

ACCESSIBILITY OF PUBLIC BUILDINGS FOR WHEELCHAIR USERS

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Abstract

Public buildings are expected to provide services, information, participation, and safety to all members of the community. For wheelchair users, however, access is often interrupted by barriers at approach routes, entrances, ramps, lifts, circulation corridors, service counters, toilets, seating areas, and emergency exits. These barriers are not merely design defects. They limit equal participation in education, health care, administration, cultural life, employment, and civic decision-making.

This paper examines the accessibility of public buildings for wheelchair users through a built-environment and rights-based perspective. It considers how physical design, building operation, maintenance, management, and regulatory enforcement shape the practical usability of public facilities. Particular attention is given to the continuity of the accessible route, the relationship between dimensions and independent movement, the quality of vertical circulation, the availability of usable sanitary facilities, service access, wayfinding, and emergency preparedness.

The study uses an integrative review and conceptual analysis of literature on universal design, disability studies, architectural accessibility, public policy, and building standards. The analysis distinguishes nominal compliance from functional accessibility, because a ramp, lift, or accessible toilet can exist on paper while remaining unusable because of poor gradients, blocked paths, locked facilities, inadequate turning space, or weak maintenance.

The review indicates that inclusive public buildings require a continuous and well-maintained access chain from arrival to departure. Effective accessibility depends on early design integration, measurable standards, consultation with users, independent audits, staff training, routine maintenance, and accountable grievance processes. The paper concludes that wheelchair accessibility should be treated as a core public-service obligation and an essential indicator of equitable urban development.

Keywords: Wheelchair Users, Public Buildings, Universal Design, Barrier-Free Access, Built Environment, Mobility, Inclusive Architecture, Accessibility Standards, Disability Rights, Public Services

1. INTRODUCTION

Public buildings shape everyday access to citizenship. Government offices, hospitals, schools, universities, courts, libraries, transport terminals, community halls, museums, banks, and recreational facilities are places where people seek services, exercise rights, learn, work, meet others, and participate in public life. When the built environment cannot be used by wheelchair users, the consequence is more than inconvenience. It creates unequal access to opportunities that should be available on the same basis to all residents.

Wheelchair access depends on a sequence of connected conditions rather than on one isolated architectural feature. A visitor must be

able to reach the site from a street, public-transport stop, parking area, or drop-off point; enter the building without encountering steps or unstable surfaces; move through corridors and doors; use lifts where levels change; approach counters, rooms, and seating; use toilets; receive information; and leave safely in an emergency. A break at any point can make the entire journey inaccessible. Consequently, accessibility should be assessed as a continuous route and not as a checklist of separate facilities.

Many public buildings contain visible accommodations that appear to satisfy accessibility requirements but do not support independent use. A ramp may be too steep, too narrow, unprotected at the edge, or blocked by

temporary objects. An elevator may be located behind a locked gate or used for goods instead of passengers. An accessible toilet may be used as a store room, have an inward-opening door, lack transfer space, or be kept locked. Such examples illustrate the difference between the presence of an accessibility feature and its actual usability.

The social model of disability helps explain why these barriers matter. Wheelchair use is not itself the source of exclusion; exclusion arises when physical environments, institutional routines, and service practices are designed around a narrow assumption of mobility. Public buildings therefore have a responsibility to remove avoidable barriers and to provide reasonable, dignified, and safe access. This responsibility is reinforced by disability-rights frameworks, universal-design principles, and building regulations that recognise accessibility as a condition for equal participation.

The objective of this paper is to examine the principal factors that determine whether public buildings are accessible to wheelchair users. The paper reviews key literature and standards, defines the object of study, explains a review-based methodology, analyses recurring barriers, and proposes practical principles for planning, auditing, operating, and improving accessible public facilities.

2. LITERATURE REVIEW

Research on accessibility has moved beyond a narrow concern with isolated ramps or prescribed dimensions. Contemporary work links accessibility with usability, safety, dignity, autonomy, and participation. Accessibility refers to the possibility of reaching and entering a place, while usability concerns whether the environment can be used effectively and independently for its intended purpose. A building may technically permit entry while still preventing a wheelchair user from navigating a doorway, operating a service counter, using a toilet, or responding to an emergency.

Universal design provides an important framework for this analysis. It encourages the creation of environments that can be used by the widest possible range of people without requiring separate or stigmatising arrangements. In public buildings, universal design supports level or gently graded routes, clear circulation, adequate door widths, controllable doors, spacious lifts, accessible counters, legible signage, rest points, and seating arrangements that accommodate different bodies and mobility devices. The approach does not eliminate the need for specific accessibility provisions; rather, it integrates access into mainstream planning.

Disability studies also emphasise the institutional character of access. An accessible building is sustained by management decisions: whether furniture is placed in corridors, whether ramps are repaired, whether elevators are maintained, whether accessible toilets are available, whether staff know how to assist without taking control, and whether complaints lead to corrective action. The quality of access is therefore produced through design and operation together.

Standards and legal frameworks establish minimum expectations, but their effectiveness depends on enforcement and contextual application. International and national guidance commonly addresses approach routes, parking, entrance thresholds, ramp gradients, handrails, doors, corridors, lifts, sanitary facilities, signage, service counters, seating, and emergency arrangements. Standards offer measurable design criteria, yet a compliance-only approach can overlook continuity, maintenance, choice, and user experience. The literature consequently supports a combined approach: apply standards rigorously, involve wheelchair users in assessments, and evaluate the building through real journeys and service tasks.

The following table summarises key sources that inform the analysis of wheelchair accessibility in public buildings.

Table 1: Summary of Key Literature on Accessibility of Public Buildings

S. No	Author(s) / Year	Accessibility Focus	Study Context	Key Contribution
1	United Nations (2006)	Equal access and	Human-rights framework	Establishes accessibility as a condition for equal participation and

		participation		independent living.
2	WHO & World Bank (2011)	Disability and environment	Global disability report	Links environmental barriers with reduced participation in social and public life.
3	Iwarsson & Stahl (2003)	Accessibility and usability	Conceptual analysis	Clarifies that accessible environments must also be practically usable by people with different capabilities.
4	Imrie & Hall (2001)	Inclusive design	Built environment	Examines how conventional design assumptions can exclude disabled people from urban settings.
5	Steinfeld & Maisel (2012)	Universal design	Architecture and planning	Presents universal design as an approach for improving access across everyday environments.
6	Preiser & Ostroff (2001)	Design practice	Universal design handbook	Provides planning and design principles for inclusive spaces, products, and services.
7	ISO 21542 (2021)	Building accessibility	Technical standard	Sets requirements and recommendations for accessibility and usability of the built environment.
8	Government of India (2016)	Rights and non-discrimination	Legal framework	Provides a statutory basis for barrier-free access and inclusion of persons with disabilities.
9	MoHUA / CPWD (2021)	Barrier-free standards	Indian built environment	Offers practical guidance for accessible routes, ramps, lifts, toilets, signs, and public facilities.
10	U.S. DOJ (2010)	Accessible design	Public accommodations	Specifies enforceable design standards for accessible public facilities and services.
11	WHO (2022)	Health equity and participation	Global policy report	Shows the importance of removing environmental barriers to reduce inequities faced by persons with disabilities.
12	United Nations (2015)	Inclusive cities	Sustainable development	Connects inclusive public space and infrastructure with sustainable urban development.

3. OBJECT OF STUDY

The object of this study is the accessibility of public buildings for wheelchair users. The analysis focuses on the physical, operational, and institutional conditions that enable or prevent a wheelchair user from independently reaching, entering, using, and leaving a public facility. It covers both new buildings and existing buildings that require adaptation or improvement.

The study considers public buildings broadly, including administrative offices, health facilities, educational institutions, cultural venues, transport-related buildings, libraries, courts, community centres, and service facilities. These settings differ in function, scale, occupancy, and security arrangements,

but they share a public obligation to provide safe and equitable access.

The analysis examines the full access chain: site arrival; parking and drop-off; external paths; entrance and reception; horizontal circulation; vertical movement; use of rooms and service points; sanitary facilities; seating and public amenities; information and wayfinding; evacuation and emergency management; maintenance; and complaint handling. This approach recognises that access is weakened when any one link in the chain fails.

KEY POINTS OF OBJECT OF STUDY

- To examine how approach routes, parking, drop-off areas, paths, ramps, and entrances

- affect independent arrival at public buildings.
- To assess the adequacy of door widths, thresholds, corridors, turning spaces, floor surfaces, and internal circulation for wheelchair movement.
 - To analyse vertical access through lifts, platform lifts, ramp systems, and multi-level circulation arrangements.
 - To evaluate access to service counters, consultation rooms, classrooms, halls, waiting areas, public seating, and information points.
 - To investigate the usability of accessible toilets, changing facilities, drinking-water points, and other essential amenities.
 - To consider signage, lighting, reception practices, digital queue systems, and staff assistance as components of accessible service delivery.
 - To examine emergency evacuation, refuge areas, alarms, exit routes, and staff preparedness for wheelchair users.
 - To assess maintenance, procurement, building management, compliance audits, and grievance mechanisms that influence continued accessibility.
 - To develop a practical framework for inclusive, safe, dignified, and accountable access to public buildings.

Table 2: Object of Study Framework

S. No.	Study Component	Description	Purpose
1	Arrival and Approach	Parking, drop-off areas, pedestrian paths, crossings, surface quality, lighting, and wayfinding.	Ensure a wheelchair user can reach the entrance safely and independently.
2	Entrance and Reception	Thresholds, doors, ramps, reception counters, waiting space, and security procedures.	Provide dignified and usable entry into the building and its services.
3	Horizontal Circulation	Corridors, door widths, manoeuvring spaces, floor finishes, and route continuity.	Enable movement between public spaces without obstruction or unsafe detours.
4	Vertical Circulation	Lifts, ramps, handrails, controls, landings, and access to upper or lower floors.	Provide equivalent access where building levels change.
5	Service and Activity Areas	Counters, classrooms, clinics, meeting rooms, auditoriums, workstations, and seating.	Allow wheelchair users to receive services and participate in activities.
6	Sanitary Facilities	Accessible toilets, transfer space, grab rails, fixtures, turning space, and maintenance.	Support privacy, hygiene, dignity, and longer independent visits.
7	Information and Assistance	Signage, maps, digital systems, staff communication, and assistance protocols.	Make accessible features identifiable and services understandable.
8	Emergency Preparedness	Evacuation routes, refuge points, alarms, evacuation chairs, drills, and staff roles.	Protect safety without requiring wheelchair users to depend on improvised arrangements.
9	Management and Accountability	Maintenance, access audits, user feedback, procurement, monitoring, and complaints.	Sustain accessibility after construction and correct failures promptly.

4. RESEARCH METHODOLOGY

This paper uses an explanatory and integrative review design. It does not report a new building survey or a single-site case study.

Instead, it synthesises concepts and evidence from disability studies, universal design, architecture, public policy, accessibility standards, and guidance on public-service

delivery. The design is appropriate because the research question concerns the relationship between built form, institutional practice, and wheelchair users' ability to participate in public life.

The review is organised around four analytical domains: first, the continuity of the physical access chain; second, the usability of internal spaces and public services; third, safety, maintenance, and emergency preparedness; and fourth, governance, enforcement, and user participation. Sources are considered for the design principles they provide, the barriers they identify, the standards they propose, and their implications for planning and management.

To preserve analytical clarity, the study distinguishes between design availability and operational availability. A lift is available in design only when it is specified in plans. It is operationally available when it is functioning, reachable, unlocked, sized appropriately, and managed in a way that permits independent use. The same distinction applies to ramps, accessible toilets, parking spaces, and service counters. This distinction is essential because many accessibility failures emerge after construction through poor maintenance, ad hoc storage, security restrictions, or staff practices. The study also separates technical compliance from meaningful inclusion. Technical dimensions provide indispensable safeguards, but accessibility is experienced through real tasks: entering a building during busy hours, negotiating a security check, opening a heavy door, reaching a counter, waiting for a lift, using a toilet, attending a meeting, and leaving when alarms activate. A building that meets isolated measurements but makes these tasks difficult cannot be treated as fully accessible.

4.1 RESEARCH DESIGN

- Study Type: Explanatory and literature-based research.
- Approach: Integrative review and conceptual synthesis.
- Unit of Analysis: Public buildings, access routes, service environments, and building-management arrangements.
- Primary Accessibility Domains: Arrival, entry, circulation, vertical movement, service use, sanitary facilities, information, emergency access, and maintenance.

- Context Variables: Building age, function, occupancy, location, technical condition, institutional capacity, and regulatory enforcement.
- Outcome Variables: Independent mobility, safety, usability, dignity, service access, participation, and user confidence.
- Ethical Position: The study does not collect personal, clinical, or confidential data from wheelchair users or building occupants.

4.2 METHODOLOGICAL STEPS

- Step 1: Define wheelchair accessibility as a continuous, user-centred access chain from arrival through exit.
- Step 2: Identify the major building elements that influence movement, reach, transfer, orientation, and independent use.
- Step 3: Review disability-rights frameworks, universal-design literature, accessibility standards, and public-building guidance.
- Step 4: Classify barriers as site-related, architectural, service-related, operational, maintenance-related, or institutional.
- Step 5: Compare technical provisions with practical usability, including route continuity, obstruction, control location, transfer space, and staff practice.
- Step 6: Analyse how building management, procurement, inspection, and complaint systems influence the durability of access.
- Step 7: Identify limitations, including variation in building typologies, local codes, resource conditions, and user needs.
- Step 8: Develop principles for design, retrofitting, operation, and accountability in accessible public buildings.

5. DATA ANALYSIS

The data analysis is based on qualitative synthesis of the reviewed literature and standards. Rather than calculating a numerical accessibility score, the analysis traces recurring patterns in the way public buildings enable or limit wheelchair use. The central finding is that wheelchair accessibility is cumulative. Small failures at multiple points can combine to create a major barrier, whereas a coherent set of modest but well-maintained provisions can support independent use.

Across the reviewed sources, the most common barriers are not confined to historic

or resource-constrained buildings. They also occur in newer facilities when accessibility is added late in the design process, treated as a separate route, or left to informal management. The analysis is organised around four areas: arrival and entrance; internal circulation and service access; amenities and safety; and operation, maintenance, and accountability.

5.1 ARRIVAL, APPROACH, AND ENTRANCE ACCESSIBILITY

The first stage of access is often overlooked. A wheelchair user may be unable to reach the entrance because of uneven pavements, missing curb ramps, narrow pathways, open drains, parked vehicles, poor lighting, steep slopes, or an inaccessible security gate. Dedicated accessible parking is useful only when it is connected to a continuous route and located close enough to the entrance to reduce unnecessary travel. Drop-off areas should provide level, protected space for safe transfer and should not require a person to move through traffic lanes.

Ramps remain a common response to level changes, but their quality varies considerably. An effective ramp requires an appropriate gradient, sufficient width, level landings, handrails where needed, edge protection, slip-resistant surfacing, clear approach space, and freedom from obstruction. A ramp that is too steep may require assistance; one without rest landings can be exhausting; one ending at a heavy door can create a second barrier. Design should therefore consider the ramp as part of a route rather than as a stand-alone object.

Entrances should offer an accessible route that is equivalent in safety, dignity, and convenience to the main entrance. Side or rear entries, service entrances, and routes requiring staff intervention may be necessary in constrained existing buildings, but they should not become a default substitute for inclusive planning. Door thresholds should be level or minimal, door clear widths should accommodate wheelchair passage, handles and access controls should be reachable, and automated or low-force doors should be considered in high-use public facilities.

Security systems can unintentionally interrupt access. Turnstiles, raised scanner platforms, narrow screening lanes, and fixed queuing barriers may exclude wheelchair users even when the building entrance is otherwise level.

Public buildings should provide an accessible screening route, adequate turning space, and staff procedures that preserve privacy and autonomy. Access should not depend on a wheelchair user waiting for a guard to remove obstacles or find a portable ramp.

5.2 INTERNAL CIRCULATION, VERTICAL MOVEMENT, AND SERVICE ACCESS

Inside the building, corridors, doorways, floor surfaces, and furniture arrangements determine whether access continues. Corridors should be wide enough for comfortable movement and turning, particularly near doors, seating areas, and intersections. Temporary furniture, display stands, waste bins, cable covers, cleaning equipment, and queue barriers frequently reduce effective width. Building managers need to treat circulation routes as protected access infrastructure rather than as flexible storage space.

Doors are a recurring point of difficulty. A doorway may meet a nominal width requirement while remaining hard to use because the door is heavy, the handle is poorly located, the closer is too strong, the approach space is restricted, or the door swings into the path of travel. In public buildings with frequent use, automated doors, hold-open systems, or low-resistance hardware can significantly improve independent access. At minimum, door operation should be considered from both sides and in relation to wheelchair turning space.

Where levels change, lifts are usually the most reliable solution for wheelchair users. A lift must be large enough to accommodate a wheelchair and companion where assistance is needed, with controls at reachable height, clear visual and audible indications, adequate waiting space, and dependable maintenance. Placing the only accessible lift in a remote or staff-controlled zone can undermine its usefulness. Signs should direct users to lifts from primary circulation routes, and operational policies should not treat passenger lifts as optional during public service hours.

Service access involves more than reaching a room. Counters should include a lower usable section with knee clearance and approach space. Classrooms, clinics, meeting rooms, and auditoriums should include wheelchair spaces integrated with general seating, not

isolated at entrances or in back corners. In libraries and offices, work surfaces, self-service terminals, and document collection points should allow a forward or parallel wheelchair approach. Consultation rooms should accommodate turning and enable the person to sit alongside companions or support staff without blocking circulation.

Wayfinding is also important for independent movement. Signs indicating the accessible entrance, lift, toilet, reception area, refuge point, and emergency exit should be placed where decisions are made, not only at the final destination. Clear symbols, high contrast, consistent terminology, and staff who can provide accurate directions reduce dependence on ad hoc assistance. Although this paper focuses on wheelchair users, good wayfinding benefits many other visitors, including older people, people with temporary injuries, and persons unfamiliar with the building.

5.3 SANITARY FACILITIES, AMENITIES, AND EMERGENCY PREPAREDNESS

Accessible sanitary facilities are essential for meaningful access. A visitor who cannot use a toilet may be unable to attend an appointment, class, hearing, meeting, or event for more than a short period. The accessible toilet must provide adequate turning space, a door that can be opened safely, transfer space beside the toilet, correctly placed grab rails, reachable fixtures, an accessible wash basin, usable accessories, and an emergency call system where appropriate. A toilet labelled accessible but used for storage, kept locked, or missing critical transfer space does not meet its functional purpose.

Other amenities shape the quality of a public visit. Drinking-water points, cafeteria seating, vending areas, waiting zones, ticket counters, prayer rooms, exhibition spaces, and public seating should allow wheelchair approach and use. Seating layouts should provide choices rather than one designated position. Where queuing is required, systems should include an accessible route and allow a wheelchair user to remain in line without obstructing others or being forced to wait separately. Such details communicate whether a building anticipates wheelchair users as ordinary participants.

Emergency planning is frequently the weakest component of accessibility. Standard

evacuation plans often assume that everyone can descend stairs independently. Wheelchair users may require evacuation lifts where appropriate, protected refuge spaces, evacuation chairs used with consent and trained support, two-way communication, clear staff roles, and drills that include persons with disabilities. A refuge point is not a complete solution unless it is protected, known to staff, included in emergency procedures, and linked to a reliable method of assistance.

Emergency alarms should be understandable and should not rely solely on one sensory mode. Wheelchair users may also encounter blocked exit routes, locked fire doors, narrow escape paths, or inaccessible assembly areas. Public-building managers should therefore review the entire emergency journey: how the person receives notice, where they go, how assistance is organised, how information is communicated, and where they can wait safely after evacuation. Inclusive safety planning protects both individual rights and the overall resilience of the institution.

5.4 OPERATION, MAINTENANCE, AND INSTITUTIONAL ACCOUNTABILITY

The condition of access after a building opens is determined by operational practices. Ramps can be blocked by bicycles or planters; lifts can be out of service for long periods; accessible parking can be used by unauthorised vehicles; toilets can become store rooms; and door mechanisms can deteriorate. These failures are not minor maintenance issues. They remove the ability of wheelchair users to use public services. Institutions should therefore include accessibility in daily inspection schedules, maintenance contracts, asset registers, and service-quality reviews.

Staff practices also influence access. Reception staff, security personnel, facility managers, and service providers should know the location of accessible routes and facilities, how to communicate respectfully, and when to offer assistance. Assistance should be offered, not imposed. Staff should avoid moving a wheelchair, pushing a person, or making assumptions about capacity without consent. Training should include practical route familiarisation so that employees can respond confidently when a lift fails, a route is temporarily closed, or a visitor requests accessible service.

Accessibility must be supported by procurement and renovation procedures. Furniture, queue systems, signage, kiosks, doors, security equipment, and temporary structures can all affect access. Procurement specifications should require usable clear widths, appropriate heights, durable surfaces, accessibility-compatible layouts, and serviceability. Renovation projects should not remove existing accessible features or create new barriers through raised thresholds, decorative steps, altered reception counters, or space-saving partitions.

Accountability is strengthened when buildings are assessed with wheelchair users and disability organisations rather than through desk review alone. Access audits should include real route testing, measurements, observation during busy periods, review of maintenance records, staff interviews, and user feedback. Findings should lead to a published corrective-action plan with responsibilities and target dates. Grievance mechanisms should be easy to use and should allow users to report barriers without being required to repeatedly explain why access matters.

A strong institutional approach treats accessibility as a continuing public-service standard. Senior leadership should assign responsibility, allocate a maintenance budget, establish review cycles, and require accessibility reports for new projects, leases, renovations, and major events. Such arrangements turn accessibility from an individual request into a routine and measurable organisational commitment.

6. DISCUSSION

The reviewed literature demonstrates that accessible public buildings are produced through a combination of design quality, operational discipline, and rights-based governance. The most important practical idea is continuity. A building cannot be described as accessible because it contains one ramp, one lift, or one marked toilet. The route must remain usable from the point of arrival to every essential service and back out again. This requires coordination between architects, engineers, facility managers, service departments, security teams, and decision-makers.

A second implication is that separate access is often weaker access. When wheelchair users

are directed to a side door, a service corridor, a staff lift, or a toilet located in a remote area, they may experience delay, uncertainty, loss of privacy, and dependence on staff. Existing buildings may sometimes require alternative solutions because of structural constraints, but the objective should remain equivalence of experience wherever feasible. Mainstream routes, entrances, counters, and facilities should be designed for diverse users from the beginning.

A third implication concerns the relationship between standards and lived experience. Technical standards are essential because they provide measurable requirements that can be checked, specified, and enforced. However, standards must be interpreted through actual use. A doorway is not accessible merely because its measured width is adequate; it must also be possible to approach, open, and pass through it. A toilet is not accessible merely because it is labelled; it must support transfer, turning, privacy, and maintenance. User-led audits are therefore necessary to identify failures that drawings and compliance certificates may miss.

The discussion further highlights the value of retrofitting. Older public buildings can be difficult to alter, but inaccessibility should not be accepted as inevitable. Improvements may include regrading approach paths, installing curb ramps, widening doors, modifying thresholds, adding low-force door hardware, reorganising furniture, installing platform lifts or passenger lifts, redesigning counters, creating accessible toilets, and upgrading signage. The sequence of interventions should be guided by the access chain, risk, service importance, and user feedback. Low-cost changes can sometimes remove substantial barriers, while major structural works may be necessary where there is no safe route between levels.

Finally, public accessibility should be linked to broader institutional values. Buildings that are inaccessible convey that wheelchair users are not expected to participate. Buildings that provide independent, safe, and dignified access communicate the opposite: that public services belong to everyone. This is why accessibility should be measured not only by construction completion but also by service usability, user confidence, complaint

resolution, and the reliability of accessible features over time.

7. CONCLUSION

This paper examined the accessibility of public buildings for wheelchair users. The analysis shows that access is shaped by the full journey through a building: arrival, approach, entry, circulation, vertical movement, service use, sanitary facilities, information, emergency response, and departure. Barriers at any stage can prevent equal participation, even when individual accessibility features are present.

The evidence reviewed indicates that accessible public buildings require continuous routes, appropriate dimensions, usable doors and lifts, accessible service points, functioning sanitary facilities, clear information, inclusive emergency planning, routine maintenance, trained staff, and accountable management.

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These measures should be integrated into new construction, renovation, leasing, procurement, and day-to-day operations. Accessibility is not a specialised add-on; it is a condition for delivering public services fairly.

The paper concludes that the most effective approach combines standards-based design with user-centred evaluation. Public institutions should involve wheelchair users in planning and audits, protect accessible routes from obstruction, maintain critical features, monitor performance, and correct barriers promptly. Future research may examine accessibility outcomes across different building types, regions, public agencies, and retrofit strategies, with greater attention to the experiences of wheelchair users in high-traffic and emergency situations.

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