Inclusive Streetscapes

A Human-Centered Framework for Streetscape Design

Benito O. Pérez



SOFTWOOD BOOKS
SUFFOLK, UK

Published and Manufactured by Softwood Books
Office 2, Wharfside House, Prentice Road, Stowmarket, Suffolk,
IP14 1RD
www.softwoodbooks.com
hello@softwoodbooks.com

EU Rep:
Authorised Rep Compliance Ltd., Ground Floor, 71 Lower Baggot Street, Dublin,
D02 P593, Ireland
www.arccompliance.com
info@arccompliance.com

Text ©Benito O. Pérez, 2026

A CIP catalogue record for this book is available from the British Library
All rights reserved.

Without limiting the rights under copyright reserved above, no part of this publication may be reproduced, stored, or introduced into a retrieval system, or transmitted, in any form or by any means (electronic, mechanical, photocopying, recording or otherwise) without the prior written permission of both the copyright owners and the publisher of this book. This book was created without the use of artificial intelligence tools.
The author does not grant permission for this manuscript to be used for training AI models or other machine learning purposes.

The URLs provided in this book were correct and accessible at the time of publication.

Paperback ISBN: 978-1-918811-20-9

Dedication

This book is dedicated to my grandmother, Angela Aponte (1942-2024) whose journey with Alzheimer's disease became an unexpected catalyst for this work.

When she was diagnosed in 2020, what started as normal aging accessibility challenges, our family began to acutely experience the world of streets and public spaces differently. Places and pathways that we had previously taken for granted—crossings, sidewalks, curb ramps, transit stops, entrances, and the many small decisions required to navigate a streetscape—became newly visible through her experience. Alzheimer's brought to the forefront a dimension of disability that is often less apparent in the design of our communities: disabilities that may be cognitive, sensory, neurological, or otherwise not immediately visible.

Her life and our experience caring for her remain a lasting reminder that accessibility is not an abstract design principle. It is about people, dignity, independence, participation, and the ability to move through the world with confidence and belonging.

This tribute also extends beyond one person and one family. The ideas in this book have been inspired by the broader disability community—by people with disabilities, their families, advocates, caregivers, designers, and allies whose experiences, persistence,

creativity, and contributions have advanced the understanding of what accessible and inclusive streetscapes can and should be.

To those who have navigated streetscapes that were not designed with them in mind, challenged assumptions, advocated for change, shared their lived experiences, and helped redefine what accessibility means: thank you. Your voices and contributions are an essential part of this work.

This book is dedicated to my grandmother, and to the many people whose lives and experiences continue to remind us that streets should be designed not simply for movement, but for people.

Contents

Introduction 1

Acknowledgements 8

The Groundwork We Inherited: A Brief History of Disability Rights 13

Listening at Scale: No Framework Without Feedback 22

Engaging People with Disabilities 36

Curbside and Parking 45

Transit Access 59

Bike Lanes and Cycle Tracks 68

Multi-Use Shared Paths 81

Sidewalks 89

Intersections 102

Plazas and Public Spaces 120

Emerging Mobility: Designing for What Comes Next 131

The Work Continues: A Call to Keep Advocating and Engaging 146

Resources 152

Glossary: Key Terms and Concepts 164

Introduction



Image 1: A red and white TTC streetcar (number 4570) approaches a raised passenger platform on a sunny day in downtown Toronto. Photo by Aditya Inamdar. Used with Permission.

Our surface transportation system (whether in the United States or abroad), with its roads, sidewalks, cycleways, transit, and passenger rail, carries many people and goods within and across communities to jobs, services, and other community functions. However, our surface transportation system isn't built or maintained in a way that all people can use safely within and across communities.

As the Dangerous by Design[1] report notes, we have a roadway safety crisis in the U.S. that, as of 2022, kills more than 20 vulnerable road users (those outside of vehicles) on any given day. This represents an astonishing 75% increase in these deaths since 2010. Danger outside of a vehicle is getting consistently worse: The share of all traffic deaths that were people outside of motorized vehicles reached the highest share in 40 years. This is in alarming contrast to other nations around the world, where roadway fatalities, even with vulnerable road users, are declining.

Whether by lack of awareness, exposure, or concern, policy discussions about transportation system design and investments routinely fail to acknowledge and consider people with disabilities. People with disabilities are a component of a diverse community, representing our family members, friends, coworkers, fellow hobby enthusiasts, and others in the community. People with disabilities are present across communities, with 1 in 4 people[2] having some form of disability, increasing to 1 in 2 for people over the age of 65. This design framework is focused on the needs of that 25% to 50% of the population. Throughout the document we will refer to this population with a variety of terms, but we seek to talk about any group using the terms and language they use to describe themselves.

1 Smart Growth America, 2026: https://www.smartgrowthamerica.org/signature-reports/dangerous-by-design/

2 https://www.cdc.gov/disability-and-health/



Image 2: A reference chart from the Hidden Disabilities Sunflower scheme showing twenty-three icons and text labels used on personalized cards to indicate specific accessibility needs and hidden conditions. HD Sunflower USA Corp. Used with Permission.

Some disabilities are apparent, while others are invisible. Regardless of their disability, community members want safe access to jobs, services, and amenities, and to be independent members of their community. The accessible streetscape, one that is built to be safe and comfortable for all users regardless of ability, is foundational for providing egalitarian mobility access and connectivity within a community.

This Inclusive Streetscape Design Framework is born out of a growing need in the transportation planning, design, and engineering space to understand what it means to talk about, contemplate approaches, design, build, operate, and maintain an inclusive streetscape. This framework is aimed not only at transportation practitioners but also at policy and decision makers, the general public, communication professionals, and advocates of transportation accessibility for community members with disabilities.

A limiting factor in existing inclusive streetscape design guidance pertains to mindset, inclusivity, and public understanding of the needs and desires of people with disabilities. A critical example of this is the lack of mention of cognitive disabilities[3] across almost all accessibility regulations. There are considerations made for people who are blind or have low vision, people with mobility disabilities, and people who are deaf or hard of hearing across existing design guidance.

3 Lisa Wagner, January 21st, 2022: Intellectual Disability, a Little Known and Multidimensional Disability

However, when it pertains to the needs of persons with cognitive disabilities, there is limited guidance to streamline and simplify safe user interactions in streetscape design.

This framework is written in partnership with groups and organizations representing persons with disabilities and practitioners. It should be thought of as the initial context setting for developing a system that best serves those with disabilities. Many practitioners or decision makers are not themselves disabled, and need advice from others who are. These practitioners plan and design the streetscape in ways that might meet technical guidance (where it exists), but they aren't advised by local disability stakeholders. This results in people:

- Not able to get to jobs and services,
- Exposed to mixed traffic in the roadway,
- Unable to cross the street because traffic signals are set (or flashing yellow) to presume no vulnerable road users,
- Blocked by an obstructive sign or post,
- Subjected to tripping hazards such as steep inclines or pathway intrusions (for instance, a ramp lip or protruding building fire connection port from a building wall several feet above the sidewalk),
- Other numerous hazards and challenges that people with disabilities face regularly as they travel within and between communities.

This framework outlines the accessibility challenges across common streetscape elements in a community (broken out into element "modules"). This means highlighting the good, bad, and ugly of streetscape design, operations, and maintenance for people with disabilities that are otherwise taken for granted. The framework lays out the common state of the practice, as well as feedback from a diverse constellation of disability collaborators. The framework also lays out a framework for practitioners and decision-makers to consider—and for advocates to advance—regarding design, maintenance, and investment to improve accessibility for that particular streetscape element.

This framework will not be all-inclusive of every single aspect of streetscape design. Although this framework will not be able to deliberate among the merits of all roadway users that are competing for the same access to the streetscape, it will hopefully inform practitioners of the design perspectives of historically marginalized and vulnerable users in the Disability community. It will be incumbent upon informed practitioners' judgment to weigh decisions and design practices that equitably and safely allow all users to move about every community.

The goal of this framework is to spur conversation, so that future, more inclusive, design guides that practitioners and decision makers use, such as the

NACTO's Urban Street Design Guide[4] and Urban Bikeway Design Guide[5], Smart Growth America's Best Complete Street Policies[6], the Manual of Uniform Traffic Control Devices[7], the Public Rights of Way Accessibility Guidelines[8], the AASHTO Policy on Geometric Design of Highways and Streets (i.e., AASHTO Green Book)[9], start to make substantive design and policy updates that are inclusive of people with disabilities.

If we wish to make our communities safer and more connected, those conversations must include people with disabilities and incorporate their needs and concerns, aiming for a holistic, people-first mobility transportation paradigm.

4 https://nacto.org/publication/urban-street-design-guide/

5 https://nacto.org/publication/urban-bikeway-design-guide/

6 https://www.smartgrowthamerica.org/program-of-work/complete-streets/

7 https://mutcd.fhwa.dot.gov/

8 https://www.access-board.gov/prowag/

9 https://aashtojournal.transportation.org/aashto-releases-7th-edition-of-its-highway-street-design-green-book/

Acknowledgements

Smart Growth America advocates for people who want to live and work in great neighborhoods. We envision a country where no matter where you live, or who you are, you can enjoy living in a place that is healthy, prosperous, and resilient. Learn more at www.smartgrowthamerica.org.

The National Complete Streets Coalition, a program of Smart Growth America, is a non-profit, non-partisan alliance of public interest organizations and transportation professionals committed to the development and implementation of Complete Streets policies and practices. A nationwide movement launched by the Coalition in 2004, Complete Streets is the integration of people and place in the planning, design, construction, operation, and maintenance of transportation networks.

The International Parking and Mobility Institute (IPMI) is the world's largest association of professionals in parking, transportation, and mobility—professionals working to advance the parking and mobility profession through professional development, research and data collection, advocacy, and outreach. Learn more at www.parking-mobility.org.

Project Team

This project was led by Benito Pérez, former policy director at Transportation for America and now with the Illinois Department of Transportation (at time of publication), with additional contributions from London Weier, assistant policy associate. Editing and communication strategy from Heidi Simon, Director of Thriving Communities. This project was completed with the oversight of, Beth Osborne, President and CEO of Smart Growth America.

This publication was released in September 2026.

Graphic design, copy-editing, communication strategy, and layout generously provided by Rachel Yoka and the International Parking and Mobility Institute. Cover art prepared and provided by Angelica I. Pérez.

This project was made possible through the generous support of Uber and the Barr Foundation.

Additional thanks to the cadre of volunteers who helped conceptualize and provided research support, survey development, writing, editing, and development of this report.

Core volunteers

- Rachel Yoka - International Parking and Mobility Institute
- Carol Tyson - Disability Rights Education and Defense Fund
- Sarah Malaier - American Foundation for the Blind
- Lisa Strader - Portland Bureau of Transportation
- Chris Grgich - Fehr and Peers

Guidance

- Melissa Anderson - Federal Highway Administration
- Scott Windley - U.S. Access Board
- Kelly Buckland - formerly U.S. Department of Transportation
- Maddy Ruvulo - San Francisco Municipal Transportation Agency

Survey development

- Denise Arnold, Ph.D. - University of Illinois, Chicago

Survey editors

- Annette Williams - San Francisco Municipal Transportation Agency
- Patricia Tice, Ph.D. - ProFound Insights, Inc.
- Steve Yaffe - Yaffe Mobility Consulting
- Matthew Roe - Stantec
- Lawrence Haynes - American Public Health Association
- Gillian Capper - American Public Health Association
- Doris Ray - EnDependence Center of Northern Virginia
- John Waterman - Programs to Educate All Cyclists
- Ana Torres-Davis - National Council on Disability

Survey analysis

- Mike Wallace - Fehr and Peers
- Jeremy Klop - Fehr and Peers

Additional writers

- Alex Sarno - Fehr and Peers
- Chris Iverson - Iverson Mobility

Report editors

- Ruth Rosas - America Walks
- Alan Hejl - Spark Access
- James Elliott - Toole Design
- Kenneth Loen - Washington State Department of Transportation
- Aditya Inamdar - Kittelson and Associates
- Beezy Bentzen - Accessible Design for the Blind
- Syroun Sanossian - SZS Engineering Access Inc.
- Chisara Brown - North Carolina Department of Transportation
- Alena DeGrado - Wisconsin Department of Transportation
- Stefanie Seskin - National Association of City Transportation Officials
- Yazmín García
- Briana Gilmore - Uber
- Harrison Peck - Uber
- Kate Hunter-Zaworski, Ph.D. - Oregon State University
- Maria Angelica Deeb, PE, PTOE, ENV SP, City of Mesa, AZ
- Bruce Kaplan - WSP
- John Waterman - PEAC
- Adrian Engel - Fehr & Peers
- Angelica I. Pérez

The Groundwork We Inherited:
A Brief History of Disability Rights



Image 3: Disability rights activists, including Judy Heumann (center left) and Kitty Cone (center right), demonstrate outside the White House in Washington, D.C., on April 26, 1977. Heumann holds a sign calling for the signing of regulations enforcing Section 504 of the Rehabilitation Act. Photo by HolLynn D'Lil/Getty Images. Used with Permission

Accessible Transportation Policy: A United States Prologue

Accessibility in transportation could be mistaken by many in the transportation space to have started with the ratification of the Americans with Disabilities

Act (ADA)[10] on July 26, 1990. However, the 20th century saw the emergence of multiple movements for disability rights, some of which centered transportation access as a key demand, as in the U.S. in the 1970s and '80s. Taking a cue from the Civil Rights Movement in the 1960s, the Independent Living Movement (IL Movement)[11] advocated for the rights of the disability community.

At its core, the IL Movement teaches that people with disabilities should have the same freedom as anyone else to live in their own communities, make their own decisions, and receive the support they choose. Instead of seeing disability as something that must be "treated" in institutions, the Movement promotes the idea that attitudinal or physical barriers in the environment—not a person's disability—are what limit participation. For some people with disabilities, navigating the streetscape, removal of barriers may mean ensuring accessible physical elements such as curb ramps or keeping sidewalks clear of obstructions. For others, that may mean travel training to learn how to travel in the community.

Congress passed the Rehabilitation Act of 1973[12] due to the advocacy of the disabled activists in the

10 https://www.ada.gov/law-and-regs/ada/

11 https://www.nilp.org/history-of-independent-living-movement/

12 https://www.congress.gov/bill/93rd-congress/house-bill/8070

IL Movement. This legislation, the precursor to the ADA, focused on the rights, advocacy, access, and protections for individuals with disabilities, especially in federally funded programs and services. Two important outcomes resulted from this legislation. First, the U.S. Access Board[13] was established: a federal agency charged with advancing equality for people with disabilities and developing accessible design guidelines and standards. Second, disability was determined as a protected class as opposed to just a unique case by diagnosis. In 1977, regulations for implementing the Rehabilitation Act, specifically Section 504 (which protected persons from disabilities from being excluded from, denied benefits of, or discriminated against in programs or activities that receive federal financial assistance), emerged, following a determined disability advocacy campaign that organized sit-ins, letter writing, and engagements with Congress. In 1986, the National Council on Disability[14] (NCD), an independent federal agency created in 1978, and disabled activists recommended to President Reagan that there be an Americans with Disabilities Act. The members and staff of the NCD, plus a core group of disabled community members and activists, took to drafting the ADA, with a bill introduced in Congress in April 1988.

13 https://www.access-board.gov/

14 https://www.ncd.gov/



Image 4: President George H.W. Bush signs the landmark Americans with Disabilities Act into law on the White House South Lawn on July 26, 1990. He is flanked by disability rights advocates Evan Kemp and Justin Dart (seated), along with Reverend Harold Wilke and Swift Parrino (standing). Joyce Boghosian, Public domain, via Wikimedia Commons.

From Law to Practice: Implementing the ADA

The passage of the ADA on July 26, 1990, was a significant milestone in the U.S. toward rectifying ongoing wrongs against persons with disabilities (with similar milestones happening around the globe). The law acknowledged that people with disabilities belong in, participate in, and contribute to their community, and codified the fact that excluding/segregating them has no place in the United States. However, this was only the starting point for a fundamental change in how our built environment is thought of in a way that it is inclusive for all people. The next step in the journey to rethink our built environment was to develop implementable guidelines for an accessible built environment. This meant developing detailed step-by-step instructions and schematics that communities can replicate in building or retrofitting the built environment. These guidelines were and are intended to be the bare minimum requirements to ensure the ADA's goal (codified in 42 U.S. Code 12101(b)(4)) of "address[ing] major areas of discrimination faced day-to-day by people with disabilities."



Image 5: Disability rights advocate and artist Lois Curtis presents President Barack Obama with her original painting, *Girl in Orange Dress*, during an June 20, 2011 meeting in the Oval Office. They are accompanied by advocates and representatives Janet Hill, Jessica Long, and Lee Sanders. Official White House Photo by Pete Souza. Public domain.

Municipal and state governments are required to conduct self-evaluations and have an ADA transition plan[15], which identifies key investments and changes necessary to improve community accessibility, inclusive of timeline and entity responsible to deliver. Furthermore, states have to develop and implement an Olmstead plan, derived from the Olmstead v. Lois

15 https://highways.dot.gov/fed-aid-essentials/videos/civil-rights/americans-disabilities-act-transition-plans

Curtis[16] Supreme Court case in 1999. These plans chart out how the state will ensure disabled people can live in the most integrated community settings with access to community-based services.

The U.S. Access Board embarked on developing various guidelines that would shape the accessibility of the built environment. The first guideline, which became enforceable via the Department of Justice, was the 1991 ADA Standards for Accessible Design. These standards dictate how we design, build, operate, and maintain public access facilities to be inclusive for people with disabilities, including government facilities or commercial venues facilitating public access. The 1991 standards provided a starting point for accessible design, but it would take about 20 years to iterate on what worked, what didn't work, and what was missing in the 1991 version (and requiring multiple supplements), before evolving into the 2010 ADA Standards for Accessible Design[17].

A significant gap in the earlier ADA standards was its application to transportation facilities and streetscapes. Though standards were enacted in 1991 that touched upon transportation facilities, there remained many questions and concerns on how best to guide communities in making their streetscapes accessible for all. A Public Right of Way Accessibility Committee

16 https://www.olmsteadrights.org/about-olmstead/

17 https://www.ada.gov/law-and-regs/design-standards/2010-stds/

was formed in 1999, charged with developing accessibility standards for the public right-of-way (i.e., streetscape). Through discussions, listening sessions, field visits, and public feedback, this committee was able to produce a working draft of the Public Right of Way Accessibility Guidelines (PROWAG) in 2011. It would take another 12 years, stemming from additional public comment, political headwinds, and evolving streetscape technology and demands, before the draft PROWAG guidelines[18] would become adopted[19] by the U.S. Access Board in September 2023, and the US Department of Transportation[20] in December 2024.

As of September 2026, PROWAG is still pending to be ratified via final federal rulemaking by the Department of Justice. Even after PROWAG is finally adopted and becomes an enforceable standard, more work remains to be done to refine and implement accessibility standards. A major consideration in future standards and guidelines development will be to broaden the definition of disability in a way that is representative of both visible and invisible disabilities and facilitates universal design. This is something the

18 https://www.access-board.gov/prowag/

19 https://www.federalregister.gov/documents/2023/08/08/2023-16149/accessibility-guidelines-for-pedestrian-facilities-in-the-public-right-of-way

20 https://www.federalregister.gov/documents/2024/12/18/2024-29990/transportation-for-individuals-with-disabilities-adoption-of-accessibility-standards-for-pedestrian

New Jersey legislature recognized in 2023[21], tasking their State Department of Transportation to rethink street design standards that are more inclusive of universal design.

There remain challenges in fully incorporating accessible streetscape design, based on three key issues:

There is a lack of awareness that municipalities and agencies are obligated, under the ADA, to build and alter facilities so that they are "readily accessible to and usable by" disabled people. The failure to ratify PROWAG or provide technical standards does not change, or put on hold, legal requirements to ensure access.

Road and streetscape designs that prioritize cars over pedestrians or cyclists make travel dangerous for anyone outside a car.

The current inaccessible, car-centric approach is so entrenched, there is no one person or office responsible. It requires change in many different regulations, procedures, standards, trainings, etc. to get to a different result.

Overcoming these challenges makes the difference between making transportation truly inclusive, regardless of disability status, or just meeting the basic requirements to meet obligations set by law to move projects forward.

21 https://njleg.state.nj.us/bill-search/2022/S147/bill-text?f=PL23&n=3_

Listening at Scale:

No Framework Without Feedback



Image 6: Caption: Three Black and disabled people stroll down a city sidewalk together on a sunny day. Disabledandhere (28 June 2019). This file is licensed under the Creative Commons Attribution 4.0 International license.

Historically, the transportation planning and project development process has been a top-down approach that sometimes includes soliciting feedback. Practitioners define, study, and sketch out a solution to a problem. After answering those questions, they solicit feedback to the solution they mapped out. When the public provides feedback, they are often told the things they want (e.g., sidewalks, curb cuts, etc.) are

too expensive. Time and again, members of the public feel left out and disengaged from the process due to not being engaged early in the process nor given ownership of the problem definition and project framing. This disengagement then piles on to challenges that could delay projects or may entrench divided[22] communities further via infrastructure.

While the historic pattern of engagement with the Disability community by practitioners has been delayed or absent entirely, those that have been engaged often have little to no representation from the Disability community. As such, many multimodal transportation projects and streetscape improvements do not account for people with disabilities, limiting their mobility and making it deadlier for them to traverse their community.

Survey Framework

The inclusive streetscape framework is aimed at informing practitioners and decision makers on what it would take to develop and maintain accessible streets. However, to ensure that such a framework attempts to speak to and meet the needs of the Disability community, their feedback had to be solicited. The project embarked on developing a survey aimed at collecting grassroots feedback on the experiences of

22 https://www.smartgrowthamerica.org/programs-and-coalitions/

navigating the streetscape in respondents' respective communities. The survey was targeted for a global reach with at least 1,000 responses to generate statistically valid results. However, the survey mostly engaged respondents across U.S. states and territories.

The survey, comprising 38 questions, touched upon the demographics of the respondents and their disability (or disabilities), their mobility patterns and the infrastructure they travelled on, and on the mobility challenges they faced. The survey facilitated open-ended questions to allow respondents to provide feedback on their experiences that may not have fitted common or set answers. Formulation of these 38 questions took a year to finalize; iterations occurred among volunteers on the project, a doctoral student from the University of Illinois in Chicago, who created the initial survey instrument draft, plus members/friends of the Transportation Research Board Standing Committees on Accessible Transportation and Mobility (AME50) and Transportation and Public Health (AME70).

The survey was produced on the SurveyMonkey platform, allowing for easier aggregation of results, regardless of the language the survey was taken in. To improve language accessibility, the survey and marketing materials were translated into Spanish, French, Arabic, and Mandarin Chinese, with the intent of covering the most common global languages. The survey was marketed from April to June 2024, engaging a variety of marketing approaches to raise awareness

of the survey. Marketing materials were developed to include template messages to third party survey distributors as well as potential survey respondents, plus simplified QR codes to help survey distributors make the survey accessible more widely. The survey was promoted via a blog post[23] and newsletters, discussing the origins of the project and introducing the survey, leveraging project partners such as the Disability Rights Education & Defense Fund and the International Parking and Mobility Institute to vet and promote the survey to its members, presentation to the Consortium for Constituents with Disabilities to raise awareness of the project and survey, leveraging social media such as X, Facebook, and LinkedIn to push the survey out with hashtags: #streets4all, #ADA, #disabled, #disabilityawareness, #disability, and #disabilitycommunity.

Survey Limitations

As often occurs with such work, the project team hit a few roadblocks once the survey was made publicly available. Hopefully, future efforts to engage with a survey on this topic and of this magnitude will improve upon the development and distribution of this survey.

From a survey construction perspective, there were some clarity concerns about survey respondents. Is it

23 https://www.smartgrowthamerica.org/knowledge-hub/news/new-survey-accessible-streetscapes-for-the-disability-community/

just the person themselves with the disability? Could caretakers of people with disabilities take the survey (on the person with disabilities' behalf; from their caretaking experience; without end user bias)? If the person with disabilities, or the caretaker, was under 18 years of age, could they take the survey? Furthermore, the language of the survey, targeted at a 6th to 7th grade reading level, may have limited the accessibility for persons who are neurodivergent and interpret language differently; this concern was only raised after the survey had been released.

In administering the survey, there were challenges in providing alternative ways to take the survey. Some users contacted the project team, raising concerns over not having access to a computer for themselves or for a shared community of respondents. There were project team discussions about providing a PDF version of the survey, which could then be filled out by hand and scanned and emailed or mailed to the project team. For some survey respondents, a phone interview was requested to gather responses in a way that was more accessible for respondents (including PEAC[24], a neurodivergent non-profit group from Michigan).

In regards to the coverage of the survey, there were challenges in ensuring ample awareness of the effort, especially internationally. There was some outreach from the United Arab Emirates to help

24 https://www.bikeprogram.org/

distribute the survey, but otherwise, there was limited engagement from the outreach to international disability organizations. Within the United States, there is a network of over 400 independent living organizations, plus the Association of University Centers on Disabilities (with representation in every U.S. state and territory), that could have been better leveraged to help expand the coverage of the survey.

Leveraging survey summary analysis tools from SurveyMonkey, plus cross-tabulation tools from Microsoft Excel by the generosity of Fehr and Peers staff, the project team was able to decipher findings across open response questions. With the knowledge that individuals may have multiple disabilities, have different lifestyles, be in different stages of life, and/or be from different communities, the individual survey responses were summarized to investigate how the combination of lived experience influences respondents' ability to achieve daily activities. The analysis also summarized the free response feedback to inform respondents' personal interaction with various aspects of the streetscape.

The survey was able to garner 1,023 responses, with just over 750 responses fully filling out the survey. Sixty-five of those responses came from outside the United States, with responses from Australia, Austria, Bhutan, Bulgaria, Burkina Faso, Burundi, Cambodia, Canada, Democratic Republic of the Congo, Denmark, Fiji, Gambia, Ghana, Guatemala, Guyana, India, Ireland, Japan, Lebanon, Lesotho, Malaysia,

Mauritania, Nepal, the Netherlands, New Zealand, Nigeria, Pakistan, the Philippines, Rwanda, Slovakia, Sri Lanka, Uganda, the United Kingdom, and Zambia.

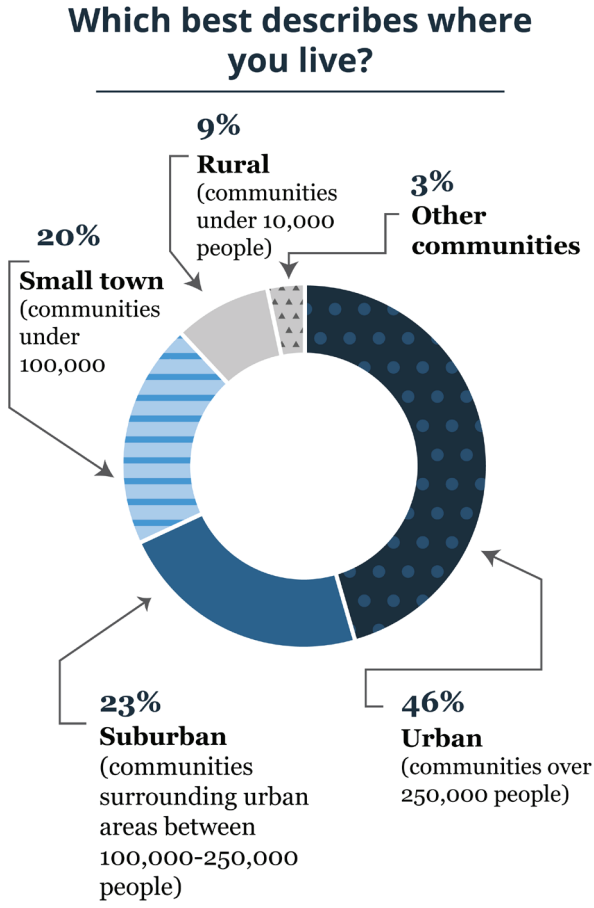
Within the 950 responses attributed to the United States, every state, as well as the District of Columbia, and Puerto Rico, was represented.

State	Respondents	State	Respondents
AK	25	ID	11
AL	3	IL	18
AR	14	IN	6
AZ	44	KS	3
CA	85	KY	4
CA	3	LA	4
CO	6	MA	27
CT	17	MD	24
DC	27	ME	8
FL	10	MI	26
GA	8	MN	29
HI	1	MO	12
IA	3	MS	4

State	Respondents	State	Respondents
MT	17	PA	51
MT	1	PR	4
NC	21	RI	2
ND	13	SC	7
NE	2	SD	2
NH	2	TN	12
NJ	27	TX	13
NH	5	UT	4
NJ	3	VA	26
NM	43	VT	1
OH	27	WA	113
OK	4	WI	52
OR	74	WV	2

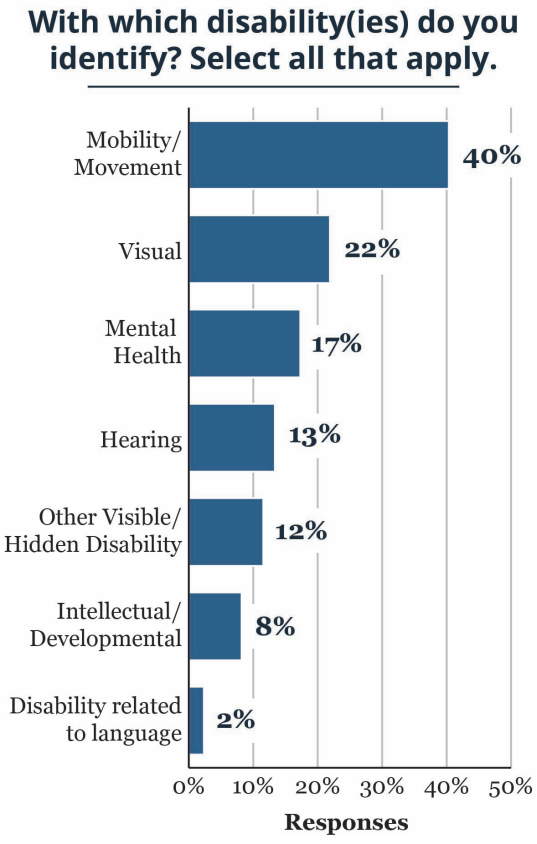
Table 1: Survey Responses from US States and Territories.

Of those who responded, nearly half were from communities with more than 250,000 residents, 9% from rural communities (with less than 10,000 residents), 20% from small town communities (with less than 100,000 residents), and the rest from suburban communities near urban areas.

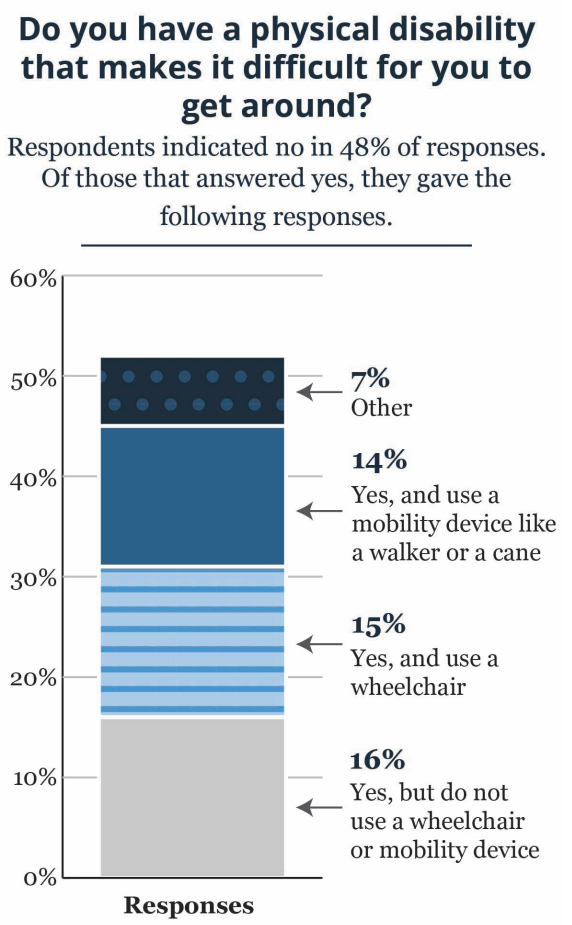


Graph 1: Where survey respondents live by community type.

The respondents represented a diversity of types of disabilities, self-identifying in a range from no disability, but around and supporting people with disabilities, to physical, vision, hearing, cognitive ability, and other disabilities. Regardless of disability, around 40% of respondents identified their disability as impeding on their mobility.



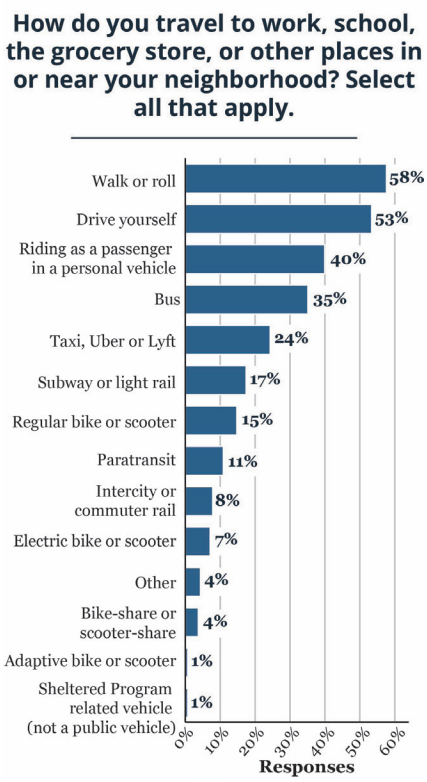
Graph 2: Disability identification among survey respondents.



Graph 3: Physical disability and mobility among survey respondents

Regarding how respondents moved about their community, they travelled via various modes regularly, including:

- Nearly 60% of respondents walk and roll
- Around 55% of respondents drive, and 40% are passengers in personal vehicles
- Varying levels of engagement with their community's transit:
  - Around 35% of respondents take buses
  - Just above 10% take paratransit services
  - Around 8% of respondents take intercity rail
  - Just above 15% of respondents take subway/light rail
  - Around 25% of respondents take rideshare services like taxis, Uber, or Lyft
- Around 15% of respondents take a standard bike/scooter, with less use of bike or scooter share, electric or adaptive bikes or scooters



Graph 4: Modes of transportation used to travel to work, school, the grocery store, or other places in or near the neighborhood, by percentage of survey respondents.

Specific findings will be covered as appropriate in the various sections of the framework, but there were several common themes within the survey responses. At the forefront of the mind for respondents were issues of personal safety (from the high-level societal challenges to the roadway safety crisis); maintenance; access and wayfinding challenges; vehicle-oriented policy, design, and operations, and inconsistent/

unpredictable streetscape features (e.g., contraflow lanes, scooters, roundabouts, bulb-outs).

The following chapters include recommendations; all of them should be accessed and included, to the extent possible, in the design, construction, and operation of the streetscape.

For more information on the survey instrument used and the data yielded from the 2024 administration of the survey, please contact the author or the International Parking and Mobility Institute (https://www.parking-mobility.org/contact-us/).

Engaging People with Disabilities



Image 7: A group of pedestrians, including individuals carrying white identification canes for the visually impaired and officials wearing high-visibility safety vests, gather at a city crosswalk underneath a line of overhead traffic signals. Lisa Strader / Portland Bureau of Transportation.

The streetscape that we experience is shaped by various factors, such as design standards, materials, and maintenance procedures, but it should also be shaped by community needs and input.

There is much literature and guidance on community engagement and outreach that practitioners have

access to, with the common theme of "meeting people where they are." A historic challenge in public involvement and engagement has been engaging persons with disabilities regarding transportation decision making. Some of that challenge stems from a lack of understanding on how to relate with persons with disabilities within the conversation, as well as methods of engagement to garner meaningful feedback. Addressing these key issues for persons with disabilities will help to ensure that public engagement efforts are more representative of the entire community.

Engaging the Community

Any engagement requires effective communication, starting with how to refer to those you are working with. When communicating with or writing about any person or community, it is important to remember that stakeholder or interest groups are not uniform. There can be a difference of approach across a demographic group, whether talking about disability, gender, ethnicity, etc. Ultimately, the best approach is to use the language that an individual or organization prefers and to be respectful and inclusive in your communication.

With public involvement and engagement, there are various tools and approaches to solicit feedback. Whether it's through a public meeting, literature, visual materials, surveys, focus groups, field experience engagements (e.g., walk audit), there are a multitude of

ways that have been tried and tested to garner feedback. But are those approaches inclusive of persons with disabilities? Within the intention of "meeting people where they are," traditional approaches to public engagement need to be revisited to promote a more inclusive process.

Generally, scope out your community, especially those in the Disability community. Get an understanding of their style and communication preferences to better tailor engagement approaches. More specifically:

- **Written material**: The written word conveys information and meaning to its reader. Depending on the disability, the written word could be lost in translation.
    - **Visual Accessibility**: To support people with visual disabilities, any written materials being handed out or displayed to users needs to be provided in an electronic format (ahead of an event, so screen readers can be leveraged). That format also includes as a baseline: text that is sans-serif[25] (or without extended strokes to convey the letter) and at least 14-point size. A caption should be embedded or included before or after accompanying images/charts/graphs/tables, to convey the information portrayed. More visual accessibility information for digital media can be found via the U.S. Access

25 https://fonts.google.com/knowledge/glossary/sans_serif

Board[26], or the Web Accessibility Initiative[27]. For physical written media, tactile media with braille[28] should be leveraged.

- **Language Accessibility**:
  - For members of the community where their native language is not English (or English is not the dominant language), that means leveraging translation support to convert the written material into alternative languages. Consult with your community to better understand the common languages spoken by non-native speakers, to better convey critical information.
  - For members of the neurodiverse community, it can help to avoid complex terms and instead leverage plain language and clear symbols that leverage context from lived experiences (e.g., is that road nice or mean?)
- **Technology Accessibility**: In the digital age, there has been an increasing reliance on social media, websites, e-mail blasts, and the like, to disseminate and solicit information.

26 https://www.access-board.gov/ict/wcag2ict.html

27 Updated 05/26/2026: https://www.w3.org/WAI/standards-guidelines/wcag/

28 https://www.afb.org/blindness-and-low-vision/braille/what-braille

However, not everyone has access, means, or ability to leverage digital communication technology (e.g., computer or smartphone) or the supportive infrastructure required to use it (e.g., electricity, broadband access). Ensure alternative ways of communicating to and from stakeholders beyond digital communication alone, as well as where stakeholders can access public access digital technologies (e.g., public libraries).

- **Oral communication**: The spoken word also carries meaning and information to the listener.
    - **Language Accessibility**: avoid complex terms or acronyms and leverage plain language and clear symbols that leverage context from lived experiences. This is good advice when working with any group: de-wonk your language and talk the way non-specialists do.
    - **Language speed**: Whether for neurodiverse individuals, American Sign Language (ASL) interpreters, captioners, or the general public, there is a need to be mindful of one's talking speed. The average[29] number of spoken syllables in the English language is about 150 syllables a minute. Going faster may cause comprehension challenges for listeners. To

29 Nurden R., 02/25/2015: https://www.londonschool.com/blog/slow-down/

support ASL interpreters and, potentially, neurodivergent stakeholders, too, share prepared remarks and supportive background information before a speaking engagement (several days to a week in advance), so they are aware of the context of the message and to deliver a clear and concise interpretation of your message. If technology resources allow, also consider an interpreter teleprompter, so the interpreter can follow along with the prepared remarks. Where this isn't possible, make sure to communicate to the attendees that remarks and materials will be shared afterwards.

    - **Captions**: For any pre-recorded videos, the use of captions assists people with low to no hearing to be able to comprehend the video message.

- **Gatherings**: Public conversation is paramount in public involvement and engagement, especially in an in-person forum. The venue/event space can be a welcoming space for persons with disabilities to engage, or a barrier to providing feedback. Historically, public involvement practices have asked stakeholders to advise them of their accessibility accommodations for consideration. But to support event spaces that "meet people where they are," consider the following:

- **Venue**: Ensure a venue provides infrastructure for persons with disabilities to get to and navigate the venue.
  - Does the venue have transit access (inclusive of paratransit services) and an accessible pick-up and drop-off zone from transit (or other vehicles to the streetscape)?
  - Does the venue have sidewalks and curb ramps to navigate the streetscape to the venue?
  - Does the venue have tactile infrastructure (e.g., physical floor textures and strips) to communicate navigation and wayfinding?
  - Does the venue have (depending on where an event is held) an elevator for persons using mobility devices and fire escape tools to evacuate persons using mobility devices?
  - Does the venue have lighting controls that provide flexibility in brightening and/or dimming the event space?
  - Does the venue provide furniture spacing and podium placement in order to be accessible for persons with mobility devices?

        - Does the venue provide a place for people to sit who are waiting to engage with a public meeting, especially for persons who have difficulty standing for long periods of time?

    - **Field Experience Engagements (e.g., walk audits, transit ride-alongs)**: There are many barriers in the streetscape that need to be addressed. For decision makers, that point is made via field experience engagements. There is no way to account for every barrier that may emerge in the immersive experience, but working with disability stakeholders in advance on considerations and contingencies will be critical to ensure their safety and to support their involvement in the immersive experience.

Reference to the Community and Language

Identity is important to any individual and/or community; the same can be said for people with disabilities. It is important to be mindful of how they are referenced in outreach and engagement.

- **People-first vs. Identity-first language**: There is still a debate, even within the Disability community, on whether to refer to a person first or a disabled identity first, for example describing

people "with disabilities" versus "disabled people." There is no right way or approach. It is recommended that practitioners and other interested stakeholders reach out to their local Disability community and ask how they would like to be identified.

- **Ableist Language**[30]: Whether referring to parking or other disability programs historically (and still in the present), some folks may refer to people in the Disability community as "handicapped." "Hand-in-cap" refers to a lottery game in the 17th century that had its meaning corrupted over time. The term has historically stigmatized disabled people. There are other words or ways to describe disability that have also fallen out of favor because of negative connotations and overshadowing the person with their disability, for example, it recommended to refer to "disability status" or "disability" instead of "all abilities" or "differing abilities", or "wheelchair user" instead of someone who is "wheelchair-bound". It is important to be mindful of—and avoid—language that devalues a person or connotes that there is something wrong with being disabled.

30 Ravishankar R. A., 12/15/2020: https://hbr.org/2020/12/why-you-need-to-stop-using-these-words-and-phrases

Curbside and Parking



Image 8: A driver using a manual wheelchair pulls the collapsed frame of their chair across the driver's seat of a parked silver sedan onto a Washington, D.C. street. District Department of Transportation.

Comprising around a third of a community's land use, parking (or vehicle storage) is a fixture within, or adjacent to, the streetscape. A car coming off the street into a parking lot or garage crosses the streetscape (and the pedestrian/cyclist) at a curb cut. In other curb settings, parking the vehicle parallel or angular to the curb and opening the door intersects with a bikeway, or a streetscape that doesn't accommodate pedestrians.

Two events need to happen at the curbside to ensure overall accessibility. First, the curbside needs to be

available to allow persons with disabilities to park their vehicle or unload from vehicles as passengers. Second, the curbside needs to include features that allow persons to walk or roll safely onto the sidewalk and onward to their final destination. Accessible parking in the right-of-way is vital for inclusivity, allowing people with disabilities to access services, businesses, and public spaces conveniently.

Accessibility at the Curb

Accessible parking and curb access is essential for ensuring that individuals with disabilities can fully participate in community life. Since the adoption of the Americans with Disabilities Act (ADA) in 1990, private parking lots[31] have been required to include accessible and conveniently located spaces to businesses. However, in the public right-of-way, implementation of accessible curbside loading and parking accommodations have lagged behind other public ADA improvements like curb ramps and accessible push buttons at signalized intersections. In urban areas where off-street parking is limited and curbside street parking exists at a premium, accessible curbside facilities are even more important to ensure successful and safe loading and unloading operation for all individuals, regardless of disability status. Ensuring

31 https://www.ada.gov/topics/parking/#:~:text=Car%20accessible%20spaces%20must%3A%201%20Be%20at%20least,ground%20%28measured%20to%20the%20bottom%20of%20the%20sign%29

accessible parking and loading spaces also can be complementary to accessibility goals for sidewalk, driveway, roadway, and cycling facilities. Integrating accessible parking into the modern urban fabric presents challenges and opportunities for enhancing mobility and inclusivity in streetscapes.

Current Conditions of the Practice

Currently, communities have the opportunity to address accessible parking in various ways, including incorporating elements such as curbside parking, parking meters, loading zones, and striping for landing areas. These elements must be designed to provide clear, safe access for individuals with disabilities while balancing the needs of other road users, including cyclists, pedestrians, motorists, and those facilitating delivery goods. For some of these communities, safety involves minimizing the conflict point attributed to the use of these elements. Communities often face challenges in dedicating the required space for fully accessible curbside parking due to competing demands for limited curbside space (e.g., parking, loading, bus/bikeway, streetery/public space).



Image 9: A person using a manual wheelchair attempts to access a specialized "Red Top" accessible parking meter on a sidewalk in Washington, D.C., which is partially blocked by a docked JUMP dockless rental e-bike. District Department of Transportation.

- Curbside Parking: To provide accessibility at parking spaces parallel to or angular to the street curb, the parking should meet specific dimensions and accessibility features as outlined by PROWAG[32]. Curbside parking spaces are occasionally demarcated by signage, with some communities designating minimum enforceable spacing requirements, pavement markings—which require ongoing maintenance and seasonal upkeep during winter conditions, and, in some cases, curb coloring, as is done in jurisdictions such as California. For some communities, there may be no

32 https://www.access-board.gov/prowag/

demarcation for curbside parking, only deferring to safety-oriented traffic rules to not park close to intersections, hydrants, and curb cuts. When it comes to accessibility challenges, some users may not be able to navigate complex parallel parking maneuvers midblock. Once parked, the most common parking accessibility challenge is the absence of a safe, clear landing area to exit the vehicle and access the sidewalk (if there is one). Examples of obstacles in the clear landing area include tree boxes, landscaping elements, or other hardscaping that prevents direct access to the sidewalk.

- Parking Meters: In some communities, curbside parking requires payment, oftentimes at meters or pay stations. A wide range of payment systems exist today, including but not limited to per-space parking meters, per-block pay stations, and digital-forward mobile payment applications. Recently-installed meters and pay stations are designed to ensure ADA requirements for access to the user interface (with the tactile interface no more than 36 inches and the screen interface no more than 48 inches above level ground). Many older parking meters and pay stations are outdated and some mobile payment solutions may not be comprehensively accessible, causing issues for some. Furthermore, in some communities, separate meters for persons with disabilities have

been installed as a stopgap measure to ensure accessibility. Other than the payment interface itself, the most common accessibility challenge for users is obstructed or non-functioning parking meters or pay stations. Parked bicycles (including dockless bikeshare), scooters, and other streetscape features can also obstruct access to meters.

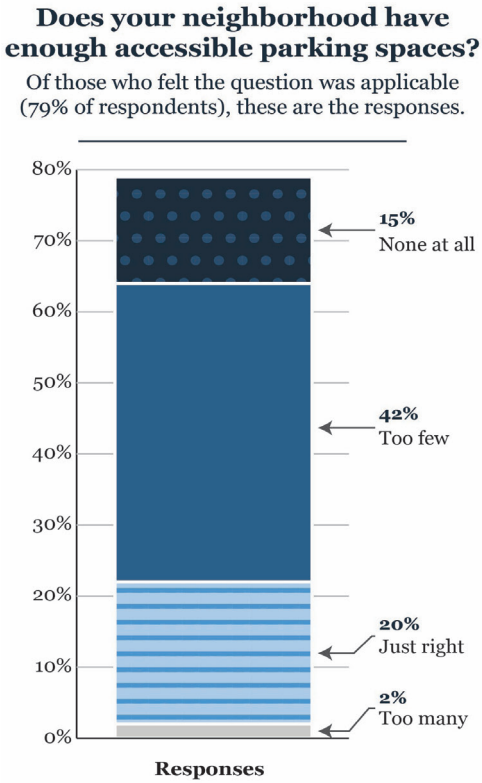
- Charging and Fueling Stations: With the rise of electric and alternative fuel vehicles in the transportation fleet, there has been a growing demand for charging and fueling stations in both off-street parking areas and on-street curbside locations. Curbside charging stations today involve the need to handle cables. User interfaces at charging stations may have accessibility and legibility challenges. As charging infrastructure proliferates, more consideration will likely be placed to accommodate other transportation modes such as e-bikes, e-wheelchairs, and e-scooters. Design consideration will be needed to ensure charging accessibility is not impeded for any mode.
- Loading Zones: Space that facilitates transfer between modes—specifically, between vehicles and the pedestrian space—oftentimes take the shape of curbside loading zones. These are oftentimes demarcated differently from curbside parking spaces with striping and signage differences. In some communities, they may be separately designated for freight, transit, and passenger

uses, while in some dense urban communities, co-locating loading zones for all use types and leveraging policies and tools to manage access may be utilized. Loading zones are imperative for allowing safe and convenient transferability, not just for accessibility of people from vehicles, but also for commerce and goods delivery. More guidelines for loading zones are outlined in PROWAG. The most common challenge for persons with disabilities at loading zones are unattended vehicles obstructing the loading zone (and treating it as parking versus active loading and unloading), preventing clear access to the curb.

- Striping for Landing Areas: In some communities, defined striping has been included for curbside parking and loading areas. Similar to landing area striping in private parking lots, these areas ensure proper space for transfer to and from wheelchairs or other similar mobility devices. Landing areas are less common in the public right-of-way, only recently being recommended through PROWAG guidelines adopted in 2023. The challenge in implementing landing area striping for parking and loading is the limited right-of-way that communities may have. When they are present, persons with disabilities face the challenge of other users not recognizing the purpose of the landing area and parking in/obstructing that space.

- Relationship with the Roadway: Curbside parking, loading, and other similar features allows for individuals to transition between driving and walking/rolling. Curbside parking is often marked as parallel parking or angled parking, next to roadway space that is used for movement (e.g., bike lanes, general purpose driving lanes, etc.).

Stakeholder Feedback



Graph 5: Survey responses on whether neighborhoods have enough accessible parking spaces.

As part of a stakeholder survey in spring 2024, respondents were asked about their access to parking and related experiences. About 3 out of 4 respondents noted some level of accessible parking availability in their community. However, that level of accessibility came with some experience caveats, including the need for more accessible parking supply, both on-street and off-street. More specifically, there was a need for accessible parking to account for van access that allows users to navigate to the curb ramp and sidewalk most efficiently while not having the van access point be boxed in by other vehicles. It also should allow for accessible space users to navigate in to and out of designated spaces on-street and off-street.

Many other concerns beyond what is included in the sections above were expressed, including:

- The removal and replacement of disabled parking with other, potentially inaccessible uses.
- Complete street designs that add amenities but reduce disability access, including van ramp access to sidewalks.
- The misuse of ADA placards and permits increasing demand for limited accessible spaces, compounded by other users blocking access and loading areas.
- Overhead power lines, streetlights, and micro-mobility devices creating obstacles for higher-clearance vehicles and accessible pathways.

- The lack of charging access for electric wheelchairs, increasing the risk of users becoming stranded without responder support.
- Construction activity limiting curbside parking access, with insufficient information or accommodations provided.
- The placement of designated accessible spaces being far away from entrances, resulting in delayed or indirect access to destinations.
- Freight vehicles and other users blocking curb ramps and sidewalks, limiting accessible paths of travel.
- Unclear accessibility standards for curbside vehicle charging stations, with charging cords posing tripping hazards.
- Parking lots posing challenges for individuals with neurodivergence due to unclear pedestrian areas and shared vehicle–pedestrian space.



Image 10: A man in a power wheelchair prepares to board an accessible red minivan via a rear-entry ramp on a city street in Washington, D.C., as another man stands near the open trunk to assist. District Department of Transportation.

Recommendations

To encourage more accessible curbside designs, communities should ensure all inclusive parking spaces comply with PROWAG guidelines[33], including dimensions, signage, and access aisles. This also includes the recommended minimum number of accessible parking spaces per block face or complete curbside network. Specific strategies include:

33 https://wwwF.access-board.gov/prowag/technical.html#r310-on-street-parking-spaces

- **Engage Stakeholders**: Members of the public may not understand how to use key accessibility elements at the curb or parking facility, nor the rationale behind them. Involve people with disabilities, and other stakeholders, in the planning process to identify practical solutions, ensure the designs meet actual user needs, and that a clearly-defined purpose and need is established for curbside projects.
- **Consult/Document Policy and Investment Solutions in ADA Transition and/or Olmstead Plans**: Curbside and parking cannot be made accessible overnight. By charting out a strategy and defining agency roles and responsibilities to incrementally address accessibility with measurable and attainable performance metrics, practitioners can manage expectations and build community good will.
- **Compromise Solutions with Sidewalk and Landscape Areas**: Wider sidewalks make it easier to accommodate everyone's needs rather than trading one need off against another to preserve as much space in the road for drivers. Find ways to balance the needs of accessible parking with maintaining sufficient sidewalk width and landscaping. This might include reconfiguring sidewalk furniture or adjusting planting areas. In geometrically constrained areas, spaces should meet the PROWAG to the maximum extent feasible.

- **Identify Locations of Accessible Parking Spaces**: Place accessible parking spaces near curb cuts and accessible routes to ensure ease of access to sidewalks and building entrances, ensuring an understanding of the context and the routes used by the Disability community.
- **Establish a Standard for Parking Payment Equipment Design**: Creating a new standard that prioritizes accessible pay stations at a block level, rather than individual meters, while also minimizing impacts to streetscape and other elements.
- **Demarcate Curbside Zones**: Add signage that distinguishes curbside zones for transit, passenger loading, ride hailing, and freight. Specific signage will also help increase neurodivergent accessibility at the curb to access all types of mobility.
- **Establish Routine Maintenance and Monitoring Protocols**: Implement a routine maintenance program to ensure accessible parking spaces, adjacent accessibility elements, and applicable temporary work zones are kept in good condition and free of obstructions. This is crucially important when it comes to winter maintenance and ensuring parking and accessible curb areas are clear of snow and ice.

- **Consider New Enforcement Technologies**: Consider deploying curbside cameras or other related technology to ensure vehicles using accessible loading and parking spaces are in need of accessibility features. Cameras may be able to detect ADA placards or license plates to ensure these spaces are not used incorrectly. Enforcement may aid in ensuring availability of spaces throughout the day, but should only be used carefully and strategically in locations where violations often occur. Enforcement should also be deployed equitably and have checks to ensure that those needing to use accessible features are not accidentally penalized.
- **Note Relationship to Other Street Features**: Accessible parking and loading zones should be mindful of other infrastructure features, such as bike lanes, landscaping, street furnishing areas, or other accessible pathways. Conversely, bike lanes need to be mindful of and allow sidewalk access for accessible parking. Consider including parking and loading step-offs in design as well as shared uses in limited curbside parking.

Transit Access



Image 11: A TriMet bus stops at a Portland, Oregon, bus stop as passengers wait nearby, including a person using a mobility scooter. Lisa Strader / Portland Bureau of Transportation.

Transit in communities takes on various forms, depending on land use context and community resources. Some communities have legacy transit systems that resemble a heavy rail "subway" system, with station entrances at or within the streetscape. Other communities have invested in light rail systems, which could have station entrances at or within the streetscape, in a roadway median, or adjacent to the curb. In most communities, transit takes the form of

buses, whether fixed route or on-demand services. The focal point of accessibility when it comes to transit is at the streetscape (i.e., the first/last mile to transit stations and stops), where people walk/bike/roll to the station entrance/stop and wait to board or disembark transit.

Current Conditions of the Practice

Accessibility to transit stations and stops varies a great deal by community, and yet that accessibility is often determinative in whether transit is a viable option for persons with disabilities. The bus may be accessible, but the bus stops may only be a sign on the side of the road, lacking a sidewalk or even a road shoulder to help people safely reach the stop. This creates safety issues for all users, but especially for persons with disabilities trying to navigate to or from a stop.

On the other end of the spectrum for communities, especially in densely-populated, transit-rich areas, the streetscape right-of-way is often so narrow that some communities have deployed level boarding with a bike lane traversing the length of the level boarding area. There are concerns on how to manage cyclist behavior in this mixed traffic zone, let alone boarding area, and on-bus tactile and other indicators to alert transit patrons of the mixed traffic activity. Some of those communities have proactively engaged the disability and cycling communities to better understand their respective perspectives and contextualize a solution for

instances where level bus boarding with a bike lane is needed.

For heavy rail stations, some agencies leverage elevators to navigate disabled users to the boarding platform level. However, the state of repair for those elevators often varies by station, leaving some users unable to access particular stations.

At any station entrance, the presence of shared micromobility vehicles (e.g. dockless bikes/scooters) can pose access challenges without clear management requirements for where those vehicles can be stationed. Otherwise, they can pose as a barrier to the station/stop, obstruct a stop clear zone, or constrict the accessible pedestrian path to or by a station/stop.

Streetscape Transit Accessibility

When thinking about the accessibility of transit station entrances and stops, it is important to be mindful of who has responsibility for the streetscape, since most of the time it is not the transit agency. Transit agencies have to coordinate with either the local property owner directly, or with the local jurisdiction. This has implications on how a station entrance or stop is set up, maintained, and managed during temporary disruptions.

At the station entrance or stop, there should be signage to denote the station and transit service provided plus directions for the visually impaired to find the accessible station entrance, if applicable.

Particularly at station entrances, there may be an adjacent elevator or accessibility ramp that helps users navigate from the streetscape to the transit boarding level. Furthermore, depending on the station entrance that has ascending or descending stairs or escalators, there is a need to demarcate a change in the streetscape so blind or low vision users can navigate toward or away from the station entrance.

At bus stops in particular, there should be:

- a shelter and/or seating for users waiting for upcoming bus services, which is helpful for users who may have mobility disabilities and either need respite from the elements or to be able to sit and wait for the next bus.
- a clear zone abutting the bus stop, allowing the bus to deploy a wheelchair ramp to the curb if the curb is not set up for level boarding.
- a need to ensure a clear pedestrian path to/from, and by, the stop/station entrance that can support at least two wheelchair users passing by each other (for more information, see the sidewalk section), without overlapping the bus stop street amenities or station entrance.

There are many wayfinding enhancements that support accessibility. Tactile walking surface indicators can enhance wayfinding for passengers with vision

disabilities. Truncated dome detectable warnings (often called "warning plates" by persons with cognitive disabilities) should be used on curb ramps, at level crossings, and on transit platforms as required by PROWAG[34]. Raised bar tactile direction indicators have multiple uses in transit.

- One: guide bars, one foot wide, with bars oriented in the direction of travel, can guide transit users in open areas such as station entrances, mezzanines, and platforms.
- Two: sidewalk alert bars, two feet wide, can be placed across the full width of the sidewalk to indicate the location of mid-block transit stops and the location of crosswalks to access mid-block transit boarding platforms. Bars should be oriented parallel to the continuing path of travel on the sidewalk: this minimizes their impact on pedestrians with mobility disabilities.
- Three: transit door location bars, two feet wide by minimum three feet long, going away from a platform edge or curb, can be used to mark locations where transit doors will open. It is most helpful to use transit door location bars to mark the front entry to buses. On platforms serving trains that can vary in length, marked locations should be limited to those where there will always be a door.

34 https://www.access-board.gov/prowag/

An often-overlooked streetscape element concerns construction work. In such situations, there is a need to provide clear directions, ample notification, including motion-activated audible information devices providing guidance for pedestrians with vision and cognitive disabilities required by PROWAG, and accessible alternatives to access transit service. That may take the form of a station shuttle service if an elevator or other accessibility ramp is offline for maintenance. In terms of bus stops, this means ensuring a maintained clear zone for the bus wheelchair ramp and accessible streetscape elements for safe temporary stops. Practitioners should be mindful of providing the accessible temporary stop—and appropriate notification—prior to closing an operational stop.

Stakeholder Feedback

As part of a stakeholder survey in spring 2024, respondents were asked about their access to transit and related experiences. The most common issues respondents flagged were challenges getting onto or off of a transit vehicle with their mobility device, not being able to locate and navigate to the transit stop, transit service not operating as fixed route, plus lack of nearby transit stops and reliable transit service. Several users flagged concerns with barriers in the streetscape impeding their access to transit (whether micromobility vehicles, construction, or debris). This

particular issue resonated with multiple blind or low vision respondents. Another issue raised by blind or low vision respondents was the issue of limited to no tactile notification of mixed traffic when crossing the street or boarding the bus (to denote not only vehicles, but bike lane traffic), as well as wayfinding.

Recommendations

To encourage more accessible transit station/stop designs, communities should meet PROWAG Requirements. They can also implement the following strategies:

- **Compromise Solutions with Sidewalk and Landscape Areas**: Find ways to balance the needs of transit stops with maintaining sufficient sidewalk width and landscaping. This might include reconfiguring sidewalk furniture or adjusting planting areas. In geometrically-constrained areas, priority should be given to provide a well-defined accessible pedestrian route and a bus stop clear zone. It might also require narrowing lanes to add space for those accessing transit and moving through the community.

- **Engage Stakeholders**: Involve people with disabilities, and other stakeholders, in the transit planning process to identify practical solutions and ensure the designs meet actual user needs, as well as ensuring streetscape access is part of transit planning.
- **Consult/Document Policy and Investment Solutions in ADA Transition and/or Olmstead Plans**: Transit stops and facilities cannot be made accessible overnight. By charting out a strategy and defining agency roles and responsibilities to incrementally address accessibility with measurable and attainable performance metrics, practitioners can manage expectations and build community goodwill.
- **Develop outreach/education resources and tools**: Carefully-designed public outreach and outreach to organizations and facilities serving people with disabilities will be needed when there are changes in transit facilities. But also remember that members of the public may not understand how to use key accessibility elements at the transit stop or facility, or the rationale behind them. By creating tutorials and information resources, the public can better understand and respect these elements to ensure that persons with disabilities are able to better access transit.

- **Regular Maintenance and Monitoring**: Implement a routine maintenance program to ensure accessible transit station entrances, elevators, ramps, stops, bus shelters, adjacent accessibility elements, and applicable temporary work zones are kept in good condition and free of obstructions. This is crucially important when it comes to winter maintenance and ensuring transit stops are clear of snow and ice, so they are not creating an obstacle for persons with disabilities.
- **Enforcement**: Consider utilizing technology to ensure vehicles are not obstructing the bus's ability to access a bus stop to provide accessible boarding. Any use of monitoring technology should take privacy concerns of the general public into account. Data should be protected.

Bike Lanes and Cycle Tracks



Image 12: Three cyclists smile while riding tadpole-style recumbent tricycles side-by-side down a residential city street during an outdoor community open-streets event in Portland. Lisa Strader / Portland Bureau of Transportation.

A robust and healthy multimodal transportation system in any community features facilities and roadway treatments for cyclists. On most slow-speed streets, bicycle route signs and sharrows are deployed, and bicycles (and other pedal cycles) operate in mixed traffic. On other roadways, with higher traffic volume and speed, many American transportation agencies will mark cycle lanes (widely known as bicycle lanes, unprotected or protected) with lane signs and markings. However, for the majority of cyclists, the presence of protected cycle lanes (also known as

"separated cycleways" or "cycle tracks") reduces traffic stress and is the preferred condition for riding in their community.

Communities have been trying to implement more cycling infrastructure, especially protected cycle lanes, to increase the number of people who feel comfortable riding along roadways. Furthermore, persons with disabilities benefit and may leverage such cycling facilities to travel via adaptive cycling equipment or adaptive mobility devices (e.g., wheelchairs) where feasible. As dedicated cycling infrastructure has emerged in communities, the streetscape complexity has increased, creating accessibility challenges for persons with disabilities.

Current Conditions of the Practice

Cycling infrastructure has become a more notable addition to the streetscape across a diverse range of communities. That may take the form of bicycle parking or "bike racks," placed upon the sidewalk to provide a secure place to lock one's bicycle. For communities with parking meters, cyclists may be able to leverage parking meters (especially double-headed parking meters) as an alternative to bike racks. Depending on the location and placement of the bike racks, or if a bike is attached to a parking meter, a parked bicycle may obstruct the pedestrian path or access to the parking meter user interface, creating an obstacle and hazard

for persons with disabilities. Relatedly, some cyclists ride on the sidewalk to reach where they will park their bicycle. By doing so, they introduce a speed differential safety issue with pedestrians and other sidewalk users.

Cycling infrastructure is treated differently, depending on the adjacent motorized vehicle volumes and speed differential from cyclists. On low volume and low speed streets (e.g., residential streets), cycle routes vary from cycle boulevards (marked by sharrows and/or signage) to protected cycle lanes. The placement of cycle route signage on the streetscape occasionally creates curb clear zone obstructions on the sidewalk for persons with disabilities, depending on signage placement (you can find more on that in the sidewalk section). Two other major accessibility challenges on residential streets would be cyclists riding on residential sidewalks, plus all cyclists (and pedestrians) appearing clear and visible is an increasing challenge in motorized vehicles. Cars have increased in size considerably (noticeably in the U.S., but also elsewhere) over the last 20 years and their reduced visibility and increased risk of causing head and neck injuries than a smaller car have led to an increase in deaths from collisions[35]. Roadways having more speed and volume than residential streets require dedicated cycle lanes.

35 https://www.smartgrowthamerica.org/knowledge-hub/news/bigger-vehicles-are-directly-resulting-in-more-deaths-of-people-walking/

Slightly higher roadway volume and speed differential typically has narrow, marked cycle lanes adjacent to the parking lane, with a minimum width of five feet in constrained streetscapes. These cycle lanes provide limited room for a cyclist to navigate adjacent vehicle traffic and parallel parked vehicles opening doors, especially a person with a disability who is parking and exiting their vehicle without a refuge area. Guidance from the NACTO Urban Bikeway Design Guide[36] recommends providing a wider cycle lane to provide a larger buffer zone for the cyclist, and possible lane intrusions.

On the busiest streets with high volumes and the highest speed differential, typically, cyclists will use protected cycle lanes, to include parking protected cycle lanes that invert the parking lane and the cycle lane (in which the cycle lane is closest to the curb). Although this treatment gets the cyclist away from moving traffic, the challenge remains for cyclists trying to maneuver around vehicles opening doors if a minimum three-foot buffer isn't in place, and for accessibility vehicles deploying their wheelchair ramp to a clear zone on the sidewalk or street-level pavement.

As discussed in the transit section, conflict points between cyclists in protected lanes and pedestrians/disabled transit riders is particularly acute in the emerging design of constrained transit stops, which often have a cycle lane traversing the boarding zone or

36 https://nacto.org/publication/urban-bikeway-design-guide/

traveling between the level boarding platform/island and the sidewalk. Stops where boarding and alighting is in a cycle lane cannot be considered accessible to passengers with vision disabilities unless there is a geometric design or traffic control that reliably causes cyclists to yield to pedestrians at the transit boarding area.



Image 13: A modern “floating bus stop” design on Whitechapel High Street in London, showing a cycle track running between the main sidewalk and the passenger boarding island. Matt Brown. Creative Commons Attribution 2.0 Generic license.

For parking-protected cycle tracks that have a delineator (whether plastic bollards or concrete stops), accessibility for persons with disabilities is also strained. All people, regardless of disability status, like to be dropped off as close as possible to their

destination, whether by transit or other motorized vehicles. For persons with disabilities being dropped off at a location that has the presence of a cycle track, it can feel like being dropped off in the middle of an active traffic lane. Given the speed differential between the person with a disability being unloaded and a cyclist, there is a high likelihood for a crash, without any treatment to slow cyclists down and raise awareness of the pedestrian leaving the vehicle.

Regardless of the cycle facility, if construction activity obstructs the cycle facility, cyclists typically share the pedestrian detour if no specific cycle detour facilities are made available, and/or the cyclist is uncomfortable riding in traffic; this creates speed differences with pedestrians on the detour route.

Lastly, but not least, there is the challenge of cyclists and pedestrians conflicting at intersections. Though frowned upon by some communities, some cyclists observe the "Idaho Stop"[37] rule, which is to yield, versus stop, at a stop sign, look both ways, and then cross a signalized intersection when it is safe to do so from crossing traffic. There are reasons why cyclists observe this behavior, including to maintain as narrow of a speed differential with other motorized traffic as possible. The conflict emerges, regardless of a stop sign or signalized intersection, when some cyclists create a speed differential with pedestrians, especially persons

37 https://bikeleague.org/sites/default/files/IdahoStop-DelawareYield_8_2018.pdf

with disabilities, crossing the intersection during their designated time to cross. Persons with cognitive disabilities may not anticipate a cyclist when observing typical predictable traffic-movement behavior, nor will a person with limited/no hearing hear the cyclist, nor will a person with limited vision see the oncoming cyclist. Wherever possible, intersection design should separate pedestrians and cyclists by islands, as well as incorporate cycle lane continuation markings across the intersection.

Streetscape Cycle Lane Accessibility

There are many considerations to improve cycle lane accessibility for all users in the streetscape. Key considerations are treatments oriented to both the cyclist and pedestrian. Tactile effects of pavement markings on cycle facilities should indicate to cyclists to slow down in key areas where pedestrians are consistently present, such as transit stops, crosswalks, and any refuge crossing area from a parking/loading lane to the sidewalk. In the parking/loading lane, there is a need to create a refuge area directly in front of or behind the accessible parking space, perhaps connected to a sidewalk extension intersected by the cycle lane/cycle track, which will allow the person to safely exit their vehicle from the driver or passenger side. This refuge area then provides visibility to the incoming cyclists of waiting pedestrians, and especially persons with disabilities who are looking to cross the

cyclist's path of travel. These refuge areas and adjacent pedestrian routes will need to be clear of obstructions, including bike parking and signage poles, to maximize path accessibility and visibility for all users. More specifics on accessible cycle lane design and related streetscape elements can be found in PROWAG[38] and the NACTO Urban Bikeway Design Guidelines.

Stakeholder Feedback

As part of a stakeholder survey in spring 2024, respondents were asked about their accessibility on or around cycle lanes, cycle tracks, and related experiences. Most respondents noted that they were unable to ride a bike due to either a disability or never learning to do so. This included respondents who also used a wheelchair or other mobility device. Others noted safety concerns, especially when it came to speeding vehicles and vehicles not stopping for them to cross. Individual respondents highlighted many concerns, including:

- increasing use and prevalence of shared micro-mobility, there are increased safety issues on sidewalks, cycle lanes, and crosswalks due to speeding micro-mobility vehicles and those vehicles not yielding to, or stopping for, pedestrians crossing the street.

38 https://www.access-board.gov/prowag/

- crossing the street when there is a cycle lane present is difficult for people who are blind or low vision, since they cannot gauge if a cyclist is coming, regardless of the presence of a stop sign or signal.
- a community that leverages planters, grass strips, art, trees, and other obstructions to protect the parking protected cycle lane, can prevent people from parking an accessible van and deploying the wheelchair ramp.
- rapid installation of cycling facilities, sometimes in non-traditional design approaches, has led to confusion, especially when there has not been any community outreach or education for understanding the overall streetscape flow of traffic for all users.
- need for education/signage that alerts cyclists to deaf users navigating cycle lane crossings.

Recommendations

To encourage more accessible cycle lanes, cycle track designs, and supporting adaptive cycling for persons with disabilities, communities should meet available PROWAG requirements and NACTO Urban Bikeway Design Guide guidance, including dimensions, signage, and clear zones. They can implement the following strategies:

- **Compromise Solutions with Sidewalk and Landscape Areas**: Find ways to balance the needs of cycle lanes and cycle tracks with maintaining sufficient sidewalk width and parking/loading access. This might include reconfiguring sidewalk furniture or adjusting planting areas. In geometrically-constrained areas, priority must be given to provide an accessible pedestrian route, while managing motor vehicle speeds to facilitate a shared street.
- **Separate Pedestrians and Cyclists Where Designated Cycle Lanes are at Sidewalk Level**: A raised, high-visual-contrast, trapezoidal, tactile warning delineator or a planter strip is recommended where cycle lanes are at the same level as the sidewalk because it has been found to be highly detectable to, and recognizable by, pedestrians who are vision disabled. Separated cycle lanes can also be designed at street or intermediate-level, eliminating the need for additional definition of space beyond the existing raised curb edge. It is crossable by people using mobility aids, but should be interrupted by truncated dome detectable warning surfaces (or "warning plates" for persons with cognitive disabilities) where crossing cycle lanes is intended. Additionally, ensure ample clear zone (more information on this can be found in the sidewalks section) between the tactile demarcated cycle lane and the curb that handles people coming out of vehicles.

- **Explore Bicycle Parking in the Street Right of Way**: Explore opportunities to place bicycle parking in the street, if geometrically possible. Locations historically underutilized include intersection approach zones. Bicycles parked in these zones can leverage the zone for parking in ways other vehicles can't; they allow maintenance of the daylighting/line of sight of other intersection approaches for pedestrians and other vehicles.
- **Engage Stakeholders**: Involve people with disabilities, and other stakeholders, in planning and design bike infrastructure to identify practical solutions, ensuring the designs meet actual user needs.
- **Consult/Document Policy and Investment Solutions in ADA Transition and/or Olmstead Plans**: Cycling facilities cannot be made accessible overnight for all users. By charting out a strategy and defining agency roles and responsibilities to incrementally address accessibility with measurable and attainable performance metrics, practitioners can manage expectations and build community good will.
- **Regular Maintenance and Monitoring**: Implement a routine maintenance program to ensure accessible refuge areas and paths, in addition to cycle lanes and cycle tracks, adjacent accessibility elements, and applicable temporary work zones are kept in good condition and free of

obstructions. This is crucially important when it comes to winter maintenance and ensuring cycling facilities are clear of snow and ice, not creating an obstacle for persons with disabilities.

- **Develop Outreach/Education Resources and Tools**: Members of the public, including the cycling community, may not understand how to use key cycling facility accessibility elements or the rationale behind them. By creating tutorials and information resources, the public can better understand, use, and respect these elements.
    - This may also take the form of an educational campaign for cyclists with disabilities to learn about various adaptive cycles available, adaptive cycle performance, and visibility.
    - This may also take the form of cycling instruction for persons with disabilities and/or the general public.
- **Relationship to Other Street Features**: Accessible cycleways should be mindful of other infrastructure features, such as transit stops, landscaping, parking, street furnishing areas, or other accessible pathways.
    - For parking in buffered cycle lanes, provide a minimum of 5-foot-wide loading and unloading areas that are free of obstructions along all accessible parking, and along all parking where possible to maintain programmatic access.

- Provide marked crosswalks with yield or stop lines across cycle lanes and cycle tracks connecting accessible loading/unloading zones to sidewalks and building frontages.
- Provide accessible pathways and refuge areas between, around, or across cycle lanes, including connecting to existing or new curb ramps.
- Provide tactile, high-visibility delineation between cycling infrastructure and accessible pathways.

Multi-Use Shared Paths



Image 14: A clear winter day on Chicago's Lakefront Trail near Fullerton Avenue, showing the parallel infrastructure of the multi-use pedestrian trail alongside the active lanes of DuSable Lake Shore Drive. Michelle Stenzel. Used with Permission.

Shared-use paths are off-road transportation facilities that are designed for a variety of non-motorized users, including, but not limited to, cyclists and pedestrians. These paths are typically paved, designed for two-way travel, and oriented toward recreation or connecting areas frequented by non-motorized users. Multi-use paths create an important avenue for pedestrians, cyclists, and others to safely access transportation facilities separated from motorized vehicles.

These facilities are in high demand from a wide variety of users in limited space, which can be

challenging. The three design factors DOT identifies to ensure safe and functional shared paths are: separation between multi-use paths and roadways, width and clearance, and design speed[39]. When these characteristics are out of alignment, non-cyclist users of paths can be placed at a disadvantage; a challenge that will only exacerbate any accessibility barriers of the infrastructure.

Current Conditions of the Practice

Accessibility to, and on, multi-use and shared paths varies greatly between communities. For some communities, there is a designated shared path away from the roadway with rudimentary two-way lane markings, but may or may not have ample width to accommodate two-way cyclist traffic and additional space for non-cyclist users. That can create speed differential collisions between cyclists and pedestrians on the shared path.

Some of those shared-use paths face maintenance issues, with debris and vegetation disrupting the pavement (e.g., raised roots) and complicating the path's state of repair. Other paths also have path lighting irregularities and varying path geometry (e.g., sharper curves), which could obscure path user visibility. These issues are an annoyance to most non-cyclists, but the consequences are more acute for

39 https://highways.dot.gov/safety

persons with disabilities, who may be traveling the path at a slower speed or face navigation challenges from maintenance conditions or lack of path wayfinding to manage around mixed-speed traffic.

On the other hand, some communities, often in more densely-populated areas, do have separated multi-use paths, with a designated cycleway and adjacent shared slow zone and high visibility path markings for non-cyclists to traverse or yield away from the higher-speed cyclist traffic.

Multi-Use Path Accessibility



Image 15: A cyclist travels along a tiled sidewalk lined with yellow tactile paving strips past a shuttered construction hardware distributor in Quito, Ecuador. Benito O. Pérez (February 2026).

Accessibility for multi-use paths touches upon path width, grade, cross-slope, surface material, protruding objects, and pedestrian routes to and from the shared-use path. These elements share similar characteristics as sidewalk guidance, but with different facility users. The specific recommendations for these design elements, which can be found in PROWAG[40], provide practitioners with clear dimensions when designing and constructing multi-use paths.

Additionally, there are broader approaches that can improve accessibility. If the path is to be accessible to all users (and mindful of the interactions between disabled path users and other users, most notably, cyclists), it is important that it is designed to provide safe interactions between users of motorized or non-motorized vehicles and pedestrians with disabilities. There are two approaches to this concern:

- **Separate Pathways for Cyclists and Pedestrians**: The separation could be provided by creating two directions of travel on one path, or physically separating the two user groups or directions, especially in extremely high-volume areas. Each separate path of travel should be at least five feet wide (allowing two wheelchair users to pass each other).

40 https://www.access-board.gov/prowag/

- **Detectable Warning Surfaces at Shared-Use Path Intersections**: These include tactile markings to warn pedestrians with disabilities that they are entering a space with other modes of traffic.

Further recommendations and treatments should be mindful of path design speed, which would allow for cyclists or other non-pedestrians with the space and time necessary to react to interactions with other users that may otherwise result in a crash.

Stakeholder Feedback

As part of a stakeholder survey in spring 2024, respondents were asked about their access to multi-use/shared paths and related experiences. Respondents raised a variety of accessibility concerns, with most of the issues related to maintenance, geometry, and perception of safety. On the maintenance side, respondents flagged paths being too narrow, not cleared of debris or snow in a timely manner, or having state of repair issues (gaps, ruts, broken pavement). Some users indicated that some paths in their community are too steep and not usable for persons with disabilities, let alone not connected with the rest of the transportation system. One respondent noted that they use a power wheelchair and got caught on a hill with their battery running out. They were unable to charge their wheelchair or seek first responder help and were stranded on the hill path.

Other feedback included:

- there have been more idle vehicles in paths (and sidewalks) due to the increase of micro-mobility, creating obstacles for all users.
- bridges can have an uneven path transition between the path and the bridge.
- the lack of tactile guidance around mixed traffic on the shared path creates danger for those with visual challenges.
- vegetation overhang can be an obstacle on multi-use paths and needs regular pruning and maintenance so it doesn't become an obstacle.
- there is a need to educate and place signage for all users to be aware of deaf users of multi-use paths, who cannot hear passing warnings by other path-users.
- disability considerations, not only on shared-use paths, but all transportation assets, are usually low on the list to be advocated for, and there is a need for more appreciation of and advocacy for accessibility in transportation infrastructure.

Key Challenges

Amongst the key challenges disabled people around the country are facing regarding multi-use path

accessibility are regulatory and inclusivity challenges. Recommendations and guidelines from regulatory provisions can improve general approaches to the design, construction, and maintenance of multi-use paths. However, unless those design guidelines are made mandatory as well as the easier and economically-viable design alternative, some communities will not be provided with a robust accessible transportation network, nor accessible multi-use paths. Conversely, it's important to balance meeting all design guidance and the availability of resources and political will to build paths; it is crucial to start somewhere and build a case to improve, otherwise communities will opt to not build any paths.

Recommendations

To encourage more accessible multi-use/share path designs, communities should ensure paths comply with PROWAG guidelines, including dimensions, signage, and markings. Specific strategies include:

- **Ample Path Width**: To allow the separation of cyclists from pedestrians, multi-use shared paths should be a minimum of five feet wide. This allows at least two wheelchairs to pass each other going in different directions. Cyclists should be encouraged to dismount and walk their bicycle—or ride slowly (at pedestrian speeds, roughly 3 miles or 5 kilometers per hour)—when sharing the path with

pedestrians. If right-of-way, and resources, allow, multi-use paths should be at least five feet wide in each direction, to allow separation of cyclists from pedestrians.

- **Path Transitions**: When there are path intersections or transitions to the end of the path, ensure there are adequate signage, markings, and tactile treatments to indicate path transitions for all users.
- **Consult/Document Policy and Investment Solutions in ADA Transition and/or Olmstead Plans**: Multi-use/Shared path facilities cannot be made accessible overnight. By charting out a strategy and defining agency roles and responsibilities to incrementally address accessibility with measurable and attainable performance metrics, practitioners can manage expectations and build community good will.
- **Routine Maintenance and Monitoring**: Implement a routine maintenance program to ensure accessible multi-use and shared paths, adjacent accessibility elements, and applicable temporary work zones are kept in good condition and free of obstructions. This is crucially important when it comes to winter maintenance and ensuring those facilities are clear of snow and ice, not creating an obstacle for persons with disabilities.

Sidewalks



Image 16: A horizontal Siamese fire department connection manifold projects significantly into the pedestrian path on a North Halsted Street sidewalk in Chicago, creating a low-profile tripping hazard and sidewalk protrusion for blind or visually impaired pedestrians. Benito O. Pérez (April 2026).

All people in a community are pedestrians for the beginning and end of any trip. Sidewalks foster healthy communities[41] by reducing pedestrian and roadway crashes, managing the possible conflict points, encouraging physical exercise through recreational

41 https://highways.dot.gov/safety

walking or rolling, and providing an alternative to sitting in roadway congestion. The sidewalk is a mechanism to improve the livelihoods of community members, especially for those who cannot drive and instead rely on the sidewalk for transportation. Children, older adults, and people with disabilities make up 37% of the population in some states, representing a large proportion of people who deserve accessible and reliable mobility throughout their communities.

Current Conditions of the Practice

Sidewalks are an element of the streetscape that are often taken for granted, but they play a vital role in the mobility of people who don't or can't take other modes of transportation. However, the presence of the sidewalk in a community depends on delegated responsibility. For example, in major cities like New York City or Washington, DC, the sidewalks are a responsibility of the municipal government, and as such, provide consistent design, construction, and maintenance standards. But such examples are the exceptions to the norm.

For many communities, the construction and maintenance of sidewalks are a local property owner responsibility. Municipalities may impose requirements on developers to install sidewalks to current minimum geometric standards. Given the

changes in standards over the years, sidewalks on an individual block can vary widely in width, state of repair, and path obstacles (e.g.., utility poles and traffic signposts). This creates a challenge for people with disabilities to be able to reliably and safely navigate the sidewalk network in their community. Furthermore, those jurisdictions often defer the maintenance of those sidewalks to the adjoining property owner. That maintenance can vary, depending on the resources and awareness of the adjoining property owner.

And when there are sidewalks, there may be glaring sidewalk gaps. This is most common when sidewalks are added parcel by parcel and not along with the roadway itself. In this case, it is treated as regulatory compliance of an amenity/element and not a sidewalk system meant to connect people to destinations or the rest of the network. This creates unpredictability for disabled people, who can't continue their journey due to the lack of a sidewalk, and are forced to travel in the street or on an alternative path.

The lower the density in the community, the lower the likelihood one will find sidewalks. For rural communities, pedestrians may be forced to rely on roadway shoulders, if one is available, to walk or roll down the corridor. This creates exposure to roadway crashes for anyone walking/rolling on the side of the road.

When there is construction on the roadway or property or a building next to temporary accessible routes with related accessible wayfinding,

they are inconsistently implemented. And if a detour is provided, the accessible elements, such as curb ramps, are not often provided or maintained for the detour.

Another glaring challenge for sidewalks, regardless of community type, are protrusions into the pedestrian path. Some protrusions may be natural, such as a tree branch growing into the path of travel. Other protrusions may be directly in the pedestrian path of travel (e.g., utility poles, signage poles, street furniture), while still others may be immediately adjacent to the pedestrian path of travel (e.g., fire hose connection, utility meter, low-hanging signage, power lines). PROWAG provides specifications for the amount that objects may protrude into the travelled path. Local regulations should include ways obstructions can be reported and methods through which clearing them will be enforced.

The most notable symbol of sidewalk accessibility is the curb ramp, a small ramp built into the curb instead of a step down. This feature is much more common today, but the history of the curb ramp reveals a long journey of advocacy. From the 1960s to the 1980s, activists took action, creating curb ramps themselves by smashing the curb or pouring concrete to create ramps. Still, many communities do not have them or do not have them consistently throughout the area. Furthermore, their placement can be problematic. Curb ramps at corners are often at the apex of the corner, requiring people using mobility aids to detour from a straight path of travel to use the curb ramp, and

leading pedestrians with vision disabilities toward the center of the intersection.

Sidewalk Accessibility

In his book, *Sidewalk Government*[42], Michael Pollack compared the sidewalk to a commons. This characterization refers to the fact that jurisdictional responsibilities on sidewalk usage and maintenance are very blurred in cities. An example of how conflicts can arise through this gray area occurs when it snows: if homeowners are responsible for the sidewalk space in front of their home, they may be expected to shovel the snow in the winter, or even replace cracked and damaged slabs. While this may ease the strain on municipal governments, it results in inequitable sidewalk maintenance across neighborhoods and will also further complicate the ability to regulate sidewalk accessibility.

Depending on people's physical, cognitive, and sensory disabilities, barriers to sidewalk accessibility might be experienced very differently. Common issues include sidewalk slope that exceeds PROWAG[43]

42 Pollack M., Sidewalk Government, 04/08/2024. 122 Michigan Law Review 613 (2024), Cardozo Legal Studies Research Paper No. 697, 2023, available at: https://ssrn.com/abstract=4198355 or http://dx.doi.org/10.2139/ssrn.4198355: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4198355

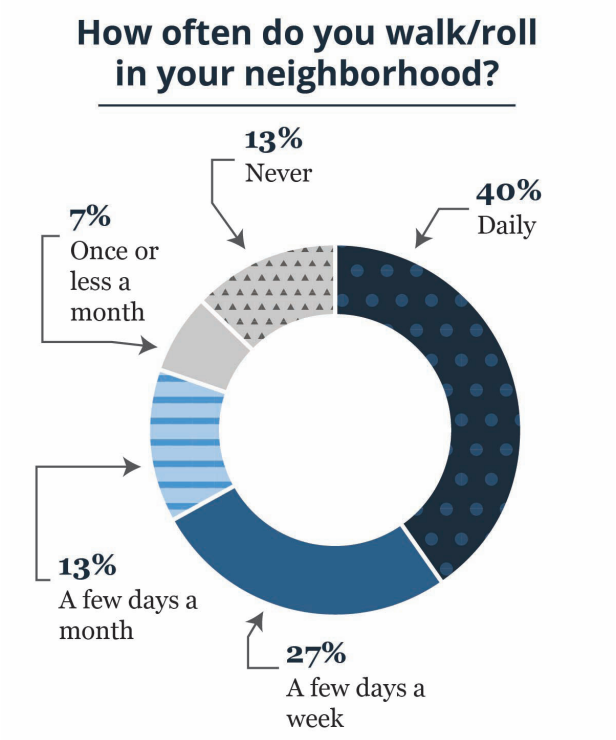
43 https://www.access-board.gov/prowag/

limits for either—or both—running slope or side slope, degraded concrete or pavement, obstacles in the sidewalk, and inappropriate signage. It's not hard to see the benefit of a smooth, clear, and well-signed sidewalk. Whether the sidewalk user is a person who is blind or has low vision, a mother pushing a stroller, or a resident choosing to use a roller bag instead of a backpack for groceries, accessible sidewalks connect pedestrians to transit options and resources. If the sidewalk is not accessible, the streetscape as a whole never will be.

In the development of our cities, some users are left behind due to a lack of enforceable standards and consideration. As noted by Steve Wright in Streetsblog[44], numerous "city planners, architects, engineers, public works, transit and capital project department heads," have been eager to end accessibility considerations once the project is compliant. Sidewalks might be closed for years from construction, cut in half by poorly-placed utility poles, or cracked and difficult to navigate for people with disabilities. The path to accessible sidewalks will require a multi-pronged approach that combines the power of federal regulation with enforcement at the local level and the widespread effects that changes in mindset can bring about.

44 https://usa.streetsblog.org/2023/07/26/why-american-cities-still-arent-accessible-after-33-years-of-the-ada

Stakeholder Feedback



Graph 6: Frequency of walking or rolling in survey respondents' neighborhoods.

As part of a stakeholder survey in spring 2024, respondents were asked about their access to sidewalks and related experiences. More than a third of respondents walk/roll in their neighborhood daily; two thirds of respondents walk/roll several times a week. However, respondents flagged a variety of issues challenging sidewalk accessibility.

The most common issues respondents flagged were geometric (too steep, too narrow), gaps in the network and not getting them to destinations, state of repair, micro-mobility vehicles parking and obstructing sidewalks, and safety issues with adjacent roadway traffic. Particular responses from respondents included:

- the need for adjacent street furniture to help with respite from balance issues.
- the high risk of curb cuts that orient towards the middle of an intersection versus the crossing direction for people who are blind or low vision.
- maintenance issues of sidewalks, particularly narrow and/or uneven paths, in addition to obstructions by micro-mobility vehicles.
- the need for practitioners to better understand and engage community members, so there is targeted implementation of accessible sidewalks that get the community to key destinations.
- the need for sidewalk detours when there is streetscape construction.
- the fact that walking is not practical when the sidewalks are not getting them to destinations.
- the benefit of truncated domes (tactile treatment or "warning plates" by some persons with cognitive disabilities), yet they also noted that the domes

can be a hazard for people who may use mobility devices with small wheels.

- the lack of sidewalks at all, or poorly-maintained sidewalks along state owned roadways in rural areas.

Recommendations

The first steps to designing a more accessible sidewalk system are to understand the diverse experiences of sidewalk users and how design choices impact user experience of a space. Disabilities can vary in "agility, balance, cognition, coordination, endurance, flexibility, hearing, problem-solving, strength, vision, and walking speed," creating the need for a sidewalk corridor that can accommodate all pedestrians. Additionally, it is doubly important to design accessible paths of travel for pedestrians because people with disabilities are more likely to rely on the sidewalk for transportation. Furthermore, consult/document policy and investment solutions in ADA transition and/or Olmstead Plans. Sidewalk facilities cannot be made accessible overnight. By charting out a strategy and defining agency roles and responsibilities to incrementally address accessibility with measurable and attainable performance metrics, practitioners can manage expectations and build community good will.

Lastly, practitioners should develop outreach/education resources and tools. Members of the public

may not understand how to use key accessibility elements for sidewalks, or the rationale behind them. By creating tutorials and information resources, the public can better understand, respect, and make use of these elements.

When designing an accessible sidewalk network, the following characteristics need to be considered in the context of accessibility:

- **Sidewalk Grades and Cross Slopes**: The grade, or steepness of a sidewalk should comply with PROWAG, and be extremely limited where possible. Sidewalks should include level rest areas when at a steep grade.
- **Sidewalk Surfaces**: Material, changes in level, stability, slip-resistance, gap dimensions, and visual consistency, are characteristics of sidewalk surfaces that can improve or diminish the accessibility of the sidewalk.
- **Protruding Objects**: If items protrude out into the sidewalk too far, or protrude from a wall instead of up from the ground, it can be difficult for users who are blind or low vision to detect and avoid the items.
- **Driveway Crossings**: These transitions for cars from buildings to the street need to be detectable by all users, protect pedestrians from unknowingly entering the street, and should prioritize the safety of sidewalk users.

- **Curb Ramps**: These breaks in the curb connect sidewalks to the street and should be easily navigable for users using walking aids or wheelchairs, and should include detectable warnings that alert pedestrians they are leaving the sidewalk.
- **Communication to Pedestrians**: Tactile cues, audible tones, verbal messages, vibro-tactile information, accessible placement of push buttons, detectable warnings, and clear messaging ensure that all pedestrians can safely navigate the sidewalk.
- **Pedestrian Crossings**: Crossings turn sidewalk corridors into sidewalk networks, and should be accessible and safe for pedestrians to ensure that all non-drivers can navigate the entire streetscape.
- **Temporary Sidewalks**: When there is street-scape construction, communities should follow specifications in PROWAG providing for acces-sible detour paths, akin to an example[45] from Washington, DC, which provides for Pedestrian Safety and Work Zone Standards regarding Covered and Open Walkways.

45 District Department of Transportation, 08/28/2024: Pedestrian Access and Safety - Compendium - Confluence



Image 17: An uncleared, icy public sidewalk stretches along a residential neighborhood street in Portland, Oregon, following a winter storm. Thick patches of packed snow, slush, and frozen footprints create an irregular and hazardous walking surface. Lisa Strader / Portland Bureau of Transportation.

- **Regular Maintenance and Monitoring**: Implement a routine maintenance program to ensure accessible sidewalks and adjacent accessibility elements, and applicable temporary work zones are kept in good condition and free of obstructions. This is crucially important when it comes to winter maintenance and ensuring sidewalks are clear of snow and ice, not creating an obstacle for people with disabilities.

- Provide a way for community members to report issues and adequately fund a response program.

In Baltimore, an extreme lack of curb ramps serves as a reminder that accessible design changes are not guaranteed just because they are enshrined in law. In the U.K., two organizations, Sustrans and Transport for All, created a report with specific recommendations to address inaccessible and unsafe street conditions for disabled people. Some of the specific solutions included a long-term pavement fund for improved and maintained pavements, ensuring services and amenities are accessible and close to communities, and innovating wayfinding and journey-planning tools to work for people with disabilities. These solutions illustrate the need for accessibility to extend beyond specific dimensions and characteristics of the sidewalk and into the way that we think about and plan our communities as a whole. If the sidewalk is accessible but the broader community is not, a change in physical design won't address deep-rooted issues.

Intersections



Image 18: Pedestrians, including people pushing a stroller and using a wheelchair, cross the intersection of Wells Street and Division Street in Chicago. Benito O. Pérez.

Intersections and mid-block crossings are crucial points where pedestrians and vehicles must safely share space. In a typical year, nearly 2.5 million crashes[46] in the United States occur at intersections.

46 https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/810682

Ensuring safety and accessibility at these points is a priority for planners, transportation engineers, and policymakers. It is also important how communication with and between these various users happens at intersections (i.e., signage, signals, and pavement markings). Layering across all these considerations are the needs of people with disabilities, who interact with the intersection differently.

Current Conditions of the Practice

Intersections

At a 4-way intersection, there are 32 conflict points[47], accounting for all the combinations of movements at an intersection and where these various movements converge in an intersection. That's just for vehicles/cyclists. Pedestrian movements add another 8 conflict points.

Traditional vehicular intersection design emphasizes maximum throughput of vehicles, which is a detriment to other streetscape users. For intersection corners, that means the degree of curvature may be gentle to allow a continuous traffic flow without sacrificing vehicle speed. But this makes it harder for a driver to see a pedestrian and stop, meaning the higher speed for throughput is more likely to lead to a deadly crash. Also, depending on the intersection, vegetation, or

47 https://highways.dot.gov/media/11311#page=4

other line of sight protrusions, may impede the line of sight, creating risk for pedestrian and vehicle collisions at intersections.

The majority of intersections are not signalized, especially the more suburban and rural a community is. Unsignalized intersections do not provide the same indication to drivers that there will be pedestrians. These unsignalized intersections expose pedestrians to crossing situations that are less safe. With more than a third of a community's population either unable (people with disabilities, youth, seniors) or not interested in driving, a hostile intersection design undermines the ability to use the most accessible sidewalk, bike lane, and transit service. This is particularly true for people with vision or mobility disabilities, because they will find it harder to see or be seen by drivers.

Roundabouts



Image 19: At a roundabout, a driver fails to yield to a pedestrian using a long cane at a marked pedestrian crossing. US Access Board. Public domain.

Roundabouts are increasingly popular as alternatives to traditional intersections due to their traffic flow efficiency and vehicle traffic safety benefits (only 8 vehicle conflict points[48] compared to 32 at a traditional 4-way intersection). However, designing them for accessibility remains a challenge. These challenges include the lack of clear guidance on crossing point locations for pedestrians and cyclists. Vehicles move at slow speeds but don't necessarily stop for pedestrians and cyclists. For blind or low vision pedestrians, there is a lack of clear vehicle sounds that can be used to help them know when and where to cross. Furthermore, for pedestrians with cognitive disabilities, it can be difficult to understand when it is safe to cross, with cars rolling through the roundabout. This issue is amplified by cyclists with cognitive disabilities, trying to navigate a roundabout with limited markings and negotiating with pedestrians and vehicles.

At multi-lane roundabouts, 1 vehicle may yield to a pedestrian on a crosswalk while the adjacent vehicle, perhaps not seeing the pedestrian, continues across the crosswalk. Again, the undistinguishable or inconsistent traffic flow sound is a problem for blind pedestrians who need to accurately judge gaps in traffic or yields to determine when to cross safely.

48 https://www.fhwa.dot.gov/publications/research/safety/00067/000675.pdf#page=6

Curb Ramps

Curb ramps provide access from the sidewalk to the roadway crossing where both pedestrians and vehicles use the facility. Curb ramps, like many other elements, were originally developed to address the needs of people with disabilities, but also benefit others, such as parents pushing a stroller or pulling a wagon, delivery hand trucks, and someone pulling luggage.

Curb ramps at corners vary widely from diagonal to directional to perpendicular to depressed. The most problematic alignments are single diagonal curb ramps or fully-lowered corners that spread the width of 2 curb ramps. Single diagonal curb ramps aim users to the middle of the intersection. For someone who is blind, they may have navigational training that allows them to reorient themselves but it is still disconcerting to step out of the pedestrian space and into the vehicle travel space, aimed away from your destination—the other side of the street. For persons with a cognitive disability, the diagonal ramp gives little indication of where to stand or where to cross the intersection. Mobility device users also feel exposed needing to adjust their direction of travel on the roadway.

Fully-lowered corners, or depressed curbs, remove any curbing on the corner, making it easier—and maybe attractive—for vehicles, especially trucks or buses, to drive over that area when making the turn. People who have a cognitive disability or who are blind, low vision, and/or mobility device users mention

feeling very exposed to the possibility of being hit when standing on corners with this design.

The contrasting color and texture of the truncated dome detectable warning (or "warning plates" for persons with cognitive impairment), required at the bottom of curb ramps, provides notice to blind or low vision pedestrians and people with cognitive disabilities that they are leaving the pedestrian space and entering the street. A bright-yellow panel is the most noticeable color. It is a color of warning, but does not mean "stop" (like red), and it is one of the last colors someone losing their sight will be able to distinguish. Frequently, in design districts or historic districts, municipalities opt for brick-colored or dark-gray-colored or black panels. These are especially problematic for people who have low vision. When wet, they can be barely distinguishable from the adjacent sidewalk. Dark gray or black panels can look like a hole in the sidewalk.

Signals

Ensuring traffic signals are accessible, usable, and are appropriate for the type of intersection traffic for individuals with disabilities is essential for inclusivity and safety. Intersections will vary throughout a city, and even on the same corridor. Intersections can have multiple vehicle travel lanes, including those dedicated to right or left turns and dedicated transit or bike lanes.

The vehicle movement and width variations make clear, consistent signals that much more important.

Any pedestrian needs to be able to locate and activate a pedestrian signal, move to the crossing location, and be ready to cross when signaled. Pedestrians who are blind or low vision need to find the street, identify the crossing location, find and activate any pedestrian signal crossing mechanisms, reorient themselves at the crossing location to be aligned to cross within the crosswalk, determine when it is safe to cross, and, ideally, travel in a straight path from one side of the street to the other. Pedestrians using mobility devices also need to find and activate pedestrian signal crossing mechanisms and get themselves back to the crossing location, aligned to move when the signal indicates. Pedestrian push buttons should be readily located and usable by people with vision and mobility disabilities. More information can be found in various guides and design manuals, but the rule of thumb is to place the push button around 3 feet above the finished level floor and within 10 feet of the edge of the curb or pavement at the crossing location.

Provision of accessible pedestrian signals (APS), required by PROWAG[49] in new construction and alterations, enables pedestrians who are blind or low vision to locate pushbuttons and to obtain audible and tactile signal phase information. APS should also be installed at existing crossings having visual pedestrian

49 https://www.access-board.gov/prowag/

signals. If pedestrians with full vision require pedestrian signals to be sure that they will understand when the pedestrian phase begins and ends, there can be no assumption that people who have vision disabilities are able or likely to correctly determine the onset of the walk interval.

Crossing cycle length is also a consideration for accessibility. Signal lengths that are based on walking pace for typical pedestrians (i.e., 3.5 feet per second) will often be too short for a white cane or mobility device user, a senior (i.e., 2-2.5 feet per second), or even a parent walking with a child, for instance. Traffic signal engineers need to be mindful of varying perception and reaction times based on the type of pedestrian, and whether pedestrians need to allow for others to cross before them or are within a group and not individuals crossing.

Lastly, communities may revert signals to flashing yellow/red after certain hours of the day (and disabling any pedestrian signals). That may reduce friction for vehicles, but, for pedestrians, it creates a lack of signal visibility, and loss of the opportunity to cross in dedicated intervals. This issue is particularly acute for persons with cognitive disabilities, who are navigating the streetscape via predictable traffic rules, only to be interrupted by the flashing lights signaling either no dedicated crossing interval or no clear guidance for them to cross the street for the duration of the flashing light period.

Crosswalks and Intersection Clear Zones



Image 20: A pedestrian crosses a wet, high-visibility continental crosswalk at a signalized intersection during a rainy night in Boston, Massachusetts. Toole Design Group / Pedestrian and Bicycle Information Center (PBIC) Image Library. Public Use.

As mentioned earlier, the typical intersection will be 1) unsignalized, 2) unsigned with a stop sign, and 3) unmarked with a pedestrian crosswalk. Pedestrians crossing at corners are more expected than those crossing in the middle of a block, unless at a formal mid-block crossing. In some states, all corners are legal crossings, but because marking each of them would be time-consuming and a significant maintenance cost, they are left unmarked. Where crossings are marked, there are several types of markings used; these can vary along the same transportation corridor, which can lead to confusion. Furthermore, debris and winter weather may obstruct the visibility of pavement markings that delineate crosswalks and intersection clear zones.

Crosswalks should be marked according to requirements and technical specifications in the *Manual on Uniform Traffic Control Devices*[50] and PROWAG. Where crossing is not intended, the sidewalk should be separated from the street by landscaping or a vertical edge treatment making it clear to all users that the crossing is closed.

Street murals have become increasingly popular as community building and community placemaking elements. Street mural design elements need to be planned carefully to allow persons with disabilities to safely travel. A white cane user and a pedestrian with a cognitive disability can detect the difference between painted and bare asphalt. Where they are expecting that difference at a marked crossing and, instead, find continuous paint, expected crossing guidance is removed. Communities should work with the Disability community to determine community-specific tactile and design features to incorporate into street murals.

Streetscape Intersection Accessibility

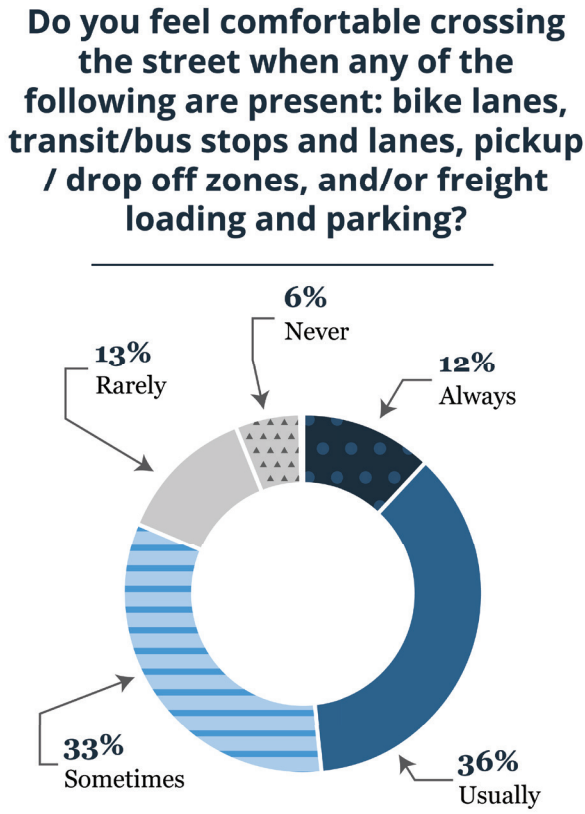
There is a confluence of different types of users at intersections, traveling at different speeds and methods. Crucial in intersection design and supportive infrastructure will be an approach that looks to narrow the speed differential across all users at an intersection, as well as use temporary and permanent

50 https://mutcd.fhwa.dot.gov/

fixtures to reduce the pedestrian crossing distance. For a traditional intersection, that may take the shape of tightening the radius of an intersection corner to indicate to a driver that they need to slow down as they navigate a turn, as well as adding an intersection bulb-out. Furthermore, intersections and mid-block crossings should include a clear zone, which could be parking that is pulled back from the crossing (at least 40 feet). California has a "Daylighting Law[51]," requiring that there be no parking within 20 feet of a crosswalk. This ensures that pedestrians are visible to drivers, pedestrians can see oncoming vehicles, and pedestrians with vision disabilities can hear oncoming vehicles. Visibility of all users is important at intersections, with appropriate lighting, vegetation maintenance, and utility placement out of the pedestrian path of travel. There also is a need for consistency in design treatments at intersections that provide wayfinding for persons with low vision or cognitive disability. Tactile walking surface indicators such as raised bar guide bars, longitudinal tactile warning guidance, sidewalk alert bars, and alignment bars, as well as trapezoidal tactile warning delineators can aid wayfinding for pedestrians with vision disabilities

51 https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202320240AB413

Stakeholder Feedback



Graph 7: Survey responses on their comfort crossing the street when bike lanes, transit/bus stops and lanes, pickup/drop-off zones, and/or freight loading and parking are present.

As part of a stakeholder survey in spring 2024, respondents were asked about their experiences with intersections. The most common issues respondents flagged were: vehicles speeding, running red lights, and not stopping for them at intersections; lack of appropriate navigation, such as when and where to

cross, at curb ramps; poor state of repair of curb ramps and pedestrian infrastructure; audible crosswalk indicators not functioning properly or being drowned out by loud vehicle traffic; push buttons not working, inaccessible, or hard to find for visually impaired persons, as well as tactile bumps being painful or causing imbalance for users with mobility issues or persons using mobility devices.

More specific feedback from respondents included reinforcing their local experience of not being able to cross the street due to speeding traffic unwilling to stop, and a need for more marked crosswalks, as well as needing better-maintained and better-designed curb ramps that provide appropriate navigation for all users without the fear of falling (either out of a wheelchair or tripping). One respondent flagged the need for some crossing signalization at roundabout intersections, since the design does not naturally cause vehicular traffic to stop. Another respondent flagged truncated domes, especially when the treatment is installed more generously at an intersection, saying it creates access challenges for persons using mobility devices. One respondent noted not having enough time to cross the street when starting at the "start the walk" signal.

Recommendations

Depending on the element, there are various suggestions to consider and explore in more depth, with detailed resources available. Additionally, across

all elements, consult/document Policy and Investment Solutions in ADA Transition and/or Olmstead Plans. Intersections, signs, and markings cannot be made accessible overnight. By charting out a strategy and defining agency roles and responsibilities to incrementally address accessibility with measurable and attainable performance metrics, practitioners can manage expectations and build community goodwill.

Practitioners should develop outreach/education resources and tools. Engaging community members with disabilities in planning, design, construction, and commissioning will allow for infrastructure to better serve the entire community. Explaining new or changed transportation system infrastructure is important for its safe and appropriate use. Members of the public may not understand how to use key accessibility elements for intersections, roundabouts, signals, and markings, or the rationale behind them. By creating tutorials and information resources, the public can better understand and respect these elements, as well as persons with disabilities being able to better understand and navigate them.

Lastly, implementing a routine maintenance program to ensure accessible refuge areas and paths at intersections and roundabouts, in addition to signage, signals, and markings, adjacent accessibility elements, and applicable temporary work zones are kept in good condition and free of obstructions is crucially important when it comes to winter maintenance and ensuring intersections plus cycling/pedestrian refuge

areas are clear of snow and ice, not creating an obstacle for persons with disabilities.

Intersections and Roundabouts

Tackling intersection accessibility will involve reducing the crossing length, slowing traffic down, or managing vehicle restrictions along certain intersections/routes. For traditional intersections, that means tightening turn radii to indicate to drivers that they need to slow down. Narrowing travel lanes approaching an intersection (from the standard 12 feet to 10 feet) also naturally slow drivers down and is standard design in most developed countries. Leveraging intersection bulb-outs creates an obstacle for vehicles (and slows them down), while also reducing the crossing length for pedestrians. Whether for intersections or roundabouts, the deployment of pedestrian signals, accessible pedestrian signals, pedestrian hybrid beacons, or raised crossings with Rectangular Rapid Flashing Beacons can improve safety and accessibility of crossings. It is important to keep in mind that only standard red, yellow, green traffic signals and pedestrian hybrid beacons have red indications, requiring drivers to stop. Other traffic control devices such as rectangular rapid flashing beacons only alert drivers to yield to pedestrians. There also needs to be enhanced and continuing education for drivers, cyclists, and pedestrians on how best to navigate roundabouts, which significantly reduce travel conflict points but still require attention for all users on

where to look for pedestrians or cyclists. Roundabout markings, signage, and tactile treatments can also be a valuable approach to raise awareness of all roadway users and how best to navigate the roundabout.

Signals

Activation mechanisms in consistent, convenient, ADA compliant reach (3 to 3.5 feet above the pedestrian path floor), height, and landing locations will be beneficial to the safe, efficient crossing of pedestrians with disabilities. Signals need to be visually clear but also provide audible and vibrotactile cues for blind and low vision pedestrians, as they rely on non-visual cues to safely navigate street crossings. Audible cues alert all pedestrians, including those who are distracted, to the status of the pedestrian signal, improving overall safety.

Signals meeting the reach, height, and landing requirements of the ADA allow pedestrians using mobility devices to get to and then activate them. To the greatest extent possible, placing them at consistent locations on each corner will allow them to be regularly used by pedestrians who cannot see them. Locator tones can also be helpful. Placement as close to the crossing as possible, and no more than 10' from it, will allow for someone to activate the signal and to get to and through the crossing during the crossing cycle.

Signals that allow pedestrian traffic to begin to cross before vehicle traffic begins to move—Leading

Pedestrian Interval (LPI) signals—are beneficial to all users. They increase the signal crossing length and make the pedestrian more visible to drivers because they are on the crosswalk, not just stepping off the curb, when the signal releases vehicles to begin to move. Lastly, banning the use of flashing signals in a jurisdiction will likely improve accessibility for pedestrians with cognitive disabilities.

Markings

Not all crossing locations are marked, but where they are, markings need to be maintained to be visible to both drivers and pedestrians. Many community members who use white canes or mobility devices say they prefer the solid parallel lines or ladder bars and parallel lines for several reasons: they are most visible, they define the protected crossing area, like a stop bar at a stop sign, they provide a visual cue to halt, and they extend almost from curb to curb. In addition to markings, signage that both warns drivers to be aware of a crossing and identifies the safest crossing location for pedestrians can be helpful.

If there is community desire for street murals, it has to be mindfully designed with consideration for the Disability community, e.g., with tactile treatments, so as not to confuse low vision pedestrians traveling the streetscape.

Curb Ramps

PROWAG specifies the dimensions, slopes, and locations of curb ramps. Designs in which two perpendicular curb ramps are provided at each corner provide the greatest accessibility for both pedestrians who have vision disabilities and those who use mobility devices because they normally enable the most direct and efficient path of travel across the street. Curb ramps must intersect the street at 90 degrees or they will result in instability of wheelchairs rolling between the curb ramp and the street. Furthermore, a level landing is required at the top of all curb ramps, and a truncated dome detectable warning panel is required at the bottom of all curb ramps.

The width of sidewalk, corner radius, and other features will constrain the design. It is desirable for curb ramps to slope in the direction of travel on the associated crosswalk, which aids pedestrians with vision disabilities in establishing an accurate heading to cross the street. On corners with wide radii, it may not be possible to satisfy the needs of both populations.

People with low vision advocate for having all detectable warnings be in safety yellow because of its high conspicuity even when contrast and lighting are not ideal, because yellow is a standard color for warnings, and because consistency is extremely important for pedestrians who don't have full access to visual information.

Plazas and Public Spaces



Image 21: Pedestrians cross an interlocking stone plaza on Saint-Jacques Street outside the historic Second Empire style Hôtel Place d'Armes building in Old Montreal. Photo by Aditya Inamdar.

Plazas and public spaces are also known as "third-places"[52]: social spaces that aren't work, school, or home. These environments are important for developing a community's sense of identity and a sense of belonging for individuals. Third spaces allow people to socialize and exchange ideas, all for little to no money.

52 Albss-Albert, 01/12/2023: https://medium.com/illumination/the-death-of-third-places-and-the-evolution-of-communities-5bbffc01c5e

One of those types of spaces that some communities are creating are pedestrian plazas. Pedestrian plazas are car-free zones in urban communities that are typically made by blocking off vehicular traffic to create safe spaces for non-motorists in public spaces. These areas do more than create a car-free zone, they create community.

The importance of plazas and public spaces emphasizes the need for these areas to be accessible to all individuals. If these areas are poorly designed, people with disabilities and older adults may not be able to take advantage of them even when these communities may be the ones who could benefit from them the most. A 2016 study[53] found that despite being 20% of the population, seniors only accounted for 4% of public park visitors. A key contributing factor to this statistic is that plazas and public spaces are not created with all users in mind. Some spaces may have accessible design internally, but lack well-thought-out access points, restricting who can enter in the first place. On the other hand, the areas may be accessible, but once within the plaza or public space, navigation challenges are exacerbated. These barriers can be overcome through careful consideration at the planning, implementation, and maintenance stages.

53 https://www.rand.org/pubs/external_publications/EP66493.html

State of the Practice

Communities of varying densities and sizes have some presence of plazas and/or public spaces. In a suburban community, that may be the community playground. In a large city, that may be multiple parks or an expansive parkland. In small towns, that may be the town square. Historical communities have commons or town squares that served as a gathering place for the community. The denser communities with parks and plazas have a higher likelihood of being connected to the community via sidewalks and bike paths. Yet even some parks and plazas may have access point challenges, due to conflicts of infrastructure jurisdiction, such as the case in Washington, DC's Meridian Hill Park, owned by the National Park Service, while the adjoining sidewalks belong to the city. There is little to no access ramp into the park.



Image 22: Pedestrians walk beneath a mature canopy of oak trees along the brick-paved Charlottesville Downtown Mall, a historic pedestrian zone in Charlottesville, Virginia. Bobak Ha'Eri.

Many communities that are light on plazas and park space have, in recent years, started to take back roadway and create car-free streets and pedestrian plazas/malls. The need was particularly acute as a result of the COVID-19 pandemic, necessitating more open gathering spaces in communities. Because these types of plazas are transformed vehicular areas, unique challenges can take place depending on both the historical design and the process utilized to plan and implement streetscape changes. Pedestrianization programs which take shape in the form of plazas have numerous benefits which are taken seriously when deciding whether to invest in the change or not. For example, New York City's Plaza Program[54] requires numerous letters of support from community stakeholders and demonstrated need for public space improvement in under-resourced neighborhoods. These kinds of requirements are meant to ensure that the demonstrated benefits of plaza installations can be met, but what the program does not explicitly define are their methods to ensure these spaces are accessible to all communities.

There are numerous benefits to plazas and public spaces, but these areas can only reach their full potential when they are accessible to all communities. Although there is the funding and desire, alongside proven benefits, to make pedestrian plazas more

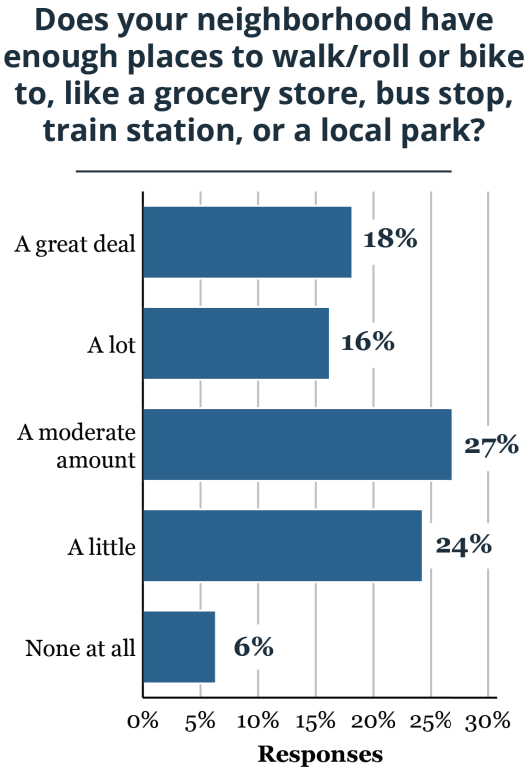
54 https://www.nyc.gov/html/dot/html/pedestrians/nyc-plaza-program.shtml

common across our streetscape, people need to be able to access those spaces in the first place. Legislation, such as the Americans with Disabilities Act (ADA), regulate the infrastructure of public spaces. However, regulation can be limited and, oftentimes, does not cover a wide enough range of considerations.

Currently, design considerations for pedestrian plazas[55] are focused on infrastructure to limit motorist-pedestrian interactions, proper drainage, permanent and temporary seating, and climate and durability. While the improvement of these characteristics can have side benefits for members of the Disability community, accessible plaza design should be at the forefront of these decisions.

55 https://globaldesigningcities.org/publication/global-street-design-guide/streets/pedestrian-priority-spaces/pedestrian-plazas/example/

Stakeholder Feedback



Graph 8: Perception of survey respondents on the availability of sidewalks, bikeways, and paved pathways for walking/rolling or biking to daily needs and destinations.

As part of a stakeholder survey in spring of 2024, respondents were asked about their experiences accessing local spaces, such as parks. Their responses indicated what much of the literature suggests: these spaces are increasing in popularity, and, as they do, their frequency in urban spaces has increased as well. Accessibility challenges regarding plazas and public

spaces do not arise from the lack of these spaces, but, rather, because access point design considerations have not prioritized disabled communities.

In an extended comment section within the survey, respondents expanded upon their experiences accessing public spaces in their communities. Some of the key barriers to accessing public spaces are listed below:

- Activities and/or bus stops are too far away
- Limited connectivity between destinations
- Inaccessible infrastructure, such as too-steep walkways
- Big intersections with high-speed vehicles increase feelings of unsafety
- Limited and/or no information about public spaces and access
- Poor infrastructure maintenance
- Parking limitations for scooters and other vehicles
- Feelings of inapplicability for rural communities

In summary, we can see from the responses that we not only need to ensure our plazas and public spaces encompass universal design principles[56], but that

56 https://gdci.wpengine.com/publication/global-street-design-guide/designing-streets-people/designing-for-pedestrians/universal-accessibility/

we need to ensure surrounding infrastructure and streetscapes allow people to access these spaces in the first place.

Recommendations

When we begin to think about designing inclusive public spaces, there are four key areas[57] to pay attention to that can significantly improve accessibility. First, any physical barriers that could restrict access points to the space should be removed or widened to accommodate wheelchairs, mobility scooters, and other devices. Physical barriers can take place within pathways, or at access points, designated by things such as bollards. The second key consideration should be of elevated areas, such as boardwalks or lookout points. In these cases, ramps and handrails should allow for the ease of access for any visitor. Third, textured surfaces and landscaping should be utilized to communicate information to people with visual disabilities. Tactile paving, contrasting colors, street furniture, and reflective strips improve accessibility and visual differences for visitors of all abilities. Finally, practitioners should prioritize the placement of rest points, such as sheltered benches and shaded areas that can improve the experience for individuals with limited mobility.

57 Harris V., 10/03/2023: https://www.marshalls.co.uk/news/creating-inclusive-and-accessible-public-spaces

While these four areas are a good place to start, we can expand upon them through resources, such as ASLA's Universal Design[58] recommendations for parks and plazas, and through feedback gathered in the 2024 stakeholder survey. Additionally, FHWA's 2017 publication of Accessible Shared Streets: Notable Practices and Considerations for Accommodating Pedestrians with Vision Disabilities[59] offers insights into some specific design elements that should be utilized to ensure accessible plazas and public spaces.

Beyond meeting the PROWAG requirements, the following list represents a more comprehensive guide to ensuring accessibility is considered throughout the planning, implementation, and maintenance phases in plazas and public spaces.

- **Engage Stakeholders**: involve people with disabilities and other stakeholders in the planning process to identify practical solutions and ensure the designs meet actual user needs.

58 https://www.asla.org/focus-areas/diversity,-equity,-inclusion/universal-design-guide/universal-design-guide-parksplazas

59 U.S. Department of Transportation, 10/2017: https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/accessible_shared_streets/fhwahep17096.pdf

- C**onsult/Document Policy and Investment Solutions in ADA Transition and/or Olmstead Plans**: plazas, public spaces, and shared street facilities cannot be made accessible overnight. By charting out a strategy and defining agency roles and responsibilities to incrementally address accessibility with measurable and attainable performance metrics, practitioners can manage expectations and build community goodwill.
- **Regular Maintenance and Monitoring**: implement a routine maintenance program to ensure accessible entry points, pathways, elevated surfaces, rest areas, and sanitation facilities are kept in good condition and free of obstructions. This is crucially important when it comes to winter maintenance and ensuring facilities are clear of snow and ice, not creating an obstacle for persons with disabilities.
- **Develop Outreach/Education Resources and Tools**: members of the public may not understand how to use key accessibility elements for plazas, public spaces, or shared streets, let alone the rationale behind them. By creating tutorials and information resources, the public can better understand and respect these elements, as well as helping persons with disabilities to be able to better understand and navigate them.

- **Relationship to Other Street Features**: accessible plazas and public spaces should consider border zones to the area and ensure that they provide a clear separation between pedestrian and vehicular zones. Additionally, pedestrians should be able to have a clear path of perception to anticipate the accessibility of spaces further away.
- **Consider Using Tactile Walking Surface Indicators to Aid Wayfinding for Pedestrians with Vision Disabilities**: tactile direction indicator bars can facilitate staying within the pedestrian access route when there are no natural boundaries that can be easily followed. Raised trapezoid tactile warning delineators can facilitate avoiding unintentional entry into zones where there may be vehicles.

Emerging Mobility:
Designing for What Comes Next



Image 23: Two riders stand with a pair of shared electric scooters, including a three-wheeled seated adaptive scooter model, along a closed roadway lane in Golden Gate Park, San Francisco. Better Bike Share Partnership. Public Use.

The transportation ecosystem has been changing quickly in the past decade. Prior to 2010, the streetscape only had to contend with moving vehicles, vehicles parking or loading, the cyclist, and the pedestrian. Since that time, the streetscape has seen the introduction of micro-mobility (e.g., bikeshare, scooters), food trucks, ride hailing enhancements

(e.g., Uber, Lyft, Via), point-to-point carsharing and moped sharing, on-demand delivery services (e.g., Grubhub, Postmates, Amazon Fresh), plus electric and autonomous vehicles (including sidewalk delivery robots)—not to mention non-transportation uses like parklets and streeteries. The speed at which these changes to transportation modes and uses of transportation infrastructure have occurred and are occurring can make it difficult for many jurisdictions to keep up.

Emerging mobility will be something transportation engineers, planners, and managers will have to keep tabs on in relation to the impact on overall community mobility. According to a McKinsey survey in 2023[60]:

- Almost a third of respondents plan to increase their use of micro-mobility, and nearly half plan to replace their private vehicles.
- More affordable and robust electric vehicles are expected to come online, which could support further fleet expansion.
- Customers are becoming more conscious of the environmental impact of their products, which could lead to increased demand for electric scooters, bikes, and other micro-vehicles powered by sustainable energy sources.

60 https://www.mckinsey.com/~/media/mckinsey/industries/automotive%20and%20assembly/our%20insights/spotlight%20on%20mobility%20trends/spotlight-on-2023-the-trends-transforming-mobility.pdf

- Micro-mobility vehicles are expected to continue to evolve in design and are undergoing development to be programmed and less reactive.
- Artificial Intelligence (AI) cameras and other smart technologies are expected to become standard in the industry, improving rider safety, reducing accidents, and optimizing fleet management.
- Geofencing allows cities to control where shared e-scooters and bikes are able to ride, having more control of the public rights-of-way (ROW) and conflicts with vulnerable roadway users (VRUs).

Current Conditions of the Practice

"Emerging Mobility" refers to technologies that are at various levels of integration into the existing transportation fabric but are still relatively new. The nascent nature of these technologies presents two challenges that are intrinsically linked: the first is that, with newness, there is inevitably less understanding of its implications. The second is that there is the need to think thoughtfully about the application of the technology prior to full-scale implementation.

There are key emerging technologies and streetscape uses that warrant specific awareness and attention in navigating the streetscape accessibility challenges. Those technologies and uses include autonomous vehicles, zero emission vehicles (i.e., electric vehicles), micro-mobility, sidewalk programming

(e.g., streeteries and food trucks), plus app-based ride hailing or on-demand delivery.

Autonomous Vehicles

The California DMV defines[61] autonomous technology as, "technology, including a combination of hardware and software, remote and/or on-board, that has the capability to drive a vehicle without active physical control or monitoring by a human operator." This technology is currently in various states of maturity, and challenges have, indeed, already arisen. In the Disability community there is both excitement for the technology to expand access to on-demand mobility, and deep concern regarding accessibility and safety for disabled passengers and pedestrians.

One of the arguments for AVs is that they can provide increased mobility for people with disabilities. But that is only possible if they are designed and deployed with accessibility in mind. As the technology continues to develop and is made more affordable, there are three clear accessibility-related challenges: vehicle design, supporting infrastructure, and vehicle interaction with street-users. The design of the autonomous vehicle itself is critical for ensuring accessibility for all users, especially individuals with disabilities. This includes physical access (e.g., ramps, lifts, spacious interiors

61 https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=VEH&sectionNum=38750

for wheelchairs, doorways, walking surfaces), user-friendly controls, and interfaces that accommodate a range of disabilities (e.g., visual, auditory, cognitive). Infrastructure and devices supporting AVs must also be accessible (e.g., curb design, pick-up/drop-off zones, signage, charging stations, apps accessed via smartphone or other devices).

AVs require designated areas for safe boarding and disembarking, and these spaces need to be universally accessible to all users. AVs must also be capable of perceiving and interacting safely and effectively with various street users, including people with mobility devices or disabilities, pedestrians, and cyclists. AVs need to be able to detect and respond appropriately to the unique behaviors and needs of these users, such as crossing speeds or movements of people with mobility disabilities or service animal users, and detecting where accessible infrastructure (e.g., curb cuts) is located.



Image 24: A dedicated accessible electric vehicle (EV) charging stall features wide, crosshatched access aisles and high-visibility painted asphalt markings at an upgraded Electrify America station in Bedford, Pennsylvania. Alan Hejj / SparkAccess.

Zero-Emission Vehicles

Zero-emission vehicles, also known as ZEVs, refer to vehicles that do not directly emit gas or other pollutants. The two most prominent ZEV technologies at the moment are battery-electric vehicles (BEV) (which also includes electric micro-mobility) and hydrogen fuel cell electric vehicles (FCEV). Transitioning to ZEVs is being promoted for several reasons, but among the most prominent is the role they play in reducing national greenhouse gas (GHG) emissions and air pollution. GHG emissions are the primary cause of climate change. Currently, the transportation sector is the sector responsible for the most GHG emissions in the United States (U.S.), accounting for

approximately 30 percent of U.S. GHGs[62]. The largest sources of transportation GHGs are light-duty trucks, which include sport utility vehicles, pickup trucks, and minivans (39.7%); medium and heavy-duty trucks (23.4%); passenger cars (16.6%); commercial aircraft (7.2%); pipelines (3.9%); ships and boats (2.4%); other aircraft (2.8%), and rail (1.9%).

When it comes to accessibility challenges with ZEVs and the streetscape, the friction comes from how these vehicles are fueled and how that may impede the streetscape. For FCEVs, the primary challenges with the pump-and-go experience are: a system which informs drivers with disabilities where and when accessible services are offered; assistance request systems; the height of the controls and keyboard which may put them out of reach to someone who uses a wheelchair; design of the nozzle and gas hose to accommodate dexterity disabilities; sufficient space for wheelchairs to navigate the width of lanes between fuel pumps, and how such facilities are accessed by vehicles while crossing the streetscape path for pedestrians and cyclists.

For BEVs, there are accessibility issues on the streetscape, as well as the fueling infrastructure. From a siting perspective, curbside charging provides more access for electric micro-mobility (e.g., chairs, cycles) and people in electric wheelchairs to also charge. However, fueling infrastructure design guidance for

62 https://www.c2es.org/content/u-s-emissions/

BEVs is oriented towards a gas station approach, despite permanently or temporarily appearing in some communities at the curb (such as Beam Global's EV ARC). It requires charging cords from the station or from the vehicle to an outlet hanging or laid out on the streetscape, raising the risk of an obstacle or tripping hazard for all users, especially for persons with disabilities. Furthermore, with most charging stations designed and operated as self-serve stations, there is a need for co-location of charging stations with customer support.

Other accessibility considerations for BEVs include mobility features and communication features at the charging station. Regarding mobility features, a sufficient number of EV chargers should be physically accessible to individuals using mobility devices (e.g., wheelchairs, scooters, walkers, and canes). Key accessibility mobility features include the size of the charging space, the availability of access aisles, the placement and installation of chargers, and ensuring the chargers are easy to operate. EV chargers should also include accessible communication features and operable components, allowing them to be used by individuals who are deaf or hard of hearing, and others.

Micro-Mobility Vehicles

The last decade has seen an exponential increase of micro-mobility devices on many community streetscapes. Prior to 2010, micro-mobility signified

the wheelchair, or mobility assistance device, as well as bicycles. In the 2010s, various municipalities welcomed various shared micro-mobility providers who offered docked and dockless bikeshare, scootershare, and personal delivery devices (i.e., sidewalk delivery robots) to help with the mobility of people and goods. This was also in parallel with shared mobility providers like regular and point-to-point carsharing and moped sharing with nearly all micro-mobility and sharing options being inaccessible to disabled people.

These new mobility tools drastically changed the streetscape ecosystem in many communities overnight. For micro-mobility, there were exponentially more bikes and scooters parking on the streetscape (e.g., on the sidewalk, locked to parking meters, in parking and loading clear zones, at bus stops). More people leveraging micro-mobility in parallel to personal delivery devices were navigating them on what, historically, in many communities, was the pedestrian path. That trend created an increase in speed differential exposure for pedestrians on the sidewalk. This speed differential on sidewalks became dangerously acute for persons with disabilities, especially those with sensory or cognitive disabilities.



Image 25: A pedestrian and a Starship Technologies autonomous sidewalk delivery robot wait side by side at a street crosswalk in Redwood City, California. Dcoetzee. Creative Commons CC0 1.0 Universal Public Domain Dedication.

Streetscape Programming

Many older communities feature an actively-programmed streetscape, dating back to days before the car. Sidewalk vendors, business signage, civic engagement and education, dining, and community event space was common on the street until the advent of the car. Auto dominance for nearly the past century pushed many of those uses out of the streetscape, save for some very dense communities like New York City, who still have a strong presence of sidewalk vendors. In the late 2000s, with an evolving economic climate imposing pressures on small businesses, communities

started to see the emergence of mobile vending (i.e., food trucks). In Washington, DC for example, the first food truck emerged at the 2009 presidential inauguration, and has exploded in presence since. Mobile vending transformed vehicles used for mobility into a place of business stationed in the streetscape. That created access challenges into the vehicle business space and created a fluid obstacle in the pedestrian path as people queued for the mobile vendor.

In 2020, the world experienced the COVID-19 pandemic, which altered how all communities lived, worked, and engaged. Commerce and community life that historically happened in adjoining land uses to the streetscape poured into the streets. To allow businesses to stay afloat, communities explored sidewalk dining and took advantage of outdoor ventilation. Other communities had a lack of play space and repurposed parking into adjoining park space, if not outright closing a street to vehicular traffic.

The streetscape programming within the past decade has evolved from what many knew it as, restoring a historical precedent to the streetscape, yet under a space-constrained streetscape, which in turn creates accessibility challenges for persons with disabilities trying to traverse the streetscape.

Ride Hailing and On-Demand Delivery

Taxis have been historically known as the ride hailing mobility option across communities. Their presence was known in a community via a taxi stand, adjoining curb space where taxis idled for passengers, then traversed to the nearest clear curb to allow passengers on/off. To be a taxi driver also involved training and a regulated code of conduct to ensure a consistent customer experience.

That paradigm was drastically altered in the 2010s with the advent of app-based ride hailing (e.g., Uber, Lyft, Via). These app-based services altered the ride hailing ecosystem by introducing private auto users seeking an on-demand gig to leverage their vehicle to transport people (and eventually goods) on-demand. These new ride hailing drivers typically have no formal training on how to engage customers, how to support disability riders, or how to navigate the streetscape to pick up or drop off passengers. This enables customers to be dropped as close to their destination as possible, without regard to the consequences of other streetscape users. That has often meant blocked bike lanes, crosswalks, or even bus stops.

Partway through the 2010s, app-based ride hailing's cousin service, on-demand delivery, emerged in communities. When a user wanted take-out or something from a convenience store, they could leverage one of these services to pick it up and deliver it. That meant app-based drivers idling in the streetscape

without regard to consequences for other users when picking up or dropping off their orders. Washington, DC in 2017 introduced a PUDO (pick-up/drop-off) zone, aimed to provide a demarcated area to safely pick up passengers without hindering the safety of passengers or other streetscape users.

Recommendations

The emerging mobility trends noted earlier are not a fully exhaustive list of technologies and use changes of the streetscape. As opposed to long established transportation covered in other sections, there is not a long list of experience, best practices, or standards to turn to. The recommended considerations that a community should contemplate are regardless of the emerging mobility trend in their community. Each question should be answered through the lens of the fundamental purpose of the streetscape: to facilitate the accessible movement of people and goods safely and efficiently, while also shaping public life, supporting social interaction, local identity, civic belonging, and environmental harmony.

- Does an emerging technology or use hinder that purpose? If so, how? Are there any considerations to mitigate such hindrances?
- Does an emerging technology or use account for/test for diverse types of users and their associated mobility behaviors?

- Do AI cameras and technology detect and appropriately respond to all people with all disabilities and people with all skin complexions? Is data collected by AI cameras secure, and does it respect traveler privacy?
- When dealing with autonomous vehicles, does the vehicle sensor technology detect and anticipate the behavior of the diversity of persons with disabilities (e.g., a wheelchair or service animal user, people with sensory or cognitive disabilities)? Will the vehicle pay extra attention to individuals with darting behavior, such as children and individuals who are known runners (elopement)?
- Does an emerging technology or use provide for clear navigation and education for all types of users? In thinking about charging stations, does signage and user interfaces provide ample communication solutions to convey the use and/or navigation?

As mobility technology is rolled out in a community, practitioners should develop outreach/education resources and tools. Members of the public may not understand how to use key accessibility elements for emerging mobility technology or the rationale behind them. By creating tutorials and information resources, the public can better understand and respect these elements, as well as persons with disabilities being

better able to understand and navigate emerging mobility technologies.

With the advancement of emerging mobility technology, practitioners need to define and implement a routine maintenance program to ensure the emerging mobility technology, adjacent accessibility elements, and applicable temporary work zones are kept in good condition and free of obstructions. This is crucially important when it comes to winter maintenance and ensuring emerging mobility technologies are clear of snow and ice, not creating an obstacle for persons with disabilities. For example, some communities have created designated mobility hubs and parking zones for micro-mobility vehicles, in addition to enforced securing of those vehicles in the appropriate parking location. This has lowered some friction of improperly placed micro-mobility vehicles in the streetscape.

Lastly, consult/document Policy and Investment Solutions in ADA Transition and/or Olmstead Plans: emerging mobility will evolve quickly, but it is crucial to contemplate then document the accessible policies, strategies, and investments in those solutions. By charting out a strategy and defining agency roles and responsibilities to incrementally address accessibility with measurable and attainable performance metrics, practitioners can manage expectations and build community goodwill.

The Work Continues:
A Call to Keep Advocating and Engaging

The Inclusive Streetscape Design Framework covered various streetscape components typically found in communities across the U.S. and occasionally around the world, but may have missed some nuanced elements. It will be for organizations like NACTO[63], AASHTO[64], ITE[65], and other national and international transportation organizations to engage national and international disability organizations to debate, deliberate, and reach consensus on best practice street design specifics. How we use our streets and streetscape will continue to evolve, and established standards will have to adapt and evolve with those changes.

Regardless of specific streetscape design elements, we can look to other examples of accessible design that provide a framework for providing inclusive streetscapes and spaces.

63 https://nacto.org/

64 https://transportation.org/

65 https://www.ite.org/

DeafScape[66], an application of the DeafSpace Project[67] that focuses on deaf accessibility in public spaces, establishes 8 principles for designing accessible public spaces. The first principle advocates for textured transitions between sidewalks, streets, and other walking areas. The second, shoulder zone, refers to barriers between these different kinds of infrastructure and how, when designed for accessibility, they can improve options for users to rest or communicate. The other principles include degree of enclosure, night lighting, flexible seating, wider pathways, rhythm, and multisensory cues. Within each principle there are specific design recommendations that can improve accessibility in these spaces, but more broadly, they illustrate the kinds of considerations we should have in order to improve accessibility in these spaces.

When it comes to designing public spaces, best practices[68] in regards to visual impairment accessible design calls for recommended design considerations, including:

66 https://www.landscapeperformance.org/collections/deafscape-principles-in-public-spaces

67 https://gallaudet.edu/campus-design-facilities/campus-design-and-planning/deafspace/

68 https://www.fhwa.dot.gov/environment/bicycle_pedestrian/publications/accessible_shared_streets/?_gl=1*mihmnh*_ga*MTg0NTY0Mjg3OS4xNzQ4NzQ3ODc2*_ga_VW1SFWJKBB*czE3NTA5NTc5MjgkbzUkZzAkdDE3NTA5NTc5MzMkajU1JGwwJGgw

- Context-sensitive street design to adjoining community and land uses
- Providing layers of information in design to respond to diverse needs of persons with disabilities
    - Alignment of the pedestrian access route and other streetscape features
    - Tactile walking surface indicators, detectable edges, and detectable changes in surface texture
    - Appropriate and consistent use of detectable warning surfaces
    - Materials and texture, in addition to color and tonal contrast
    - Signs and markings
    - Audible information (e.g., accessible pedestrian signals, and environment information)
    - Electronic wayfinding information or tactile maps (i.e., maps with raised features that people who are blind can use for interpretation)
- Creating clear, predictable, consistent, and safe environments, even for special event streetscape programming.
- Providing for consistent operations and maintenance of streetscape design elements, regardless of climate and use.

Jason Slocombe is an inclusive designer working with MotionSpot[69] and identifies 5 essential design considerations[70] for people with cognitive disabilities:

- Acoustic environment
- Reducing visual noise
- Easy entrances
- Welcoming sanitary facilities
- Recalibration and seating

Additionally, when it comes to interacting with people with cognitive disabilities, PEAC[71] suggests that messaging be simplified to very basic terms and, if possible, binary choices such as if a design element is "mean" or "nice".

Improvements to signage and information sharing on streetscapes can be made by utilizing easy-to-understand images and/or vocabulary. These considerations will also aid non-English speakers with navigating public spaces.

Building upon communication improvements, practitioners should develop outreach/education resources and tools. Members of the public may not understand how to use key accessibility elements for

69 https://motionspot.co.uk/

70 Slocombe J., accessed 06/24:2026: https://hdsunflower.com/au/insights/post/design-accessible-spaces

71 https://www.bikeprogram.org/

streetscapes, or the rationale behind them. By creating tutorials and information resources, the public can better understand and respect these elements, as well as helping persons with disabilities to be able to better understand and navigate them.

Final Thoughts

The Inclusive Streetscape Design Framework serves as a supportive resource to help practitioners refine and advocates to push for streetscape design to better serve all their stakeholders and constituents, regardless of ability.

In a perfect world with ample resources, guidance suggested in this framework and resources cited throughout the document would be applied as standard practice. The reality is that many communities are resource-constrained and have varying levels of political will to advance changes in streetscape design practice.

Perfection is the enemy of the good when it comes to advancing accessible streetscape design. If communities can come together to incrementally improve streetscape accessibility, it builds community experience to want more inclusive design. Budgets and resources are reflections of community values, so it is important to change hearts and minds, reminding the community that everyone experiences disability, developing temporary and/or permanent disabilities

in their lifetime. Improving accessibility for persons with disabilities in the present will surely help other community members in the future.

Resources

REPORT NAME	AUTHOR	HIGH LEVEL TOPIC	RESOURCE CATEGORY
Children crossing streets: The cognitive task of pedestrians across nations	David C. Schwebel, Department of Psychology, University of Alabama at Birmingham	Assessing risk in Low and Middle Income Countries (LMICs) for children crossing roadways	Background
The Forgotten History of How Accessible Design Reshaped the Streets	Sara Hendren	History of Disability Activism	Background
Intellectual Disability, a Little Known and Multidimensional Disability	Lise Wagner - Inclusive City Maker	Disability awareness and education	Background
Access for Individuals with Disabilities	Pedestrian and Bicycle Information Center	Resource guide for accessible street legal rights and guidebooks for designers	Background

Benchmarking Accessibility in Cities: Measuring the Impact of Proximity and Transport Performance	International Transport Forum: Dimitrios Papaioannou and Nicolas Wagner of the International Transport Forum, Alexander C. Lembcke of the OECD Centre for Entrepreneurship, SMEs, Regions and Cities, and Lewis Dijkstra of the European Commission's Directorate-General for Regional and Urban Policy	Establishes a new urban accessibility framework by identifying which destinations can be reached on foot, by bicycle, public transport or car within a certain time (accessibility) and then identifying how many destinations are nearby (proximity).	Background
City of Bellevue Curb Management Plan	Bellevue Transportation Commission (May 2023), Bellevue City Council (July 2023), Various Consultants, City of Bellevue Core Team, City of Bellevue Leadership & Oversight Team, Subject Matter Experts & Other Contributors (listed on pg. 2)	Curb typology framework and illustration of management principles including public engagement, policy development, and prioritization recommendations	Background
Safety Benefits of Walkways, Sidewalks, and Paved Shoulders	FHWA Safety Program	Foundational information—sidewalks	Background
ADA Transition Plan and Inventory Map	FHWA		Background

DREDF Transportation Resources	DREDF	ADA Topic Guides, Reports, Links to Comments, CCD	Background
Better for People with Disabilities: How can we offer equity of access for people with disabilities?	Streets Alive Yarra - Website	Policy plan to improve the accessibility of Yarra Streets—also, a petition	Key Accessibility Issues
Addressing Transportation and Accessibility for All	TR News, Various Authors throughout Issue	Accessible transit design, planning, technology, decision making, healthcare, and working conditions	Key Accessibility Issues
Professional Practice - Universal Design	Ian Dillon and Jared Green - ASLA	Landscape architecture design principles and communities to consider.	Key Accessibility Issues
Accessibility Toolkit: When Complete Streets Help People with Disabilities	Zoe Gervais	Complete Streets and Accessibility	Key Accessibility Issues
New Accessibility Rule Could Impact Employees with Disabilities	Matt Gonzales - Society for Human Resource Management	New public right of way guidelines issued by U.S. Access Board	Key Accessibility Issues
They don't just stay in a room to die: new buildings giving older people beauty, freedom, and dignity	Rowan Moore - The Guardian	Architectural design principles for older people and people with age-related disabilities	Key Accessibility Issues

Parking & Mobility Magazine, May 2024 Issue: Accessibility & Transportation Equity	Various Authors	Magazine issue with resources for practitioners, survey results, transportation equity, and other accessibility/equity topics.	Key Accessibility Issues
Crossing solutions at roundabouts and channelized turn lanes for pedestrians with vision disabilities: A guidebook	National Academies of Sciences, Engineering, and Medicine	An accessibility framework and methodology for evaluating treatment alternatives for proposed crossing and wayfinding accommodations.	Accessible Streetscape Design
Getting to the Curb: Guide to Building Protected bike Lanes working for Peds	Walk San Francisco	Streetscape/Curb design considerations for bike/ped and disabilities	Accessible Streetscape Design
ADA Best Practices Tool Kit for State and Local Governments	US Access Board	Implementation best practices	Accessible Streetscape Design
Missouri DOT ADA Checklist	Missouri DOT	Design standards	Accessible Streetscape Design
Special Report: Accessible Public Rights-of-Way Planning and Design for Alterations	PROWAAC/Otak, Inc.	Planning and designing for streetscape alterations	Accessible Streetscape Design

Tactile wayfinding in transportation settings for travelers who are blind or visually impaired	O'Brien, S.W./ UNC - Chapel Hill	Tactile Walking Surface Indicators (TWSIs) as an effective solution to wayfinding for visually-impaired travelers.	Key Accessibility Issues
The Sunflower Icons	Hidden Disabilities Sunflower	Communication designs for people with support needs due to disability.	Communicating Accessible Complete Streets
Planning and designing streets to be safer and more accessible for people with vision disabilities. A toolkit for Montgomery County and the Metropolitan Washington Region	Toole Design	Guidance for designing streets and outdoor spaces in urban areas that are more accessible to people with low vision or vision loss.	Accessible Streetscape Design
Accessible Sidewalks and Street Crossings - an informational guide	U.S. DOT/Federal Highway Administration	Accessible design standards for sidewalk corridors	Accessible Streetscape Design
Accessible Street Design	City of Vancouver (BC, Canada) Engineering Services	Design standards for accessible streets	Accessible Streetscape Design
Deafscape: Applying DeafSpace to Landscape	Alexa Vaughn	Design guide for Deaf accessibility in Landscape Architecture	Accessible Streetscape Design

Deafscape: Principles in Public Spaces	Alexa Vaughn	Case Study briefs which illustrate design principles in "Deafscape: Applying DeafSpace to Landscape."	Accessible Streetscape Design
DeafSpace - Campus Design and Planning	Gallaudet University - Website	An introduction to the DeafSpace Project and Concepts	Accessible Streetscape Design
How to Design a Better City for Deaf People	Sarah Holder	Bloomberg CityLab Article - Gallaudet DeafSpace	Accessible Streetscape Design
How Gallaudet University's architects are redefining deaf space	Amanda Kolson Hurley	Curbed Article - Gallaudet DeafSpace	Accessible Streetscape Design
Why Inclusive Cities Start with Safe Streets	Diana Budds	ASLA's universal design guidelines	Accessible Streetscape Design
Professional Practice - Universal Design: Neighborhoods	ASLA	Design Guide	Accessible Streetscape Design
Professional Practice - Universal Design: Parks and Plazas	ASLA	Design Guide	Accessible Streetscape Design
Professional Practice - Universal Design: Playgrounds	ASLA	Design Guide	Accessible Streetscape Design
Professional Practice - Universal Design: Streets	ASLA	Design Guide	Accessible Streetscape Design

This Streetscape Was Designed by a Deaf Person for Deaf People	Samantha Swenson	Universal Streets	Accessible Streetscape Design
When it redesigns its campus, Gallaudet hopes to pioneer architecture for the Deaf	Neil Flanagan	DeafSpace	Accessible Streetscape Design
How to design spaces to better meet the needs of neurodivergent groups	Jason Slocombe, Senior Inclusive Design Consultant and Neurodiversity Design Specialist, Motionspot	Design considerations for the neurodivergent community.	Accessible Streetscape Design
Towards a More Accessible Curbside: Opportunities and Challenges with Accessible Metered Parking in Washington, D.C.	Benito O. Pérez, AICP CTP; Travis Flowers	Accessible curbside access.	Accessible Streetscape Operations
Global Street Design Guide	Global Designing Cities Initiative, NACTO, Island Press	Design guide for urban streets.	Accessible Streetscape Project Development
Design for the Mind - Neurodiversity and the built environment	Jean Hewitt	Design considerations for the neurodivergent community.	Accessible Streetscape Project Development
ADA Transition Plans: A Guide to Best Management Practices	Jacobs Engineering	Development and management of ADA transition plans.	Accessible Streetscape Project Development

DeafSpace's Design Principles Take Shape in the DC Area - A talk in NoMa earlier this week highlighted pioneering projects that promote visual communication	Edward Russell	DeafSpace.	Accessible Streetscape Public Engagement
Thefts of parking meters has impact on people living with disabilities	Kristen Mirand	Accessible parking.	Accessible Streetscape Public Engagement
Design Recommendations for Accessible Electric Vehicle Charging Stations	U.S. Access Board	Accessible Design and Electric Vehicle Charging Stations.	Accessible EV Charging
The Hidden Disabilities Sunflower	Hidden Disabilities Sunflower	Intro to Hidden Sunflower Network - disability advocacy and support program.	Communicating Accessible Complete Streets
The Case Against Sidewalks and How Can Create New Avenues for Pedestrians	Alissa Walker	Sidewalk maintenance, rethinking the separation between street and sidewalk.	Accessible People Centric Street Uses
How to Make Shared Streets Truly Shared by All	Lise Wagner - Inclusive City Maker	Shared Streets.	Accessible People Centric Street Uses
Accessible Shared Streets	Elliott, J; Lohse, K; Toole, J; Lockwood, I; Barlow, J; Bentzen, B; Porter, C	U.S. DOT Federal Highway Administration.	Accessible People Centric Street Uses

Accessible Streets Studio - Virtual Showcase	Past Events	Showcase of pilot programs/ technologies deployed to address transportation challenges and accessibility gaps.	Accessible Technology
ADA Alert: California Requires Electric Vehicle Charging Stations to be Accessible to Drivers with Disabilities	Martin H. Orlick - ADA Compliance and Defense Blog	Growing applications for ADA regulation.	Accessible EV Charging
Defining and Measuring Equity in Public Transportation	Christopher E. Ferrell, David B. Reinke, John M. Eells, Matthew M. Schroeder	Policies and Practices for equity measurement in public transit.	Equity
Disability Rights Advocates Sue Baltimore For Accessible Sidewalks, Streets	Emily Sullivan	Class action suit for more accessible sidewalks.	Equity
Completing Sidewalk Networks: Benefits and Costs	Todd Litman, Victoria Transport Policy Institute	Improving current sidewalks and expanding those networks have benefits which outweigh costs.	Funding
NYC DOT Initiatives for People with Disabilities	NYC DOT	Accessible DOT programs and projects.	Standards and Policies

Report Calls for Safe and Accessible Streets	Disability Rights UK	Policy/Planning proposal.	Standards and Policies
The Practical Application of PROWAG: When Does it Impact My Project's Design and Compliance?	Lee Rodegerdts, Fred Wismer, and Bastian Schroeder	Policy implementation guidelines (PROWAG).	Standards and Policies
Guide to the ADA Accessibility Standards	U.S. Access Board	Design standards for accessible streetscape.	Standards and Policies
Accessible Parking Spaces	ADA - U.S. Department of Justice and Civil Rights	ADA requirements for accessible parking spaces.	Standards and Policies
ADA Compliance Brief: Restriping Parking Spaces	ADA - U.S. Department of Justice and Civil Rights	Implementation protocol for ADA requirements for accessible parking spaces.	Standards and Policies
2010 ADA Standards for Accessible Design	ADA - U.S. Department of Justice and Civil Rights	Revised regulations to the original 1990 Americans with Disabilities Act.	Standards and Policies
Simsbury Police Cracking Down On Disabled Parking Scofflaws	Michael Lemanski,Patch Staff	Accessible parking awareness.	Standards and Policies
Why American Cities Still Aren't Accessible After 33 Years of the ADA	Steve Wright	Accessibility legislation.	Standards and Policies

Not enough accessible parking spaces for people with disabilities claims Manx Stroke Foundation	Manx Radio - Chanelle Sukhoo	Accessible parking challenges and awareness.	Standards and Policies
PROWAG	U.S. Access Board	New guidance on public right of way accessibility standards.	Standards and Policies
Equal citizenship for people with disabilities	Antoine Fobe	European Disability Card.	Future Research
Developmental risk factors for childhood pedestrian injuries	Richard Schieber, Nancy Thompson	NCIPC, CDC.	Key Accessibility Issues
Walkability Checklist	NHTSA	Checklist to determine community walkability.	Education and Awareness
Travel Access as a Key to Equitable Planning	Fehr and Peers	Accessibility framing.	Education and Awareness
Accessible Sidewalks for Inclusive Cities	Narae Choi Gunes Basat	Sidewalk mapping project.	Education and Awareness
A Review Of Public Right-Of-Way Accessibility Experiences In Canada	Canadian ITE	Survey of accessibility framework in Canada.	Standards and Policies
EV Accessibility NPRM Comments	T4America	Accessibility Guidance feedback.	EV Charging
Urban Bikeway Design Guide	NACTO	Bikeway design guidance.	Accessible Streetscape Design

Spotlight on Mobility Trends	Kersten Heineke, Philipp Kampshoff, and Timo Möller	Future mobility trends.	Future Research
Accessible Parking Guide	United Spinal Association	Accessible Parking.	Education and Awareness
AVs and Increased Accessibility Workshop Series (2019)	Alliance of Automobile Manufacturers	Accessible AV issues identified and recommendations.	Accessible AVs
When We Say "Safe Vehicles" Inclusive Algorithms & Data, Privacy Presentation	DREDF	AV detection and algorithmic bias concerns and recommendations.	Accessible AVs

Glossary:
Key Terms and Concepts

This is a non-exhaustive list of terms and acronyms with their associated definitions found or inferred throughout the Inclusive Streetscape Design Framework.

Accessibility - individuals with disabilities can equally access and benefit from information, interactions, mobility, and services, similar to those without disabilities, with comparable ease of use.

Accessible pedestrian path/route - continuous, unobstructed path designed to be safely and easily used by individuals with disabilities, including those using wheelchairs. It connects accessible elements and spaces within a site, ensuring they can be reached and traversed without barriers. The minimum width is 5 feet (1.5 meters). Also known by engineers as a pedestrian access route (PAR) or pedestrian through zone.

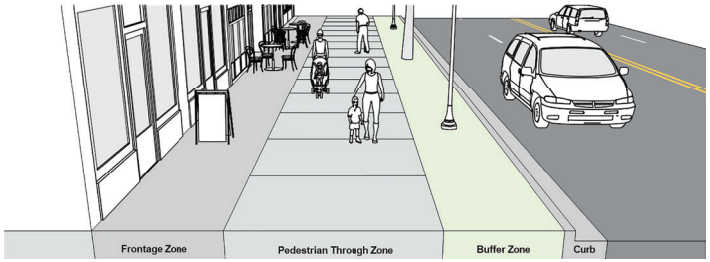


Image 26: Curbed roadway pedestrian zone showing the frontage zone, pedestrian through zone, buffer zone, and curb. Ohio Department of Transportation.

Accessible pedestrian signal (APS) - devices that provide auditory, visual, and vibrotactile information to pedestrians who are blind or who have low vision, who may also have hearing loss, so they can know when they should begin to cross at a signalized intersection. Also known as an accessible push button.



Image 27: Pedestrian signal push button. Raysonho @ Open Grid Scheduler / Grid Engine, 21 July 2015. CC0 1.0 Universal (Public Domain Dedication).

ADA placards/permits - a visible credential for vehicles issued by a state/province/territory department of motor vehicles that allows people with disabilities to park in designated accessible spaces and potentially receive other parking benefits.



Image 28: Disability parking placard displayed in a vehicle. DC Department of Motor Vehicles.

ADA Standards for Accessible Design - initially issued in 1991 and last updated in 2010, these are standards that stipulate what is required for a building or facility to be physically accessible to people with disabilities. More information at https://www.ada.gov/law-and-regs/design-standards/. Could also be known by Civil Rights coordinators as ADAAG.

ADA Transition Plan - document required by the Americans with Disabilities Act (ADA) that outlines how a public entity will make its facilities and programs accessible to people with disabilities.

Adaptive mobility - any tool, device, or machine that is used to help with any task associated with daily mobility. Can include, but not limited to, accessible vans, adaptive cycles, mobility devices.

Alighting - descending from a bus, train, or other public transit vehicle.

American Association of State Highway and Transportation Officials (AASHTO) - a nonprofit, nonpartisan association representing highway and transportation departments in the 50 states, the District of Columbia, and Puerto Rico. It represents all transportation modes: air, highways, public transportation, active transportation, rail, and water. More information at www.transportation.org.

Americans with Disabilities Act (ADA) - the Americans with Disabilities Act (ADA) is a comprehensive civil rights law that prohibits discrimination based on disability in many areas of public life. It ensures equal opportunities for individuals with disabilities in employment, public services, public accommodations, and telecommunications. More information at www.ada.gov.

Angled parking - also known as diagonal parking, is a parking configuration where vehicles are parked at an angle to the curb or edge of the road, rather than parallel or perpendicular.

Apex - the most inside point of an intersection corner, typically protected by a curb structure. Also, the location is not recommended to install a curb ramp.

Artificial intelligence (AI) - the simulation of human intelligence in machines that are programmed to think and act like humans.

Association of University Centers on Disabilities (AUCD) - a diverse network of practitioners, researchers, educators, emerging leaders, people with disabilities, community advocates, and professionals. More information at www.aucd.org.

Autonomous Vehicles (AVs) - also known as a self-driving vehicle, it is a vehicle that can operate with limited to no human interaction.

Battery electric vehicles (BEVs) - a type of electric vehicle that runs solely on electricity stored in a battery pack, with no internal combustion engine.

Braille - a tactile writing system used by individuals who are blind or visually impaired to read and write.

Bus stop - a location on the streetscape that buses stop to pick up and drop off passengers.

Busway - a dedicated roadway or lane for the exclusive use of buses.

Caption - a brief piece of text that accompanies an image, video, or other media to provide context, explanation, or description.

Charging station - also known as a charge point, chargepoint, or electric vehicle supply equipment (EVSE), this is a power supply device that supplies electrical power for recharging plug-in electric vehicles.

Clear zone - the unobstructed space at the curb required for accessible boarding or alighting, particularly for individuals using wheelchairs or other mobility devices. The minimum area is 48 inches by 48 inches (1.2 meters by 1.2 meters).

Cognitive disability - a condition that can impact an individual's thinking, learning, remembering, and/or problem-solving abilities. It's a broad term encompassing various conditions that affect cognitive functions, including intellectual disability, autism spectrum disorders, brain injury, dementia, and persistent mental illness. These disabilities can manifest as difficulties with intellectual functioning, learning, and processing information.

Commons - as it pertains to streetscapes and sidewalks, a shared community use.

Complete Streets - an approach to planning, designing, and building streets that enables safe access for all users, including pedestrians, bicyclists, motorists, and transit riders of all ages and disability status.

Concrete stop - a physical barrier, often made of concrete, that separates the bike lane from motorized vehicle traffic.



Image 29: Concrete curb separating the protected bike lane from motor-vehicle traffic on Clybourn Avenue in Chicago. Steven Vance. Creative Commons Attribution-NonCommercial-ShareAlike 2.0 Generic.

Conflict point - any location where the paths of two or more vehicles, pedestrians, or cyclists may intersect, potentially leading to a collision.

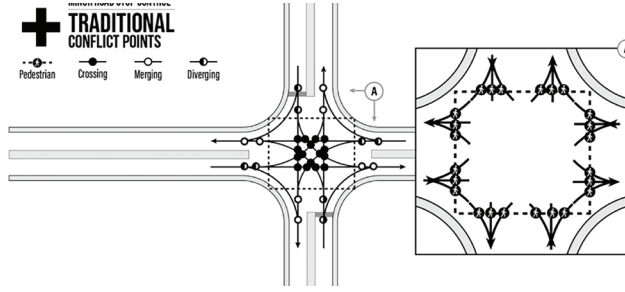


Image 30: Traditional conflict points at a minor-road stop-controlled intersection, showing numerous pedestrian, crossing, merging, and diverging conflicts. Federal Highway Administration (FHWA.) Public Domain.

Consortium for Constituents with Disabilities (CCD) - largest coalition of national organizations working together to advocate for federal public policy that ensures the self-determination, independence, empowerment, integration and inclusion of children and adults with disabilities in all aspects of society. More information at www.c-c-d.org.

Curb - raised edge of a sidewalk or pavement where it meets the street or road.

Curb cut - a section of a curb that is lowered to ground level, typically to create a ramp for access between a sidewalk and a street or driveway.

Curb ramp - a short ramp cutting through a curb or built up to it.

Cycle boulevard - a type of street designed to prioritize cycle traffic and create a comfortable, low-stress environment for cyclists.

Cycle lanes - a designated section of a road separated from other traffic lanes, typically by a painted line, for the exclusive use of cyclists.

Cycleways/cycle path/bikeway - a path or route specifically designed for cyclists, often separated from other traffic.

Cyclist - a person who rides a bicycle or any other type of cycle powered by pedal movement.

Degree of curvature - a measure of how sharply a curve bends, typically used in civil engineering for designing roads.

Delineator – a physical barrier placed along a set, painted line, thus clearly delineating the line that separates traffic—or identifying changes in traffic. Can be, but not limited to, bollards, traffic cones, traffic barrels, or planters.



Image 31: “BikeRail” barrier separating a protected bikeway from motor-vehicle traffic on Eads Street in Crystal City. BeyondDC, “BikeRail” protected bikeway barrier by DezignLine, 2019. Creative Commons Attribution-Non-Commercial 2.0.

Detour - a long or roundabout route that is taken to avoid something, such as construction, completely blocking a travel path.

Disability - the result of the interaction between individuals with a life-long or acquired health condition, such as cerebral palsy, autism, blindness, or amputation and personal and environmental factors, including negative attitudes, inaccessible transportation and public buildings, and limited social support. (Adapted from the World Health Organization definition.)

Disabled parking - designated parking spaces parallel to the curb that provide a clear zone to embark/disembark a vehicle safely.

Disability Rights Education and Defense Fund (DREDF) - founded in 1979, this is a leading national civil rights law and policy center directed by individuals with disabilities and parents who have children with disabilities. More information at www.dredf.org.

Driving lane - a designated portion of a road, typically marked by lines, that is meant for a single line of vehicles to travel in the same direction.

E-bike - a bicycle that can be run on electric power as well as by pedaling.

E-scooter - a two-wheeled vehicle powered by an electric motor, designed for personal transportation, typically for short distances in urban areas. They are lightweight, often foldable, and generally ridden while standing.

E-wheelchair - also known as a power wheelchair, a mobility device that uses an electric motor and batteries to propel the chair, allowing individuals with mobility impairments to move independently.

Electric vehicles (EVs) - a vehicle that is propelled by one or more electric motor, using electrical energy stored in rechargeable batteries as its primary power source.

Fire hose connection - also known as a Fire Department Connection (FDC), a connection point on the exterior of a building that allows firefighters to supply water to the building's sprinkler system or standpipe system.



Image 32: Fire department hose connection on a building in downtown Durham, North Carolina. Ildar Sagdejev (Specious), 2008. Creative Commons Attribution-ShareAlike 4.0

First/last mile - refers to the initial or final leg of a journey, typically from an origin point (like a home or business) to a transit station or stop or from the transit station or stop to the destination.

Fixed Route service - type of public transit where vehicles, like buses or trains, follow a predetermined path and schedule, with designated stops for picking up and dropping off passengers.

Flashing yellow - a traffic signal mode in which drivers should proceed with caution, slowing down and being prepared to yield to pedestrians and other vehicles. It indicates a potential hazard, requiring extra attention and alertness. For some signalized intersections, flashing yellow mode disables the crosswalk signals, which could leave persons with cognitive disabilities with no information on when to cross.

Food trucks - a vehicle, trailer, or cart from which food or drink for human consumption is sold or dispensed.

Fuel cell electric vehicles (FCEVs) - an electric vehicle that uses a fuel cell to generate electricity, rather than a battery pack. This electricity powers the vehicle's electric motor, and the only byproduct is water vapor. FCEVs are fueled with hydrogen gas, which is stored in a tank on the vehicle.

Geofencing - the use of global position system (GPS) or Radio Frequency Identification (RFID) technology to create a virtual geographic boundary, enabling software to trigger a response when a mobile device enters or leaves a particular area.

Grade - also known as slope, it is the incline or steepness of an accessible route, such as a sidewalk or ramp. The maximum grade for pedestrian access routes or clear zones is 3%, or rising one inch every 3 feet in length and/or width, and 8%, or rising 1 inch every foot in length or width, for curb ramps.

Greenhouse gas (GHG) - gases in the Earth's atmosphere that trap heat, contributing to the greenhouse effect and warming the planet

Hearing disability - a partial or total inability to hear, which can range from mild to profound and can affect one or both ears.

Idaho stop - the common name for laws that allow cyclists to treat a stop sign as a yield sign, and a red light as a stop sign.

Independent living - self-determination and control for individuals with disabilities, enabling them to make choices about their lives and participate fully in society.

Independent Living Movement - a social movement led by disabled people that started in the mid-20th century, focused on empowering people with disabilities to live as independently

as possible, advocating for their rights and promoting community inclusion.

Intercity rail - passenger train services that travel between cities, typically covering longer distances than commuter or regional trains.

International Parking and Mobility Institute (IPMI) - world's largest association of professionals in parking, transportation, and mobility—professionals working to advance the parking and mobility profession through professional development, research and data collection, advocacy, and outreach. More information at www.parking-mobility.org.

Intersection - a location where two paths of travel intersect.

Intersection clear zone - also known as the intersection daylight zone or stop clear zone, it's the area near a crosswalk or intersection cleared of parked vehicles and other obstructions to improve visibility for drivers, cyclists, and pedestrians.

Invisible disability - a physical, mental, or neurological condition that is not readily apparent to others, yet significantly limits a person's movements, senses, or activities, and impacts their daily life. These conditions can range from chronic illnesses and pain to mental health conditions, learning differences, and sensory processing disorders.

Landing area - also known as a level rest area, a level area at the top and bottom of a curb ramp or where a ramp changes direction. It provides space for users to maneuver, rest, and transition between different sections.

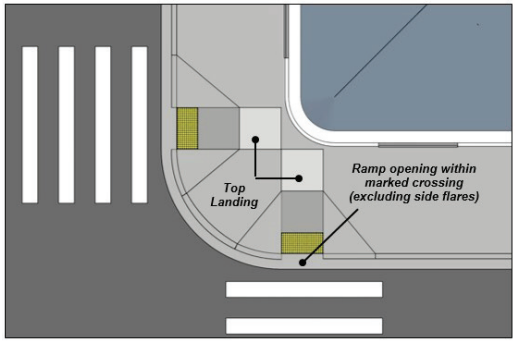


Image 33: Curb ramp with the ramp opening contained within the marked pedestrian crossing, excluding street flares. U.S. Access Board. Public Domain.

Lane markings - painted lines on the road that guide drivers and regulate traffic.

Language access -the provision of services to ensure that individuals with limited English proficiency (LEP) have the same access to services as English speakers.

Level boarding - the transit vehicle's floor is at the same height as the platform or curb, allowing passengers to enter and exit the transit vehicle without needing to climb steps or use ramps.

Level crossing - also known as a grade crossing or railroad crossing, is where a railway line intersects with a road, path, or runway at the same level.

Level ground - a walking surface that has a minimal slope.

Light Rail - a form of urban passenger rail transportation that uses electric-powered cars or short trains on fixed rails.

Loading zones - a designated area, usually on a street, where vehicles can temporarily park to load or unload passengers, baggage, or goods.

Manual of Uniform Traffic Control Devices (MUTCD) - the manual that defines the standards used by road managers nationwide to install and maintain traffic control devices on all streets, highways, pedestrian and bicycle facilities, and site roadways open to public travel. More information at www.mutcd.fhwa.dot.gov.

Median - a physical barrier or strip that separates opposing lanes of traffic. Can be raised and used as a pedestrian refuge.



Image 34: Trees and planters on a landscaped median strip along a divided road in Wetaskiwin, Alberta. BethGwynne, 2021. Creative Commons Attribution-ShareAlike 4.0.

Micro-mobility - transportation using lightweight vehicles such as bicycles or scooters, especially electric ones, that may be owned or borrowed as part of a self-service rental program in which people rent vehicles for short-term use within a town or city.

Mixed traffic zone - area or facility where different modes of transportation, such as motor vehicles, bicycles, and pedestrians share the same space or roadway.

Moped sharing - a micro-mobility system where electric mopeds are made available for short-term rental to the public, often through a mobile app.

National Association of City Transportation Officials (NACTO) - an association of North American cities and transit agencies formed to exchange transportation ideas, insights, and practices and cooperatively approach national transportation issues. More information at www.nacto.org.

National Council of Disability (NCD) - an advisory agency on disability policy in the United States for all levels of government and for private sector entities. More information at www.ncd.gov.

Neurodiversity - defined by the Autistic Self Advocacy Network as no two brains being exactly the same. The neurodiversity movement says that people with brain-based disabilities (like autism, intellectual disabilities, learning disabilities, or mental health disabilities) should be accepted and included in society just like neurotypical people (people without brain-based disabilities). More information at https://autisticadvocacy.org/about-asan/what-we-believe/.

Obstruction - an object that blocks navigation of the streetscape.

Olmstead plan - a public entity's roadmap for complying with the Supreme Court's Olmstead decision, which mandates that people with disabilities should be supported to live in community settings, rather than in institutions, whenever appropriate.

Olmstead v. Lois Curtis - a landmark Supreme Court decision in 1999 that affirmed the right of people with disabilities to live in the most integrated setting appropriate to their needs, rather than being unnecessarily segregated in institutions. It required public entities to develop Olmstead plans. More information at www.olmsteadrights.org/about-olmstead/.

On-demand delivery (ODD) service - a service where goods—often prepared food, groceries, or other consumer staples—are delivered to customers quickly and efficiently, with the customer having some control over the delivery time and location via a mobile app.

On-demand service - also known as demand-responsive transit (DRT) or micro-transit, refers to a flexible transportation service where vehicles are dispatched to pick up and drop off passengers based on real-time requests, rather than following fixed routes and schedules.

Parallel parking - parking of a vehicle or vehicles parallel to the curb.

Paratransit - a form of on-demand public transportation designed to serve individuals who cannot utilize standard fixed-route bus or rail services due to disabilities or other limitations.

Parking - the act of stopping and disengaging a vehicle and, usually, leaving it unoccupied temporarily, either at the curb or in an off-street facility.

Parking lane - a designated area alongside a road, separated from the main traffic lanes, where vehicles can legally park.

Parking meter - a machine next to a parking space in a street, into which the driver puts money so as to be authorized to park the vehicle for a particular length of time.

Parklet - a small permanent or temporary seating area or green space created as a public amenity on or alongside a sidewalk, especially in a former roadside parking space.



Image 35: Parklet on Struga Street near Piotrkowska Street in Łódź, Poland. Zorro2212, 2016. Creative Commons Attribution-ShareAlike 4.0.

Pavement markings - also known as striping, these are painted lines, symbols, and patterns on roads and parking lots that guide, control, and regulate traffic.

PEAC - a non-profit organization based in Ypsilanti, Michigan that advocates for transportation equity for Michiganders with disabilities. Our

travel training programs teach people how to ride bikes and public transit safely and independently. More information at www.bikeprogram.org.

Pedestrian - a person walking along a road or in a developed area.

Pedestrian Hybrid Beacons (PHB) - also known as a high-intensity activated crosswalk (HAWK) beacon, this is a traffic control device designed to help pedestrians safely cross busy roadways at mid-block or uncontrolled intersections. It remains dark until activated by a pedestrian, then cycles through a sequence of lights to warn drivers and allow pedestrians to cross.



Image 36: Pedestrian hybrid beacon (PHB) signal indications and sequence. Federal Highway Administration. Public Domain.

Pedestrian refuge area - a designated space within a roadway that provides a safe place for pedestrians to pause while crossing, particularly on multi-lane roads or at locations with high pedestrian traffic.

Personal delivery device (PDD) - also known as a sidewalk delivery robot, it is a small, autonomous or remote-controlled robot designed to deliver goods like food, groceries, or other items along sidewalks and pedestrian areas.

Physical disability - a condition that impacts a person's physical functioning, mobility, dexterity, or stamina. It is caused by an impairment in the body's physical systems such as (but not restricted to) musculoskeletal, neurological, sensory. It can be present from birth (congenital) or acquired later in life through injury, illness, or disease. Significant barriers are often attitudinal or environmental (e.g., inaccessible sidewalks or steps).

Pick-up/drop-off zone (PUDO) - a designated area where vehicles can briefly stop to safely pick up or drop off passengers or goods, typically in locations where parking is restricted.

Plastic bollard - a sturdy, vertical post made from high-density polyethylene (HDPE) or other durable plastics, designed to manage traffic and protect pedestrians and property from vehicle impact.



Image 37: Bollards separating a protected cycleway from motor-vehicle traffic in Cardiff, Wales. Bibeyjj, 2021. Creative Commons Attribution-ShareAlike 4.0

Plaza - a public square, marketplace, or similar open space in a built-up area.

Point-to-point carsharing - also known as one-way or free-floating carsharing, allows users to pick up a vehicle at one location and drop it off at another within a designated service area.

Policy on Geometric Design of Highways and Streets - also known as the AASHTO Green Book, it is a manual documenting current design research and practices for highway and street geometric design. The document provides guidance to highway engineers and designers who strive to make unique design solutions that meet the needs of highway users while maintaining the integrity of the environment.

Portable Document Format (PDF) - a file format that preserves the original appearance of a document, regardless of the software, hardware, or operating system used to create or view it.

Practitioner - a professional actively engaged in transportation planning, policy development, design, construction, operations, and maintenance.

Protected cycle lanes - a designated lane for cyclists that is physically separated from motor vehicle traffic and sidewalks.

Protrusion - a part of a building that extends outward, beyond the main surface or plane of a building's facade. It can be at a level that impedes the pedestrian access route.

Public Right of Way Accessibility Guidelines (PROWAG) - set of guidelines developed and finalized by the U.S. Access Board in 2024 to ensure that pedestrian facilities in the public right-of-way, like sidewalks, crosswalks, and pedestrian signals, are accessible to and usable by people with disabilities. The guidelines are pending ratification (at the time of this publication) by the U.S. Department of Transportation and U.S. Department of Justice to be considered enforceable standards.

Public Space - any area that is accessible and open to the general public, often serving as a place for social interaction, recreation, and civic engagement.

Quick Response (QR) - a machine-readable code consisting of an array of black and white squares, typically used for storing URLs or other information for reading by the camera on a smartphone.

Raised bar tactile directional indicators - also known as directional tactile ground surface indicators (TGSI), tactile guidance strips, or guide bars, are a type of textured paving installed on sidewalks and other pedestrian areas. These indicators feature a series of raised, elongated bars aligned in the direction of travel, providing a tactile cue for pedestrians with visual impairments to navigate safely and independently.



Image 38: Directional tactile paving and a curb ramp in Newmarket, Auckland, New Zealand. Ingolfson, 2011. Public Domain.

Raised crossing - also known as a raised crosswalk or raised intersection, this is a pedestrian or bicycle crossing where the pavement is raised to the level of the sidewalk, creating a speed table across the road. These crossings are designed

to slow down vehicles and improve pedestrian visibility and safety.



Image 39: Artist's impression of a raised speed table with pedestrian and bicycle crossings in Mount Roskill, Auckland. Auckland Transport, 2019.

Rectangular Rapid Flashing Beacons (RRFBs) - a pedestrian-activated warning device used at crosswalks to enhance driver awareness and increase pedestrian safety. It consists of two rectangular, yellow LED lights that flash rapidly when activated by a pedestrian pushing a button—or via passive detection. This flashing pattern helps alert drivers to the presence of pedestrians, encouraging them to yield the right-of-way.



Image 40: Rectangular rapid flashing beacon (RRFB) at a pedestrian crossing in Shady Cove, Oregon. Oregon Department of Transportation, 2018

Rehabilitation Act of 1973 - a landmark U.S. federal law that prohibits discrimination based on disability in programs conducted by federal agencies, in programs receiving federal financial assistance, and in federal employment. It also requires federal agencies to make their electronic and information technology accessible to people with disabilities. More information at www.ada.gov/resources/disability-rights-guide/#rehabilitation-act.

Rideshare - travel in a private vehicle driven by its owner, free or for a fee, especially as part of an arrangement made using a website or app.

Right-of-way - a specific route that people, animals, vehicles, watercraft, or utility lines travel, or the legal status that gives them the right to do so.

Roadway - a wide way leading from one place to another, especially one with a specially-prepared surface which vehicles can use.

Roundabout - a road junction at which traffic moves in one direction around a central island to reach one of the roads converging on it; a traffic circle.

Sans serif - a typeface characterized by the absence of small, decorative strokes called serifs at the end of letterforms.

Section 504 - section of the Rehabilitation Act of 1973 that prohibits discrimination based on disability in programs and activities that receive federal financial assistance.

Section 508 - section of the Rehabilitation Act of 1973 that requires federal agencies to make their electronic and information technology accessible to people with disabilities.

Sensory disability - a condition that impacts a person's vision, hearing, touch, taste, or smell. It can be present from birth (congenital) or acquired later in life through injury, illness, or disease. Significant barriers are often attitudinal or environmental (e.g., inaccessible signals, signs, announcements, or curb cuts).

Shared use parking -a parking management strategy where parking spaces are utilized by multiple land uses with differing peak parking demand periods.

Shared usepPath - also known as a multi-use path, this is a dedicated pathway physically separated from motorized vehicle traffic, designed for use by both pedestrians and bicyclists, and potentially other non-motorized users like skaters or wheelchair users.

Sharrows - a road marking in the form of two inverted V-shapes above a bicycle, indicating which part of a road should be used by cyclists when the roadway is shared with motor vehicles.



Image 41: Bicycle sharrows (shared-lane markings) on Harbord Street in Toronto, Ontario. Dylan Passmore, 2011. Creative Commons Attribution 2.0 Generic.

Sidewalk - a paved path for pedestrians at the side of a road.

Sidewalk bulb-out - also known as a curb extension or neckdown, it is a traffic calming measure that extends the sidewalk into the parking lane and reduces the intersection crossing distance for pedestrians.



Image 42: Sidewalk bulbout (curb extension) narrowing the roadway and shortening the pedestrian crossing distance in Yate, England. Adrian Pingstone, “Traffic calming,” 2003. Public Domain.

Sidewalk cross slope - the slope of a sidewalk measured perpendicularly to the direction of pedestrian travel.

Sidewalk furniture - also known as street furniture, encompasses the various objects and structures placed in public pedestrian areas to enhance functionality, aesthetics, and the overall user experience.

Sidewalk gap - a section of a roadway where a sidewalk is missing, resulting in a break in the pedestrian walkway between two existing sidewalk segments.

Sidewalk lip - a raised edge or sudden change in elevation on a sidewalk surface. This can occur at joints or cracks in the pavement.

Sidewalk grade - the slope or incline of the sidewalk in the direction of travel.

Signage - the design or use of signs and symbols to communicate a message.

Single diagonal curb ramp - a curb ramp located at the corner of an intersection that serves two intersecting crossing directions. It's positioned at the apex of the corner and slopes diagonally, rather than being perpendicular or parallel to the curb. This type of ramp can be problematic for pedestrians, particularly those with visual impairments, as it can direct them away from the crosswalk and into traffic



Image 43: Center Market in Wheeling, West Virginia, photographed in July 2022, with a single diagonal curb ramp prominent at the corner in front of the historic market building. Benito O. Pérez (July 2022)

Smart Growth America - a non-profit organization that works hand in hand with decision-makers, innovative thinkers, and community advocates. More information is www.smartgrowthamerica.org.

Speed differential - the disparity in speed between vehicles, often discussed in relation to safety and speed limits

Stakeholder - a person or entity with an interest or concern in something.

Steep grade - a slope or incline that is noticeably high or at an angle and that requires significant effort to ascend. In terms of percentages, a steep grade is often considered to be above 7%, with anything above 15% generally requiring extra attention to construction and safety.

Step-off - abrupt drop from the curb.

Street amenities - features added to streets to improve their functionality, aesthetics, and the overall experience for users. These can include anything from trees and public art to bike lanes and parklets, enhancing walkability, safety, and community engagement.

Street mural - a large-scale artwork painted or applied directly onto a wall, pavement, or other permanent surface in a public space.

Streetery - an outdoor dining area, typically created by repurposing on-street parking spaces or sidewalks, to extend a restaurant's seating capacity.

Streetscape - the overall visual environment of a street, encompassing all the elements that contribute to its character and how it is experienced by people.

Subway - an underground electric railroad.

Tactile cues - the use of touch to provide information or guidance to an individual.

Tactile treatment - also known as detectable warning surfaces, these are textured surfaces with raised domes that visually and tactilely alert people with visual impairments to potential hazards like street crossings or step-offs.

Temporary disability - a physical or mental condition that prevents someone from performing their job duties or engaging in normal daily activities for a limited period, with the expectation of full recovery.

Third places - a social environment distinct from home ("first place") and work ("second place") where people can connect, build community, and engage in informal social interaction.

Traffic stress - the negative psychological and physiological responses experienced by individuals due to the presence and behavior of traffic.

Transit - buses, trains, subways, and other forms of transportation that charge set fares, run on fixed routes, and are available to the public.

Transit door location bars - touch bar or sensor located near a door (often a rear door) that passengers can activate to request the door to open.

Transit-rich - areas where a majority of land is within a half-mile radius of existing or planned rail or ferry stations, or bus stops with high frequency service (e.g., 15-minute headways or less).

Transportation Research Board - a leading organization in transportation research, providing valuable resources and expertise to transportation professionals and policymakers worldwide. More information at www.nationalacademies.org/trb/.

Trapezoidal tactile warning delineators - raised, textured surfaces, typically trapezoidal in cross-section, used to indicate the boundary between a pedestrian walkway and a hazard, like a bike lane, at the same level or in a shared street area.



Image 44: Trapezoidal tactile warning delineator separating a sidewalk from a sidewalk-level protected bicycle lane in Seattle's University District. Seattle Department of Transportation.

Tree box - also known as a landscape element, planting area, a tree space, or tree filter box, is a designated area on a public sidewalk or street right-of-way where a tree or other landscaping is planted.

Truncated dome detectable warnings - also known as sidewalk alert bars, longitudinal tactile warning guidance, detectable warning surfaces (DWS), or truncated domes, are a system of textured ground surfaces designed to provide a tactile cue to individuals who are blind or visually impaired.



Image 45: Truncated-dome detectable warning surface at a street curb in New York City. Ryxhd123, 2010. Creative Commons Attribution 3.0 Unported.

U Rack - a simple rack with an inverted U shape, designed to securely hold bicycles.

Ugly Laws - a series of discriminatory ordinances, primarily in the United States from the late 19th to mid-20th centuries, that prohibited people with disabilities or those with visible deformities from appearing in public spaces. More information at Ugly Laws: Disability in Public, located at https://www.jstor.org/stable/j.ctt9qgf13.

Universal design - the process of creating products and environments that are usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.

Urban Bikeway Design Guide - design guidance, developed by NACTO, for the development of bike facilities on city streets based on other design guidance, city case studies, best practices in urban environments, research and evaluation of existing designs, and professional consensus. More information at www.nacto.org/publication/urban-bikeway-design-guide/.

Urban Street Design Guide - design guidance, developed by NACTO, showing how streets of every size can be reimagined and reoriented to prioritize safe driving and transit, biking, walking, and public activity. This design guide emphasizes the core principle that urban streets are public places and have a larger role to play in communities than solely being conduits for traffic. More information at www.nacto.org/publication/urban-street-design-guide/.

U.S. Access Board - an independent federal agency that advances accessibility through leadership in accessible design and the development of accessibility guidelines and standards. More information at www.access-board.gov/.

User interface - the means by which the user and a computer system interact—in particular, the use of input devices and software.

Utility meter - a device that measures the consumption of a utility, such as electricity, gas, or water, and is typically used for billing purposes. Can appear in the streetscape protruding from a side of a building.



Image 46: Chicago, Illinois — August 2026: A prominent black utility meter and pipe assembly is mounted beside a storefront, with the Chicago streetscape, pedestrians, brick buildings, and intersection visible behind it. Benito O. Pérez (August 2026).

Vegetation overhang - any type of plant life, including hedges, trees, shrubs, or bushes, that grows outwards from a property's boundary and extends over an adjacent area. This can include areas such as a footway, carriageway (road), or public right-of-way.

Vibrotactile information - information conveyed through vibrations that are felt on the skin.

Visible disability - a physical, sensory, or intellectual disability that is readily apparent or thought to be noticeable to others through observation.

Visual disability - refers to a range of conditions that affect a person's ability to see, even with corrective measures like glasses or contact lenses.

Vulnerable road users (VRUs) - someone on or near the road who is not protected by a vehicle or other "shield," and therefore is at a higher risk of injury in a traffic collision.

Wayfinding - the process, signage, and tools orienting oneself within a space and navigating to a desired destination.

Web Accessibility Initiative (WAI) - a project of the World Wide Web Consortium (W3C), focused on making the web accessible to people with disabilities. More information at www.w3.org/WAI/.

Work zone - a designated area on a road or highway where construction, maintenance, or utility work is being performed, typically marked by signs and traffic control devices.

Zero-emission vehicles (ZEVs) - a vehicle that produces no exhaust gas or other pollutants from its onboard power source.