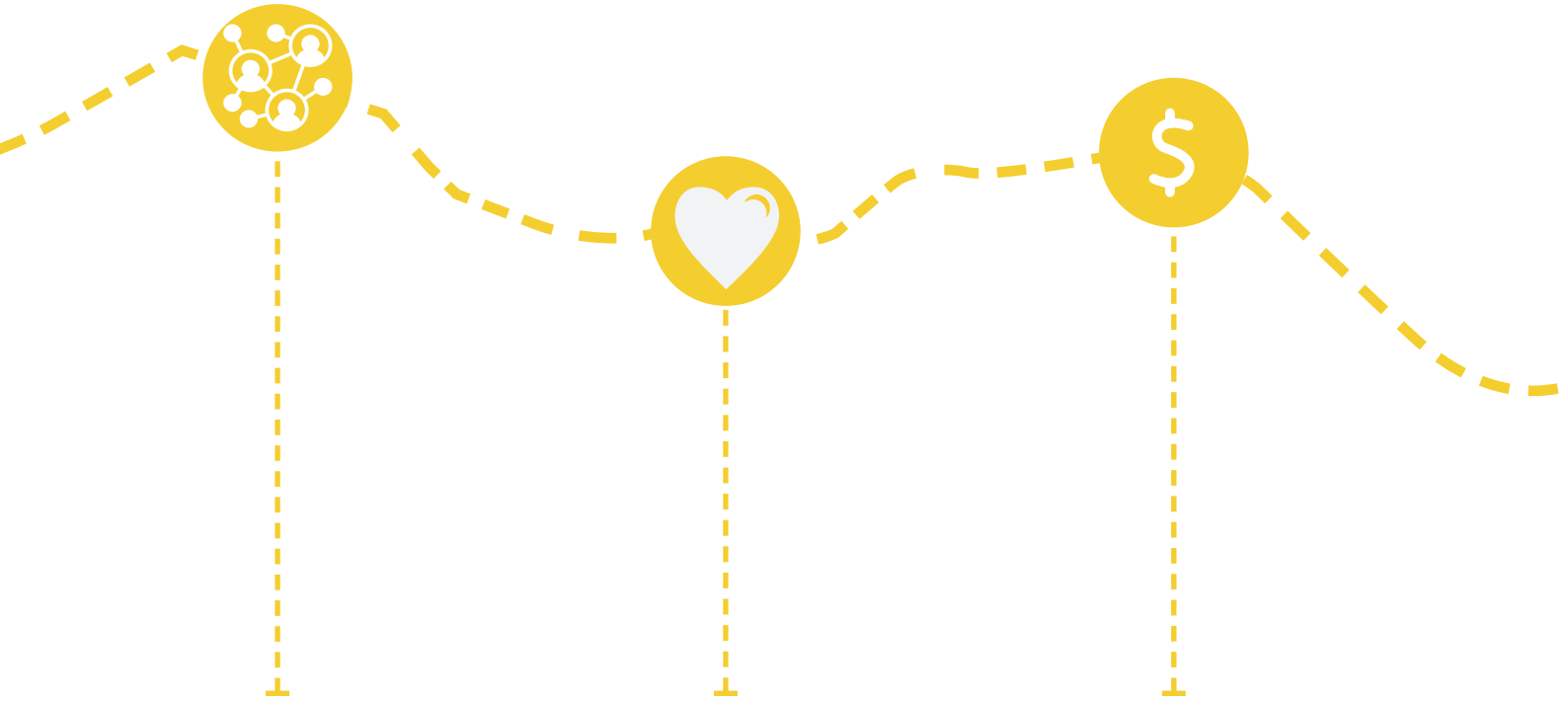
Cargo bikes are particularly effective for last-mile delivery, that is, from the last part of the delivery process or logistics chain all the way to the customer's door. Thanks to its compact size and maneuverability, cargo bikes can navigate busy urban areas, bypass traffic and reach destinations more efficiently, especially during peak hours.

Reduce congestion and emissions

By using cargo bikes for parcel delivery, it can reduce the number of vans and trucks on the road. This helps minimize traffic congestion in cities and therefore also decrease carbon emissions, leading to better air quality and a more sustainable transportation system.

Flexibility and accessibility

Cargo bikes can access areas that are challenging for larger vehicles, such as narrow streets, some pedestrian areas and most bike lanes. They can deliver packages directly to the customer, stopping closer to the destination and for shorter amount of time, even in densely populated urban areas where parking and accessibility can be problematic for traditional vans.



Branding and customer experience

Cargo bikes are also an effective branding tool for businesses. With their distinctive appearance and ability to move through busy streets of the city, they can serve as mobile ads. Brand visibility is increased and leaves a positive impression on customers.

Health and well-being

Cargo bikes promote a healthier and more active lifestyle for delivery drivers. Cycling provides exercise and contributes to personal well-being, reducing the sedentary nature of traditional delivery jobs.

Cost effectiveness

Finally, cargo bikes are a cost-effective alternative to motorized vehicles for delivery. They have lower operating costs, have no parking costs and do not rely on expensive fuels. This makes them an attractive option, especially for small businesses, independent couriers and local delivery services.

1.2 Scope

This handbook defines three aspects: (1) the step in the journey, (2) the user type and (3) the area type. The study identifies the daily challenges in the life of a cargo biker by going deeper into the characteristics of some steps in the journey and the different user types. The steps in the journey considered are loading / unloading, parking, charging, and the transition between driving and standing still. The needs of each user group are mapped into three area types, a mixed-traffic shopping street, a pedestrian area and a residential area, at each step of their journey. Each of these combinations of layers contributes unique dynamics and opportunities for cargo bikes.

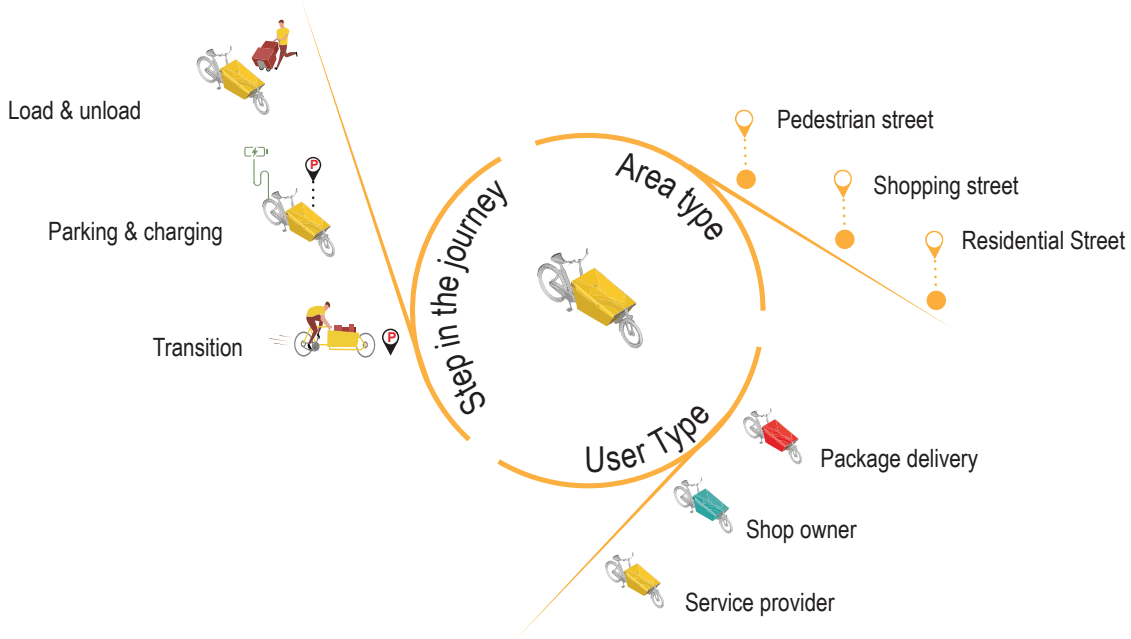
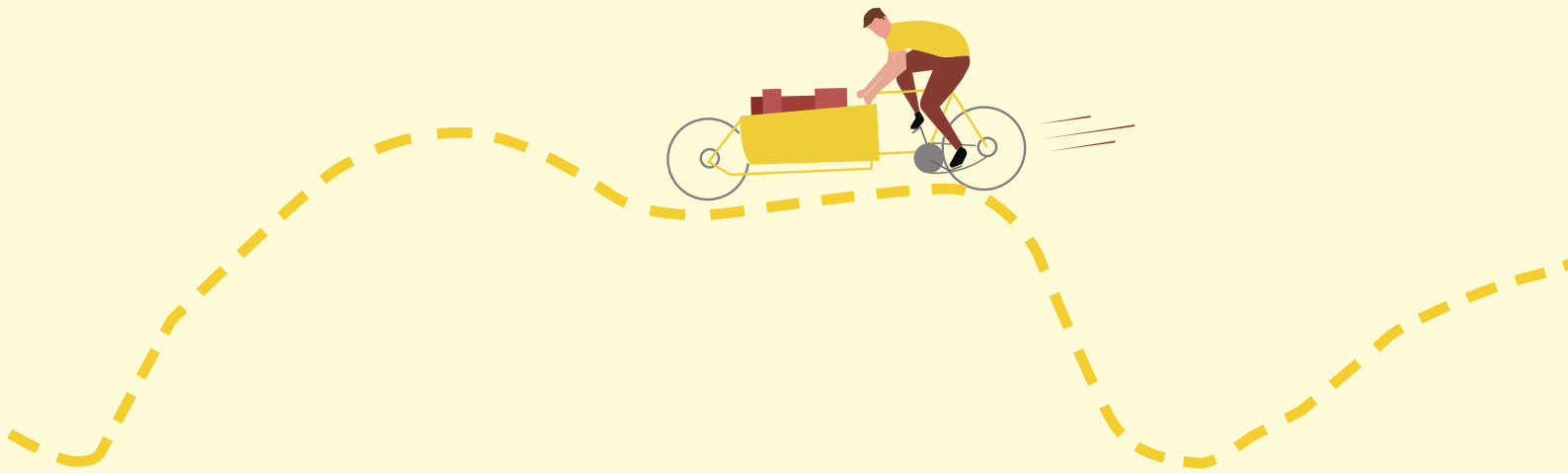


Figure 1
Systematic representation of the three aspects of this research

1.3 Overview

This guide provides guidance to municipalities on how to provide space for cargo bikes to encourage sustainable logistics in inner cities. The goal is to help municipalities make decisions when designing public space and drafting policies and guidelines that are cargo bike friendly. Chapter 2 describes the current context regarding policies and regulations in The Netherlands. Chapter 3 explains the method of analysis used and the main findings regarding different types of cargo bike logistics.

Chapter 4 explores the opportunities and challenges of different area types. Chapter 5 presents solutions to give cargo bikes space in cities from a spatial and policy perspective. These are made concrete on the basis of Rotterdam examples. The guide concludes with recommendations and suggestions for follow-up research. Results of interviews with stakeholders can be found in the appendix.



2
Current 'Space for Cargo Bikes'

In cities, choices must be made about the design of public space based on information about the needs from different users of this space. This chapter looks at existing legal space and future developments in policy.

2.1 How is it Organized?

Currently, the Netherlands lacks specific regulations for cargo bikes. Cargo bikes are considered a subtype or a specific variant of bicycles. In other words, cargo bikes are not considered a separate category of vehicles, but rather a type of bicycle. This may have legal, regulatory or tax implications, depending on the specific laws and regulations in a particular country or region. It may also affect traffic regulations, permits and tax rates applicable to cargo bikes compared to other forms of transportation.

The many different regulations which could influence cargo bike movement are a challenge for municipalities. In the municipality of Groningen, they have chosen to design much of the public space in the city center at one level which ensures that there is no distinction between the roadway and the sidewalk, with which everything is at one ground level.

In current municipalities, policies for cargo bikes fall under bicycle policy and are often part of conversation at ZE-Zones and sustainable logistics. The city of Leiden indicated in an interview that it is working on aspects around developing ZE-Zones and developing an LEV (Light Electric Vehicles) policy framework. Important subjects here are enforcement, exemptions and licensing. Currently, Leiden has a complex system of granting exemptions.

2.2 Opportunities

The main opportunities for cargo bikes stem from changes in consumer shopping behavior. Especially since the pandemic, there has been continued growth in online shopping, combined with the desire to receive same-day / next-day deliveries. The focus is on fast deliveries, more frequent orders and smaller packages. Cargo bikes fit perfectly into this environment, hence their growing popularity in logistics and urban areas. With the growth in the use of cargo bikes, the classification of this type of vehicle / mode is expected to change in the coming years. Moreover, understanding future policies regarding zero-emission zones may also reveal opportunities for cargo bikes. These opportunities are briefly outlined below.

2.2.1 LEV-Kader

At the time of writing, the Ministry of Infrastructure and Water Management, SWOV (Stichting Wetenschappelijk Onderzoek Verkeersveiligheid) and the RDW are working together with the aim of developing a national framework for the approval of Light Electric Vehicles (LEVs). Establishing this framework will help coordinate policies that maximize the benefits of light electric vehicles. In addition, it can simultaneously address potential challenges and concerns and serve as a guide for future investments, regulations and initiatives to promote sustainable mobility and environmentally friendly transportation options. This LEV framework includes four categories (see Figure 2):

(1a) E-(cargo)bike full pedal assistance < 75 kg.

(1b) all other LEV's with 1a < 55 kg.

(2a) freight transport.

(2b) passenger transport.

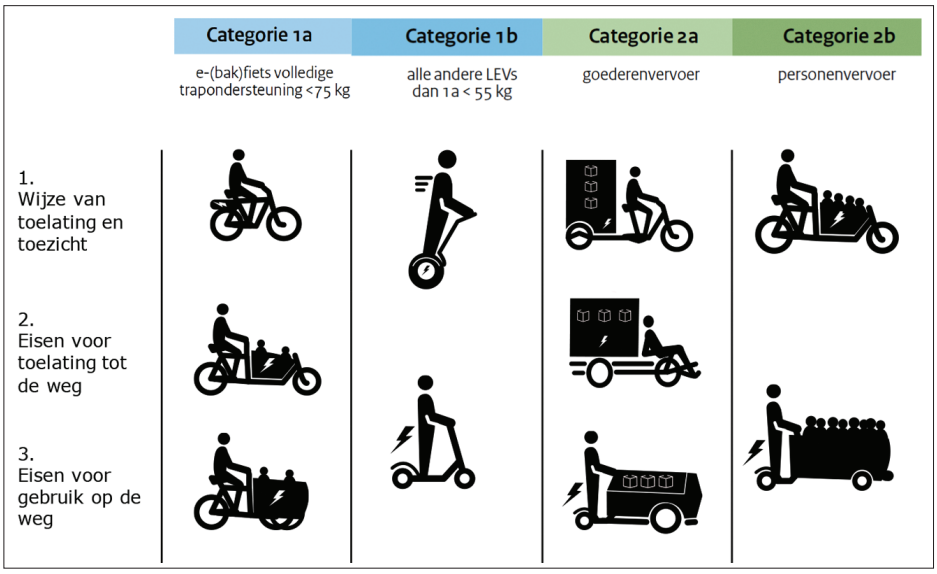


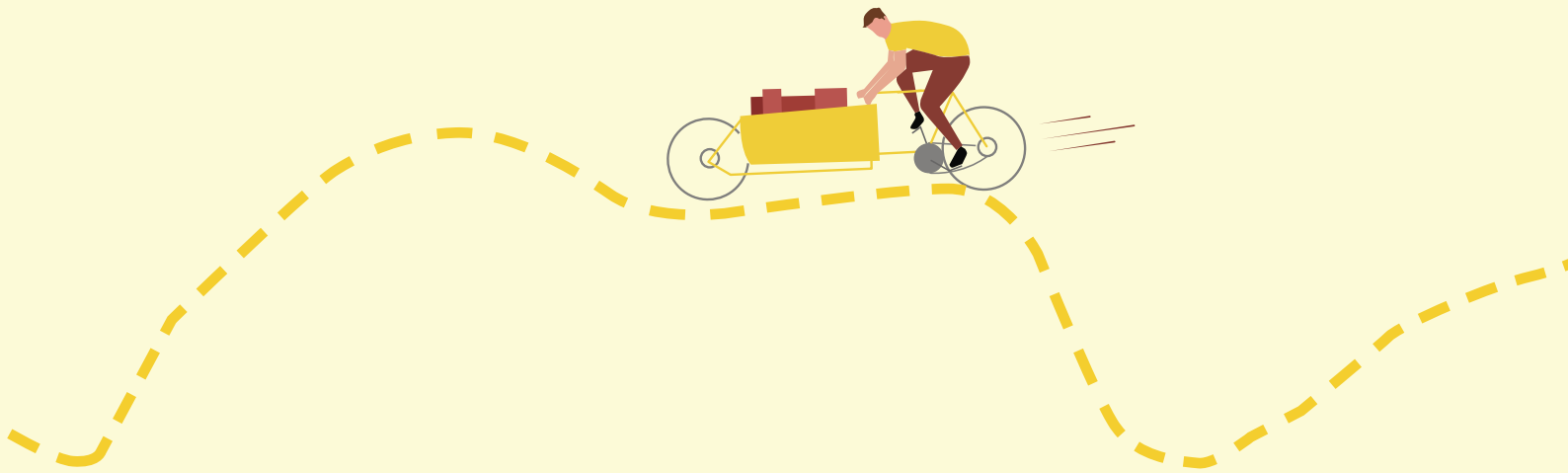
Figure 2
Schematic representation of LEV framework

2.2.2 Zero-Emission Zones

As of January 1, 2025, municipalities in the Netherlands will have the authority to designate a specific urban area where polluting vans and trucks are no longer allowed. This specific area is designated as a zero-emission zone (ZE Zone). A ZE Zone must include at least the city center and surrounding neighborhoods. Only vans and trucks are allowed to operate in this area if they emit no harmful emissions, such as vehicles that run on electricity or hydrogen.

Cargo bikes are inherently a zero-emission / active form of logistics. Recent developments in the electrification of cargo bikes have made it even easier to move faster through cities and carry heavier loads. This makes the cargo bike as a logistics modality a central pawn in many projects aimed at scaling up green urban logistics. The growth of this market aligns with the introduction of ZE Zones in 2025, and the goals of achieving CO2-free urban logistics in major urban centers by 2030[2]. With this growth, it is also necessary to plan for the space needed for cargo bikes in inner cities and to be included in future design decisions for public spaces.

The plans for ZE Zones and the timeframe for their implementation create an opening for new and innovative forms of logistics in many European cities. Municipalities have looked at innovative hub models, cheaper rental programs for shared e-cargo bikes or even subsidies for smaller companies to remove the barrier of the high initial investment required to change their logistics processes to more sustainable methods[4] . For example, Aarhus (Denmark) has improved logistics movements around explored the central station to completely redevelop the area based on the logistics plan. Ravenna (Italy) has included in its SUMP plans to create several hubs around the city center to completely eliminate vehicles and make the city center entirely for walking and cycling[5].

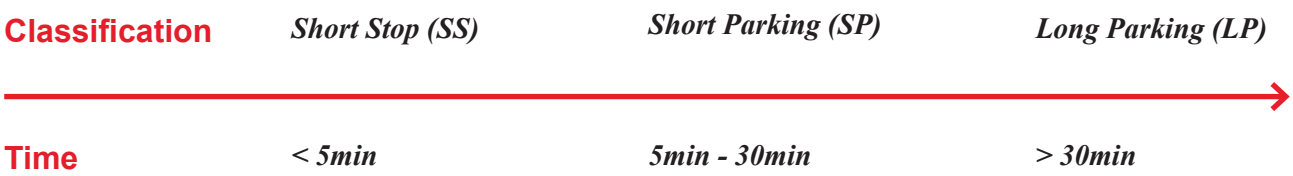


3
Cargo Bike Logistics

This chapter describes the different types of logistics processes and looks at what is needed during the day for usage of cargo bikes in logistics. Based on interviews with cargo bike users (business owners, retailers), we define the cargo bike family and its different types of use.

3.1 Types of Logistics

While some research recognizes that cargo bikes can be used for different types of logistics movements, little is said about these differences and how they relate in terms of spatial demand in urban environments. Research has shown that the main general users of goods for which cargo bike logistics is attractive include businesses, restaurants and catering, retail and stores, supply companies of all scales and professional service companies are. Within the scope of this study, these different types of users can be categorized into 3 different types of logistics as they have different parking time and location needs: **(1) parcel delivery, (2) shop owner with own cargo bike and (3) service logistics**. For each of these categories, a 'day of the cargo biker' is introduced. This involves a categorization of stopping / parking time defined as shown in the diagram below.



The purpose of this chapter is to identify the logistics patterns and key challenges faced by different types of users. Understanding these specific needs is important to facilitate inclusiveness for different users and different models of cargo bikes when creating public space policy and design.

© Cargo bike Logistics via Cycling Industries

© Cycloon Bezorging via Cycloon

© Highway maintance crew via The Construction Index

3.1.1 "Day in the life of a cargo biker"

Parcel delivery

Package delivery using a cargo bike is growing in popularity, especially in busy and densely populated urban areas. Cargo bikes are specifically designed to carry large loads, making them ideally suited for package delivery in urban environments where traffic congestion and environmental problems are common. The process of parcel delivery with a cargo bike works as follows (see also Figure 3):

1. **Collection of packages:** The process begins with picking up packages from various locations, such as distribution centers, post offices, or directly from the sender.
2. **Loading the cargo bike:** Next, the packages are loaded into the cargo bike in an orderly manner. Cargo bikes are equipped with spacious and sturdy cargo boxes in which various packages can safely transported.
3. **Navigating the city:** The delivery driver uses the cargo bike to maneuver through the city and reach package destinations. The maneuverability allows cargo bikes to move easily through busy streets and narrow alleys, often making them faster than traditional delivery vehicles.
4. **Delivery to recipient:** Once at the destination, the packages are unloaded and handed over to the recipient. A cargo bike takes up less space than a van and can be parked on the sidewalk. Delivery drivers can use electronic devices such as tablets or smartphones to record the delivery and possibly have the recipient sign a receipt.

At the distribution center / hub, many facilities are available for the cargo bike and the rider, such as a battery charging point or battery changing station, as well as restrooms and food and drink for the cyclist. Generally, one delivery round takes about two hours, after which the cargo biker cycles back to the distribution center for another load. Because most cargo bikers work half-day shifts (i.e. four hours), they typically do two delivery rounds per workday. This is also because most distribution centers are currently located on the outskirts of the city, making the distances to reach their main downtown destinations greater. The loading and unloading processes can become more challenging in areas where cargo bikes are officially not allowed to ride near the destination point (for example, in a pedestrian area).

An inclusive design for this type of user allows them to cycle faster through the city via more direct routes and stop as close as possible for loading and unloading the cargo bike.

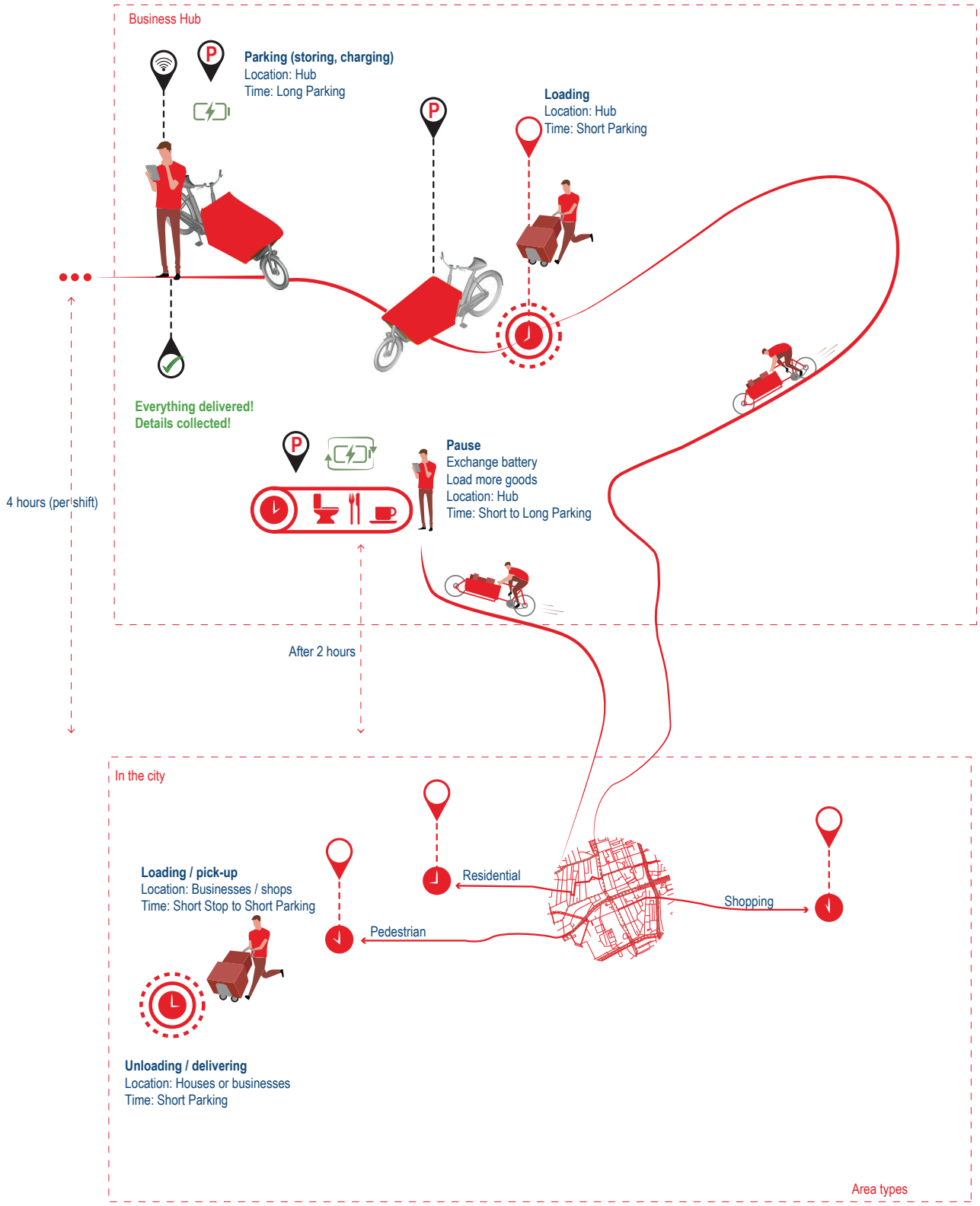


Figure 3
Day in the life of a cargo biker: parcel delivery

3.1.2 "Day in the life of a cargo biker"

Shop owner with cargo bike / use of cargo bike delivery

A retailer with its own cargo bike is a business that uses a cargo bike to transport goods and make deliveries. Having their own cargo bike gives stores more control over their delivery and service logistics and provides an opportunity to make a positive impact on the environment and the community. It can also be an effective way to stand out from the increase competition and customer loyalty by offering an attractive and sustainable delivery option. Some ways a store can use its own cargo bike:

- **Package delivery:** A store can use its own cargo bike to deliver online orders and packages to customers' homes. This can be especially convenient for stores that also have an e-commerce platform.
- **Groceries delivery:** Supermarkets or convenience stores can use cargo bikes to deliver groceries to customers' homes. This is useful, for example, for customers who are unable to go to the store themselves or simply do not have the time.
- **Meal delivery:** Restaurants, cafes or bakeries can use their own cargo bikes for the delivering meals, coffee or pastries to customers in the neighborhood.
- **Mobile shop:** Some stores use cargo bikes as mobile outlets to stand in different locations around town and sell their products.
- **Promotion and marketing:** A store can use a cargo bike as an eye-catching marketing tool to attract attention and promote their brand by handing out samples or discount coupons for example.

In this study, we focus on the type of stores that use cargo bikes to deliver their products, as there is routine usage of space and the frequency of location change is higher. Thus, from the above list, the types of parcel delivery, grocery delivery and meal delivery are applicable.

The stores considered here are primarily small to medium-sized stores, as they often do not have sufficient space in their store to park the cargo bike or reserve a dedicated loading / unloading area for deliveries and therefore must use public space. Larger stores would operate in a manner more similar to that described for parcel delivery, with the store then corresponding to the 'hub'. The following page shows an example of the daily steps in the journey of a shop owner with their own cargo bike.

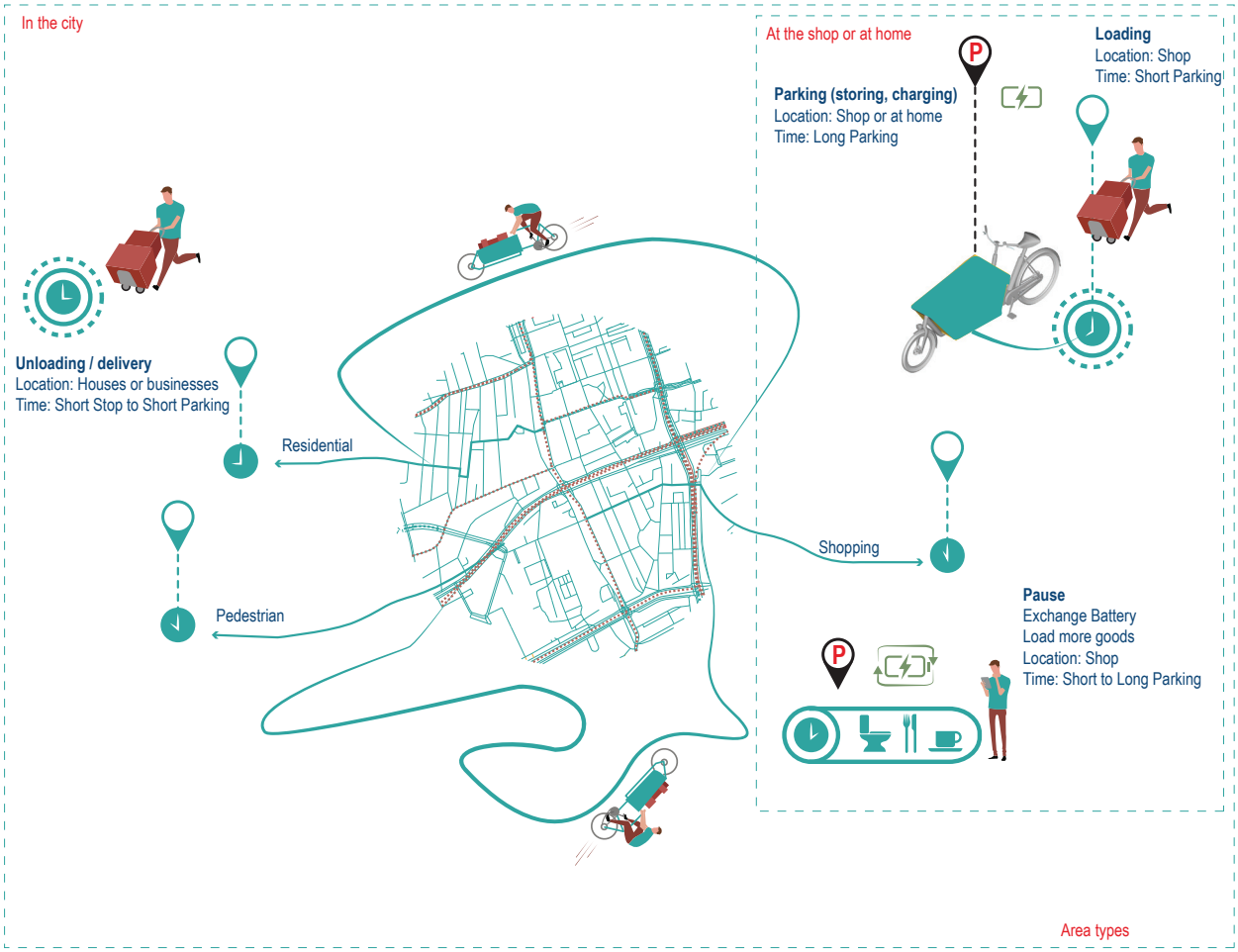


Figure 4
Day in the life of a cargo biker: shop owner

A major challenge for shop owners in comparison to cargo bike enterpreneurs for parcel delivery, is the location to store / park and charge their cargo bike. While parcel delivery services have a distribution center where the bikes can be safely stored, retailers usually have their store or home as options for this step. Both options come with limitations, given the dependence on the availability of space and facilities.

An inclusive design for this type of user includes an area where they can safely store their bike especially at night and charge it, as well as a place to park near their store during the day when not in use. In the city, this user mainly unloads products and thus stops briefly at their destination, similar to the delivery process of package deliverers.

3.1.3 "Day in the life of a cargo biker"

Service logistics

Service logistics with cargo bikes is about using cargo bikes to deliver services within urban environments. Some examples of applications within service logistics with cargo bikes are:

1. **Technical services:** Companies specializing in maintenance and repair can transport tools and equipment via cargo bikes to locations where they are needed.
2. **Personal services:** Professional service providers such as nail technicians and hairdressers can use cargo bikes to carry supplies to perform work on location.
3. **Urban cleaning:** Cargo bikes can be used to collect waste and recycling materials in busy urban areas[6].

Figure 5 shows an example of the daily steps in the life of a service provider who uses cargo bikes for his business.

The three most challenging spatial aspects for service logistics are loading and unloading, parking and charging. This is partly because they differ per step in the journey and per type of cargo bike user. These three aspects have a major impact on public space because the cargo bike, for short or long periods of time, can cause a blockage in traffic flow. How much space is available at that time and how space should be redesigned if it is not available depends on the type of area within the urban area.

A characteristic of this type of logistics is the need to park the cargo bike safely at its destination while the service is being performed, which is different than the previously described forms of logistics with cargo bikes (parcel delivery and the shop owner with cargo bike) which usually have short loading and unloading stops at the destination. As with the shop owner with a cargo bike, charging and storing / parking their cargo bike can also be a challenge for these types of logistics services if they do not have a secure location such as a hub to leave their cargo bike while charging or overnight.

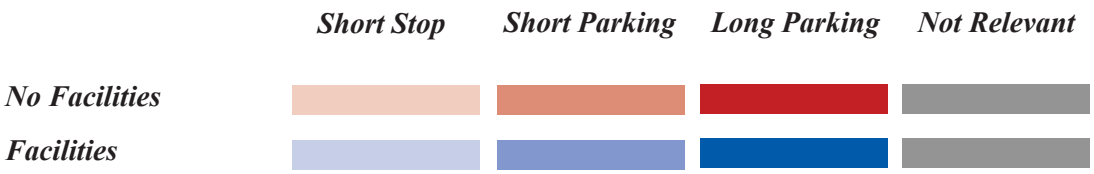
Figure 5
Day in the life of a cargo biker: service logistics

An inclusive design for this type of user includes a space where they can safely store and charge their cargo bike overnight, as well as a space to park near their destination where they will be providing service. A concern here is to have a (semi) guarded parking space in the public area. These users may be transporting expensive materials and tools in their cargo bike to provide their services. In the Netherlands, these spaces may consist of municipal bicycle sheds, converted parking garages or neighborhood bicycle sheds, where there are then a number of spots designated for cargo bike use. In this regard, accessibility to these facilities should also be ensured by, for example, ramps and larger elevators suitable for cargo bikes as these facilities are often underground.

3.2 Lessons from the "Day in the life of a cargo biker"

As mentioned in 3.1, the main challenge lies in finding space for cargo bikes when loading / unloading, parking and charging. To get to standstill, the transition from riding to standing still is also important to investigate. Therefore, this section examines these steps in the journey described using a number of parameters for the three area types and three types of logistics within the scope of this study.

The day in the life of the cargo biker summarizes the findings in the needs of using cargo bikes for logistics. These can be divided into three layers: step in the journey, area type and type of logistics demand. The information discussed in the previous sections is summarized in Table 1 on the right side of the page. Below is the legend. 'Facilities' here refers to charging points, parking facilities and options for locking up the cargo bike.



From Table 1, we can see that the different logistics types have similar needs in the three different area types.

- The area type where facilities are currently especially needed is the pedestrian area. In this area, bicycle restrictions during the day result in cargo bikers having to park somewhere else for the delivery, increasing the delivery time and the possibility of theft of the cargo or the bike.
- There is a need for parking and charging in the residential area.
- In the shopping street, there is mainly a need for short loading and unloading space. For this, flexible use of space is a possible opportunity.

All in all, it is clear that cargo bike users need some facilities in both physical space and policy space to achieve their full potential.

Table 1
Summary "Day in the life of a cargo biker"

		Loading	Unloading	Parking	Charging
Pedestrian street *(without backstreet)*	Parcel delivery				
	Shop owner *(has shop / house in the area)*				
	Shop owner *(does not have shop / house in the area)*				
	Service provider				
Shopping street *(without backstreet)*	Parcel delivery				
	Shop owner *(has shop / house in the area)*				
	Shop owner *(does not have shop / house in the area)*				
	Service provider				
Residential street	Parcel delivery				
	Shop owner *(has shop / house in the area)*				
	Shop owner *(does not have shop / house in the area)*				
	Service provider				

3.3 Cargo Bike Family

The literature review shows that there are no guidelines for manufacturers to design cargo bikes. However, it is known that cargo bikes are often used within a logistics framework for travel in an urban environment. This fact already highlights an important aspect of the movement, namely that users are using the city's current cycling infrastructure - which was historically designed for normal bicycles. This has a direct impact on the popularity of specific types of cargo bikes within the wide range of types of cargo bikes that exist today. In contrast, many streets were historically designed for cars, vans and trucks. This is where there are gains to be made by using cargo bikes. They take up less space in a parking space or on the road than cars and vans. So they create space.

Research has shown that the most popular type of cargo bike is the so-called "Long John." This is a two-wheeled cargo bike, usually no wider than 0.9 m, with or without electric assistance and without a trailer, so the cargo space is embedded in the bicycle frame. The interviews with entrepreneurs and retailers who use cargo bikes for their logistics needs confirm that "Long John" cargo bikes have good driving dynamics and flexibility in the current infrastructure and for current logistics processes. Another aspect that was highlighted as important is the front and rear luggage space. The bike experience is better with the load in the front than in the back, even though this limits the height of the load that can be carried without blocking the field of vision.

The diverse cargo bike family requires more inclusive infrastructure design. A loading / unloading area narrower than 1 meter may accommodate the backpacker, but does not accommodate long john users. Similarly, a bike gutter / rail to enter a bike parking facility is typically designed for two-wheeled bikes, but presents an accessibility problem for three-wheelers.

Workshops and discussions with experts and users indicate an increased popularity of the Long John in combination with a trailer for package delivery. The trailer is still a separate unit that can be attached or detached from the bicycle as needed.

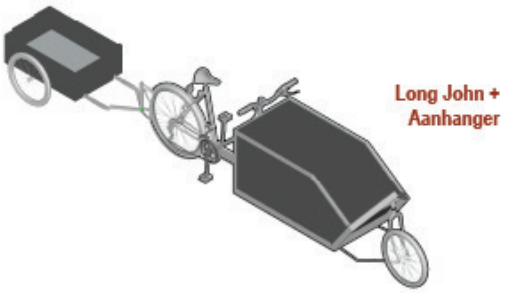


Figure 6
Long John with trailer example

Below are the cargo bikes types ranked by popularity among users. The classification is based on findings from a number of interviews and literature review.

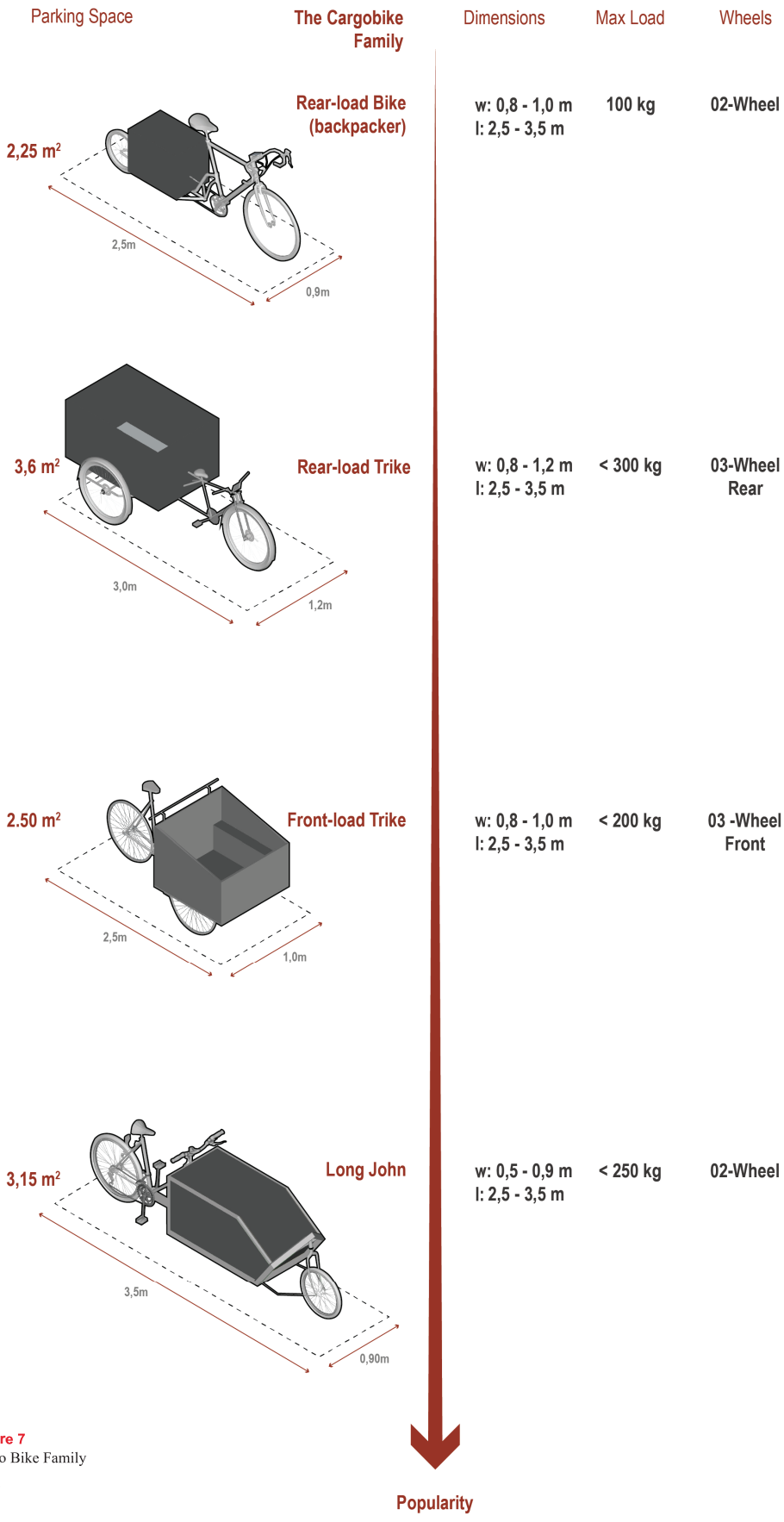
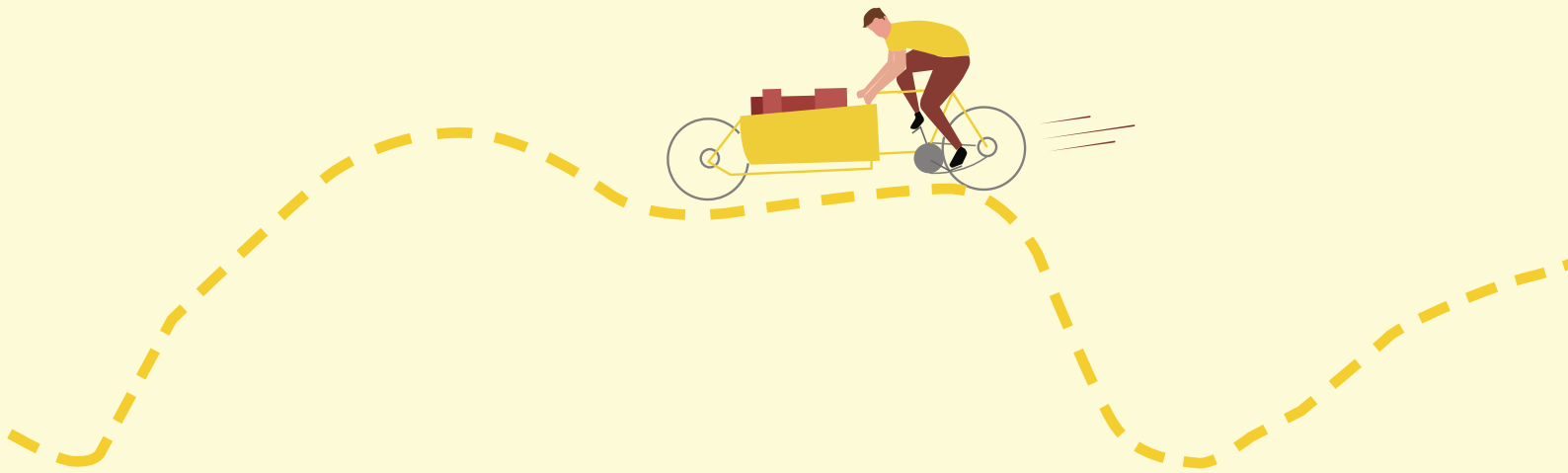


Figure 7
Cargo Bike Family



4
Factsheets Area Typologies

This chapter explores three area typologies focusing on identifying opportunities and obstacles for cargo bikes. For each area typology, a fact sheet is presented with spatial characteristics, key bottlenecks and opportunities for the cargo bike.

4.1 The Public Space

In the scope of this study, three area typologies are distinguished based on their functional design (what needs does the area serve), accessibility and network (how is this street located in the network and what type of traffic can be expected) and design characteristics (what is the size). The typologies are: pedestrian area, shopping area and residential area.

1. The pedestrian area refers to an area designed primarily for pedestrians where the full width of the roadway is for pedestrian use[7] and where motorized traffic is minimized or not allowed at all. These areas are usually intended to provide a safe and pleasant environment for pedestrians, including shoppers, tourists and residents.

2. The shopping area refers to an area in a city or village where there is a concentration of stores and where users of different modes are welcome, for example, motorists, cyclists, pedestrians and public transport. Shooping streets often have a lively atmosphere, especially during busy shopping hours and evenings.

3. The residential area refers to an area designed primarily for residents and their residential use. It is designed with an emphasis on tranquility, safety and livability[8]. In residential areas, through traffic is usually discouraged in favor of local residents and their needs. This type of street may contain a mix of houses, apartments and possibly some local amenities, but it is generally less focused on commercial activities than a shopping area.

Case studies have been set up for these area typologies. Distinguishing the typologies allows the search for space for cargo bikes to focus on the multiple objectives and complex interactions of each area. This is especially important when priority needs to be given in the redevelopment of public space. Moreover, cargo bikes use public space in different ways depending on the characteristics of the space, other modes and interactions they encounter.

This section presents factsheets of the different area types with the aim of illustrating their spatial characteristics for the logistics needs of cargo bikes and the main bottlenecks.

Figure 8
GPS-details of cargo bike movement of 12 rides, where the main streets and preferred routes can be seen

Pedestrian Area

Lijnbaan (Rotterdam)

Features

- Activities: commercial / retail
- Mode: pedestrians
- Infrastructure: wide sidewalk, accessible / ground level
- Street furniture: bollards, plants, benches, tables
- Policy: bikes allowed outside shopping hours
- Most space for pedestrian flow

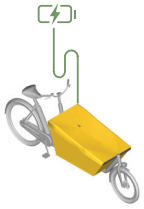
Pedestrian areas are both an attractive area for cargo logistics, since the main activities are commercial, and a challenge because of bicycle restrictions and large pedestrian flows during daytime. Visitors to stores in these areas can park their bicycles on side streets or in nearby bicycle parking. Out-of-business hours, delivery vehicles are allowed on some of these streets, alternatively side or back streets are used for loading / unloading.

Pedestrian Areas in The Netherlands

Figure 9
Pedestrian area examples

Area type characteristics mapped against the steps in the cargo biker's day.

Table 2
Pedetrian area characteristics per step in they journey

	 Loading	 Unloading	 Parking	 Charging	 Transition
Location 	Space on the street outside shopping hours. Also possible via back or side streets.	Space on the street outside shopping hours. Also possible via back or side streets.	Possible in back streets or side streets, not in the street itself.	Possible in back streets or side streets, not in the street itself.	Current design provides for this.
Duration 	Short parking	Short stop - Short parking	Long parking	Long parking	Short stop

Opportunities in this area type: street profile is wide, can be used for different functions and provides for a smooth transition from moving to stationary cargo bike due to the absence of sidewalks and height differences.

Limitations with this area type: speed must remain low, dismount if necessary. It is more difficult to access this area and the network is not well connected.

Inclusivity and accessibility of this area type: Given its characteristics, this area type poses a challenge for cargo bikers at all the above steps in the journey. This street type easily creates a blockage in the network for cargo bikes. At the same time, cargo bikes can also potentially create a blockage on this street by interacting with the flow of pedestrians. In order not to impede the flow of pedestrians, parking and charging are not allowed here. To charge or park, users such as service providers must use back streets or bike racks. These functions should then be provided near the zone, furnished with reserved spaces for cargo bike parking and made accessible to the different types of cargo bikes. The steps of loading and unloading during shopping hours, applicable to all user types, can be facilitated by allowing cargo bikers to walk their bikes to their destination when the streets are not too crowded, or providing them with cargo bike-specific loading / unloading zones on side streets or back streets.

Shopping Area
Nieuwe Binnenweg (Rotterdam)

Features

- Activities: commercial / retail & residential
- Modalities: multimodal (cars, public transport, bicycles, vans, pedestrians)
- Infrastructure: sidewalk, bike lanes and roads or shared streets, parking lots, van loading/ unloading areas, high curbs
- Street furniture: trees, bike racks, benches
- Policy: bike on the road or bike path, not on the sidewalk

Shopping streets have to accommodate high flows and users of multiple modes, including bicycles, vans and cars. Currently, cargo bikes primarily use the bicycle infrastructure.

However, as mentioned earlier, the current bicycle infrastructure is not ideal for cargo bikes, as the bike lanes are narrow, the racks are not suitable for cargo bikes, and high curb ramps hinder the transition from moving cargo bike and stationary cargo bike. Loading/unloading areas for goods deliveries are planned on these streets and there is a higher traffic volume than in for example residential areas. Space on sidewalks is limited by space for pedestrians and terraces.

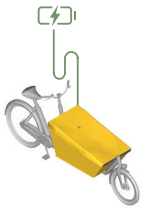
Shopping Areas in The Netherlands

Figure 10
Shopping area examples

Area type characteristics mapped against the steps in the cargo biker's day.

Table 3
Shopping area characteristics per step in they journey






	Loading	Unloading	Parking	Charging	Transition
Location	Space on the sidewalk or in loading and unloading areas.	Space on the sidewalk or in loading and unloading areas.	In side streets in public spaces. Otherwise indoors Not possible on the sidewalk.	In side streets in public spaces. Otherwise indoors Not possible on the sidewalk.	Design of the sidewalk is important for this.
Duration	Short parking	Short stop - Short parking	Long parking	Long parking	Short stop

Opportunities in this area type: good accessibility from connecting streets in the network and ability to drive through. In addition, there are many facilities near each other making it possible to make deliveries which are a short distance from each other.

Limitations with this area type: difficult to park due to narrow sidewalk and crowds. To get onto the sidewalk, several obstacles will have to be overcome, such as parked cars, high curbs and other amenities such as trash cans, benches, bus stops, terraces etc.

Inclusivity and accessibility of this area type: Although this area type offers limited space, there is an opportunity to explore whether the space currently used as a function lane can accommodate cargo bikes Given the multimodal aspect of this street, cargo bikes inevitably share space with vans and trucks. There is an opportunity to create flexible loading / unloading zones where cargo bikes have priority, given their short stopping time. This benefits all types of users. For owners of stores on these streets who have their own cargo bikes, incentives can be created through policies or subsidies to reserve space on their terraces to park their cargo bikes. Alternatively, municipalities can look at increasing the presence of cargo bike racks.

Residential Area

Lambertusstraat (Rotterdam)

Features

- Activities: residential
- Modalities: multimodal (cars, bikes,
- pedestrians)
- Infrastructure: narrow sidewalk, divided
- streets, parking lots, high curbs
- Street furniture: trees, bike racks, bollards
- Policy: bicycle on common area
- Most space for cars (charging + parking)

The residential area has relatively low parking and traffic intensity during the day. Unlike city streets where the space is occupied by many different vehicles, in residential areas much of the space during the day is occupied by the same vehicle / group of vehicles. Cycling through is facilitated because bicycles can use the roadway, which is often not congested with traffic.

Residential Areas in The Netherlands

Figure 11
Residential area examples

Area type characteristics mapped against the steps in the cargo biker's day.

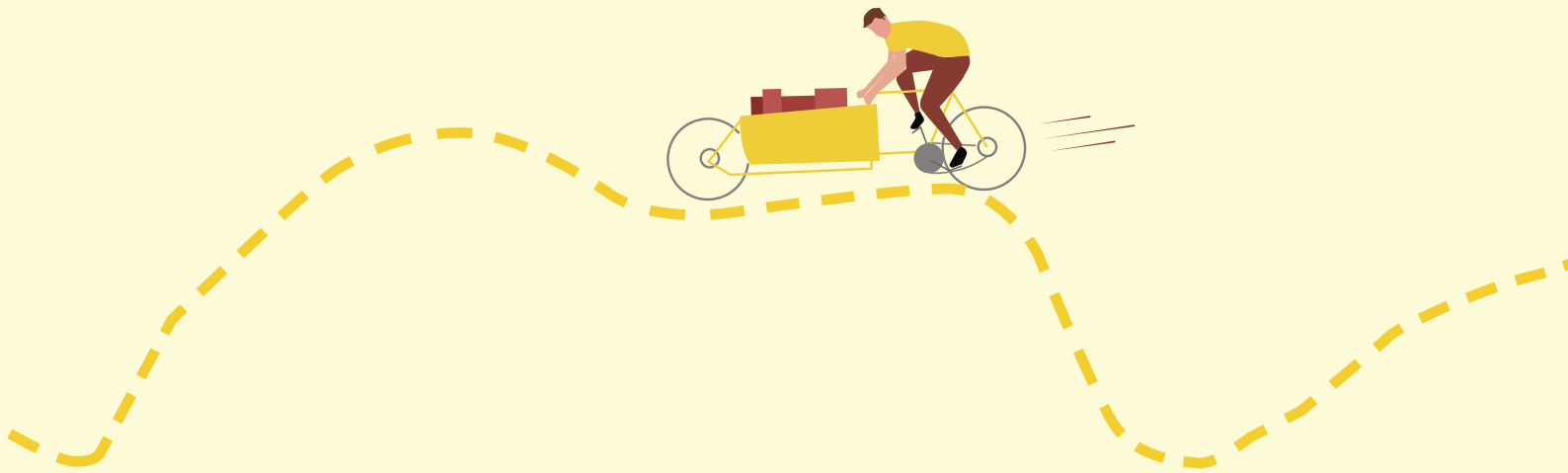
Table 4
Residential area characteristics per step in they journey

	 Loading	 Unloading	 Parking	 Charging	 Transition
Location	Space on the sidewalk or in loading and unloading areas.	Space on the sidewalk or in loading and unloading areas.	Possible on the sidewalk or on private property.	Possible on the sidewalk or on private property.	Design of the sidewalk is important for this.
Duration	Short parking	Short stop - Short parking	Long parking	Long parking	Short stop

Opportunities in this area type: space for parking and riding. Transition to sidewalk has obstacles but is generally doable.

Limitations with this area type: less connected with the urban network. Often not an efficient delivery, as can be seen from the GPS data in Figure 8.

Inclusivity and accessibility of this area type: given the quiet nature of this area type, loading and unloading can often be done on the sidewalk or at a parking lot near the destination. This is especially important for package delivery services. Unlike the other area types, it is inefficient to make multiple deliveries in residential areas because the delivery locations are often further apart. Thus, it is an important benefit of this area to be able to stop here as close to their destination as possible. An inclusive design for cargo bike-friendly residential areas also considers the potential parking and charging needs of the store owner or service provider who owns a cargo bike. For these steps, replacing on-street parking spaces with cargo bike racks may be an option. Alternatively, the design can build on the growing popularity of neighborhood bike racks and promote the accessibility of these facilities to cargo bikes. For service logistics, it is important to have wide enough sidewalks to allow for extended parking.



5
'Space for Cargo Bikes' 2.0

This chapter presents a step-by-step scheme to arrive at an arrangement suitable for logistics involving cargo bikes. The current policies and ambitions, as well as starting points can vary greatly per municiplaity. Using the systematics designed in this chapter for assiting in decision-making, two scenarios are developed for each area typology on how to give more space for cargo bikes. Here street profiles, longitudinal sections and visualizations are provided.

5.1 Demand for Space / Guidelines

For (de)designing public space, choices must be made. Cargo bikes have a growing role within logistics and this requires redistribution and flexible use of space. On the one hand, the use of vans and other logistics vehicles is decreasing, freeing up space for other uses. So the use of cargo bikes creates space.

On the other hand, the need to fit and place cargo bikes and other logistics vehicles in a flexible manner becomes even more important. From the previous chapters, the needs and challenges of the use of cargo bikes are explained. This chapter describes how space can be created to address these needs and challenges.

The previous chapters have presented key findings regarding the needs of cargo bikes for the different logistics types and the opportunities and challenges of the different area types. Given these findings, this section outlines a guide the search for space, in policy and in design. The following questions are answered:

1. Policy: How can space be provided for cargo bikes through the implementation of new policies or changes to existing policies on current infrastructure?

2. Infrastructure: What are the infrastructure changes that can be made to safely and efficiently meet the needs of cargo logistics?

3. Regulatory: What are the rules and requirements for the new infrastructure to guide the use of space?

5.2 Systematics

Because municipalities have different starting points and ambitions, a flexible system has been established with 5 steps. From a high scale level to a low scale level. In step 1 the ambitions and starting points in a municipality are discussed and defined, after which the system zooms in per scale level on practical aspects such as involving stakeholders, adjusting the logistics network and creating more accessible and inclusive designs.

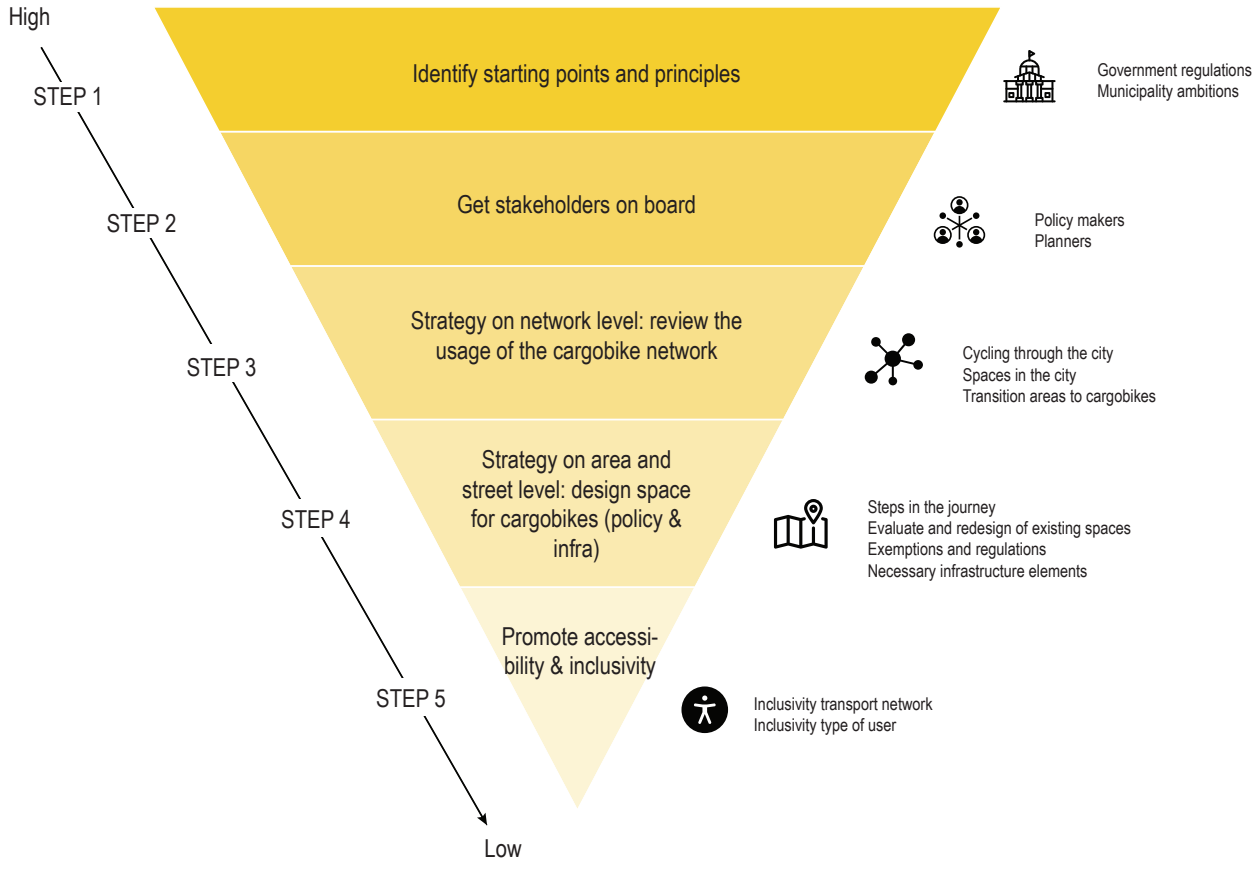
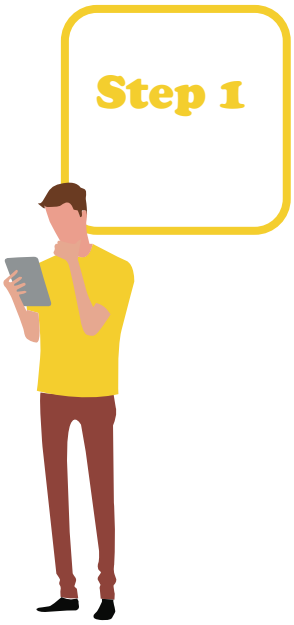


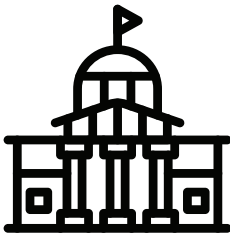
Figure 12
Space for Cargo Bikes Systematics

5.2.1 Step 1: Identify starting points

Understanding government regulations and specifications that affect urban logistics and mobility is essential for municipalities in shaping their ambitions and area development plans. This will determine opportunities, priorities, investments and efforts. Therefore, the first step is to define goals and evaluate the current status of their key areas of development.

Municipalities can then consider specific investments in infrastructure improvements, grants and other incentives, depending on their goals and timeframes.





Questionnaire for municipalities internally: where do they stand now?

Current use of cargo bikes

- Map the number of cargo bikes within the municipality.
- Map who is currently using cargo bikes? (businesses, residents, municipal services, etc.).
- Map the purposes of use (transportation of goods, people, waste, etc.).

Infrastructure

- Where are existing bike lanes and which roads are suitable for cargo bikes?
- Where are existing logistics routes now?
- Map where there are places to park and charge cargo bikes.
- Identify bottlenecks and opportunities for infrastructure improvements.

Policies and regulations

- What are existing rules and regulations regarding cargo bikes?
- What are current subsidies or incentives for using cargo bikes?
- What are possible policy changes?
- Which modalities have priority in the design of public space?

Future goals / ambitions

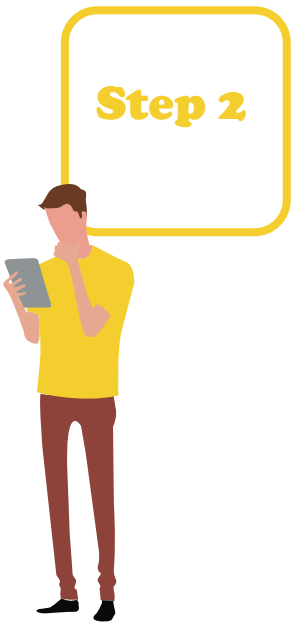
- Set achievable goals for expanding cargo bike use.
- Create a timeline for achieving these goals.

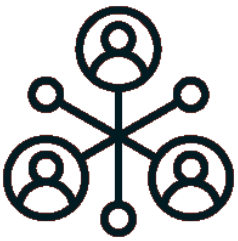
5.2.2 Step 2: Define the team & include stakeholders

Stakeholder engagement is essential in encouraging the use of cargo bikes. This is because different stakeholders have unique insights, needs and concerns. Involving these stakeholders in policy changes, spatial adjustments and in the decision-making process provides a broader understanding of the measures needed and identifies barriers. In addition, it helps build support and identify opportunities and threats, resulting in more effective strategies for promoting cargo bike use.

Within the municipality, the main stakeholders to participate are the urban development, logistics and mobility departments. Including the various cargo bike users in the decisions also promotes inclusivity and allows the municipality to keep up with developments on the ground. In addition, residents and businesses can contribute with insights into the operation of the area. Therefore, the recommendation is to include and involve these parties early in the decision-making process, drawing on the various areas of expertise and keeping track of developments.

The 8 steps to include stakeholders from the municipality are shown in the diagram.





Roadmap stakeholders

1. Identify key stakeholders: Identify all relevant stakeholders involved in the use and promotion of cargo bikes in the city. This may vary by city and area typology. Examples include: residents, schools, businesses, cyclist associations, transportation companies, environmental organizations, the police, city planners, local business owners and other municipal departments such as logistics.

2. Identify and analyze interests and viewpoints: Map the interests and views of each stakeholder group regarding cargo bikes. This can range from environmental benefits to traffic safety and economic opportunities.

3. Organize a stakeholder meeting: Organize a stakeholders' meeting in which all stakeholders are invited to share their ideas and views.

4. Work toward common goals: Identify common goals and try to reach agreement on the benefits of promoting cargo bikes in the city.

5. Develop an action plan: Based on the input and agreement reached during the meetings, develop an action plan to make cargo bikes more of a priority in the municipality's policies. This plan should include clear goals, actions, milestones and timelines.

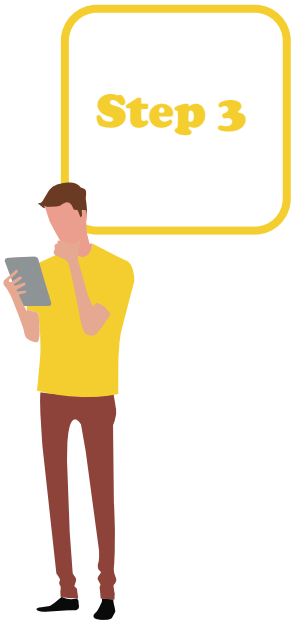
6. Involve stakeholders: Work with stakeholder groups to actively involve them in the implementation of the action plan. This can include involving companies in providing cargo bike services, creating safe bike lanes and informing citizens about the benefits of cargo bikes.

7. Monitor and evaluate progress: Monitor and evaluate progress of policies / actions related to cargo bikes. Adjust as needed.

8. Keep communicating: Ensures open lines of communication with all stakeholders to keep them informed of progress and any changes in policy. This increases stakeholder trust and engagement.

5.2.3 Step 3: Assess usage at the network level

It is important to look at infrastructure at the network level when developing olicies for logistics chains focuding on cargo bikes specifically. A well-planned network of bike lanes, parking facilities, loading zones, traffic lights and intersections ensures optimal accessibility and safety for cargo bikes. This contributes to more efficient transportation, is scalable with increasing demand and has positive environmental impacts. It can also provide economic benefits. Some of these network elements are explained below.



Network elements

Bicycle policy

Establish bicycle policies that take into account the needs of cargo bikes. This may include establishing traffic rules and regulations for cargo bikes and for others modes to interact with it, such as speed limits.

Logistics hubs

Guarantee site availability by regulating space use both at the edge of ZE Zones and within ZE Zones.

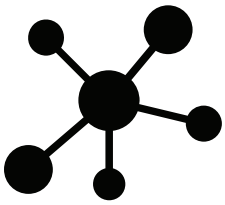
For instance, cooperative hubs can facilitate the operation of various logistics services and also reduce cycling distances for cargo bikes within the city.

Mobile logistics hubs

Companies are increasingly integrating vans, trucks or boats as a "flexible hub" in their logistics system. This offers flexibility: the location of the hub can be adjusted according to deliveries of the day.

Traffic light systems

For public transport and trucks in logistics, special adjustments have already been made at traffic lights. By also doing this on specific routes where many cargo bikes travel, a municipality can improve traffic flow and encourage use of cargo bikes.



Parking policy

Develop parking policies specific to cargo bikes. Here is, among other things, allocating parking spaces for cargo bikes and establishing rules for parking these vehicles.

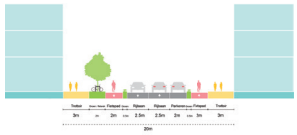
Access to restricted areas

Work on policies that allow cargo bikes to access areas, such as pedestrian zones or car-free zones. This may increase the use of cargo bikes in commercial areas and promote them in inner cities, where other modes are then not allowed.

Bicycle infrastructure

Invest in a well-developed network of bicycle infrastructure suitable for cargo bikes. This includes wide bike lanes and paths that can accommodate wider and longer vehicles. Ensure that bicycle infrastructure is connected and provides access to key destinations in the city.

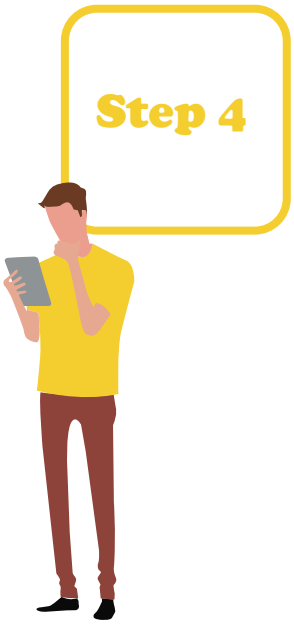
Bicycle-friendly urban planning



Integrate cargo bike friendly urban planning into area development plans. For example, consider creating cargo bike friendly routes when designing new urban areas.

5.2.4 Step 4: Design space at the area and street level

Choices must be made about who to allocate public space to and how to allocate it. To help make these choices, here the main guidelines for finding space that meets the needs of cargo bikes are presented.



Design space in street

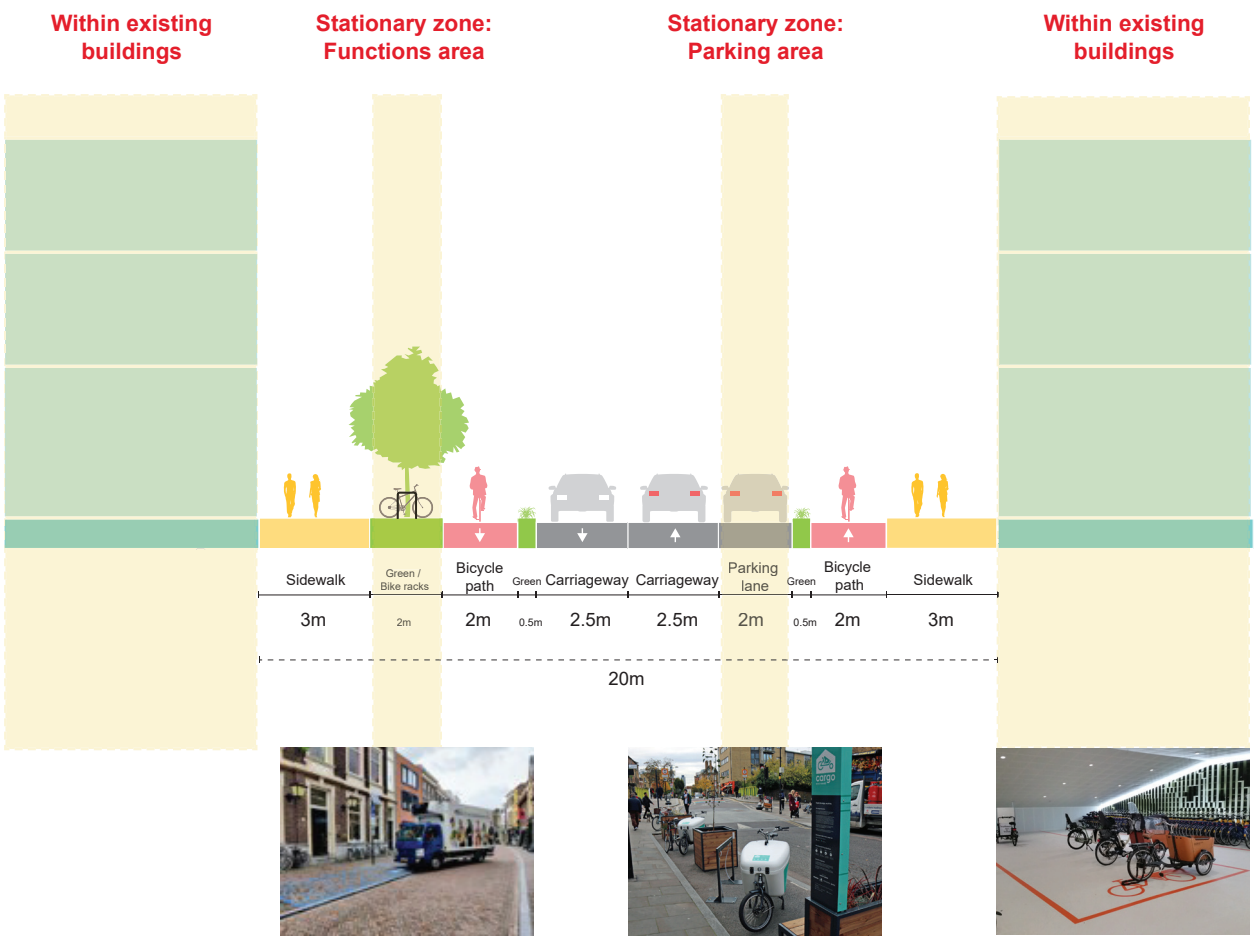


Table 5
Key guidelines for looking for space and designing spaces

	Parking / charging	Loading / unloading	Transition
Within existing buildings These spaces are usually safe for storage / parking at night but also parking during shopping hours at the service or delivery destination. Especially attractive to retailers and service logistics who do not have space in their stores or homes.	Parking garages Bicycle shelters Neighborhood shelters	Inside stores	Ramps, escalators and elevators instead of stairs with bicycle gutters. Longer and less steep slopes Aisle widths > 1.5 m Specific cargo bike lanes and doors > 1.5 m wide

	Parking / charging	Loading / unloading	Transition
Stationary zone: Parking area A stationary zone is one where there are only stationary objects. For the road component, this means for example parked cars, bicycles, or greenery.	Replaced car parking spaces Side streets Back streets	Replaced car parking spaces Flexible loading / unloading areas for vans and other means of transportation.	Elevated crossings

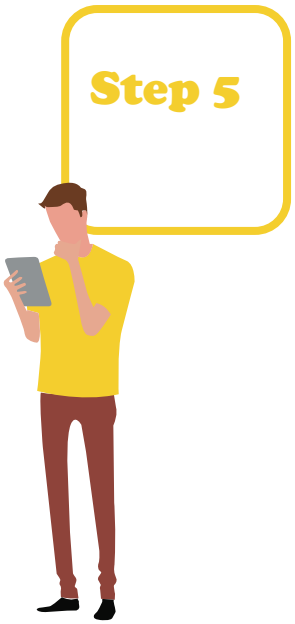
	Parking / charging	Loading / unloading	Transition
Stationary zone: Functions area Spaces on the sidewalk where it does not impede pedestrian flow, that is, between elements, for example, terraces, benches or trash cans, or by using existing bicycle or car infrastructure.	Empty space between elements Terraces	Empty space between elements Unused / little-used bicycle parking spaces Terraces	Lowered and non-sharp curb

5.2.5 Step 5: Promote accessibility and inclusivity

Inclusive design takes into account the specific needs of each user, even if there are shared needs between different user types. While parcel delivery users have a hub to store their cargo bike at night, users of store owners may use facilities such as bicycle racks. A requirement is then that they must be accessible and meet the necessary requirements.

For inclusive design:

- Increase the number of bike racks where space is reserved for cargo bikes.
- Reserve space for cargo bike parking and charging stations in residential areas.
- Minimize construction of hard/physical infrastructure elements on busy streets (pedestrian streets, shopping streets) to promote flexibility of space use.
- Make bike racks accessible to cargo bikes. That means using ramps and escalators wide enough for cargo bikes of different sizes. Include charging stations for e-cargo bikes.
- Offer subsidies for store owners to meet higher insurance costs for parking their e-cargo bikes in their store.



- Design loading / unloading areas suitable for different sized bikes from the cargo bike family.
- Give space to cargo bikes of parcel delivery services on the roadway instead of the bike lane.
- Widen bike lanes.
- Offer subsidies for store owners to meet higher insurance costs for parking their e-cargo bikes in their store.

5.3 Case Study: Rotterdam

In this chapter we explore three case studies where we look at how the practical approach to integrate cargo bikes into the city can be improved. To do so, we have created two viable scenarios by area typology that fit within the systematics established in Chapter 5. These scenarios illustrate how more space can be offered to cargo bikes and to utilize their full potential in the pursuit of sustainable and efficient urban mobility.

We present the scenarios using longitudinal sections, cross-sections, and visualizations. The process to develop the scenarios included design sessions with stakeholders, including the municipality of Rotterdam, cargo bike entrepreneurs, and experts. Starting points were the developed systematics and the concept plans and ambitions shared by the municipality. Examples include the concept area typologies for bicycle businesses, distinguishing, for example, between areas with mixed residential and commercial activities and purely commercial areas with mixed or monotype businesses. In these concept plans, it is noticed that there has been a start in the process to identify the spaces that can be used for cargo bike storage and loading and unloading activities, whether they are allowed on public urban space or only on the owner's own property (indoors or outdoors).

5.3.1 Pedestrian area - Lijnbaan, Rotterdam

Figure 13
Lijnbaan, Rotterdam

Step 1: Identify principles of pedestrianization Lijnbaan

Lijnbaan is a pedestrian area surrounded by a specific shopping area in which only pedestrians are allowed. The "consideration framework for bicycle delivery companies" at the City of Rotterdam includes the following aspects.

At network level: for access route delivery vehicles, a distinction is made between "crosses with pedestrians" or "residential area. If the area does not cross pedestrians, a route plan is possible provided it is balanced with traffic space and flows. If the area does cross pedestrians, it must be balanced with traffic, pedestrian and residential space and flows.

At the area level:

- Loading and unloading activities at this location are possible indoors. Outside (in the public space) it is possible only if it is balanced with traffic, pedestrian and residential space.
- Parking / storage is always allowed on private property (indoor or outdoor). Outside in the public space it is only allowed if for short term parking (during closing time and in balance with other traffic) and not allowed for long term parking.

Step 2: Engage stakeholders

When incorporating cargo bikes differently in this area type, it is important to involve retailers, residents and business owners. In addition, it makes sense to consider how their logistics schedules fit together and take this into account for defining how the area may develop.

Pedestrian area: current situation

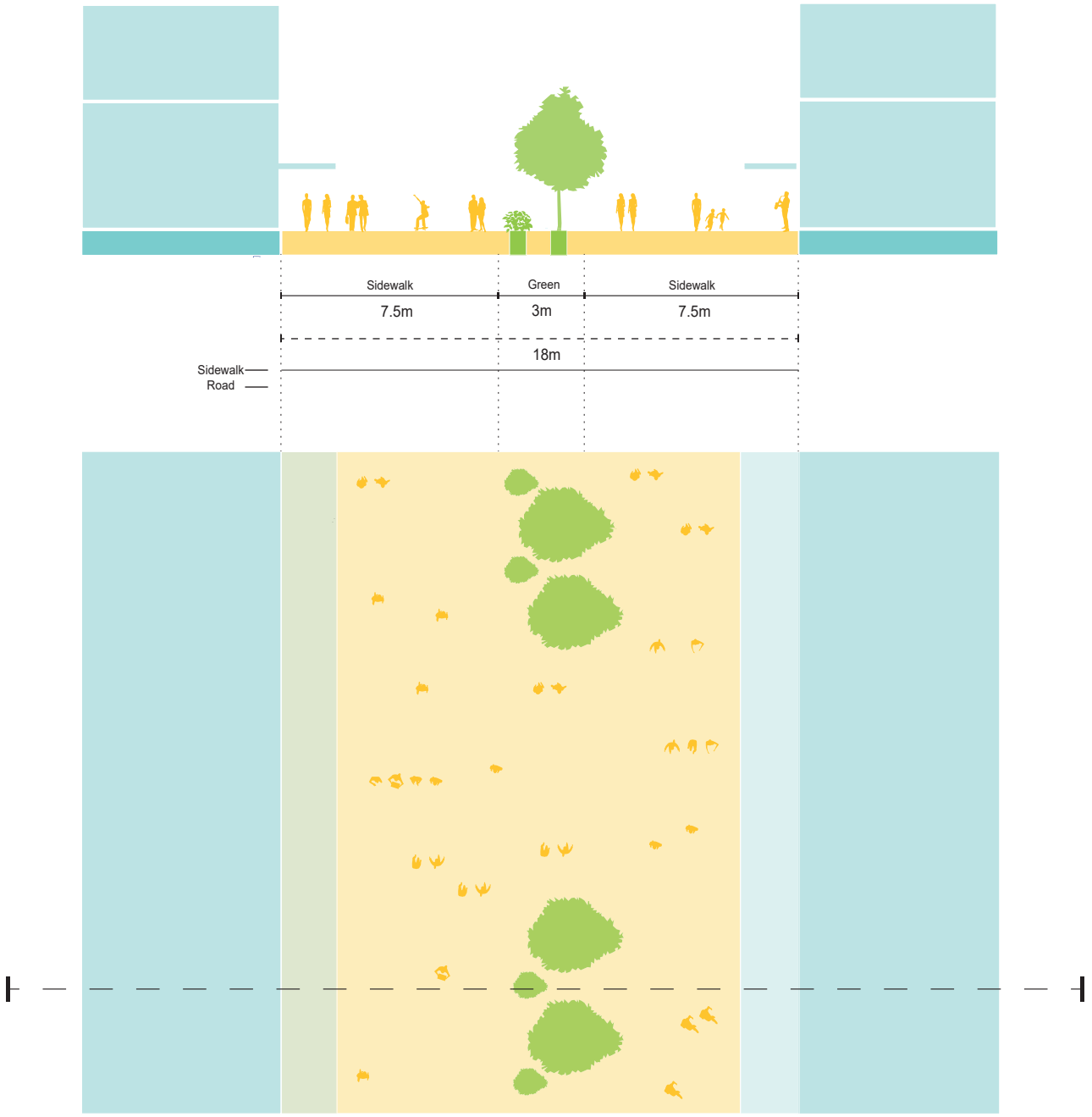


Figure 14
Pedestrian area - current situation

Cargo bikes parking space

Cargo bike loading / unloading zones

Flexible loading / unloading zones (cargo bike, vans)

Scenario 1

Cargo bikes (partially) allowed

Principles

- Cargo bikes allowed outside business hours.
- Loading and unloading activities possible during shopping hours. There is space on the sidewalk between elements in the stationary zone for this purpose, accessed via transition zones ("cargo bike path" to minimize conflicts).
- Parking cargo bikes is not allowed (creates blockage). However, this is possible in parking garages in the neighborhood.

Step 3: Network-level strategy

The Lijnbaan is a flow area for pedestrians, not cyclists. The pedestrian has priority here. Therefore, there are no dedicated bike lanes at the Lijnbaan in this scenario that encourage bicycle flow. To ensure that cargo bikes can reach the loading and unloading areas in this scenario, it is proposed that the intersecting streets be designed as shared space. This ensures that cargo bikes can reach the pedestrian area and that space is available for them on side streets (or connecting streets) for driving, loading and unloading and parking. An alternative option is to retain the bicycle lanes on the intersecting streets, in which case cargo bikes can continue to use the existing bicycle infrastructure.

For parking, a suggestion is to develop parking garages with dedicated cargo bike spots and neighborhood bike racks where shoppers can park their cargo bikes.

Step 4: Strategy at the area-street level

In this scenario, there are policies developed to permit (partial) access to the area. In addition, places for loading and unloading are designed so that delivery drivers do not have to walk long distances with packages outside the cargo bike. These loading and unloading spots are designed on the sidewalk, between elements in the already existing stationary zone. Shop owners in this area can park their cargo bikes indoors, but must walk with their cargo bike towards the store if the access is only via the pedestrian street. If there is no space in their store, they can park in garages nearby.

Step 5: Promote accessibility & inclusivity

The bays are large enough to accommodate different types of cargo bikes, in addition, the cargo bikes have access to the area within specified times, provided they drive or walk slowly. If space for cargo bikes is planned in parking garages and / or neighborhood parking lots, design entrances should include moving walkways and ramps that are cargo bike-friendly

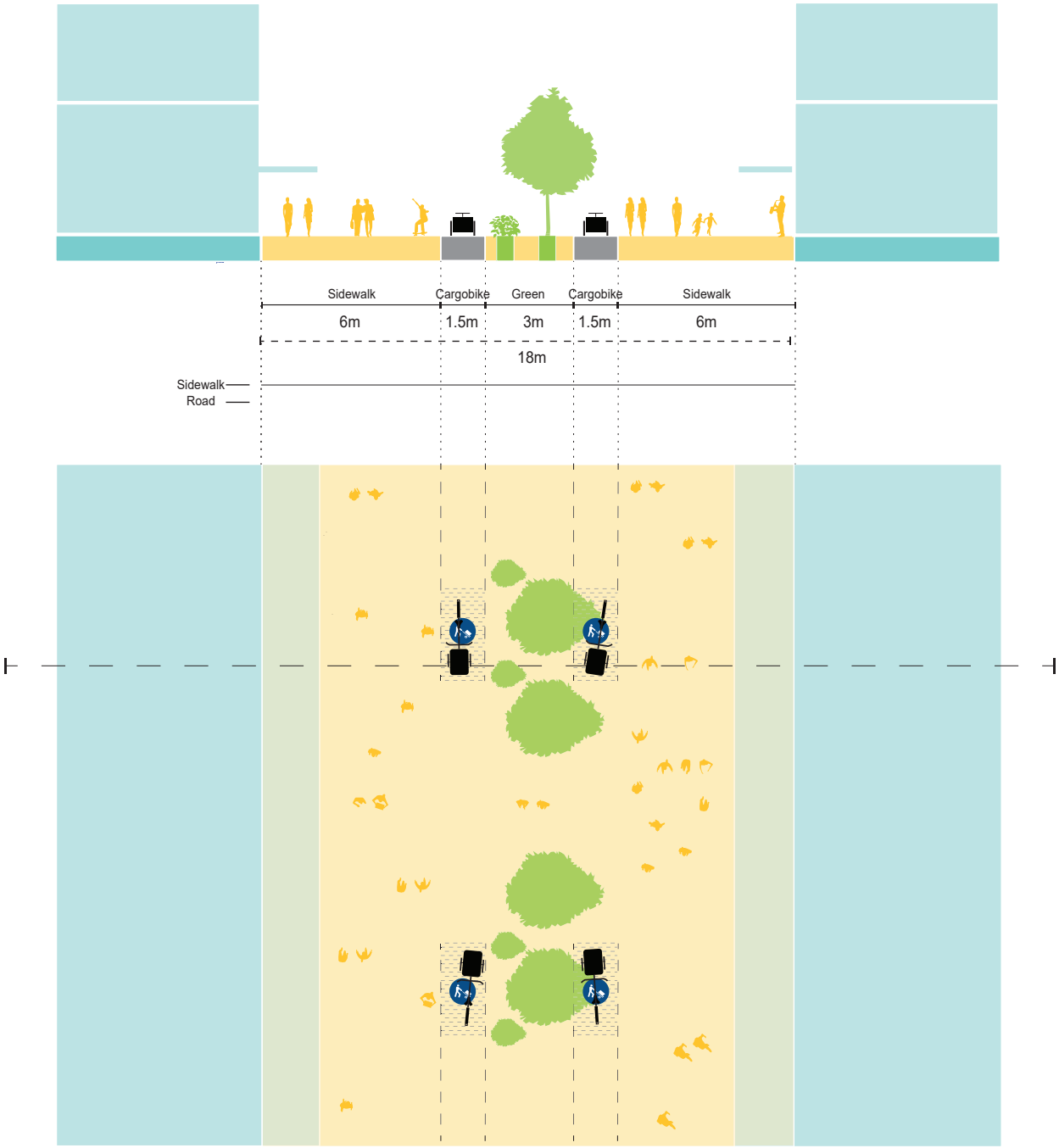


Figure 15
Pedestrian area - scenario 1 - cargo bikes partially allowed

Cargo bikes parking space

Cargo bike loading / unloading zones

Flexible loading / unloading zones (cargo bike, vans)

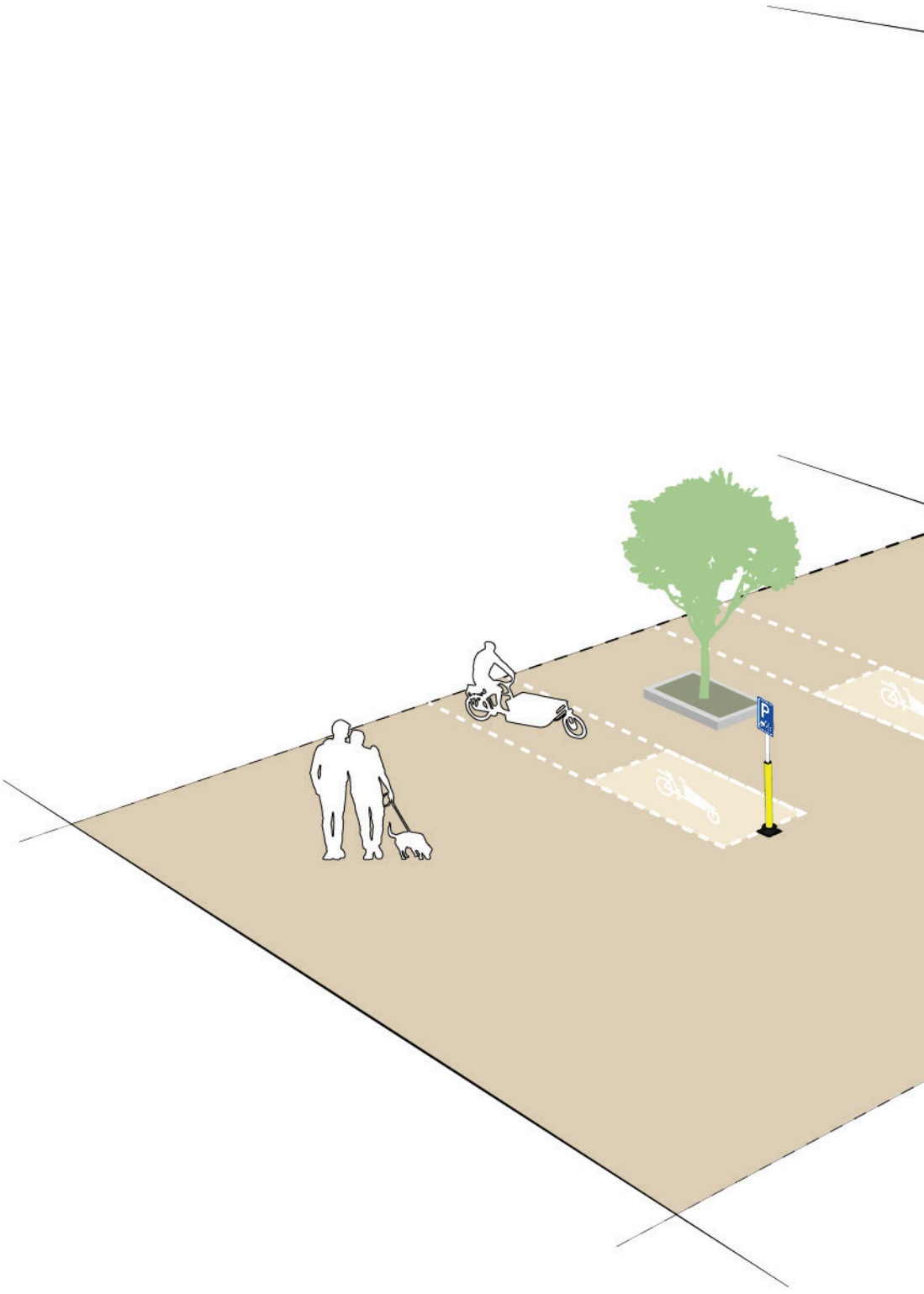
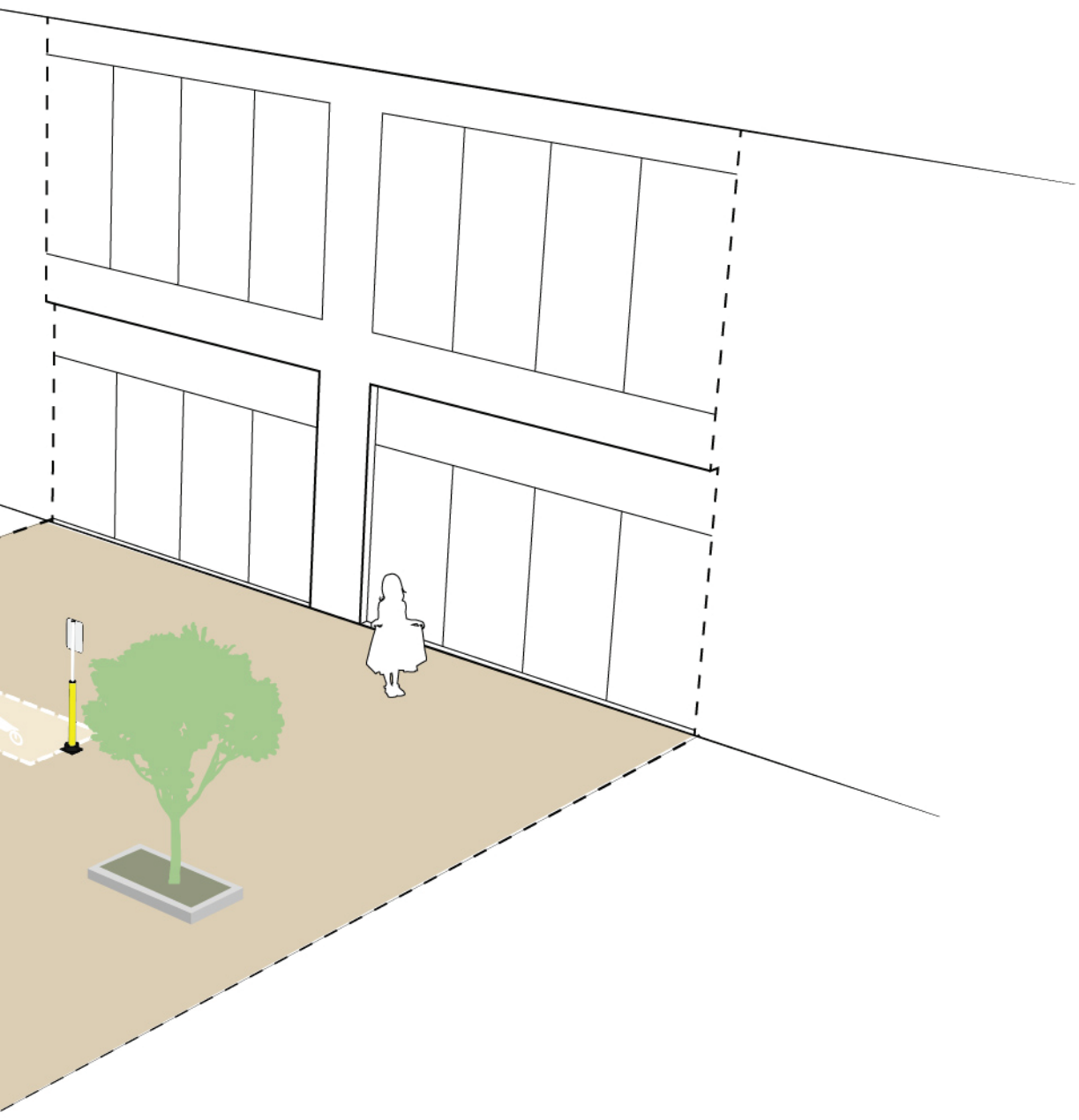


Figure 16
Pedestrian area - scenario 1 - cargo bikes partially allowed



Scenario 2
Hubs in back streets

Principles

- LadeLoading and unloading in hubs in back streets, flexible spots (shared with other vehicles but priority for cargo bikes). Cargo must then be taken on foot or with a push cart towards the delivery location.
- Parking is available in parking garages, in hubs on back streets with charging points for shop owners with their own cargo bikes or inside the store via a back entrance.
- Transition is not required as spaces are designed at street level.

Step 3: Network-level strategy

In this scenario, cycling through the pedestrian area is completely prohibited within shopping hours. Mobility hubs are created in the side and / or back streets. These are well connected to the urban bicycle network. In this scenario, there is an opportunity to create hubs for cargo bike logistics in innovative ways, such as applying new curb space management technology (e.g. Coding the Curbs). Such technologies are an opportunity to flexibly reserve and use space.

Step 4: Strategy at the area-street level

As in this scenario, mobility hubs are realized on side and back streets, here there is space for loading and unloading as well as longer parking. Loading and unloading spaces are shared with other logistics vehicles (e.g. vans, trucks). Sheltered parking spaces with a charging point for (e-)cargo bikes are created for people who want to park, here store owners can also use them.

Step 5: Promote accessibility & inclusivity

The compartments are large enough for the different models of cargo bikes. In addition, all cargo bikes can enter the side streets. Transition to a sidewalk is not necessary because the bays are designed to be bike-friendly, this also makes it inclusive. By incorporating sheltered areas for overnight parking / storage and charging stations, the needs of shopkeepers with their own cargo bikes who do not have space in their stores to park are also met.

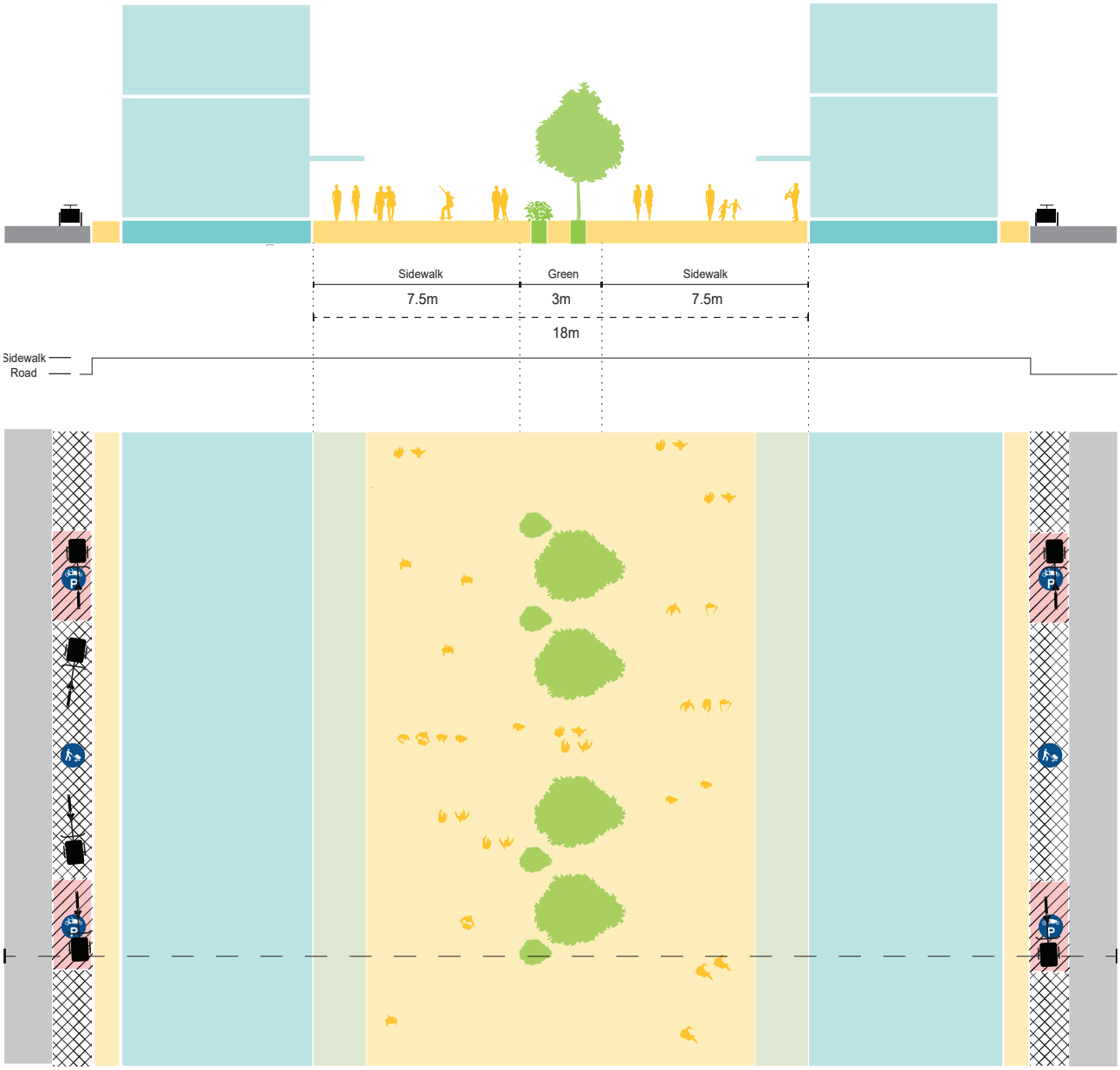


Figure 17
Pedestrian area - scenario 2 - hubs in back streets

Cargo bikes parking space

Cargo bike loading / unloading zones

Flexible loading / unloading zones (cargo bike, vans)

5.3.2 Shopping street - Nieuwe Binnenweg, Rotterdam

Figure 18
Nieuwe Binnenweg, Rotterdam

Step 1: Identify starting points for New Binnenweg

The Nieuwe Binnenweg is a shopping street with mixed traffic flows and both stores and residential facilities. The "consideration framework for bicycle delivery companies" at the City of Rotterdam includes the following aspects.

At network level: for access route delivery vehicles, a distinction is made between "crosses with pedestrians" or "residential area". If the area does not cross pedestrians, a route plan is possible, provided it is balanced with traffic space and flows. If the area does cross pedestrians, it must be in balance with traffic, pedestrian and residential space and flows.

At the area level:

- Loading and unloading activity supply at this location is possible indoors. Externally (in the public space) it is possible only by agreement and in balance with traffic, pedestrian and residential space.
- Parking / storage is always allowed on private property (indoor or outdoor). In public spaces, short parking (during closing time and in balance with other flows) is allowed and long parking is not allowed.

Step 2: Engage stakeholders

With this area type, it is important to involve shop owners and residents. In addition, talking to people who own parking permits is crucial and it is useful to involve public transportation parties.

Shopping street: current situation

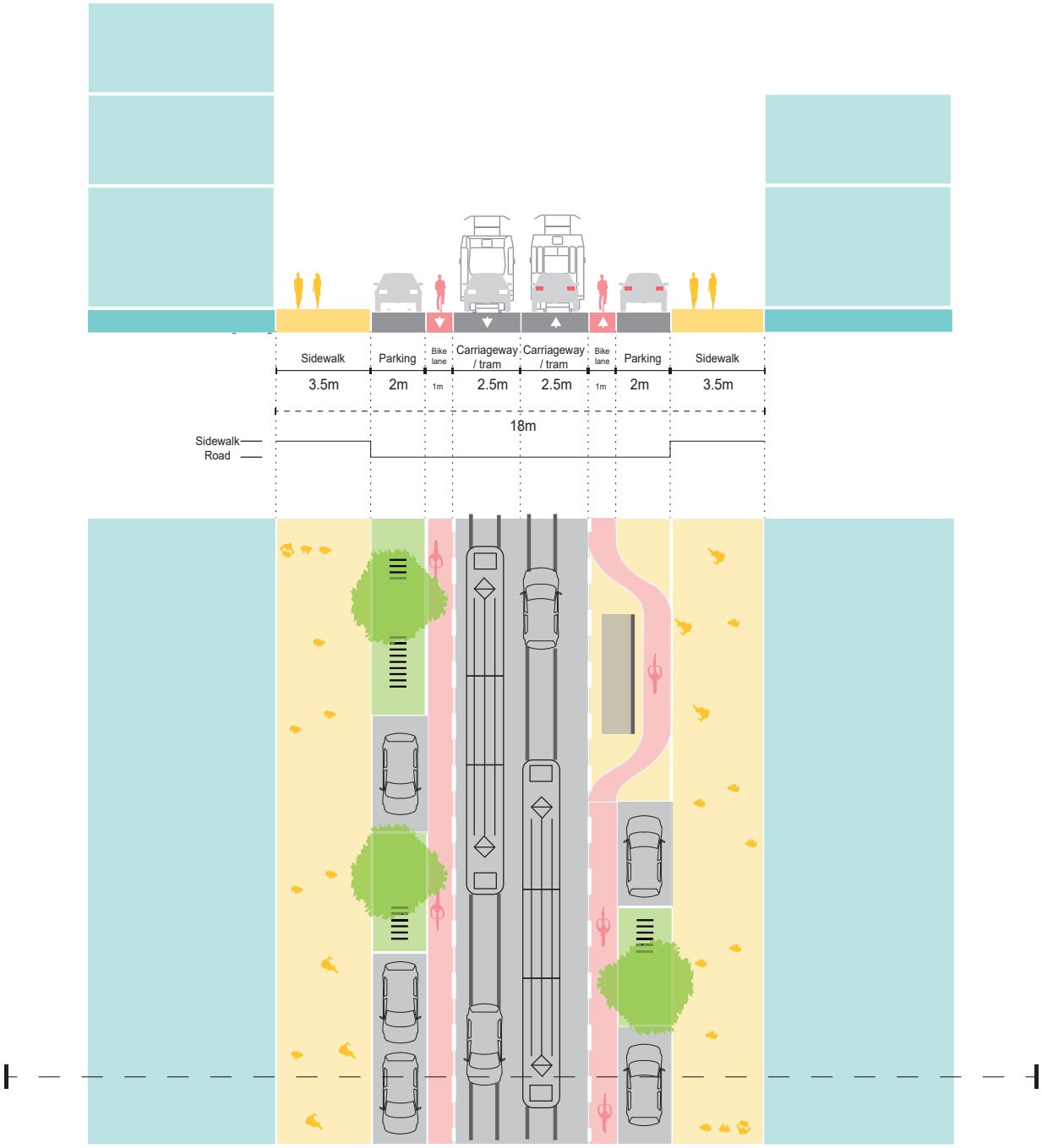


Figure 19
Shopping street - current situation

Cargo bikes parking space

Cargo bike loading / unloading zones

Flexible loading / unloading zones (cargo bike, vans)

Scenario 1

Modify current street profile: flexible use of space

Principles

- Cargo bikes use new loading and unloading bays along with vans.
- Transition to the sidewalk is not really necessary.
- A wider bike lane (at least 2 meters) that cargo bikes also use.
- Parking (short and long) possible in parking garages nearby, side streets and hubs, or in winter on terrace of stores.

Step 3: Network-level strategy

The Nieuwe Binnenweg is now a flow area and will remain so for the foreseeable future. This scenario includes a limited transformation where cargo bikes can load and unload in areas currently designated for cars / delivery vans. This street is well connected to the surrounding network, and to maintain the character of transit on the street, no on-street parking is planned in the public space. This scenario allows for a high turnover of users throughout the day.

Step 4: Strategy at the area-street level

Short-stay and off-street parking is possible on private property, not in public spaces. Places for loading and unloading are developed in parking spaces, transition to the sidewalk is therefore not necessary. This promotes the use of cargo bikes on this street for deliveries and pick-ups. Long-term parking is not possible at these public facilities.

Step 5: Promote accessibility & inclusivity

The bike path will be wider and thus more accessible to different models of cargo bikes. Store owners who have a terrace can use the space to park their cargo bikes. However, since on-street parking is not allowed / planned in public spaces, accessibility must be provided for cargo bikes to access bike parking (adequate width of entrances, aisles and ramps).

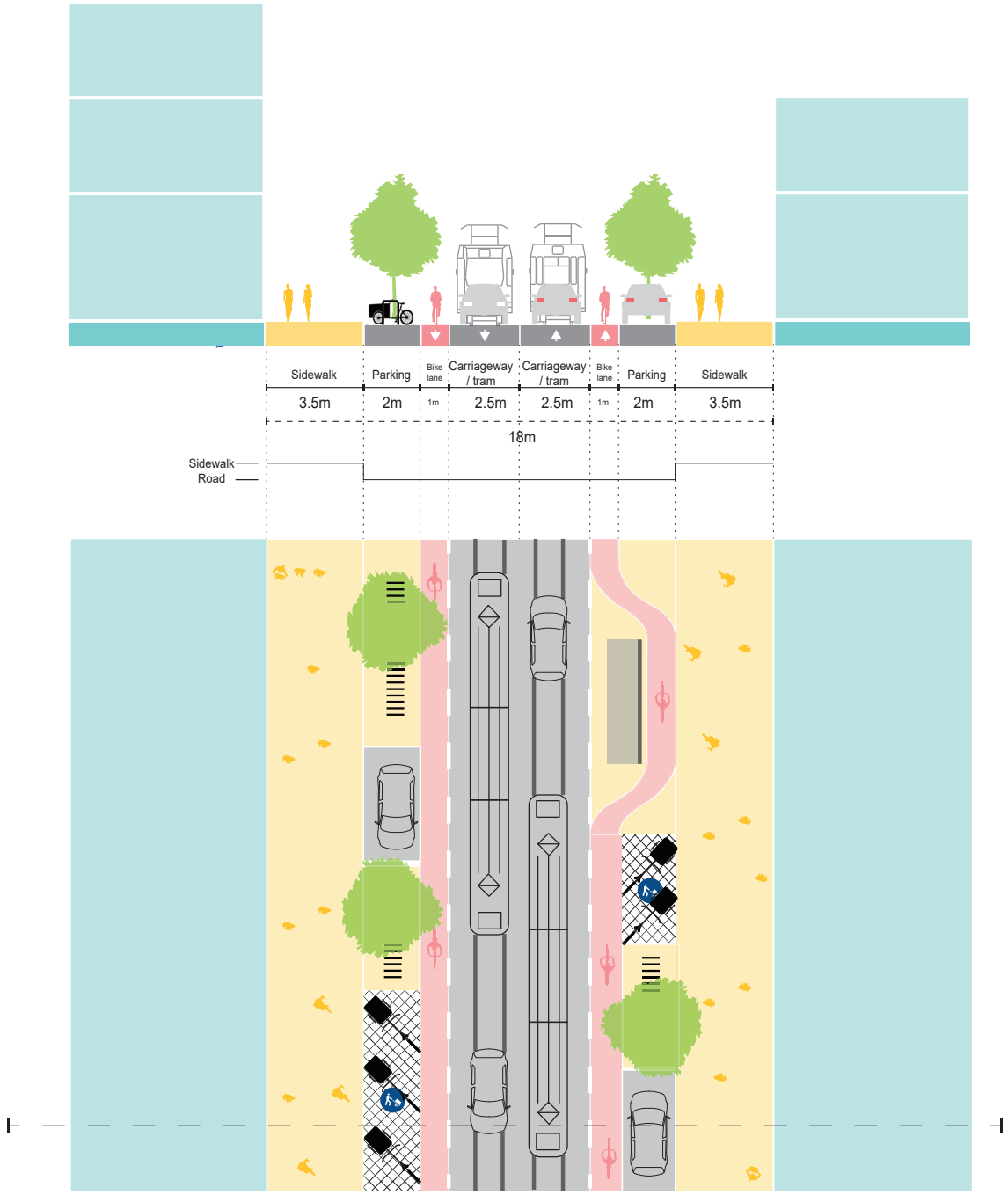


Figure 20
Shopping street - scenario 1 - flexible usage of space

Cargo bikes parking space

Cargo bike loading / unloading zones

Flexible loading / unloading zones (cargo bike, vans)

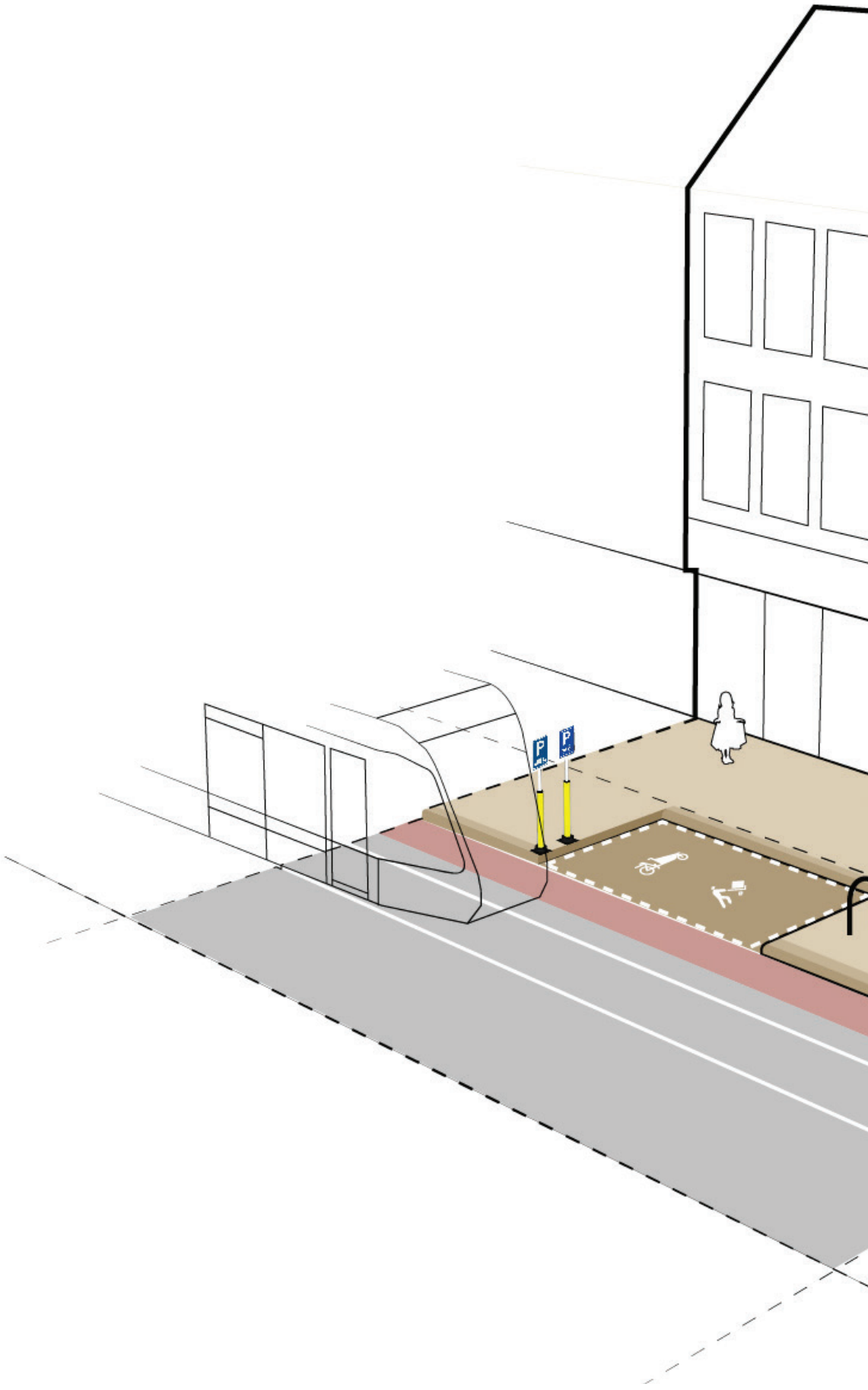


Figure 21
Shopping street - scenario 1 - flexible usage of space

Scenario 2

Total street reconfiguration: shared space

Principles

- Develop shared space, where cargo bikes are parked on the sidewalk.
- Realignment of the entire street to 30 km/hour.
- Parking possible on the street in cargo bike parking spots.

Step 3: Network-level strategy

This scenario sees the city street as a place to stay, that is, no longer as a street that is just being driven through. The speed becomes 30 km/hour and the layout is adjusted. The street is thus no longer part of a through network, but is given the focus as a shopping street with a residential and calmding function. The routes for through traffic will go around the area. These routes may be given priority for through traffic, for example by designing traffic lights strategies.

Step 4: Strategy at the area-street level

The space is designed as shared space, transition to a place for loading and unloading is thus facilitated. Parking for a longer time is possible on the street itself on the widened sidewalks in the stationary zone. Charging points are provided in the covered parking spaces. The wider sidewalk also facilitates loading and unloading, with cargob ikes being able to stop quickly by the stores and residences without significantly interfering with other traffic flows.

Step 5: Promote accessibility & inclusivity

The Nieuwe Binnenweg is a busy street and that manifests itself in that not everyone has infinite space. Store owners can reserve space during the day to park their cargo bike close to their store, making it easier to access when needed for a delivery. The shared space design provides a smooth transition option.

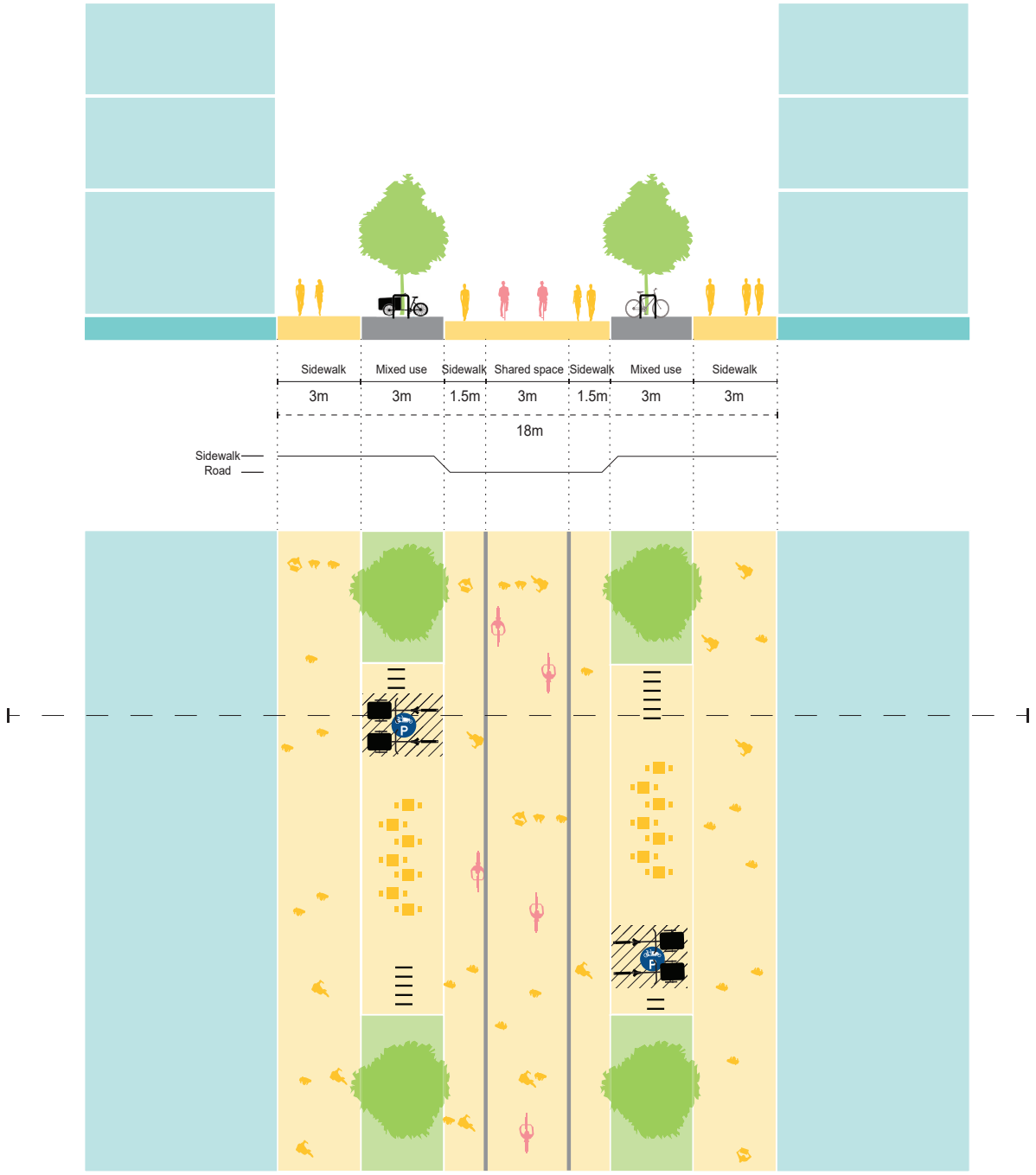


Figure 22
Shopping street - scenario 2 - shared space

5.3.3 Residential area - Lambertusstraat, Rotterdam

Figure 23
Lambertusstraat, Rotterdam

Step 1: Identify starting points for New Binnenweg

Lambert Street is a typical residential street. The "consideration framework for bicycle delivery companies" at the City of Rotterdam includes the following aspects.

At the area level:

- Loading and unloading activity in this location is possible indoors. In public space possible only by agreement and in balance with other traffic, pedestrian and residential space.
- Parking / storage is always allowed on private property. In public spaces it is never allowed.

Step 2: Engage stakeholders

In a residential area, it is important to consider current residents, shop owners and permit holders of spaces in the area.

Residential area: current situation

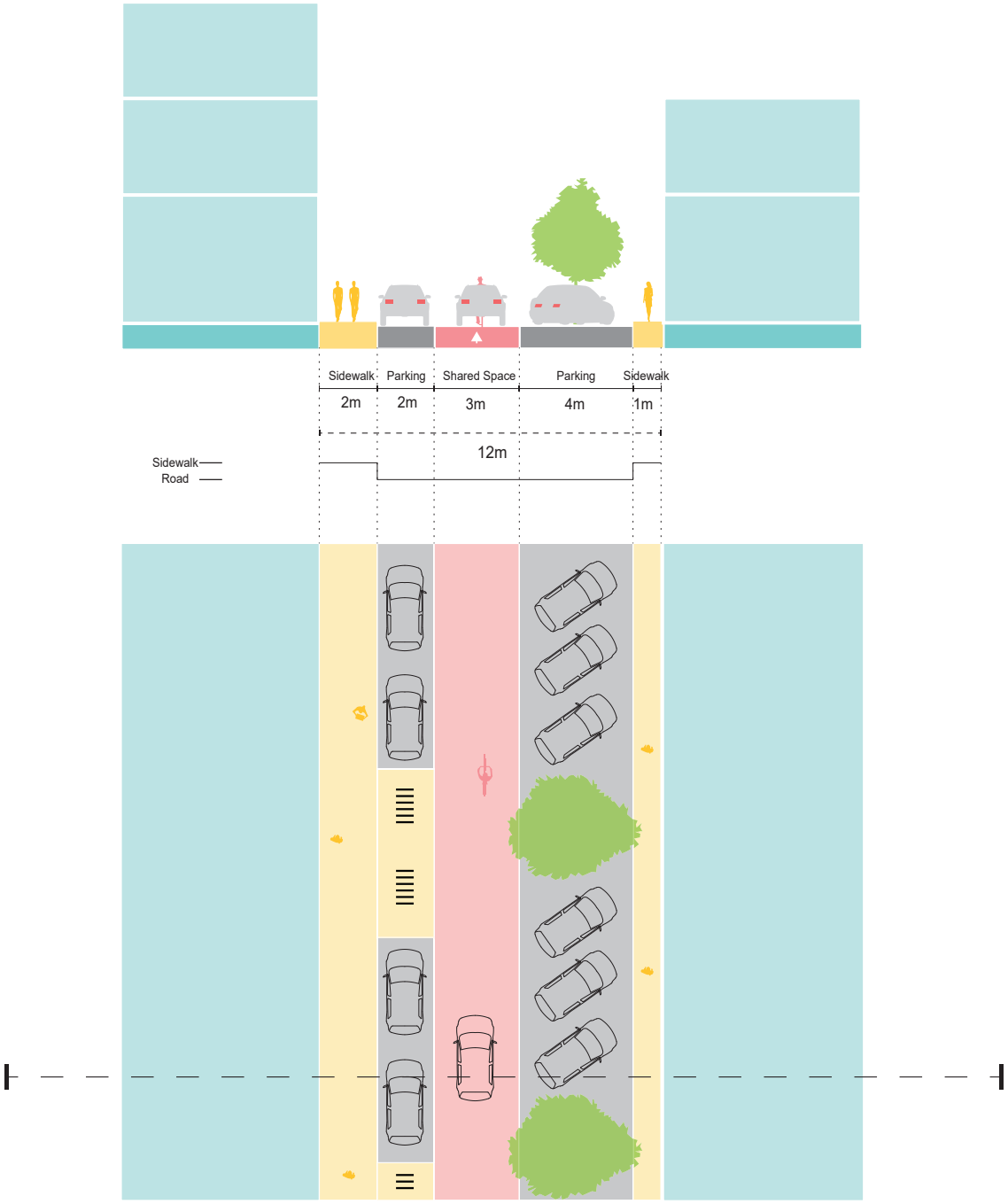


Figure 24
Residential area - current situation

Cargo bikes parking space

Cargo bike loading / unloading zones

Flexible loading / unloading zones (cargo bike, vans)

Scenario 1
On the sidewalk

Principles

- Do not design specific loading and unloading areas, but create space in stationary area.
- Parking spots for cargo bikes instead of parking spots for cars.
- Cargo bikes on the roadway, no bike lane.
- Transition - apply curb ramps with sloped sides.

Step 3: Network-level strategy

Residential areas are designed as residential areas with a maximum speed of 30 km/h. These streets are primarily a "destination" for cargo bikes with short delivery stops. Delivery locations are far apart (in contrast to the concentration of stores where they are often close together). Therefore, it is important to connect these "slower" residential areas via "faster" through streets where the cargo bike has priority. This allows them to "regain" the time they lose by cycling slower in the residential areas when moving between different residential areas.

Step 4: Strategy at the area-street level

Street space is planned for cargo bikes for parking and loading. One car parking space on the street can serve as parking for two cargo bikes. The design should ensure that parking is protected at night. To facilitate the transition to the sidewalk, curbs with sloping sides have been applied.

Step 5: Promote accessibility & inclusivity

The parking spaces and roadway are spacious enough to accommodate different models of cargo bikes. The secure parking spaces with charging facilities provide space for service providers and store owners who have their own cargo bikes but have no other place in their home or store to park and charge them.

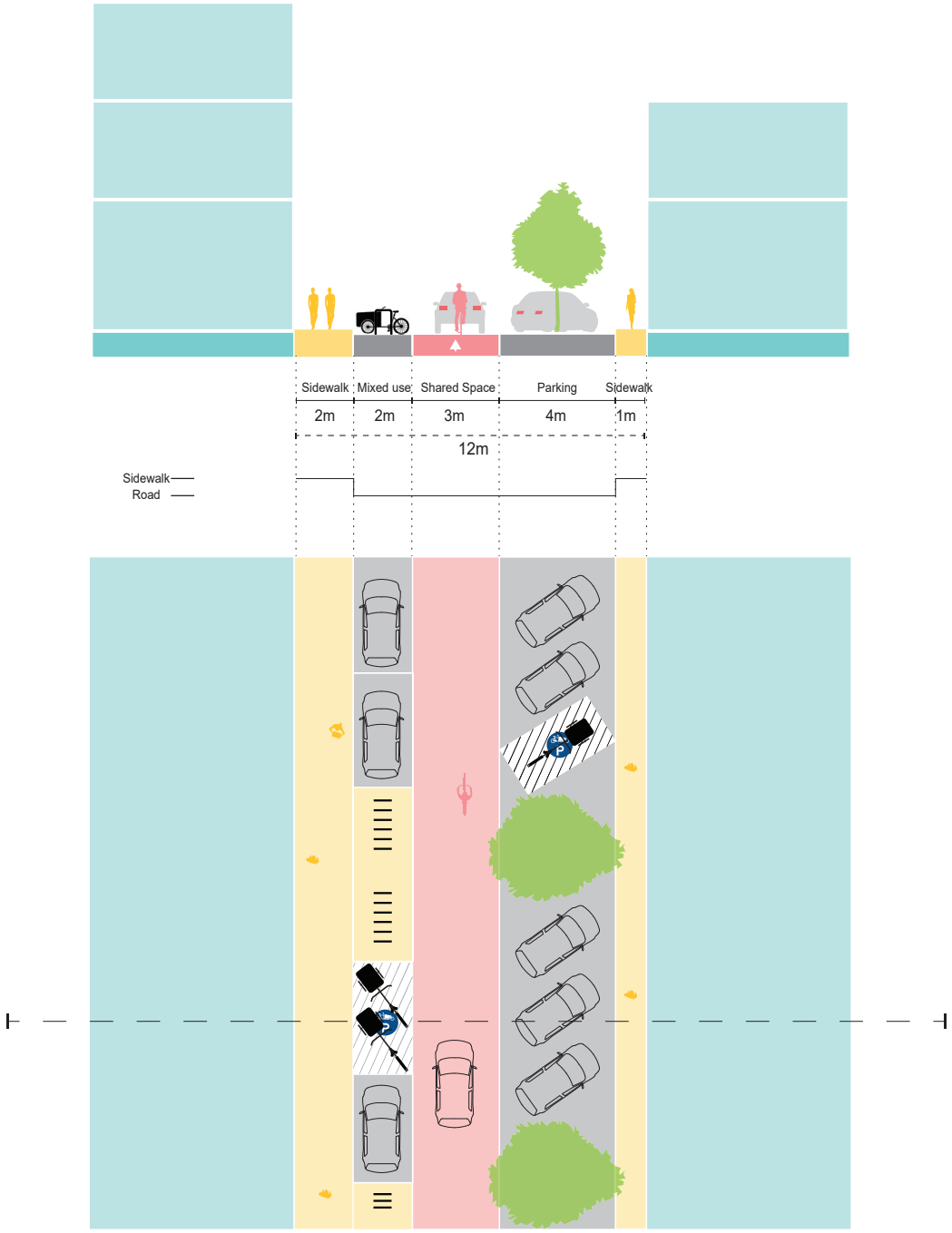


Figure 25
Residential area - scenario 1 - on the sidewalk

Cargo bikes parking space

Cargo bike loading / unloading zones

Flexible loading / unloading zones (cargo bike, vans)

Scenario 2

Street redesign: Living Street

Principles

- Priority for pedestrians and cyclists.
- Prioritizing safety for children. Living Streets concept.
- A "bike lane" for cyclists and cargo bikers to pass safely and have clear access.
- Furnish street as a residential area.

Step 3: Network-level strategy

In this scenario, the street is not part of a continuous network: it is a street with a specific residential function. Residents and visitors park their vehicles here and occasionally people drive through. These streets are mainly a "destination" for cargo bikes for short delivery stops. Delivery locations are far apart (in contrast to the concentration of stores that are often close together). Therefore, it is important to connect these "slower" residential areas via "faster" through streets where the cargo bike has priority. This allows them to "regain" the time they "lose" by cycling slower in residential areas when moving between different residential areas.

Step 4: Strategy at the area-street level

The area has a residential function and pedestrians have priority. Important is the safety of residentials, especially children and the elderly who live here. The space freed up by removing car parking spaces can be used by many more functions, for example, bicycles and cargo bikes that take up less space. Allowing only active modes of transportation to use these streets will also encourage businesses to make more use of cargo bikes. Loading and unloading can be done in the stationary zone on the sidewalk. The design should ensure that parking is protected at night. Transition to the sidewalk is irrelevant because the entire street is at the same level.

Step 5: Promote accessibility & inclusivity

The bays and road are large enough to accommodate different models of cargo bikes. The protected parking spaces with charging point facilities provide inclusivity for service providers and store owners who have their own cargo bike but no other place in their home or store to store and charge it.

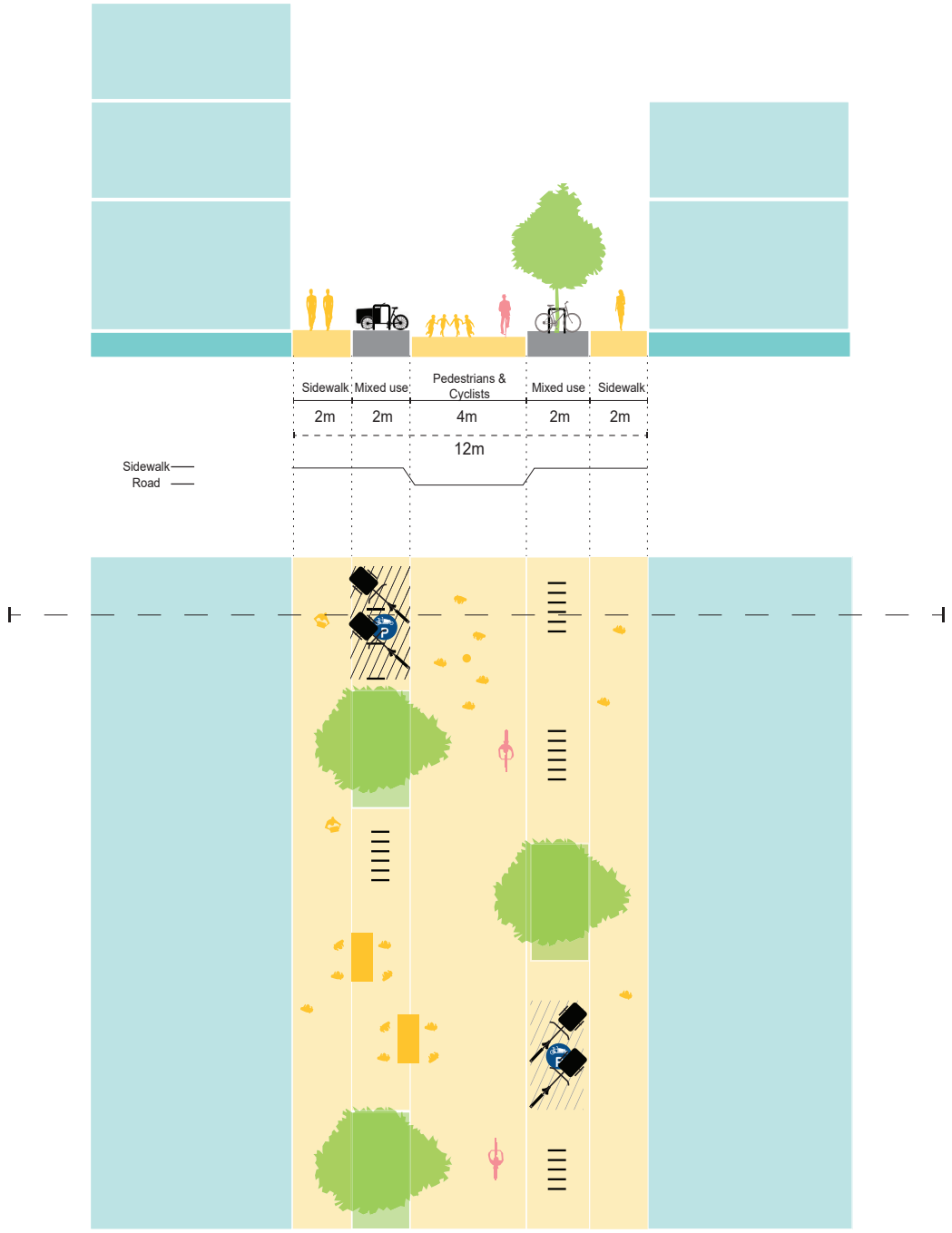


Figure 26
Residential area - scenario 2 - Living Street

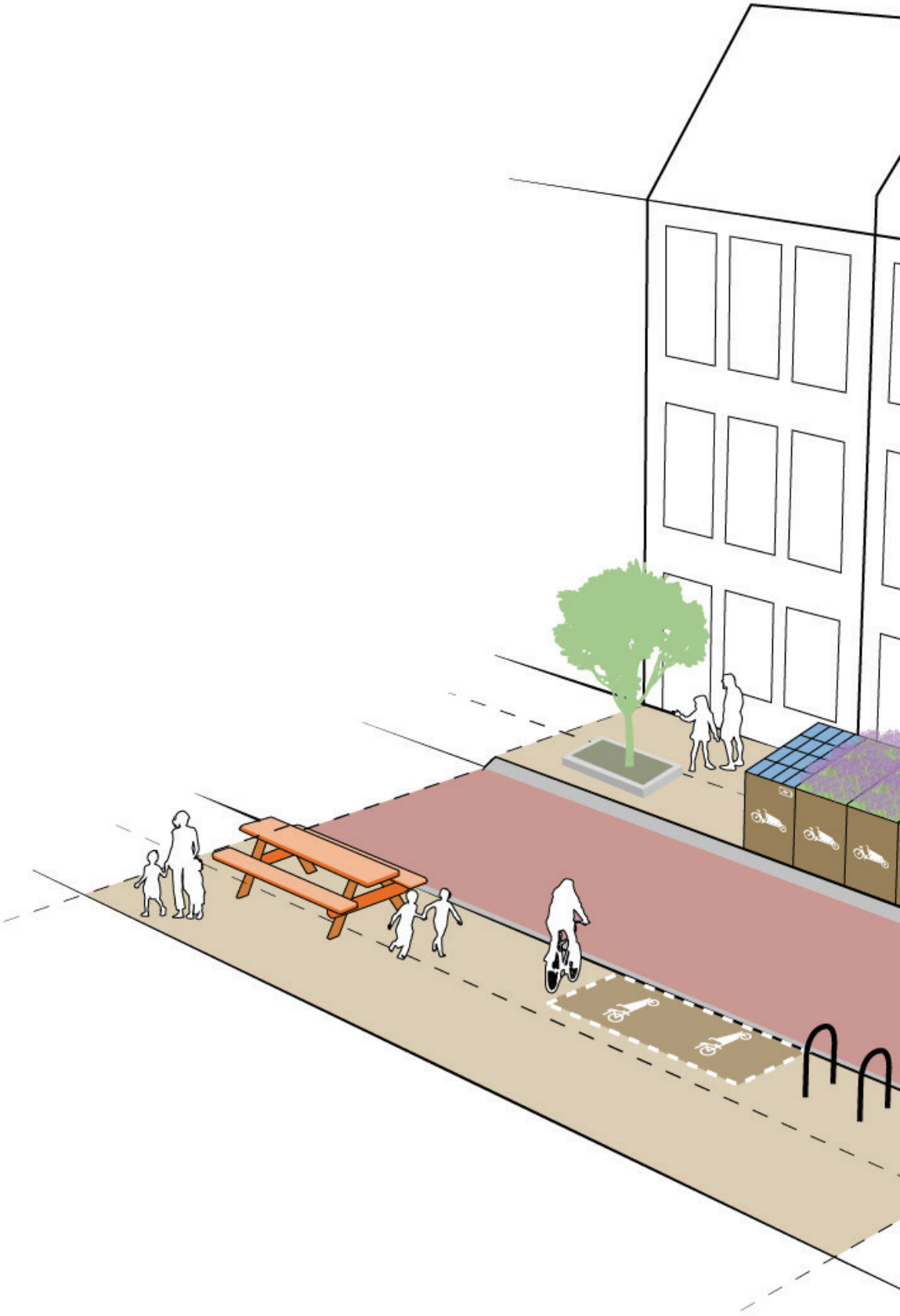
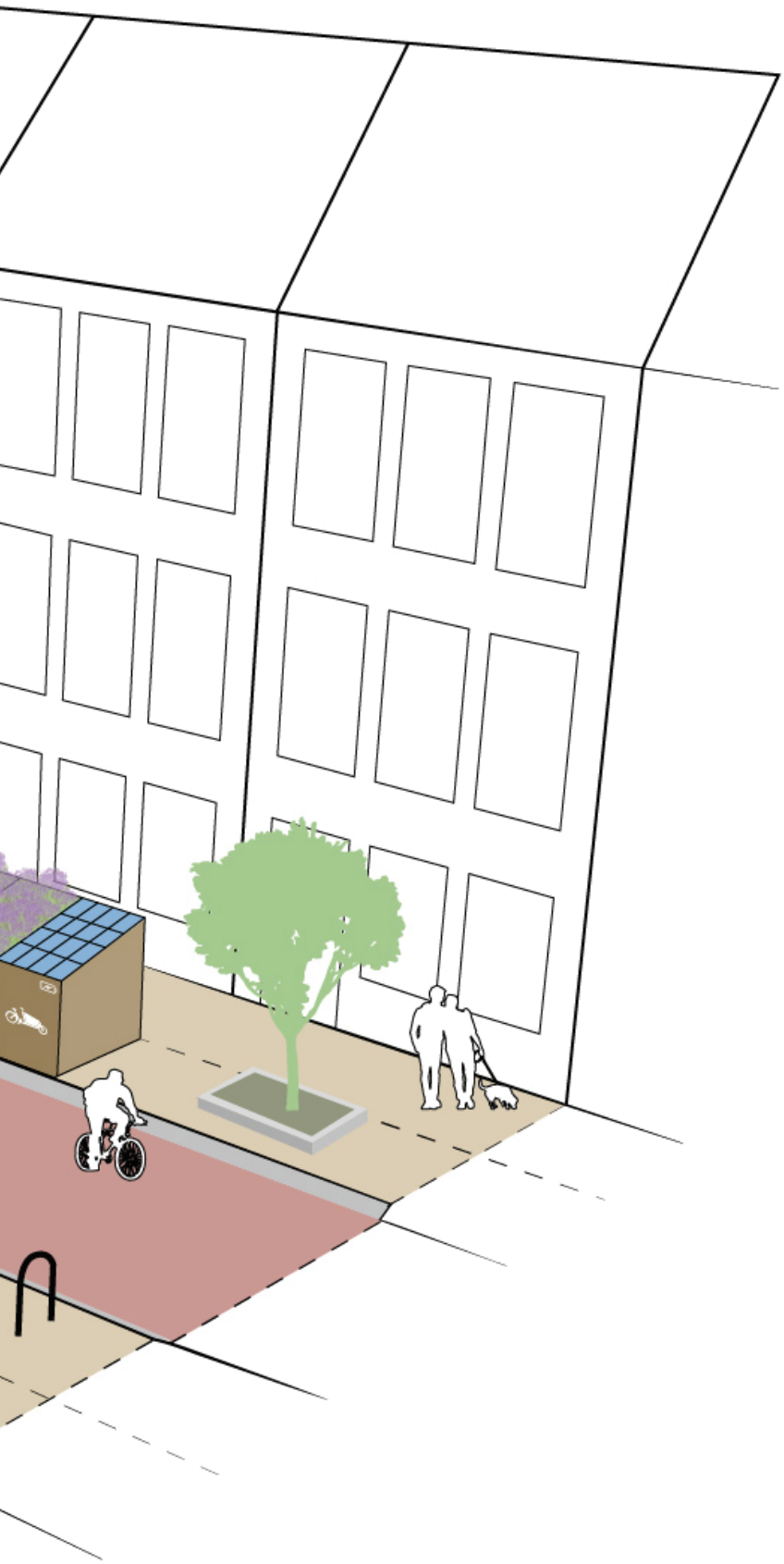
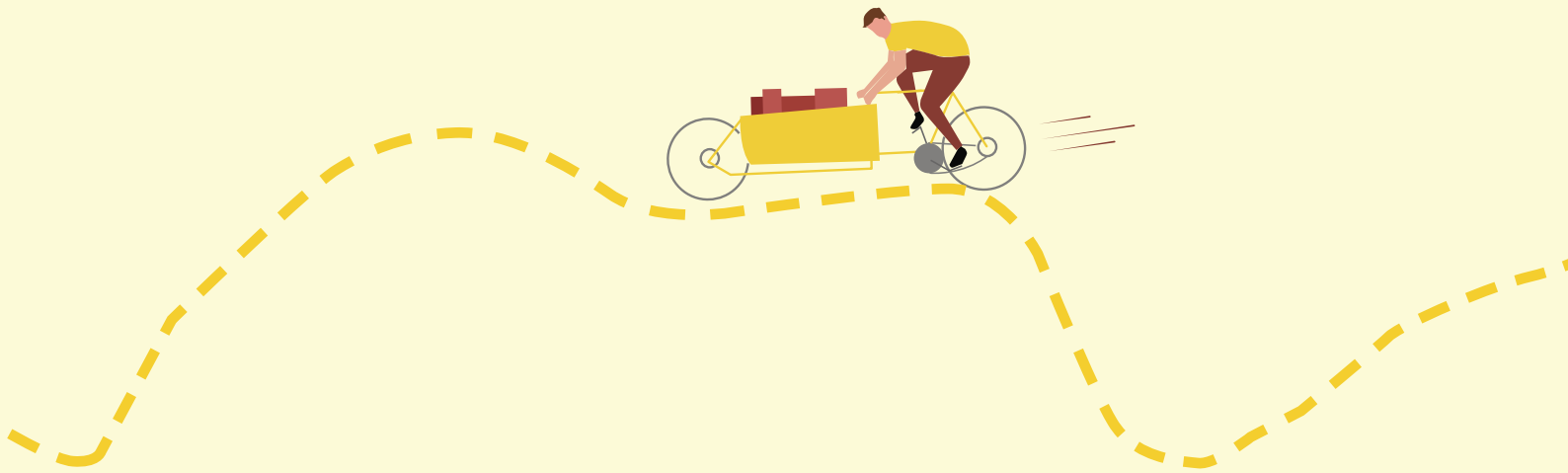


Figure 27
Residential area - scenario 2 - Living Street





6
Conclusions

6.1 Conclusions

Space for cargo bikes in cities is organized in different ways. The lack of national guidelines for dimensions and characteristics of cargo bikes that may be placed in public spaces results in municipalities each taking their own measures to organize transport by cargo bikes. Moreover, each municipality seems to be at a different stage of the process, because of how they plan the development of their urban network. The guideline "space for cargo bikes" is designed to allow flexibility.

Steps 1 and 2 of the guide emphasize the need to stay aware of national guidelines and relevant municipal plans and ambitions that may affect logistics with cargo bikes. Because the cargo bike market is developing rapidly, governments are lagging behind. For the same reason, contact with local stakeholders is crucial, not only to keep them informed, but also to include them in the development process. Users and entrepreneurs know what the developments on the ground are and how this can affect the demand for space in the city.

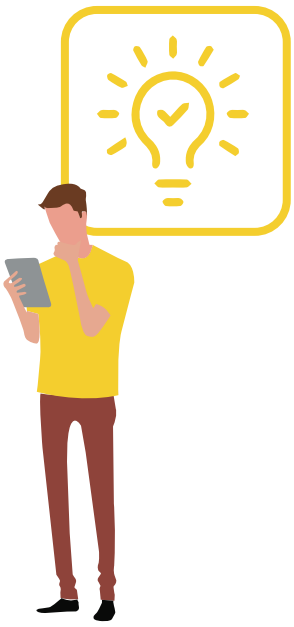
Steps 3 and 4 of the guide focus on the elements of public space to facilitate the use of cargo bikes for logistics at the network and local level. When it comes to regulations, cargo bikes fall under bicycles. At the network level, therefore, many recommendations refer to adapting bicycle infrastructure to accommodate these larger vehicles and the needs of their users. At the street level, the search for space for cargo bikes focuses on unused spots (called "stationary zones") on the sidewalk, as well as on reallocating spots according to the STOMP principle, giving bikes and cargo bikes priority over cars, for example.

An inclusive design of space for cargo bikes meets the common and specific needs of different users. Step 5 of the guide focuses on how inclusivity can be addressed in design, including identifying key accessibility issues that emerged during the interviews.

Main conclusions from the study and the application of the systematics to Rotterdam are:

1. Riding cargo bike: Provide wider bike lanes and / or more sharedspace streets where cargo bikes of different sizes can coexist with other traffic. In places where cargo bikers need to cycle longer distances between destinations (e.g., residential neighborhoods), it is also important to have a good network of connecting streets.
2. Loading / unloading cargo bike: Reserve frequent locations on shopping streets for loading and unloading to take advantage of the benefits of the mixed function use of this area type. In addition, this helps prevent cargo bikes from obstructing pedestrian flows on the sidewalk. In residential areas, provide sidewalk space at regular intervals.
3. Parked cargo bike (including charging): Provide secure parking spaces in garages and bike racks (near shopping areas) and the ability to charge the cargo bikes. One possibility is to subsidize the additional insurance costs if no space on the street / public space can be implemented. If it cannot be done indoors then make space for it on the sidewalk (in residential areas).

This guide on "space for cargo bikes" compiles the findings of interviews, literature review and workshops with key stakeholders and experts. The guide is intended as a tool for municipalities with options for various area types.



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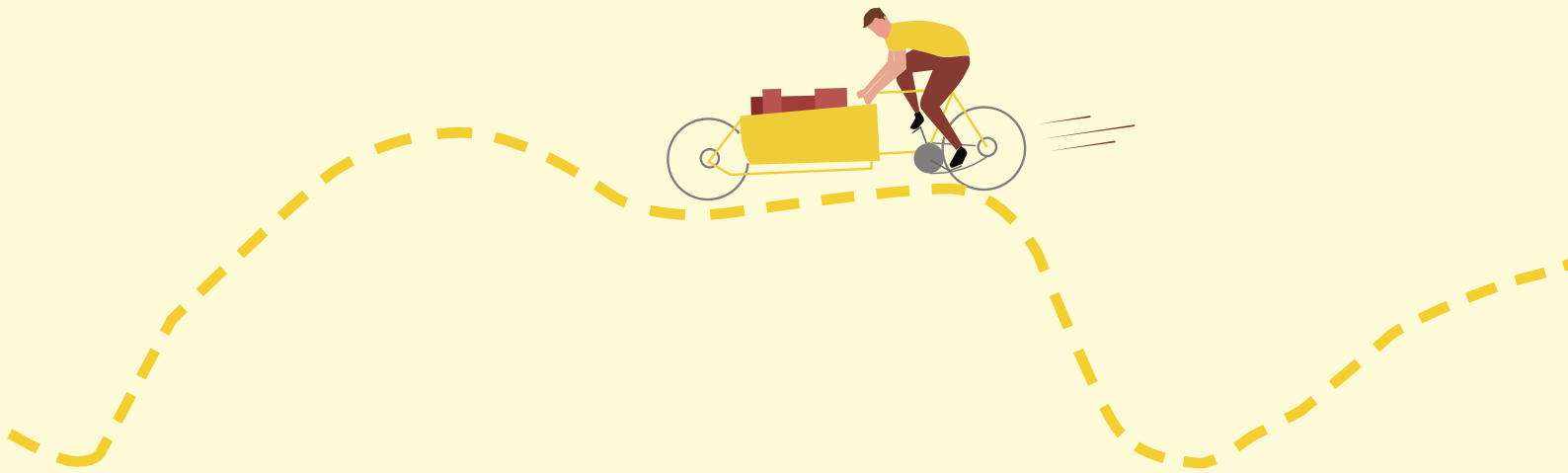


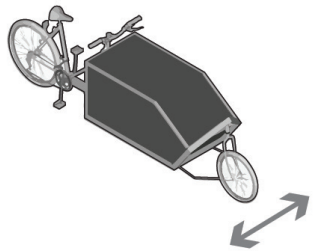
Appendices

A.1 Literature review

A.1.1 The Cargo Bike and Logistics

The cargo bike is a solution to many logistics challenges in an urban environment. The current cargo bike family /consists of a wide variety of types and sizes. The choice of a particular type of vehicle depends on the end purpose or user type. Currently, most countries have limited legislation regarding the design of cargo bikes[9]. Manufacturers design cargob ikes according to their own specifications and taking into account the available bicycle infrastructure design guidelines. There are five main components on which cargo bikes can be categorized by: width, payload, number of wheels, electric or pedal-powered, and whether the load is on a trailer or not. All of these components play a role in the space usage of cargo bikes in cities and are related to specific challenges faced by cargo bike entrepreneurs.

Five componentes of cargo bikes



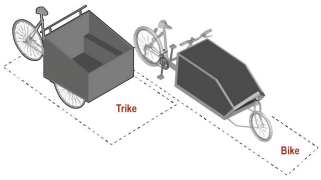
Width[10]

- Width cargo bike: 75 – 150 cm (in practice often up to 125 cm)
- Often similar to normal bikes as they use the same infrastructure[11].
- Constraints: wide cargo bikes can create barriers to the flow of other modes of transportation that use bicycle infrastructure, since in most cities, bike lanes are not designed for wide bikes. This creates potentially dangerous conditions for both cargo bikers and other road users.
- Width is an important feature in the design process of parking lots, cargo bike parking spaces and other spatial elements of cargo bikes in cities.

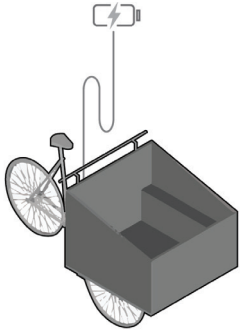
Payload[10]

- Payload cargo bike: 120 - 300 kg. Electrically supported up to 500 kg
- Limitations: cargo bikes have a limited load capacity compared to motorized vehicles such as vans or trucks. Although they are suitable for transporting medium to large loads, they cannot carry the same quantities of goods as larger vehicles.
- The volume they can carry distinguishes the logistics behavior of cargo bikes from other urban logistics transport modes. Cargo bikes can be integrated into two types of logistics systems. In a monomodal system where the cargo bike is the only means of transportation to make deliveries at the end of the chain. This is often seen in inner-city trips, to and from a hub or from an urban store to a delivery destination within the urban environment. In addition there is a multimodal system in which the cargo bike cooperates with other means of transportation and usually a transshipment hub for finer distribution[10].
- In spatial design, weight affects the maneuverability of the cargo bike and thus the space to be reserved for it.

Numer of wheels[10]

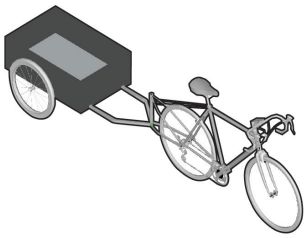


- Varied between 2 to 4 wheels. Often more wheels if there is also a trailer behind the cargo bike.
- Cargo bikes with 2 wheels have similar driving dynamics to normal bikes and can usually be driven on any infrastructure[10].
- 3-wheelers can be wider than regular bicycles and do not have to use the mandatory bike lane or moped path. If the bike lane is too narrow or crowded, they can use the roadway[11]. These bicycles have a more stable stance but lower cornering speeds than two-wheeled bicycles[10].
- For spatial planning, the number of wheels affects the maneuverability of the bicycle and the space they occupy in relation to width.



Electric or pedal driven

- This characteristic has to do not only with whether or not the cargo bikes need a charging space for the battery, but also with the speed at which they cycle and the weight they can carry.
- Limitations: electrically assisted cargo bikes plus cargo can weigh more than 500 kg today. This raises the question of how stability and controllability hold up, for example at higher speeds or if a sharp turn has to be taken. For electric cargo bikes, having a loading space for the bike is also currently a limitation, as cities do not always have enough space accessible for cargo bikes.
- Charging the battery may take 2.5 to 4.5[12],[13] hours (if the battery requires 100% charging).



With/without trailer[10,14]

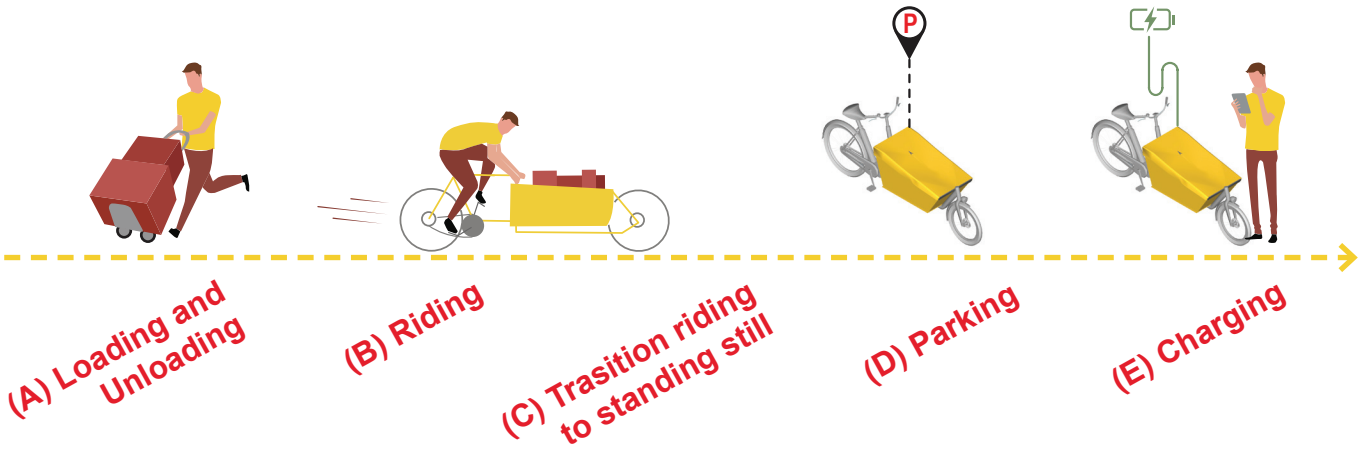
- Trailers are not as popular in logistics because they require significantly more space and have less stability[15] .
- Limitations: in addition to the aforementioned stability and extra space, bicycles with trailers have a less pleasant driving experience and additional maintenance requirements[14].
- Because the trailer is a detachable part of the bicycle, space planning can distinguish between space needed for the bicycle and space needed for the trailer.

In addition to the five components mentioned above, bicycle length is also a relevant characteristic for land use planning and design. However, length is somewhat more standardized than the other parameters. Cargo bikes are generally longer than normal bikes, typically between 2.5 m and 3.5 m for cargo bikes without trailers[10]. In width and height, cargo bikes do not differ much from normal bicycles[11].

The listed features of the cargo bike highlight the properties of existing models and the associated spatial demand. In addition to these features, it is also useful to include provisions needed for the use of cargo bikes, such as charging stations. These necessary facilities can be identified by studying the different steps in a cargo biker's journey.

A.1.2 Steps in the Journey

We divide the journey of a cargo bike(r) into steps. For each step in the journey, cargo bikes have specific needs and challenges they face. These can be distinguished by the time the cargo biker needs to stay in certain location. For example, the physical spaces a cargo bike occupies during loading and unloading, parking and charging are different from each other due to the different time required for this step and facilities needed.



(A) Loading and unloading

The process for loading and unloading the cargo bike is defined here as the amount of time required to put the load on the bicycle (loading) and to remove the load from the bicycle and deliver it to its final destination (unloading). This is different from parking in most cases, as parking refers more to the status of long idling, at night or between deliveries when cargo bikers can rest. However, depending on the area type / delivery location, a combination of parking and unloading may occur during a delivery (for example, through pedestrian areas where cargo bikes are not allowed to cycle).

Topics that are important to consider when examining loading and unloading are:

Time of day: The time of day matters a lot for the inconvenience it causes. Logistics entrepreneurs should choose a less busy time of day to load and unload, if possible.

Signage: Provide clear signage that loading or unloading is taking place. Use warning signs or flashing lights to inform other road users of the temporary activity.

Consider pedestrians: Be alert to pedestrians and give them enough space to walk safely past the parked cargo bike. Try not to block their passage.

Consider traffic: When loading or unloading near traffic, extra attention is needed for things such as reversing cars or blocking the road or bike lane.

Efficient loading and unloading: Prepare loading and unloading properly and organize the load in an efficient manner to make the process as smooth and quick as possible.

There is a gap in the literature that discusses how much time is needed for this process and the location where it can happen in the city for different types of logistics services.

(B) Riding

Some important aspects affecting the use of cargo bikes in bicycle infrastructure:

Bicycle lane width: Cargo bikes are wider than regular bicycles because of their front or side boxes. Therefore, it is important that bike lanes be wide enough to ensure safe passage for cargo bikes. A wider bike lane also prevents conflicts with other cyclists and pedestrians. Cargo bikes with more than two wheels and wider than 75 cm may use the roadway. The speed limit should not exceed 30 km/h to allow cargo bikes to mix safely with motorized traffic.

Turning radius: Because of their length and weight, cargo bikes have a greater turning radius than a bicycle. When designing bike lanes and curves, it is necessary to take this turning radius into account so that cargo bikes can navigate safely without obstacles or friction with other road users. Compared to vans, cargo bikes actually have a smaller turning radius.

Intersections: Specific provisions should be made at intersections to ensure the safety of cargo bikes. This may include adequate visibility for both bicyclists and motorists, clear traffic markings and traffic lights appropriate to the speed of cargo bikes.

Lanes: At some intersections, special lanes for cargo bikes can be useful. This allows them to position themselves for the intersection and leave earlier than other cyclists and vehicles.

Safety: Since cargo bikes tend to be heavier and less maneuverable than regular bicycles, it is essential to implement additional safety measures such as clear signage, traffic education and, if possible, separation of bike lanes from motorized traffic. In addition, it is recommended for riders to wear helmets or other protective equipment.

(C) Transition from riding to standing still

Generally, cargo bikes share bike lanes with other cyclists, such as regular bikes, e-bikes and cargo bikes. The different speeds and sizes of these bikes can affect interactions. It is important that cyclists, including cargo bike drivers, respect each other's space and take into account the speed and maneuverability of the different bicycles.

In some places, cargo bikes must share the roadway with motorized traffic. Drivers of cars, trucks and scooters should be alert to the presence of cargo bikes and consider their slower speed and potentially larger size. Giving adequate space when overtaking cargo bikes and anticipating their movements can help prevent accidents. In busy city centers, cargo bikes and pedestrians may collide on pedestrian crossings and in pedestrian areas.

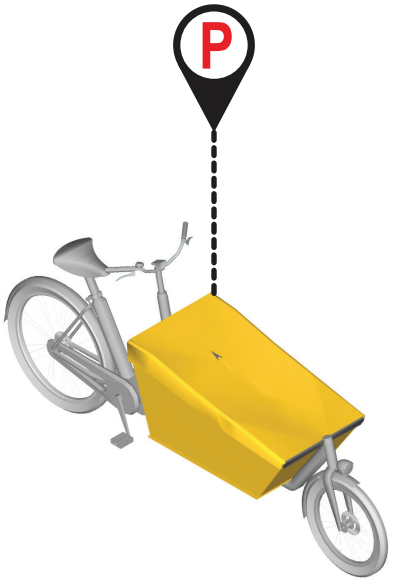
Like regular bikes, cargo bikes must also be parked correctly so as not to impede the flow of traffic. In some cities, there are dedicated bike racks and parking spaces for cargo bikes. In other cities, there is currently no dedicated spot and drivers often have to look for an adequate space themselves.

(D) Parking

Parking refers to the step in the journey where the cargo bike is stationary for an extended period of time and does not necessarily require charging. There are different types of parking for a cargo bike: parking at night / while not in use, parking outside places where they are not allowed to cycle but need to deliver (e.g. pedestrian areas), or even parking for the cargo bike courier to rest, eat or go to the restroom.

Stationary cargo bikes require dedicated parking facilities, which presents opportunities for municipalities to design designated parking spaces for them. This can help make more efficient use of public space and better integrate cycling into urban planning. In busy city centers, there is often limited space for parking bicycles, let alone cargo bikes. Finding sufficient and suitable parking spaces can be a challenge. If the cargo bike is left unattended, there may be a risk that the cargo or the bicycle is stolen or damaged. This can be especially problematic when carrying valuable or fragile loads. Stationary cargo bikes can obstruct the passage of pedestrians and other cyclists if they are not parked responsibly.

Because cargo bikes are smaller than traditional vans, they require less space for storage and parking. It is important to provide adequate parking spaces suitable for securing cargo bike.



(E) Charging

How often a cargo bike should be recharged depends on, among other things of the battery type, battery capacity and use of the bicycle. Battery capacity is usually measured in watt-hours (Wh) or amp-hours (Ah). The higher the capacity, the greater the range of the cargo bike on a full battery. Although there are differences in the time it takes to charge, all types of electric cargo bikes have provisions that must be provided, such as a charging point and a place to lock the bike while charging the battery (this may be while charging). If the battery of a cargo bike does not last an entire ride / day, the battery is quite easy to be replaced. The courier service can use couriers for this purpose or, for example, install (or have installed) battery change machines at strategic points in the city. To date, there are insufficient information of how different companies and types of user deal with this.

A.1.3 Design and Policy

The number and types of vehicles sharing the space and the quality of bicycle infrastructure present all determine the quality of a given space for cargo logistics. This is applicable to public space, design and street furniture as well as policy. The report[16] highlights some of these based on the frameworks Traffic in the City (Immers, Egeter, Diepens, & Weststrate, 2015) and Functional Ambiance (Verheijen & Smidt, n.b.). It is recognized that it is important to maintain the purpose and character of the street. Whereas some spaces are defined by functionality, for example in busier streets where the flow of traffic is the main function, in other spaces the purpose of meeting stands out. These findings highlight the importance of dividing public space into areas and creating space for cargo bikes that not only meet logistical needs but also maintain the character of the type of area for which the space was designed.

To create cargo bike friendly environments, there are generally some considerations to be made:

Sufficient space: Street furniture such as benches, road signs and trash cans should provide sufficient space for cargo bikes to pass safely. The passage should be wide enough to allow a cargo bike to pass without difficulty, without the risk of collision or damage to the load.

Height: The height of the street furniture is important to prevent the roof or cargo of a cargo bike from colliding with it. The height should match the height of most cargo bikes to avoid problems.

Visibility: If possible, make street furniture highly visible to cyclists, including cargo bike users. Reflective elements or striking colors can help increase visibility and prevent accidents, especially when it's dark.

Placement: The location of street furniture is crucial to prevent it from being an obstacle to the flow of cargo bikes. They should be strategically placed so as not to impede the movement.

Flexibility: In some cases, considering flexible bollards may be a good option. These can be temporarily removed or folded down when needed, such as to facilitate the loading and unloading of cargo bikes.

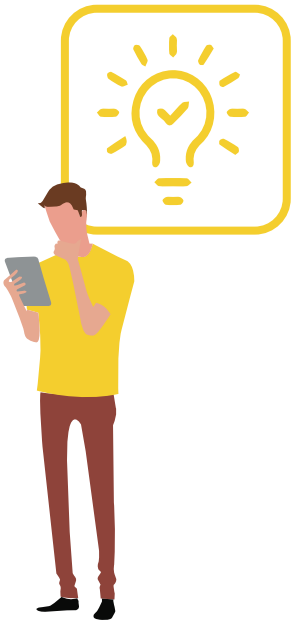
Bicycle parking spaces: In addition to shielding traffic, it is also important to provide sufficient bicycle parking spaces where cargo bikes can be safely stored when not in use.

Interaction: giving space to cargo bikes or other sustainable forms of logistics requires consideration of the other modes / road users using the space and the interaction between them.

Design: the design and location of designated space for cargo bikes should fit well with the character and function of the street in which they are located.

A.1.4 Conclusion

There are three layers that determine the demand for space for cargo bikes: (1) the bicycle needs such as size and maneuverability, (2) the step in the journey of the logistics service for which the bicycle is being used, which relate to how long they need a particular space for and what amenity area is needed, and (3) the different area typologies in the urban environment and their character and function that need to be preserved in design and policy development. There are gaps in the literature in each of these layers, especially in how they interact. The following sections explore these gaps through stakeholder interviews and data analysis of actual movements of cargo bikes in cities.



A.2 Stakeholders

The stakeholders in this research consist of policy makers (municipality and lawyers), the private sector (entrepreneurs cargo bikes, shopkeepers and downtown manager) and an independent expert (Jos Sluijsmans). Interviews were held with these stakeholders to identify what guidelines and policies already exist and where information is missing. The element of "space" is hereby highlighted from two perspectives, physical space (design) and legal space (policy).

A.2.1 Legal Space

ZE-Zones

Currently, there is no national legislation on the use of cargo bikes yet in The Netherlands. However, municipalities are working to introduce it, this can be seen, among other things, by the ZE-Zone policy that will be implemented in many municipalities in 2025. In the Municipality of Groningen, they are going a step further:

> "Groningen is going to introduce ZE Zones from April 1, 2025. But politicians have also asked about what to do now as there is already a lot of nuisance, so what can we start now. Therefore, since February 1, 2023 window hours for trucks were introduced. This means that after midday, no trucks or commercial vehicles are allowed anymore into the zones without a waiver. This serves as a sort of intermediate step, and companies that are already using cargo bikes will benefit."
>
> (Groningen interview).

The municipality has engaged business owners and citizens by including them in these steps:

> "We do this by a lot of talking, informing and listening. Before you pass a measure, everyone who can be affected has to be included. Some business owners have as many as 40 suppliers. What should we regulate or what measures should we take to make it work?"
>
> (Groningen interview).

The municipality of Leiden also indicated that it was working on aspects surrounding the development of ZE Zones and the development of an LEV policy framework. Important concepts mentioned here were enforcement, exemptions and licensing. Currently, Leiden has a complex system of granting exemptions.

Regulations

The many different regulations are a challenge for municipalities. The regulations are now used interchangeably, both with division of the street and with exemptions, for example. In Groningen, they have made sure to design the entire downtown area at 1 level, this ensures that there is no distinction between the roadway and sidewalk, but one ground level:

> "Loading and unloading can then be done basically anywhere, as long as you don't block the street or entrances. Residential areas are more often roadway and sidewalk. But there it's easier for cargo bikes to use the sidewalk for a while."
>
> (Groningen interview).

Utrecht City Council is also trying to create an umbrella policy, this to make enforcement easier:

> "Utrecht municipality wants general a policy instead of a policy by area types"
>
> (Jurist Utrecht Interview)

Rotterdam City Council does not yet have specific legislation and regulations for cargo bikes: "At the moment, all types of cargo bikes fall under the same policy as cyclists." In Rotterdam they also notice resistance, both from residents and fellow officials:

> “In the city center, there is already difficulty placing bike racks because the pressure on outdoor space is so great. The resistance also comes from the municipality itself, for example, about ensuring aesthetics.”
>
> (Rotterdam interview).

Entrepreneurs appear to be mainly following the legislation and adapting to it:

> “We are stimulated from municipalities by means of exemptions, which means that we can cycle in shopping areas where other bikes cannot. We have never been fined for cycling in these areas. We have good contact with every municipality with residents.”
>
> (Interview Cycloon)

When it comes to parking, the business owners also follow local policy. While they would welcome additional parking options, they are going with what they have: "We follow the legislation. In pedestrian areas, we park somewhere outside the area. There are a lot of gray areas which can be used for this. Rule one to the couriers: don't cause a nuisance. No double parking. Sustainability in a business is also: how do I treat the city". (Moss interview).

(Interview Moss)

Education - Training

Traffic safety is mentioned by all stakeholders in interviews. Business owners are actively working on this themselves with the help of education, safe bicycles and bicycle accessories and traffic regulations, for example, in pedestrian areas or on the sidewalk.

> "In all aspects, we put safety first. The bikes are of good quality which makes them less likely to break down. Bike messengers get shoes that you clip into the pedals, they get cycling clothes and a helmet. They are not allowed to wear dark sunglasses where other road users can no longer see their eyes, in addition, the phone must be stuck on their bikes. Safety is also paramount in terms of how they bike, and what they need to take extra care of. For example, riders learn that they should never ride in blind spots or always need to swerve."
>
> (Cycloon interview).

For safe cycling, areas are also designated for practice:

> "We also train on responsible cycling. This is what we do, for example, in hospital areas or station areas, where people are in a hurry. Here the couriers have to be extra alert, and here they are trained to deal with that. They learn that they get paid by the hour and not by the package, so safety is paramount."
>
> (Cycloon interview).

Moss notes that there have actually been no traffic incidents, but that the laws surrounding safety of cargo bikers are not always clear.

> "Efficiency is the most important thing. The better equipped with knowledge, the more efficient they are. In addition, we fully comply with the legislation: we wear helmets and are insured. Although this insurance is very oddly regulated for cargo bikes."
>
> (Moss interview).

According to the city of Leiden, extra attention is needed for how to behave in traffic as a bicycle courier, and for this the city is willing to think along and possibly assist.

> "And maybe we should allocate some money to study how to deal with cargo bikes in the public space."
>
> (Gemeente Leiden)

A.2.2 Physical Space

Space for Cargo Bikes

With one-level design in Groningen, there are fewer issues in practice regarding loading and unloading. Moreover, the municipality sees no problem with long-term parkers because this is not in line with the efficient use of time and space for cargo bikes.

> "Stopping to load and unload is allowed in pedestrian areas, parking is not. Loading and unloading is when you stop, you unload your stuff and move on immediately. We don't actually see a nuisance in this either, because they are in a hurry to move on again and so don't linger unnecessarily"
>
> (Groningen interview).

With a public space designed for all modes, cargo bikes can be on the roadwa:

> "Municipality of Groningen wants to encourage cycling in general: Groningen has extensive bicycle structure. Through some routes you don't encounter car traffic. Bike lanes are super crowded. If cargo bikes are very wide and large, that's then difficult. 30 km/hour downtown is seen as the solution, as then cargo bikes can ride on the carriageway. Right now they ride where bikes are allowed to ride."
>
> (Groningen interview).

Leiden City Council mentions that space consideration is the most important consideration in cargo bike policy. "Greening, climate adaptation, bike parking, building housing... it all needs space. The question is what does it provide? Also in terms of transport movements."(Leiden Interview)

Parking

Parking requires space; this cannot always be done on the sidewalk. The city of Utrecht is in the process of reducing parking spaces:

> "In the coalition agreement, it says we eliminate 1% of parking spaces in the city every year, and there are policies on that that people can submit initiatives for: shared mobility, playgrounds, etc."
>
> (Jurist Utrecht interview)

The initiative is also largely with the residents and business owners to respond to this and provide the appropriate the space

Area typologies

For business owners, pedestrian areas are fine for delivery, but not for other purposes: "Pedestrian areas are avoided as much as possible" (Cyclone Interview). This is because it is not allowed to ride fast through it. So in the network, a pedestrian area is actually a blockage. In the shopping streets and residential areas, the cargo bikes have to use the sidewalk. Here they should get off their bikes, but this is often not done:

> "Riders regularly ride up and down sidewalks at excessive speeds, we see this in broken rims and tires. We prefer to park in parking spaces / plazas, as the sidewalk is for pedestrians."
>
> (Moss interview)

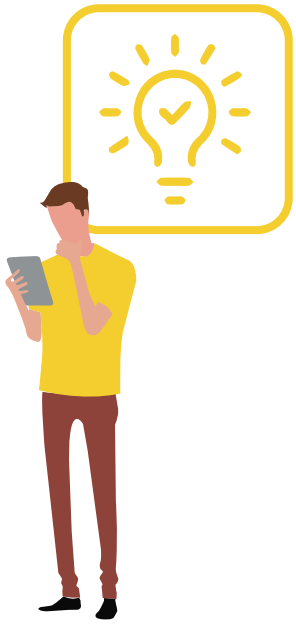
So the transition to the sidewalk is a blockage here.

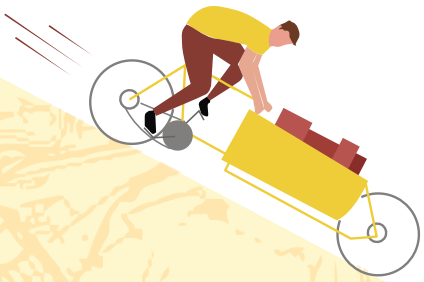
A.2.3 Conclusion

This chapter examined the roles of the stakeholders and key observations from the interviews. It can be concluded that municipalities are in different stages of policy development.

The municipalities of Groningen and Leiden have both sought and found solutions to accelerate the use of cargo bikes in urban logistics. In Rotterdam, on the contrary, there is still a great deal of diversity of opinion.

Usage of the cargo bike proves to be easier in areas where the road is shared with different modes and a maximum speed of 30 km per hour is the norm. Parking and transition to the sidewalk are also easier here. For cargo bike entrepreneurs, it is actually nice to be able to cycle faster over long stretches because it allows them to use time efficiently. However, cargo bike entrepreneurs adapt to public space policies and design
The different area typologies call for different behaviors and uses.





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