Fostering and Advancing Equity in Transportation Design

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Table of Contents

List of Figures

1.0 Introduction

1.1 Context

Equitable transportation design is considered the practice of designing transportation infrastructure to account for the needs of every possible user, particularly those from equity-seeking groups[1]. While the intersection of equity[2] and transportation planning is well researched, there are limited resources available on equitable transportation design. Equity is of growing concern in transportation design for two main reasons: first, the need to design for aging populations (particularly in Western democracies) and people with disabilities [1]. Second, it will be vital to retain roadway space for equity-seeking groups in the face of potentially disruptive transportation technologies such as ride-hailing and autonomous vehicles. With that in mind, this paper will discuss various equitable transportation design considerations, describe several tools and strategies to incorporate equity into transportation design, and show why equity matters for transportation design.

As a part of my Transportation Engineering II Course (UBC) Project, I was a part of a team retained by the City of Vancouver to assess the level of safety and comfort experienced by pedestrians and cyclists on the Broadway Corridor in Vancouver, with a special emphasis on equity. As a result, our team developed an audit that assessed how urban infrastructure assets and modes of transportation perform concerning accessibility, aesthetics, comfort, condition, equity, and safety. The process of developing the audit involved an extensive foray into how transportation design can foster and advance equity for transportation users, particularly those from equity-seeking groups, low-income persons, and *non-single-occupancy vehicle modes*[3].

[1] Equity-seeking groups according to the Government of Canada include women, indigenous peoples, people with disabilities, and members of visible minorities [6].
[2] Equity is defined as (1) the notion of fairness or justice; (2) the adjustment of levels and types of resources so that solutions vary and are appropriate to a group's unique needs and preferences [4].
[3] Or *historically disadvantaged modes* such as walking, cycling, and transit. Also inclusive of carpooling.

2.0 Equitable Transportation Design Considerations

2.1 Women

Equitable transportation design can be fostered for women by maximizing perceived safety in public spaces. This can be accomplished by the provision of adequate lighting, emergency help phones, and maximization of roadway sightlines. Examples are shown in **Figure 1** and **Figure 2**.

Figure 1 – Lighting (Summerland, BC) [2, p. H74]

Figure 2 – Emergency Help Phone (UBC) [3]

2.2 Indigenous Peoples and Members of Visible Minorities

Equity for indigenous peoples and members of visible minorities can be fostered by promoting representation and reconciliation. For example, indigenous place names could be placed adjacent to common names, where warranted, to promote reconciliatory efforts. An example of English and Indigenous signage is shown in **Figure 3**.

Figure 3 – English/Indigenous Transportation Signage (Sea to Sky Highway, BC)

2.3 People with Disabilities

Equity in transportation design for people with disabilities (mental and physical) ensures that the built environment is predictable, comprehensible, consistent, and easily navigable. Universal Access Design, a consultancy promoting the advancement of design for people with disabilities, consider the following key principles for effective universal design: *equitable use*, *flexibility in use*, *simple and intuitive use*, *perceptible information*, *tolerance for error*, *low physical effort*, and *size and space for approach and use* [4].

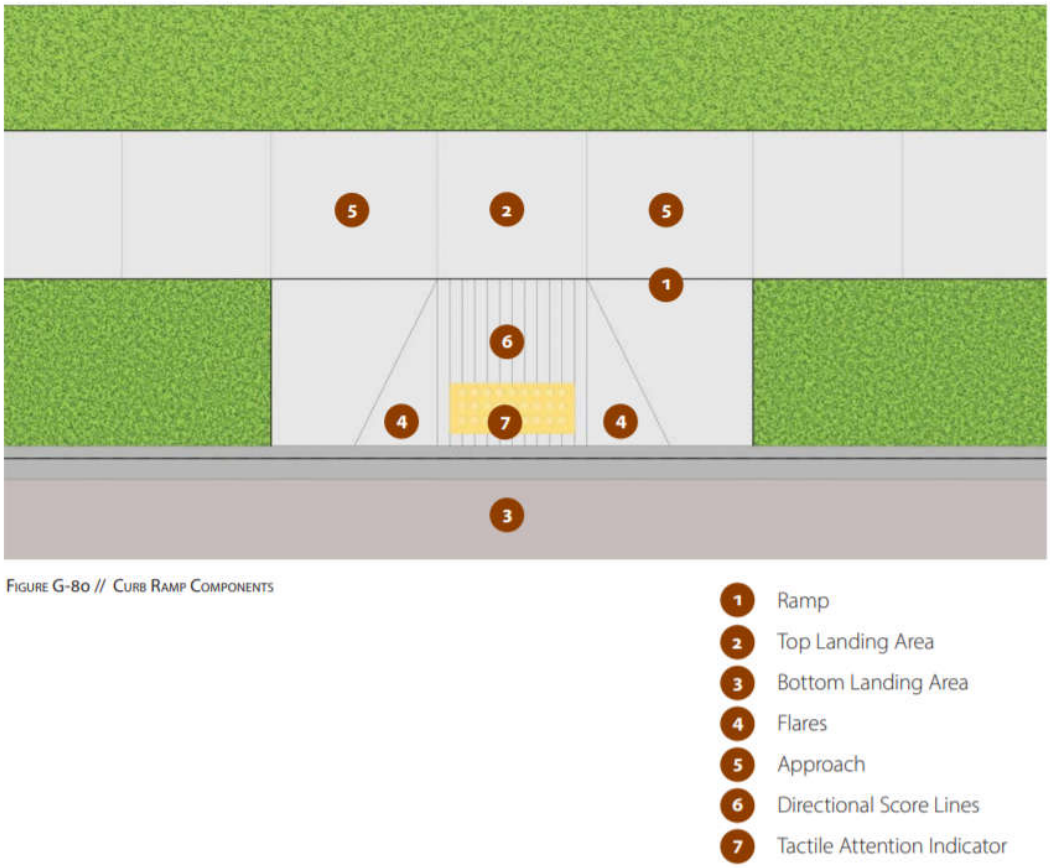

Figure 4 – Curb Ramp Components [2, p. G43]

2.3.1 People with Visual Impairments

People with visual impairments can be accommodated by score lines on curb letdowns, tactile guidance strips, braille signage, alignment of curb letdowns, and accessible pedestrian signals. Score lines on curb letdowns help guide pedestrians with visual impairments to the opposite curb letdown, whereas tactile guidance provides a sensory feel of where to go. Braille signage and accessible pedestrian signals help

visually impaired people cross major signalized intersections. Score lines and tactile guidance are shown in **Figure 4** and **Figure 5** respectively.

Figure 5 – Tactile Guidance Pad on a Curb Letdown [5]

2.3.2 People with Audible Impairments

People with audible impairments can be accommodated by clear transportation signage and signals.

2.3.3 People with Mobility Impairments

People with mobility impairments can be accommodated by well-designed curb letdowns and sidewalks, minimization of grades and grade-changes on sidewalks, appropriate pedestrian signal timing, and adequate maintenance of sidewalks to minimize uneven surfaces due to tree roots, differential settlement, and cracking. Minimizing of grade and grade changes is imperative for the design for people with mobility impairments because they may not be able to physically maneuver the grades with ease. Additionally, people with mobility impairments move, on average, at a slower pace. Thus, they may require additional time to cross an intersection. As such pedestrian signal timing should account for typical, slower users of a crosswalk. Lastly, sidewalks that deteriorate due to tree root growth, cracking, and settlement are difficult for people with mobility impairments to navigate because they are less consistent predictable to navigate. An example of cracking due to tree root growth is shown in **Figure 6**.

Figure 6 – Cracking due to Tree Roots [6]

2.3.4 People with Mental Disabilities

People with mental disabilities can be accommodated by inviting, open sightlines and acoustic dampening in crowded urban areas. This is mainly to reduce the sense of claustrophobia induced by overcrowding and confined transportation corridors.

2.4 Low-Income Persons

While access to real-time data through smartphone devices is nearly ubiquitous, this may not be the case for low-income persons. Equitable transportation design for low-income persons should include accessible real-time transportation data for transportation services, such as digital transit signage.

2.5 Walking, Cycling, and Transit Modes

Walking, cycling, and transit modes can be accommodated by ensuring that their modes are not impeded or impacted by competition for road and curb space with other modes or services such as car/bike-sharing, ride-hailing, and logistics. Cycling, specifically, can be accommodated by the provision of adequate cycling amenities such as bicycle racks, parking, signage, wayfinding signage, tools, bike signal-phasing, and dedicated cycling lanes, where appropriate. An example of a bike parkade is shown in **Figure 7**.

Figure 7 – Bicycle Parkade (Surrey, BC) [7]

3.0 Equitable Transportation Design – Tools and Resources

Equity can be incorporated into transportation design through adherence to progressive design guidance, use of equity analysis tools for projects, and recruitment and consultation of equity-seeking groups.

3.1 Publications and Resources

Several publications and resources that promote equitable transportation design guidance for the North American context include the following:

- *BC Active Transportation Design Guide*
- *Boston Complete Streets Guide*
- *Rick Hansen Foundation* Publications
- Municipal universal access design guidelines.

3.2 GBA+ Analysis Tool

The GBA+ (Gender-Based Analysis) tool is an increasingly adopted tool in public-decision making that assesses "how diverse groups of women, men, and non-binary people may experience policies, programs, and initiatives" [8]. The "+" indicates that other identity factors such as race, ethnicity, religion, age, and mental or physical disability can be accounted for and analyzed. Whether or not the GBA+ analysis affects project outcomes, the use of the tool ensures due diligence in the design process.

3.3 Recruitment and Consultation

Lastly, the recruitment and consultation of equity-seeking groups can help incorporate equity considerations into the transportation design process. This ensures that all perspectives and considerations are input towards the ultimate design of built infrastructure, especially those used by equity-seeking groups.

4.0 Conclusion

Equity in transportation design is important because the benefits of public infrastructure should be fairly and justly distributed. Transportation design is, in essence, a statement of public values and priorities through the allocation of space for people, modes, and travel. If a society values equity, then these values should be reflected across all public institutions and assets.

As Leahy and Takesian say, “equity in transportation [design] is not simply a concept to be emphasized. It should be the basis on which all work is done” [9]. Equitable transportation design should be “inclusive and consider all people as owners, planners, and decision-makers” [9]. It should duly “acknowledge and account for past and current inequities and provide everyone with the infrastructure needed to succeed and thrive” [9]. While the cost of considering and incorporating equity into transportation may be considerable, the benefits of fostering equity, improving equity outcomes, and allowing everyone to freely engage in the urban built environment is priceless.

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