

SAFE CYCLING DESIGN MANUAL FOR ISTANBUL

Executive Summary

April 2015





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ACKNOWLEDGEMENTS

This report has been prepared with 2014 Direct Activity Support from the **Istanbul Development Agency**. We are also grateful to **Bloomberg Philanthropies** for supporting EMBARQ Turkey – SUD to sustain their activities and projects in Turkey¹.

We owe particular thanks to: **Carsten Wass** from Consia Consultancy for his hard work during the road safety study of existing cycle facilities; to **Benjamin Welle**, Senior Expert of EMBARQ's Global Health and Road Safety Department; and to **Prof. Dr. Haluk Gerçek** and **Asst. Prof. Onur Tezcan** from the İTÜ Department of Civil Engineering for their support in preparing the surveys. Support for the survey process was also provided by **Erman Topgül** from Street Belongs To Us (Sokak Bizim Derneği), **Ayşe Pinar Gürer** from Active Living Association (Aktif Yaşam Derneği), **Lotte Bech** as the Urban Cycle Planner, **Bicycle Transportation Platform** (Bisikletli Ulaşım Platformu), **Cyclists' Association** (Bisikletliler Derneği), and **Salcano** as the corporate member of EMBARQ Turkey. Thanks to **Philippe Christ from OECD** for sharing his invaluable knowledge

in the visioning workshop; to **Ceyhan Vardar** from the Ministry of Health/Public Health Association; to **Peter Dalos** from Budapest Transport Center; to **Marisa Cruz** from Evonik; to **Halime Tekin** from Istanbul Metropolitan Municipality Transportation Coordination Directorate; to the **relevant departments of the Istanbul Metropolitan Municipality and Kadıköy, Adalar, Zeytinburnu and Bakırköy District Municipalities** for participating in face-to-face interviews; and to the NGOs that participated in focus group meetings. We owe particular thanks to: **Güneş Yerli**, Operations Manager of EMBARQ Turkey, for administrative support; to **Pınar Köse** as the Projects Coordinator of EMBARQ Turkey for her comments and text editing; to **Sercan Selvi** as Project Assistant; and to **Esra Süel** from EMBARQ Turkey for supporting the survey process. We also owe thanks to **Superpool** for their bicycle track visual design and **Maggie Biroscak** for editing this report.

Furthermore, we present special thanks to our corporate members **Salcano Bicycle** and **TEMSA Global** for their significant support to sustainable transport studies.

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SALCANO

¹All content and opinions provided herein are the properties of the authors of this report. The report does not necessarily reflect the opinion of the funder.

FOREWORD

In cities around the world, cycling has caught the attention of many transport policy makers. Unplanned growth and urban sprawl have increased trip distances and the use of motorized transport, at the expense of cycling and walking. This process has created unlivable urban spaces in many large, economically important cities and metropolitan areas, making new transport policies necessary. For policy makers, cycling has become a key component of sustainable transport planning which promotes more livable environments, energy efficiency, sustainable environmental approaches, and more active lifestyles. In Europe, there are 50 million trips by bicycle per day (5% of all the trips). This rate is up to 18% in Denmark, 27% in the Netherlands and 60% in some Asian countries, where cycling is supported (Buehler and Pucher, 2012).

In recent years, Istanbul, Turkey's densest city, has promoted cycling projects that strive to cope with traffic problems and improve the quality of life. In 2013, the Mayor of the Istanbul Metropolitan Municipality (IMM), Dr. Kadir Topbaş declared a target of 1050 km of cycle track projects by 2023.

EMBARQ Turkey-SUD was founded to improve the quality of life in cities by finding sustainable solutions to urban transport and urban development problems that threaten the environment and human health. With its

national and international team of experts, EMBARQ Turkey-SUD conducts research and operations to support cycling, improve the safety of bicycle transportation, and promote cycling as an integrated mode of transport in cities. The ultimate purpose of these efforts is to turn cities into people-oriented and livable places, and to prevent the negative implications of fuel-based motor traffic.

With this work, financed with 2014 Direct Activity Support of İSTKA (Istanbul Development Agency), EMBARQ Turkey intends to develop cycling as an alternative mode of transport for cyclists, policy makers, and transport implementers. Within this scope, EMBARQ Turkey conducted and analyzed interviews with cyclists and policy makers in Istanbul, to make the existing conditions safer for cycling and to propose solutions and strategies for implementing new projects.

I extend my gratitude to all my colleagues who contributed to this report, to the Istanbul Development Agency for its support, to IMM and district municipalities, to universities and NGOs that promote cycling, and to all the respondents who took part in our surveys.

Arzu Tekir
Director of EMBARQ Turkey

GLOSSARY

CYCLE LANE:



A cycle or bicycle lane is a narrow traffic lane set aside on a road for the use of cyclists. It is a protected space on the carriageway, separated from motor traffic by means of road markings, and often additionally announced by road signs.

²

CYCLE TRACK:



A bicycle track (or cycle track) is a track, path, or lane designated for use by cyclists from which motorized traffic is generally excluded. They are physically separated from the carriageway, e.g. by curbstones, grass or ditches.

²

GREENWAY OR CYCLE TRAIL:



A greenway, or cycle trail, is generally a two-way cycle track that is planted with grass, trees, etc.

³

² Source: www.nacto.org

³ Source: www.minneapolismn.gov

ADVANCED STOP LINE (BIKE BOX):



An advanced stop line (ASL), also called an advanced stop box or a bike box, is a set of road markings at signalized road junctions that allows certain types of vehicles (such as bicycles) a head-start when the traffic signal changes from red to green.

SHARED BUS-BICYCLE LANE:



This is a lane designated for the shared use of busses and cyclists.

BICYCLE PARKS/RACKS:



A bicycle park or rack is a device at which cyclists can park their bicycles for short or extended periods of time.

⁴ Source: as.sobrenet.pt

⁵ Source: www.markapon.com



INTRODUCTION

EMBARQ Turkey has worked on bicycle transportation for the past five years. In 2012, EMBARQ Turkey organized the BikeLab Istanbul Workshop to improve cycling infrastructure and cycling conditions in the city. Since then, EMBARQ Turkey's continued work on cycling projects led to the release of this report. The report aims to promote a safe and appealing environment for cyclists by creating safe cycling routes, improving intersections, and integrating cycling with public transportation.

This report has been prepared between 1st of September and 30th of November 2014 by EMBARQ Turkey-SUD with 2014 Direct Activity Support of Istanbul Development Agency (ISTKA).

Based on a literature review, surveys and interviews, and site visits this report provides an overview of the benefits of cycling and the current ways in which cycling projects are managed within departments in Istanbul. It goes on to survey cyclists and NGOs about current practices, expectations, and challenges that relate to cycling, and suggest ways in which these challenges can be addressed. The result, "**Safe Cycling Design Manual for Istanbul**", is intended as a tool to help municipal authorities, NGOs, and transport practitioners work together to build safer, more convenient cycling infrastructure that is integrated with current modes of transportation.

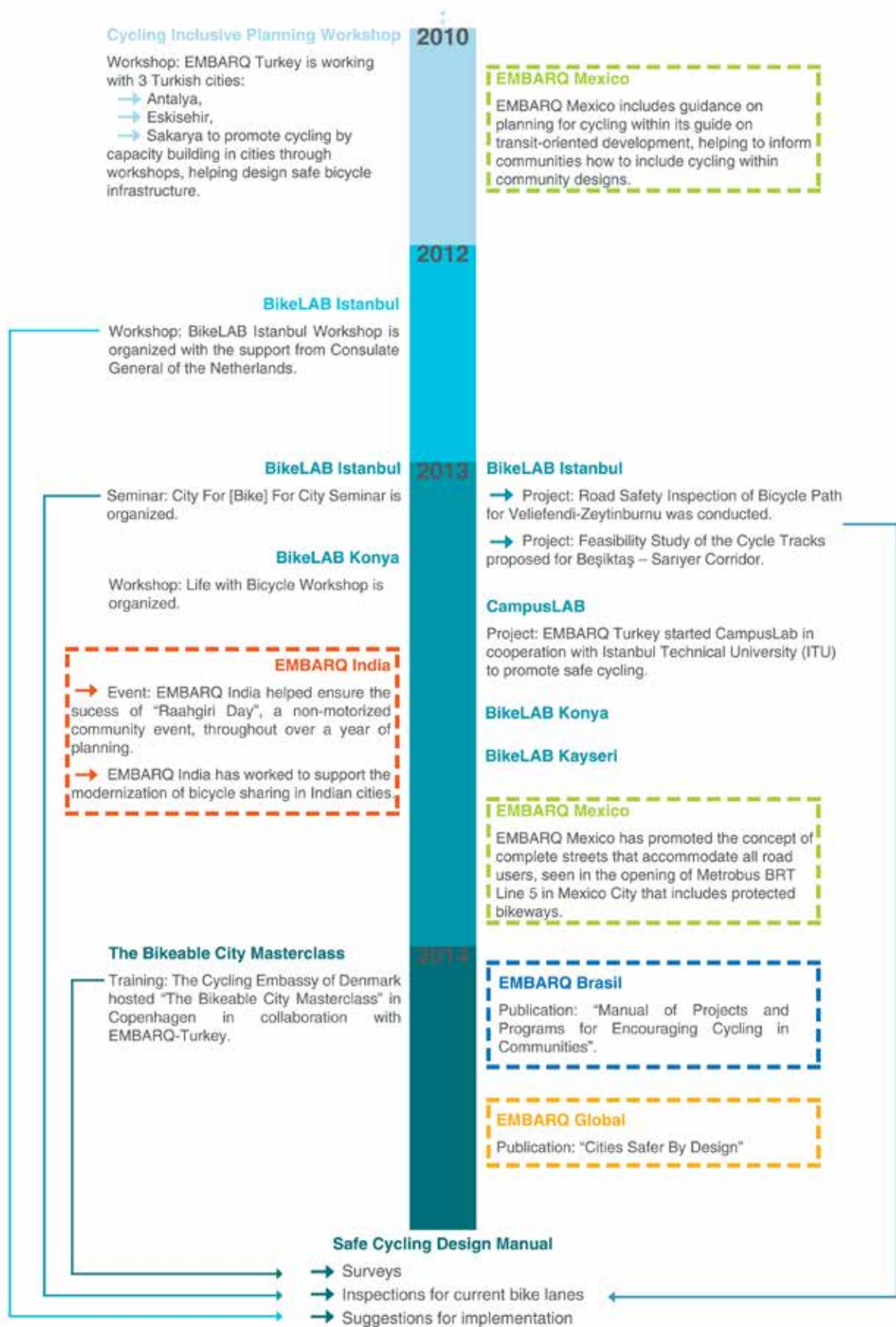
The report has three main sections:

1. The Benefits of Cycling: The first section describes the economic, environmental, social, and public health benefits of cycling, based on the resources and reports of international experts.

2. Management Aspects of Cycling Infrastructure: This section provides an overview of the current state of cycling infrastructure in Istanbul, based on face-to-face interviews with local government representatives, focus groups meetings of NGOs, a visioning workshop, and surveys of bicycle users.

3. Cycling Practices: The third section evaluates existing and potential cycle tracks in Istanbul based on current international design standards.

Figure 1 Timeline - History of studies on cycling



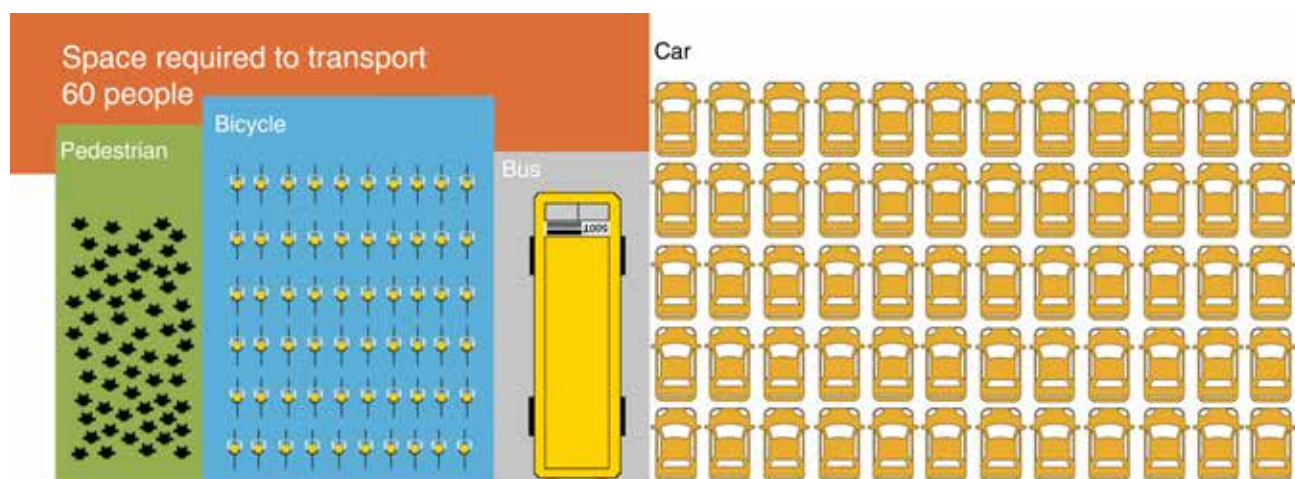
THE BENEFITS OF CYCLING

The first section of this report covers the ways in which cycling contributes to increased quality of life (QoL) and urban mobility. Although there is no universal consensus on QoL indicators, they typically include economic welfare, health, education, freedom, transportation, social relations, and satisfaction in one's living environment. Cycling as a mode of transport at urban scale also has economic, environmental, and social benefits, as well as public health benefits.

Economic benefits: Cycling reduces the consumption of natural resources, decreases the cost of transport infrastructure for municipalities, reduces energy costs, and creates an economic dynamism in urban centers by encouraging flexible mobility.

Environmental benefits: Cities where cycling is popular and integrated in city plans can offer their citizens a cleaner and more livable environment, one with better air quality and less traffic-related noise. Perhaps the greatest benefit of cycling is that it does not consume fossil fuels, and therefore does

Figure 2 Space required to transport 60 people



not contribute to air pollution. The use of bicycles rather than private cars on short-distance urban trips also reduces emissions.

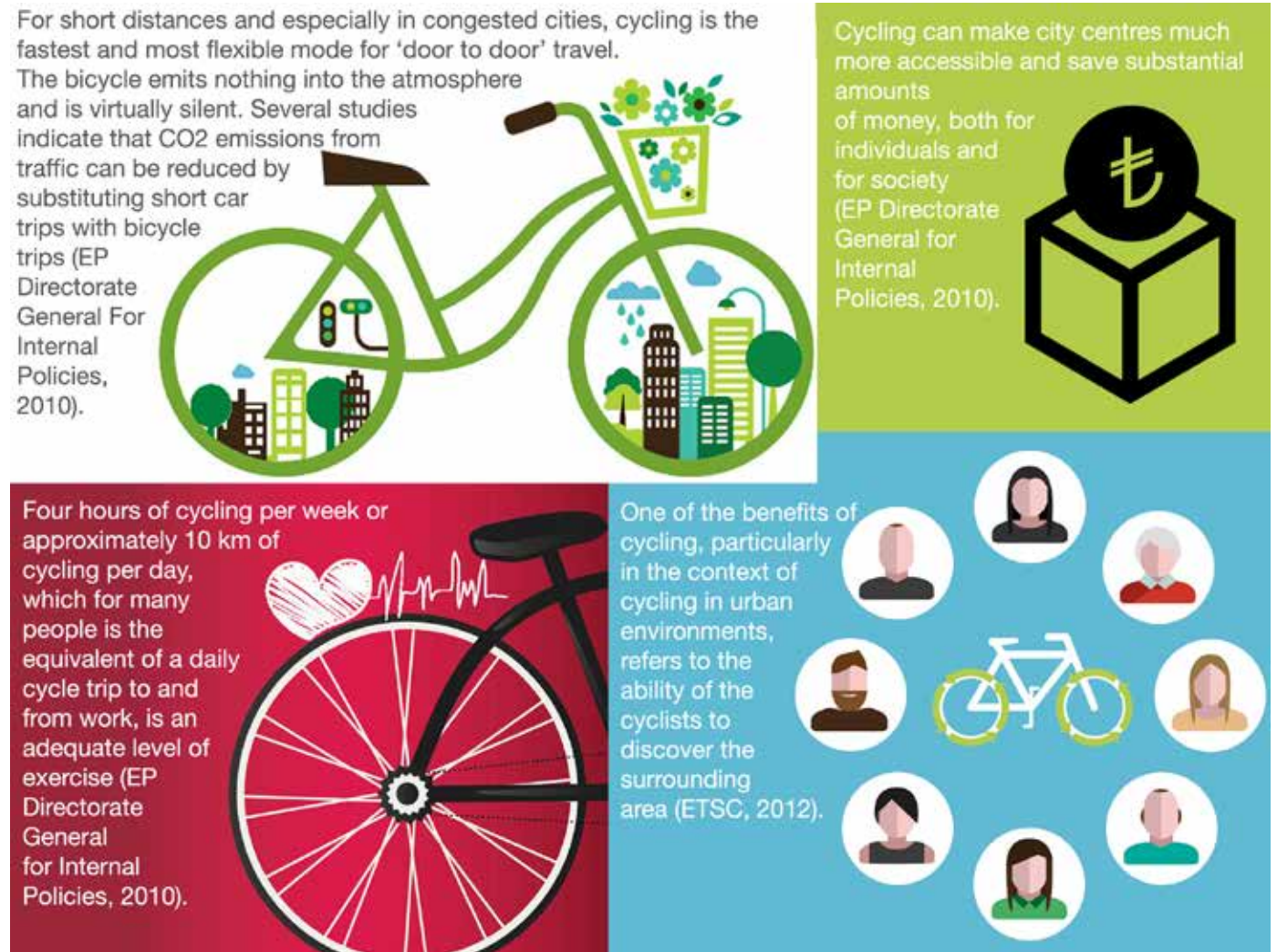
Social benefits: Cycling increases people's mobility, thereby increasing their quality of life. In social terms, walking and cycling increase transport options and flexibility, thereby encouraging people to move around and explore new places and improving their perceptions of urban spaces.

Health benefits: Cycling increases physical exercise and therefore reduces the risk of cardiac diseases, cancer, and other health problems that

lead to premature death. In Turkey, three people out of four have inadequate levels of physical activity. For this reason, several institutions and organizations have developed strategies to promote physical activity and propose policies to encourage cycling.

Using these four categories, this report provides detailed information on the benefits urbanites can experience when municipalities invest in cycling infrastructure.

Figure 3 The Benefits of Cycling



MANAGEMENT ASPECTS OF CYCLING INFRASTRUCTURE

The second part of the report provides an overview of the status of cycling infrastructure in Istanbul, including its management, current problems, and potential solutions. It includes face-to-face interviews with the local government representatives of Istanbul, focus group interviews with NGOs, a visioning workshop, and surveys that were developed to target cyclists.

MANAGEMENT AND JURISDICTION OF CYCLE FACILITIES

Face-to-face interviews were conducted with different departments of the Istanbul Metropolitan Municipality (IMM) and with Kadıköy, Bakırköy, Zeytinburnu and Adalar District Municipalities. The purpose of these interviews was to define the authorized departments within the local administrations that plan and implement cycle facilities citywide. All interviews consisted of a list of the same five questions.

The IMM is the only authority that has overall jurisdiction for the planning and implementation of cycling facilities. District municipalities do not have jurisdiction to create cycling routes unless those routes pass through park spaces within the

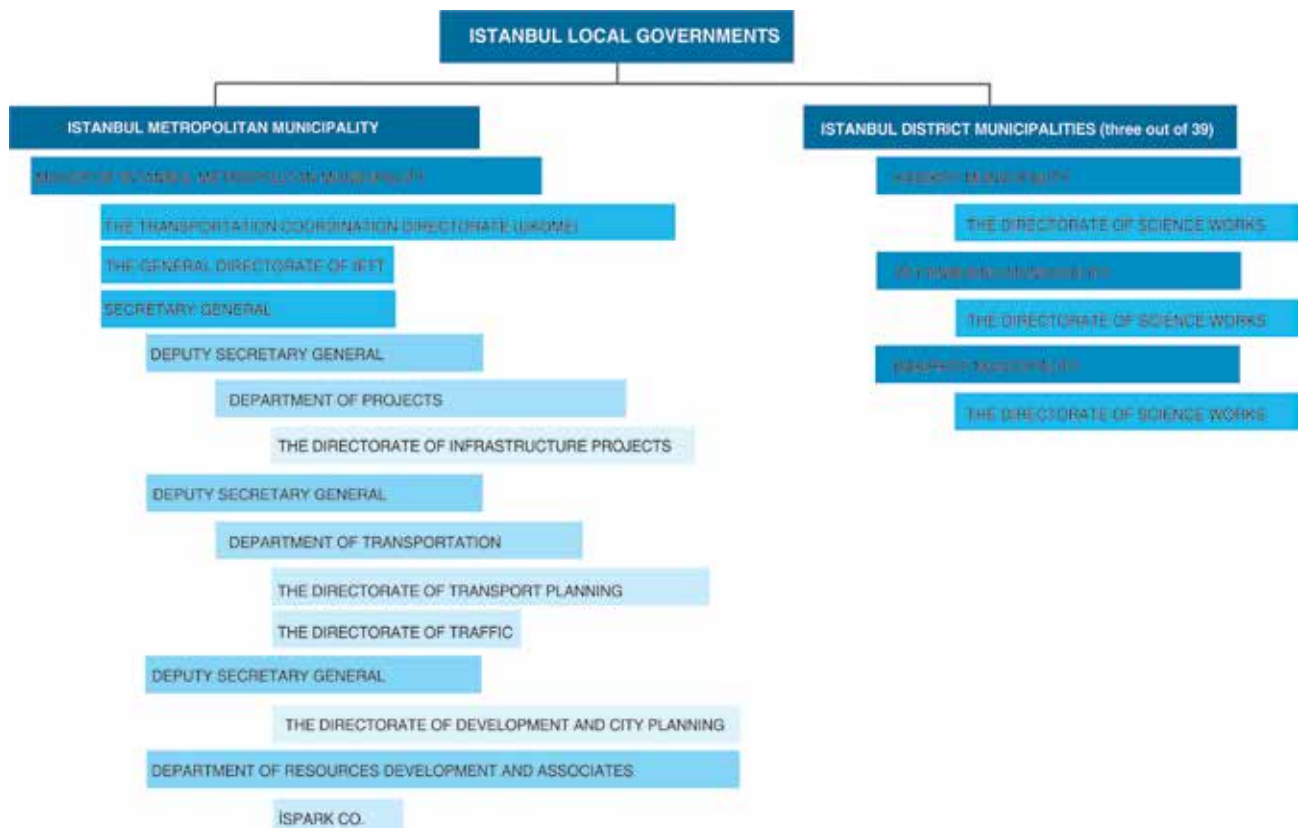
municipalities' borders. The majority of existing cycle lanes in Istanbul are within the district municipalities of Kadıköy, Zeytinburnu, Bakırköy, and Adalar.

As seen in the table, the departments of IMM function under different directorates. This causes delays in planning and implementation and complicates the coordination between the departments. The document "Studying, Planning, and Project Designing of Cycle Lanes and Footpaths throughout Istanbul" has not been updated since the Directorate of Transport Planning first drew it up in 2006. Therefore cycling project designs are often not included in plans, causing fragmented stages of implementation.

IMM has several different departments that are involved in cycling projects (Different department are authorized to design, plan, and oversee cycling projects.) These include the Directorate of Development and City Planning, the Directorate of Transport Planning, the Transportation Coordination Directorate, the Directorate of Infrastructure Projects, and the Directorate of Traffic. The municipal enterprises İSPARK and İETT also take part in cycling projects.

The Directorate of Development and City Planning is a top-level authority regarding cycling facilities within IMM. The department is involved in the preparation and approval processes of urban master plans that address transportation and land use planning together. It is also responsible for planning cycle facilities and footpaths and putting them in city plans.

Table 1 Local Government Entities that Manage Cycling Projects



The Directorate of Transport Planning is the other authorized body within IMM for the planning and design of cycling facilities. This directorate produces high-level decisions and projects on footpaths and cycle tracks. In 2006, the Directorate of Transport Planning produced a report titled “Studying, Planning, and Project Designing of Cycle Lanes and Footpaths throughout Istanbul.”

The Transportation Coordination Directorate is the policy-making body for transportation and traffic citywide (including for both major and minor transport arteries). The Transportation Coordination Directorate also conducts the tender processes for the project design of cycle lane phases that are planned by the Directorate of Transport Planning. District municipalities, which only have jurisdiction

in minor arteries within their defined borders, are supposed to communicate with the Transportation Coordination Directorate if they request a cycle project.

Specific to cycling facilities, the **Directorate of Infrastructure Projects** integrates its projects with those of the Directorate of Transport Planning, and prepares the implementation of cycle lane projects. This directorate is also responsible for integrating cycle lanes in street and square renewal projects and car-free zone projects, and improving the accessibility of recreational zones and squares.

The Directorate of Traffic is responsible for managing the existing traffic signalization network as well as planning, coordinating and enforcing

traffic as a whole, and conducting and outsourcing horizontal markings and vertical traffic signs. This directorate's proposals on implementation and material selection are adapted to the projects.

iSPARK, an enterprise of IMM, is authorized to establish bicycle-sharing systems in the existing cycle lanes as per the Municipal Council's decision.

The General Directorate of IETT, another enterprise of the metropolitan municipality, works on the integration of cycling into public transportation systems within its own jurisdiction. Currently, there are 20 IETT buses equipped with bike racks, 10 for each side of the city.

Figure 4 Current and Projected Cycle Track Projects for Istanbul⁶



⁶ Source: Istanbul Metropolitan Municipality The Transportation Coordination Directorate

CYCLING INFRASTRUCTURE PROBLEMS AND PROPOSED SOLUTIONS

This section also discusses the problems with Istanbul's cycling infrastructure and proposed solutions, based on the findings of a visioning workshop, focus group, and surveys of bicycle riders.

Visioning Workshop

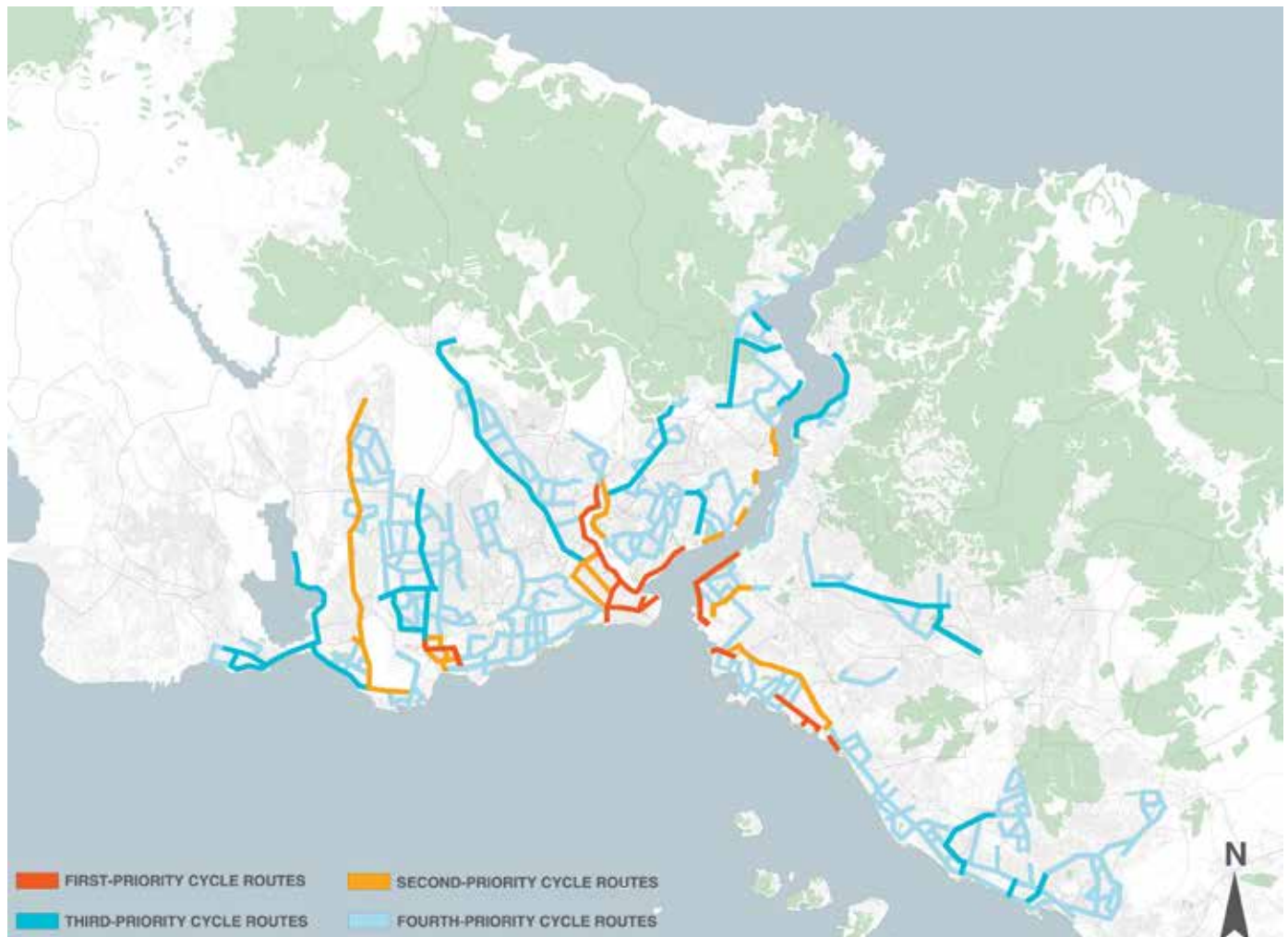
In the visioning workshop convened for this report, participants defined their main problems with cycling in Istanbul and proposed solutions. Approximately 50 representatives from local government, the private sector, academics, and transport-focused NGOs participated in the workshop. The visioning workshop aimed to gather stakeholders

together and evaluate the current status of bicycle transportation in Istanbul from different point of views.

The participants of the workshop identified the following items as the leading problems:

- Lack of respect for cyclists from other road users
- Lack of participation in cycling
- Lack of integration with other modes of transport
- Lack of infrastructure
- Lack of awareness about cycling and cyclists.

Figure 5 Cycle Track Projects Based on the Priorities Defined for Istanbul⁷



⁷ Source: Istanbul Metropolitan Municipality The Transportation Coordination Directorate

Proposed solutions included:

- Development of a transportation master plan to encourage the integration of cycling with other modes of transport
- Integration of cycle tracks with public transportation (e.g. metro, BRT, tram, bus, etc.), including the provision of adequate, secure, and affordable bicycle parks/racks nearby
- Consideration of the topography of Istanbul when developing cycling plans
- Participation of NGOs active in bicycle transportation, local people, and other relevant stakeholders in local infrastructure projects.

In focus group interviews, NGO representatives emphasized how important it is for municipalities to satisfy the needs of all urbanites when running infrastructure projects.

NGOs also suggested several arrangements that are necessary to encourage people to cycle, and that would ultimately lead to the development of a cycling culture. One example would be the construction of bicycle parks where people can lock their bicycles safely. Increasing the number and service frequency of busses equipped with bike racks – which İETT first put into service in November 2013 – might also make cycling easier and improve the visibility and awareness of cyclists. NGOs also recommended that driving courses emphasize all the components of road traffic – the pedestrians, cyclists, public transportation and drivers alike – and that such courses must teach the hierarchy of usage in transportation.

SURVEYS OF USER TRENDS

Two different survey research methods – face-to-face and online questionnaires – were used to better understand the existing conditions of Istanbul's cycle lanes and the expectations of the cyclists, identify the challenges along existing routes, and shed light on proposals for new routes.

There were 200 respondents to the face-to-face survey and 3611 respondents to the online survey. Both surveys asked detailed questions regarding demographic structure, cycling habits, purpose of cycle trips, preferred routes, challenges in traffic, use of bicycle parks and bicycle sharing systems, as well as respondents' opinions and proposed solutions to cycling challenges. Since respondents to the online survey were gathered from local bicycle organizations and NGOs, the face-to-face survey was conducted in Kadıköy–Kartal, Zeytinburnu–Veliefendi ve Yeşilköy–Florya cycling tracks to reach cyclists who did not belong to any of these groups. Results are shared separately in order to see the differences in perspectives of the two groups, on the assumption that those in the online group would be more serious cyclists.

- Out of 200 respondents who participated in face-to-face survey, 69% were male and 31% were female. Similarly, in the online survey 70% of respondents were male while 30% were female.

Figure 6 Face-to-face Survey Results - Gender

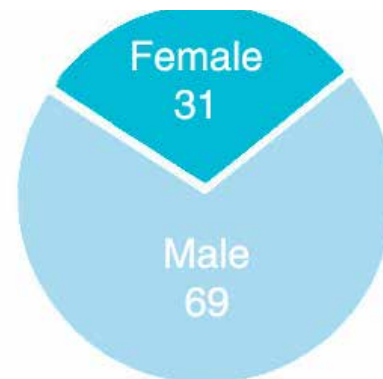
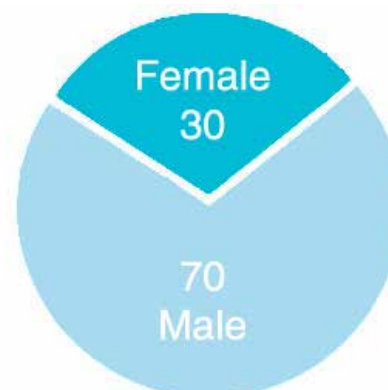


Figure 7 Online Survey Results - Gender



- In both survey groups, the majority of respondents were age 28 to 34.
- In the face-to-face survey, 45.5% of respondents had university degrees, while only 25.5% of respondents to the online survey did.
- A substantial percentage of respondents (94.5%) in the face-to-face survey reported that they owned a bicycle. In the online survey, 75% of respondents reported that they owned a bicycle.
- In face-to-face survey, respondents generally reported that they had first started cycling when were between the ages of 10 and 19. In online survey, respondents reported that they had first started cycling before the age of 9.
- In both groups, the highest percentage of respondents spent 0 to 200 Turkish Lira per month on transportation. Respondents who spent more than 250 Turkish Lira on transportation generally preferred motorized vehicles for transportation.
- Respondents in each group had different reasons for cycling. For example, in the face-to-face survey 15% of respondents used cycling as a

mode of transport while 75.5% cycled as a hobby and leisure-time activity. In the online survey, 48% of respondents used cycling as a mode of transportation while 83% cycled as a leisure-time activity. The share of respondents who use cycling both as a mode of transport and as a leisure-time activity is higher in the online survey than in face-to-face survey.

- Among respondents in the face-to-face survey who used cycling as a mode of transport, 83% were male while 17% were female. Among respondents in the online survey who used cycling as a mode of transport, 79% were male while 21% were female. Moreover, 77% of respondents in the face-to-face survey and 59% of respondents in the online survey reported that they use cycling for commuting.
- In terms of preferred cycling routes, 36% of respondents in the face-to-face survey prefer the coastal line as their primary route for cycling, while 31% of respondents in the online survey prefer to cycle along routes that are parallel to existing vehicle traffic. Neither group preferred cycle tracks that are created on pavements/footpaths.

Figure 8 Face-to-face Survey Results - Reasons for Cycling

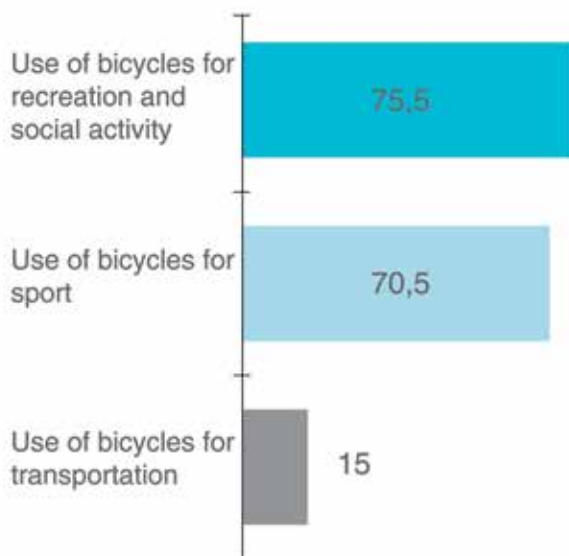
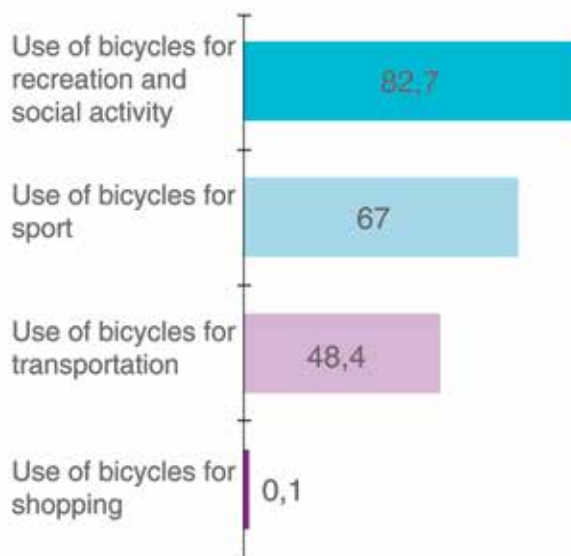


Figure 9 Online Survey Results - Reasons for Cycling



- Respondents of both survey groups reported that they prefer cycling because it is healthy, fast, affordable, and flexible.
- When asked about accidents in the past year, 17.5% of respondents in the face-to-face survey reported being involved in an accident. Of those who had been in an accident, 43% collided with a motor vehicle, while 37% collided with a pedestrian. In the online survey, only 16% of respondents reported involvement in a traffic accident in the past year. In this group of respondents, 63% collided with a motor vehicle, while 31% collided with a pedestrian.
- District-specific analysis on cycling has shown that both respondents in the face-to-face survey and respondents in the online survey prefer Kadıköy District as their primary route for cycling. In Sarıyer, Beşiktaş, Kadıköy, Fatih and Bakırköy districts, trips tend to start and end in the same district. Additionally, cyclists who start their trips in one of these districts generally tend to end up in a destination in the nearest adjacent district.
- Both survey groups reported the following challenges in all districts: lack of police enforcement, infrastructure problems, unsafe roads, fast flowing traffic, and problems at the road intersections.

Figure 10 Face-to-face Survey Results - District Specific Analysis on Cycling



- Both surveys revealed that the least safe routes are in Üsküdar and Bahçelievler districts, Survey respondents recommended making the tracks continuous and safer.
- In both surveys, the majority of respondents did not use existing bicycle parks. In the face-to-face survey, 75% of respondents reported that they had heard of such bicycle parks and 79% of respondents reported that they had never used them. In the online survey, 39% of respondents reported that they had heard of existing bicycle parks and 71% of respondents reported that they had never used these parks.
- Respondents pointed out the need to raise awareness among the public to promote cycling and suggested that cycling be popularized through public service ads. They also emphasized that drivers should obey traffic rules and respect cyclists, and that drivers and police should be trained on the rights of cyclists. 86% of respondents in the face-to-face survey and 64% of respondents in the online survey said that seeing politicians cycling would increase cycling's popularity.

Figure 11 Online Survey Results - District Specific Analysis on Cycling



3 CYCLING PRACTICES

The third section, on cycling practices, includes design criteria for cycle lane facilities at national and international scale, analysis of the existing cycle tracks in Istanbul, and site research on safe cycling.

The design criteria section covers the following cycle lane facilities, on the basis of design principles, benefits, implementation and real life examples:

- Cycle networks
- Urban bike lanes and cycle tracks
- Greenways
- Intersections
- Horizontal road markings and vertical road signs
- Bicycle parks.

Figure 12 Design criteria for cycle lane facilities



The highlights of this section are listed below:

- Routes for cyclists should be coherent, direct, and continuous, without forcing cyclists to detour.
- Neither road intersections nor residential sites should interrupt the continuity of the cycle lanes.
- Cycling facilities should be physically segregated from high-speed motor traffic, especially on streets and roads with moderate to high traffic volume. Intersections and junctions should be designed to make cyclists clearly noticeable.
- While planning cycling facilities, driving path typology/hierarchy should be taken into account.
- Preference should be given to one-way cycling facilities. However, two-way cycling facilities may also be constructed if the road design does not allow for one-way cycle lanes on each side of the road, as long as such cycle tracks are supported with signalization systems. (EMBARQ, Global 2014).
- Colored asphalt and signs should be used to improve the visibility of cycling facilities.
- Whenever possible, there should be physical constraints or space for protection between the cycle lane and the carriageway. However, the physical constraints should be minimized on right turns before intersections (Elvik Vd., 2009).
- Access to greenways and the transportation network in greenways should be designed to be responsive to the environment and adaptive to the territory.
- Accessibility of greenways and cycle trails should be improved by connecting them to short-distance public transportation and to streets. These connections should also be considered when regulating urban traffic. Radial and circular footpaths and cycle tracks should be available within the greenways (Ahern, 1995; Çelik, 2005).
- Navigation and signalization systems for cyclists should be created and integrated with other modes of transport. Traffic signals should be designed and located in a way to yield the right of way to the cyclists. This can prevent drivers from moving according to bicycle signals.
- Bike boxes should be created at signalized intersections as a safe space for cyclists. Bike boxes make cyclists noticeable in front of motor vehicle queues during the red light period and allow them a head-start when the traffic signal changes from red to green. Such bike boxes should be designed behind pedestrian crossings to minimize the probability of bicycle-pedestrian interaction in the bike boxes.
- Special traffic signs can be used when regulating bicycle traffic with traffic lights. For example, markings can be used to show cyclists their options in traffic and to make their trip easier, as well as to indicate dead-end streets, one-way streets, and non-pedestrianized zones (www.muenster.de).
- Adequate bicycle parks should be provided in line with demand.
- Bicycle parks should be noticeable from a distance and signs should be in place to guide cyclists to such parks.
- Bicycle parks should be accessible directly and they should not be blocked with steep ramps, stairs or doors (Karaşahin, 1999).

ANALYSIS OF THE EXISTING CYCLING FACILITIES IN ISTANBUL

This section under “**Cycling Practices**” includes analysis of the Veliefendi-Zeytinburnu Cycle Track and the Kadıköy-Pendik Cycle Lane. The analysis is based on three-day site visits and inspections of each route, conducted by transportation engineers.

The Veliefendi-Zeytinburnu Cycle Track starts from the road junction that connects Istanbul Kennedy Street and the Side Road D-100, and extends to Aksu Street, Ekrem Kurt Avenue and Çobançeşme Koşuyolu Street. This cycle track is 2.7 km long and is designed as a two-way track along the east side of the highway. It is normally not recommended to construct two-way cycle facilities on one side of a road in urban areas. However, this cycle track is well-segregated from the carriageway and almost all intersections are controlled with a signal phase that is specifically designated for

cyclists. This cycle track is within the acceptable safety limits as long as the proposed improvements in this analysis are taken into account.

- Below is a list of the general challenges observed in the Veliefendi-Zeytinburnu Cycle Track:
- Other road users stop and/or park on the cycle track
- Speed limit and inconvenient road design
- Poorly maintained markings on the cycle track
- Lack of vertical signs that indicate the start of the cycle track
- Interaction with motor vehicles due to poor signalization and markings at the intersections

Figure 13 The Veliefendi-Zeytinburnu Cycle Track



- Interaction with motor vehicles in the residential areas, social facilities, and car parking lots that are located by the road
- Inconvenient road crossings for cyclists and vulnerable traffic users
- Interrupted pavements and cycle tracks,
- Non-continuous cycle track, neither starting nor ending safely.

The Kadıköy-Pendik Cycle Lane starts from the Moda Coastal Line, continues along Munir Nurettin Street, and extends to Fenerbahçe Dalyan through Cephanelik Street after Kalamış Marina. It reaches to Bostancı along the reclaimed coastal line. The cycle lane is interrupted at the Bostancı Coastal Transfer Center, but then goes along the reclaimed coastal line until it ends up in Pendik. The cycle lane is 29 km long.

Figure 14 The Kadıköy-Pendik Cycle Lane



The Kadıköy-Pendik Cycle Lane stretches out along the coastal line of four districts: Kadıköy, Maltepe, Kartal, and Pendik, and reflect the different habits and expectations of users along the route.

Below are listed the general challenges observed in the Kadıköy – Pendik Cycle Lane:

- Positioning of the urban furniture
 - Interaction between bus stops and cycle lane
 - Lack of standards in horizontal road markings
 - Lack of standards in vertical road signs
 - Surface deformation on the cycle lane
 - Lack of continuity along the cross-sections of the cycle lane
- Detailed solutions with visual support are provided in the relevant section of the report.

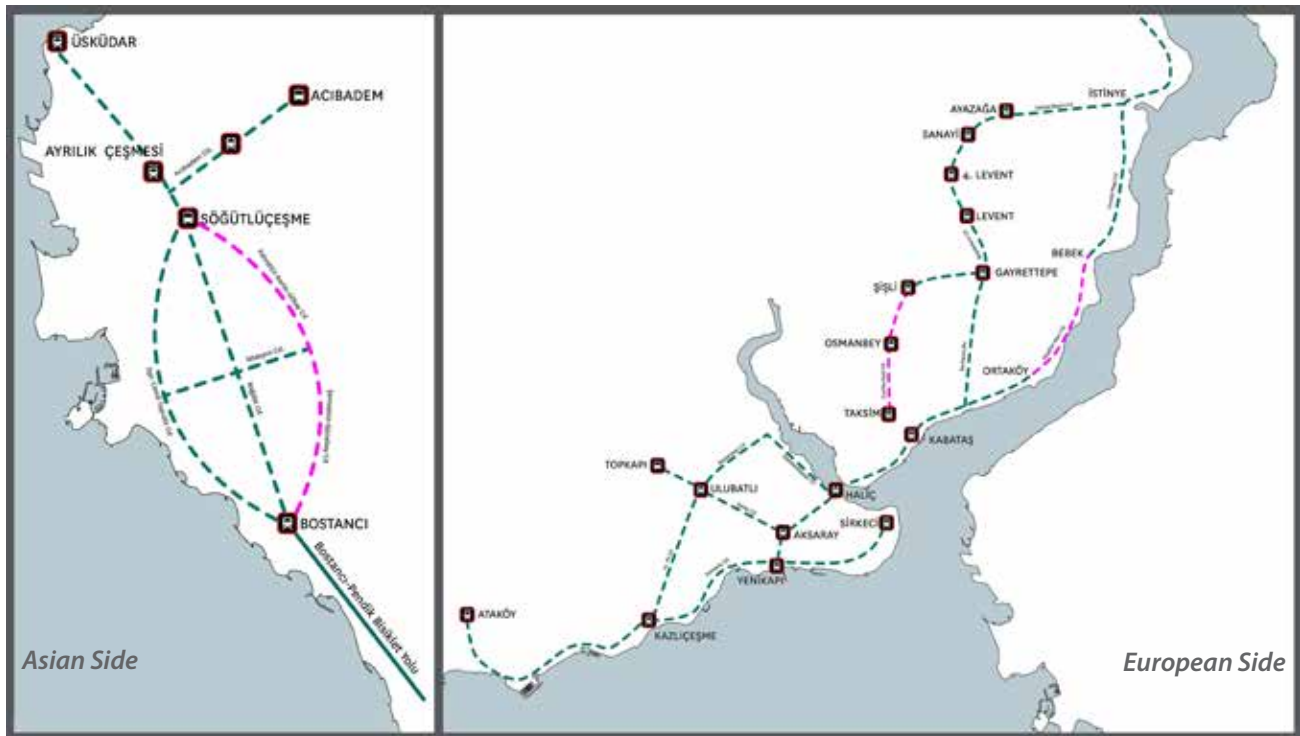
SITE RESEARCH ON SAFE CYCLING

Based on the interviews and survey results, potential routes for safe cycle tracks were selected on the Asian and European sides of Istanbul. Safety, integration with public transportation, convenience of the topography for cycling, centers of attraction, traffic volume, route length, proximity to key locations, and width of streets were all taken into

account when selecting the routes. Three main lines were studied as candidates for safe cycle tracks:

- Şemsettin Günaltay Street – Fahrettin Kerim Gökay Street
- Ortaköy-Rumeli Hisarı
- Cumhuriyet Street.

Figure 15 The Potential Routes for Safe Cycle Tracks



EMBARQ-Turkey and its research partners conducted in-depth studies along these streets and developed solutions for potential problem areas such as bus stops and points of pedestrian-cyclist, cyclist-cyclist, and cyclist-driver interaction. Some of these proposals were designed as 3D visuals.

Figure 16 Design Proposal for Şemsettin Günaltay Street – Fahrettin Kerim Gökay Street



Figure 17 Design Proposal for Cumhuriyet Street



EVALUATION

“Safe Cycling Design Manual for Istanbul” is a comprehensive study that intends to:

- 1) identify the challenges and expectations of cyclists in Istanbul,
- 2) outline the roles and responsibilities of the relevant authorities with jurisdiction over cycling projects, and
- 3) propose solutions to make existing cycle tracks safer and to make new cycle track designs more feasible.

Its ultimate goal is to raise awareness of cycling and to promote cycle tracks with safe infrastructure in Istanbul. This effort will require better coordination between the authorities — the Istanbul Metropolitan Municipality and District Municipalities — and NGOs that work to promote cycling. Through better management and design, Istanbul can make cycling safer and more convenient for all of its residents.

The city of Istanbul faces unique challenges with regards to cycle lane implementations. Istanbul has the broadest local government structure of any metropolitan area in Turkey; no district municipality has a say on transportation routes, except for those in parks within their own jurisdictions. The Istanbul Metropolitan Municipality (IMM) is mainly accountable for the city’s bicycle transportation routes. In practice there is lack of coordination between the departments of IMM, though they appear on paper to be systematically structured. Individual directorates, which participate in cycling projects and implementation, are attached to

different general secretaries or departments under IMM. Municipal enterprises are also authorized under IMM to plan and implement bicycle projects. This overlap causes delays in official procedures and creates communication and timing problems.

Interviews with local authorities revealed another challenge: the Directorate of Transport Planning is accountable for transportation plans; however, in practice The Transportation Coordination Directorate chooses the transportation routes/lines and opens tenders based on the recommendations, requests, and expectations that it receives. Therefore, The Transportation Coordination Directorate stands out as the highest authority in the area of cycle lanes and footpaths.

Moreover, the Transportation Master Plan of Istanbul, being drafted by the Directorate of Transport Planning, currently does not incorporate cycle lanes. This indicates that cycling is still considered to be a leisure time activity rather than an essential part of urban transport.

Interviews within the Directorate of Infrastructure Projects and the Directorate of Traffic indicate that bicycle infrastructure implementation has been delayed due to the above-listed reasons. Due to the disconnection between tendering and implementation phases, some routes that are normally eligible to become part of wider transportation networks have been ignored. This situation inhibits people from adopting cycling as a habit.

iSPARK's current development of bicycle sharing facilities on existing cycle lanes is the right approach. However, these facilities are limited to coastal areas that are almost slope-free and not used in non-coastal lines where they are also sorely needed. These plans also indicate that cycling is not regarded as a mode of transport for the entire city.

PLANNING AND INTEGRATION

- The central government of Turkey needs to prepare “National Cycling Plan” that covers strategies and implementation. Cycle network designs and implementation plans should be included in development plans, transportation plans, policies, and investments.
- Central and local governments need a platform to coordinate plans and strategies on non-motorized transportation, and provide local governments with enough technical support and staff.
- Transportation planning in Istanbul should take on an integrated approach, meaning that there should be a cycle master plan rather than piecemeal cycle lanes and bike sharing systems in different local districts.
- Transportation planners and government agencies should consider cycle lanes and cycle tracks as part of broader cycle networks, and the necessary safety conditions should be provided.
- Bicycle tracks should be designed both to serve neighborhoods and to integrate with public transit systems. Bicycles can work well for trips within neighborhoods; the average trip distance within districts in Istanbul is 5-6 km, and bicycle transportation can be done easily over that distance (Kaya, 2013). In survey results, the majority of respondents stated that their bicycle trips were no longer than 60 minutes, and cyclists who start their trips in one of district generally tend to have a destination in the same or nearest adjacent district. For example, 61% of cyclists stated that they starts their trips in Kadikoy and tend to complete their trips in the Kadikoy district.
- Safety and comfort are essential qualities of effective bicycle networks. Forty percent of survey respondents cited safety as one of their most important criteria for choosing a cycling route. This was followed by 29% choosing “comfort” and 21% choosing “short distance.”
- Bicycle parks should be adequate to the demands and expectations of bicycle riders. In surveys, the majority of respondents did not use existing bicycle parks. In the face-to-face survey, 75% of respondents reported that they had heard of such bicycle parks, but 79% of respondents reported that they had never used them. In the online survey, 39% of respondents reported that they had heard of existing bicycle parks and 71% of respondents reported that they had never used them. Most cited safety as the reason why they did not use these facilities.
- Integration with public transportation vehicles poses another challenge to bicycle adoption. There are bicycle parks in several ferry ports, subways, and BRT stations, but they are not adequate. In many cases, it is not possible to carry bicycles on public transportation. IETT already has 20 buses equipped with bike racks city-wide, but these types of services must be promoted in all modes of transportation.

INFRASTRUCTURE

- Routes for cyclists should be coherent, direct, and continuous. In surveys, 90% of respondents faced major infrastructure problems when attempting to use bicycles. Fifty percent of respondents felt that unsafe and non-continuous bicycle routes posed major problems.
- Bike lane and cycle track width should comply

with international standards. In surveys, 44% of respondents cited lane width as important considerations for bike lanes and cycle tracks.

- Cyclists need navigation and signalization systems that are integrated with other modes of transport. In surveys, 35% of respondents pointed to the lack of vertical road signs as a major safety issue.

PARTICIPATION

- Central and local governments, NGOs, the private sector, and universities should collaborate to develop awareness-raising activities for safe cycling.
- While selecting routes for cycle lanes, the number of cyclists, their preferences, and their safety expectations are as important as the slope, width and suitability of the land. However, the exact number of cyclists in Istanbul is not known, and both cyclist and accident counts are poorly performed.

EDUCATION AND PUBLIC AWARENESS

- Vehicle driving courses should include all components of traffic, including cyclists and their rights. Survey respondents emphasized that all road users should obey traffic rules and that drivers and police should be trained on the rights of cyclists.
- Elementary schools should provide bicycle use and safety trainings. Cycling culture and awareness should be developed from an early age.
- Survey respondents pointed out the need to raise public awareness to promote cycling, and suggested that cycling be popularized through public service ads.

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