



Technical Note on Accessibility

Fact Sheet 3:

Accessibility in the Transportation
Sector of Operations

3



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Inside front cover

Technical Note on Accessibility

Part 3: The Thematic Fact Sheets

Fact Sheet 3:

Accessibility in the Transportation Sector
of Operations



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This guidance is one of **four sets of documents constituting the World Bank Technical Note on Accessibility**. It is primarily meant for the Bank's task team leaders (TTLs), program implementing units (PIUs) and E&S specialists. The note can be also used by other development partners, including World Bank clients. It focuses on investment project financing (IPF).

The sections that comprise the **Technical Note on Accessibility** are: **The Narrative (Part 1); The Project Cycle Guidance (Part 2); The Five Thematic Fact Sheets (Part 3); and The Technical References (Part 4)**.

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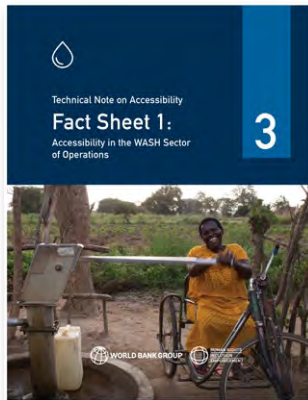
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Overview of the Thematic Fact Sheets



Download Related Sections



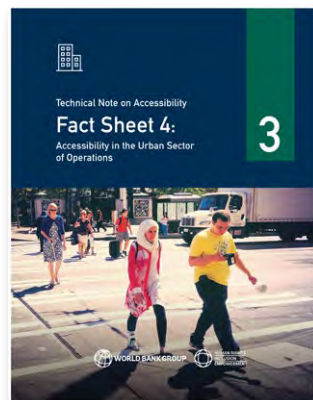
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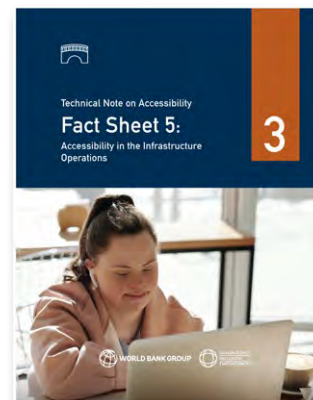
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Fact Sheet 5:
Accessibility in
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Transportation and Accessibility



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Transportation is at the heart of urban living, and a key condition for access to employment opportunities, health care, social connections, and education in all areas, including rural settings. Without accessible public transport options persons with disabilities face isolation and may incur extra expenses in accessing basic services and rights.

There are multiple ways in which governments can invest in retrofitting public transportation services for accessibility. For example, in preparation for the 2020 Tokyo Olympic and Paralympic Games, the city invested in creating transportable ramps, provided staff training, and displayed large-print signs to make their metro system accessible.

As many cities around the world are growing rapidly, they are investing in developing stronger urban transit systems to address demand. Engaging and consulting with persons with disabilities on how to design and enact universal design principles can ensure that cities develop long-lasting, accessible transit systems.

Accessible transportation to connect persons with disabilities in rural areas to health centers, clinics, school, family, cities, and jobs is an important and often neglected component. In many countries, there are limited affordable and accessible transport options, particularly in rural areas. Ensuring that infrastructure and transport development considers and meets the needs of persons with disabilities is of critical importance. This can be done through ensuring small-scale bus services and expanding access to paved roads



and assistive technologies like wheelchairs, walking aids, or other mobility tools that ease travel.

Large-scale transit systems like roads, trains, and buses that connect villages to essential services in towns and cities should also consider adding accessibility features like accessible vehicles, reduced fares for persons with disabilities and their caretakers, and implementing universal design principles in the design and construction of terminals for easy navigation.

It is recommended that planners who are designing or retrofitting transport facilities for accessibility engage with persons with disabilities. Engaging with persons who have a variety of different types of disabilities, and researching the legal requirements and guidelines for accessible spaces will ensure that the accessibility features are implemented in the most user-friendly way possible. This will in turn ensure that persons with disabilities are able to benefit from the investments in transportation that are being made around the world.



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Key Elements



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Accessibility in the transportation sector extends positive effects across many other sectors as well. For example, it is crucial to improving access to education, health, culture, or employment; to realizing more inclusive urban development plans and disaster risk reduction (DRR) strategies; and to advancing digital accessibility related to mobility that can be used afterward in other sectors as well. **Similarly, accessibility interventions in other sectors can greatly contribute to more accessible mobility.** For example, accessible ICT solutions can be applied to transportation services like booking tickets, or providing live updates on traffic; inclusive approaches in the urban sector can facilitate the implementation of accessible transportation; and the adoption of accessibility standards in public buildings can highlight the need to create accessible transportation to reach them.

When planning accessible cities, an **unbroken chain of movement** must be ensured: urban planning and inclusive mobility solutions need to ensure that persons with disabilities are able to **Reach** the infrastructure, while the design of buildings needs to ensure that they are able to **Enter** the building, **Circulate** around it, and **Use** all the relevant spaces freely and independently (following the R.E.C.U. steps). *(For additional information please refer to the Urban and Infrastructure Fact Sheets).*



Accessible transportation and mobility are about:

- > **Public Collective Means of Transportation** - trains, buses, planes, boats, trams, etc. - that are adapted to allow persons with disabilities to get on and off independently; to travel in a safe position; to cancel tickets; and so on.
- > **Public Individual Means of Transportation** - taxis, vans, tuk-tuks, etc. - that are adapted to allow persons with disabilities to get on and off, to store their assistive devices during the trip if necessary, etc.
- > **Mobility-Related Facilities** - stations, bus stops, airports, etc. - that allow persons with disabilities to safely enter, circulate, find their way, and access the desired transportation.
- > **Mobility-Related Urban Infrastructure** - roads, bridges, pedestrian crossings, pavements - that allow persons with disabilities to circulate within urban or rural environments.
- > **Information and communication within the facilities** - signs at bus stops, timetables, maps, information for travelers in airports - provided in more than one format, to accommodate the needs of those with visual, hearing, mobility, or other disabilities.
- > **Information and communication inside collective means of transportation.** Accessible information inside trams, trains, buses, etc. about current and next stops, emergency procedures, how to call for help, etc.
- > **Digital information and communication.** Digital platforms that provide real-time information on the transportation system, Web services to book a ticket or file a complaint, etc. *(For additional detail please refer to the ICT Fact Sheet).*

The **involvement and participation of persons with disabilities** and their representing organizations must be ensured in all phases of a transportation project, from needs assessment to design, follow-up of the initiatives, and testing and evaluation after completion, to make sure their needs are being properly taken into account, and to ensure the quality of the implementation.



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Data at Glance



Figure 1: Image Source: https://www.who.int/disabilities/Disability_infographic_EN_rev_Jun_2018.pdf?ua=1



Figure 2: Image Source: <https://sdgs.un.org/>

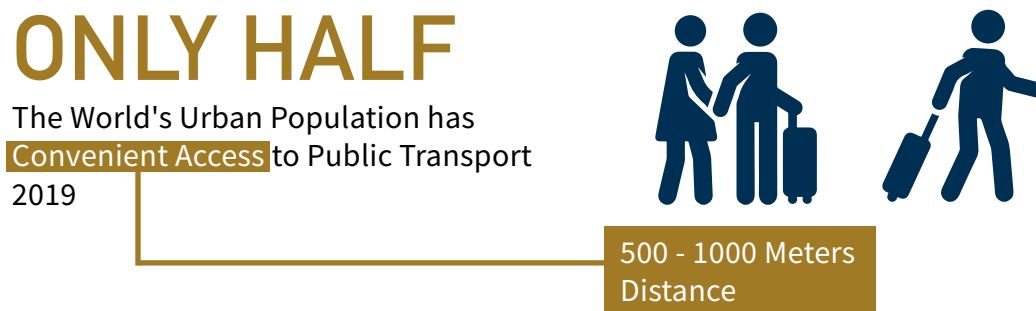


Figure 3: <https://www.uitp.org/campaigns/pt4me/>



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International Framework



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The **Convention on the Rights of Persons with Disabilities (CRPD)** requires states' parties to ensure equal access to transportation for persons with disabilities (Article 9). Article 20 on Personal Mobility underlines their responsibility to “ensure personal mobility with the greatest possible independence for persons with disabilities,” including the timeliness and affordability of options:

- 20(b) aims at facilitating access by persons with disabilities to quality mobility aids, devices, assistive technologies, and forms of live assistance and intermediaries, including by making them available at an affordable cost.
- 20(d) aims to encourage entities that produce mobility aids, devices, and assistive technologies to consider all aspects of mobility for persons with disabilities.



Sustainable Development Goal (SDG) 11 (“Make cities and human settlements inclusive, safe, resilient and sustainable”) specifically mentions developing safe, affordable, accessible, and sustainable transport systems for persons with disabilities and older persons. Affordable and accessible transportation for persons with disabilities is also essential for meeting SDG



1 (Poverty); SDG3 (Good Health and Well-Being); SDG4 (Education), SDG8 (Decent Work and Economic Growth), SDG9 (Industry, Innovation, and Infrastructure), and SDG10 (Reduced Inequalities).

One of the transformative commitments in the UN's **New Urban Agenda** specifically mentions facilitating access for persons with disabilities on an equal basis with others, to public transport in urban and rural areas. This Agenda calls for accessible, affordable, and safe public transport options to ensure sustainable mobility for all. And the WHO–World Bank World Report on Disability identifies barriers in public transportation and provides an action agenda for the realization of inclusive transport systems.¹

To date there is no specific and comprehensive international **standard for accessible transportation**. Some references can be found in broad national accessibility standards such as **the Dubai Universal Design Code** Section C. Some countries have national regulations that can be used as a helpful reference as well:

- Canada: **Accessible Transportation for Persons with Disabilities Regulations**
- USA: **The Americans with Disabilities Act (ADA) Accessibility Guidelines for Transportation Vehicles**

Design standards for transportation and road systems are often managed at the city level, and there are interesting examples of accessibility measures that have been adopted by municipalities: for example, Greater Nottingham (UK), Mexico City, and the City of Mississauga, Canada.

As a general rule, national, local, or regional accessibility standards have to be complied with. International standards like **ISO 21542:2021, Building Construction - Accessibility and Usability of the Built Environment** should be used to integrate into existing mandatory standards, or used when local standards are not available, or if they are too permissive. In addition, standards from other countries can be used as a reference when they seem relevant. Mobility infrastructure (like train, bus, tram, or metro stations, bus stops, urban sidewalks, parking areas, etc.) must consider the design of accessible ramps, stairs, elevators, walkways, reception and waiting areas, information and wayfinding panels, etc.

1 World Health Organization and the World Bank. 2011. **World Report on Disability**. Geneva: World Health Organization.



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Examples of Key Challenges and Actions for Accessibility in Transportation



Photo: © OlegD, Shutterstock

Type of Difficulty	Challenges in Accessing Transportation	Considerations for Reducing Barriers
Physical (mobility, dexterity, and physical strength)	➤ High and wide gaps between cars/buses/metros and the ground; ➤ No ramp or elevator access to railway platforms, metro cars, or buses; ➤ Broken infrastructure or elevators; ➤ Limited elevator capacity; ➤ Too-narrow gantries; ➤ Elevators / ramps too far from metro cars; ➤ Dexterity required to enter/exit bus, car, metro safely;	✓ Reduce gap between cars/buses/metros and ground through ramps or levelling; ✓ Increase number and size of elevators; ✓ Have grievance management system to address and alert passengers of elevator or other outages; ✓ Widen entrance/ticket gantries; ✓ Consult with persons who have physical impairments concerning the design and placement of accessibility features;



Type of Difficulty	Challenges in Accessing Transportation	Considerations for Reducing Barriers
	> Nowhere to sit in stations	✓ Provide multiple benches and seats at stops and stations.
Visual	> Small, low-contrast signs; > Visual signage only; > Lack of guidance or safety features.	✓ Have large, high-contrast signs and maps; ✓ Include braille in station maps mounted on walls; ✓ Use braille pavers throughout stations, railway/metro cars, buses, and sidewalks; ✓ Provide information on bus line number, direction, and route in both visual and auditory formats.
Hearing	> Auditory communication and information not in accessible format (passenger announcements, routes, verbal communication with operators, etc.).	✓ Provide information on bus line number, direction, and route in alternative formats, such as a button that activates information panels, or an app to get updates via SMS/mobile phone.
Speech	> Reliance on speech to communicate with operators and purchase tickets.	✓ Provide alternative formats for purchasing tickets (i.e., automated machines or online) and ways to participate in key meetings/stakeholder forums.



Type of Difficulty	Challenges in Accessing Transportation	Considerations for Reducing Barriers
Cognitive/ Psychosocial	> Complex transport system maps; > Difficulty navigating stations independently; > Noise level and lights may be jarring for some; > Crowds and density of people on transit systems; > Limited information on frequency of buses, trains, trams, etc.	✓ Provide plain-language or simplified pictorial maps in stations and online; ✓ Consult with persons who have cognitive disabilities concerning the lights, sounds, and signage used in transit systems; ✓ Provide digital information on the availability of trains, trams, or buses.

For additional details on practical recommendations for this sector, please refer to **PART 4 of this Technical Note: “Technical References.”**

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Accessible Transportation Projects



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NOTE: This section contextualizes the main sections of [Part 1 of this note \(the Narrative\)](#), in which the desired conditions for accessibility in a country, together with possible activities, are described with an overarching perspective. Here, concrete examples are provided for the transportation sector.

An accessible transportation project aims at achieving some of the key conditions for accessibility in the sector, such as:

Condition	Description/ Examples
Institutional Commitment	Existence of public transportation policies and strategies aimed at better inclusion of persons with disabilities.
Operationalization	Enforcement of implementation mechanisms to ensure that compliance with accessibility standards is actively required, monitored, and evaluated.
Empowerment	Capacity development about accessibility in transportation for all relevant actors and at all stages.



Condition	Description/ Examples
Enactment	Funding and support for projects that improve accessible mobility for all.
Durability	Development and sharing of knowledge about inclusive mobility.

It should also implement the main activities that can contribute to the enhancement of accessibility in the sector, such as:

Activity	Description/ Examples
Advocacy / Awareness Raising	Raises awareness and sensitizes local authorities, institutions, development actors, professionals, the general public, and all stakeholders on the importance of disability-inclusive mobility.
Procurement	Promotes the adoption of public procurement strategies that refer to accessibility standards for transportation solutions.
Involvement of Private Sector	Encourages incentives for research and innovation in the private sector to develop more accessible transportation solutions.
Assessments and Data Collection	Assesses the existence and quality of local policies, strategies, legislation, standards or guidelines concerning accessibility of transportation and supports for the development or improvement of the needed tool;



Activity	Description/ Examples
	Assesses the existence and quality of local implementation mechanisms concerning accessibility of transportation and support for the definition or improvement of the needed processes; Considers how to address the fragmentation of roles and responsibilities: different stakeholders in charge of roads, means of transportation, transportation infrastructure, disability and social affairs, etc.
Budget and Human Resources	Ensures the allocation of appropriate funds for implementation of accessibility in terms of activities and human resources;
Meaningful Participation	Works to empower organizations of persons with disabilities (OPDs) as the main actors in the process; Promotes inclusive and participatory approaches at all stages of the transportation process (initial needs assessment, design and proposal review, monitoring and testing of works, evaluation of the implemented activities); Takes disability into account for the public, but also for public transport sector staff.
Capacity Development	Supports the technical capacity development of local professionals in the sector, university students, development workers, etc.; Supports the sensitization of bus drivers, taxi drivers, station agents, and other transport staff to address the needs of passengers with disabilities;



Activity	Description/ Examples
	Engages stakeholders in the sector and OPDs in thematic seminars, workshops, conferences, and other public events around accessible and inclusive transportation; Encourages the development of communities of practice and the creation and sharing of research, thematic publications, collections of good practices and lessons learned, and any other capitalization tool.
Technical Support to Stakeholders	Promotes the enforcement, creation, or revision of inclusive transportation policies, standards and enforcing mechanisms; Promotes different types of safe, inclusive, and ecofriendly mobility: nonpolluting and accessible public transportation means (urban rail, bus, rapid transit, etc.), dedicated cycle lanes and affordable bike-renting solutions, pedestrian areas, more accessible infrastructure for bus and train stations, bus stops, airports, maritime stations, etc.; Adapted communication on and about mobility, etc.; Addresses all the aspects of mobility: means of transportation, road and pavement systems, mobility infrastructure (bus stops, stations, airports), communication materials and techniques related to safe mobility; Promotes overall harmonization and coherence between accessibility measures and other measures (road safety, information strategies, etc.)



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Practical Examples



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Recommendation	Example
Assessment: At the initial stages of the project, thoroughly assess the overall country framework in terms of accessibility; in particular, assess the existence of regulations concerning transportation and mobility.	In China national legislation has not been matched by adequately detailed regulatory frameworks at the provincial and local levels. There are no nationwide administrative regulations in China for barrier-free facilities yet. The lack of a consistent enforcement mechanism has produced a tragic lack of consistency in achieving overall inclusive accessibility outcomes. In a country where there is a rapidly building infrastructure, like in China, these are important lessons learned, and indications for good practice.²
Participation: Involve persons with disabilities in	As part of the design and construction phases, the <u>Lima Bus Rapid Transit (BRT) system (P170595)</u> conducted several consultations with persons with

2 Babinard, J., W. Wang, C.R. Bennett, and S. Mehndiratta. 2012. **Accessibility of Urban Transport for People with Disabilities and Limited Mobility : Lessons from East Asia and the Pacific (worldbank.org)** Washington, DC: World Bank.



Recommendation	Example
consultations about the accessibility of proposed solutions for public transportation.	disabilities and organizations of persons with disabilities to get feedback on the designs and plans for the transport system. Persons with disabilities noted that the placement of pedestrian footways and intermediate shelters should be equidistant to crosswalks, and that use of steps that obstruct the width of the pathway should be limited, since this is a tripping hazard for many persons with disabilities. This valuable feedback was able to empower persons with disabilities and to increase the overall accessibility and connectivity of the proposed system.
Implementation: Make sure that the appropriate accessibility standards are followed for the World Bank's supported transportation projects from the earliest stages of the architectural design.	The Cairo Airport Terminal 2 Rehabilitation Project included compliance with international accessibility standards right from the concept stage. Accessibility features were included in the final design, and Terminal 2 addresses the needs of persons with disabilities and older persons.
Capitalization: Develop and periodically update technical guidance on how to implement accessible mobility solutions for persons with disabilities.	In 2013, the Middle East and North Africa Region Sustainable Development Sector published a practical guidance note, "Improving Accessibility to Transport for People with Limited Mobility (PLM)" , (World Bank 2013).
Participation / Implementation: Include committees of	The Liaoning Medium Cities Infrastructure Project worked with local associations for persons with disabilities to test accessibility improvements funded

Recommendation	Example
persons with disabilities in the monitoring and supervision of ongoing mobility-related works, to ensure the quality of accessibility interventions.	by the project. These audits identified problems such as too-narrow sidewalk ramps and misalignments between ramps and sidewalks, which would have rendered these sidewalks unusable for many persons with disabilities.
Technical Assistance / Participation: Promote the development of accessibility strategies and implementation mechanisms; and, when this is not possible, find “lighter” alternative solutions to mainstream disability within the transport sector.	The experience of China showed that even where a mechanism does not exist for regulating and enforcing accessible design principles, significant positive impacts can be made by at least ensuring that accessible design principles are incorporated into standards and guidelines (which is simple and relatively inexpensive to achieve); and by organizing the community of persons with disabilities, and empowering them to participate in the infrastructure development process.³
Knowledge Management / Monitoring: Review World Bank-financed projects for the urban transportation sector to assess accessibility features, highlight best practices, and make recommendations for improvements.	A total of 14 World Bank-financed projects in East Asia and Pacific (EAP) region were reviewed from January-July 2011 with financial support from an Environmentally and Socially Sustainable Development Network (ESSD) Disability and Development grant secured by Human Development Network Social Protection (HDNSP) to carry out work under the general theme of "Mainstreaming Disability." The review included 12 projects in China and two in Vietnam. Of the projects started between May 1998 and May 2010, six were completed; five were in progress; and three were beginning implementation and

3 Babinard, J., W. Wang, C.R. Bennett, and S. Mehndiratta. 2012. [Accessibility of Urban Transport for People with Disabilities and Limited Mobility : Lessons from East Asia and the Pacific \(worldbank.org\)](https://www.worldbank.org/publications/urbantransport) Washington, DC: World Bank.



Recommendation	Example
	construction. All were substantial projects, with financing ranging from \$43 to \$113 million. The investments included road infrastructure, traffic management schemes, and improvements of public transport facilities. ⁴
Knowledge Management / Monitoring: Encourage local stakeholders to engage in a continuous learning process about accessibility, and take advantage of World Bank-funded transportation projects (collection; analysis and sharing of good practices; and lessons learned on accessibility).	In 2016, the World Bank, along with the Pacific Region Infrastructure Facility and other stakeholders and donors, produced a report on <u>Improving Accessibility in Transport: Infrastructure Projects in the Pacific Islands</u>, which provides technical guidelines, auditing tools, and recommendations for decision makers. In general, effective practices include the following: ➤ Policy and regulatory changes. Adopt accessibility standards and guidelines; include access for all in transport policies; mandate accessibility in public procurement. ➤ Inclusive and universal design. Focus on all aspects of transit, including road and pedestrian environment, vehicle design and operation, stations and stops, signage and information (firm, even surfaces; tactile guideways and surfaces; curb cuts and ramps; traffic-calming measures; audio, visual, and tactile signage; vehicle entry and aisle space for persons using wheelchairs).
Implementation: Ensure that a thorough follow-up	The revision of 14 World Bank-financed projects in EAP showed that national or international universal access guidelines do not appear to have been applied

4 Babinard, J., W. Wang, C.R. Bennett, and S. Mehndiratta. 2012. **Accessibility of Urban Transport for People with Disabilities and Limited Mobility : Lessons from East Asia and the Pacific (worldbank.org)** Washington, DC: World Bank.



Recommendation	Example
of implemented accessibility improvements is conducted, to monitor the quality and consistency of planned activities.	consistently during implementation. One reason may be the lack of resources for carefully supervising contractors and implementation of the accessibility features.⁵

5 Ibid.

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Annexes: Useful Insights



Annex 1:

Overall Definitions

Accessibility is the degree to which persons with disability can have access “on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas.” (CRPD, Article 9)

Accessibility is about applying the seven principles of **Universal Design** to new infrastructure, products, or services, and/or to existing ones to the extent possible, taking the local context into consideration. Universal Design “means the design of products, environments, programs and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.” (CRPD, Article 2)

It is not always possible to apply the principles of Universal Design to the fullest, but it is always possible to identify and provide reasonable accommodation to a person who requires it.

Reasonable Accommodation refers to “necessary and appropriate modification and adjustments not imposing a disproportionate or undue burden, where needed in a particular case, to ensure to persons with disabilities the enjoyment or exercise on an equal basis with others of all human rights and fundamental freedoms.” (CRPD, Article 2)



Annex 2:

The Costs of Accessibility in Transportation

Improving Accessibility to Transport for People with Limited Mobility: A Practical Guidance Note, a 2013 World Bank study offers many interesting insights into the costs and benefits of accessibility in the transport sector. In particular, it identifies 71 items that would improve the accessibility of various means of transportation and infrastructure, and classifies them according to both their overall cost (the total cost of procuring or executing an element, including accessibility improvements), and their marginal cost (the incremental cost of making an element accessible).

The study shows that in terms of overall cost, 60 percent of the analyzed accessibility features are considered to be cheap or very cheap; 35 percent to be moderately expensive; and only 5 percent to be expensive. In terms of marginal cost, 70 percent of the analyzed accessibility features are considered to be cheap or very cheap; 27 percent to be moderately expensive; and only 3 percent to be expensive.

Tables 1 and 2 below have been elaborated from the original World Bank document. They show the items ordered by marginal cost, where:

- Low marginal cost = Less than 5 percent of the total implementation cost of the basic transport system feature.
- Medium marginal cost = 5 to 10 percent of the total implementation cost for this feature.
- High marginal cost = More than 10 percent of the total implementation cost.

The study also analyzed the cost effectiveness of these 71 items by compiling generalized cost and benefit information and estimating:

- *The scale of implementation costs* for each accessibility measure. Where appropriate, this includes due consideration of the marginal cost and maintenance, or associated costs.

- > *The scale of likely benefits* arising from implementing each accessibility feature, with due consideration for the extent to which likely benefits accrue to both Persons with Limited Mobility (PLM) and the wider population.

The results show that 34 percent of the items are highly cost - effective; 59 percent have a moderate cost - effectiveness; and 10 percent have low cost - effectiveness.

Tables 3 and 4 below have been elaborated from the original document. They show the items ordered by cost-effectiveness.

Table 1: Items with Low or Low-Medium Marginal Cost

Family	Element	Overall Cost of Implementation	Marginal Cost of Accessibility
Pre-journey Information	Printed Information - booklets, leaflets, timetables	Low	Low
Pre-journey Information	Telephone Information Services	Medium - High	Low
Information at Stops & Stations	Static Visual Information	Low	Low
Information at Stops & Stations	Real-time information displays	Medium - High	Low
Information at Stops & Stations	Real time and pre-recorded audible information	Low - Medium	Low
Information at Stops & Stations	Tactile information	Low - Medium	Low
Information at Stops & Stations	Terminals & kiosks	Low - Medium	Low
Information On-Board Vehicles	Static Visual Information	Low	Low
Information On-Board Vehicles	Real time information displays	Low - Medium	Low
Information On-Board Vehicles	Audible Information	Low - Medium	Low



Family	Element	Overall Cost of Implementation	Marginal Cost of Accessibility
Information On-Board Vehicles	Tactile Information	Low	Low
Travel Training	Disability Awareness Training Events	Low	Low
Travel Training	Disability Awareness Training Videos	Low	Low
Travel Training	Disability Awareness Training Posters & Leaflets	Low	Low
Footway & Sidewalks	Signage & Wayfinding	Low	Low
Dropped Curbs & Street Crossings	Drop Curb	Low	Low
Dropped Curbs & Street Crossings	Island Refuge	Medium - High	Low
Public Transport Stop/Station Infrastructure	Folding or Fixed Seats at Stops or Stations	Low	Low
BRT/Light Rail Stops	Folding Seats within Stop/Station	Low	Low
Airplanes	Burnett Seat Supports	Low	Low
Airplanes	Aisle Wheelchairs	Low	Low
Rapid Transit Vehicles	Handrails & Stanchions	Low	Low
Rapid Transit Vehicles	Color Contrast Step Noses	Low	Low
Rapid Transit Vehicles	Priority Seating	Low	Low
Trains	Handrails on Stairs	Low	Low
Trains	Wheelchair Ramps	Low	Low



Family	Element	Overall Cost of Implementation	Marginal Cost of Accessibility
Trains	Incorporating Fully Accessible Rolling Stock	High	Low
Private Vehicle Adaptations	Swivel Cushion to Aid Getting In & Out of the Vehicle	Low	Low
Private Vehicle Adaptations	Transfer Board	Low	Low
Private Vehicle Adaptations	Handbrake Adaptations	Low	Low
Rickshaws	Seat Belts & Other Modest Adaptations	Low	Low
Rickshaws	Lowering the Floor of A Cycle Rickshaw	Low	Low
Travel Training	Travel Training	Low	Low - Medium
Dropped Curbs & Street Crossings	Footway Build-Out	Medium	Low - Medium
Dropped Curbs & Street Crossings	Raised Table	Medium	Low - Medium
Dropped Curbs & Street Crossings	Zebra Crossing	Medium	Low - Medium
Public Transport Stop/Station Infrastructure	Raised Boarding Structures	Low - Medium	Low - Medium
Public Transport Stop/Station Infrastructure	Bus Stop Surfacing	Low	Low - Medium
Public Transport Stop/Station Infrastructure	Bus Shelters	Low	Low - Medium
BRT/Light Rail Stops	Bus Mounted Boarding Bridge	Low - Medium	Low - Medium



Family	Element	Overall Cost of Implementation	Marginal Cost of Accessibility
Major Terminals & Interchanges	Ramps to Provide Level, Step Free Environments	Low - Medium	Low - Medium
Ferries & Marine Vessels	Transfer Ramps from Pier to Vessel	Medium	Low - Medium
Ferries & Marine Vessels	Providing Dedicated Wheelchair Spaces	Low - Medium	Low - Medium
Trains	Automatic Doors on Trains	Medium	Low - Medium
Private Vehicle Adaptations	Wheelchair Ramps	Low - Medium	Low - Medium
Private Vehicle Adaptations	Button-Operated Clutch on the Gearshift	Low - Medium	Low - Medium
Parking Facilities	Accommodating Parking Spaces Closer to Retail Outlets and Leisure Facilities	Low - Medium	Low - Medium
Taxis & Minibuses	Adapting a Taxi or Minivan to Accommodate Persons with Limited Mobility	Low - Medium	Low - Medium
Rest Areas	Accommodating Parking Spaces Closer to Buildings	Low - Medium	Low - Medium

Table 2: Items with Medium to High Marginal Cost

Family	Element	Overall Cost of Implementation	Marginal Cost of Accessibility
Major Terminals & Interchanges	Passenger Lift to Platform	High	High
Airplanes	Ambulifts	High	High
Pre-journey Information	Developing an Online Journey Planner & Travel Information System	High	Medium



Family	Element	Overall Cost of Implementation	Marginal Cost of Accessibility
Footway & Sidewalks	Improved Footways and Sidewalks	Medium - High	Medium
Footway & Sidewalks	Tactile Paving	Medium	Medium
Dropped Curbs & Street Crossings	Signalised Crossing	Medium - High	Medium
Major Terminals & Interchanges	Accessible Toilets	Medium	Medium
Trains	Portable Manual Train Lifts	Medium	Medium
Private Vehicle Adaptations	Horizontal Steering Wheel	Medium	Medium
Private Vehicle Adaptations	Wheelchair Accessible Motorcycle	Medium	Medium
Parking Facilities	Widening Parking Spaces for Disabled Users	Medium	Medium
Parking Facilities	Disabled Parking Concessions	Medium	Medium
Powered Wheelchairs & Scooters	Powered Wheelchair	Medium	Medium
Powered Wheelchairs & Scooters	Mobility Scooter (class 2)	Medium	Medium
Powered Wheelchairs & Scooters	Mobility Scooter (class 3)	Medium	Medium
Rest Areas	Widening Parking Spaces for Disabled Users	Medium	Medium
BRT/Light Rail Stops	Elevator or Stair Lift	High	Medium - High



Family	Element	Overall Cost of Implementation	Marginal Cost of Accessibility
Rapid Transit Vehicles	Single Deck Articulated Low Floor Kneeling Bus	High	Medium - High
Rapid Transit Vehicles	Curbside Lifts	Medium - High	Medium - High
Private Vehicle Adaptations	Wheelchair Accessible Vehicle	Medium - High	Medium - High
Taxis & Minibuses	Purchasing an Accessible Taxi	Medium - High	Medium - High

Table 3: Items with Low or Low-Medium Cost-Effectiveness

Family	Element	Cost Effectiveness
Information at Stops & Stations	Terminals & Kiosks	Low - Medium
Footways & Sidewalks	Tactile Paving	Low - Medium
Footways & Sidewalks	Signage & Wayfinding	Low - Medium
Dropped Curbs & Street Crossings	Raised Rable	Low - Medium
BRT/Light Rail Stops	Elevator or Stair Lift	Low - Medium
Major Terminals & Interchanges	Passenger Lift to Platform	Low - Medium
Airplanes	Burnett Seat Supports	Low - Medium
Airplanes	Aisle Wheelchairs	Low - Medium
Airplanes	Ambulifts	Low
Trains	Incorporating Fully Accessible Rolling Stock	Low - Medium



Family	Element	Cost Effectiveness
Private Vehicle Adaptations	Wheelchair Accessible Vehicle	Low - Medium
Private Vehicle Adaptations	Button-Operated Clutch on the Gearshift	Low - Medium
Private Vehicle Adaptations	Horizontal Steering Wheel	Low
Private Vehicle Adaptations	Wheelchair Accessible Motorcycle	Low
Parking Facilities	Disabled Parking Concessions	Low - Medium
Powered Wheelchairs & Scooters	Powered Wheelchair	Low - Medium
Powered Wheelchairs & Scooters	Mobility Scooter (Class 2)	Low - Medium
Powered Wheelchairs & Scooters	Mobility Scooter (Class 3)	Low - Medium

Table 4: Items with Medium to High Cost-Effectiveness

Family	Element	Cost Effectiveness
Pre-journey Information	Printed Information-Booklets, Leaflets, Timetables	High
Pre-journey Information	Printed Information-Booklets, Leaflets, Timetables	High
Pre-journey Information	Developing an Online Journey Planner and Travel Information System	Medium
Pre-journey Information	Telephone Information Services	Medium



Family	Element	Cost Effectiveness
Information at Stops and Stations	Static Visual Information	High
Information at Stops and Stations	Real-time Information Displays	Medium
Information at Stops and Stations	Real Time and Pre-Recorded Audible Information	Medium
Information at Stops and Stations	Tactile Information	Medium
Information On-Board Vehicles	Static Visual Information	High
Information On-Board Vehicles	Real Time Information Displays	Medium
Information On-Board Vehicles	Audible Information	Medium
Information On-Board Vehicles	Tactile Information	Medium
Travel Training	Disability Awareness Training Events	Medium - High
Travel Training	Travel Training	Medium
Travel Training	Disability Awareness Training Videos	Medium
Travel Training	Disability Awareness Training Posters and Leaflets	Medium
Footways & Sidewalks	Improved Footways and Sidewalks	Medium - High
Dropped Curbs & Street Crossings	Drop Curb	High
Dropped Curbs & Street Crossings	Footway Build - Out	Medium - High



Family	Element	Cost Effectiveness
Dropped Curbs & Street Crossings	Signalised Crossing	Medium - High
Dropped Curbs & Street Crossings	Island Refuge	Medium
Dropped Curbs & Street Crossings	Zebra Crossing	Medium
Public Transport Stop/ Station Infrastructure	Raised Boarding Structures	Medium - High
Public Transport Stop/ Station Infrastructure	Bus Stop Surfacing	Medium - High
Public Transport Stop/ Station Infrastructure	Folding or Fixed Seats at Stops or Stations	Medium - High
Public Transport Stop/ Station Infrastructure	Bus Shelters	Medium
BRT / Light Rail Stops	Bus Mounted Boarding Bridge	Medium - High
BRT / Light Rail Stops	Folding Seats within Stop/ Station	Medium - High
Major Terminals & Interchanges	Accessible Toilets	Medium
Major Terminals & Interchanges	Ramps to provide level, step free environments	Medium
Ferries & Marine Vessels	Transfer Ramps from Pier to Vessel	Medium - High
Ferries & Marine Vessels	Providing Dedicated Wheelchair Spaces	Medium
Ferries & Marine Vessels	Emergency Call Alarms	Medium
Rapid Transit Vehicles	Handrails and Stanchions	High
Rapid Transit Vehicles	Color Contrast Step Noses	High



Family	Element	Cost Effectiveness
Rapid Transit Vehicles	Priority Seating	Medium - High
Rapid Transit Vehicles	Single Deck Articulated Low Floor Kneeling Bus	Medium
Trains	Handrails on Stairs	High
Trains	Wheelchair Ramps	Medium - High
Trains	Portable Manual Train Lifts	Medium - High
Trains	Automatic Doors on Trains	Medium
Private Vehicle Adaptations	Wheelchair Ramps	Medium - High
Private Vehicle Adaptations	Swivel Cushion to Aid Getting In and Out of the Vehicle	Medium
Private Vehicle Adaptations	Transfer Board	Medium
Parking Facilities	Widening Parking Spaces for Disabled Users	Medium
Parking Facilities	Accommodating Parking Spaces Closer to Retail Outlets and Leisure Facilities	Medium
Rickshaws	Seat Belts and Other Modest Adaptations	Medium - High
Rickshaws	Lowering the Floor of a Cycle Rickshaw	Medium - High
Taxis & Minibuses	Adapting a Taxi or Minivan to Accommodate	Medium - High
Taxis & Minibuses	Purchasing an Accessible Taxi	Medium
Rest Areas	Widening Parking Spaces for Disabled Users	Medium
Rest Areas	Accommodating Parking Spaces Closer to Buildings	Medium



Annex 3:

Why Accessibility in Transportation Matters - Advocacy Tips

NOTE: This section contextualizes [Chapter 3 and 5.B.3 of Part 1 of this Note \(the Narrative\)](#), in which the main arguments in favor of accessibility are described with an overarching perspective; here concrete examples are provided for the transportation sector.

Social Benefits

- Accessibility of transportation is not a voluntary choice or an act of goodwill; it is a right for persons with disabilities that is recognized by international treaties.
- Accessibility is a legal obligation for states, especially those that have ratified CRPD, and its implementation is monitored at the international level.
- Accessibility of means of transportation and transportation infrastructure is a condition for inclusion (along with nondiscrimination, and participation).
- Accessibility of transportation is beneficial for all members of society; it is a shared value not only for persons with disabilities, but also for older people, children, pregnant women, persons with temporary injuries, etc.
- Accessibility of transportation boosts dignity and self-esteem because it allows persons with disabilities to live their lives in a more independent way, and become less reliant on other people's help, and more self-confident.
- More accessible environments and transportation solutions allow persons with disabilities to fully reach their potential as human beings in the domain of their choice.



- Accessible communication and digital services related to mobility can have a role in the protection of persons with disabilities, victims of violence, and others in need of support.
- Accessibility of mobility solutions can be a lifesaving requirement in emergency preparedness and response, allowing persons with disabilities not to be left behind in case of natural disaster, conflict, and other emergency situations.

Other Benefits

- Accessibility of transportation solutions allows more persons with disabilities to access education or employment opportunities, and therefore contribute to the development and increase of a country's GDP, so that they can:
 - ✓ Rely less on national allowances (and these funds can be used elsewhere);
 - ✓ Become consumers (and contribute to the economy of the country);
 - ✓ Become taxpayers (and contribute to developing the country).
- Accessibility of transportation allows persons with disabilities to be more independent, and caretakers and family members to spend more time working, producing, and consuming.
- Accessibility improvements in the transportation sector allow more persons with disabilities to travel, contributing to the development of tourism.
- Accessibility of means of transportation and infrastructure is visible, and therefore can affect the way a country is perceived.
- Accessibility of transportation is not very expensive, and the cost-effectiveness is generally high.
- The scale of likely benefits arising from implementing each accessibility feature, with due consideration of the extent to which likely benefits accrue to both Persons with Limited Mobility (PLM) and the wider population.



Annex 4:

Minimization of Risks

A robust link between accessibility measures and other measures related to transportation and mobility must be ensured in order to minimize barriers and risks, and to avoid inaccessible safety measures, or unsafe accessibility measures.

- **Risks connected to safety measures:** Measures are not accessible (pedestrian underpasses or elevated walkways with steps only; traffic separations between lanes that are not interrupted by accessible curb ramps/passages to enable persons with disabilities to safely cross the street; spaces between protection bollards on pavements too narrow for a wheelchair to pass through; bollards not consistent with tactile paths; pedestrian crossings equipped with nonaccessible zebras or traffic lights; etc.);
- **Accessibility measures that are not fully safe** (steep curb ramp leading to a crowded traffic lane; accessible sidewalks side by side with a cycling lane, with no separation or tactile alert for persons who are blind; etc.).
- **Risks connected to communication/information:** “Silent Airport” strategy in airport to reduce nuisance and acoustic pollution, with not enough monitors or other alert systems for persons who are deaf or who have intellectual impairments (Dubai airport, London City Airport, Venice Marco Polo Airport, etc.); information totems at bus stations only visual (buses that stop there, schedule, delays); names of bus/tram/train/metro stop not clearly visible for passengers; and so on.



Annex 5: Additional Resources

Anjlee, A., and A. Steele. 2016. **Disability Considerations for Infrastructure Programmes.** Evidence on Demand

Dennis, R. 1998. **Rural Transport and Accessibility: A Synthesis Paper.** Geneva: International Labour Organization.

Pacific Regional Infrastructure Facility (PRIF). 2017. **Improving Accessibility in Transport Infrastructure Projects in the Pacific Islands.**

Raghupathy, A., and A. Shreyas. 2018. **The Delhi Metro and Disability.** University of Delhi: New Delhi.

TUMI. 2019. **Disability Inclusive Public Transport: Practical Steps to Making Public Transport Disability Inclusive.** Applied Research Programme in High Volume Transport.

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