HERITAGE AXS PATRIMOINE

RESEARCH REPORT
Prepared for Accessibility Standards
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Dr. Ernesto Morales
Université Laval

TERRITORIAL RECOGNITION AND THANKS

In the spirit of friendship and solidarity, we acknowledge that the heritage sites studied in this research project are located on the traditional, ancestral and unceded territories of the First Peoples of these places. Being at the crossroads of the Nionwentsïo of the Huron-Wendat people, the Ndakina of the Wabanaki people, the Nitassinan of the Innu people, the Nitaskinan of the Atikamekw people and the Wolastokuk of the Wolastoqey people, we honour our relationships with each other.

SUMMARY

The overall objective of this project is to provide scientific evidence to support the reconciliation of inclusive accessibility in heritage buildings and sites. Research activities included a scoping review to identify accessibility best practices in heritage buildings and sites at the international level; Identify accessibility issues at the Old Seminary and in the Petit Champlain in Québec City through guided tours with 24 participants with various disabilities; Evaluate the two selected sites using the Rick Hansen Accessibility Certification (RHFAC); as well as developing solutions to architectural barriers arising from preservation constraints of heritage sites with a co-design approach (Morales, 2012).

The results suggest that some existing standards may be adequate by providing the minimum level of accessibility that will meet the needs of a limited number of persons with disabilities. However, several other standards have gaps while other standards will need to be developed because they are necessary and do not currently exist. These standards can be used to promote the design and management of safe, accessible, and enjoyable interventions for people with disabilities in a heritage setting.

This report integrates qualitative and quantitative data to make recommendations for all elements of the interior and exterior spaces in the heritage buildings context.

As a first step, there is a need to amend national and provincial heritage preservation laws to provide greater flexibility to incorporate accessibility solutions. Second, emphasis should be placed on the use of materials that can be easily integrated into the context, i.e., elements of the same (or very similar) stone or wood or glass elements, which can blend harmoniously into the context of heritage buildings. Finally, although the recommendations of this report can help in the development of better interventions on heritage sites and buildings, it is always advisable to ask for the active collaboration of people with disabilities, not only wheelchair users, but also people with visual, hearing or intellectual disabilities, as well as the elderly and autistic people, before proceeding with any intervention.

Accessibility Standards Canada

Normes d'accessibilité Canada

UNIVERSITÉ LAVAL

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INTRODUCTION

Universal accessibility refers to the absence of obstacles (e.g. physical) so that environments are understandable, usable and passable by all people (Government of Canada, 2019; Jones, 2014; Preiser & Smith, 2011) . Many people around the world live with disabilities that can sometimes limit them from carrying out their daily activities in the community. Additionally, public spaces are often not built to be accessible to all people regardless of their abilities. According to the World Health Organization (WHO) (2020), approximately 16% of the world's population lives with one or more disabilities. In addition, 3.8% of people over 15 have functional difficulties. These figures are increasing due to various factors such as the aging of the population. Currently, people aged 60 and over represent 13.5% of the world's population (World Health Organization, 2016). In Canada, approximately 20% of people aged 15 and over live with one or more disabilities, including 43% with a severe or very severe disability (Statistics Canada, 2017), and this percentage increases with age. On the other hand, more than half of the world's population is currently concentrated in cities (United Nations Population Fund, 2021), which makes the accessibility of public spaces, including heritage sites, very important.

Historic and heritage buildings and sites were built before the development of the rights of people living with disabilities and the development of accessibility standards (Société Logique, 2017). One of the particularities of heritage sites and buildings is that they cannot be completely modified due to their historical importance (Éditeur Officiel du Québec, 2020; Société Logique, 2017). Therefore, adapting them to make them more accessible poses a significant challenge.

In 2019, the first federal accessibility law came into force with the aim of making Canada a country free of all barriers – "particularly those of a physical or architectural nature, which relate to information, communications , behaviors or technology or that is the result of a policy or practice" – by 2040 (Government of Canada, 2019).

The accessibility standards contained in provincial and federal construction standards most often concern barriers linked to motor disabilities and sometimes visual disabilities. These documents do not mention other types of disabilities such as cognitive difficulties or invisible disabilities (e.g. chronic pain, autism spectrum disorders). In addition, these standards generally apply to new buildings, which means that historic heritage buildings are excluded.

Many elements represent barriers to accessibility of the built environment, including heritage sites. These elements vary according to people and their abilities. It is therefore essential to find solutions to make sites accessible to all people through universal or inclusive design. Universal design or design is "the design of products and environments so that they are usable by all people, wherever possible, without the need for specialized adaptation or design." (Preiser & Smith, 2011, p. 4.3). It is recommended to include users in the design of spaces or objects, in order to promote a participatory and person-centered design approach (Heylighen, 2008; Jones, 2014). The users' perspective is very relevant because of the knowledge they can provide, based on their experience (Heylighen, 2008). The environment plays an important role in carrying out activities. The combination of a person's capabilities and a facilitating environment is essential for the realization of all activities in the community (Trouvé, 2016). Universal design includes seven principles that were created to establish criteria defining the characteristics of design usable by all (Jones, 2014; Preiser & Smith, 2011) :

1. Fair use. The space or object is accessible to people with various abilities and the use is equivalent for all, with the aim of not promoting stigmatization.
2. Flexible use. The space or object allows for the choice of different uses according to the person's preferences or abilities.
3. Intuitiveness and simplicity. The space or object is easily understandable to everyone, regardless of experience or language.
4. Perception of information. The information is clearly presented in several different ways (e.g., text, pictogram and tactile information).
5. Error tolerance. The design of the space minimizes the risk in the event of an accident or error.
6. Low effort. The space is accessible with minimal effort.
7. Adequate dimensions. The space or object allows use for everyone, regardless of the size of the person.

Universal design principles are more often applied in spaces like universities, healthcare facilities and public buildings than in other spaces like restaurants or shopping malls. Some professionals involved in design sometimes use measuring instruments to evaluate universal design (e.g.: checklists, consultations). However, the evaluation is not systematically carried out and the involvement of users in the design is rare (Watchorn et al., 2018).

On the other hand, few documents have been found in scientific writings on the reconciliation between universal accessibility and heritage conservation. Note, however, that several initiatives have been put in place, particularly in Europe where we benefit from a built heritage that is older than in Canada. In Norway, the Agency for Cultural Heritage Management City of Bergen has developed principles for the conservation and modification of heritage sites (Asmervik, 2016). Although the use of these principles is not extensive, it is relevant to mention them since guidelines in the area are limited. The eight principles are as follows (Asmervik, 2016, pp. 93-94) :

1. Entirety. It's important to think about the whole environment and not just a building or a secluded entrance.

2. Addition. When adding new solutions to old buildings, it is very important not to destroy the old traces. The new solution must be an addition and not a transformation.
3. Readability. It is important that the history of the site is readable so that one can judge what is an addition and what is the original construction.
4. Contrast and adaptation. In some situations, it is best for the addition to contrast with the old building to increase readability, while in other situations, it is better to adapt to the existing design in order to achieve an unobtrusive (not as obvious) addition.
5. Design and visual expression. The universal design solution must be site-specific so as not to destroy historical traces.
6. Reversibility. It should be easy to remove the universal design solution and revert to the original design if necessary.
7. Durable. It is important that the choice of materials does not destroy the original materials.
8. Enrichment. The universal design solution must not only enrich the building by making it more accessible, but also enrich its design.

In France, the Palace of Versailles is one of the witnesses to these principles and is one of the most visited sites in this country. Improvements have been made to ensure equality for all visitors and thus promote an inclusive experience for all people. Accessibility solutions were provided using discreet elements (e.g., ramps, elevators) that were well integrated into the site (Ministère de la Culture et des Communications de France, 2011). Also, Vardia and his collaborators (2018) conducted a case study on the accessibility of Jantar Mantar, a heritage site in Jaipur, India. They proceeded through four stages: 1) acquiring theoretical knowledge; 2) user participation; 3) evaluation and 4) innovative design solutions.

Québec has a great built heritage (sites and buildings). However, because Canada is a young country, heritage is limited compared to other parts of the world such as Europe. As a result, conservation standards are strict in order to protect heritage. Two examples of heritage sites are the Petit Champlain district and the Old Seminary in Québec City. Québec City was founded by Samuel de Champlain in the early seventeenth century and remains the only city in North America to have preserved its ramparts still surrounding Old Québec. The clifftop Upper Town is home to many churches, convents, a variety of historical sites, and several important monuments and buildings. The Lower Town is mainly composed of old districts that form an urban ensemble in line with those of the fortified colonial cities. The territory of the historic district of Old Québec was designated by the Government of Québec as a heritage site of Old Québec in 1963 by the Cultural Property Act, which is now the Cultural Heritage Act. Then, the limits were established in 1964. To this day, Old Québec is still protected by this law. On the Canadian side, the federal government, through various departments and Parks Canada, manages several properties located on this territory. The historic district of Old Québec is also recognized by UNESCO as a city inscribed on the World Heritage List and moreover, the headquarters of the Organization of World Heritage Cities is in Québec City.

The Old Seminary National Historic Site of Canada was designated a national historic site of Canada in 1929 because it is the oldest educational institution in Canada. The Society of Priests of the Séminaire de Québec was founded in Québec City by Monsignor François de Montmorency-Laval, the first bishop of New France. In 1663, the Major Seminary was created and brought together the parish ministry, the mission and the clergy. The "Petit Séminaire" was founded in 1668 with the aim of teaching the French language and culture to young Indigenous people. In 1852, the Seminary continued its educational mission by founding the first French-language Catholic university in the country, which was named Université Laval in honour of Monseigneur de Laval. Since 1988, the School of Architecture at Université Laval has been located at the Old Seminary.

The Old Seminary, like the rest of Québec City's heritage park, is a very important part of Canada's heritage. Despite the existing documents on interventions in heritage buildings, as well as on accessibility standards, the vast majority are based on empirical data that do not necessarily have the scientific basis necessary to meet the requirements of our plural society, with different types of visible and invisible disabilities. It is therefore essential to identify the environmental elements that have an impact on people living with visible and invisible disabilities. Secondly, it is necessary to develop solutions on the environment, so that they can access, circulate and carry out activities in heritage sites and buildings.

PROJECT OBJECTIVES

This project is part of the **Advancing Accessibility Standards Research** in the Built Environment Priority Area, including Heritage Buildings, grants and contributions program.

The overall objective of this project is to provide scientific evidence to support the reconciliation of inclusive accessibility in heritage buildings and sites.

The specific objectives are to :

1. **Produce a Literature review**. Identify accessibility best practices and facilitators, carried out in heritage buildings and sites through a literature review.

2. **Perform an evaluation of heritage sites.** Identify accessibility issues at the Old Seminary and in the Petit Champlain in Québec City.

   a) **Walking Intreviews**. To collect the perception of people living with disabilities on the selected heritage sites and the buildings that make them up through a guided tour.
   b) **Online questionnaire.** To identify the most important elements to be addressed in terms of accessibility in heritage sites using an online questionnaire.
   c) **Objective evaluation**. Objectively assess the accessibility of selected heritage sites using the Rick Hansen Accessibility Certification (RHFAC).

3. **Development of solutions.** TFor the architectural barriers arising from heritage site preservation constraints, using a co-design approach with validation of solutions and development of prototypes.

RESEARCH ACTIVITIES

The realization of our research project required the use of a mixed methodology and the realization of the following steps :

I. LITERATURE REVIEW

Objective

Identify accessibility best practices and facilitators, carried out in heritage buildings and sites.

Methodology

A "scoping review" type of literature review (Arksey & O'Malley, 2005; Levac, Colquhoun & O'Brien, 2010) was conducted to identify international best practices in accessibility in heritage buildings. The model used for this research is the Human Development Model - The Disability Creation Process (HDM-DCP) (International Network on the Disability Creation Process). This model includes the interaction between the person (personal factor) and his or her environment (environmental factor). This study focused on environmental enablers.

Identification of relevant studies. In order to answer the research question, eight databases were selected and visited on October 18, 2021 (CINHAL, Avery index to architectural periodicals, Ergonomics Abstracts, Design & applied arts index, MEDLINE, Art full text, EMBASE, America: History and life). A comprehensive research approach involving two concepts, accessibility and heritage sites, was used in each of them. A free and controlled vocabulary has been used and validated by a professional librarian.

Selection of studies. The Covidence software was used to sort the selected items. It eliminated 84 duplicates, leaving 381 articles to be analyzed. To simplify the analysis of the articles, they were first sorted by two pairs of reviewers according to their title and abstract. In the event of a conflict, a third evaluator has made the final decision. This process resulted in the elimination of 256 articles deemed irrelevant. The same process was applied to the remaining articles, but this time by reading the full text.

The inclusion criteria for this selection were as follows: 1) Articles describing accessibility solutions applied to heritage sites (adaptation process in a real context), 2) Articles proposing accessibility solutions at a theoretical level, 3) Scientific articles (including protocols), 4) Grey literature, 5) Documents written in English and French. Exclusion criteria were 1) documents on the accessibility of services (e.g., education, health), 2) documents that include heritage elements other than the built environment, such as protocols or assistance from site staff, 3) documents on web accessibility, 4) reviews of scientific literature, 5) letters from editors, 6) documents published before 1990. A total of 31 studies were included in this scoping review.

Two pairs of reviewers extracted data from the 31 studies and analysed the quality of the individual articles. They then met to share information in order to reach a consensus. Data extraction from the 31 articles was performed, which allowed the extraction of research-relevant information according to the HDM-DCP model. Discussions among the evaluators resulted in consensus.

Results

The solutions and environmental factors facilitating accessibility to buildings and heritage sites have been categorized and are presented according to the different types of disabilities. In total, 24 studies selected addressed accessibility in people with motor disabilities, 22 addressed accessibility in people with visual disabilities, 11 addressed accessibility in people with hearing disabilities and 2 in people with a hearing disability. intellectual disability. No other type of disability was addressed in the studies included. These studies were carried out in mainly European countries (n=21), more particularly in the United Kingdom (n=13), the United States (n=7), Asia (n=3) and South America. (Brazil n=1). No studies selected were conducted in Oceania or Africa.

Environmental facilitators for people living with motor disabilities

According to the studies selected and the data extracted, several environmental factors can facilitate accessibility, i.e. visiting places, for people with motor disabilities. The factors mentioned most frequently are the presence of access ramps (n=16), elevators (n=12), adapted toilets (n=12), handrails (n=11), lifting platforms (n=8), accessible parking (n=6) and the widening of aisles and doorways (n=6).

According to the studies retained and the data extracted, several sites have innovated by installing an elevator in order to preserve heritage. This is the case of Crosby (2005), who proposed the construction of a second building adjacent to the heritage building to accommodate the elevator and a footbridge connecting the two buildings. Another example is presented in the article by Smith (2007). The owners installed an elevator in place of the toilets to minimize disruption to the physical appearance of the property. The impact on the authenticity of the heritage building is also less significant, as some ramps do not require the demolition of walls and can sometimes be removed and installed only when necessary (Foster, 2004).

Adjusting thresholds (either by raising or lowering them) to create a clear passage (n=8) was also a frequently used solution. Peredo-Lopez (2010) suggests different ways of doing this. For example, they modified the main entrance by removing the exterior staircase and significantly lowering the ground level. They also modified access to the atrium by lowering the interior floor to the same level as the entrance, while moving the staircase to allow for the installation of an elevator. Crosby (2005) also gets creative by eliminating exterior thresholds between different levels (and the interior) by extending three ground floor windows to provide complete threshold-free access.

Other factors facilitating accessibility were also proposed in the studies selected, such as the presence of surfaces facilitating the use of wheelchairs (n=5), mechanical door systems (n=4), elevators. stairs (n=4), the removal of obstacles on the path (n=4), reception desks of different heights (n=4), the possibility of a virtual reality visit (n=4), the modification of the layout of the rooms (n=4), the possibility of loaning a wheelchair (n=3), the presence of places reserved for people in wheelchairs (n=3) and rest rooms with available seats (n=3).

Environmental facilitators for people with visual disabilities

Depending on the studies selected and the data extracted, several solutions and environmental factors can facilitate accessibility for people with visual disabilities, including the use of braille (n=9) or audio guides (n=11). Lighting also plays an important role for visually impaired people. It is therefore necessary to adapt the lighting by modifying its intensity and avoiding confusing arrangements or overly stimulating lights (n=7). Using brochures can also be helpful for visually impaired people, as long as they are easy to read. To this end, it is recommended to avoid visual clutter and use large font (n=9). The same goes for signage (n=8), which facilitates the organization and movement of people.

Another important asset is the use of different cues (visual, tactile, auditory) (n=5) to transmit information to ensure that each individual can fully understand and live the experience, regardless of their abilities and of their disabilities (level of visual degeneration, knowledge of Braille, etc.). For example, to ensure safety on stairs, visual cues (contrasts) (n=6) and tactile alerts on the floor and walls can be used (Crosby, 2005). In the article by Tutal and Topcu (2018), the carpets of the mosque were woven in a way that they were felt by the soles of the feet so that visually impaired people could perceive the lines.

Some articles also highlight the importance of choosing the right coating for walls, ceilings and floors (n=2). Materials that are neither too reflective nor too absorbent and color contrasts are recommended. In Roberson's (2009) manuscript, the physical environment is designed to provide sufficient space for people with visual disabilities to move around safely (n=1). Other means, such

as group or individual tours and live events or lectures (n=1) were also used in some texts to promote accessibility (Xicola-Tugas, 2012).

Environmental facilitators for people with auditory disabilities

For hearing impairments, few facilitators were presented. However, the use of induction loops (n=5), the use of subtitles in videos (n=6), the use of sign language (n=2), and the ability to read lips (n=1) (Gordon, 1999) in some contexts have been presented. The use of multisensory tools and strategies (n=1) (Renel, 2019) may be relevant for information transmission as well as for orientation and signalling. The information should therefore be written down as often as possible, but the use of images can also make it easier to understand. Mastrogiuseppe et al. (2021) recommend, among other things, translating texts using Augmentative Alternative Communication (n=1), which offers a variety of images that can be understood by all.

Technological tools are also recommended such as sound amplifiers (n=2) as well as voice modulators (n=1) that allow you to adjust the speed of the presentation and repeat the desired parts. Finally, some articles emphasize the importance of choosing the right wall, ceiling and floor covering and using materials that promote acoustics (n=2). Indeed, Volta Voices et al. (2001) recommend the use of additional mats and padding to create a favorable acoustic environment.

Environmental Facilitators for People Living with Developmental Disabilities

Among the different modalities, the relevance of offering resources that allow the activation of the user's prior knowledge, such as the use of repetition and recall of information (n=2), has emerged. The simplification of the text (n=2) is also presented as a relevant modality. For example, according to Rix (2005), the use of simple language (short sentences), a constant and slow pace (about 130 words/minute), the use of clear and obvious reference points, and the use of simple visual documents and explanatory signs should be encouraged. Among other things, information should be presented using bright primary colours and large, visible characters (n=1) (Rix, 2005). Second, the articles propose to prioritize the information (n=2) in order to present it according to progressive levels of difficulty by dividing it into smaller elements. Mastrogiuseppe et al. (2021) also advise using strategies that encourage the possibility of interaction with cultural content (n=1). Rix (2005) suggests proposing clear changes between stimuli and different concepts/characters/stories (e.g., pauses) (n=1). Distractions and stimuli should also be limited (n=1) (Rix, 2005) (e.g. by adjusting the volume of the sound). Finally, audio tours using technological aids, such as portable tape recorders, CD players, programmed handsets, and laser triggers or headphones, may be relevant if the equipment offered is easy to use and has large buttons and visual cues (n=1) (Rix, 2005).

Other environmental facilitators

Other modalities have been presented in various articles to improve accessibility to the various disabilities, such as the training of staff (n=9) to make them aware of good practices to adopt with people with disabilities. Similarly, the different means of multisensory signage (n=4) inside and outside the sites were discussed in order to facilitate the visit of different people. It is also important that the presentation of signage be consistent throughout the route (Noble, 2002). Some articles also suggest providing pre-visit information on site accessibility (n=4) so that people

living with various disabilities can plan their visit and trip in advance (Vardia et al., 2018). Other studies also mention the relevance of providing a clear itinerary (n=3) to visitors in order to facilitate their visit to the site. Finally, providing an explanatory text of the site in different languages (n=1) is a way discussed in the article by Cazorla et al. (2010) to facilitate the accessibility of the site.

II. Assessment of heritage sites

Three methods were used to evaluate the selected heritage sites: 1) guided tours; 2) an online questionnaire and 3) an assessment using the tool offered by the Rick Hansen Accessibility Certification (RHFAC).

II. 1 Walking interviews

Objective

Identify accessibility issues at the Old Seminary du Québec and in the Petit Champlain in Québec City for people living with disabilities through a guided tour.

Methodology

The evaluation of heritage sites is based on a qualitative approach aimed at describing and understanding the meaning of the experiential issues encountered by people living with disabilities.

Participants and recruitment

Participants were adults with disabilities who met the following selection criteria :

1. Living with a visible disability (motor, visual, related to the normal aging process) or invisible (autism, intellectual disability, hearing impairment, pain or chronic fatigue).
2. 18 years of age or older.
3. Ability to communicate with the research team, with or without help or support.
4. Ability to travel to and navigate the historic district of Old Québec, in Québec City (Canada), with or without a mobility aid.

With regard to the inclusion and exclusion criteria, it should be noted that although people living with invisible disabilities can sometimes present certain traits recognizable to others, they often go unnoticed during casual interactions. However, their quality of life and ability to function may be as affected as those of people with more visible disabilities. This is why people with invisible disabilities (autism, intellectual disability, hearing loss, chronic pain or fatigue) were included in the study. Furthermore, with regard to the diagnosis, the participants who were included were on the basis of a self-diagnosis. Individuals were asked to self-identify as having one or more disabilities.

Regarding the sampling methods, participants were recruited by the snowball method and by proximity. A recruitment poster was distributed through social media (Facebook) and by various organizations dedicated to people with disabilities (e.g.: Grouping of Disabled People's Organizations in region 03 – ROP 03; Kéroul, Student Office with disabilities from Laval University).

Some participants who agreed to be recontacted by the researchers involved in the project for studies on similar subjects were also contacted to complete recruitment and ensured greater representativeness of the different groups of people with disabilities in the study. . Participants who expressed an interest in participating were contacted by telephone or email to determine their eligibility and provide them with information about the project.

Data collection

To collect the data, the team conducted interviews along the way in the historic district of Old Québec City in Québec City, which has been on the UNESCO World Heritage List since 1985. This technique consists of on-site interviews, during which participants can explain their experiences in relation to a specific environment when they visit the place. Since person-environment interaction can be difficult to express in simple terms, this technique facilitates the expression of perceptions about the environment through the direct, real-time interaction between the person and the environment. This method also allows researchers to perceive the person's attitude and behaviour as well as changes in the environment. Two historical heritage sites have been chosen for the guided tours :

1. The School of Architecture of Laval University located at the Séminaire de Québec and,
2. The Petit-Champlain and Place Royale sectors in Old Québec.

These two sites were chosen because of their heritage significance. The Séminaire de Québec is a building, and the Petit-Champlain and Place Royale sectors are outdoor sites, so both indoor and outdoor heritage places can be explored. In addition, both locations allow participants to visit them with members of our research team, even if there are environmental barriers.

The Séminaire de Québec has a few adaptations that allow the circulation of people with reduced mobility on most floors, such as an elevator and two lifting platforms, and a few adapted washrooms, which does not mean that they are completely accessible.

The itinerary in the Petit-Champlain and Place Royale sectors did not include any adaptations, but traffic on some streets was possible for participants. The itineraries have been predefined to ensure the safety and comfort of the participants as well as the study of environments with heritage characteristics.

Two or three members of the research team, with no established relationship with the participants before the study, were present from the commented pathways. One of them led the interview and guided the participant orally (a sign language interpreter was present for interviews with a deaf person), and the others led the interview. The others checked the technical elements (microphones, recorder and camera) and managed contextual questions (for example, taking the key to the library when it was locked). All participants conducted two interviews, one at each site, between April and August 2022, during the day or evening, to cover different environmental situations and weather conditions. Some Covid-19 travel measures, such as proof of vaccination, were still in place during the data collection period. The participants were asked to describe their experiences in both locations and answered open-ended questions in a semi-structured interview.

Data analysis

Each interview was fully transcribed by a team member and the transcriptions were reviewed by another team member to ensure the accuracy of the transcription. Videos were used to contextualize the data in audio format where necessary. A mixed thematic analysis (Hsieh & Shannon, 2005; Miles et al., 2014) was carried out using:

a) the human development model – disability production process (MDH-PPH) (Fougeyrollas et al., 2018) and

b) selected elements of the Rick Hansen Foundation Accessibility Certification (RHFAC) survey (Rick Hansen Foundation, 2022).

The MDH-PPH model offers a perspective on the interaction between the person and the environment in the emergence of disability situations and presents different personal and social dimensions that are important to inform. The Rick Hansen Foundation Accessibility Certification (RHFAC) instrument provides a framework for more specifically addressing potential physical barriers in the environment. The codes therefore refer to the person, the social and physical environment as well as activities and roles.

Five members of the research team participated in the coding process (ARR, MLa, JR, MLe, AS). A partial coding of the data was first carried out. The members involved individually coded 2 interviews (the same - an external interview and an internal interview). The team members then met twice to discuss coding discrepancies and establish consensus on the definitions of codes and coded extracts. A coding book was established and each interview was coded by one person and revised by another. Coding was carried out using NVivo version 13 software (Lumivero, 2020). Once the coding of the interviews was completed, themes from the subthemes could be identified based on the similarities and differences between the emerging elements. Meetings and discussions took place throughout the analysis process.

Results

In total, 21 people carried out two guided tour type interviews, one at the Séminaire de Québec and the other in the Petit-Champlain and Place Royale sectors, for a total of 42 interviews. The interviews lasted between 27 and 125 minutes. All participants completed the interview at the Séminaire de Québec and only one participant was unable to complete the interview at the Petit-Champlain and Place Royale sectors due to pain experienced while navigating the uneven sidewalk (the interview lasted 8 minutes). Most participants were unfamiliar with the Séminaire de Québec and most participants had already visited Old Quebec simply to walk around and enjoy the atmosphere, for cultural activities or events (e.g., workshops, shows , carnival, theater) or to go to local restaurants and bars.

Regarding participant characteristics, 57.1% (n = 12) were women, 38.1% (n = 8) were men, and 9.5% (n = 2) were non-binary. Participants' ages ranged from 22 to 79 years (median age = 40). The participants presented different types of disabilities and different functional profiles: 52.4% (n = 11) lived with visible disabilities and 47.6% (n = 10) with invisible disabilities. Most participants also had comorbidity characterized by secondary disabilities, often milder. All participants who used mobility assistive devices were familiar with them, except for one person who had just gotten his walker.

Three main themes emerged based on the experience and obstacles identified by participants:

(1) Obstacles and impact on participation: which addresses the obstacles encountered by participants during interviews, their impact on participation, the strategies developed by participants, as well as the role of other people present on the site;

(2) Disabling accessibility: which includes some of the partial accessibility solutions already present on the sites, and the feelings experienced by the participants with regard to these solutions, and

(3) Meaning of Heritage: which addresses the meaning and importance of historical heritage for people with disabilities. Citations are intended to identify the number of participants, initial gender, and condition (e.g. autism, mobility, etc.).

(1) Obstacles and impact on participation

Overall, most participants felt limited by environmental obstacles on a daily basis, but perceptions of the frequency of limitations were heterogeneous among participants. Regarding the places visited, different obstacles were identified, some of which are common to both sites while others are specific to one or the other.

Access to toilets was often mentioned as a potentially problematic feature for both sites, but also generally in participants' activities. Several participants, living with different disabilities, explained that it was one of the first things they would like to spot when visiting a new place. However, some participants indicated that they avoided using public toilets for various reasons (lack of cleanliness, partially accessible toilets, etc.). One participant even mentioned that some people with disabilities would resist the urge to drink before going to a place where access to toilets is not guaranteed.

At the Séminaire de Québec, indoor site, the echo, a characteristic of heritage buildings, was mentioned by several participants living with different types of disabilities as an obstacle, notably by autistic people and people with hearing impairments, but also by participants with visual disabilities or chronic pain, who view it as a source of disruption or distraction, and as a significant barrier to communication.

In the Old Quebec sector, outdoor site, participants explained that their participation in activities in this sector could be hindered by obstacles such as uneven ground, obstructions on the sidewalk (for example, store displays, etc. other posters, trash cans) or the absence of rest areas and street furniture. Then, Petit-Champlain and Place Royale being tourist areas, the presence of large groups of people on the site disturbed several participants. For example, a participant reported that a group around a street musician could be disturbing for deaf people because they could have difficulty understanding the situation since they did not perceive the sound information while some autistic people felt overloaded.

Autistic participants also mentioned that there were too many sensory stimuli, especially on the outdoor course and in terms of visual and acoustic stimuli. The variety of colors, shapes and textures, as well as the noise and music, are elements that can make the visit to Old Quebec uncomfortable for some participants.

II. 2 Online survey

Objective

Identify the most important elements on which to intervene in relation to the accessibility of two heritage sites in Quebec City, the Old Seminary of Quebec and the Petit Champlain, for people living with disabilities

Methodology

The population targeted by the online questionnaire was divided into three categories of people across Canada: 1) people with visible and invisible disabilities, 2) caregivers, 3) professionals with expertise in universal accessibility or heritage . An online survey using the Lime Survey platform (Limesurvey GmbH, 2003) was developed. The questionnaire included 19 questions divided into five sections: 1) socio-demographic questions, 2) questions on the Old Seminary, 3) questions on the Petit Champlain and Place Royale sectors, and 4) questions on the perception of heritage, and 5) questions contact. Sections 2, 3 and 4 constitute the core of the questionnaire. In sections 2 and 3, respondents had to select a total of three different obstacles per area included in the survey, without ranking or order of importance. The questions were developed based on the data collected during the commented courses and on the basis of the RHFAC evaluation questionnaire. A statistics expert was consulted for the actual construction of the questionnaire (e.g. choice of the format of the response options). Alternative texts were integrated for the audiovisual content and photos were included in order to clearly illustrate the places mentioned in the questionnaire. These photos are presented below with the results in the section of the same name.

A pre-test was carried out with experts in accessibility and in the field of disability as well as with two people with disabilities, one visual, the other intellectual, in order to check the ease of access (link), the accessibility of the content (vocabulary and wording of the questions, color and size of the text, speech synthesis), the relevance, the order of the questions and the response time required. Then, the survey was sent to community organizations related to disability in Canada so that they could disseminate it through their networks with a view to recruiting participants. The organizations contacted are: Kéroul, Servio, Adaptavie, Rick Hansen Foundation and Inclusion Canada. Descriptive statistics were produced based on the responses obtained using Microsoft Excel (Microsoft Corporation, 2010).

Results

Socio-demographic characteristics of respondents

A total of 35 people responded to the online questionnaire. Respondents ranged in age from 18 to 76 years (average 35 years). Seventeen respondents identified as male (48.6%), 14 identified as female (40%) and 2 did not identify with either gender (11.4%). Respondents resided in nine Canadian provinces or territories, primarily Quebec (n=14), Ontario (n=7) and British Columbia (n=5). In terms of respondents' profile, 21 said they were a person with disabilities (60%), 11 said they were a caregiver and 2 said they were an expert in accessibility or heritage. Among the IAPs, 9 also said that they also had expertise in accessibility (n=2), heritage expertise

(n=2) or were studying in one or other of these areas (n=5). IAPs or caregivers (n=33) reported having one or more types of disabilities or supporting a person with one or more types of disabilities. The most common types of disabilities are motor disabilities (n=19), chronic pain (n=9), chronic fatigue (n=8) and autism (n=6).

Table 1. Sociodemographic characteristics of participants (n=35)

	Mean	Scope
Age	35	18-76
	n	**%**
Gender		
Male	17	48,6
Female	14	40,0
Non binary	4	11,4
Province of residence		
Québec	14	40,0
Ontario	7	20,0
British Colombia	5	14,0
Alberta	3	8,6
Manitoba	2	5,7
Other*	4	11,4
Profile		
Person with disabilities (PAI) only	13	37,1
PAI with professional expertise in accessibility	2	5,7
PAI with professional expertise in heritage	2	5,7
PAI studying in the field of accessibility or heritage	5	14,3
Caregiver only	11	31,4
Professional expert only	2	5,7
Type of disability of person or person being cared for** (n=33)		
Motor	19	57,6
Visual	2	6,1
Auditory	1	3,0
Chronic pain	9	27,3
Chronic fatigue	8	24,2
Autism	6	18,2
Intellectual disability	2	6,1

*Nova Scotia n=1 ; Nunavut n=1 ; Prince Edward Island n=1 ; Northwest Territories n=1
** This question applies to 33 respondents who may have one or more disabilities, or respondents who assist someone who may have more than one type of disability.

The presentation of data relating to architectural obstacles identified in heritage places is divided into two sections, one concerns interior places (section 2 of the questionnaire) and the other exterior places (section 3 of the questionnaire). The presentation of data in each section is also divided according to the different areas making up the premises (e.g.: main entrance, toilets). The data presented is amalgamated, therefore presented without distinction of age, gender, profile (people with disabilities (PAI)) or province of residence.

Each respondent (n=35) had to select a total of three different obstacles per area included in the survey, without ranking or order of importance. In total, 105 responses per area were collected. Some people selected the same obstacle two or three times, but were only considered once for the purposes of the analyses.

Obstacles observed in interior heritage places: Old Seminary

Section 2 of the questionnaire focused on interior spaces and included four areas of the Old Seminary of Quebec: 1) the main entrance, 2) a corridor, 3) a toilet room and 4) the café. The obstacles identified by the respondents will be presented for these four locations.

Main entrance : In total, 35 respondents identified eight elements as obstacles related to the accessibility of the main entrance of the Old Seminary for a total of 101 mentions of obstacles (each respondent could identify up to three obstacles) (Table 2; Figure 1). The three most frequently identified obstacles were 1) the step at the entrance for 19 respondents (54.3%), 2) the doors and handles for 16 respondents (45.7%) and 3) the sidewalk for 14 respondents (40.0%). Other obstacles identified were: lack of identification of the entrance, lack of signage, lighting, surface of the ground outside (texture, color, patterns) and lack of tactile cues .

Figure 1a. The main entrance

Table 2. Barriers linked to the accessibility of the main entrance to the Old Seminary (n=35 respondents with 101 mentions of obstacles)

Barriers	n mentions (%)	% repondants
Walk (at the entrance)	19 (18,8)	54,3
Door(s) and handle(s)	16 (15,8)	45,7
Sidewalk	14 (13,9)	40,0
Lack of entry identification	11 (10,9)	31,4
Absence of traffic signs	11 (10,9)	31,4
Lighting	10 (9,9)	28,57
Outdoor ground surface (texture, color, patterns)	9 (8,9)	25,7
Lack of tactile cues	6 (5,9)	17,1
I prefer not to answer	5 (4,9)	14,3
Total	101 (100,0)	-

The "respondents" column refers to the number of people out of a total of 35 respondents who selected the item as a barrier. "Barriers" indicates the number of times each element was mentioned as an obstacle out of all mentions of obstacles (n=101). Each participant could choose up to three obstacles.
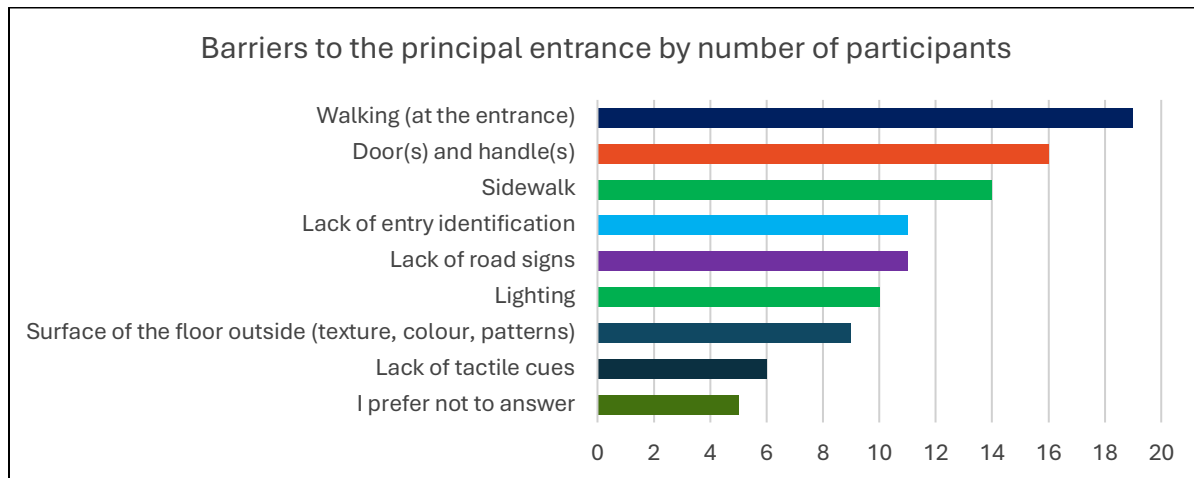
Figure 1b. Obstacles linked to the accessibility of the main entrance to the Old Seminary (n=35)

Corridor : Of the 35 people who responded, 19 (54.29%) considered walking at the entrance to be an obstacle, 16 people (45.71%) identified doors and handles as an obstacle, and 14 people (40%) identified the sidewalk as an obstacle. Corridor : In the corridor, 12 items were identified as barriers, of which the three most common were: 1) lack of handrails, identified as an obstacle by 17 people (48.57%); 2) the length of the corridor and 3) the floor area, selected as barriers by 13 people each (37.14%). Other elements were the absence of seats, lighting, reflections or glare, walls, width of the corridor, colour contrast between the floor and walls, absence of signage, lack of tactile cues and others.

Figure 2a. The corridor

Table 3. Barriers linked to the accessibility of a corridor of the Old Séminaire (n=35 respondents with 103 mentions of obstacles)

Barriers	n mentions (%)	% respondents
Lack of handrail	17 (16,5)	48,6
Corridor length	13 (12,6)	37,1
Floor surface (texture, color, pattern)	13 (12,6)	37,1
Lack of seating	11 (10,7)	31,4
Lighting	10 (9,7)	28,6
Reflections / glare	7 (6,8)	20,0

15

Walls (texture, color, defects, ...)	6 (5,8)	17,1
Corridor width	7 (6,8)	20,0
Color contrast between floor and walls	3 (2,9)	8,6
Lack of signage	4 (3,9)	11,4
Lack of tactile cues	3 (2,9)	8,6
Other	3 (2,9)	8,6
I prefer not to answer	6 (5,8)	6
Total	103 (100)	-

La colonne « répondants » réfère au nombre de personnes sur un total de 35 répondants qui ont sélectionné l'élément comme étant un obstacle. La « obstacles » indique le nombre de fois où chaque élément a été mentionné comme un obstacle sur l'ensemble des mentions d'obstacles (n=103). Chaque participant pouvait choisir jusqu'à trois obstacles.
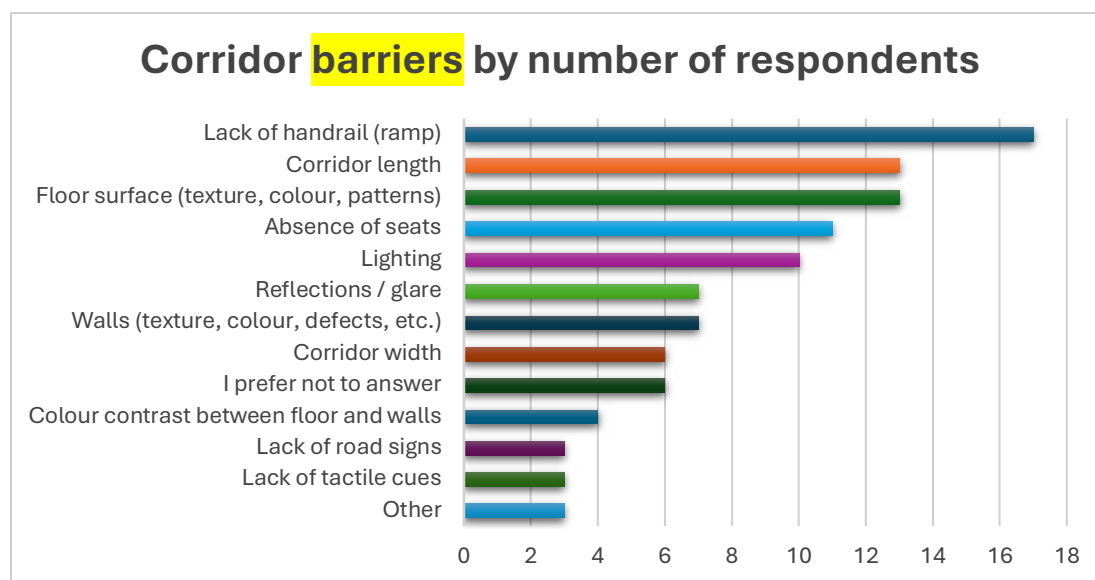
Figure 2b. Barriers identified in a corridor of the Old Seminary by number of respondents

Note: The same person indicated "other" three times and did not add any comments.

Toilets A total of 35 respondents identified 12 items as barriers related to the accessibility of a

washroom at the Vieux-Séminaire for a total of 101 mentions of barriers (each respondent could identify up to three barriers) (Table 4; Figure 3). The three most frequently identified obstacles were 1) grab bars for 9 people, (54.3%), 2) locating accessories for 15 people (42.9%) and 3) space for maneuvering and transferring for 10 people (28.6%). Other barriers identified include: sink, lack of countertop, flushing mechanisms, washroom identification sign, floor surface (texture, colour, patterns), window, lighting, colour contrast, and lack of tactile cues.

Figure 3a. Toilet at the Vieux-Séminaire

Table 4. Barriers linked to the accessibility of a toilet in the Old Séminaire (n=35 respondents with 101 mentions of obstacles)

Barriers	n mentions (%)	% répondants
Grab bars	19 (18,3)	54,3
Locating accessories (e.g.: paper)	15 (14,4)	42,9
Space for maneuvering and transfer	10 (9,6)	28,6
I prefer not to answer	11 (10,6)	31,4
Sink	10 (9,6)	28,6
No counter	10 (9,6)	28,6
Flushing mechanisms	7 (6,7)	20,0
Toilet identification sign	6 (5,8)	17,1
Floor surface (texture, color, patterns)	5 (4,8)	14,3
Window	4 (3,8)	11,4
Lighting	3 (2,9)	8,6
Color contrast between floor, walls and accessories	2 (1,9)	5,7
Lack of tactile cues	2 (1,9)	5,7
Total général	101 (100)	-

The "respondents" column refers to the number of people out of a total of 35 respondents who selected the element as a barrier. "Barriers" indicates the number of times each item was mentioned as a barrier out of all barrier mentions (n=101). Each participant could choose up to three obstacles.

Insérer

Barriers to the toilet by number of respondents

Barrier	Value
Lack of tactile cues	2
Lighting	3
Floor surface (texture, colour, patterns)	5
Flushing mechanisms	7
Washbasin	10
Space for manoeuvring and transfer	11
Grab bars	19
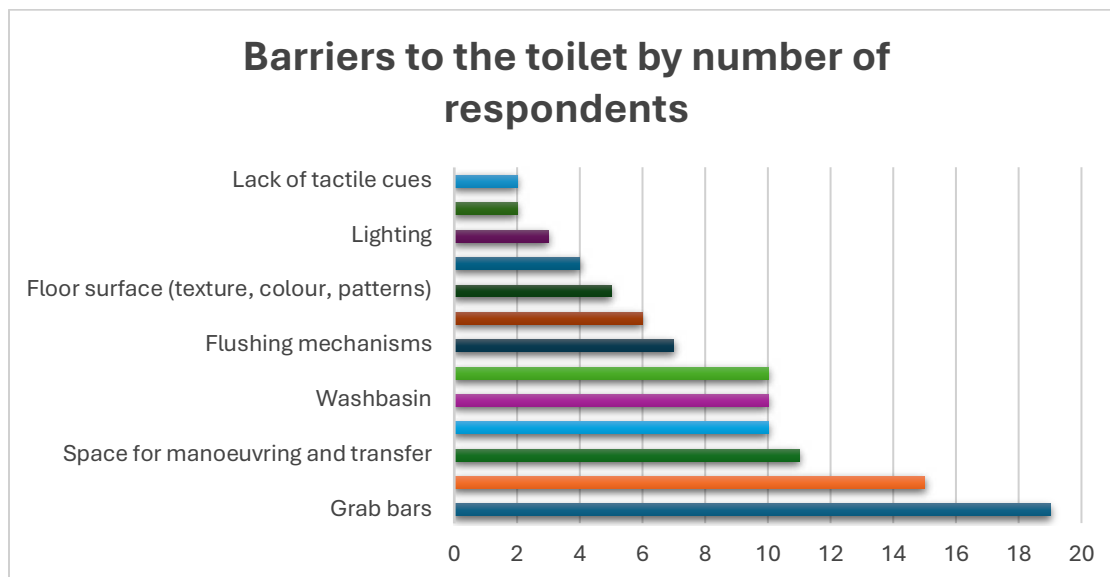
Figure 3b. Barriers identified in a corridor of the Old Seminary by number of respondent.

Coffee shop : A total of 35 respondents identified 11 elements as barriers related to the accessibility of the Café du Vieux-Séminaire for a total of 104 mentions of obstacles (each respondent could identify up to three barriers) (Table 5; Figure 4b). The three most frequently mentioned elements were: 1) the circulation space, identified as an obstacle by 17 people (48.6%); 2) tables, which were selected by 16 people (45.7%) and 3) seats, which were selected as obstacles by 11 people (31.4%). Other elements mentioned were the gable ceiling and walls, windows, lack of signage, lack of tactile cues, reflections or glare, lighting, and the "other" element

Figure 4a. The coffee shop

Table 5. Barriers related to the accessibility of the Café du Vieux-Séminaire (n=35 respondents with 104 mentions of barriers)

Barriers	n mentions (%)	% repondants
Circulation space	17 (16,4)	48,6
Tables	16 (15,4)	45,7
I prefer not to answer	14 (13,5)	40,0
Seats	11 (10,6)	31,4
Ceiling/walls (gable))	10 (9,6)	28,6
Windows	8 (7,7)	22,9
Lack of road signs	6 (5,8)	17,1
Lack of tactile cues	6 (5,8)	17,1
Reflections / glare	5 (4,8)	14,3
Floor surface (texture, colour, patterns)	5 (4,8)	14,3
Other	3 (2,9)	8,6
Lighting	3 (2,9)	8,6
Total	104 (100)	-

Note: The « percentage of persons » column refers to the number of persons out of 35 (total number of respondents) who selected the element as a barrier. The « total percentage column » shows the percentage of the total number of responses to the question (n=104) because each person could choose up to three barriers.
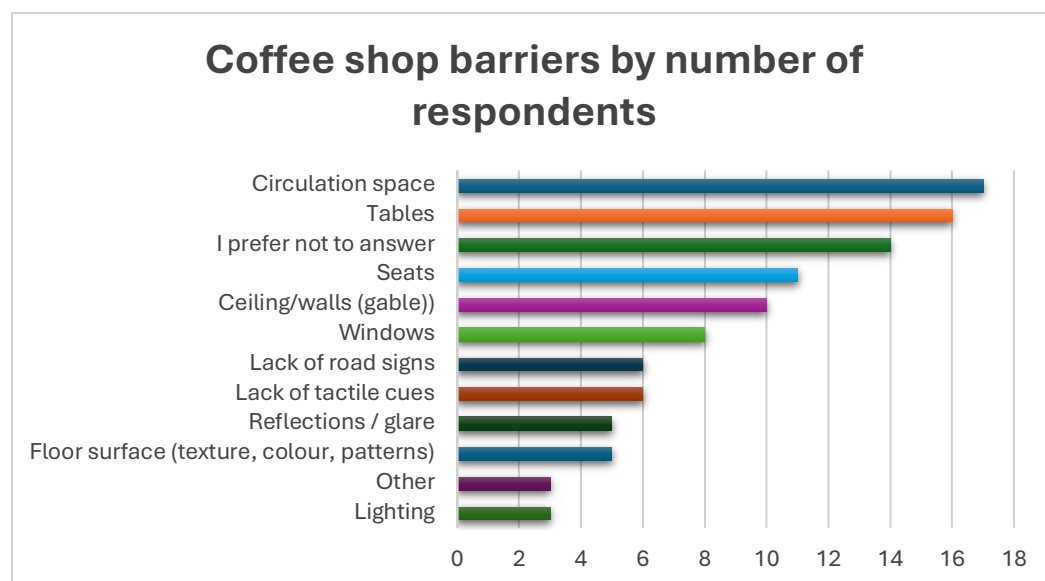
Figure 4b. Accessibility barriers at the Vieux-Séminaire café (n=35)
Note: The same person indicated "other" three times and did not add any comments.

Barriers at Outdoor Heritage Places: Old Québec
This section of exterior elements includes two areas of Old Québec that were featured in the survey: 1) Petit Champlain Street and 2) Place Royale.

Rue du Petit Champlain : Rue du Petit Champlain: In this section, 12 elements were also identified as barriers. The three most frequently identified by respondents were: 1) Entrances to businesses, 2) lack of sitting or rest areas, and 3) floor area, which were selected by 54.29%, 51.43% and 40% of respondents, respectively. Other barriers were the slope of the ground, the lack of tactile cues, lighting, traffic and maneuvering space, visual stimuli, traffic signs, garbage cans, snow and the "other" element which was ice and the usual traffic of the street.

Figure 5a. Rue du Petit Champlain

Table 6. Barriers related to accessibility on Rue du Petit Champlain (n=35 respondents with 102 mentions of barriers)

Obstacles	n mentions (%)	% repondants
Entrances to shops	19 (18,6)	54,3
Lack of sitting or a rest area	18 (17,6)	51,4
Floor surface (texture, colour, pattern)	12 (11,8)	40,0
Slope of the ground	14 (13,7)	34,3
Lack of tactile cues	7 (6,9)	20,0
Lighting	6 (5,9)	17,1
Circulation space and manoeuvring	5 (4,9)	14,3
Visual stimulus	5 (4,9)	14,3
Traffic signs	5 (4,9)	14,3
Garbage bins	4 (3,9)	11,4
Snow	4 (3,9)	11,4
Other	2 (2,0)	5,7
I prefer not to respond	1 (1,0)	2,9
Total	102 (100)	-

Note: The « percentage of persons » column refers to the number of persons out of 35 (total number of respondents) who selected the element as a barrier. The « total percentage column » shows the percentage of the total number of responses to the question (n=102) because each person could choose up to three barriers.

P. Champlain barriers by number of respondents
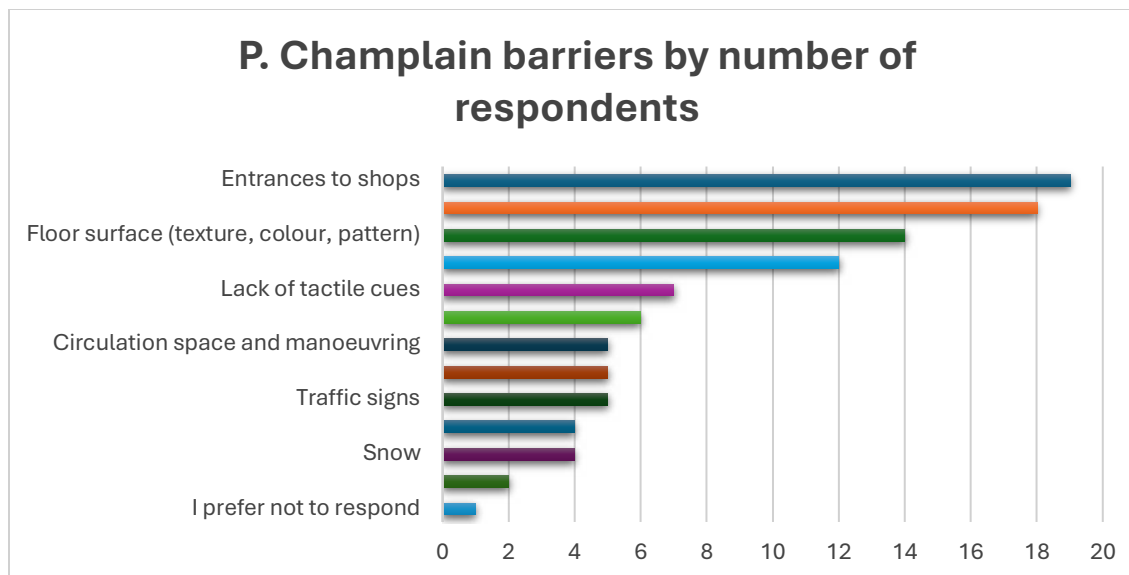
Figure 5b. Barriers identified on Petit Champlain Street by number of respondents

Place Royale : A total of 35 respondents identified 10 items as barriers related to the accessibility of Place Royale for a total of 102 mentions of barriers (each respondent could identify up to three barriers) (Table 7; Figure 6b). The three most frequently identified obstacles were 1) the floor surface for 17 people (48.6%), 2) the slope of the ground for 15 people (42.9%) and 3) the entrances to shops for 15 people (42.9%). Other barriers that were identified were: insufficient rest areas, lack of tactile cues, lack of shelter or covered space, benches, traffic space, lack of signage, and lighting.

Figure 6a. Place Royale courtyard

Table 7. Barriers related to the accessibility of Place Royale (n=35 respondents with 102 mentions of barriers)

Barriers	n mentions (%)	% repondants
Floor area (texture, colour, pattern)	17 (16,7)	48,6
Slope of the ground	15 (14,7)	42,9
Entrace to shops	15 (14,7)	42,9
Insufficient rest areas	13 (12,8)	37,1

Lack of tactile cues	9 (8,8)	25,7
Lack of shelter or covered space	8 (7,8)	22,9
Benches	7 (6,9)	20,0
Circulation space	6 (5,9)	17,1
Lack of road signs	5 (4,9)	14,3
Lighting	4 (3,9)	11,4
I prefere not to answer	3 (2,9)	8,6
Total général	102 (100)	-

Note: The « percentage of persons » column refers to the number of persons out of 35 (total number of respondents) who selected the element as a barrier. The « total percentage column » shows the percentage of the total number of responses to the question (n=102) because each person could choose up to three barriers.
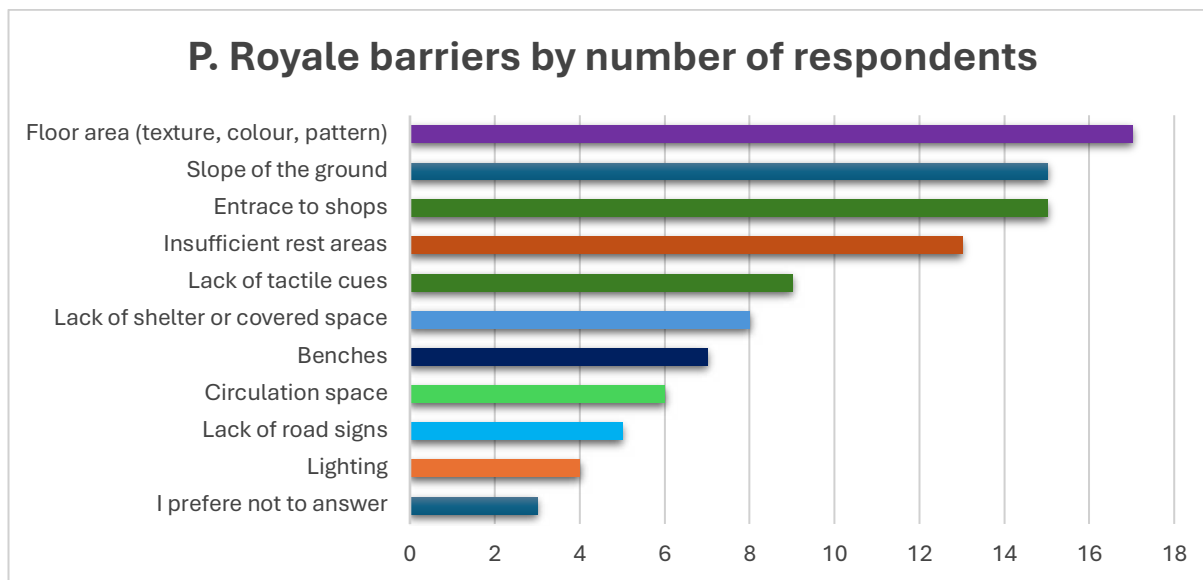

Figure 6b. Barriers identified in Place Royale by number of participants

Similar and different barriers in the respondent's place of origin

In order to explore the similarities and divergences in terms of heritage accessibility between Quebec City and other cities and provinces, respondents were asked about the similar and different barriers they encounter in their place of origin.

Heritage buildings (interior) : For indoor spaces, 17 (48.57) people indicated that they find similar barriers, such as stairs, uneven floors or limited circulation space, and 14 (40%) people indicated that they do not. On the other hand, 16 people (45.71%) indicated that they find different barriers and 16 who do not (Table 13). Some examples of different barriers would be inaccurate signage, lack of resting places, limited facilities (e.g., washrooms), overcrowded spaces, lack of interpretive signage (making it difficult to understand the meaning of the heritage site), safety, or information available only in English and/or French.

Table 8. People who find similar and different barriers (interior)

	Similar barriers		Different barriers	
	n	%	n	%
Yes	17	48,57	16	45,71
No	14	40,00	16	45,71
I prefere not to answer	4	11,43	3	8,57
Total	35	100	35	100

Historic Places (outdoor): In terms of outdoor spaces, 20 people (57.14%) reported encountering similar barriers, such as uneven sidewalks and cobblestones, uneven streets, access to businesses or brick flooring on trails that can trigger leg spasms; while 12 people (34.29%) mentioned not encountering any. On the other hand, 17 people (48.57%) reported finding different barriers, while 12 people did not find any other barriers (Table 14). Examples of these different barriers include lack of signage for suitable paths/entrances, adverse weather conditions, or safety concerns, such as uneven terrain, slippery surfaces, or insufficient lighting.

Table 9. People who find similar and different barriers (outside)

	Similar barriers		Different barriers	
	n	%	n	%
Yes	20	57,14	17	48,57
No	12	34,29	12	34,29
I prefere not to respond	2	5,71	5	14,29
Missing response	1	2,86	1	2,86
Total	35	100,00	35	100,00

Importance and significance of heritage

Section 4 of the questionnaire focused on the importance and significance of heritage places to respondents. In terms of the importance of heritage places, the results show that the majority of respondents (n=30/32; 93.8%) consider heritage places to be "important" (n=9; 25.7%) or "very important" (n=21; 60%). These data highlight a predominant valuation of heritage among the participants, highlighting its significant role in their cultural and social perception. In terms of the meaning of historic places, the results show that 77.1% of respondents (n=27) perceive historic places in relation to history; 60.0% related to culture (n=21 people) and 54.3% related to identity (n=19) (Table 10). Less than one-quarter of respondents (n=7; 20.0%) associate heritage places with inaccessibility and less than one in 10 associate it with risk (n=3; 8.8%). These results illustrate a diversity of perceptions of the meaning of heritage places, highlighting predominant aspects such as history and culture.

Table 10. Significance of historic places by number of participants

	History		Culture		Identity		Inaccessibility		Risk	
	n	%	n	%	n	%	n	%	n	%
Yes	27	77,14	21	60,00	19	54,29	7	20,00	3	8,57
No	7	20,00	13	37,14	15	42,86	27	77,14	31	88,57
N/A	2	2,86	2	2,86	2	2,86	2	2,86	2	2,86
Total	36	100	36	100	36	100	36	100	36	100

II.3 Accessibility Assessment through the Rick Hansen Foundation Accessibility Certification

Three methods were used to assess the accessibility of the selected heritage sites. The third and final method was an objective assessment using the tool proposed by the Rick Hansen Foundation Accessibility Certification (RHFAC). The Rick Hansen Foundation, whose mission is to advocate for accessibility for all, offers a national rating system that measures and certifies the level of accessibility of buildings and sites, based on the holistic experience of people with various disabilities affecting their mobility, vision and hearing. This program provides a better understanding of the physical accessibility of the site and how to improve it.

Objective

Objectively assess the accessibility of selected heritage sites using the Rick Hansen Accessibility Certification (RHFAC).

Methodology

The assessment is carried out by certified professionals, using a questionnaire (RHFAC Survey) in which the assessor rates the various elements of the environment according to the instructions in the documents provided by the Rick Hansen Foundation (Professional Handbook and Workbook). Two members of the research team completed the Rick Hansen Foundation training between January and April 2022 to become certified professionals and conduct the assessment. For this project, version 3.0 of the evaluation was used.

The Rick Hansen Foundation offers two levels of certification: regular certification and gold certification. To be certified as accessible, the assessed site must achieve a total rating of at least 60% and meet two criteria: 1) have at least one accessible entrance and 2) have at least one universal toilet. As far as gold certification is concerned, the site must obtain a rating of at least 80% and meet 12 criteria:

- Designated accessible parking spaces, if parking is provided

- Access to public transportation, if the site is located in an area served by public transportation.
- Accessible access path(s) leading to the entrance of the building.
- A main entrance accessible to the public and staff.
- Access to all floors expected to be used by an elevator accessible to all.
- At least one universal toilet.
- Emergency systems with visual and audible fire alarms in public and private areas.
- Orientation strategies in place to navigate through the site.
- Safety features, such as tactile warning indicators at the top of stairs and cane-detectable features, in case of overhanging or protruding hazards along the way.
- Tactile markings for permanent part identification.
- Assistive listening and communication enhancement technologies, where relevant to the site.
- Accessibility measures for key functional facilities at the site.

This questionnaire is structured in three levels (categories, elements and characteristics). Each category and elements represent specific areas of evaluation, while characteristics are the criteria for analysis within elements. These characteristics provide operational details to assess the degree of accessibility or compliance of each element. The version used includes 10 categories:

1. Vehicular access
2. Approach and exterior entrance
3. Interior circulation
4. Indoor services and environment
5. Sanitation
6. Wayfinding and signage
7. Emergency systems
8. Additional use of space
9. Residential units
10. Trails and paths

Both sites under study were evaluated. Before carrying out the on-site assessment, a selection of the applicable categories was made in relation to the characteristics and functions of each site. Then, site visits were made to collect the information necessary for the evaluation (e.g., photos and measurements of the site). The questionnaire was completed by assigning the relevant scores to each characteristic included in the assessment.

Results

Old Seminary – Section occupied by the School of Architecture of Laval University

Site description : The former seminary, a heritage and historical site, was built between 1675 and 1878, with its central body built between 1684 and 1687, as well as its two wings erected between 1704 and 1713. Inspired by 17th-century French classical architecture, this imposing building consists of five levels, four of which are storeys. Since 1988, it has been home to Université Laval's School of Architecture, whose main users are students, professors and other staff.

Evaluation Scope : The areas included in this evaluation are all included in the section of the Vieux-Séminaire housing the School of Architecture, including: In addition, in the context of this research project, only the sections included in the commented itineraries were considered for the evaluation in order to maintain consistency in the exploration of the environment. Elements 3.7, 4.4, all elements of category 8 (except 8.6); and categories 9 and 10 are excluded from the assessment because they do not apply (for example, there is no shower in the assessed section).

Evaluation by categories and elements :

The section of the Vieux-Séminaire evaluated as part of this project obtained a total percentage of points of 47% and the building could therefore not be certified as accessible. The scores for each category and element are presented in the form of tables (tables 11 and 12).

I. Vehicle access

This category includes two elements to be assessed: parking and general vehicular access. The former obtained a percentage of 38.2% while the latter obtained 20% of points, making a total of 31.5% for this category as a whole (Table 11).

Table 11. Accessibility of vehicular access to the Old Seminary

Categories and items		Points			%
		Earned	Available	Max.	
1.0	Vehicle Access	17	54	65	31,5
1.1	Parking	13	34	45	38,2
1.2	General vehicle access	4	20	20	20,0

1.1. Parking

On-site parking is available near the secondary entrance (adapted) to the building. However, it has several points to improve in order to be accessible:

o Lack of demarcation of parking spaces in the parking area leading to various accessibilitybproblems :

Figure 7. Images of the parking

– Inability to determine the number of parking spaces, including the number of accessible parking spaces despite the presence of a sign indicating the reserved area.

- Insufficient number of accessible parking spaces based on an approximate calculation of the number of parking spaces, including accessible spaces (40 spaces with ±1-2 accessible spaces), and a minimum ratio of 2:50.
- Difficulty in determining whether the measure of accessible parking spaces meets the recommended minimum clearance to allow a person in a wheelchair to get in and out of their vehicle.
  - Possible obstruction of the road for people with reduced mobility due to the fact that the accessible parking lot is located near an entrance (on the left) dedicated to delivery.
  - Gravelled surface with sliding possibilities and difficult to navigate in a wheelchair.
  - Inadequate signage of accessible parking spaces (small sign, and therefore difficult to see from a distance from the entrance to the parking lot).
  - Lack of pedestrian paths and other designated paths.
  - In the parking space at the entrance there is no demarcated path for pedestrians.
  - Lack of artificial light in the parking area.
  - Lack of shelter for designated accessible parking space.
  - Unobstructed accessible parking space (snow) at times

Figure 8. Images of the parking

1.2. General access for vehicles

General vehicle access refers to access to the site from transportation and also to the drop-off areas available on site. There are several points of improvement available for this item:

- No drop-off area is provided on site despite the space available in the parking lot near the entrance.
- There is no bus stop nearby, even though the neighborhood is served by the bus network and the building serves an urban student community.

2. Paths and exterior entrances

This category refers to the exterior entrances to the building as well as the paths available outside either to reach the front door or to communicate different sections of the site to the outside. The category received 50.3% of the points and includes four elements: 1) exterior paths to the facility, 2) exterior ramps, 3) exterior stairs, and 4) building entrance. These items received 47.7%, 57.1%, 52.6% and 45.7% of the points respectively (table 12).

Table 12. Accessibility of the approach and exterior entrances of the Old Seminary

Categories and items		Points			%
		Earned	Available	Max.	
2.0	Exterior Approach and Entrance	82	163	194	50,3
2.1	Outdoor paths to the facilities	21	44	48	47,7
2.2	Outdoor railings	20	35	35	57,1
2.3	Outdoor stairs	20	38	41	52,6
2.4	Building entrances	21	46	70	45,7

2.1. Outdoor paths leading to the facilities
Some elements should be reviewed concerning the **external paths leading to the building**:

Main entrance

Secondary entrance

Figure 9. Images of the entrances to the School of Architecture at the Old Seminary

- o Signage is limited in the entrances.
- o In the main entrance a poster is available on the fence but not in the door of the building. Since there are several doors, it would be relevant to indicate which one goes to the reception.
- o In the secondary entrance, there is a plaque at the entrance to the parking lot and another one next to the front door but there is a lot of distance between the two.
- o No signage or directional signage is available.
- o The path to the secondary entrance has a steep slope at the entrance to the car park without a handrail (more than 8%).
- o No rest areas are available outside the entrances.
- o The secondary entrance has no artificial lighting.

- In the main entrance, one might tend to pass through the arch rather than through the door of the school.
- In the secondary entrance there is no convenient and understandable route to the facilities. There is no path.
- There is no drainage system. Accumulation of water in the parking area

2.2. Outdoor Railings

Several features could be improved with regard to the exterior access ramp leading to the SECONDARY entrance, which is the one adapted for people with reduced mobility:

SECONDARY entrance

Figure 10. Images of the secondary entrance ramp

- Relatively pronounced gaps between the planks of the wooden access ramp. Limited width of the exterior ramp. Restricted dimensions of the landing. No contrast or anti-slip strips available. Exterior ramp leading to the SECONDARY entrance not cleared (snow) at certain times Absence of handrail on one side of the ramp and metal handrail without extensions at the beginning and end of the ramp. Lack of protection in the delivery area. Relatively pronounced gaps between the planks of the wooden access ramp.
- Limited width of the exterior ramp.
- Restricted dimensions of the landing.
- No contrast or anti-slip strips available.
- Exterior ramp leading to the SECONDARY entrance not cleared (snow) at certain times
- Absence of handrail on one side of the ramp and metal handrail without extensions at the beginning and end of the ramp.
- Lack of protection in the delivery area.

SECONDARY entrance

Figure 11. Images of the secondary entrance ramp

2.3. Outdoor stairs

Several features would need to be improved with regard to the exterior staircase leading to the SECONDARY entrance, which is the one that is adapted for people with reduced mobility:

Figure 12. Barriers identified in Place Royale by number of participants

- o The space is well cleared, with a garbage can and a tree at the bottom of the stairs. In winter, the staircase is not always completely cleared of snow.
- o There are two handrails, but they are not left and right, only on part of the stairs.
- o No tactile indicator is available on the steps of the external staircase.
- o There are no contrasting anti-slip strips on the nose of the steps.
- o The steps have a stair nosing that is slightly protruding.
- o There is no drainage system.
- o There are only two street lamps that diffuse light in front of the door but not enough on the stairs.

2.4. Building entrances

MAIN entrance

SECONDARY entrance

Figure 13. Entrance images

The section of the building studied as part of this project includes
two entrances: the main entrance and the secondary entrance,
which is the one that is adapted for people with reduced mobility.
To make these entries accessible, several points of improvement
would be relevant :

- o   The main entrance is not accessible as it has steps.
- o   None of the entrances have an automatic door or with a motorized opening .
- o   There is no path showing how to get to the main entrance or secondary entrance.
- o   At the main entrance, there is a plaque of Laval University, but it is black, difficult to see. The entrance is not easily identifiable.
- o   No tactile indications or other signage are available.
- o   The doors are relatively heavy.
- o   The doors have a high threshold.
- o   In winter, each entrance has two doors, leaving less space in front of the first door and also little space to be able to maneuver between the two doors.
- o   There are no cane-detectable barriers around the doors opening to the outside.
- o   Entrances do not offer a rest area or outdoor sitting.
- o   No shelter is provided except in winter.

Figure 14. Images of the front doors

3. Interior circulation

This category refers to both horizontal and vertical interior travel spaces. The category includes eight items that scored between 41% and 35.9%: interior doors and openings (excluding washrooms) (41%), traffic path (44.4%), hallways and vestibules (55.2%), interior ramps (62.5%), elevators (59.2%), interior stairs (65.9%), escalators and moving walkways (n/a), and platform lifts (53.3%) (Table 13). The overall percentage obtained for this category as a whole is 55.8%.

Table 13. Accessibility of the interior circulation elements of the Old Seminary

Categories and Items		Points			%
		Obtained	Available	Max.	
3.0 Interior Circulation		145	260	312	55,8%
3.1	Interior doors and openings (excluding washrooms)	16	39	63	41,0%

3.2 Indoor routes	8	18	22	44,4%
3.3 Corridors and vestibules	16	29	31	55,2%
3.4 Interior railings	20	32	35	62,5%
3.5 Elevators	42	71	71	59,2%
3.6 Interior stairs	27	41	41	65,9%
3.7 Escalators and moving walkways	0	0	19	n/a
3.8 Platform lifts	16	30	30	53,3%

3.1. Interior doors and doorways (excluding washrooms)

This element refers to all doors and passageways inside. Several types of doors and passageways are available in the building and the main points for improvement regarding the interior doors would be :

o No motorized or self-opening doors are available on site.
o Many doors are heavier, especially fire doors.
o In some hallways, the doors open to the hallway and there are no tactile indicators.
o Almost all handles are button-shaped, which can make it difficult for people with motor disabilities to use.
o Glass doors on the premises do not have any visual indicators (e.g., coloured stripes).

Figure 15. Images of the interior doors

3.2. Indoor routes

This element includes the routes and circulation areas inside the building. Some areas for improvement have been identified :

o Some grade changes are present in the building, however, ramps and platform lifts are available in all grade changes encountered in the section of the building being evaluated for this project. However, there are other level changes that only feature stairs.
o The most used spaces are accessible, even if the autonomous use of equipment and spaces is not always possible.
o The structure of the building doesn't make sense and there aren't any tracking systems that help.
o There are no tactile indicators in open areas, but they are relatively small.

Figure 16. Images of indoor routes

3.3. Corridors and vestibules

The building includes many corridors that would have elements to improve in order to make them accessible :

- o Usually the hallways are clear (with the exception of the basement where sometimes there are recycling bins and the second floor or sometimes there are tables in the hallway).
- o The contrast is generally good but the floor is reflective (the pale green + beige contrast could be improved).
- o It would be relevant to have handrails in long corridors and there are none at the moment.
- o No sitting or rest areas are available in the long corridors evaluated as part of this project.
- o Lighting in some hallways is limited, especially in the basement.

Figure 17. Images of corriodors and vestibules

3.4. Interior ramps

The Old Seminary includes several interior ramps to overcome changes in levels within the same floor. Key areas for improvement would include :

- o The landings at the beginning and end of the ramps are not always large enough and sometimes are in transit areas.
- o There are no contrasting non-slip strips.
- o There is one handrail only and only on one side of the ramp.
- o Some ramps are not easily located and could therefore be indicated with signage.
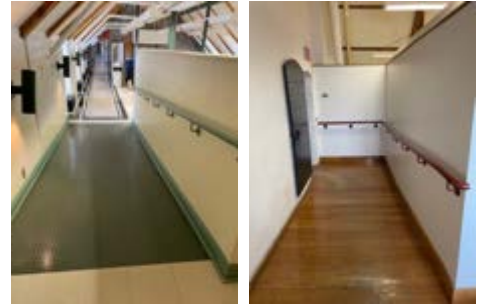
Figure 18. Images of interior railings

3.5. Elevators

Only one elevator is available in the section of the Old Seminary evaluated for this project and various key points for improvement have been identified :

- o No indication of the elevator is available, and it is not easily visible, and it is not close to the main entrance.
- o There are no tactile and auditory cues and the order of the numbers is not obvious.
- o The elevator doors reopen automatically but there is no motion sensor, so the door can hook the person who is in the elevator door frame.
- o The buttons do not have braille or raised characters.
- o Audio indications are not provided.
- o The visual indications of the elevator offer limited information. This indicates the level we are going to, but not the level we are at.
- o No handrails are available in the elevator.
- o There is no color contrast between the floor and the walls of the elevator, inside the car.
- o No mirrors are available.
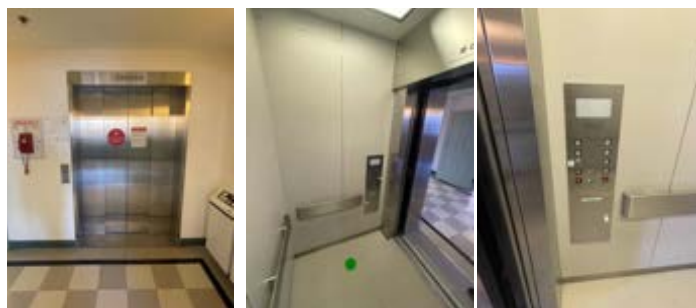
Figure 19. Images of the elevators

3.6. Interior stairs

Several staircases are available at the Old Seminary, those that were considered for this evaluation are those that were most often used as part of the guided tours. Areas for improvement for this element would be as follows :

o There is a landing at the bottom and top of the stairs, with sufficient space at the bottom, but at the top, in the event that the doors are closed and have to open when there are passers-by, the door takes up manoeuvring space that can get in the way
o In the majority of stairs, the handrail is located on one side only and has a single height.
o No touch indicator is available.
o The stairs are beige (wood color) and there are no contrasting anti-slip strips on the nose of the steps.
o The stair nosings are rounded, but are protruding to the point where it becomes risky to get stuck in them when climbing the stairs.
o The lighting is good, but it's not even, creating small areas of shadow that can hinder traffic.

Figure 20. Images of interior stairs

3.7. Escalators and moving walkways

This category was assessed as "Not Applicable (N/A)" because there are no escalators or conveyor belts in the site and the presence of these elements is not expected in this context.

3.8. Platform lifts

Two platform lifts are available on the site: one on the 1st floor and another on the 4th floor. Both platforms are used to overcome a level change of 2 to 4 steps. Several points for improvement have been targeted :

o One of the platforms requires a key that is only accessible at the security post at the main entrance (non-accessible entrance). While some means of communication are possible (e.g., phone calls), support is limited and there are no instructions on this.
o The width is 82 cm, which is less than the minimum width required.
o There are barriers on the side where there are no doors and handrails on the control side.
o The first and 4th floor platforms require the continuous press of the button to be activated, i.e., they only go up or down when the button is held.

o   Platforms do not provide auditory feedback.

Figure 21. Images of the lighting platforms

4. Indoor services and environments

The category of indoor services and environment consists of six elements, one of which was considered to be "Not applicable (N/A)". The percentage of points obtained for this category as a whole is 45.7%. The items included and the percentages of points awarded to each are as follows: 1) Lobby and reception area (41.7%), 2) Reception desks, service counters, and self-service Transaction Kiosks (41.7%), 3) Waiting areas, general sitting, meeting rooms, and lounges (47.8%), 4) Kitchen (n/a), 5) Acoustic considerations (85.7%), and 6) Building lighting and systems (39.3%).

Table 14. Accessibility of services and interior environment of the Old Seminary

Categories and items		Points			%
		Obtained	Available	Max.	
4.0 Indoor Services and Environment		43	94	167	45,7%
4.1 Lobby and reception area		5	12	18	41,7%
4.2 Reception desks, service counters and self-service transaction kiosks		10	24	37	41,7%
4.3 Waiting areas, general sitting, meeting rooms and lounges		11	23	31	47,8%
4.4 Kitchen		0	0	43	n/a
4.5 Acoustic considerations		6	7	10	85,7%
4.6 Building lighting & systems		11	28	28	39,3%

4.1. Lobby and reception area
The lobby and reception area are not clearly signposted and the layout of the venue is not intuitive

Figure 22. Images of the lobby

o The key points for improvement would therefore be:
o Lack of signage at the gates and difficulty in finding one's way to the facilities of interest.
o Elevators and stairs away from the front desk
o No signage indicating the location of the main facilities.
o Textured (not smooth) and overly shiny floor
o Insufficient lighting (40-60 lx.)

4.2. Reception desks, service counters and self-service transaction kiosks

The main entrance does not have a reception desk as such, but an access to the security post including a small counter 900mm high. There are no self-service kiosks available on site. The elements for improvement would be :

o Security inaccessible from the main entrance (currently only visible).
o Lack of countertops at different heights.
o Limited signage to get to the security post.
o Little contrast between the security post and adjacent surfaces.
o No assistive communication technology available.

Figure 23. Images of the reception desk

4.3. Waiting areas, general sitting, meeting rooms and lounges

With respect to waiting areas, general seating, meeting rooms, and lounges, the key areas for improvement would include :
o Few seats are available in the course except for the library.
o Limited variety of chairs within the same room or space.
o Several chairs located in inaccessible places (e.g., you have to go up and down a few steps)
o Tables that are too high with square corners in common areas (e.g., library)
o No system to facilitate communication where exchanges are planned.
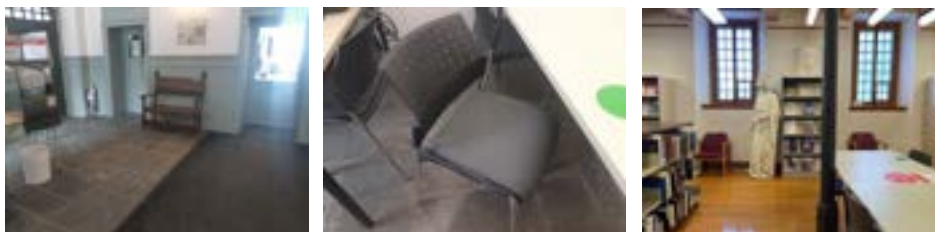
Figure 24. Images of waiting areas and seats

4.4. Kitchen

This category was assessed as "Not Applicable (N/A)" because there are no accessible kitchens in the sections assessed for this project.

4.5. Acoustic considerations

Few noises were present in the building at the time of the assessment, however the traffic at that time was not representative of the usual traffic. The only problem to improve regarding acoustics is :
- o   Echo presence in some sections of the building.

4.6. Building lighting & systems

Regarding lighting and building systems, such as outlets or switches, there are some areas that could be improved :
- o   Insufficient lighting in some corridors and entrances.
- o   Significant variation in lighting levels and types, especially in entrances.
- o   Lack of individual light controls.
- o   Significant presence of reflections due to surface finish.
- o   Fountains suitable for the knees, but waterers too high (920mm).

5. Sanitary facilities

The sanitary facilities category consists of two elements: 1) washrooms and 2) showers. However, showers were not available in the sections explored in this study. The element referring to washrooms obtained a percentage of 41.7%. This category, having only one element evaluated, obtains the same rating (41.7%) (Table 15).

Table 15. Accessibility of the sanitary facilities of the Old Seminary

Categories and items	Points			%
	Obtained	Available	Max.	
5.0 Installations sanitaires	35	84	126	41,7%
5.1 Washrooms	35	84	84	41,7%
5.2 Showers	0	0	42	n/a

5.1. Washrooms

The key areas for improvement for the washrooms in the evaluated section of the Old Seminary are :
- o   Several adapted toilets are available on site, but there are none in each group of toilets.
- o   The amount of universal toilets is limited.
- o   The building has signage using international standardized symbols for all washrooms, but there are no raised or braille letters and/or symbols.
- o   Signage is installed at the recommended height but on the door rather than on the wall and the contrast with the surface area between the signage and the door is limited.

- o No electric door is available for the toilet.
- o The free space of the toilet doors is limited (about 800 mm), which limits the entry of people with reduced mobility.
- o None of the door fittings are accessible. The knob is round and the lock requires fine finger control.
- o The free space inside the universal toilets and cubicles is limited (about 1200mm).
- o Accessories are often placed too high or in hard-to-reach places.
- o There is no electrical outlet or emergency button in the universal toilet.
- o No changing tables are available on the site for children or adults.

Figure 25. Images of washrooms

6. Signalisation and wayfinding

This category, which has 40% of the points, includes three elements that refer to the building's signalling and wayfinding systems: 1) General signage with a percentage of points of 45.2%; 2) room identification signs with 46.7% of the points; and 3) bulletin boards and interactive information kiosks that received 0% of the available points (Table 16). Some key areas for improvement for each element have been identified in this category :

Table 16. Accessibility of the signage and wayfinding of the Old Seminary

Categories and items		Points			%
		Obtained	Available	Max.	
6.0	Signalisation and wayfinding	26	65	84	40,0%
6.1	General signage	19	42	42	45,2%
6.2	Room identification signs	7	15	18	46,7%
6.3	Interactive bulletin boards and information kiosks	0	8	24	0,0%

6.1. General signage

Regarding general signage, several shortcomings and key points for improvement were encountered during the evaluation :

Figure 26. Images of general signage

- o There are title signs (from the school, the library, etc.), but no directional indiction.
- o No perpendicular signage is available for key locations.
- o There are not a variety of techniques for orientation.
- o The letters and numbers are not very visible from a distance. The characters are too small.
- o Several panels have a small white on pale green contrast, not significant enough for it to be significant.

6.2. Room identification signs
The element evaluating the room identification panels also identified some areas for improvement :
- o Several rooms have a room number but not the name or function of the room.
- o None of the rooms have a tactile sign, with raised or braille characters.
- o Panels are often placed on the door rather than on an adjacent surface.

Figure 27. Images of room identification signs

6.3. Interactive directories and information kiosks
The main areas for improvement for this element are the presence of directories :
- o No directory has been found in the site, but it could facilitate orientation in the building as well as the identification of key places.
- o The location of equipment or facilities is not put forward.

Figure 28. Images showing lack of directories

7. Emergency and evacuation systems

This category considers everything that refers to emergency and evacuation systems and includes three elements: 1) Emergency exits and refuge areas; 2) Fire alarm system and equipment; 3) Evacuation instructions. These elements were evaluated at the Vieux-Séminaire and obtained the following points respectively: 13.3%, 17.9%, 45% (Table 17). Some areas for improvement were identified for each element assessed :

Table 17. Accessibility of emergency systems and evacuation of the Old Seminary

Catagories and items	Points			%
	Obtained	Available	Max.	
7.0 Emergency and evacuation systems	16	63	70	25,4%
7.1 Emergency exits and refuge areas	2	15	28	13,3%
7.2 Fire alarm system and equipment	5	28	22	17,9%
7.3 Evacuation instructions	9	20	20	45,0%

7.1. Emergency exits and refuge areas

This includes roads to emergency exits, as well as gates and refuge areas. During the evaluation, several areas for improvement were identified :
- o No emergency refuge areas or evacuation equipment for people with reduced mobility have been identified.
- o Emergency exits are not easy to locate.
- o The space near the emergency exits is sometimes limited.

Figure 29. Images of emergency exits

7.2. Fire Alarm Systems & Equipment
The main areas for improvement in this element would be the following :
- o No visual fire alarm is available in the site.
- o Fire equipment (e.g., fire extinguishers or alarm triggers) are often placed too high.
- o There is no notification system available in case of emergency.
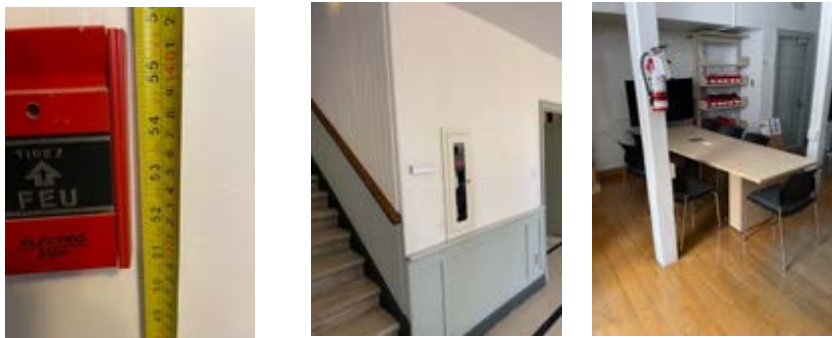
Figure 30. Images of fire equipment

7.3. Evacuation instructions
Regarding evacuation instructions, several maps and instructions are available on the site and the points to be improved would be :
- o Some evacuation plans are presented on reflective surfaces.
- o The font size of the instructions as well as the evacuation plans are small.
- o No plan or instruction has an alternative format (e.g., touch).
- o The information about the evacuation is often located too high.

Figure 31. Images of evacuation instructions

8. Additional space

This category includes any other additional space for use (18 elements), including for example cafés, swimming pools and exhibition spaces, among others. The only element that was evaluated as part of this project is "cafeteria, restaurants and bars" which obtained a score of 50%. Since only one item is evaluated in this category, the score of the category is also 50%.

Table 18. Results of the additional spaces of the Old Seminary

Catagories and items	Points			%
	Obtained	Available	Max.	
8.0 Additional Space	17	34	517	50,0%
8.1 Cafes, restaurants and bars	17	34	45	50,0%

8.1.   Cafeterias, bars and restaurants

There are some points to improve in the Café du Vieux-Séminaire included in this project, including :

o   The distance to the toilets, which are significantly far away.
o   Counter height that is too high and does not have a portion suitable for wheelchair users.
o   The menu display is presented mainly on a slate wall located behind the counter with inconspicuous writing.
o   The variety of chairs available is limited.

Figure 32. Images of the coffee shop

Total assessment score

The section of the building assessed as part of this project received a total of 365 points out of the 817 available (45%). This building would therefore not be eligible for accessibility certification from the Rick Hansen Foundation. However, despite the complexity of the building due to the historical origins of the site, several alternatives would be possible to improve the accessibility of the site.

Petit Champlain and Place Royale sectors of Old Québec

Site description : The Petit Champlain district, founded around 1608 by Samuel de Champlain when what is now Québec City, is one of the city's historical jewels. Stretching over 400 metres in length, the rue du Petit Champlain, which is the heart of the street, alone measures 220 metres. This neighborhood is bordered by Champlain Boulevard and Notre-Dame Street, forming a coherent and charming whole.

Mainly recognized as a tourist and commercial centre, Petit Champlain attracts thousands of visitors every year. Its lively alleys feature artisan shops, restaurants and art galleries, offering a unique experience for tourists looking for authenticity. However, this district is not limited to tourist activity: it is also a place of life for many entrepreneurs and workers who contribute to its dynamism.

Figure 33. Map of the Petit Champlain and Place Royale sectors

Evaluation scope: The site does not have parking, but some parking is available within walking distance. There are two public toilets, but no universal toilets. Washroom A is located at 64 Champlain Boulevard, while washroom B, located some 220 metres away, is located at 19 Notre-Dame Street. Washroom A is unisex, inaccessible to wheelchair users, and contains four stalls and two sinks. Toilet B is gender-neutral, supposed to be accessible to people in wheelchairs, it has three cubicles, one of which is accessible, two urinals and three sinks. There is a park and a public terrace. It is an outdoor place, not a building, so the entrances and interiors of businesses and other buildings (except washrooms) were not assessed. As this is a pedestrian zone, categories 1, 2, 5, 6 and 8 apply to this site. Category 7 is not applicable because there is usually no exhaust system outside.

Evaluation by categories and elements :

1. **Vehicular access**

This category includes two elements to be assessed: parking and general vehicular access. Parking was not assessed for this project because the nearby parking lots do not belong to the assessed site. General vehicular access obtained 50% of points, making a total of 50% for this entire category (Table 19).

Table 19. Vehicular access to the Petit-Champlain district

Categories and items	Points			%
	Obtained	Available	Max.	Obtained
1.0 Vehicular Access	5	10	65	50,0%
1.1 Parking	0	0	45	n/a
1.2 General vehicular access	5	20	20	25,10%

1.1. Parking

Several parking spaces are available on the street and private parking is also available in the neighborhood. However, this element was considered "not applicable" because the parking lot does not belong to the site.

1.2. General vehicular access

Regarding general access by vehicle, the district is served by the bus network that bypasses the district but does not cross it. Some areas for improvement were raised for this element :

- o No drop-off area is available, it would be relevant to provide one, especially for paratransit services.
- o Buses pass on a large boulevard but there are pedestrian crossings near each stop (the paint is often worn and therefore difficult to notice).
- o Bus stops are located about 50 to 100 metres from one of the entrances to the area.
- o Some barriers, such as terraces are present on the sidewalks.
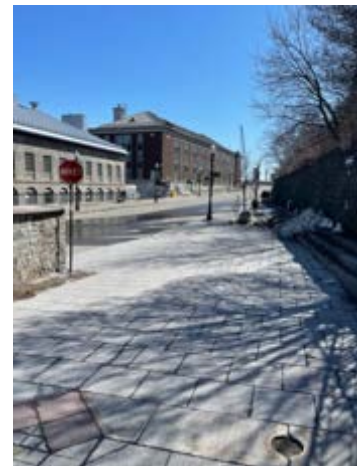
Figure 34. Image of vehicular access to Petit Champlain

2. Paths and exterior entrances

This category refers to the exterior entrances to the building as well as the paths available outside either to reach the front door or to communicate different sections of the site to the outside. The category received 42.7% of the points and includes four elements: 1) exterior paths to the facility, 2) exterior ramps, 3) exterior stairs, and 4) building entrance. Only two of these elements were applicable for this project and they obtained 26.8% and 58.5% of the points respectively (Table 20).

Table 20. Accessibility of the approach and exterior entrance to the Petit-Champlain district

Categories and items	Points			%
	Obtained	Available	Max.	
2.0 Exterior approach and entrance	**35**	**82**	**194**	**42,7%**
2.1 Outdoor paths to the facilities	11	41	48	26,8%
2.2 Outdoor railings	0	0	35	n/a
2.3 Outdoor stairs	24	41	41	58,5%
2.4 Building entrances	0	0	70	n/a

2.1. Outdoor paths leading to the site facilities

The streets and outdoor routes of the site have been assessed under this heading as part of the project and the areas for improvement identified are as follows :

Figure 35. Images of Sous-le-Fort and Petit Champlain streets

- o The clear width is not sufficient over the entire trajectory.
- o Some barriers are present on the sidewalks, which forces the user to walk on the road.
- o The majority of barriers lack contrast with adjacent surfaces.
- o Some areas are pedestrianized, but this is not indicated.
- o Some sidewalks on the second one do not allow the movement of people in both directions.
- o The coating is not uniform.
- o There are examples of puddles and areas in poor condition.
- o Rue du Petit Champlain, Rue de Sous-le-Fort and Notre Dame as well as Place Royale have a significant inclination.
- o Pedestrian crossing areas are not always indicated.
- o Rue du Petit Champlain, Rue de Sous-le-Fort and Notre Dame as well as Place Royale have a significant inclination.
- o Pedestrian crossing areas are not always indicated.

- There is a change in level between the pavement and the road and paved boats are not available.
- Barriers are present on the way (e.g., garbage cans, terraces, lampposts).
- Manholes are located on pedestrian traffic areas.
- Artificial lighting is limited.
- There are a few seats in the area but they are not suitable for all people (very limited).

Figure 36. Images of obstacles in the paths

2.2. Outdoor Ramps

No external ramp is available in the sections studied, so this element was considered as « non applicable ».

2.3. Outdoor stairs

In the Petit Champlain and Place Royale sectors, there are several exterior staircases with different characteristics. Some key points were raised for improving accessibility :
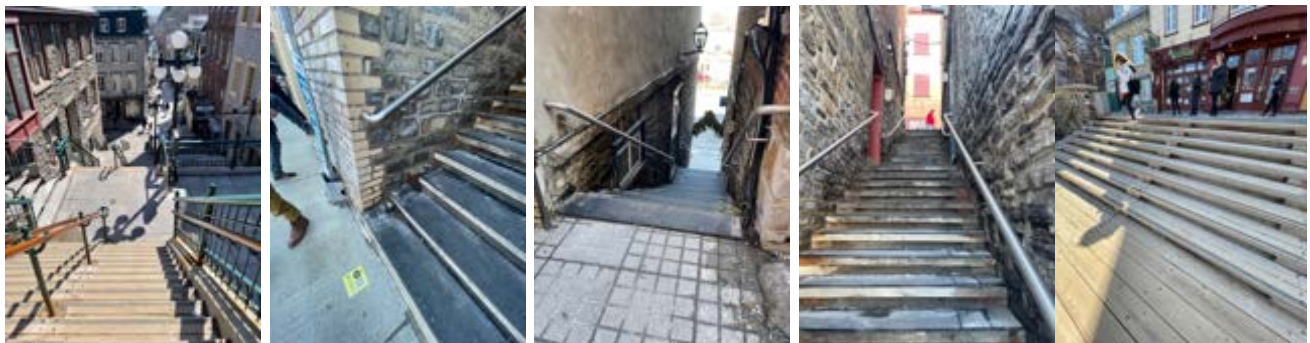
Figure 37. Images of outdoor stairs

- There is a staircase that is narrow (so difficult for two people passing at the same time).
- There are doors that open to several landings from two of the stairs.
- The beginning and end of some of the stairs are on a thoroughfare (Petit Street, Champlain Boulevard).
- Handrails do not have extensions at the beginning and end.
- The handrail supports do not allow the person to slide their hand all the way through, so they are not continuous.
- Steps do not have tactile indicators.
- The anti-slip strips (if any) are not contrasted enough.
- Lighting is limited, especially on the stairs that connect with Rue Petit Champlain and Boulevard Champlain.

2.4. Building entrances

Building entrances were mentioned in other phases of the project as a barrier for people with various disabilities. However, in the context of this project, trade was not studied, which is why this element was qualified as « non-applicable ».

3. Sanitary facilities

The "sanitary facilities" category consists of two elements: 1) washrooms and 2) showers. However, showers were not available in the areas assessed. The element referring to washrooms obtained a percentage of 50%. This category, having only one element evaluated, obtains the same rating (50%) (Table 21).

Table 21. Accessibility of sanitary facilities in the Petit-Champlain district

Categories and items	Points			%
	Obtained	Available	Max.	
3.0 Installations sanitaires	45	90	132	50,0%
3.1 Washrooms	45	90	90	50,0%
3.2 Showers	0	0	42	n/a

3.1. Washrooms

Two washrooms are available in the areas assessed and neither is completely accessible independently. The points and features to be improved would be :
o   There is only one accessible toilet stall in one of the washrooms, however, it is not accessible as there is a large step just before the front door.
o   No universal washrooms (including all amenities in the same room) are available on the premises.
o   Signage is not always located in easily visible locations.
o   The font and symbols on the toilet signs are often too small or illegible.
o   There are no tactile, embossed or braille symbols.
o   No motorized door is available.
o   The doors are relatively heavy.
o   The majority of washroom and washroom doors are narrow.
o   The space for transfers and maneuvers is sufficient only in one cabin.
o   There is no electrical outlet in the toilet cubicles.
o   Some elements, such as urinals, have little contrast to the surfaces on which they are mounted.
o   Some accessories, such as hand dryers, are too high.
o   The contrast between the floor and the walls is limited.
o   The accessible cabin has no emergency buttons or systems.
o   No adult changing tables are available on the site.
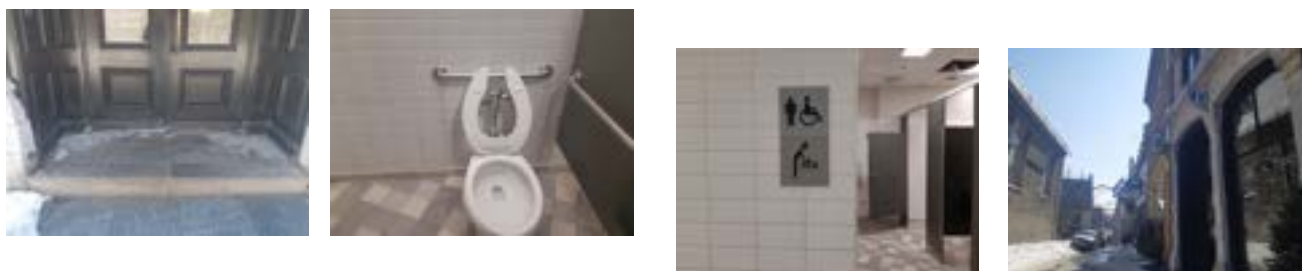
Figure 38. Images of toilets inside Place Royale

4. Signalisation and wayfinding

This category, which has 40% of the points, includes three elements that refer to the building's signalling and orientation systems, of which only two were applicable: General signage with a percentage of points of 10%; and bulletin boards and interactive information kiosks that received 28.6% of the available points (Table 22).

Table 22. Accessibility of signage and wayfinding in the Petit-Champlain district

Categories and items		Points			%
		Obtained	Available	Max.	
6.0	Signalisation and wayfinding	7	31	84	22,6%
6.1	General signage	1	10	42	10,0%
6.2	Room identification signs	0	0	18	n/a
6.3	Interactive bulletin boards and information kiosks	6	21	24	28,6%

4.1. General signage

Some key areas for improvement for this element have been identified:
- o There is no directional signage (only for toilets and this is already considered in category 5).
- o Few of the orientation techniques are used (only maps).

Figure 39. Image of a map of Petit Champlain

4.2. Room identification signs

Since the exploration of this site has focused on outdoor spaces, this element was considered to be « non-applicable ».

4.3. Directory and interactive information kiosks

A directory of available businesses is present with the maps. Improvements to the information directories and kiosks would include :
- o In the maps, no landmarks ("you are here") are available.

- o Part of the area is not covered by the map.
- o No raised or braille characters or symbols are provided.
- o There are often barriers (e.g., benches) in front of which the cards are placed.
- o Some cards are placed in a passage area or stairway.
- o There are no interactive information kiosks.

5. Additional space

This category includes any additional usage space (18 items). The only element that was evaluated as part of this project is "outdoor leisure spaces" which obtained a score of 50%. Since only one item is evaluated in this category, the score of the category is also 50% (Table 23).

The key points to be improved in outdoor leisure areas would be:
- o Some rest areas in the sectors studied are not accessible or their access is not ideal (e.g., Felix Léclerc Park).
- o The square at the end of Petit Champlain Street is not accessible because there are stairs to access it.
- o The chairs are not scattered.
- o A variety of seats is only available in the area that is not accessible.
- o There are no year-round chairs (most are not available in winter-spring).
- o The only shelter are the parasols in the square at the end of Petit Champlain Street in summer.
- o The rest areas are a bit too dark in the evenings.

Figure 40. Images of rest areas

Table 23. Accessibility of additional spaces in the Petit-Champlain district

Categories and items	Points			%
	Obtained	Available	Max.	
8.0 Additional space	8	16	517	50,0%
8.1 Outdoor leisure areas	8	16	16	50,0%

Conclusion of the Accessibility Assessment Phase through the Rick Hansen Foundation's Accessibility Certification

It should also be considered that the scores obtained by the two evaluated sites only correspond to the evaluation carried out for the purpose of the project. If the owners or lessors of the sites wish to obtain accessibility certification, a full assessment, followed by the formal steps of the Rick Hansen Foundation, would be required.

III. Solution Developpment

Objective

Co-design solutions to architectural barriers arising from heritage site preservation constraints, based on a co-design approach with validation of solutions and development of prototypes.

Methodology

When the results of the commented pathways were identified, the research team met several times to concretely determine what were the most important problems or barriers to development, as well as potential solutions. This was followed by an informal 4-week internet search for existing solutions to the most important problems. Our process began with an in-depth search on search engines, mainly Google, where we formulated specific queries such as "Solutions to facilitate access for people with reduced mobility". By carefully examining the results and analyzing the associated images, we began to understand the different solutions that existed to overcome these barriers. In addition, we explored platforms such as Pinterest to gather complementary ideas.

A significant number of existing solutions emerged from our research, which required the use of a matrix to discern the most relevant solutions. To do this, we used the 7 principles of universal design (Preiser & Smith, 2010) as evaluation criteria, as well as three additional criteria: cost, maintenance and winter conditions. Each team member evaluated the different solutions using this matrix. This process reduced the number of solutions, focusing on those that best met the 7 principles of universal design, had the lowest cost and maintenance needs, and could withstand the Québec winter. The selected solutions were then presented during the co-design sessions.

It is essential to emphasize the importance of snow and cold in this context. Québec winters are characterized by significant snowstorms, which requires solutions that can work effectively even under a thick layer of snow. In addition, climate change has a significant impact on winter conditions. Temperature fluctuations cause the snow to melt and refreeze, causing water and ice to accumulate. These conditions can make surfaces slippery and dangerous, which is an additional challenge for proper maintenance.

These maintenance issues are particularly crucial for people with disabilities. Poor snow and ice management can severely limit accessibility and mobility. Therefore, the selected solutions had to not only be cost-effective and low maintenance, but also ensure safety and accessibility throughout the year. Given these factors, the solutions presented during the co-design sessions were those that offered the best performance throughout the year, despite the challenges posed by harsh winters and the effects of climate change.

Co-design :

The second phase of our methodology involves three co-design sessions, aiming to generate new ideas and conceptual solutions to address user problems. This collaboration involves

all stakeholders, so the first session with people with disabilities (n=7) took place on November 1, 2022. To carry out a co-design session, it is necessary to find concrete ideas that serve as a starting point to be modified or completely rejected, or that serve as the basis for a completely different idea (Morales, 2012). A total of 10 solutions (5 exterior and 5 interior) were presented during the first session. The solutions presented were then modified or discarded, to be presented at the next session.

To enrich our understanding, we included in the second session the perspective of caregivers (n=6), who play a crucial role in the lives of people with disabilities. Caregivers are often exposed to environmental adaptations as direct users (when the person with disabilities is not sufficiently independent) or indirect users (when they accompany the person with disabilities without actively using the adaptations) (Sousa Ribeiro et al., 2012). Their contribution adds an extra dimension to our conceptual exploration, exposing a more complex web of underlying issues. The session took place on November 15, 2022.

Both sessions were meticulously documented with audio recordings, which were then transcribed into textual data, ensuring that every nuance and detail was preserved for analysis. Using Nvivo analysis software, we were able to systematically organize and code transcripts, allowing us to uncover patterns, themes, and ideas in discussions. This methodological approach facilitated a comprehensive review of the dialogue, allowing for an interpretation and understanding of the needs of users, the perspectives of caregivers and the perspectives of professionals. The solutions presented were then modified or discarded, to be presented during the validation session.

Validation: The voice of the experts

The third phase of our methodology, called "validation", consisted of a third session with a panel of experts with diverse skills and specialized in different disciplines (n=8). Their role was to assess the viability and relevance of previously generated ideas, drawing on their knowledge to examine the proposals from different perspectives. This diversity of expertise facilitates the examination and evaluation of emerging concepts. Like the previous ones, this session was recorded and transcribed to analyze the content of the data obtained. The session took place on November 29, 2022.

Development and implementation of the proposed solutions :

The final part of the co-design methodology includes the development of the same ideas that have been developed in previous sessions, which are pushed to the point of building a prototype for future implementation. To do this, an industrial design firm was hired with grant funds to develop prototypes. After the contract was signed, meetings of at least one hour, with the research team and the design team, were held weekly from October 2023 to March 2024. During these sessions, the company's progress was presented, and discussions were held to improve the proposals until the prototypes were built and delivered to the research team.

Results

At the end of the three co-design sessions, we observed significant results from the participants, each bringing their own expertise and unique profile. Whether it was solutions considered internally or externally, the diversity of contributions has remarkably enriched our collaborative process. The lively discussions and exchange of ideas not only generated new

concepts, but also improved the overall understanding of the issues. The sessions were divided into solutions for outdoor and indoor use.

1) Solution for the outdoor site :

Some of the most significant barriers encountered were: lack of access to buildings due to steps, lack of signage, and the urgent need for rest areas and lighting (Ruiz-Rodrigo et al., 2024). This lack of rest areas also exacerbates the difficulties for the elderly and people losing their autonomy, highlighting the importance of addressing this issue in an inclusive manner. We will only present the four most feasible examples that were discussed during the sessions.

1.1. <u>Platform lifts :</u>

Figure 41. FlexStep model, manufactured by AXESS2 - (www.axess2.co.uk).

To address the lack of access to buildings due to steps, the lift model shown is the FlexStep model, manufactured by AXESS2 - Domestic and Commercial Lifts (www.axess2.co.uk). This elevator model was chosen because it could be easily integrated into the heritage context, with the steps themselves transformed into a platform (see Figure 41).

However, this idea was dismissed during the validation session (3rd design session), as occupational therapists and rehabilitation specialists stated that due to the -30°C temperatures that can be experienced in winter in Québec, elevator motors stop working, making constant repairs very expensive. Other proposals were made, such as a well-maintained permanent ramp, but the limited space on the street would not allow for the installation of as many ramps or other ideas such as a mechanism combined with a heating system.

1.2. Lack of signage: Projection of signage on the ground :

In connection with the lack of signage, the discussion revolved around the use of signage projected on the ground, giving rise to contrasting opinions. Some participants expressed enthusiasm for this approach, considering it positive. Others expressed concern about the need to place spotlights everywhere to support this method (see Figure 42).

Figure 42. Projected signages used at IKEA

1.3.   Lack of rest areas and insufficient lighting : Bench with lighting

In response to the scarcity of rest areas and the inadequacy of night-time lighting in the Petit Champlain district, specifically on Place Royale, the solution presented and produced by ML combines benches with street lamps, with the street lamp serving as both accent lighting and a grab bar for people with reduced mobility (see Figure 43).

1.4.   Significant presence of stimuli: no solution proposed

In the vibrant Petit Champlain district, specifically on Petit Champlain Street, characterized by its vibrant array of shops and lively atmosphere, the abundance of commerce and architectural richness present both opportunities and challenges, especially for those navigating the area. In the midst of busy streets teeming with people, the intricate architectural details can disturb people with sensory hypersensitivity, including people with autism. In this context, we have not proposed a solution on this particular point. Our discussions focused on improving accessibility and reducing environmental barriers to ensure a seamless and inclusive urban experience.

2.   Solution for indoor sites

Regarding the indoor environment, they include: difficulty using stairs, lack of signage, lack of places to sit and sound reverberation, among others (Ruiz-Rodrigo et al., 2024). We will only present three

Figure 43. Lamppost as grab bar for the bench, by Lakoud.

examples of solutions that were discussed during the sessions to give an idea of how it went.

2.1. Issues associated with the use of stairs: Guided handrail with tactile indicators

One of the proposals put forward to address some of the issues with the use of stairs was to add tactile indicators to the handrails of the stairs, to help people who are blind or visually impaired determine how many steps are left. These tactile indicators would provide crucial assistance by allowing users to physically feel and count steps as they ascend or descend, improving their sense of spatial awareness, and promoting safer navigation in the built environment. This initiative represents a concrete step towards greater inclusion and accessibility for people with visual impairments, allowing them to use the stairs with confidence and independently. However, more complex information than this would be too difficult to interpret tactilely and would therefore be discouraged.

Figure 44. Guided handrail with tactile markers, by Lakoud

2.2. Lack of signage and accessibility of maps: Relief, tactile and auditory representations

We also presented a relief plan so that people with disabilities can find their way around a building more easily. The example we have taken is that of the University of Wuppertal (https://ilis-leitsysteme.de/wp-content/uploads/referenzen-Universität-Wuppertal.jpg). Tactile representations can help by providing a tangible and understandable way to understand the layout and characteristics of a building, regardless of one's sensory abilities. From raised symbols and textured surfaces to auditory cues, these accessible maps and templates can help people locate key areas, such as entrances, exits, restrooms, and amenities in a building.

2.3. Too much echo: Install acoustic panels

The proposal to add cork boards received mixed reactions. The logic of the cork was to incorporate a fixed or removable panel separate from the wall so as not to affect the heritage walls and at the same time absorb the reverberation of the space. The sign would include tactile signage for visually impaired people. One participant felt it was tempting to reduce auditory overstimulation, but worried about the diminished experience. The suggestion of using white cork to increase brightness was well received, particularly by one of the participants. The participants discussed the handicapping echo in the building and the need to judiciously dose the addition of cork according to traffic and reverberation.

2.4. Other obstacles: Other solutions

At the same time, recommendations for improving accessibility included announcing the presence of facilitators, installing hearing guides to signal the presence of tactile guides on the panels, and considering the choice of colors, including colors very bright to increase brightness. Participants also highlighted the importance of preserving the heritage aspect with elements such as

lighting and acoustic panels. The need to choose appropriate colors while keeping in mind the experience of a heritage building was highlighted, highlighting the complexity and richness of accessibility considerations.

IV. RECOMMENDATIONS AND SOLUTIONS FOR ACCESSIBLE HERITAGE PLACES

This project included various stages of exploration and evaluation of the obstacles and facilitators on the accessibility of two heritage places located in Quebec City, as well as a phase of co-creation of solutions concerning the accessibility of heritage places in general. Recommendations and final solutions flow from these steps.

Historic places allow for a unique experience in part because of their historical and architectural features. Some people with disabilities enjoy this experience despite the limited comfort. It is very important to consider this unique experience when accessibility adaptations are implemented in historic places.

However, one of the most important elements that emerged early in the development of this project was the need to amend the laws protecting Canadian heritage to make them much more flexible and thus simplify the process of making changes to achieve more inclusive accessibility.

One of the differences between accessibility interventions in buildings that are not considered heritage buildings and those that are, is the use of materials. It is a question of choosing materials that are identical or very similar to those of the original heritage building. It is also possible to use transparent materials, such as glass, which do not constitute an obstacle to the visitor's view. There are two main approaches to interventions on heritage sites:
1. Total respect for the heritage building, affecting the façade of the building as little as possible and using the same or very similar materials in the intervention.
2. Proceed with a contemporary intervention using contemporary materials to emphasize the new intervention.
It is very important to decide in advance what type of approach to take for the intervention. However, it should be mentioned that in many cases, the contemporary option will be used for major interventions involving major work on the building, the total preservation approach is generally used for access ramps and minor interventions.

The following recommendations are presented similar to the different categories of the Rick Hansen Foundation's Accessibility Certification (RHFAC) and are based on the various results obtained from this project, but also on aspects identified in the scientific literature that may positively influence the visitor experience. We decided to use an order similar to RHFAC because of the logical progression of the spaces and the fact that we used the tool within the project. The recommendations relate to six of the eight categories of the Certification, namely 1) vehicular access; 2) the paths and exterior entrances; 3) internal circulation; 4) indoor services and environments; 5) sanitary facilities and 6) signage and wayfinding. Some categories are not covered such as emergency and evacuation systems and additional spaces and neither all elements of each category.

1. Visitor Services

Although this project was originally focused mainly on solutions for the physical or architectural environment, the application of this type of solution often has certain limitations due to heritage preservation standards and laws as well as the environmental characteristics of heritage places, both indoor and outdoor (e.g., limited space). For this reason, the search for alternative solutions in connection with the social environment becomes even more important. The services and resources, particularly those specific to people with disabilities, available in this context are becoming particularly important, as they can help overcome the limitations of accessibility. Some of the services or resources that could be located in heritage places would be:

- Offer information in multiple modalities (e.g., online and in person).
- Train staff on positive and appropriate communication behaviours, skills and strategies.
- Establish regular educational programs to raise awareness of diversity, inclusion, and respect for cultural, religious, and personal differences.
- Organize workshops and trainings on respect and tolerance, addressing prejudices, stereotypes, and discriminatory behaviors.
- Develop regular awareness campaigns to educate the community on the importance of inclusivity and diverse abilities, cultures, and genders.

While some resources are offered, this is one that requires further research and the development of a future project to determine how to promote social accessibility and apply it across spaces in our society.

1. Vehicular access

The "vehicular access" category includes two elements: parking and general vehicular access, which includes access to the site from transportation and drop-off areas. The following recommendations were made for this category:

Disembarkation area

- Disembarkation areas near an accessible entrance should be demarcated and separated from the taxiway (hazard prevention).
- Present a shelter.
- Have clear and intuitive signage that is sufficient to reach the entrance to the site.

Parking

- Parking near the entrance and clearly identified accessible spaces in sufficient quantity.
- Stable surfaces.
- Nearby and intuitive payment systems.
- Free parking for seniors or people with disabilities.

Public transport

- Accessible and intuitive ticket information and purchase system with several methods available for purchasing tickets (e.g., online and on-site).
- Accessible stops near the places to visit.

- Present shelters.
- Present clear and intuitive signage sufficient to arrive from the transport at the place to be visited.

2. Paths and exterior entrances

The "Exterior Pathways and Entrances" category includes the following: exterior pathways to facilities, lighting, exterior ramps, exterior stairs, and entrances to the building or site. The following recommendations were made for this category:

<u>Outdoor paths leading to the facilities</u>

The information presented for this element focuses on an example of a heritage site development using the shared street approach to delineate pedestrian and cycling areas. Several of these elements can also be used to develop outdoor spaces where everything is at the same level and to delimit the paths leading to heritage **buildings**.

Shared streets (or shared traffic spaces) is an approach that would make it possible to offer sufficiently wide traffic areas as well as rest areas and street furniture. The principle of shared streets is that priority is given to the pedestrian and not to the vehicle, so that the speed of cars is reduced to 30 or 20 km/h and there are no pavements, i.e. the circulation area for cars and pedestrians is at the same level. This approach is very helpful for people with mobility problems. However, shared streets (or shared traffic spaces) represent a barrier for people with visual disabilities. These spaces prevent the movement of people in an area reserved exclusively for pedestrians. Feelings of safety may be reduced significantly in people with visual disabilities due to shared spaces with vehicles and bicycles and specially because of the lack of tactile cues. However, a development where all sections of the street are at the same level would be possible if certain conditions are respected:

Provide recognizable structures that clearly indicate the places intended for walking and crossing. This recognition is based on the coherence and predictability of the environment, characterized by elements with a specific meaning and function.

- Offer a recognizable, unobstructed, and uninterrupted path, ensuring confusion-free navigation for each potential destination.
- Use protective strips with a minimum width of 60 cm to ensure effective separation between the pedestrian area and the roadway and the cycle lane. These strips must be tactile and allow identification using a detection rod or the foot, for example by using a green stripe.
- Use a modular approach to layout and street furniture.

Some authors refer to the concept of the "imaginary tunnel" originating in Barcelona to keep in mind the volume necessary to delineate an obstacle-free path.

- Develop a pedestrian corridor marked by street furniture The furniture must not be separated by more than 1.2 m, thus promoting a coherent and unobstructed path (the Nazareth and Louis-Braille Institute and the Logical Society, 2014).

- Provide adequate lighting of these features to allow for visual discrimination of individuals with visual residues (Parkin & Smithies 2012).
- Ensure that planting areas do not encroach on the pedestrian corridor. They must be at least 1.2 m wide in the presence of trees, or 0.6 m in other cases. In addition, the planting pit must be at pedestrian level (Institut Nazareth et Louis-Braille et de la Société Logique, 2014). The entrance and exit of a shared street must be clearly recognizable and announced in a simple way (Janssens, 2013).
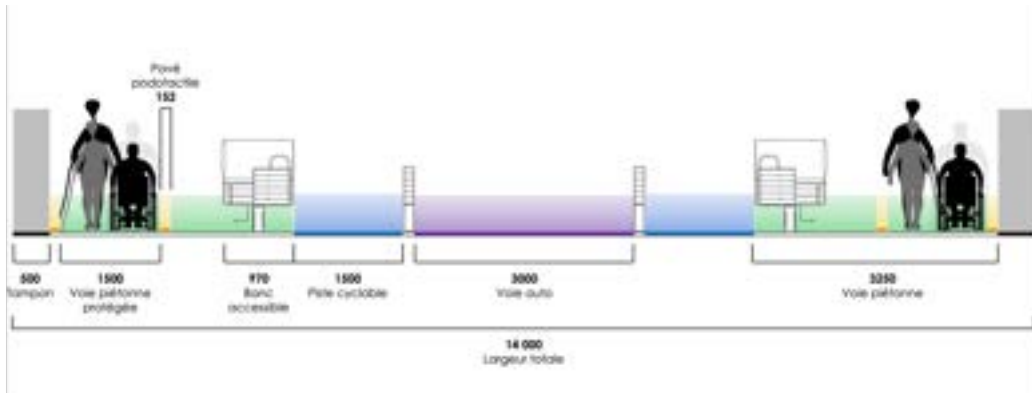

Figure 45. Proposal for the development of a shared street on Rue Saint Jean

<u>Specificities and solutions</u>

Being completely aware of the recommendations of some authors in relation to the use of bollards that are often referred as a potential dangerous elements of street furniture for people with visual disabilities, we recommend an innovative solution:

- A modular approach makes it possible to conceive of urban planning as a creative and evolving process. This approach offers an accessible and adaptable solution to heritage environments, especially for Nordic Canadian cities such as Quebec City. By envisioning the urban site as a green base, the rooms become a metaphor for street furniture and landscaping. As in the construction of a modular structure, these elements can be added, shaped and installed to optimize the possibilities offered by the site. This approach makes it possible to meet the complex requirements of urban planning, integrating climate imperatives and the varied needs of users (see Fugure 46).
- It should be emphasized that this approach goes beyond the simple separation of traffic flows. We consider these bollards to be modular elements, reminiscent of the "LEGO" concept in which "pieces" can be interchanged to better adapt to the physical context of the street while meeting the needs of pedestrians (with or without a visual disability). Referring to some authors, which advocates a minimum height of 1 meter for bollards, as well as adequate visual contrast, our proposal aims to integrate these elements into a versatile system, serving as a basis for additions such as benches, ischial supports, bicycle parking facilities and other functionalities, to create an inclusive and evolving urban environment (See figures 47, 48 and 49).

- These bollards would serve as physical barriers between the different lanes, providing clear and tangible landmarks for pedestrians, cyclists and physical activity enthusiasts. The introduction of these bollards aims to create an environment where each user has a clearly demarcated space, which helps to reduce the risk of conflicts and accidents, while providing a sense of security for people with visual impairments. One of the main characteristics of these charging stations is their removability. This design has been carefully studied to meet the specific climatic requirements of Canada's Nordic context, where snow and winter conditions play a major role. Removable bollards allow snow removal crews to carry out their operations throughout the winter, without impeding traffic or compromising safety. This flexibility is essential to ensure the possibility of shared streets throughout the year, considering seasonal variations and the weather challenges specific to each region.

Figure 46. Proposal for a "Lego" unit from a bollard

Figure 47. Proposal of the "Lego" concept of street furniture for heritage sites

Figure 48. View of Rue Saint Paul Jean today

Figure 49. Proposal for the development of a shared street and street furniture on rue Saint Jean

Lighting & systems

- Providing sufficient lighting, activated as needed, thoughtfully and consistently arranged is essential in the context of a shared street. For example, a combination of streetlamps and street furniture can be used to physically mark the separation between pedestrian and vehicular areas.
- Avoid light pollution. It is necessary to try to keep the context simple and not with large advertisements or screens.

Outdoor stairs

- To provide solutions that promote total autonomy, such as ramps when there is enough space.
- Obtain removable ramps – user acceptance of this solution is often limited because usually the solution is not installed when the person needs it and must request it and wait for it to be installed. However, when there is no other option, this type of ramp is preferable to not being able to enter at all.
- Install lifting platforms according to the climatological conditions as some models would stop working with low termperatures.
- Have a good knowledge of snow removal policies to take the necessary measures to ensure that access to the building is permanently cleared.
- Be aware of the possibility of snow falling from the roofs of certain heritage buildings. Indicate the problem and prevent any circualtion in the affected areas as well as propose schedules for removing snow from the roof.

Outdoor Railings

- Make sure the ramp can be used in both winter and summer, either with a roof or snow protection, or with the ability to easily clear snow.
- Ensure proper tilt (see CSA B651).
- Provide a stable and smooth surface, and smooth enough that the wheels of the devices do not snag.
- Ensure that the ramp entry and exit have a stable and smooth surface and that the transition to the ramp is seamless and threshold-free.
- Sufficient space in the ramp and bearings (see CSA B651).

Entrances

- Intuitive and inclusive entrance(s) (often more than one entrance on outdoor sites, open places and part of the public road). Entrance without steps (see CSA B651).
- Lightweight doors with the possibility of automatic opening.

Specificities and solutions
- The problem with entrances in a heritage context, for example those of shops, is that they very often have one or two steps. In addition, these steps are usually higher than the current building standards, which means that we often find entrances that are 50 cm higher than the street and have narrower doors.
- If the width of the street allows it, a ramp is always the best option, but it is very likely that the width of the street and the sidewalk are too narrow.
- The second option is a platform lift, but during the co-design sessions, it became clear that this solution was not suitable for outdoor use, especially due to the Canadian winter. It is therefore necessary to explore other options.
- If it is a question of starting next to each other, a common situation in a heritage context, it is recommended to explore the possibility of communicating or perforating the walls between buildings to open passages inside the stores to circulate from one store to another and create a single accessible entrance for several businesses. Therefore, it would be necessary to find the

most appropriate entrance to create a ramp and carry out the necessary work to open the interior walls. This solution may present other challenges such as maintaining fire walls, but it can be explored in certain contexts.

- If it is necessary to widen a horizontal circulation to allow entry to the building, it should be checked if the structure of the building allows it.
- If it is necessary to open a wall to make a direct entrance, it is important to respect the material of the building so that it blends easily into the heritage context.

Circulation Indoor (and outdoor) circulation

The "Interior Circulation" category includes the following: circulation areas, cladding, interior corridors and stairs, elevators and platform lifts. The recommendations issued for this category are as follows:

Traffic areas

Passageways are generally narrow, and traffic obstructions are often present, especially in outdoor sites. For example, garbage cans, terraces and shop display on the sidewalks are obstacles in the way. It is therefore essential to provide a passage space that is wide and smooth enough to allow people to move around comfortably and safely. To do this, a smooth and stable surface with appropriate dimensions must be provided.

- Minimum clear width of 1200mm indoors and 1600mm outdoors (with spaces with a width of at least 1800mm for long corridors and busy areas.
- Obstacles detectable with a white cane.
- No door opening onto the corridor.

Coatings and finishings

Historic places often have old floors that are one of the defining features of these places. Stone or paving floors are a barrier for different populations such as people who use wheelchairs, people with chronic pain or who have a high level of responsiveness to sensory stimuli. Outdoor traffic tiles must have the following characteristics:

- The material of tactile surfaces must be chosen carefully to ensure good durability.
- The coating material should be non-slip in all weather conditions, not to produce reflections and minimize glare.
- There should be no gaps between pavers or slabs (White, 2010). To this end, the pavement must be free of holes, gaps or other deformations, and the steps must not exceed 13 mm (Universal Accessibility Advisory Committee, 2014).
- It is important to consider surface drainage to avoid water pooling. For example, the installation of linear drains along tactile delimiters.

Signal tiles made of polymer (Armor-tile) or stainless steel (Advantage) remained detectable underfoot in winter conditions and sunny areas. Armor-tile had the highest detectability score.

<u>Specificities and solutions</u>

- What differentiates floors and circulation spaces in a heritage context from the rest of the accessibility specifications is that it is essential to provide for the creation of at least one section of smooth horizontal circulation and that the materials used in this smooth section are in harmony with the heritage context. In other words, you should use materials that are already found in the context itself or similar but with a smooth finish.

<u>Interior corridors and staircases</u>

Handrails are an essential element in the design of an accessible space. Historic places often have changes in level, including stairs and long corridors to travel through. Handrails can make it easier to get around, especially for people who have balance problems or chronic fatigue, such as some elderly people. Handrails must meet certain characteristics :

- Handrail for long corridors. For ramps and stairs, go beyond the first and last steps (extension of the handrail at both ends). Height between 860mm and 920mm from the ground (see CSA B651).
- Round handrail that facilitates gripping (diameter between 30 and 40 mm).
- Contrast of the handrail with the surface around it (see CSA B651).

What differentiates a handrail in a heritage context from the rest of the accessibility specifications is that it is essential that the material and design of the handrails be in harmony with the heritage context. In other words, materials that are already found in the context itself should be used, such as iron on the outside or wood on the inside. Often, these materials require diligent maintenance that must also be paid attention to.

<u>Elevators and platform lifts</u>

- To provide solutions that promote total autonomy.
- Avoid lifting platforms that require a key that is difficult to access. Ensure that platforms and elevators operate intuitively and that their controls are properly located.
- Offer multi-sensory feedback systems (e.g., backlit buttons, auditory feedback and announcements, raised characters for information).

Indoor services and environments

The "Indoor Services and Environment" category includes the following: reception and service counters, waiting areas, rest areas and seating or street furniture, and acoustic considerations. The recommendations issued for this category are as follows:

<u>Reception and service counters</u>

Some people report the importance of having information about the site or building, the activities and services as well as the accessibility elements available in several formats or modalities. It is therefore important to have advance information available in several modalities, web, but also on site and by phone, to offer flexibility and choices so that people can prepare their visit according to their preferences.

On-site, in person or by phone.

Direct or telephone contact with a person may be useful for certain people or in certain situations (e.g. more precise or individualized information, no access to the website). It is important that individuals have access to information service on-site, in person, or by telephone that could have many of the following characteristics:

- Be integrated into the tourist information offices or at the on-site reception (when available).
- Offer flexible options (e.g. application and paper documents).
- Understand adapted communication systems – e.g. tablet with sign language transcription or interpretation software.
- Be supported by awareness and training activities offered to employees to enable them to offer accessible and adapted information to people with visible and invisible disabilities.

Online

- It is important to present an accessible website, respecting the web accessibility standards (WCAG2.0), including alternative texts for images.
- Websites should be intuitive, and information should be easy to find.
- Websites must present the site's contact information (e.g., phone number, email, address) and the information needed to get there.
- Information about the activities and services available must be easily identifiable on the website.
- Accessible places and activities as well as available adaptations or resources must be identified on the website so that they can be easily identified.
- The website must be up-to-date and incorporate all changes to the site (including, for example, if renovation work is underway and certain sections of the site are not accessible or services are temporarily unavailable).

Historic places, especially outdoor sites, sometimes being neighbourhoods or boroughs, do not always have a website or there is not a specific organization that takes care of the entire site. It would be important to propose a body responsible for the site's website and its maintenance (e.g., Municipality, Ministry, Merchants' Association, Parks Canada, etc.).

Waiting areas, rest areas and seating or street furniture

The information in this section also applies to rest areas and furniture, including seating, that may be present in heritage buildings even if some points refer to "street furniture" (e.g. fire hydrants, parking meters, benches, bus stops, poles, bike racks, garbage cans and planting areas). The following recommendations were made in connection with (urban) furniture and rest areas.

- Enough rest areas on site to allow easy access and breaks without having to travel long distances to get there.
- Rest areas with a variety of chairs, including chairs that are not very low or deep and have backrests and arm supports.
- Limit sensory stimuli such as noise, music, echo, visual overload in the atmosphere or strong lights.

- Provide calming elements such as plants, natural light or tables to be able to deposit personal belongings. Provide enough (urban) furniture (e.g., benches, garbage cans) without overloading the view and the heritage atmosphere.
- Define a sufficient volume to allow for a barrier-free path for people with visual disabilities. The elements of (urban) furniture must be detectable with a cane.
- When the pedestrian corridor is marked by (urban) furniture, the elements of the furniture must not be separated by a distance of more than 1.2 metres (Institut Nazareth and Louis-Braille and Société Logique, 2014).
- Elements of (street) furniture must be illuminated to allow discrimination by people with residual vision (Parkin and Smithies, 2012).
- Provide street furniture that allows for comfortable and flexible use. Using a more inclusive and efficient bench.

Specificities and solutions

- A universal access bench designed to meet the varied needs of users (see Figures 50 and 51), with a focus on accessibility, comfort and user-friendliness is proposed. The bench is equipped with a central armrest, to provide additional support for people with mobility difficulties or who need support when sitting down or standing up. By providing specific facilities for children, including a footrest, the bench is accessible and welcoming to all members of the community, regardless of age or physical condition. The addition of lumbar support to the back and one side of each bench is intended to meet users' needs for ergonomics and comfort.

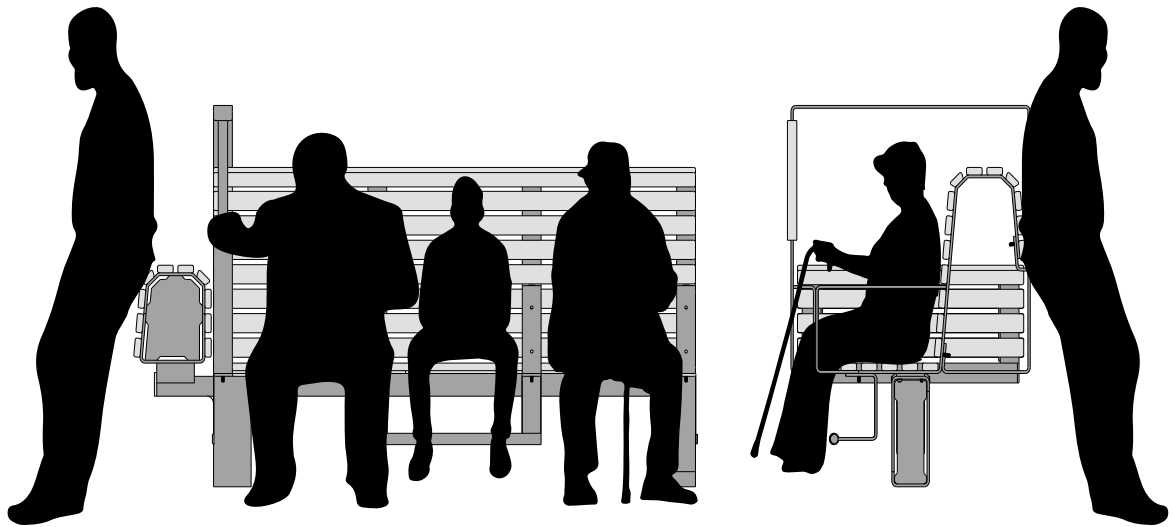Figure 50. Proposition of inclusive bench exterieur

Figure 51. Different users of the bench

Acoustic considerations

The reverberation of sound inside heritage buildings is one of the elements that has recurred in the different methods of data collection. Reverberation is an element that has been described as "characteristic" of a heritage site, so some participants would like to maintain it to some extent in order to enjoy a full experience, however other participants would explain how it is a problem for people having hearing aids in particular and hearing problems in general. The results of the co-design sessions helped to develop some ideas in this regard.

- For example, in the left image of Figure 52, there is a panel that is separate from the original wall. This separation has a dual function: it further isolates the sound and protects the original wall. The panel is made of a material that absorbs sound from the inside, so that reverberation is significantly reduced.
- It is also important to take advantage of this panel to include a handrail along the entire length of the panel, as well as different seating modes (see Figure 53) to meet the needs of most people with motor problems, such as fatigue and chronic pain or elderly people who want to take a break.

Figure 52. Different users of the bench

Figure 53. Different users of the bench

3. Sanitation

The "sanitary facilities" category consists of two components: washrooms. The recommendations issued for this category are as follows:

Washrooms

- Must be indicated on site and online to facilitate location.
- On site and Universally accessible (including all necessary items – e.g., toilet, sink, changing table – in the same room).
- Entrance without stairs or steps.
- Sufficient clearance space in the cubicle (minimum 900mm x 1500m) or universal toilet room (minimum 2100mm x 2100mm).
- Toilet height between 430 and 485 mm from the floor.
- Two grab bars available: 1) L-shaped bar on the side wall at a height of between 760 and 850mm; 2) Horizontal bar on the wall behind the toilet fixed at the same height as the side bar. A folding bar can also be added on the side of the transfer space.
- Washbasins with free space underneath as well as hose protection.
- Accessible accessories – maximum height of 1100mm and with simple and intuitive controls.
- Distribution of accessories for comfortable use: 1) soap and towel or paper dispenser near the sinks; 2) Toilet paper dispenser and garbage cans near the toilet.
- Provide quiet accessories (e.g., offer an alternative to hand dryers).
- Provide stable, non-noisy lighting. Minimize the use of neon lights.
- Ensure cleaning and cleaning policies, adapted to traffic, that allow the facilities to be clean and limit odours.

Specificities and solutions

Aim to build inclusive (or gender-neutral) washrooms and work on the following:

- Location in the building: visibility, proximity, and distribution: visible installations in the building, in plain sight, rather than hidden in a hallway corner or in a dark place
- Opening the room and extending the public sphere: It is suggested that two doorless access points be provided to allow for smooth circulation, good ventilation, and easy-to-maintain access areas (see Figure 54). In addition, the washroom hallway should be an extension, continuation, or literally part of the outdoor public hallway, as in designs that divide a washroom between the two sides of a public hallway, as if it were making its way (Form "II") (Lazere et al., 2018). The goal is to make the toilet feel like "an extension of the public space" (Sanders and Stryker, 2016; Joubert, 2022).
- Toilet partitions: The configuration of stalls for an inclusive toilet is either linear or circular, and they can be arranged around, on the periphery of the room, or in the centre, reducing space and costs by sharing plumbing (Sanders & Stryker, 2016; Cholo, 2019).
- Urinals: Some designs include a private urinal area, surrounded by three or four walls and with a doorless entrance (see Figure 55). This urinal area requires, of course, more floor space than if it were divided into toilet cubicles (Thorn, 2017). Another option is not to include urinals in this type of installation. As a compromise, it is suggested that no urinal be installed in newly constructed inclusive washrooms, and that existing urinals be retained only if the renovation budget is limited (Government of Alberta, 2019).

- Sinks: It is suggested to ensure an unobstructed space in the cleaning area to give a sense of shared space (HCMA, 2018). The cleaning area should be well lit. Public handwashing stations should be as visible as possible, even to people outside the washroom, to the point of removing mirrors above the sink (Neumueller, 2018) to increase the visibility of outsiders to the cleaning area.
- Mirrors: Inclusive washrooms are likely to have larger mirrors (Thorn, 2017). Mirrors should be accessible to people with limited mobility and of different sizes (Sanders & Stryker, 2016; Cholo, 2019). Full-length or wall-mounted mirrors are preferable and make the room feel more spacious (Foster, 2017; Oliaro, 2019). Some people in transition may want more privacy, so, even if there are public mirrors, there should also or at least be private mirrors in each stall, a safe and personal space to groom themselves (Selin-Davis, 2017; Kwun, 2018).
- Security: Increased surveillance in the public sphere. The co-presence of a small number of people in the waiting area and when washing hands increases the feeling of vulnerability due to exposure to others, while the co-presence of a large number reduces it by increasing "natural surveillance", an equally informal form of surveillance (HCMA, 2018; Francis et al., 2022).
- Inclusive signage system. Researchers recommend writing only "toilets" and/or "toilets with urinals" (Bender-Baird, 2016; Slater, Jones, & Procter, 2016). Inclusive signage should focus on the good or service provided rather than the (gender) identity of users (Cholo, 2019; Entro, 2020).

Figure 54. Different users of the bench

Figure 55. Seperate urinals

6. Signalisation et wayfinding

The **"signage and wayfinding"** category consists of three elements: general signage, room identification signs and interactive informative maps and posters. The following recommendations were made for this category:

<u>General signage</u>

- Signage should be easily visible to people with residual vision and should be designed with high contrast and large font size.

<u>Room identification signs</u>

- Directional signs indicating services or points of interest should be available to promote orientation.
- The signs must fit in with the style of the heritage site or building (e.g., use the same colour palette).

<u>Informative maps and posters (directories)</u>

- Place maps or other informative posters in a location that allows you to approach and stop in front of them to consult them.
- Off the course, especially in crowded places.
- Free flat space available in front of the cards (e.g. do not place a bench in front of the card).
- Provide adequate contrast between the font and the background of the poster and a large enough font size.
- Present information (e.g., legends in maps) in an intuitive way.
- The installation of two-dimensional tactile maps (with raised dots that meet specific standards) or three-dimensional maps (in the form of models) can improve the understanding of an unfamiliar environment (Couturier and Ratelle, 2014). However, this type of map should not be the only element for orientation and should be accompanied by additional descriptions or information.
- Offer information in Braille or raised characters.

Specificities and solutions

- Because historic places often have complex structures and organizations, accessible signage and wayfinding are particularly important.
- Bollards or poles can be used as a support for tactile navigational information, such as the direction and relative distance of the nearest waypoint.
- The use of signage projected on the ground was chosen as a solution, as can be found in several commercial stores such as IKEA. The reason for this is the possibility of projecting the different panels so as not to visually damage or pollute the walls of heritage sites and buildings with banners, maps and panels. In addition, this issue is regulated by municipal and government authorities, which is very important to clarify. Heritage environments can be significantly affected by this type of signage, and these impacts are usually controlled by regulations. It should be noted that both case studies are protected by the Quebec Cultural Heritage Act (CPA) and that UNESCO criteria ensure the authenticity of these sites. On the other hand, the projected signage offers the possibility of easily modifying or updating it.

I.   CONCLUSION

It is becoming extremely important to amend the laws protecting Canada's heritage to make them much more flexible and thus simplify the process of making changes to achieve more inclusive accessibility.

As mentioned earlier, there were several phases of work in this project for the development of these accessibility recommendations for Accessibility Standards Canada. The steps included exploring and assessing the accessibility of two heritage places, as well as co-creating solutions for the accessibility of historic places in general. Indeed, these steps allowed the identification of environmental barriers and facilitators and the in-depth understanding of the lived experiences of the participants, as well as the development of certain solutions that can improve the accessibility of heritage places.

In the two main approaches of intentions, namely total respect for the heritage building, using the same or very similar materials in the intervention; or making an intervention, it is fundamental to include people with disabilities in intervention projects to ensure that the proposed solutions are truly inclusive. People with disabilities are experts in their experience and can make an extremely valuable contribution to projects.

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