CANADA MORTGAGE AND
HOUSING CORPORATION

UNIVERSAL DESIGN

A guide for designers, builders
and developers of multi-unit
residential buildings

Canada

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Acknowledgement

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Purpose of this guide

The purpose of this guide is to:

— spark ideas about how to design and build innovative, inclusive and affordable multi-unit residential buildings (MURBs);

— provide a practical and non-technical introduction to universal design (UD) for residential designers, builders and developers who want to offer leading-edge, desirable and marketable housing that meets a broad range of community needs;

— demonstrate how UD makes accessing, using and enjoying spaces inside and outside MURBs easier, safer and more intuitive for all, regardless of age or ability;

— show how it is possible for people to stay in their homes as their circumstances change, without expensive renovations; and

— highlight the concept of adaptability, so that homes can be easily adapted to changing needs.

Application

The UD Guide is intended for multi-unit residential buildings (MURBs) consisting of single-level units in low-, mid- or high-rise buildings with common areas and entrances.

The information in the Guide does not apply to single-detached, semi-detached, row houses, stacked townhouses or individual condominium/apartment units with multiple levels.

Development of this guide

To help define the current context and state of knowledge of inclusive design and construction principles that were needed to develop industry guidelines, CMHC invested in the research that underpins this guide. This research was a starting point in consultations with industry experts and people with lived experience. CMHC is committed to developing guidance based on the Accessibility Strategy for the Public Service of Canada ("Nothing Without Us").[1] Persons with lived experience were involved with the development of this guide and will continue to be involved in future. These combined insights inform the guidance herein, but the good ideas do not stop here. CMHC is committed to evolving and progressing in line with developments in UD:

— We recognize that the following guide does not capture all potential perspectives about UD. There are many interpretations of UD in the built environment. Therefore, the following guidance is not intended to be overly prescriptive or exhaustive.

— UD is an evolving, modern and person-centred approach to creating inclusive homes. We intend to further explore certain UD goals in the future, most notably the goal of cultural appropriateness; we believe that this goal deserves more substantial and focused consideration.

— CMHC is committed to further engaging with community partners and providing updated helpful tips on our Universal Design webpage.

It should be noted that the development of this guide was undertaken recognizing that UD complements, but does not replace, accessible design that is needed to ensure persons with disabilities can safely access and use all the spaces and amenities commonly found in the residential built environment. More in-depth guidance about accessible design is provided by CMHC's Accessible Housing by Design series, which is available for viewing and download from our website (**www.cmhc.ca**), and by our Housing Knowledge Centre library.

This guide does not replace building code requirements or accessibility standards set out by the Canadian Standards Association (CSA). Designers, builders and developers need to ensure that the residential buildings they deliver meet all building code requirements set out by the relevant local authority and any referenced CSA standards.

CANADA IS DIVERSE
– Universal design responds to this diversity

Under universal design (UD), the starting point isn't based on assumptions that every household should be structured the same way or that the individuals within households have the same abilities and needs. UD recognizes that there are multiple ways of living.

Designers are asked to think about housing design in new ways. This might mean abandoning assumptions that every household should have a master bedroom with two smaller rooms for children. It might mean thinking about multigenerational homes, with work-from-home or learn-from-home spaces.

It also recognizes that the design and construction of UD MURBs can support cultural preferences by either providing the needed spaces and amenities or, at a minimum, ensuring spaces are easily adaptable to different needs.

UD provides a foundation for ensuring that housing can better respond to the needs of people with disabilities. While UD is not the same as accessible design, it does make it easier to adapt housing to meet the needs of current and future household members.

UD is relevant because consumers are asking for more choice, convenience, comfort and affordability. UD's person-centred, affordable, adaptable and inclusive approach seeks to address housing inequalities.

UNIVERSAL DESIGN

anticipates changing needs

The UD approach involves an understanding that housing needs change over time as people move through different stages of life. UD should accommodate the needs of single individuals, young families, multi-generational families, and seniors who want to age in place.

For example, about 90% of Canadians, and almost 100% of Canadians aged 65 or older, plan on supporting themselves to live safely and independently in their own home for as long as possible.[2] UD offers an affordable approach to aging in place by considering future needs and planning ahead.

Renovations or retrofits to accommodate aging in place can be costly and disruptive. By planning for change in the design and construction of new MURBs, designers can help households adapt their homes over time, with less disruption and at lower cost.

CANADA IS READY
for innovative and inclusive housing design

Universal design is already here; let's expand on it.

Canadians have been benefiting from lowered sidewalk curbs, automatic doors, smart-phone interfaces, optical and voice recognition software, more spacious/gender-neutral washrooms, spaces for social, cultural and religious gatherings and many other positive features that come from intentional efforts to make our lives easier, safer and more inclusive.

UD builds on the progress that is already taking place, and it doesn't need to be costly; often, UD is just thoughtful, well-planned design based on the needs of our diverse population.

PART ONE:

What is universal design?

Introduction

The overall goal of UD is to ensure that spaces do not discriminate and that they benefit people regardless of their abilities, needs and cultural preferences. UD offers designers and builders a competitive advantage through attractive designs that enable people to better meet current needs, evolve to address changing needs, and, age in place. A well-integrated and collaborative approach is used to ensure that design is person-centred.

UD takes an expanded view of household needs and abilities. Designers may consider what people with low vision, hearing difficulties or cognitive disabilities might need. Or, quite simply, they may consider the height differences of a multi-generational family. UD is also aesthetically pleasing and offers culturally appropriate features.

UD strikes a balance between functional living spaces that are easy to use and aesthetically pleasing spaces that respond to emotional needs. UD also asks: How will the MURB reflect potential cultural preferences? Designers should reach out to experts in universal design for assistance if the person-centred approach is unfamiliar.

More concretely, UD in multi-family housing ensures a broad range of needs are being met in and around the building. For example:

1. The parking areas, approach to the building, and entrances are easy to navigate, understand and are accessible to everyone.
2. The vertical circulation includes elevators and stairs that are easy to use, safe and accessible to everyone.
3. The horizontal circulation offers convenient, intuitive and accessible pathways with sufficient space for mobility devices.
4. The kitchens, laundry facilities and common areas meet a variety of needs and are easily adaptable to meet future accessibility needs.
5. The bathrooms are modern in design and will require minimal adaptation in the future to accommodate wheelchairs, a commode-chair and/or lifts.

The goals of universal design

The University at Buffalo's Center for Inclusive Design and Environmental Access (the IDEA Center) has played an important role in UD. They developed the following Goals of Universal Design©:

1. Body fit: Accommodating a wide range of body sizes and abilities	**2. Comfort:** Keeping demands within desirable limits of body function and perception
3. Awareness: Ensuring that critical information for use is easily perceived	**4. Understanding:** Making methods of operation and use intuitive, clear, and unambiguous
5. Wellness: Contributing to health promotion, avoidance of disease, and protection from hazards	**6. Social integration:** Treating all groups with dignity and respect
7. Personalization: Incorporating opportunities for choice and the expression of individual preferences	**8. Cultural appropriateness:** Respecting and reinforcing cultural values, and the social and environmental contexts of any design project

This goal-oriented approach is particularly practical in application; it defines the outcomes of UD practice in ways that can be measured and applied to all design domains within the constraints of existing resources.

The principles of universal design

From a historical perspective, the Seven Principles of Universal Design are worth noting. They were developed in 1997 at the North Carolina State University by Ronald Mace and a working group of architects, product designers, engineers and environmental design researchers.[3] The Principles are different from the previously discussed goals of UD in that they focus on what the design of a space should immediately offer the occupants, as opposed to what the longer-term benefits should be. Adoption of these principles provides a pathway toward meeting UD goals.

1
Equitable use

The design should be useful and marketable to people with diverse abilities.

Specifics

— Provide the same means of use for all users: identical whenever possible and equivalent when not.
— Avoid segregating or stigmatizing any users.
— Provisions for privacy, security, and safety should be equally available to all users.
— Make the design appealing to all users.

Example: Main entrances are accessible for all; people with mobility devices are not required to use a segregated side entrance.

2
Flexibility in use

The design should accommodate a wide range of individual preferences and abilities

Specifics

— Provide choice in methods of use.
— Accommodate right- or left-handed access and use.
— Facilitate the user's accuracy and precision.
— Provide adaptability to the user's pace.

Example: Kitchen counters that are adjustable in height. Power door openers.

3
Simple and intuitive use

Use of the design should be easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Specifics

— Eliminate unnecessary complexity.
— Be consistent with user expectations and intuition.
— Accommodate a wide range of literacy and language skills.
— Arrange information according to its importance.
— Provide effective prompting and feedback during and after task completion.

Example: Entrances are easy to locate and use.

4
Perceptible information

The design should communicate necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Specifics

— Use different modes (pictorial, verbal, tactile) for redundant presentation of essential information.

— Provide adequate contrast between essential information and its surroundings.

— Maximize "legibility" of essential information.

— Differentiate elements in ways that can be described (i.e., make it easy to give instructions or directions).

— Provide compatibility with a variety of techniques or devices used by people with sensory limitations.

Example: Signage in garbage/recycling areas communicates disposal requirements using multiple communication methods, e.g., symbols, plain language text or audio.

5
Tolerance for error

The design should minimize hazards and the adverse consequences of accidental or unintended actions

Specifics

— Arrange elements to minimize hazards and errors: most used elements, most accessible; hazardous elements eliminated, isolated, or shielded.

— Provide warnings of hazards.

— Provide fail-safe features.

— Discourage unconscious action in tasks that require vigilance.

Example: Provide signs for potential building hazards or railings on slopes.

6
Low physical effort

The design should be efficiently and comfortably usable, with a minimum of fatigue.

Specifics

— Allow users to maintain a neutral body position.

— Use reasonable operating force.

— Minimize repetitive action.

— Minimize sustained physical effort.

Example: Lever door handles and lightweight doors.

7
Size and space for approach and use

Appropriate size and space should be provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

Specifics

— Provide a clear line of sight to important elements for any seated or standing user.

— Make reach to all components comfortable for any seated or standing user.

— Accommodate variations in hand and grip size.

— Provide adequate space for the use of assistive devices or personal assistance.

Example: Ensure door width enables easy manoeuvring and comfort.

What is the difference between accessible and universal design?

Historically, there has been some confusion over the differences between accessible and universal design within the context of the built environment. These terms are sometimes used interchangeably, implying that they have the same meaning. Here, we draw out distinctions between the terms by the key basic elements of each. It is, however, important to note that while these distinctions are not necessarily agreed upon, they are helpful to illustrate the key differences between accessible and universal design.

Universal design (UD)

Holistic – UD features are built in and integrated in the design

Proactive – UD features are embodied during design, not retrofitted later

Inclusive – UD features meet as many needs for as many people as possible

Attractive – UD focuses on marketability and desirability

Affordable – UD features impose no or little additional costs

Flexible – UD features allow for multiple uses

It is important to note that Universal Design does not necessarily result in an element, space or complete building that meets building code accessibility requirements.

Accessible design (AD)

Conformant – AD may be required by building code or specified by building owners

Prescriptive – AD complies with standards, regulations, building code requirements

Incremental – AD may be added on to base or conventional designs

Utilitarian – AD may focus more on function and purpose than form or aesthetics

Minimal – AD can focus on the minimum additional features required by code or to meet specifications

Visible – AD may include obvious additions to conventional design

The following guidance is not intended to replace building code requirements or CSA standards. Designers, builders and developers must adhere to the requirements of their respective jurisdiction(s).

References to CSA standards within this guide pertain to:

- CSA B651-18, Accessible design for the built environment
- ASC/CSA B651:22, Accessible design for the built environment (January 2023)
- ASC/CSA B652:22, Accessible Dwellings (January 2023)

A Future Consideration for Universal Design

The advice provided in this guide was developed in consideration of the eight goals and, to a lesser extent, seven principles already mentioned. The eighth goal is worth noting, since it's an important development for CMHC and will be explored further in future consultations and guidance. "Respecting and reinforcing cultural values, and the social and environmental contexts of any design project" aligns with CMHC housing objectives.

Housing designers should adopt a design approach that creates safe, inclusive spaces for diverse cultural and religious practices, honouring distinct ways of living. It's important for designers, builders and developers to think about the design of social spaces. When more than one person lives in a household or building, people need to negotiate how space is used, who uses it and the degree of autonomy people have within it.

Questions for an inclusive future:

1. Will social spaces offer opportunities for groups/families to convene with privacy?
2. Will groups be able to carry out a variety of autonomous activities? For instance, are there spaces for people to practice smudge ceremonies privately without concerns about smoke?
3. Will people be able to cook together or pray together privately?
4. Some families are multi-generational; will the MURB have units with three or more bedrooms?
5. MURB design may also consider dedicated office spaces for visiting service providers/health professionals; residents can meet with service providers in a more neutral, less vulnerable space.

All these questions are food for thought for future considerations. More research and consultations are needed to make future guidance more concrete. We look forward to feedback from communities, researchers, planners and designers from across Canada on how they envision UD meeting the eighth goal: **cultural appropriateness**.
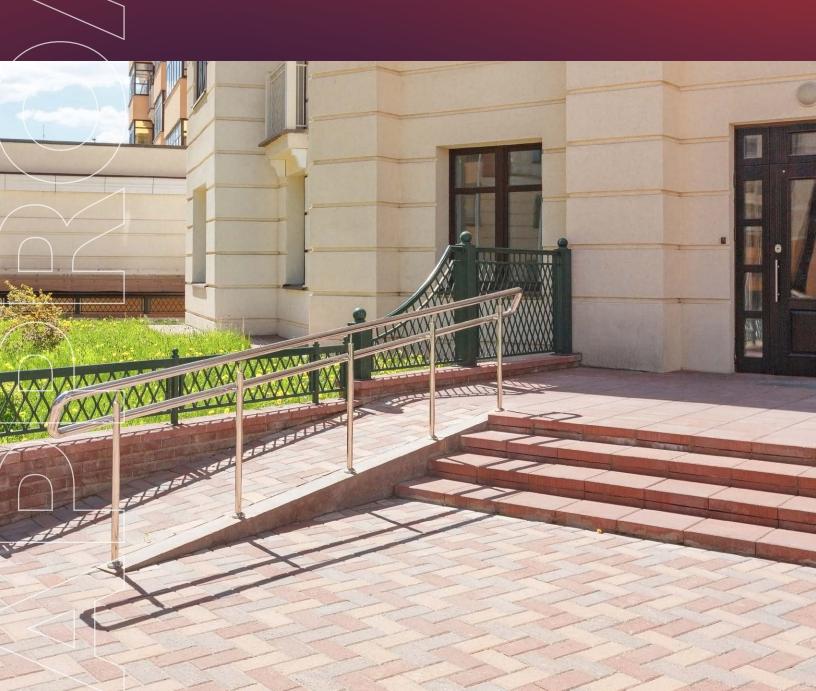
What is adaptability?

Adaptability means thinking ahead during the design and construction of the MURB. This saves time and money and minimizes hassle for future residents. Throughout the Guide, we provide advice for configuring spaces and features so that they're both widely usable and readily adaptable for meeting future accessibility requirements.

Some key examples of adaptability:

Lighting	Consider placing wiring and fixture boxes to permit future division of rooms and providing electrical rough-ins to facilitate future installation of different lighting types.
Kitchen spaces	If adjustable-height counters are too costly, pre-install the wiring and junction boxes needed behind the wall so it will be possible to install adjustable-height counters in the future.
Bathrooms	Add structural support (e.g., framing, 19 mm (¾ in.) plywood) before installing drywall and other finishes to make it easier to install grab bars, shower seating and overhead lifts if needed in the future. All walls should be designed to support loads or resist a force. See latest CSA guidance for details.
Balconies	Provide a balcony door with a rough opening to allow future installation of a sufficiently wide door (e.g., 920mm) to accommodate passage of a person using a mobility device. If a curb between the balcony and interior space cannot be avoided (see Daniels Corporation Case Study), minimize the height of the curb and ensure that there are no obstructions (e.g., baseboard heater) on the inside and outside of the curb that could complicate access to the balcony in the future.

PART TWO:

The approach to the building

Getting to the building and exterior spaces

The approach to the MURB should not only ensure that residents are proud to call it home, it must also be intuitive, barrier-free, convenient and safe. Designers should consider a variety of needs. This includes people who may have difficulty:

— locating the building entrance

— with navigation using a mobility device

— towing a cart, or pushing a stroller

Designers should provide clarity through simple layouts that use signage and intuitive entries. Wide accessible pathways, using changing textures and raised curbs to differentiate edges should also be available. Buildings should have convenient and protected spaces for pick-up and drop-off areas.

Universal design (UD) features in Figure 1:

A Accessible wide pathway

B Path is a gradual, low-effort incline

C Welcoming entrance, evenly lit

D Clear sight lines. Wooden features support wayfinding to the front door

E Protected area and accessible automatic doorway

F Main entrance is clearly identifiable and intuitive to use
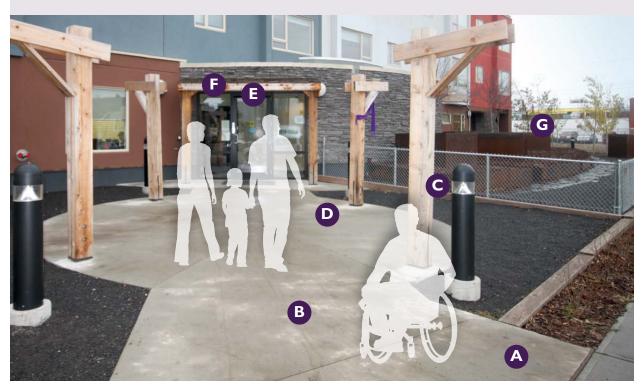
G Raised beds for easier gardening

Figure 1: Building approach
Source: Ambrose Place, Edmonton, designed and photographed by Ron Wickman.

Exterior spaces

Flexibility is important in designing exterior spaces; the needs of residents may change over time. There should be opportunities for people to enjoy outdoor spaces that accommodate multiple user types. This includes those using a wheelchair with or without a walking partner. Shade should be maximized using trees, trellises, and other landscape features. Consider using materials and foliage that require minimal upkeep in the future.

Outdoor seating

Outdoor seating arrangements should be clustered and facing each other, for people who lip read or use sign language. Resting benches, with back and arm support, located along the path of travel and at entrances, are important. Wherever possible, designers should provide protection against the elements. Outdoor spaces are particularly important for people living in MURBs, where direct access from dwelling units to an outdoor space is not always available.

Guidance

Site layout: Provide greenspace, recreational areas, patios and walkways that encourage barrier-free circulation around the property.

Seating: Seating areas should be accessible and intuitive to use. Seating (with back and arm support) should be located with a view toward activities or vistas and close enough to support ease of conversation. Provide space for wheelchairs next to seating and ensure tables can accommodate mobility devices.

Landmarks: Use landmarks as orientation points that support wayfinding (e.g. strategically located plantings, structures and water and art features).

Pathways: Wide accessible pathways, using changing textures and raised curbs to differentiate edges (min. 1,600 mm width).

Provide play opportunities (with protection from elements): for all generations, such as outdoor seating for chess boards and playgrounds for children.

Exterior lighting: should be bright and even. Dark, unlit areas should be eliminated to help provide added safety.

External pathways

Pathways are an important consideration for people using strollers, shopping carts, bikes and mobility devices. Properly designed, they help ensure everyone can access the site and building safely. They also facilitate the delivery of large items. While gentle slopes (no steps) and generous widths are the hallmark of UD pathways, designers should also provide wayfinding features.

Wayfinding refers to people's ability to know where they are, where they are headed and how best to get there, and to recognize when they have reached their destination. For instance, changing the texture or colour of walkway surfaces to differentiate edges or crosswalks promotes safe wayfinding for people with visual impairments.
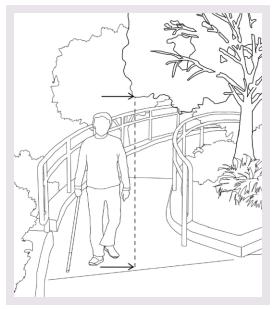

Figure 2: External pathway.
Source: UD architect, Ron Wickman.

Guidance

Route design: The design of routes should be simple and usable by all residents and visitors. Surfaces should be stable, firm and slip-resistant. See latest CSA Guidance.

Security: The routes should have clear sight lines (no hidden corners) and be well lit for adequate safety. Monitored CCTV can also make users feel at ease while using the site.

Handrails: Ensure handrails guide the path of travel, are easy to grip, have no sharp edges and do not have brackets that interrupt hand movement along the railing. Consider non-metal rails for more comfortable use during cold weather. Handrails should extend before the start of a slope or steps. This will help ensure that people can use the railing as a guide or support before the first step and after the last step.

Pathways: Colour and texture contrasting on the shoreline of pathways can be used strategically to inform wayfinding.

Edge protection: May be accomplished by several means, e.g., a concrete lip, raised landscape edging, or similar features. Edge protection along a pedestrian route should be incorporated for areas with any drop-off immediately adjacent to the walkway.

Width of the path: Pathways should be at least 1,600 mm to accommodate a wide variety of uses, including strollers, bikes, mobility devices and large delivery items.

Parking

Parking for a MURB should be safe, convenient and easy to navigate. Ideally, indoor or covered parking is available, for those using mobility devices. Indoor and outdoor parking areas should be designed for a wide range of needs. This will include those of visitors, parents, people bringing their groceries, or people loading and unloading large items. Designated parking can be intended for people who do not qualify for an accessible parking pass but who have difficulty moving about, and people who may require the assistance of someone else.

Guidance

Lighting: Use clear, well-lit parking areas for adequate safety.

Personal safety: Provide CCTV and emergency stations with lights, sounds and call buttons.

Level parking: The designated parking spaces need to be level. This is to prevent wheelchairs, strollers or other items from rolling away.

Designated parking: Provide accessible parking spaces on the shortest possible and accessible routes to the MURB:

1. Spaces should be wide enough to enable parking for an accessible van.
2. Provide designated aisles for offloading on either side of the accessible van.
3. The path should be level, firm, non-slip and hazard-free.
4. The width of the path should be 1,600 mm, but ideally wider (e.g. 1,800 mm) for side-by-side companion pedestrian traffic.
5. The location of the designated parking should lead to a barrier-free path to the building.

Figure 3: Visible accessible signs. Signage is visible during all seasons (it is not covered in snow) and may be seen from a distance.

Indoor and outdoor parking areas should be designed with the wide range of needs in mind.

Signage: Install a sign on a pole or wall in front of the space at a height that is visible to indicate the space is reserved.

Indoor/covered parking: Covered parking is advised, particularly over designated parking, to prevent snow, ice and other environmental elements from hindering access to curb cuts and accessible pathways.

Pathways: Simple and intuitive routes and spaces are clearly marked, including visitors' parking.

Curb cuts: Provide curb cuts, ensuring they aren't in locations that get blocked by parked vehicles.

Consider designated spaces for:

1. offloading deliveries or large moving items
2. people with small children or pregnant women
3. people with temporary injuries or illnesses
4. bikes and alternative forms of transport

Exterior entrances and landings

All entrances and landings for MURBs should be accessible and welcoming to everyone, yet secure against intruders and the elements. The door and entrance area should be illuminated well enough so users can clearly see the street address, find keys, have clear views and feel safe. The doorway should be wide enough for a person to easily pass through, regardless of whether they are moving large items (such as furniture), or if they are using a mobility device, such as a walking aid or wheelchair.

Guidance

Entrances

Accessible route: Ensure there is an accessible route up to, and through, the main entry door. Ensure a barrier-free continuous path of travel through all the open floor areas and rooms on the entry level of the building.

Slope: All entrances must be accessible, ideally a sloped walkway, but a ramp or mechanical lift will work if a sloped walk is not possible. The slope should be a ratio no steeper than 1:20 (5%) with a cross slope no steeper than a ratio of 1:50 (2%). For further guidance on slope and ramps, consult CSA standards and building code requirements.

Door width: All doorways must be wide enough for diverse users to pass through. All entrances should be 920 mm wide, or at minimum 860 mm wide. Designers need to fully consider the width of the door in relation to the door hardware and manoeuvring needs of people using larger mobility devices.

Entry Doors: Self-opening/closing doors should be available and allow enough time for a person, regardless of ability, to enter safely.

1. Install hardware, such as lever handles, that are easy to operate with minimal force.
2. Doors made entirely of glass and mounted in glass walls are difficult to detect and should have distinct markings to aid in defining and signaling the presence of doors and glass walls to users.

3. Each door should have a door-opening button that is accessible to a person in a wheelchair.
4. Thresholds should be low, to prevent tripping and allow the passage of wheeled aids, including wheelchairs, walkers, shopping carts and strollers. They should not be more than 13 mm high. If they are higher than 6 mm, they should be at a slope no steeper than a ratio of 1:2 (50%).

Height safety: Ensure there is plenty of headroom at the entrance, free of hanging or protruding objects.

Colour contrasting: External and internal doorways should have a colour-contrasting frame to allow it to be easily identified.

Canopy: Provide a canopy over the door or recess the door to provide a protected space for those using it and to prevent water ingress over the low threshold.

All doorways must be wide enough for diverse users to pass through, including people using mobility devices.

Entrance area and landing

Entrance area: Ensure entrance area provides enough space for a person leaving the building to adjust their outerwear without interrupting the passage of other people. Ideally, there should be available, at either side of an accessible doorway, a minimum area of 2,100 mm x 2,100 mm to allow for u-turns in mobility devices and other pedestrian traffic.

Floor surface: Ensure that the floor surface is flat, stable, firm, and slip-resistant all the way through the door, and that there is (ideally) no raised threshold in the doorway beyond 13 mm.

Floor mats: Should not impede the path and should be firmly fixed, to prevent tripping.

Seating: Provide a comfortable place to sit inside and outside the entry door with back support and arm rests.

Technology: Smart technology should be considered for people with diverse needs. For instance, buzzers that, when pressed, use the unit's lights, rather than sound, to alert occupants to the arrival of a visitor. These devices can also connect to an occupant's phone, sending an alert.

Figure 4: Lever door handles make it possible to use an elbow or fist to open a door – a helpful features for people with arthritis or for someone who has their hands full.

PART THREE:

Interior common areas

Elevators, ramps and stairs

A change in level for passing from one floor to another requires either an elevator, slope or stairs. At times, all three can be an option. The following list should be considered in addition to any measures needed to comply with building code requirements set out in the relevant jurisdiction and CSA standards.

Figure 5: Stairs and railing.
Source: Diagram by Ron Wickman, Architect.

Guidance

Elevators

Access space: Provide open space in front of the elevators for those using mobility devices, pushing a stroller, etc., and to help avoid congestion. If space permits, provide seating near elevators.

Lighting: The interior should be well and evenly lit. This will help people with visual impairments to fully view all areas of the elevator.

Colour contrast: Provide contrast around elevator frame and between interior walls and floor.

Handrails: Ensure that there are handrails in the waiting area and within the elevator.

Door safety: Closing times need to accommodate diverse abilities and speeds.

Stairs

Surfaces: Treads should be slip resistant, with tactile indicates, and nosing should not protrude in a away that would cause someone to trip.

Lighting: The stairway should be properly illuminated. Residents of diverse abilities should feel safe using the stairs.

Hand rails: Stairs should have handrails, see Figure 5.

Railings

The design and placement of railings should be considered carefully for a broad set of needs. They offer weight support through grip and they provide psychological confidence. They inform the path of travel for people with visual disabilities.

Rails: Design rails and rail supports to prevent hand damage to wheelchair users along busy passageways.

Design: Ensure handrail design enables people of shorter stature, wheelchair users and others travelling at a lower eye level to perceive and be perceived through the railings, and prevents service dogs from walking underneath the rails.

Finishes: Bare metal handrails should generally be avoided if exposed to cold weather. Instead, use plastic-coated or nylon-coated steel rails.

Location: Where a change in elevation requires a slope or ramp, handrails should be installed along the slope or ramp to protect against falls.

Lobbies and corridors

Well-designed lobbies and corridors help people move comfortably and safely, regardless of their age, strength, mobility, capacity to see, or other abilities. Lobbies should be as spacious as possible, offering room to manoeuvre if multiple people are present or passing through. Ensure that the space is well and evenly lit, with minimal glare, and that sight lines are open. These features contribute to feelings of safety.

Guidance

Interior corridors

Pathways: The path of travel, particularly to elevators, stairs, exits, etc., should be intuitive and easy to navigate:

1. Avoid installing doors along corridors unless required, because they can impede the free movement of pedestrians, wheelchair users and others who have difficulty moving.

2. Keep wayfinding features (signs, colour-contrasting finishes, auditory signals, etc.) consistent and helpful for navigation; provide location maps, emergency signs and door labels.

3. Avoid unnecessary turns or corners that limit a line of sight down the corridor. This will facilitate wayfinding and increase safety.

Floor surface: Floor surface should be flat, stable, firm and slip-resistant. The finish should allow wheeled devices to pass easily.

Colour contrasting: Consider using colour coding on the flooring to assist with orientation and guidance.

Lighting: Ensure corridors are evenly lit, with no dark shadows or areas.

Width: Corridors should accommodate a wide variety of uses (strollers, bikes, mobility devices and large delivery items) and be 1,200 mm wide at minimum, but ideally 1,800 mm wide.

Obstacle free corridors: Design corridors so they will be free of obstacles; avoid installing windows that cause an obstruction to people passing in the corridor (e.g. by opening inward), and recess radiators, fire extinguishers, and other wall-mounted items.

Handrails: There should be handrails available. Any width needed for handrails should be in addition to the 1,200-mm width for the corridor.

Lobby

Reduce glare: If the lobby has windows, design them to minimize internal glare by using external canopies, awnings or shades, or consider using tinted coatings. Ensure any glazing is properly highlighted with markings, such as opaque strips or etching along the entire width of glazed elements.

Floor surface: Ensure the mats are flush with the surrounding floor or properly treated on their edges to minimize the hazard of tripping. Also ensure they are made of a firm material (not compressible). This will allow wheeled devices to easily pass over them.

Resting areas: Provide a comfortable place to sit with back support, arm rests and conveniently placed tabletops.

Common areas

UD features in Figures 6 and 7:

A   Accessible entrance to an accessible meeting space.

B   Welcoming, evenly lit with clear sightlines.

C   Meeting space is adaptable to ceremonial needs.

D   This UD common space is an example of person-centred and collaborative design. The ceremonial room was constructed to allow residents to join in daily smudging and other ceremonies.

Figure 6: External view of ceremonial room Ambrose Place, Edmonton   Source: Designed by Ron Wickman. (www.niginan.ca)

Figure 7: Internal view of ceremonial room Ambrose Place, Edmonton.   Source: Designed by Ron Wickman. (www.niginan.ca)

Common areas

As discussed in the introduction, UD pursues a goal of cultural appropriateness. This means that considerations are made about the purpose of common areas and rooms. People should be free to engage in their religious and cultural practices safely and without discrimination. Common areas should be created in consideration of diverse ways of living. For some, this can mean having access to the natural environment and to water. For others, it can be a quiet space to pray, smudge or participate in a variety of celebrations. Gender-neutral washrooms should also be considered. Some MURBs may have smaller dwelling units that limit one's ability to have large gatherings; common areas with a kitchenette can provide these safe spaces for a variety of gatherings.

Acoustics are an important consideration for the comfort of all, and particularly for people with hearing impairments. Reverberation of sound waves and their reflection off hard surfaces can be distracting and even painful for people with low hearing levels, particularly if they rely on assistive hearing devices. Reduce sound reverberation by using sound absorbing materials. These features also help reduce noise complaints in shared living environments such as MURBs.

Guidance

Common areas

Meeting spaces: Ensure plenty of space is available; do not assume all meetings take place around a table. The room should be adaptable to many styles of congregating.

Accessible counter spaces: If the room has a counter, try to ensure that at least one section can be used by someone seated in a mobility device or regular chair and that storage is usable by all.

Windows: Make sure their design enables all people to see out from a sitting position and easily operate them.

Room controls: Light switches, dimmers, fan controls, and thermostats are located at convenient heights and operable by all. See part 7, for guidance.

Accessible washroom: Provide an accessible, gender-neutral washroom.

Kitchens: Workspaces, appliances and fixtures should meet the same requirements for widespread use. For example, if the room has a counter (e.g., for beverages and snacks), it would ideally have at least one section that a person in a mobility device would be able to position their chair underneath while preparing (e.g., cutting, peeling, adding milk or sugar) and obtaining their food or drink.

Lighting: Lighting distribution and brightness should be suitable to the room's purposes. Consider installing task lighting.

Common areas should be created in consideration of diverse ways of living.

Laundry facilities

Accessible: Ensure the laundry room's appliances are front-loading. Sink, counters and storage should be widely usable, regardless of a person's height, mobility, manual dexterity, visual acuity, or other abilities.

Safety: Consider installing mechanisms to safeguard people and laundry, such as CCTV.

Doors: Consider automatic doors for people who are trying to enter and exit the room while carrying items such as laundry.

Flooring: Provide stable and firm, slip-resistant flooring that produces minimal glare.

Mailboxes, recycling and garbage areas

Ensure the spaces set aside for mail or courier boxes, waste and recycling containers, and bicycle parking can be equitably used by all residents. For instance, bin lids should not be too high, heavy, or complex, and access doors should have automatic openers.

Ensure that these areas are error-tolerant (safe), that there is enough space for all residents and visitors to approach and use the spaces and the receptacles they contain, and that the receptacles can be operated by all.

PART FOUR:

Bathrooms

Wet-room bathrooms

Today, UD meets modern taste through the development of "wet-room" bathrooms. Using an open-concept floor plan, designers can create a spa-like atmosphere at a low cost. Wet-room bathrooms typically include curbless showers, built-in seats and benches, inset shelves and rain or multi-positioned shower heads.

Open-concept bathrooms are common in Europe and offer a sleek design and efficient functionality. With a no-threshold shower area that opens up to the rest of the bathroom, the design is ideal for growing families and seniors, or anyone who needs a little extra room, such as users of wheelchairs and walkers.

Wet-room bathrooms include affordable and easy-to-install protection against accidental leaks that might cause water damage to the surrounding walls, ceiling and floor. Waterproof membranes combined with simple, large-format tiles can offer a clean and streamlined look, or creativity can be used to create contrast in the tile positioning. Reinforced walls allow for the installation of grab bars in multiple locations immediately or at some point in the future.

UD features in Figure 8:

A   Trench drain provided

B   Lever shower valve

C   Handheld shower head on grab bar

D   Plenty of counter space with seated positions available

E   Slip-resistant flooring sloping to shower drain

F   No barrier to shower area

G   Sink has leg room for seated positions

H   Floor space in front of fixtures is accessible

I   Lighting that is bright, non-glare and even

J   Easy-to-use lever faucet handle

K   Good task lighting

L   Raised height toilet

M   Flip-up grab bars beside toilet

N   Floor-to-ceiling backing for future installation of grab bars anywhere in the bathroom.

Figure 8: Wet-room bathroom, shower features.
Source: Designed and photographed by Ron Wickman.

General bathroom guidance

The bathroom is one of the most important and most used rooms in the home. Universal design can ensure bathrooms are attractive, safe and spacious enough to be comfortably used by all.

Anticipating future need for adaptation

Successful UD bathrooms involve thoughtful planning and anticipation of future needs. By incorporating adaptability into bathroom design, households can better manage life's different stages and can age in place without expensive renovations in the future. For instance, by adding the necessary structural supports (e.g., framing, plywood) before installing drywall and other finishes, it will be far easier, and less expensive, to install grab bars, shower seating and overhead lifts as needed in the future.

Framing the floor of the bathroom with lowered-height joists allows for the installation of a continuous, single-level floor with no thresholds to step or roll over and with positive drainage to a floor drain. All of this framing is significantly less difficult and expensive to complete during new construction than during future renovations. Providing shut-off valves on sinks also enables the fixtures to be easily upgraded as needed.

Potential bathroom layouts

In an ideal world, the bathroom would have plenty of open floor space. Everyone would be able to move freely between and use all of the bathroom's fixtures, storage and other features. This is regardless of whether the users of the bathroom are short or tall, use a mobility device or other mobility aid, or need someone's assistance. In the real world, however, space is limited. Therefore, floorspace layout is a very important consideration.

Figures 9 and 10 below provide two examples of fairly small bathroom layouts that maximize flexibility and ease of use (low physical effort), while also providing suitable size and space for approach and use. As a general aid to design, the following figures are provided as examples of the free floor spaces needed for various fixtures and accessories.

Many bathrooms in the dwelling units within MURBs provide *either* a combined bathtub-shower unit, *or* a walk-in or roll-in shower, *but not* both separate bathtub *and* shower units. Regardless of the fixtures supplied, some common UD features are outlined below.
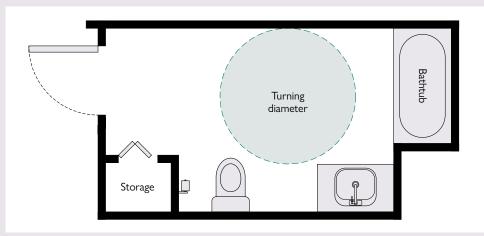

Figure 9: Small, widely usable, and accessible bathroom. Adapted and amended from CMHC, Accessible Housing by Design—bathrooms, 2016.
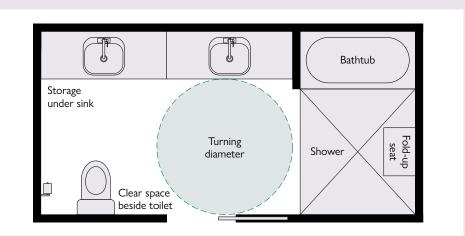Source: Original diagram by Ron Wickman.

Figure 10: Bathroom with curbless shower and bathtub, two wash basins, toilet, and storage space. Adapted from CMHC, 2016.
Source: Original diagram by Ron Wickman.

Bathroom guidance

Guidance

Clear bathroom floor space

Floor space: Ideally, a turning radius of 1,800 mm by 1,800 mm should be available in at least one accessible bathroom in the dwelling unit. At minimum, the turning radius should be 1,500 mm by 1,500 mm if power wheelchairs or other larger mobility devices are not anticipated. Room should also be provided for people who provide assistance or care in the bathroom. At a minimum, a user in a wheelchair should be able to enter, close the door and access the fixtures. The accessible bathroom should be close to or connected to at least one accessible bedroom.

Shower access: Ensure a chair commode or shower seat can easily be rolled into the shower area.

Doors: Ensure door swing does not prevent a person in a wheelchair from getting into the bathroom and closing or opening the door. Pocket doors can offer this convenience, but attention must be paid to ensuring they can be easily operated.

Sink (lavatory)

Colour contrasting: Ensure the sink and counter unit are colour contrasted from the floor to aid in the perceptibility of where one begins and another ends.

Vanity: Consider minimizing the size of any cabinetry and other supporting structures under the sink/vanity to free up leg room and manoeuvring room under the fixture. Consider installing a height-adjustable vanity. Plumbing of drains and water supply pipes should be kept as close to the wall as possible to free up under-sink space and prevent injury; water supply pipes should be insulated against contact to prevent burns and other injuries.

Faucet: Install a single-lever faucet or motion sensor faucet with a pull-out hose for cleanups. Install mixing valves that will limit the water temperature to 49°C. To prevent the growth of Legionella bacteria, it is not recommended to lower the hot water tank temperature below 60°C (140°F).

Bathtub

Ideally, space in front of the bath is 1,500 mm by 1,500 mm or, at minimum, an area 900 mm deep. There should be enough room for a safe approach and transfer into the bath, and room for caregivers.

Length: Ensure a tub is long and wide enough for most people.

Reinforcement: Provide appropriate structural support for grab bars in walls around bathtub.

Depth: Consider installing a shallow tub, which is easier to get into and for bathing children.

Flooring: Install a tub that is flat-bottomed with a non-slip bottom. Ensure the floor area around the tub is stable and firm, flat, slip-resistant, non-glare, and without strong visual patterning.

Adaptability: Ensure the bathtub can be easily replaced with a roll-in shower in the future.

Faucets: Bathtub faucets should be easily operated (e.g., lever type), clearly legible, conveniently located and clearly perceptible.

Recessed wall shelf: Recessed storage for soap, shampoo etc. will provide more room and less chance of injury.

Shower

Ideally, space in front of the shower is 1,500 mm by 1,500 mm or, at minimum, a clear floor area of 900 mm by 1,500 mm. There should be enough room to ensure a chair commode or shower seat can easily be rolled into the shower.

Provide a 1,500 mm x 900 mm curbless shower area (within the shower) that gives enough space for care workers to assist. Low-height, premanufactured, shower base units can be used if curbless showers are not possible.

Ensure the shower is floored with non-glare, slip-resistant tiles or other safety flooring that does not have strong visual patterning.

Provide adequate floor slopes allowing a positive water flow toward the drain. Drains can have either a central collection location or a long strip at the lowest portion of the shower flooring, or both.

Reinforcement: Provide appropriate structural support for grab bars in walls around shower stall.

Toilet

Reinforcement: Provide appropriate structural support for grab bars in walls around toilet.

Toilet: Select a toilet that is easy to operate and has an appropriate height.

Adequate space: Appropriate space for transfers and allowance for manoeuvrability.
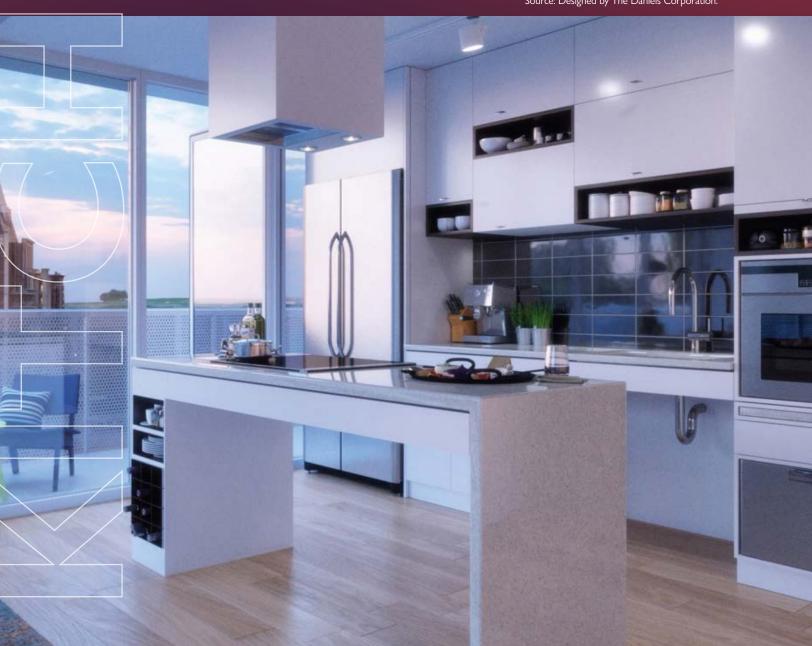
Power source: Given that there may not be a bidet, options for residents to install their own cleaning equipment onto the toilet should be supported. There should be a nearby power source.

PART FIVE:

Kitchens

Kitchen features

UD features in Figure 11:

A   Wall oven is separate from the cooktop

B   Open and accessible floor space

C   Unobstructed space under the cooktop and sink

D   Even lighting and colour contrasting between the counter and backsplash

E   Parallel approach to the cooktop (see Figure 12)

F   Lever handles at the sink

G   Landing surfaces should be conveniently located for placing hot pots, pans and other items from the cooktop and oven, and for placing items destined for either appliance. (see Figure 13).
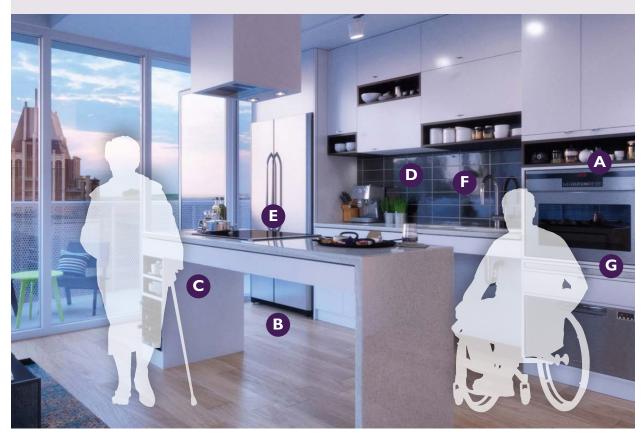

Figure 11: Kitchen with UD features.

Source: Image by The Daniels Corporation.

Adaptable kitchen features

Designing successful UD kitchens involves identifying potential users and anticipating their needs over time. Incorporating easy-to-use, accessible and adaptable features allows people to stay in their homes as they age and mitigates the cost of expensive future renovations. UD kitchens encourage and support participation in kitchen tasks, from meal preparation, cooking and serving to clean-up.

Designing for minimal effort, adaptability and safety are important principles in universal kitchen design. More lighting, a place to sit down to work, a lower workstation, and storage for food, utensils and appliances where they can be easily seen and reached are some considerations for people of different heights and abilities. UD kitchens should be designed to be flexible and adaptable.
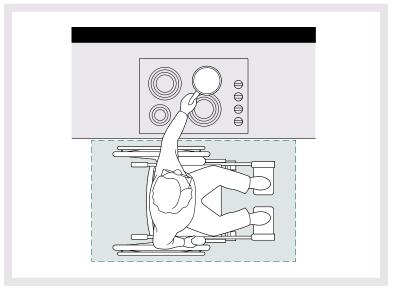

Figure 12: Parallel approach to cooktop on the range.
Source: Ron Wickman.

Figure 13: A pullout shelf positioned below the oven can be used to place utensils or items that are going into the oven.
Source: Photo by Ron Wickman.

Layouts and flooring

There are a number of ways to make a kitchen more easily adapted to life's changing needs and the diversity of abilities of those who will use it. Wherever possible, have at least 1,800 mm of unobstructed floor space between opposing counters, cabinets and appliances. Consider installing an adjustable-height counter with the sink mounted in it and sufficient free legroom. If this is not possible, pre-install wiring and junction boxes needed behind the wall so it will be possible to install electrically adjustable counters in the future. Appliances should be equipped with easily operated controls such as conventional turn knobs. Install dimmable task lighting and dimmer controls so the level of illumination can be controlled to meet a variety of needs.

Guidance

Layouts

General layout: Kitchen layouts should limit travel distances and reduce the need to lift items from one counter to the next. For instance, layouts like a U-shape, L-shape, or galley kitchen with a sink located near the stovetop can ensure pans slide easily from a stovetop to the sink (see figures 14, 15 and 16 below). Where the designer has enough floor area to work with, a person would ideally be able to easily move into, within and through their kitchen, regardless of whether or not they use a mobility device.

L-shaped kitchen design

Figure 14—An L-shaped kitchen layout is accessible for someone with a mobility device and enables:

— a forward approach to the cooktop, dishwasher, sink and refrigerator-freezer.

— a parallel approach to the cooktop and the island sink from either side, the wall oven and dishwasher from the right, and the refrigerator-freezer from the left. Occupants would be able to parallel approach the bottom drawer of the freezer when open.

The island with an optional sink provides a convenient, alternative work area which can be parallel approached from all four sides. Thanks to the knee and legroom under it, the island can be forward approached and used while in a mobility device.
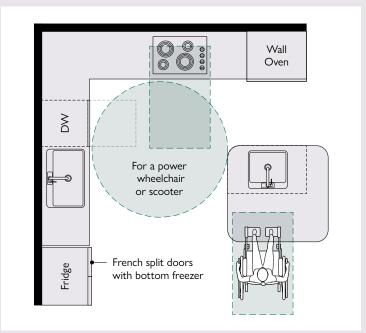

Figure 14: L-shaped kitchen, from CMHC Accessible by Design Guidance (2016).
Source: Ron Wickman.

Kitchen guidance

Guidance

Kitchen

U-shaped kitchen design

Figure 15 shows a U-shaped kitchen that has been configured for use by someone in a mobility device. Notice that a lowered work surface has been provided with no base cabinets, which allows leg room for the person to work at the counter from their mobility device.

Notice also that the person could forward approach the cooktop, sink, refrigerator and wall oven. If the cooktop had an oven below it, instead of mounted in the wall, the person would be able to parallel approach the oven from the right with its door closed or open and could parallel approach the leading edge of the open oven door from the right.

A mobility device user could also conveniently parallel approach the sink from the left or the right, could also parallel approach the refrigerator from either side, and could forward or parallel approach the face of the bottom-loading freezer's drawer when open.

Figure 15: U-shaped kitchen, from CMHC Accessible by Design Guidance (2016).
Source: Ron Wickman.

Galley kitchen

A galley-style (pass through) kitchen (figure 16) will generally facilitate ease of movement between key task areas if it provides at least 1,800 mm between the opposing base cabinets, counter tops, appliances and walls within kitchen work areas. That measurement is in addition to any protruding handles from appliances and base cabinet doors and drawers.

Counters and cabinets

Countertops: Continuous countertops allow pots, dishes and other potentially heavy objects to slide along, minimizing the need for strong core or upper body strength. Appliance garages on countertops can help minimize lifting.

Cabinet doors: Having no doors or glass doors on cupboards, or open shelves (rather than cupboards with solid doors), helps with visibility. If doors are preferred, D-type pull handles are easier to use, and colour-contrasted handles would increase accessibility.
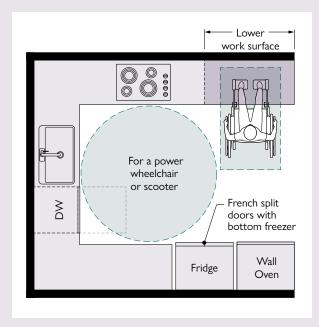
Drawers: Allow contents of a drawer to be accessible with minimal bending. Drawers and pull-out shelves (see Figure 17)or pull-out baskets in a deep shelving unit also make storage and retrieval easier. Or provide rotating ("lazy Susan") shelves inside the cabinets.

Lighting: Ensure colour or tone contrast between walls and counters. Task lighting within or around cupboards and drawers is also helpful. Light switches should be accessible from a seated position.

Adaptable countertops: Provide multiple heights for countertops and work surfaces. Rolling base cabinets complete with a finished top (figure 18) can provide a convenient work surface for seated persons. Provide a clear space below worktops and sinks.

Kitchen surfaces: Should have low glare, no sharp edges, and colour contrasts.

Sinks, Cooktops and Stoves

Cooktops and stoves:

1. A best practice is to separate the stove cooktop and oven, allowing for access in a seated position (legroom under the cooktop and seating height access to the oven).

2. The cooktop should be designed to be open underneath, to allow space for a seated person's legs. The wall-mounted oven must be positioned at a height accessible to all users.

3. Heat-resilient landing surfaces should be conveniently located for placing hot pots, pans and other items from the cooktop and oven, and for placing items destined for either appliance.

4. Controls should also be mounted near the front of the cooktop and be colour contrasted from the rest of the cooktop. A person seated in a mobility device should not have to reach across burners to adjust controls.

5. Continuous, usable countertop space is provided that is of sufficient length and, ideally, adjustable in height.

6. The microwave oven should be situated on countertops or be built-in, similar to the wall oven.

Sinks:

1. Provide single-lever handles or hands-free faucets at the sink with anti-scalding features. There should be adequate workspace on at least one side and, preferably, on both sides of the sink. Try to position the sink so there is at least 610 mm of landing space/workspace on one side and 450 mm on the other. It is important to ensure that the sink is not placed directly next to a wall.

2. Free up legroom and manoeuvring room under the sink and consider installing a sloped panel beneath the sink to hide its plumbing and prevent inadvertent contact or injury to the legs of users. This will provide the necessary knee and toe room for a forward approach to the sink in a mobility device.

3. Installing an accessible sink in a corner location is not recommended, since it restricts access to the sink by wheelchair users and limits the usability of the counter areas.
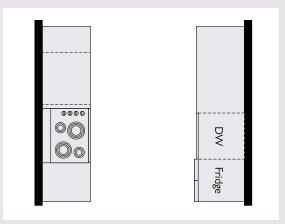

Figure 16: 1,800-mm floor space for a galley-style kitchen, from CMHC Accessible by Design Guidance (2016).
Source: Ron Wickman.

Figure 17: Pantry with pull-out shelving.
Source: Photo by Ron Wickman.

Figure 18: Rolling cabinet provides legroom under cooktop and is a portable workstation.
Source: Ron Wickman

PART SIX:

Living spaces and bedrooms

UD features in Figure 19:

A Open concept and barrier-free floor space

B Even lighting

C Accessible balcony over a low door threshold

D Smooth, resilient floor surfaces
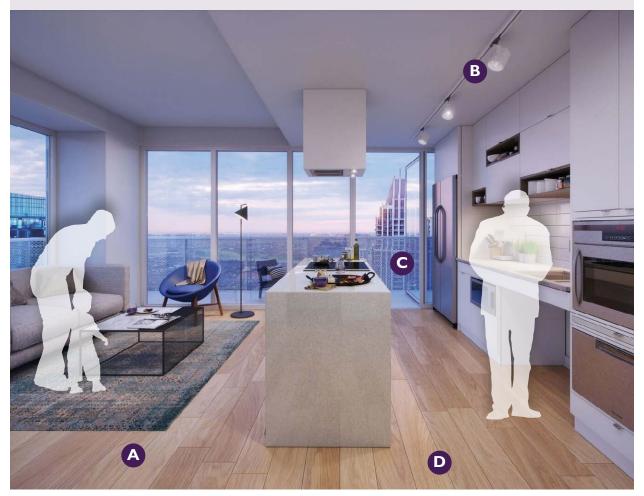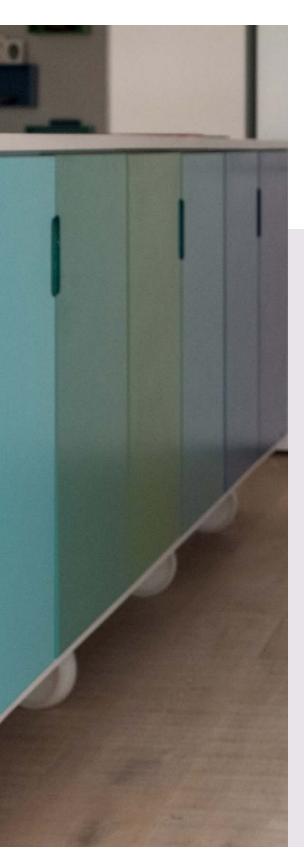

Figure 19: Living spaces informed by universal design.   Source: Image by The Daniels Corporation.

Living spaces

There are many ways to plan the layout and design of residential units within a MURB. Today, modern open-concept designs can make it easier to accommodate UD principles. Again, it is important to note that there are multiple ways of living, and it is worth collaborating with potential residents to learn more about their lifestyles and cultural preferences to determine what is appropriate for them.

Guidance

Layout: Design the space for a range of activities, such as watching television, reading, doing homework, entertaining, playing table games and dining. Allow for flexible furniture layouts.

Accessibility within the units: There should be an accessible, barrier-free route, leading to all kitchen appliances and to all bathroom fixtures. The route must also connect with all secondary exterior doors, storage areas, exterior balconies, and patios that are part of the dwelling unit.

Lighting: Make the most of natural light and outdoor views. Ensure that all living area lighting is even, minimizing glare.

Open concept plans: Having an open-concept floor plan responds to modern tastes and enables flexibility in the use of the space.

Floor space: A circular turning space with a diameter of 1,800 mm will accommodate many wheelchairs. People who use a wheelchair or scooter need clear floor space in front of furniture and electrical switches and controls. A continuous accessible path of travel at least 1,200 mm wide should be provided into and throughout all living spaces.

Door width: All doorways must be wide enough for diverse users to pass through. All entrances should be at least 860 mm, but ideally 920 mm wide. Designers need to fully consider the width of the door in relation to the door hardware and manoeuvring needs of people using larger mobility devices if choosing to comply with CSA standards. Door hardware should use lever handles. Viewers through the entry door can also be provided at multiple heights.

Figure 20: furniture for adaptable, open concept layouts that can be moved easily but also lock in place for safety.

Bedrooms

Bedrooms, particularly in a busy home, can have many functions, including for play, work, study and rest. Ideally, all bedrooms are accessible to family members and visitors using mobility devices. At a minimum, one designated accessible bedroom should be adjacent to the bathroom, or there should be provisions for adaptability features to be installed in future. For instance, designing a room with a movable wall and ensuring a wall or section of a wall can be removed allows for the installation of an accessible ensuite bathroom in the future. The design of the walls requires some consideration, not only for ensuite bathrooms, but also to ensure there is enough room for turning circles (1,800 mm by 1,800 mm). Also consider sections in the ceiling that can be dedicated to the installation of lifts to transfer someone from a bed to a wheelchair or from a wheelchair to a bathtub or shower. This will require reinforcement to ceiling joists, and electrical rough-ins to the appropriate locations in the ceiling.

Guidance

Bedroom size: Bedrooms should be accessible to those using mobility devices. At least two sides of beds should be accessible. The rooms should be designed for ease of movement and logical task execution.

Sight lines: A straightforward bedroom layout will enable people with limited hearing to have clear and open sight lines.

Modern technology: Consider smart technology that would enable control of heating, lighting and security features and allow for emergency notification for people with visual and hearing difficulties. Plan for electrical rough-ins for future smart technologies such as curtain controls, lighting and video support.

Windows: Windows should be placed for ease of viewing from a seated position and to ensure adequate natural light, security and privacy. Windows should be easy to operate within the bedroom for users of all heights and levels of physical strength.

Lighting: Rocker-type, two-way light switches, one beside the bed and one at the room entrance, should be used to ensure no one is forced to pass through a dark room. The room should be well and evenly lit.

Storage: Adjustable shelving units should be available in the bedroom, and the closet should be equipped with a light fixture. For further guidance on shelves and hanging rods, see the latest CSA guidance.

Ceiling: Ensure one bedroom ceiling is designed for lift supports.

Door width: All doorways must be wide enough for diverse users to pass through. All entrances should be at least 860 mm, but ideally 920 mm wide. Designers need to fully consider the width of the door in relation to the door hardware and manoeuvring needs of people using larger mobility devices.

Mechanical and electrical systems and equipment

Mechanical and electrical fitting guidance

The design, location, and other functional aspects of building services controls, such as light switches, electrical outlets, thermostats and environmental controls are important considerations when designing a dwelling layout. Careful planning and consideration of the placement of these controls is needed to ensure a dwelling can safely and efficiently be used by occupants and their visitors. There are many options when laying out services and controls; however, ensuring a consistent, simple design with consistent and intuitive location throughout a dwelling is generally the best approach.

Guidance

Ensure a consistent style, arrangement, position, and sequence of light controls throughout the dwelling. This fosters predictability and a more intuitive approach.

Controls should be simple and easy to use. Where feasible, avoid the use of multiple switch-gangs, since these can be confusing.

Locate the centre line of controls at a consistent height from the floor throughout the dwelling, within a range of 400 mm to 1,100 mm from the floor. If using a display, it should be 900 mm to 1,100 mm.

Controls should be located within an area of clear floor space (minimum 820 mm x 1,390 mm) and with a clear path of travel (no furniture, counters, etc.) for access by the user.

Operation of controls should be able to be done with one hand and require minimal force. Controls that require grasping, turning, or twisting are not recommended (e.g., crank-type timers on ventilation devices). Rocker-style light switches are preferred.

Control features should provide tactile and/or auditory information and feedback, as applicable, to indicate function, position, and confirmation of activation.

Colour contrast controls with their background. For example, use white-coloured light switch covers on a darker wall.

Ensure controls are adequately lit (100 lx minimum, or 200 lx where reading is necessary).

Use of two- or three-way light switches is recommended to ensure an occupant does not need to travel within a darkened room. This is also of particular importance at staircases, where a light switch should be provided at the top and bottom of stairs.

Use automatic, motion, timed, or photocell-activated light fixtures where appropriate to ensure adequate lighting and safety of occupants and their visitors.

Locate at least one electrical outlet in a room at a convenient height, where it will not be impeded by furniture, doors, etc. This also applies for communication and network connections (phone, internet, etc.), where applicable, depending on the room.

Consider roughing-in a power supply at interior/exterior doors, adjacent to windows, and at ceiling height to allow for future installation of automatic devices such as door operators, automatic window blinds, and ceiling hoists.

CASE STUDY:

Daniels' Accessibility Designed Program/ universal design

The following case study shows how the Daniels Corporation incorporated universal design features into one of their multi-unit residential projects. Note that the products, practices and designs presented reflect best practices at the time the building was constructed and are featured to illustrate a general approach to universal design. Readers are advised that the universal design elements of this case study may not meet current building code requirements or standards currently in force in their locations. Readers are encouraged to consult with appropriate regulatory authorities on acceptable approaches to meeting accessibility or other design and construction requirements.

About The Daniels Corporation

The Daniels Corporation (Daniels) is a real estate developer and builder with a 38-year history in the Greater Toronto Area (GTA). Daniels has built more than 35,000 award-winning homes and apartments; master-planned mixed-use, multigenerational communities; and commercial and retail spaces. For almost four decades, Daniels has been a fully inclusive city-builder, always looking beyond the bricks and mortar to integrate opportunities for social, cultural and economic well-being to positively impact the communities in which they build.

Background

Through ongoing discussions about how to expand their commitment to building more inclusive communities, Daniels decided it was time to address a significant gap in the marketplace—a shortage of new homes designed to accommodate mobility and other accessibility needs. Keeping the four guiding principles of the *Accessibility for Ontarians with Disabilities Act* (AODA) in mind (independence, dignity, integration, and quality of opportunity) Daniels engaged experts in the field to help evaluate the accessibility of their designs within their buildings and within the suites themselves.

The challenge

What Daniels discovered through the evaluation process was that, despite their suite designs meeting or, in some cases, exceeding the AODA standards, there was not only an opportunity, but an imperative to do more to address the needs of a broad spectrum of homebuyers and tenants, including those who use assistive mobility devices and have specific mobility needs.

Results and impact

In 2017, Daniels introduced its trailblazing **Accessibility Designed Program** (ADP), the first of its kind in North America, to provide a higher standard in accessible homes and to make condominium living more inclusive for people of all abilities. ADP suites have been included in all Daniels vertical communities ever since. The Program is aligned with the goals and principles of universal design and provides examples of best practices in universal design.

ADP suites exceed the accessibility standards of the Ontario Building Code by including features such as power-operated suite entry doors, rollout balconies with swing doors, large roll-in showers and wider doors throughout, **at no extra cost**. In addition, homebuyers can further customize their ADP suite, for an additional cost. With the goal of making the entire condominium environment as inclusive as possible, Daniels also incorporates ADP features in the amenities, common spaces and building entrance, such as lowered concierge desks, accessible kitchens in the party rooms, larger turning radii and waste chutes with automatic door openers.

This barrier-breaking program has also resulted in a unique partnership with L'Arche Toronto: Daniels has custom designed an eight-bedroom unit in their Artworks Tower condominium, located in Toronto's Regent Park neighbourhood, to meet the assisted-living needs of L'Arche, which provides housing for people with intellectual disabilities.

103
ADP suites completed or under construction.

144
ADP suites in design development.

ADP
suites range from one-bedroom to three-bedroom layouts.

Video on YouTube: "Virtual Tour: Daniels Accessibility Designed Program (ADP)"

"Before the Daniels Accessibility Designed Program, finding an accessible condo in Toronto was like finding a unicorn. They were very rare, if they existed at all, and we had mostly given up on finding a truly accessible home. Loving where you live is living in a space that works for you. For us, it's an accessible environment. In one word, it means freedom."

—Owners of a Daniels ADP home in Toronto's Regent Park neighbourhood

ADP standard suite design features

— **Roll-in shower with tiled base.** While, under the Ontario Building Code (OBC), barrier-free washrooms require a larger turning radius, they do not require any other barrier-free features. Barrier-free washrooms also often have bathtubs, and therefore do not meet the needs of mobility device users. ADP bathrooms, however, feature roll-in showers with tiled bases and grab bars.

— **Handheld and ceiling-mounted shower heads.** Flexible, handheld and ceiling-mounted shower heads greatly improve the functionality of the shower and will be provided in all roll-in showers.

— **Roll-out balcony with swing door.** Conventional balconies are typically accessed by a sliding door with a threshold high enough to make access difficult. Moreover, balcony doors are often too narrow to accommodate a mobility device.

> " Physical barriers prevent millions of Canadians with mobility, auditory and visual challenges from living comfortably within most condominium buildings and communities. We can and will design and build homes and communities that are truly inclusive and that go beyond the bare minimums required by the Ontario Building Code. "

—Mitchell Cohen, President & CEO,
   The Daniels Corporation

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love where you **live**™

— **Side-by-side Washer and Dryer.** While typical condominium suites offer stacked washer and dryer units to save floor space, this makes the dryer unit on top difficult to reach for those in mobility devises. ADP suites have the washer and dryer units placed side-by-side to improve access while residents do their laundry.

— **Power-operated suite entry door.** Power-operated suite entry doors and a low threshold greatly improve the functionality of the suite.

— **Wider doors throughout.** Under the OBC, at least one bedroom door and one bathroom door are required to have a clear opening of at least 865 mm (34 in.) in barrier-free suites. ADP suites will provide at least 865 mm clearance on all bedroom doors and the accessible bathroom door.

— **Additional clearance in bathroom.** The OBC requires a 1,500 mm turning radius in bathrooms, but, in ADP suites, the accessible bathroom will have additional clearances, including a 900 mm x 1,500 mm transfer space beside the toilet and shower, and knee clearance underneath the sink.

Continuous improvement

Although Daniels' ADP is an important step in the right direction, they are committed to the continued improvement of their design standards to ensure universal design in all their buildings and throughout their communities.

Contact The Daniels Corporation

To learn more about Daniels' Accessibility Designed Program, contact:

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Further guidance and resources

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Endnotes

1   The *Accessible Canada Act* came into force in 2019, and aims to identify, remove, and prevent barriers for persons with disabilities in Canada. To respond to the Act, the Government of Canada launched the Accessibility Strategy for the Public Service of Canada, also referred to as "Nothing Without Us," in 2019 as a roadmap to prepare the public service to lead by example and become a model of accessibility for others in Canada and abroad. https://www.canada.ca/en/government/publicservice/wellness-inclusion-diversity-public-service/diversity-inclusion-public-service/accessibility-public-service/accessibility-strategy-public-service-toc/progress-report-implementation-nothing-without-us-2019-20.html.

2   National Institute on Ageing (NIA)/TELUS Health Survey, *Pandemic Perspectives on Ageing in Canada in Light of COVID-19: Findings from a National Institute on Ageing/TELUS Health National Survey*; https://static1.squarespace.com/static/5c2fa7b03917eed9b5a436d8/t/5f85fe24729f041f154f5668/1602616868871/PandemicPerspectives+oct13.pdf.

3   North Carolina State University, "The Center for Universal Design - Environments and Products for All People," [Online]. The website is no longer available but for further information about Universal Design, please consult: https://idea.ap.buffalo.edu/.