Design Guidelines

for pedestrian accessibility

FOR ACCESSIBLE PEDESTRIAN ENVIRONMENTS

(Including: $ Streetscapes
$ Accessible Bus Stops
$ Bus Transfer Stations)

Alberta Transportation and Utilities

March 1996

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FOREWORD AND ACKNOWLEDGEMENTS

The need to provide access for all persons to public environments such as sidewalks, plazas, public transit and other services has created the necessity to develop this comprehensive "Design Guideline for Accessible Pedestrian Environments". To provide some degree of consistency, design professionals, municipal public works departments, government agencies, and developers will be encouraged to use these guidelines for projects throughout the Province. These guidelines are combined with an existing document "Design Guidelines for Accessible Bus Stops" which was created to fill a need to accommodate persons using mobility aids when accessing low-floor transit buses. Also addressed is bus transfer station accessibility. Under the auspices of the Minister of Transportation and Utilities' Advisory Committee on Barrier-Free Transportation, a subcommittee, composed of the following individuals, was formed to review and develop guidelines for accessible pedestrian environments.

Alberta Transportation and Utilities

Bob Rebus (Chair)	Grants & Administration Section
Catherine Taylor (Secretary)	Policy Development Branch
Bill Kenny	Roadway Engineering Branch

Minister's Advisory Committee on Barrier-Free Transportation

Diane Earl	Premier's Council
Chris Bellchamber	Council on Aging
Wendy Edey	Representing persons with vision impairments

These guidelines have been reviewed by many consumer groups and design professionals in Alberta and endorsed by the Minister's Advisory Committee on Barrier-Free Transportation. It is intended that these guidelines will provide guidance to city public works managers and transit planners, design professionals and developers.

The subcommittee would also like to thank the members of the Minister's Advisory Committee, the many consumer groups, design professionals and transit systems representatives who have reviewed the guidelines and provided their valuable input.

We also wish to acknowledge the following individuals who were involved with the original "Design Guidelines For Accessible Bus Stops" which was completed September, 1994 and now forms a part of this consolidated accessibility guideline.

Alberta Transportation and Utilities

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Minister's Advisory Committee on Barrier-Free Transportation

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Any questions or comments on these guidelines may be forwarded to the Grants and Administration Section of the Planning and Programming Branch, Alberta Transportation and Utilities, Fourth Floor, Twin Atria Building, 4999 - 98 Avenue, Edmonton, Alberta T6B 2X3.

GUIDELINES FOR DESIGN OF SAFE ACCESSIBLE PEDESTRIAN ENVIRONMENTS

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PART A

STREETSCAPES

GUIDELINES FOR DESIGN OF
SAFE ACCESSIBLE PEDESTRIAN ENVIRONMENTS

PART A - STREETSCAPES

1.0 Introduction

Pedestrian environments which are designed to be used by the general public, including those with disabilities, should be accessible to all persons, as well as being safe, functional and attractive. The purpose of these guidelines is to bring together the principles of good design as well as to highlight some of the commonly experienced barriers in the pedestrian environment and to illustrate some design solutions.

2.0 Principles of Good Design

Pedestrian environments in public places, either publicly or privately owned, should be designed to allow safe and convenient access by all pedestrian traffic. Although the majority of pedestrian traffic is ambulatory, a significant and growing number of pedestrians have somewhat restricted mobility due to disability or age. This group includes persons using walkers, scooters, wheelchairs (both manual and electric), people with impaired vision or hearing and some seniors. An additional group may have limited mobility temporarily due to the need to bring along a baby carriage or other wheeled device on their trips.

To ensure that the design of pedestrian environments accommodates the greatest possible number of people, it is desirable to adhere to the following:

1. Allow a clear path of travel, free of obstructions to a minimum height of 1980 mm. Examples of obstructions are directional signs, tree branches, guy wires and street furniture. Handrails projecting up to 100 mm into the clear path of travel are permitted. See drawing CB6-4.2M97.

2. Provide a firm, even, non-slip, glare-free surface (for example: broom concrete finish). An elevation change of 13 mm or more is considered to be a trip hazard and therefore should not be permitted in the clear path of travel.

3. Ensure that gradients along the path of travel are very gradual to allow access by all and that landings are added according to the desirable spacing shown in Table 1, where feasible.

Table 1 Sidewalk Gradients

Max. Slope	Max. Length	Max. Height	Landings
less than 2%	None	None	Not required
2% < grade < 5%	None	None	landings at 750 mm elevation differences are desirable
5%	None	None	Every 9 m *
6.25%	12 m	750 mm	Every 9 m *
8.3%	9 m	750 mm	Every 9 m *
10%	1.5 m	150 mm	- *
12.5%	.6 m	75 mm	- *

* Note: Sidewalks with gradients of 5% or steeper are generally considered to be ramps and therefore a minimum spacing of 9m between landings is suggested. It is recognized that the gradient and building layout on some streets may make the provision of landings impractical.

4. Provide a sufficiently wide path to suit the intended traffic. Generally an unobstructed clear width of 1.5 m should be considered a minimum; however, intermittent narrower paths of 1.2 m width are allowed for short segments or adjacent to obstacles.

5. Provide standardized ramps where necessary to cross curbs, etc.

6. The standardized maximum gradient (0.08 m/m) used on ramps should also be applied where driveways or alleyways cross sidewalks. This maximum applies to the sides of the ramp as well as to the ramp proper.

7. Provide tactile cues for people with impaired vision and audible cross walk signals where warranted at intersections. For example, the use of a 10 mm high lip is suggested to delineate the edge of roadway (beginning of ramp) or other significant boundaries, see drawing CB6-4.2M86 attached.** Tactile cues are also recommended to

**Note: All drawings related to this guideline are to be found in Appendix I.

delineate the edge of hazard in pedestrian areas, for example edge of platform at rail station or top of stairs, etc. For additional information on Audible Traffic Signals, designers are referred to the Uniform Traffic Control Devices for Canada manual, published by the Transportation Association of Canada.

8. Ensure that drainage grates on the covers of catch basins or manholes are located off the clear path of travel where possible, i.e. not on curb ramps for example. Where it is not feasible to relocate a catch basin off a ramp, for example due to excessive cost on a retrofit project, the second choice is to offset the ramp provided that the ramp will still give direct access to the crosswalk. The third choice is to have the grate installed in the ramp however in this case the cover should be installed as shown on drawing CB6-4.2M96 i.e. so that the long dimension of the elongated opening is perpendicular to the pedestrian path of travel on the ramp.

9. Grates for non-drainage structures for example electrical vaults or access hatches, etc., should be located off the clear path of travel where possible. Where grates are necessary, they should have no opening that will permit the passage of a sphere more than 13 mm diameter. Drawing CB6-4.2M97 shows the maximum recommended opening size and orientation for non-drainage grates located in pedestrian areas. If the gratings have elongated openings, they should be placed so that the long dimension is perpendicular to the direction of travel.

3.0 Some Barriers to Travel

Although most pedestrian environments in Alberta that have been designed and built in recent years are generally barrier-free, there are some construction and operational practices that present a barrier to the public at large and can have a much more restrictive impact on people with transportation disabilities.

One set of obstacles can generally be referred to as street furniture. This includes light poles, fire hydrants, traffic signals, signs, bus benches, mail boxes, newspaper vending machines, sandwich boards, tables, bike racks, waste receptacles, telephone booths, bollards, trees, etc. These items are frequently needed or desired on streets, however their placement should be carefully planned to ensure that they do not become a hazard for people with impaired vision or an obstacle for wheelchair users or other pedestrians.

A second area of concern, especially for older pedestrians and wheelchair users is the use of paving stones or bricks in pedestrian areas. The main difficulty with paving stones is the uneven surface that can result due to differential settlement that generally occurs within a few years of construction. Some paving stones have rounded edges on the surface which creates a wider and deeper joint. The uneven surfaces and joints can cause pedestrians to trip, will give wheelchair users a rough ride and could contribute to persons falling from their wheelchairs. Where paving stones are used in an indoor setting, although frost heaving and differential settlement may be eliminated, the stone surface still provides a less than ideal riding surface for people using wheelchairs.

Based on the above, it is preferred that an even concrete surface be provided for the main path of travel through pedestrian areas. Ideally, paving stones should be used as borders only. Where a designer chooses to use a paving stone edger on a sidewalk, the outside edge (adjacent to curb) is generally preferred. This provides a good tactile cue for people with impaired vision while also ensuring that the main path of pedestrian travel is separated from vehicular traffic. In general, a safer and more functional pedestrian environment would result if the clear path of travel was given top priority in all layouts i.e. with decorative finishes, paving stone tree surrounds and other street furniture not being permitted to encroach on the path of travel.

4.0 Design Solutions

1. **Ensure street furniture does not encroach on the clear path of travel in pedestrian areas.**

   In the case of **lower volume residential** or **light industrial sidewalks** where a monolithic curb, gutter and sidewalk cross-section has been selected, it is preferred that all street furniture be placed on the private property side of the sidewalk i.e. away from the roadway, so as not to encroach on the clear path of travel.

   Where additional right-of-way is available, a boulevard between roadway and sidewalk is very desirable aesthetically, provides greater safety for pedestrians and allows street furniture to be placed off the pedestrian walking surface.

Where wider sidewalks are required, for example in commercial or business areas or in the vicinity of educational or health care facilities, the sidewalk cross-section should generally be designed to accommodate street furniture without encroaching on the clear path of travel and while still providing a minimum 800 mm offset from the curb to allow for vehicle door-openings. Where buildings are constructed adjacent to sidewalks, it is best to place street furniture on the curb side of the walkway thus providing a greater offset between the pedestrian clear path of travel and the vehicular traffic. The absence of obstructions along the face of buildings is desirable.

On major arterial roads, where higher speeds and higher traffic volumes are expected, a 3 m offset between curb and sidewalk is desirable. A grass surface may be used to provide a contrasting colour and texture for the boulevard.

Drawing CB6 4.2M95 (attached) shows the typical cross-sections for the sidewalks described here.

2. **If paving stones are required on a project, they should not be placed across the main path of travel where they would be a barrier or possible hazard to some pedestrians.**

In addition to the above, measures should be taken to ensure that the effects of frost heave and/or differential settlement of paving stones are minimized. Experience has shown that the best way to ensure the integrity of a surface is to build a strong base. The major cities in Alberta have used either lean concrete or soil cement for this purpose. A levelling course of sand is generally used on top of the base and the paving stones are placed on the sand. If the back of the walkway is within 3.0 m of a building, a 50 mm layer of rigid insulation is typically placed under the base to reduce frost penetration into the subgrade. A 50 mm layer of crushed gravel may also be used below the insulation. The attached drawing, CB6 4.2M93, shows a typical structure which should provide a safe, smooth partially paved sidewalk.

CB6 4.2M94 is a plan view of a typical urban intersection where paving stones have been used to delineate the edge of sidewalk and crosswalk while not obstructing the clear path of travel. Drawings CB6-4.2M85, 86, 87 and 91 are also included to show the typical layout and construction details for ramps where urban sidewalks meet crosswalks. Drawing CB6-2.10M34 shows the details of a special catch basin/manhole frame and cover that is suitable for use on a curb ramp.

GUIDELINES FOR ACCESSIBLE PEDESTRIAN ENVIRONMENTS

PART B

ACCESSIBLE BUS STOPS AND BUS TRANSFER STATIONS

GUIDELINES FOR DESIGN OF SAFE ACCESSIBLE PEDESTRIAN ENVIRONMENTS

PART B - ACCESSIBLE BUS STOPS AND BUS TRANSFER STATIONS

5.0 Introduction

As early as 1992, Alberta municipalities had begun to make their conventional transit systems more accessible for persons with disabilities and seniors. The customary transit bus is being replaced by an accessible, full-size, low-floor bus as fleet replacement becomes necessary. By eliminating the need to climb stairs within buses, seniors find boarding much easier and ambulatory passengers are able to board quicker. The use of a ramp on the bus enables persons using wheelchairs or other mobility aids to easily access the vehicle and ride the public transit system.

As part of the plan to implement accessible buses into transit routes, transit management acknowledge the need to address the matter of access in the pedestrian environment, specifically at bus stops. Transit planners are enlisting the assistance of consumers to review the current status of the pedestrian environment and provide feedback on how bus stops can be made more accessible. Both consumers and transit management recognize that in order to ensure consistency across the province, it is essential that various guidelines be developed. The Alberta Chapter of the Canadian Urban Transit Association have also endorsed the need for provincial guidelines.

6.0 Background

The Alberta Committee to Review Design Guidelines, a subcommittee of the Minister of Transportation and Utilities' Advisory Committee on Barrier-Free Transportation, examined a report developed by an Ontario Ministry of Transportation task force. This task force investigated methods to improve accessibility to conventional transit services and conducted extensive examination of existing literature. They identified key issues and design considerations which are fundamental to improving the accessibility and usability of bus stops.

In developing the Alberta guidelines, the Alberta Committee, comprised of consumers and representatives from Alberta transit systems and Alberta Transportation and Utilities personnel, reviewed the design considerations for bus stops in the Ontario report and a similar document, the BC Transit Design Guidelines for Accessible Bus Stops, and in some instances modified these designs to address conditions for Alberta transit systems.

The Alberta guidelines have been developed to assist Alberta transit systems as they move toward providing accessible transit services through the implementation of community and low-floor buses. The guidelines are uniform and flexible, and reference other standards such as the Alberta Building Code and the curb ramp standards developed by Alberta Transportation and Utilities. These guidelines are not meant to be standards but rather to serve as design guidelines which can be interpreted and adapted to specific situations in each municipality. Information contained within the guidelines can also be used for the design of boarding and alighting areas for other accessible vehicles, including taxis, charter buses/vans, and in some instances, private vehicles.

7.0 Principles of Mobility

The basic principles of mobility in a pedestrian environment are:

- Avoid level changes wherever possible.
- Provide non-slip finishes, good grip, and sure footing to ensure surfaces are safe.
- Provide opportunities for seating adjacent to travel routes.
- Plan exterior elements to minimize obstacles and eliminate travel hazards by ensuring there is adequate overhead clearance and no protrusions into the path of travel. Newspaper boxes and other street furniture should be placed close to the edge of the travel path but out of the main flow of pedestrian traffic.
- Avoid glare from surfaces in all lighting conditions.

8.0 Principles of Effective Orientation, Wayfinding and Warning

The basic principles of orientation are:

- Provide consistency and uniformity of design elements and layout.
- Simplify orientation by using right angles for design elements and layout.
- Provide visual as well as tactile cues and landmarks within designs (examples: sidewalks with grass shoulders or borders; street furnishings such as benches, trash containers, planters located adjacent to but not within path of travel; high contrasts on shelter door frames, benches and planters).
- Walkways, hazards and waiting areas should be well illuminated for orientation and security purposes.

The basic principles of wayfinding are:

- Provide logical, unbroken path of travel from sidewalk to bus boarding area.
- Paths of travel may be easily identified by proper placement of street furniture, which, for example, can be placed to highlight location of sidewalk or ends of bus zone.
- Use colour contrast, sound, light and shade to accentuate paths of travel between shelter, sidewalk and bus boarding area.
- In rare circumstances, tactile wayfinding tiles may be used to accentuate paths of travel if pedestrian pathway is broken or wayfinding is complicated (note, however, such wayfinding tiles must be consistent in design and well differentiated from tactile warning strips). Wayfinding tiles are usually of gentle and corduroy textures, whereas warning tiles are typically of raised dot textures.

The basic principles of warning are:

- A bus stop with good ergonomics and effective wayfinding/colour contrast or tactile cues will also be beneficial for safety and warning purposes.

- Placement of street furniture such as benches, newspaper stands and planters for creation of a barrier from hazards will assist in preventing mishaps.

- Tactile indicators such as tactile warning tiles may be used in rare circumstances to accentuate a large difference in elevation (note, however, such warning tiles must be consistent in design and well differentiated from tactile wayfinding tiles).

9.0 Design Envelope

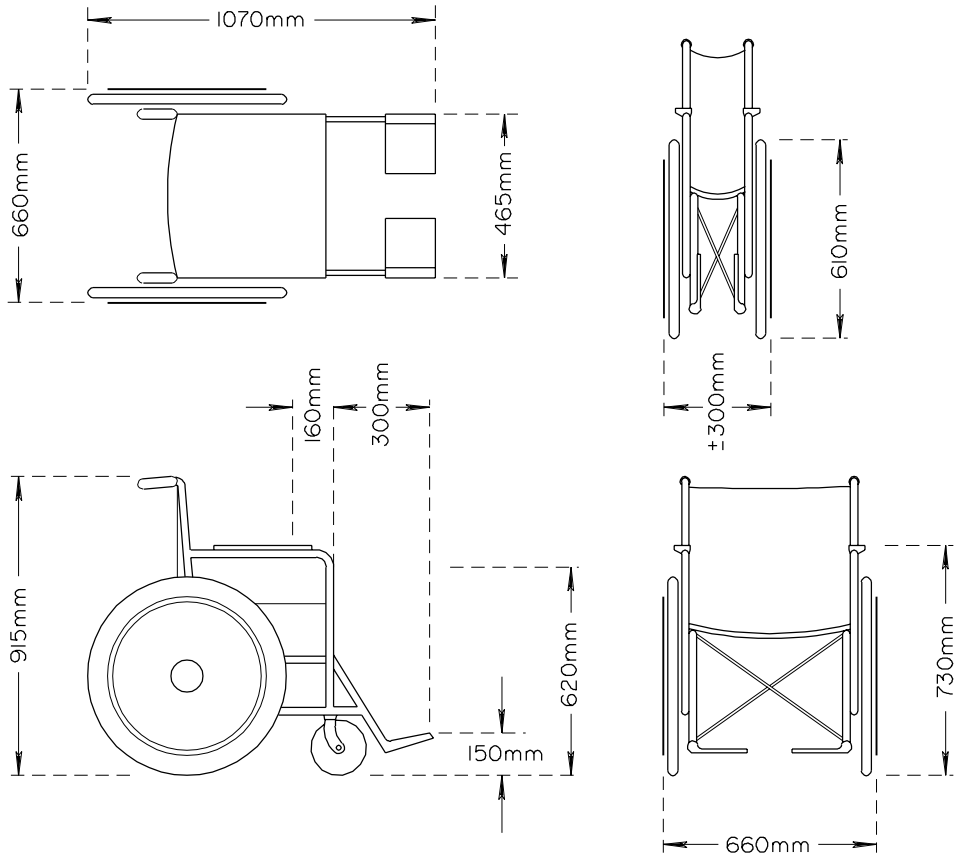
When developing a design standard or guideline, it is generally necessary to select a "design user" or "user envelope", as well as a "design vehicle" in this case the bus. In the case of accessible bus stops and transit zones, a design envelope for the user has been selected to accommodate most conventional wheelchairs and other mobility aides which could gain access to low-floor transit buses. This is considered to an extension of the person using the mobility aid. This envelope has the following dimensions:

1.22 m (length) x 0.76 m (width).

Height of the design envelope is not considered to be a critical factor or constraint. Accessible buses or other vehicles to be used to transport wheelchair users normally have enough vertical clearance within the vehicle to accommodate wheelchair users. The dimensions of the design envelope have been adopted by Alberta based on recommendations contained in the Americans with Disabilities Act (A.D.A.) passed in the U.S. which uses a "design envelope" of 48 inches by 30 inches. Figure C-7.2.5a. shows the dimensions of the design envelope to accommodate wheelchair users.

The "design vehicle" for transit zones accessible to wheelchair users is the low-floor, ramp-equipped transit bus as shown on Figure C-7.2.5a.. Transit zones should also be suitable for smaller ramp-equipped vehicles. Modification to the concrete pad size may be required for larger buses, such as the articulated low-floor buses, or lift-equipped buses. Section 7.3 discusses the minimum clearance area in further detail.

Figure C-7.2.5a Design Envelope to Accommodate Wheelchair Users



WHEELCHAIRS

A person in a wheelchair occupies a space 760mm x 1220mm and can turn within a 1500mm diameter circle.

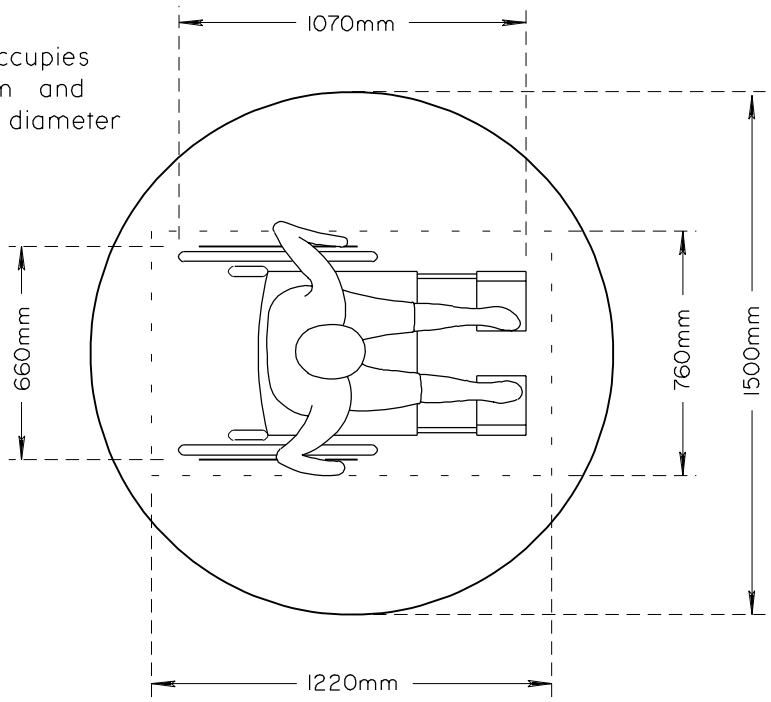
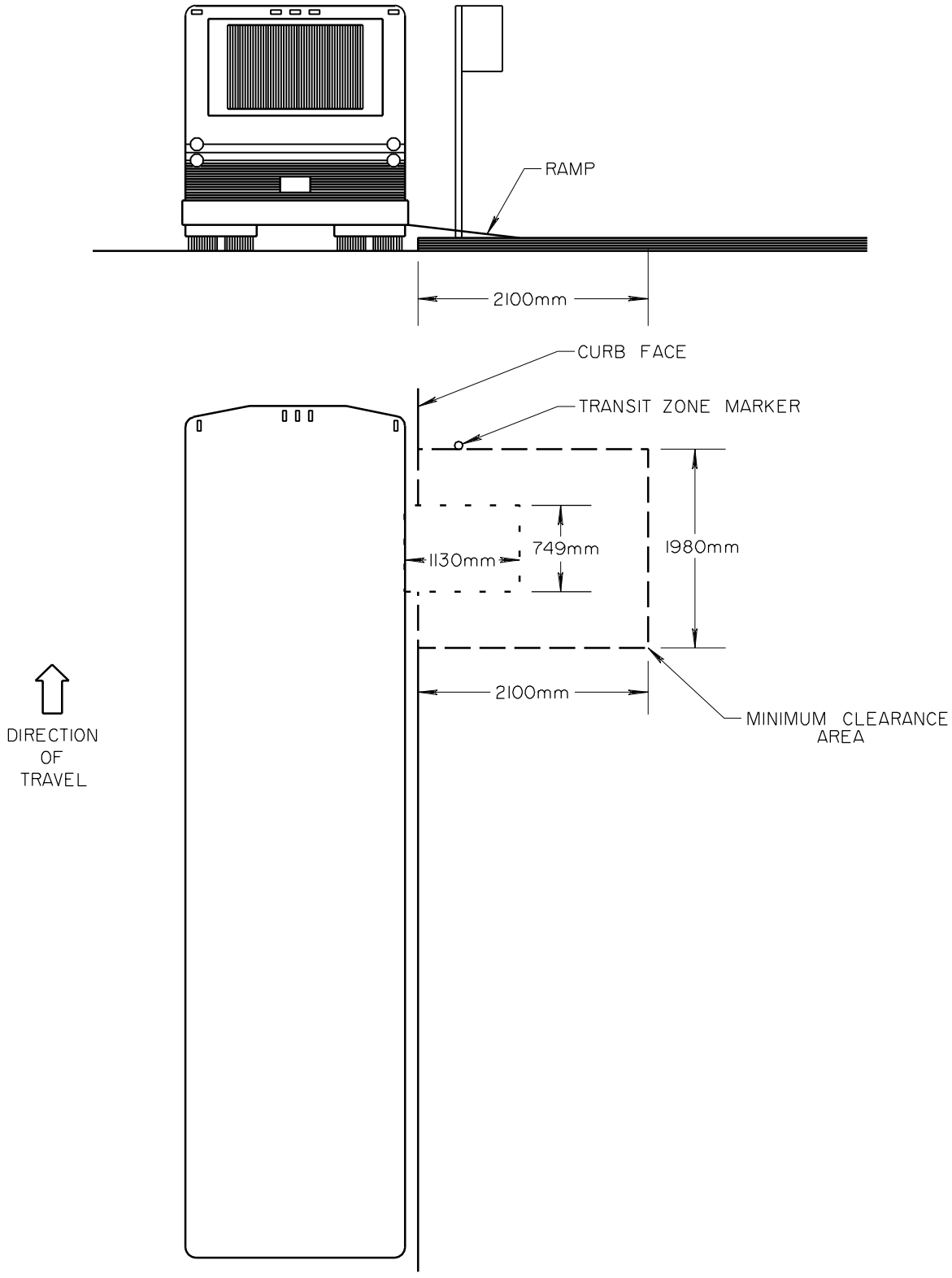


Figure C-7.2.5b Minimum Requirements for Bus Stops Accessible to Wheelchair Users



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10.0 Elements of an Accessible Environment

The barrier-free path of travel from a person's origin to his/her destination includes walkways, curb ramps, bus stops, shelters, seating, signing, lighting, and streetscape. The design considerations for these elements will be discussed in detail in the following pages and can be used as a resource tool and adapted to meet the specific needs of the particular jurisdiction.

10.1 Walkways

Walkways or sidewalks are the essential link between the origin/destination of the trip and the bus stop. Their proper design and regular maintenance are important in providing a barrier-free path of travel for all persons.

Design considerations:

- Provide non-slip surfaces that are solid, smooth, level and well drained in all weather conditions, with a desirable cross slope of 2%.

- Walkways must be well maintained to be clear of snow, ice, and other debris.

- Avoid service elements such as manholes or gratings on walkways. If they are used, they must be flush with the surface and must not have any opening larger than 13 mm in diameter. If the gratings have elongated openings, orient them so that the long dimension is perpendicular to the direction of travel, as shown on Figure CB6-4.2M97 in Appendix 1.

- Keep obstructions, such as newspaper boxes, benches, sign posts, guy wires, tree branches, and other street furniture, out of the path of travel.

- Minimum overhead clearance from grade is 1980 mm, as illustrated in Figure CB6-4.2M97 in Appendix 1.

- To assist persons with visual impairments, the surface of the walkways should be easily discernible from the surrounding areas. Use different textures (grass, concrete, paving stone), contrasting colours, and curbs to delineate paths.

- The desirable clear walkway width is 1.8 m, although a minimum width of 1.5 m is commonly acceptable.

- In areas near hospitals and seniors' homes where wheelchairs users are more common on walkways, additional width may be required as illustrated in Figure C-7.2.6.4.

10.2 Curb Ramps

Sidewalk curbs (and raised islands) remain the single most common and difficult barrier in the path of travel for persons with reduced mobility to negotiate. Any level change without the aid of a ramp would pose a mobility barrier. It is important that curb cuts/ramps are provided at all points of level change in the path of travel.

Curb ramp standards developed by Alberta Transportation and Utilities are shown in Figure C-7.2.6.2. and on Figure CB6-4.2MB6 in Appendix I. The key elements are summarized as follows.

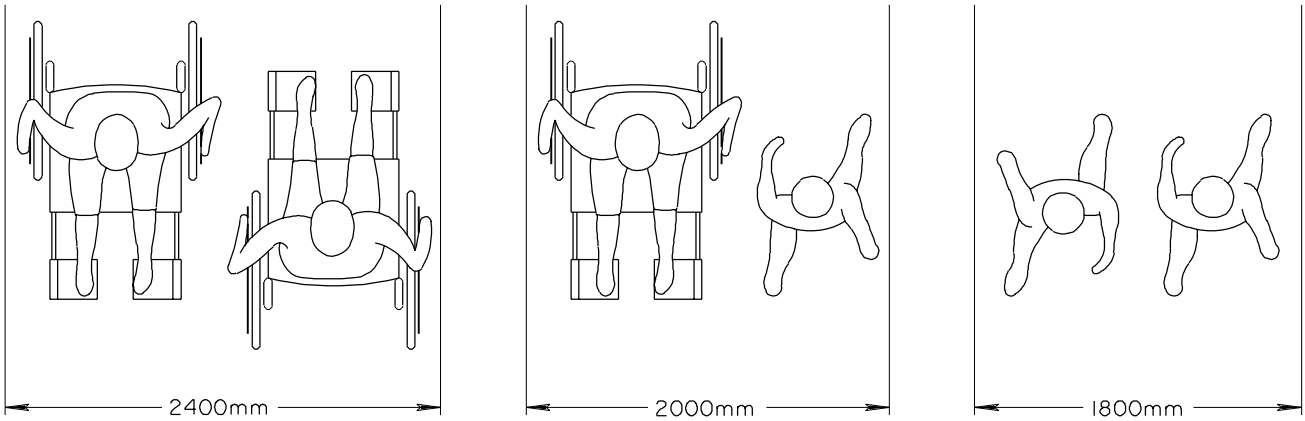
Design considerations:

- Curb ramps at intersections must be located within crosswalks. Persons using wheelchairs must be able to use the ramps safely away from the travel path of vehicular traffic.

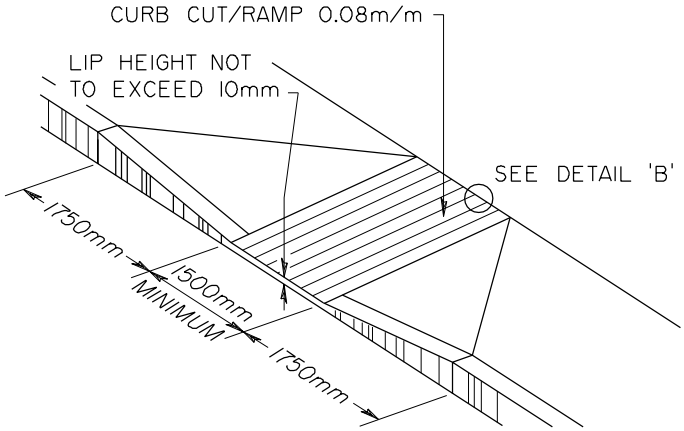
- Ideally, the bottom of the ramp should have a cane-detectable lip. The maximum rise for that lip is 10 mm to allow a smooth path for wheelchairs. See Figure C-7.2.6.2. and on Figure CB6-4.2MB6 in Appendix I for illustration.

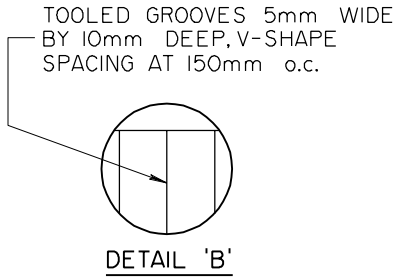
- All raised platforms/islands in transit centres must have curb ramps and appropriate ramp access into the transit centre from the adjacent pedestrian system.

Figure C-7.2.6.2 Sidewalk Widths and Curb Ramps



NOTE: A MINIMUM OF 1500mm IS COMMONLY ACCEPTABLE





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10.3 Bus Stop Location

The location of bus stops relative to the origin and destination of the trip is important to accessibility of the system. To some users, the walking distance to a bus stop may well be the major barrier to accessing the conventional transit system. Planning for bus routes and location of bus stops should be an essential and integral part of any major development planning.

Design considerations:

- areas near seniors' homes, hospitals, institutions and other high transit usage locations, bus stops should be located as close to these facilities as practically possible to reduce walking distances. Conversely, developers of seniors' homes and high density developments should consider locating their facilities close to transit routes/stops.

- The minimum obstruction clearance area to accommodate the deployment (lowering) of the wheelchair ramp from the bus and to allow for wheelchair movement after clearing the ramp is 2.1 m by 1.98 m, as shown on Figure C-7.2.5b. This minimum clearance area is based on the current bus ramp specifications and wheelchair design envelope.

- The waiting pad or street-side sidewalk at the bus stop should have a minimum length of 8.5 m, a minimum width of 2.1 m, and a barrier type curb height of 150 mm. Those transit systems with articulated buses may need to consider a longer bus pad.

- The 2.1 m width is considered to be a practical minimum requirement, sufficient to allow a wheelchair user to get on and off a bus. If the bus stop is expected to accommodate scooters or a high number of patrons, a wider (2.4 m) bus pad should be considered.

- At locations where more than one route uses a bus stop and the frequency of more than one bus stopping simultaneously at the same stop is high, an additional 17.3 m (12.3 m for vehicle length and 5 m pull-out space) should be added to the length of the concrete pad for each additional bus simultaneously using the stop.

- The bus pad should be clear of any obstacles, such as benches, newspaper boxes, garbage containers, trees and other street furniture. Regular maintenance is important to remove snow, ice and other debris.

- Bus stops should be located on sections of tangent and relatively flat roadway, and stops on steep slopes should be avoided.

10.4 Bus Stops

Bus stops and shelters are comprised of a number of individual elements that must be planned in a coordinated manner. There are a variety of road right-of-way conditions in a municipality. Each bus stop and shelter must be designed to meet the users' needs within the available right-of-way conditions and be compatible with the neighbourhood environment.

Figures 4 to 8 illustrate suggested bus stop and shelter arrangements in a variety of sidewalk and boulevard conditions in built-up and suburban locations. The suggested guidelines are flexible and may be tailored to the sidewalk and boulevard conditions at a particular stop. It is not possible to show every bus stop situation; however, these exhibits attempt to illustrate the principles of designing accessible bus stops. The exhibits are briefly described as follows:

Figure C-7.2.6.4a. shows a bus stop in a built-up area, such as central business districts, where the sidewalk occupies the space between the road and adjacent buildings.

Figure C-7.2.6.4b. shows a bus stop in a built-up area, where the sidewalk is separated by a boulevard from the road. Note that the placement of the shelter does not interfere with the sidewalk.

Figure C-7.2.6.4c. is a bus stop in a suburban area, where there is no boulevard separating the sidewalk from the road. The width of the bus pad is a minimum of 2.1 m, as compared to the 1.5 m width of the sidewalk.

Figure C-7.2.6.4d. shows a bus stop in a suburban area with a boulevard separating the sidewalk from the road. The sidewalk is part of the bus pad.

Figure C-7.2.6.4e. illustrates a bus stop in a suburban area with a wide boulevard (more than 2.1 m). A walkway is needed to connect the bus pad and the sidewalk.

Design considerations:

- Provide a non-slip, solid, smooth, well drained (desirable cross slope of 2%), and paved (usually with concrete) area around the shelter and with connections to adjacent walkways.

- Locate street furniture and signing to keep pedestrian access free of obstructions.

- Eliminate any level changes/steps between the bus pad and the shelter.

- If on-street parking adjacent to the bus stop is allowed, the transit zone may be extended by locating the transit zone marker 5 m ahead of the bus pad, to provide a pull-out space.

- Illuminate bus stop areas for orientation and security.

- Signing must be easily recognizable and legible.

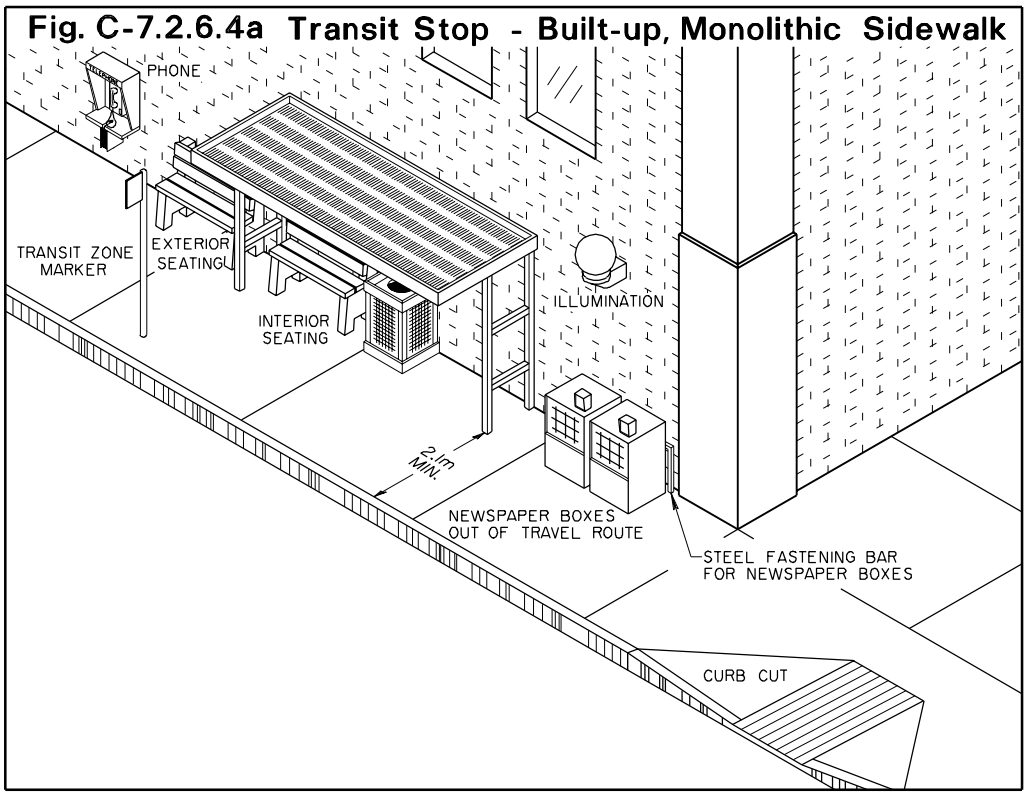
10.5 Shelters

Bus shelters primarily provide overhead protection and a certain degree of climatic protection. Shelters vary in materials and dimensions. Many of them are funded or provided by advertising companies for the return of the right to display advertising on the shelters. Municipalities should specify the standards and location of the shelters in the contracts with these companies, so that good design and location criteria are not compromised by the involvement of commercial interests.

Design considerations:

- Shelter dimensions vary. A size of 3 m long and 1.5 m wide is quite common.
- Shelters should be designed with transparent sides for visibility and security.
- Include transit route maps, schedules, and seating in shelters. Maps and schedules should be easily readable by persons using wheelchairs and, to the extent possible, persons with a visual impairment.
- Glass panels should be marked with horizontal contrasting strips.
- Provide seating, if feasible, with sufficient space to move around.
- There should not be steps between the sidewalk/bus pad and the shelter.
- Shelter openings must be a minimum of 800 mm to allow a wheelchair to pass through.
- Doorways and doors in enclosed shelters in major transit centres must be designed to the standards specified in the Alberta Building Code (see the Barrier-Free Design Guide produced by Alberta Labour).
- Heated shelters should be considered in major transit centres.
- Where public telephones are provided, at least one telephone should be accessible by persons using wheelchairs. It must be located so that the receiver, coin slot and control are no more than 1200 mm above the floor.

FIGURE C-7.2.6.4 TRANSIT STOPS



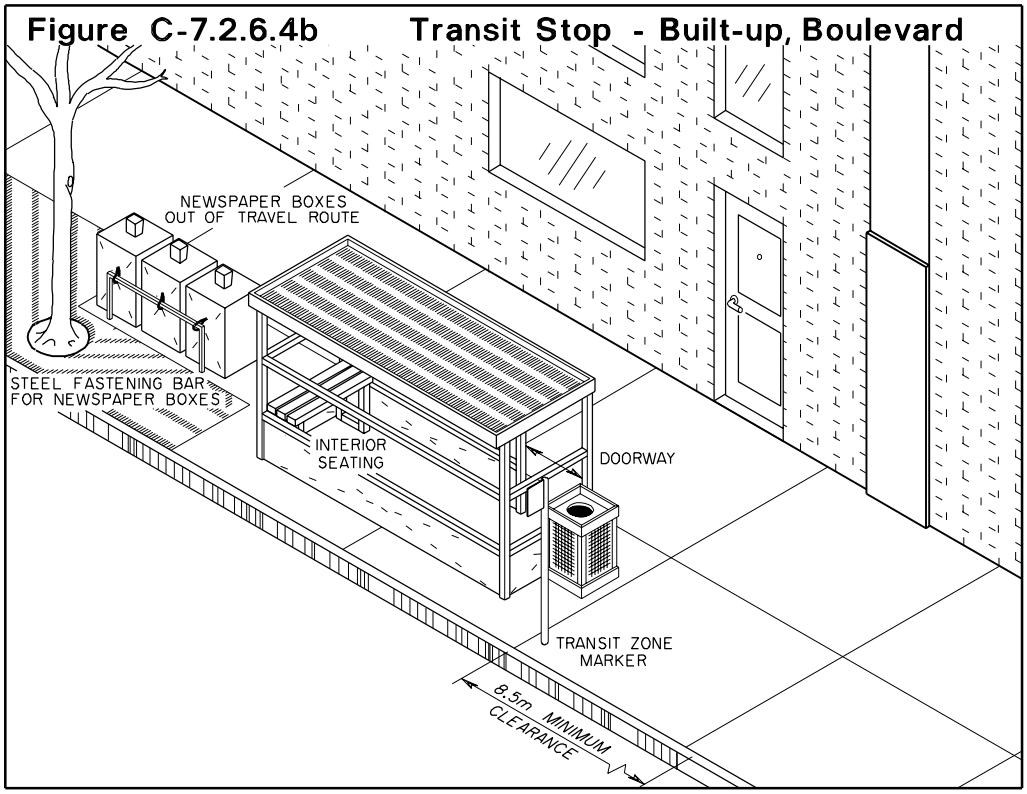


FIGURE C-7.2.6.4 TRANSIT STOPS

Fig. C-7.2.6.4c
Transit Stop - Suburban, Monolithic Sidewalk

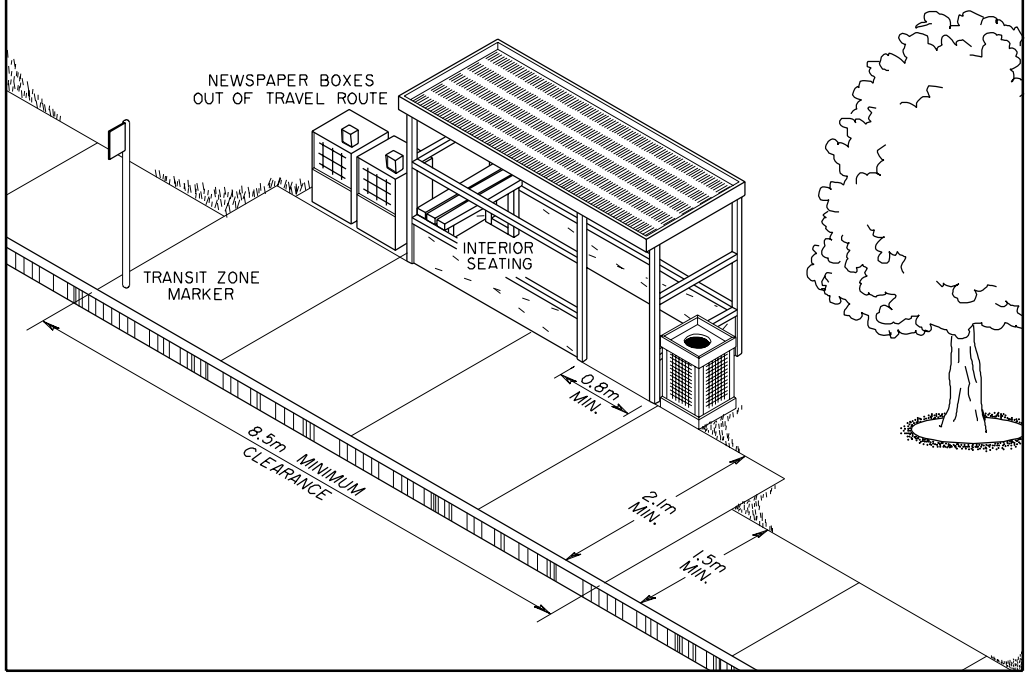
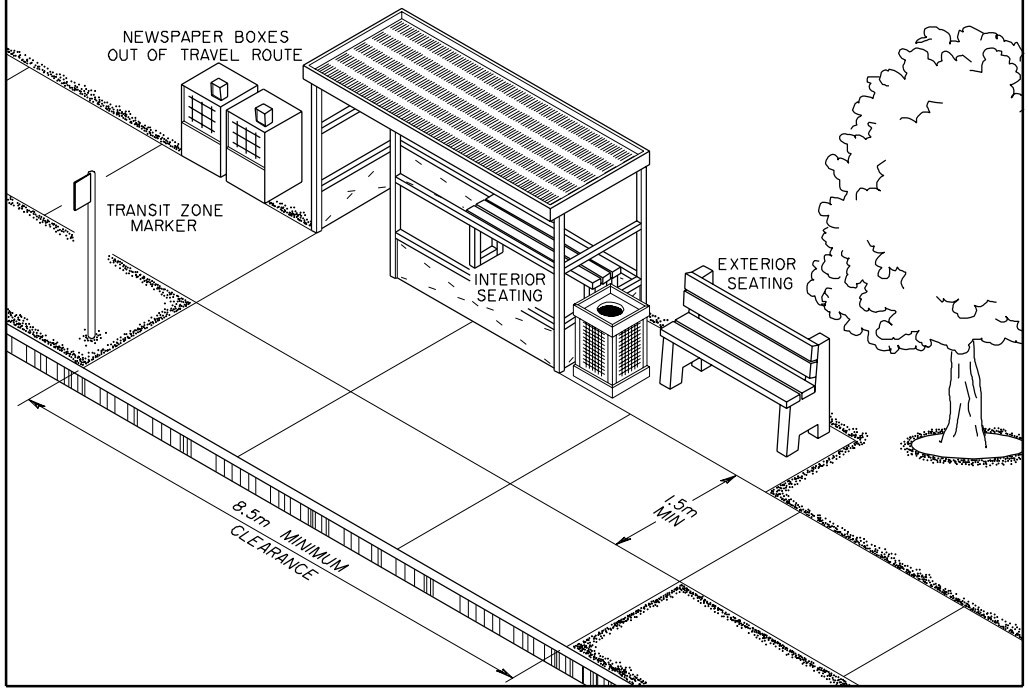


Figure C-7.2.6.4d Transit Stop - Suburban, Boulevard



Graphics File:tigsfs01\reb\manual\chapters\chap-c\debc7264.man

FIGURE C-7.2.6.4 TRANSIT STOPS

Figure C-7.2.6.4e Transit Stop - Suburban, Wide Boulevard

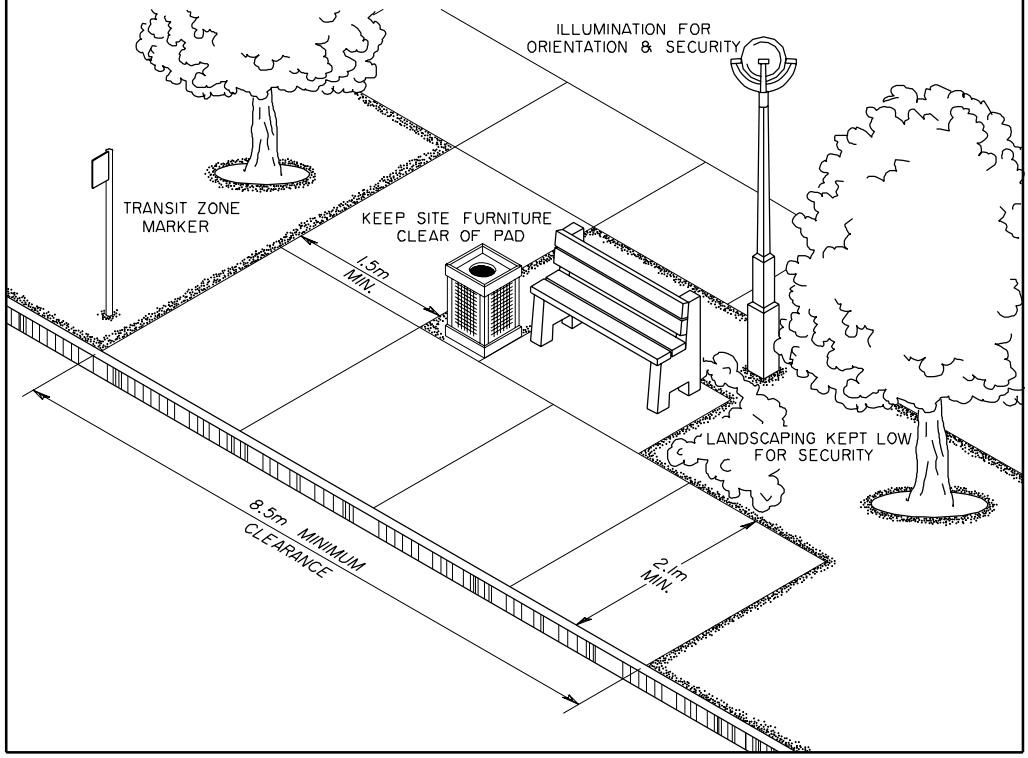
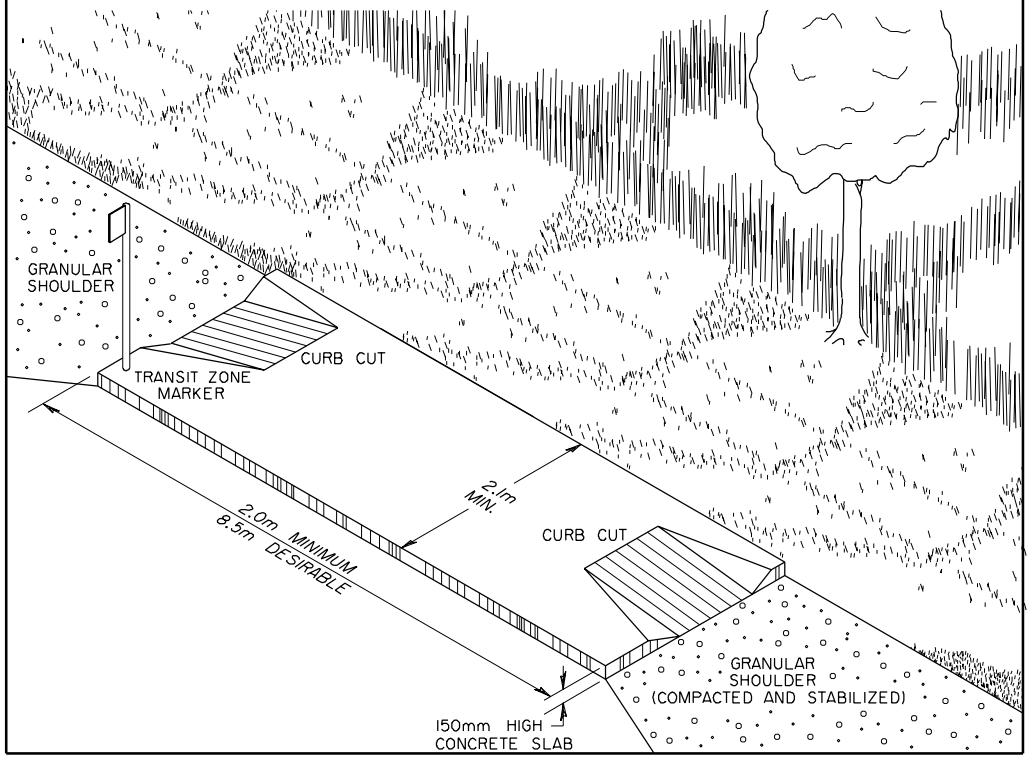


Figure C-7.2.6.4f Transit Stop - Rural Situation



Graphics File: tigsfs01\reb\manual\chapters\chap-c\debc7264.man

10.6 Seating

It is very desirable to provide seating at bus stops. Standing for even a short time may be unacceptable or even painful for some, and would impede accessibility to the transit system.

Seating can be provided inside or outside of bus shelters. Some may find the confined space inside a shelter uncomfortable, and would welcome the provision of outside seating, which may be located directly adjacent to the shelter, if one is available.

Design considerations:

- Seating benches should be placed outside the circulation of pedestrians and should not encroach upon sidewalks or bus pads.

- Seats should be located a minimum of 600 mm from the walkways so that legs do not protrude into pedestrian traffic.

- Typical dimensions are: 450 mm to 500 mm high and 400 mm to 500 mm deep. Lengths are determined by the availability of space.

- Armrests of 180 mm to 250 mm above seat height are desirable.

10.7 Rural Bus Stops

There are occasions when bus stops are needed in outlying areas, where the roads have open drainage ditches along the sides. Figure C-7.2.6.4f. shows an accessible bus stop that can be constructed along the shoulder of the road.

If the bus stop usage is very light, the length of the raised bus pad can be shortened to a minimum of 2 m to reduce the costs. At least one curb ramp must be provided to allow wheelchairs to access the bus pad.

10.8 Signing

Unlike other traffic signs, which conform to national standards, bus zone signing is typically unique in each municipality. The following design considerations are intended to provide some guidance on bus zone signing, and not intended to standardize signing practices. Essentially, bus zone signing should be readily identifiable, legible, clear, and consistent.

Design considerations:

- For regular bus zone marker signs (about 30 cm wide and 45 cm high) situated above normal head level, the route number should be shown in 72 point lettering (helvetica compressed) size, with at least a 70% contrast with the sign background.

- For large bus terminal marker signs (about 60 cm by 60 cm) situated above head level, the route number should be shown in 432 point lettering or about 15 cm in height (helvetica bold) size, with at least a 70% contrast with the sign background.

- Some bus zone marker signs, which do not extend beyond the edges of their support post or structure, may be located at eye level, providing a person may have a clear path of travel up to the sign.

- Schedule information must be well situated to allow approach by a person using a wheelchair and an initial or preferred approach by a person with a visual impairment.

- For name or identification signs, high contrast titles of significant bus zones may be situated at a height of about 1500 mm above the ground level and in at least 0.75 mm relief above the background (helvetica medium or similar lettering). The lettering should have a height of no less than 50 mm (X-height).

- For easy identification of a bus zone, it is desirable to have a pictorial representation of a bus on the signs.

10.9 Tactile Warning Strips

The use of tactile warning strips has been briefly discussed in Section 5. Tactile warning strips are used specifically for warning an individual with a visual impairment that an obstruction (or in most cases a substantial change in elevation) is located within the person's immediate path of travel. Warning strips are not generally used for wayfinding systems.

Research work is continuing in finding effective wayfinding tactile cues which will be easily differentiated from warning surfaces. Until such work is completed, tactile warning strips must only be installed where a significant change in elevation exists (for example, train platforms, the top landings of stairs and docks). Any other application of warning strips will only create confusion in safety related situations.

Tactile warning strips are not considered necessary at bus stops. Other methods of effective wayfinding may be used for bus stops, such as effective placement of street furnishings and/or shelters (see Figure C-7.2.6.4f.), to naturally guide the flow of pedestrian traffic.

11.0 Bus Transfer Stations

11.1 Introduction

In the summer of 1996, the Minister's Advisory Committee Meeting on Accessible Transportation, requested the subcommittee to extend their assignment to review accessiblility of bus transfer stations.

Since the introduction of low-floor buses to public transit bus fleets, more people with mobility aids are using public transit. Some complaints are being raised about inherant design deficiencies in existing transfer stations, those with and without buildings, making access difficult to persons with disabilities.

As a result of a site inspection made jointly by selected members of the Advisory Committee and department officials from Alberta Transportation and Utilities, a detailed list of observed deficiencies was prepared. Using the information from the Guidelines for Design of Safe Accessible Environments and the original Design Guidelines for Accessible Bus Stops recommendations were drafted and incorporated into Figures C-7.3.1a. and C-7.3.1b. The previously prepared Design Guidelines forAccessible Bus Stops is now expanded to incorporate desireable and recommended features for Bus Transfer Stations.

Two types of bus transfer stations are illustrated in these extended guidelines:

- Transfer Stations with buildings, and
- Transfer Stations without buildings.

11.2 Buildings and Shelter Features

Buildings should be accessible around the perimeter with at least 1.5 m of relatively level walkway. The exterior doors of the building should be provided with automated (push-button) door openers with a minimum clear opening of 0.9 m. All internal doorways should have a minimum width of 0.75 m. Washroom accessibility should be included. Placement height of accessible public telephones is critical. There may be more of a need for access to telephones for persons with disabilities than able-bodied patrons.

Transfer stations without a shelter building are usually constructed on smaller more compact sites. The requirements for the proper placement and alignment of curb ramps is very critical. Figure C-7.3.1b. demonstrates how other fixtures should be placed to allow a minimum path of travel of 1.5 m width.

Small shelters should be accessible. Existing shelters have floors which are constructed with a 4 X 8 foot X 1/2" thick plywood on a 2 X 4 frame. The 101 mm (4") high lip at the doorway cannot be mounted by scooters or wheelchairs. It is recommended that at the doorway the floor be flat with the outside slab or a ramp be constructed which will allow wheelchairs or scooters to travel on and enter the shelter. The recommended 1.5 m shelter width allows wheelchairs freedom to manoeuvre within the structure.

11.3 Curb Ramps

Please refer to previous guidelines which address this feature.

Because most transfer stations are placed in or adjacent to shopping centres, care should be exercised in placing curb ramps and aligning them for a direct path of travel to the shopping centre.

11.4 Streetscape Features

It is important to keep streetscape fixtures like garbage containers, benches etc, from encroaching on clear path of travel. Please refer to Figures C-7.2.6.4e. and C-7.2.6.4f. for recommended placement of fixtures.

11.5 Street Lights and Bus Stop Signs

For persons with visual disabilities, light standard and bus stop bases should not have any bolts protruding from the base. It is recommended that recessed heads be installed for all bases. Placement of poles should either be near the curb or completely out of the path of travel.

12.0 Summary

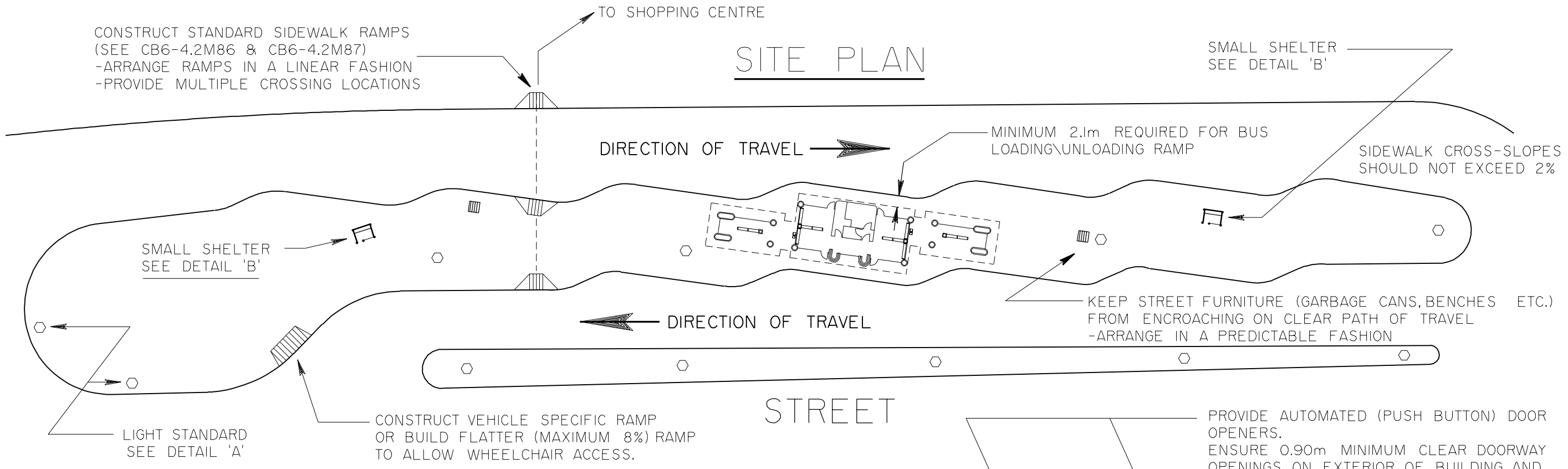
The introduction of low-floor buses in transit systems is a significant step in providing a barrier-free transportation environment. It is equally important to provide an accessible bus stop and accessible transfer stations. A barrier-free path of travel is necessary between the bus stop/transfer station and the origin/destination of the trip.

These guidelines are directed toward the design of new bus stops and transfer stations as well as retrofitting of existing facilities. Many bus stops and transfer stations in Alberta cities are not considered to be "accessible" in a strict sense, and, in addition, many sidewalks have no curb ramps. Under the present economic climate, retrofitting of existing bus stops and bus transfer stations will take some time and political will to realize. Changes will be incremental, staged over time and on a priority basis. Nevertheless, some improvements could be achieved with minimal investment. A simple rearrangement of bus stop/street furniture or removal of unnecessary obstructions could mean significant improvements to accessibility for all users.

Design of new bus stops and bus transfer stations should follow these guidelines. It is recognized that it may not be feasible to provide a 2.1 m wide concrete pad at some bus stops. Existing transfer stations, with heated shelters, may be retrofitted with desireable accessible features with currently available technology. Automated (push button) door openers could be installed in all stations over time as budgets permit. Pathway widening requiring major concrete work would be more difficult to schedule, but would greatly assist in improving accessibility. The intent is to encourage designers to use the principles of these guidelines to maximize accessibility within the available right-of-way space and funding resources.

In addition to appropriate design, another aspect that requires attention on an ongoing basis is regular maintenance and upkeep of the established barrier-free paths of travel. This is particularly important during winter conditions when snow, ice or other debris present obstacles to accessing transit stops. Coordination and cooperation between the transit system and city's public works operations becomes essential.

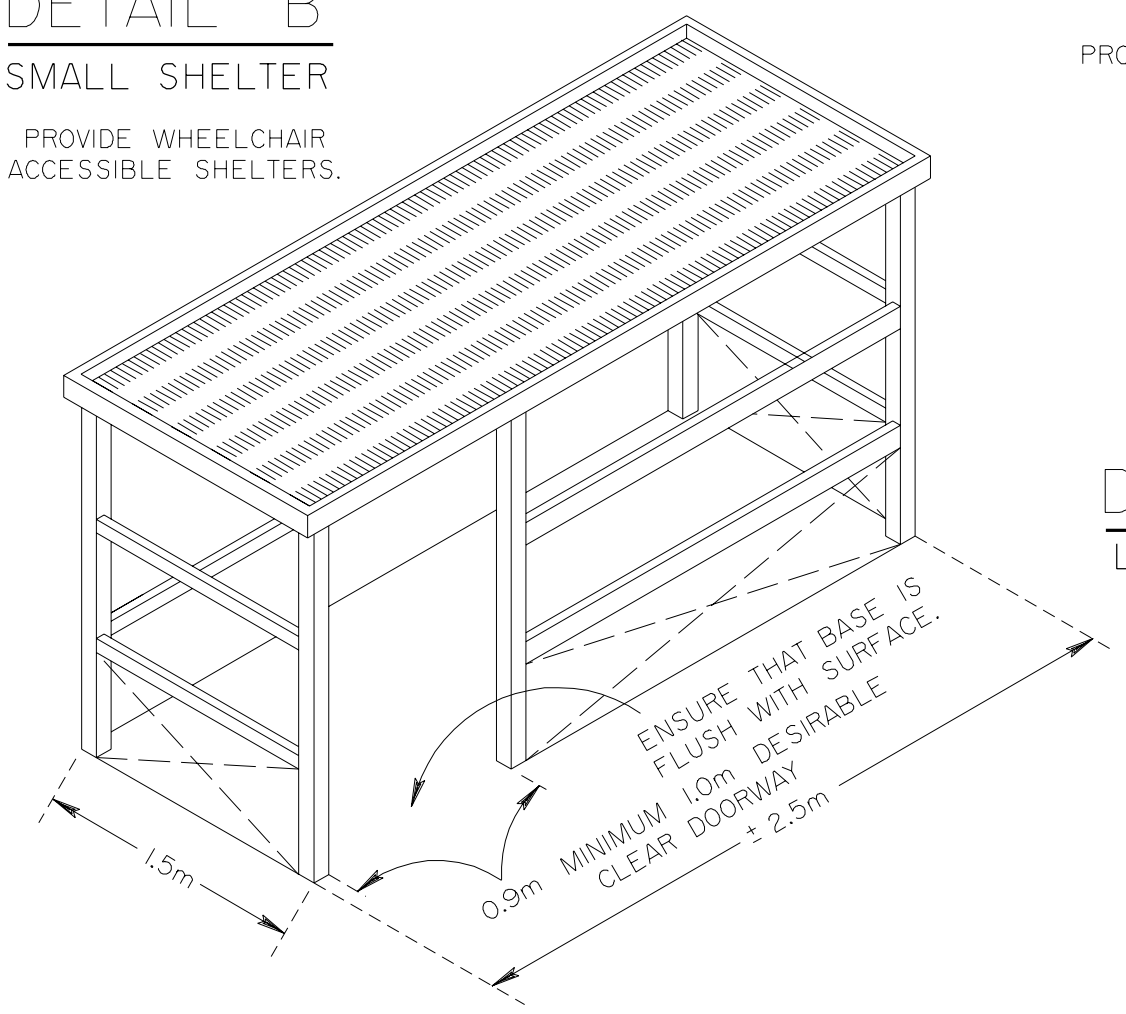
SITE PLAN



DETAIL 'B'

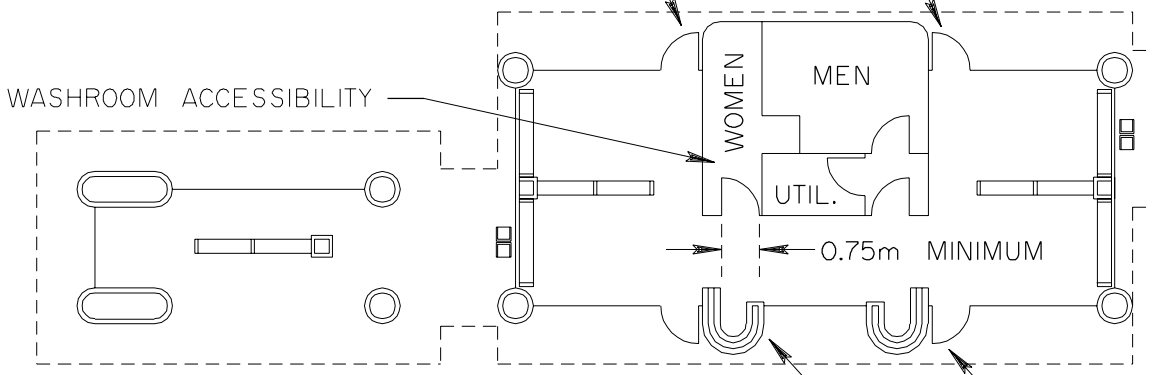
SMALL SHELTER

PROVIDE WHEELCHAIR
ACCESSIBLE SHELTERS.



PROVIDE AUTOMATED (PUSH BUTTON) DOOR OPENERS.
ENSURE 0.90m MINIMUM CLEAR DOORWAY OPENINGS ON EXTERIOR OF BUILDING AND MINIMUM OF 0.75m FOR INTERNAL DOORWAYS.

PROVIDE FOR WASHROOM ACCESSIBILITY



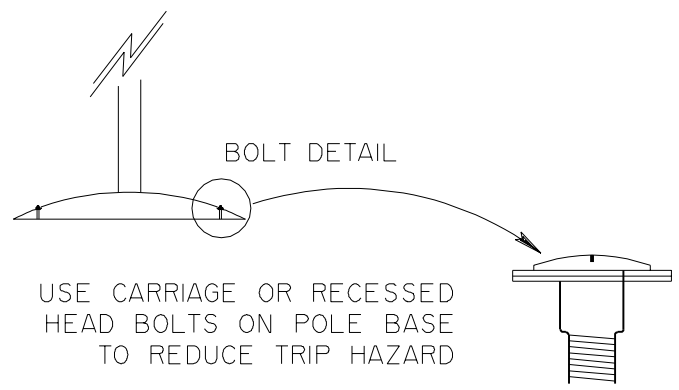
FLOOR PLAN

BUS TERMINAL SHELTER

INSTALL TELEPHONES FOR
PUBLIC USE. SPECIAL
TELEPHONES FOR THE DEAF
(TTY PHONES) MAY BE WARRANTED
BASED ON DEMAND.

DETAIL 'A'

LIGHT STANDARD



No.	REVISIONS	BY	DATE
2			
1			

Alberta INFRASTRUCTURE

FIGURE C-7.3.1a

Date: JANUARY 9, 1996

TRANSIT TRANSFER STATION

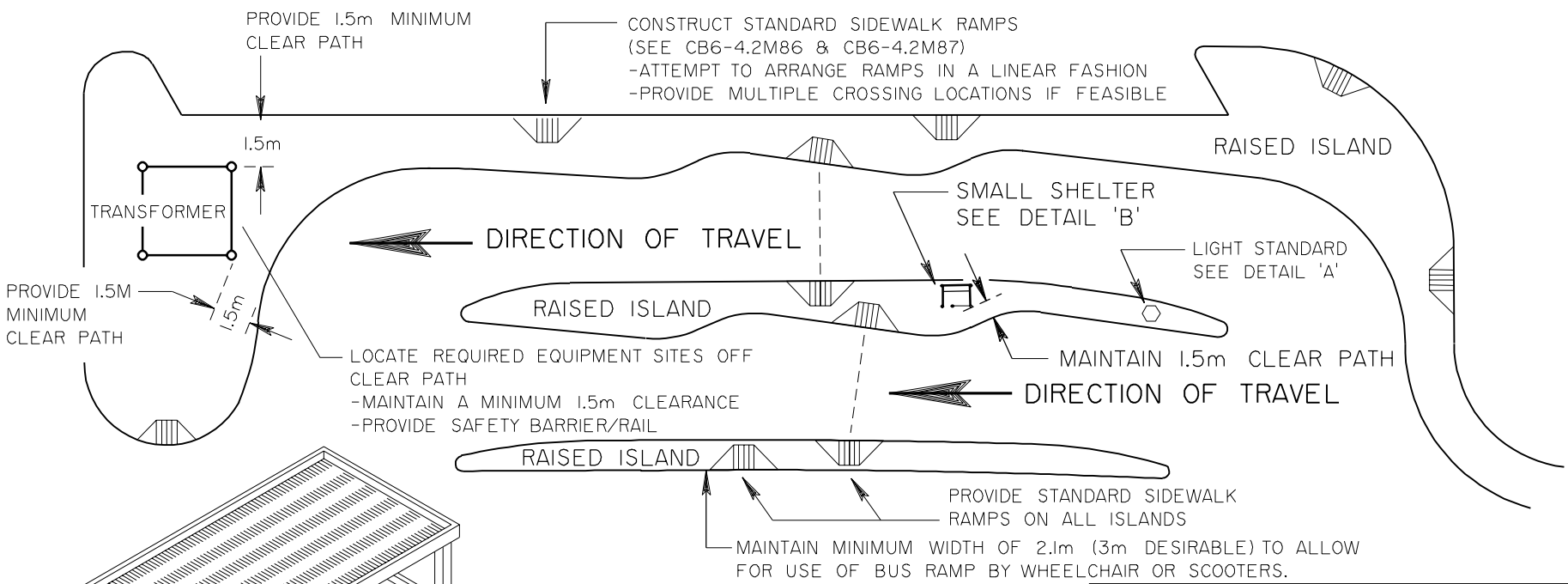
TYPICAL BARRIER FREE LAYOUT

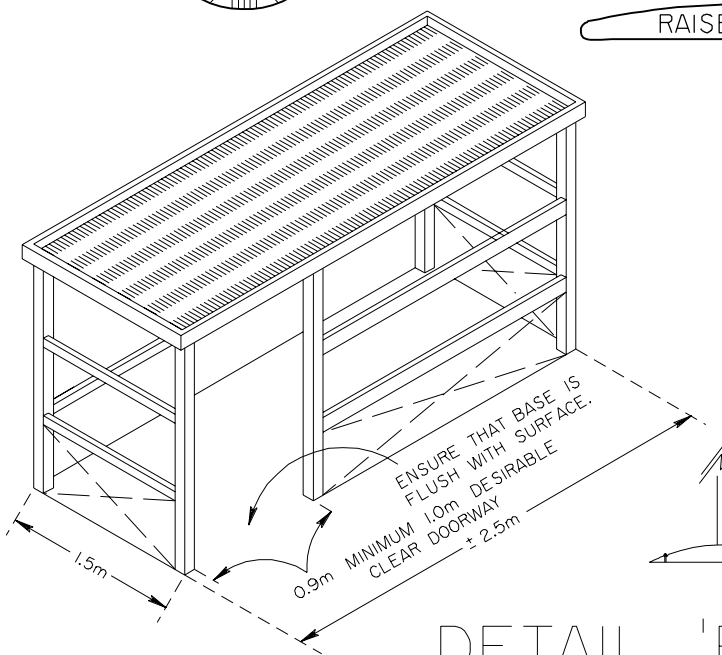
(WITH BUILDING)

Prepared By: R.M.	Checked By: B.K.	Scale: N.T.S.	PAGE C-81

GRAPHICS FILE: figsfs01\reb\manual\chapters\chap-c\debc731a.man

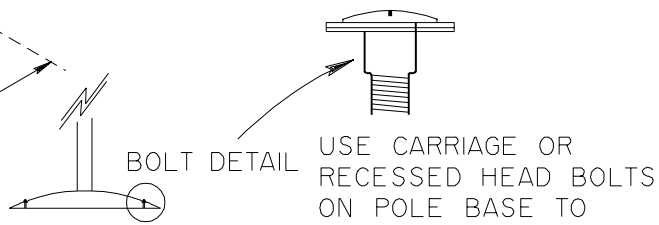
SITE PLAN

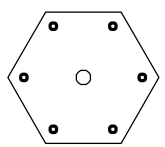




DETAIL 'B'
SMALL SHELTER

DETAIL 'A'
LIGHT STANDARD





POLE BASE
(PLAN VIEW)

No.	REVISIONS	BY	DATE
2			
1			

Alberta INFRASTRUCTURE

FIGURE C-7.3.1b

Date: JANUARY 9, 1996

TRANSIT TRANSFER STATION
TYPICAL BARRIER FREE LAYOUT
(WITHOUT BUILDING)

Prepared By: R.M.	Checked By: B.K.	Scale: N.T.S.	PAGE C-83

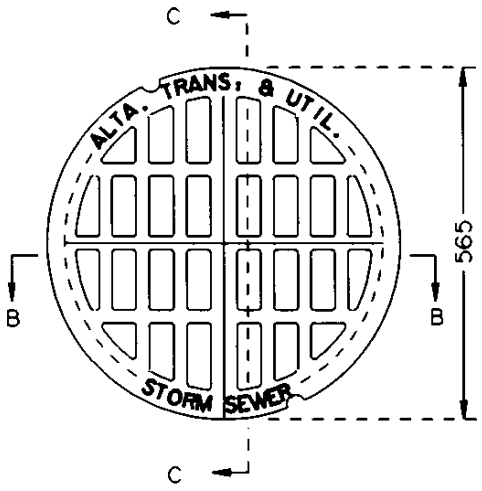
GRAPHICS FILE: tigsfs01\reb\manual\chapters\chap-c\debc731b.man

APPENDIX I

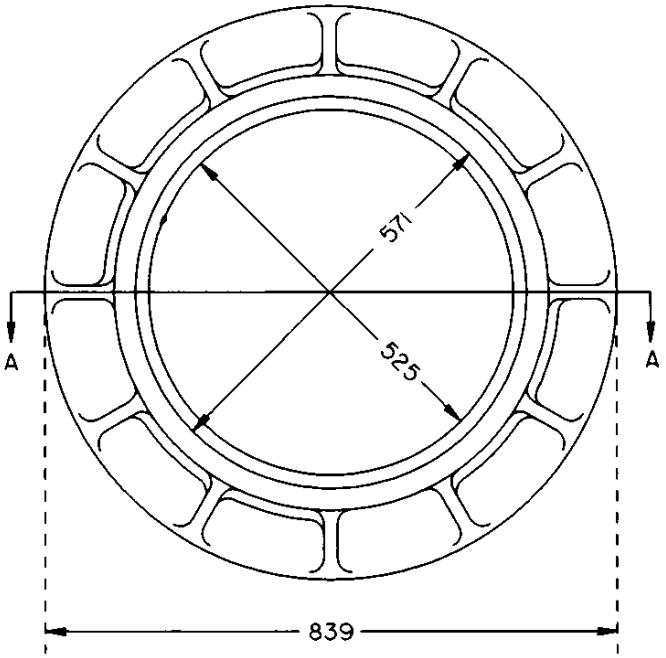
ALBERTA TRANSPORTATION AND UTILITIES

CURB RAMP AND SIDEWALK STANDARDS

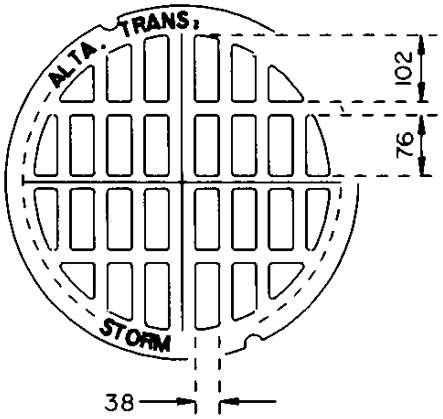
COVER-PLAN VIEW



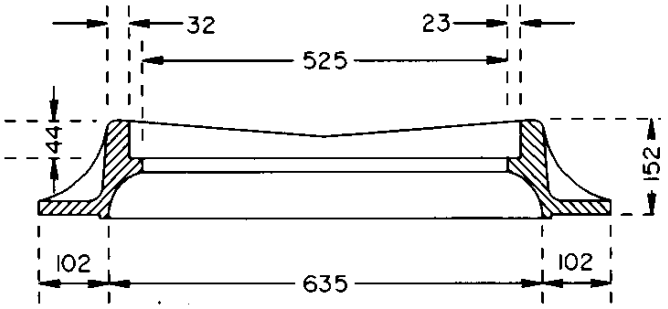
FRAME-PLAN VIEW



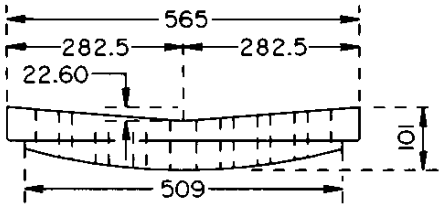
OPENING SIZES



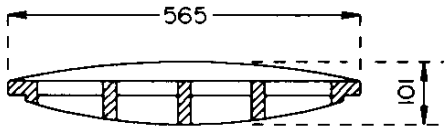
SECTION A -A



SECTION B-B



SECTION C -C



NOTES:

1. DIAGRAMS ARE BASED ON TYPE F-38 FOUNDRY CASTINGS.
2. NOMINAL DIMENSIONS IN mm.
3. THE LETTERING IS TO BE 'STANDARD RAISED CAST LETTERING' WITH 50mm SIZE LETTERS.

No.	REVISIONS	BY	DATE
2			
1			

Approved:

Executive Director
Technical Standards Branch

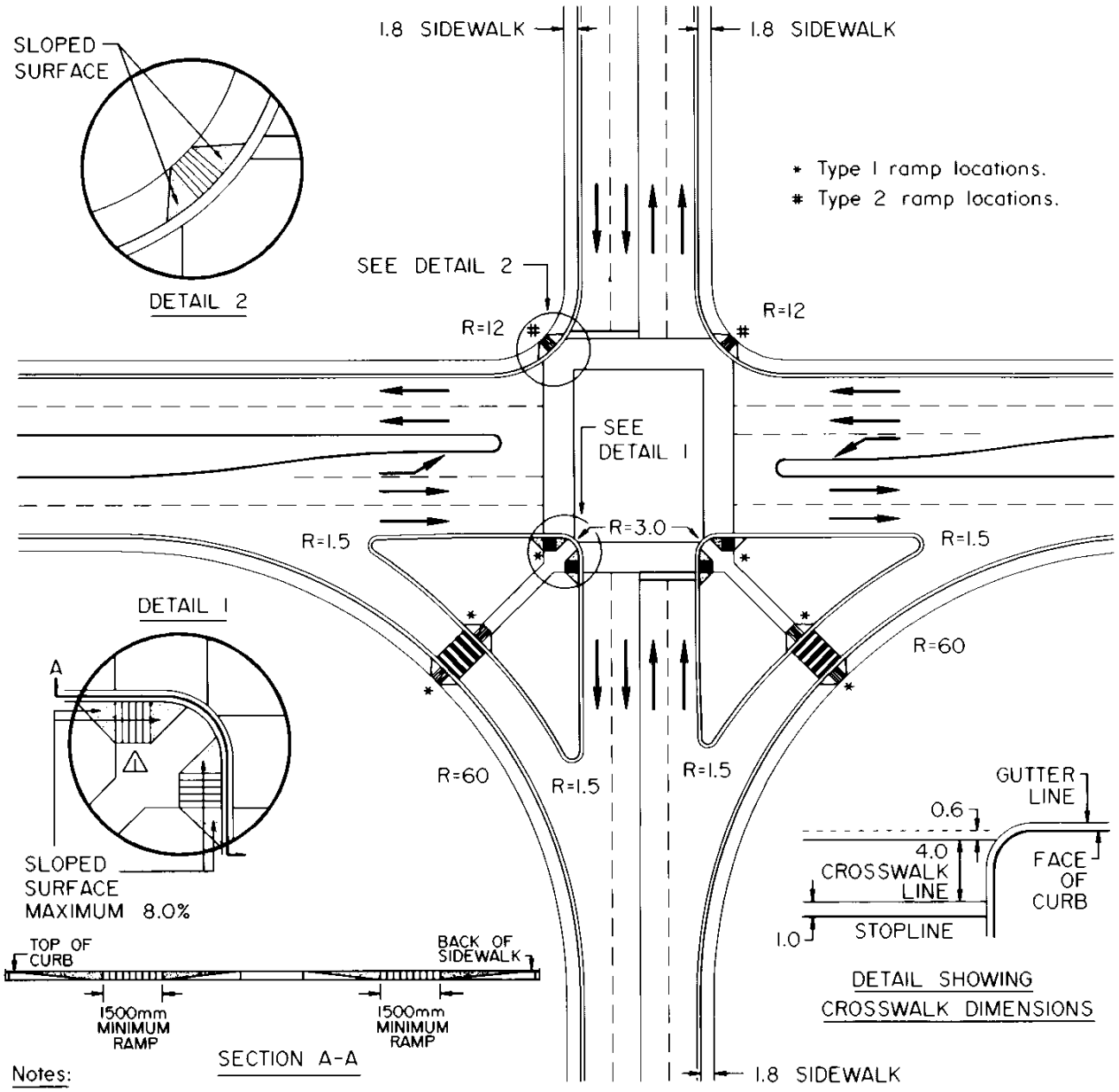
Date: DECEMBER 4, 1995

Alberta
TRANSPORTATION AND UTILITIES

WHEELCHAIR RAMP CATCH BASIN MANHOLE COVER

Prepared By: R.M.	Checked By: B.K.	Scale: N.T.S.	Dwg No: CB6-2.10M34

GRAPHICS FILE: cb6210m34.man



Notes:

1. All dimensions are in metres unless otherwise specified.
2. Sidewalk ramps must provide access directly to crosswalks.
3. The selection of curb ramp type is dependent on the location of the crosswalk relative to the curb face. Where the curb return radius is greater than or equal to 4.0m, one Type 2 ramp can be used. Where the curb return radius is less than 4.0m, two Type 1 ramps are required.
4. Where crosswalks are controlled by signals with a push-button system, the sidewalks and ramps must allow access by wheelchair to the push-button.
5. Refer to Drawing Nos. CB6-4.2M86 & CB6-4.2M87 for details of Type 1 and Type 2 ramps.
6. On a sharp corner where two Type 1 ramps are being used, the slope on the flared areas between the two ramps can be less than the 0.08m/m maximum shown. This will provide a smoother sidewalk for general use especially for pedestrians who are not using the crosswalk.

No.	REVISIONS	BY	DATE
2			
1	Type 1 ramp layout modified.	J.K.	Aug.94

Approved:

Executive Director,
Roadway Engineering Branch

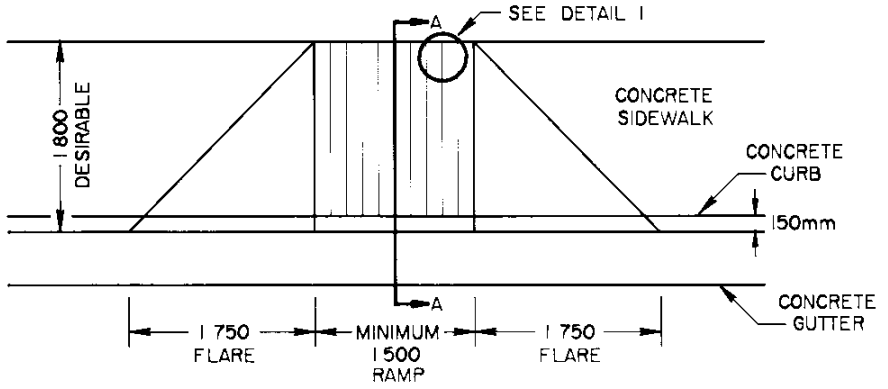
Date: JULY 2, 1991

Alberta
TRANSPORTATION AND UTILITIES
Engineering Division

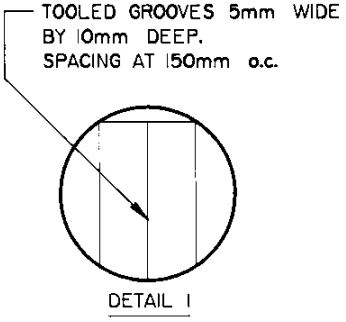
TYPICAL LAYOUT OF CROSSWALKS AND LOCATION AND TYPE OF SIDEWALK RAMPS AT URBAN INTERSECTIONS

Prepared By: R.T.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: CB6-4.2.M85

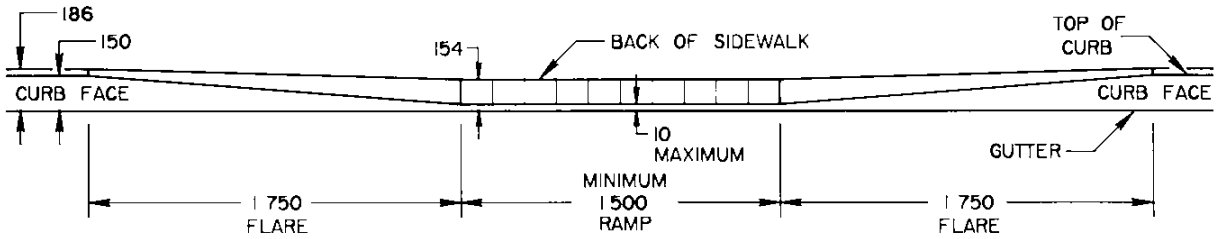
Graphics file: DEI:[200,22]cb642m85.dgn



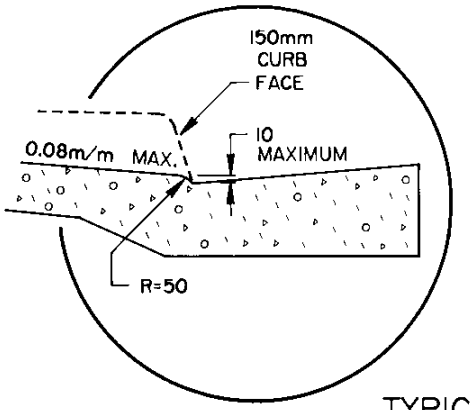
TYPICAL PLAN VIEW



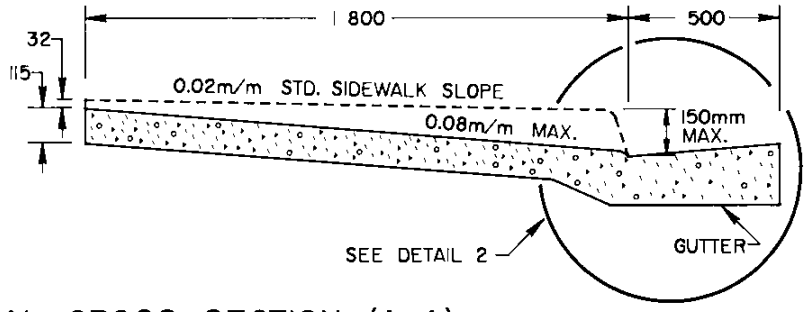
DETAIL 1



TYPICAL ELEVATION



DETAIL 2



TYPICAL CROSS SECTION (A-A)

Notes:

1. All dimensions are in millimetres unless otherwise specified.
2. Ramps for users of wheelchairs/bicycles should be located at all junctions of crosswalks and sidewalks.
3. Grooves on sidewalk ramps are to alert persons who are visually impaired of the curb-cut and a street crossing.
4. Where crosswalks are controlled by signals with a push-button system, the sidewalks and ramps must allow access by wheelchair to the push-button.
5. Concrete sidewalks, curbs and ramps to be poured monolithically.
6. Minimum width of ramp is 1500mm. It may be necessary to build wider ramps in busy urban areas where the volume of pedestrian traffic is high.
7. Maximum ramp slope is 0.08m/m.
8. Where the sidewalk is less than 1800mm wide, the 0.08m/m maximum slope should not be exceeded and therefore the back of the sidewalk must be lowered accordingly.
9. Refer to Drawing No. CB6-4.2.M85 for typical layout of crosswalks and location and the type of ramp to be used.
10. For details of typical ramps for 90 degree corners, refer to Drawing No. CB6-4.2.M87.

No.	REVISIONS	BY	DATE
2			
1			

Approved:

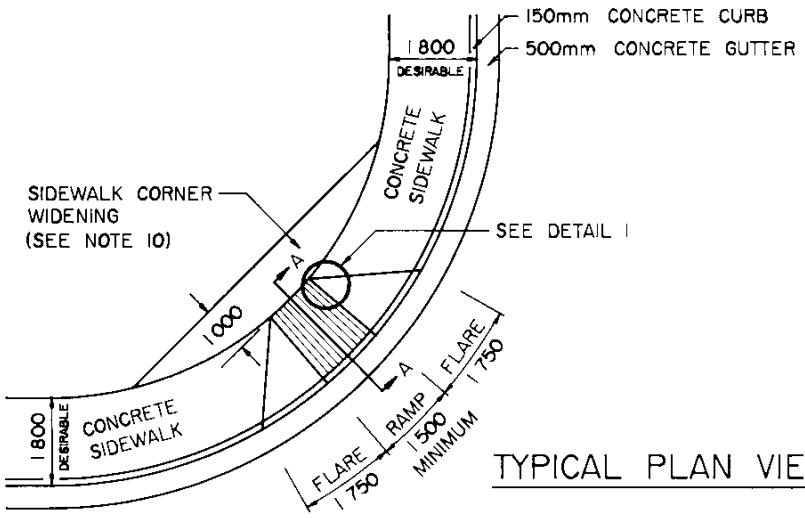
for Director,
Design Engineering Branch

Date: JULY 2, 1991

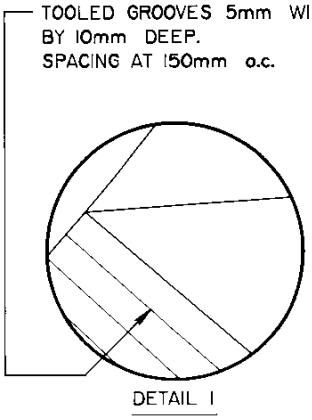
Alberta
TRANSPORTATION
AND UTILITIES
Engineering Division

CONCRETE SIDEWALK RAMP FOR WHEELCHAIR OR BICYCLE ON TANGENT (TYPE 1)

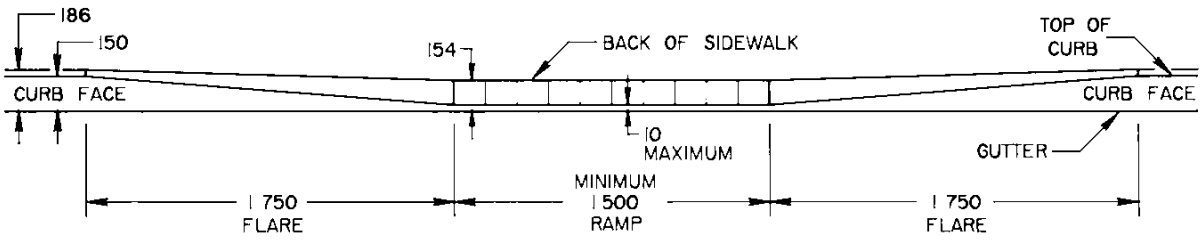
Prepared By: R.T.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: CB6-4.2.M86



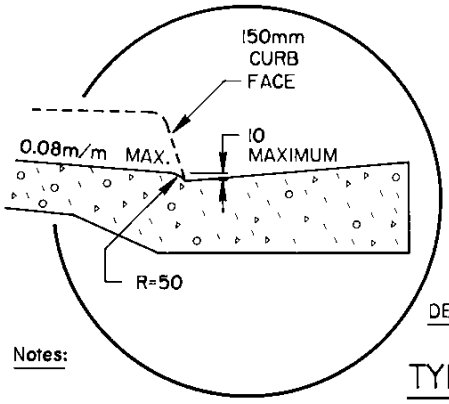
TYPICAL PLAN VIEW



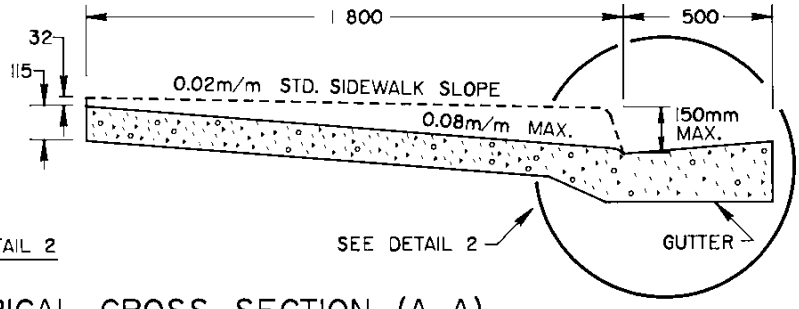
DETAIL 1



TYPICAL ELEVATION



DETAIL 2



TYPICAL CROSS SECTION (A-A)

Notes:

1. All dimensions are in millimetres unless otherwise specified.
2. Ramps for users of wheelchairs/bicycles should be located at all junctions of crosswalks and sidewalks. Ramp must be located within a crosswalk.
3. Grooves on sidewalk ramps are to alert persons who are visually impaired of the curb-cut and a street crossing.
4. Where crosswalks are controlled by signals with a push-button system, the sidewalks and ramps must allow access by wheelchair to the push-button.
4. Concrete sidewalks, curbs and ramps to be poured monolithically.
5. Minimum width of ramp is 1500mm. It may be necessary to build wider ramps in busy urban areas where the volume of pedestrian traffic is high.
6. Maximum ramp slope is 0.08m/m.
7. Where the sidewalk is less than 1800mm wide, the 0.08m/m maximum slope should not be exceeded and therefore the back of the sidewalk must be lowered accordingly.
8. Refer to Drawing No. CB6-4.2.M85 for typical layout of crosswalks and location and the type of ramp to be used.
9. For details of typical ramps for tangent sections, refer to Drawing No. CB6-4.2.M86.
10. Where right-of-way is available, the sidewalk is to be widened at corner locations as shown so that at least a 1.0m width of "flat" sidewalk is provided adjacent to the ramp.

No.	REVISIONS	BY	DATE
2			
1			

Approved:

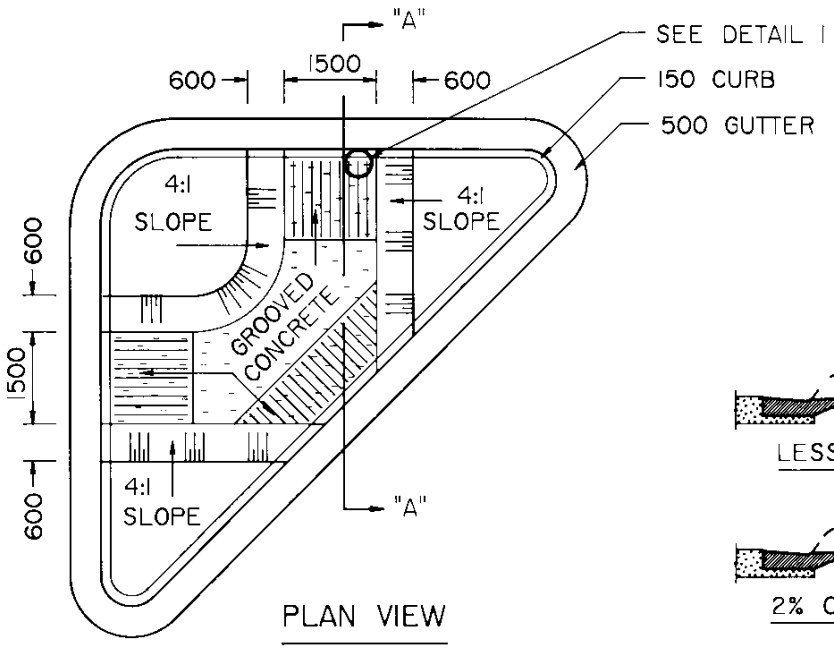
for Director,
Design Engineering Branch

Date: JULY 2, 1991

Alberta
TRANSPORTATION AND UTILITIES
Engineering Division

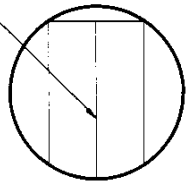
CONCRETE SIDEWALK RAMP FOR WHEELCHAIR OR BICYCLE ON CORNER (TYPE 2)

Prepared By: R.T.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: CB6-4.2.M87

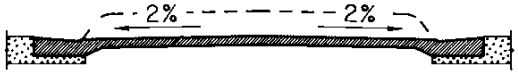


PLAN VIEW

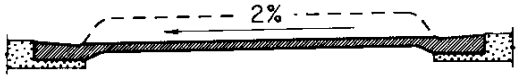
TOOLED GROOVES 5mm WIDE BY 10mm DEEP. SPACING AT 150mm o.c.



DETAIL I

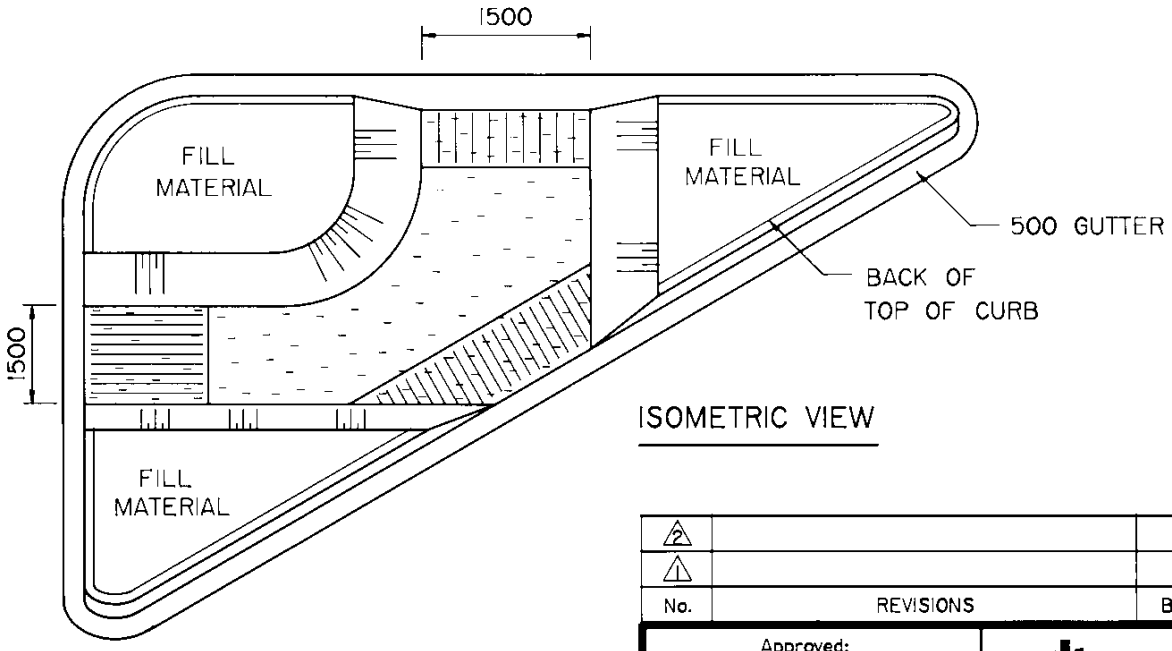


LESS THAN 2% PAVEMENT SLOPE



2% OR GREATER PAVEMENT SLOPE

SECTION "A"-"A"



ISOMETRIC VIEW

No.	REVISIONS	BY	DATE
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Notes:

1. All dimensions are expressed in millimetres unless otherwise noted.
2. Where crosswalks are controlled by signals with a push-button system, the sidewalks and ramps must allow access by wheelchair to the push-button.
3. Add 10M rebar to the ends of all bullnoses, medians and traffic islands.
4. Fill material for islands shall be earth, concrete or asphalt concrete as specified.
5. Sidewalk and ramps shall be concrete.

Approved:

for Director, Design Engineering Branch

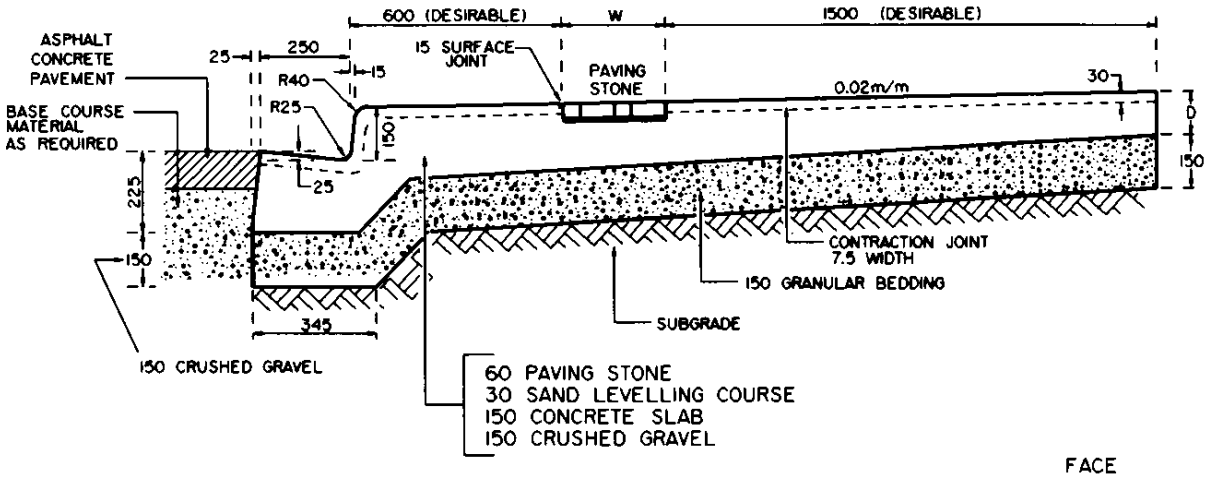
Date: JULY 2, 1991

Alberta
TRANSPORTATION AND UTILITIES
Engineering Division

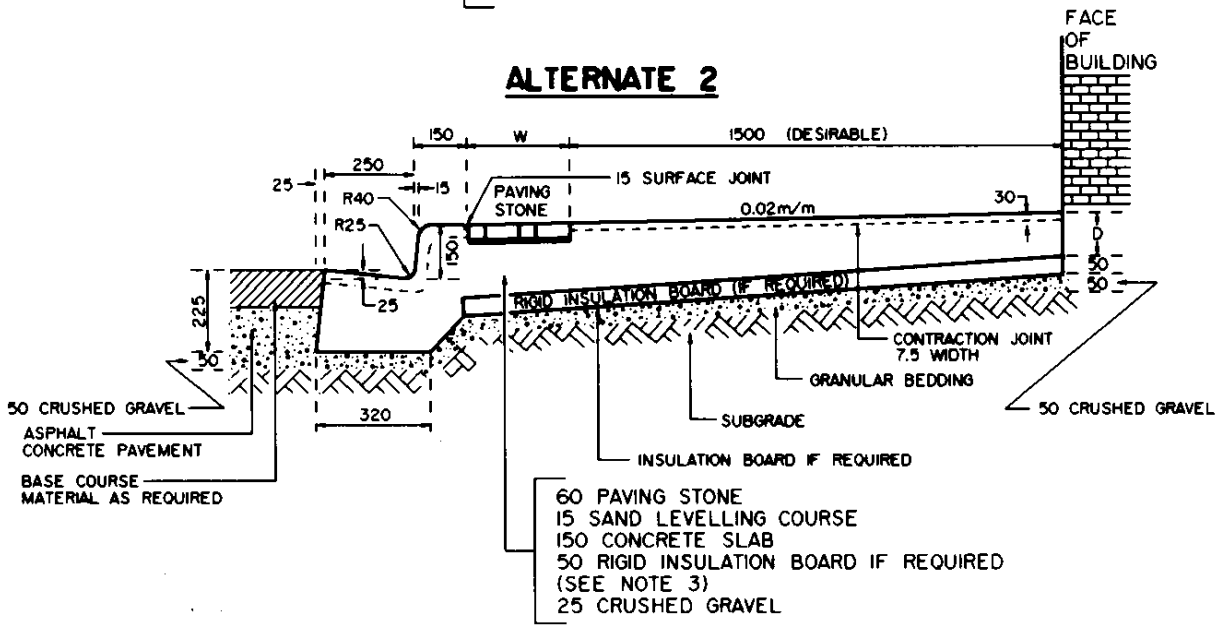
TYPICAL SIDEWALK AND CROSSWALK LAYOUT OF SMALLER ISLANDS AND MEDIANS LESS THAN 6m WIDE

Prepared By: R.T.	Checked By: JK	Scale: N.T.S.	Dwg No.: CB6-4.2.M91

ALTERNATE 1



ALTERNATE 2



NOTES

1. DEPTH OF CONCRETE FOR SIDEWALK 'D' AS PER DETAILED DESIGN.
2. 'W' IS THE WIDTH OF PAVING STONE EDGING GUIDE. THIS MAY BE SELECTED BASED ON OVERALL WIDTH BUT SHOULD NOT CAUSE CONCRETE SURFACE TO BE REDUCED TO LESS THAN 1500mm.
3. ALTERNATIVE 2 IS GENERALLY USED ONLY IN DOWNTOWN AREAS WHERE THE SIDEWALKS ADJACENT TO BUILDINGS AND FREQUENT FREEZE-THAW CYCLES ARE LIKELY TO CAUSE LONGITUDINAL CRACKING.
4. THE GUTTER PAN WIDTH MAY BE ADJUSTED WHERE NECESSARY TO MEET DRAINAGE REQUIREMENTS.
5. ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE NOTED.

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Approved:

Executive Director
Technical Standards Branch

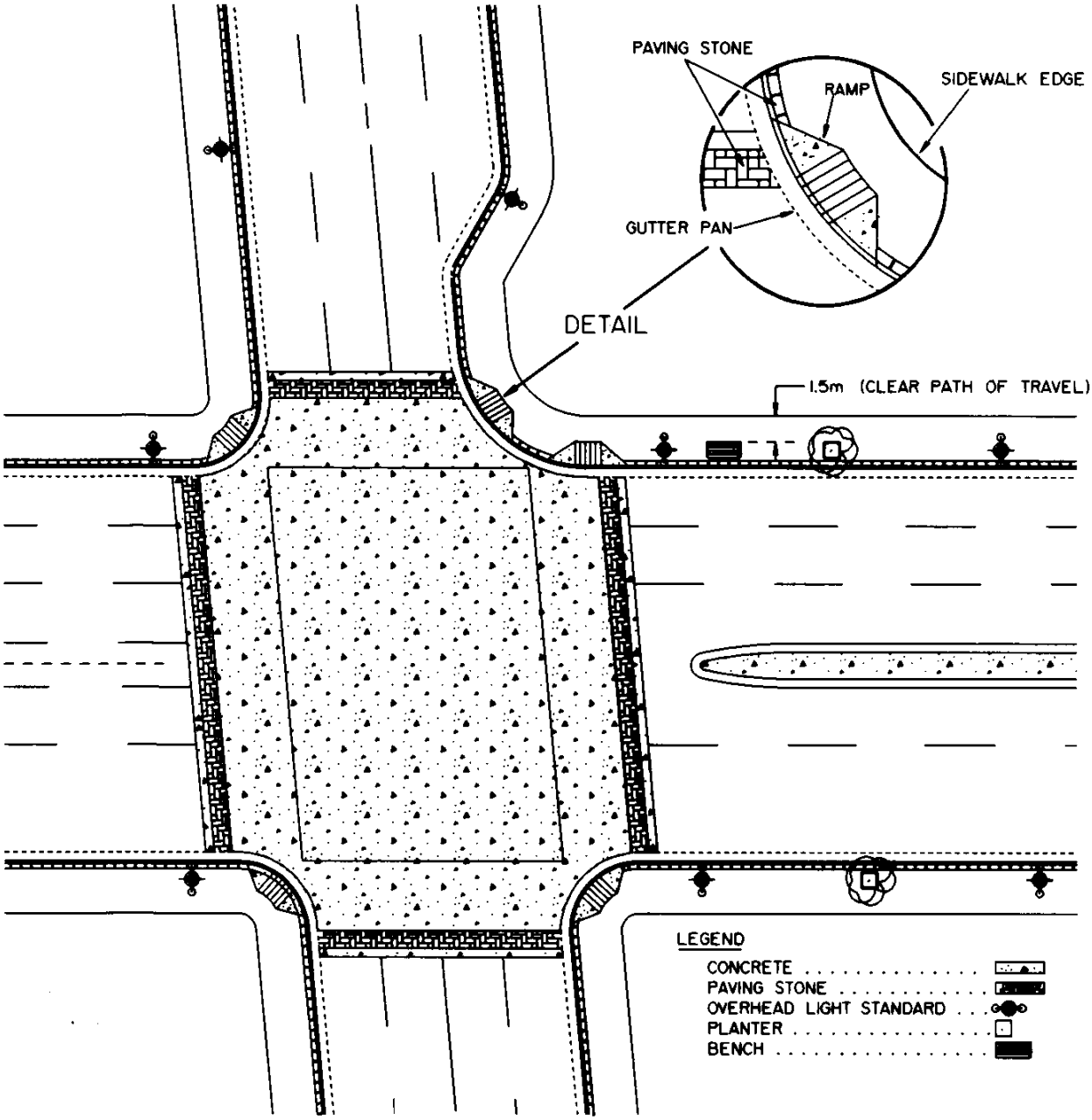
Date: DECEMBER 4, 1995

Alberta
TRANSPORTATION AND UTILITIES

MONOLITHIC CONCRETE SIDEWALK CURB AND GUTTER (250mm GUTTER) PAVING STONE EDGING

Prepared By: R.M.	Checked By: B.K.	Scale: N.T.S.	Dwg No: CB6-4.2M93

GRAPHICS FILE: cb642m93.man



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NOTES

1. THIS DRAWING ILLUSTRATES A SIDEWALK/CROSSWALK/RAMP LAYOUT WHICH PROVIDES AN ACCESSIBLE CLEAR PATH OF TRAVEL.
2. USE OF PAVING STONES AS SHOWN IS HELPFUL TO THE VISUALLY IMPAIRED WHILE NOT BEING AN OBSTACLE FOR WHEELCHAIR USERS OR OTHER PEDESTRIANS. PAVING STONE EDGING AS SHOWN PROVIDES A TACTILE CUE FOR THE VISUALLY IMPAIRED BY DEFINING THE EDGES OF SIDEWALK AND OUTLINING AREAS TO BE USED FOR STREET FURNITURE. TO OUTLINE THE CROSSWALK, TEXURED AND/OR COLOURED CONCRETE OR OTHER MATERIALS MAY BE USED INSTEAD OF PAVING STONES.
3. PAVING STONES DO NOT ENCROACH ON THE SIDEWALK'S CLEAR PATH OF TRAVEL.

Approved:

Executive Director
Technical Standards Branch

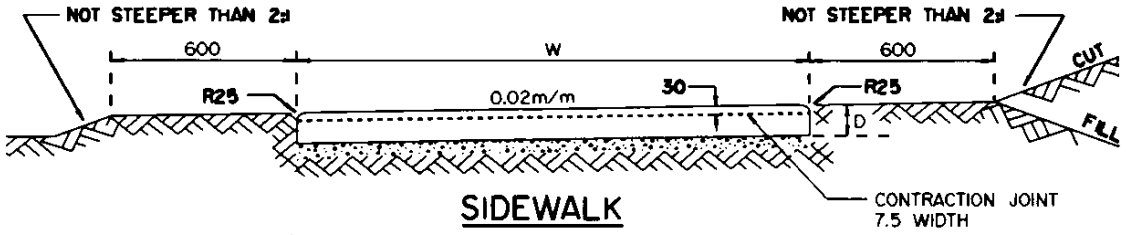
Date: DECEMBER 4, 1995

Alberta
TRANSPORTATION AND UTILITIES

EXAMPLE OF USE OF PAVING STONES ON URBAN INTERSECTION

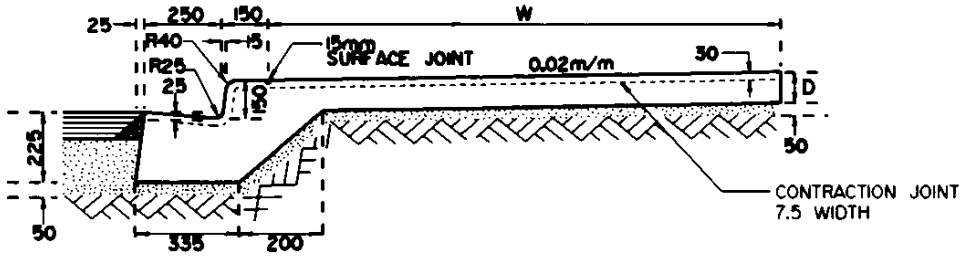
Prepared By: R.M.	Checked By: B.K.	Scale: N.T.S.	Dwg No: CB6-4.2M94

GRAPHICS FILE: cb642m94.man



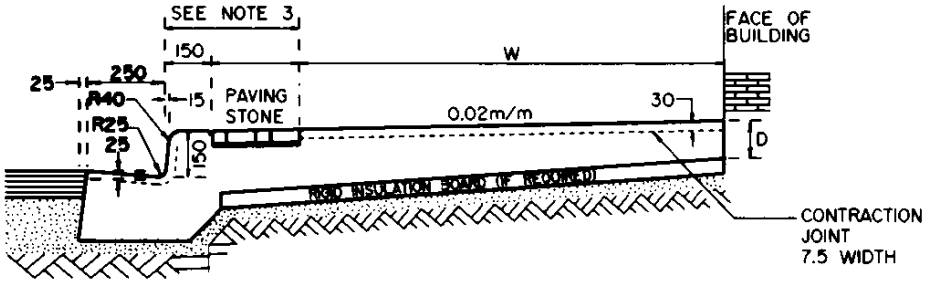
SIDEWALK

(SEE DRAWING CB6-4.2M78 FOR DETAILS)



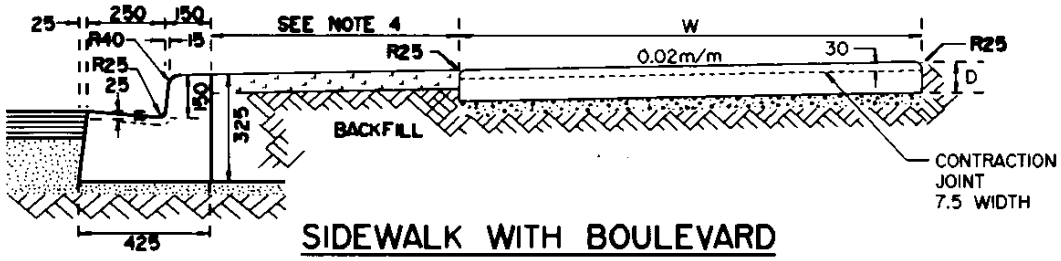
STANDARD MONOLITHIC SIDEWALK

(SEE DRAWING CB6-4.2M88 FOR DETAILS)



MONOLITHIC SIDEWALK WITH PAVING STONE EDGING

(SEE DRAWING CB6-4.2M93 FOR DETAILS)



SIDEWALK WITH BOULEVARD

NOTES

1. ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE NOTED.
2. 'W' IS THE WIDTH OF CLEAR PATH OF TRAVEL. 1.5m IS THE SUGGESTED MINIMUM HOWEVER, INTERMITTENT NARROWER PATHS OF 1.2m WIDTH ARE ALLOWED FOR SHORT SEGMENTS OR ADJACENT TO OBSTACLES.
3. WHERE PAVING STONE EDGING IS USED, THE WIDTH OF THE BORDER SHOULD GENERALLY ALLOW AN 800mm CLEARANCE FOR VEHICLE DOOR OPENINGS AND MAY ALSO ACCOMODATE SOME STREET FURNITURE.
4. WHERE A BOULEVARD IS USED, IT IS DESIRABLE THAT IT BE WIDE ENOUGH TO ALLOW FOR DOOR OPENINGS (800mm) AND PLACEMENT OF STREET FURNITURE. NARROW BOULEVARDS ARE NORMALLY PAVED, WIDER BOULEVARDS (APPROXIMATELY 3m) MAY BE GRASS.
5. 'D' IS THE DEPTH OF CONCRETE, AS SPECIFIED.

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Approved:

Executive Director,
Technical Standards Branch

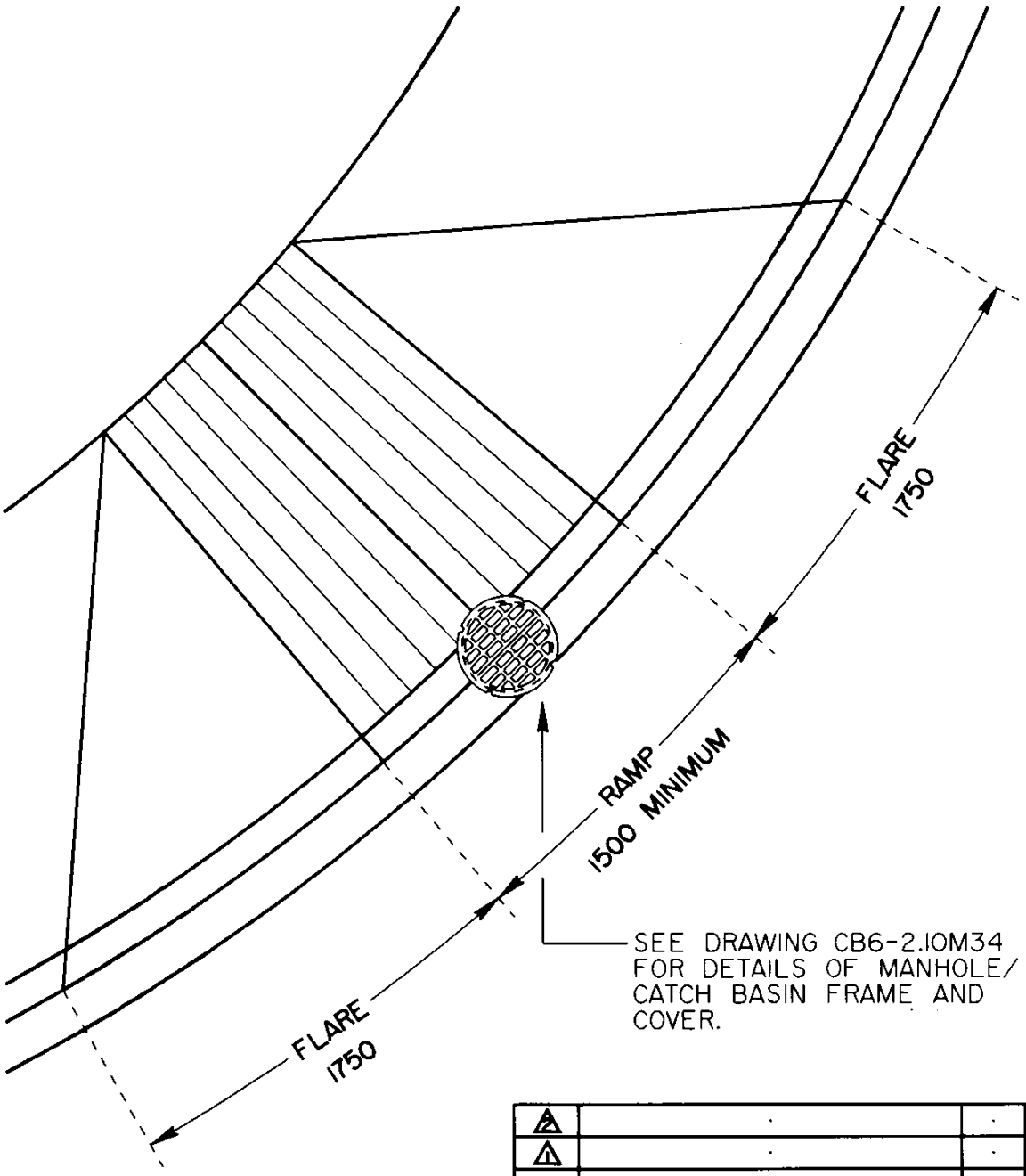
Date: DECEMBER 4, 1995

Alberta
TRANSPORTATION
AND UTILITIES

SIDEWALKS
TYPICAL CROSS SECTIONS

Prepared By: R.M.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: CB6-4.2M95

GRAPHICS FILE: CB642M95.MAN



TYPICAL PLAN VIEW

NOTE

1. IT IS PREFERRED THAT GRATES BE CONSTRUCTED OFF THE CLEAR PATH OF PEDESTRIAN TRAVEL WHERE FEASIBLE. WHERE IT IS NECESSARY TO INSTALL GRATES IN RAMPS, THE COVER SHOULD BE INSTALLED AS SHOWN HERE i.e. SO THAT THE LONG DIMENSION OF THE ELONGATED OPENING IS PERPENDICULAR TO THE PEDESTRIAN PATH OF TRAVEL ON THE RAMP.

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Approved:

Executive Director
Technical Standards Branch

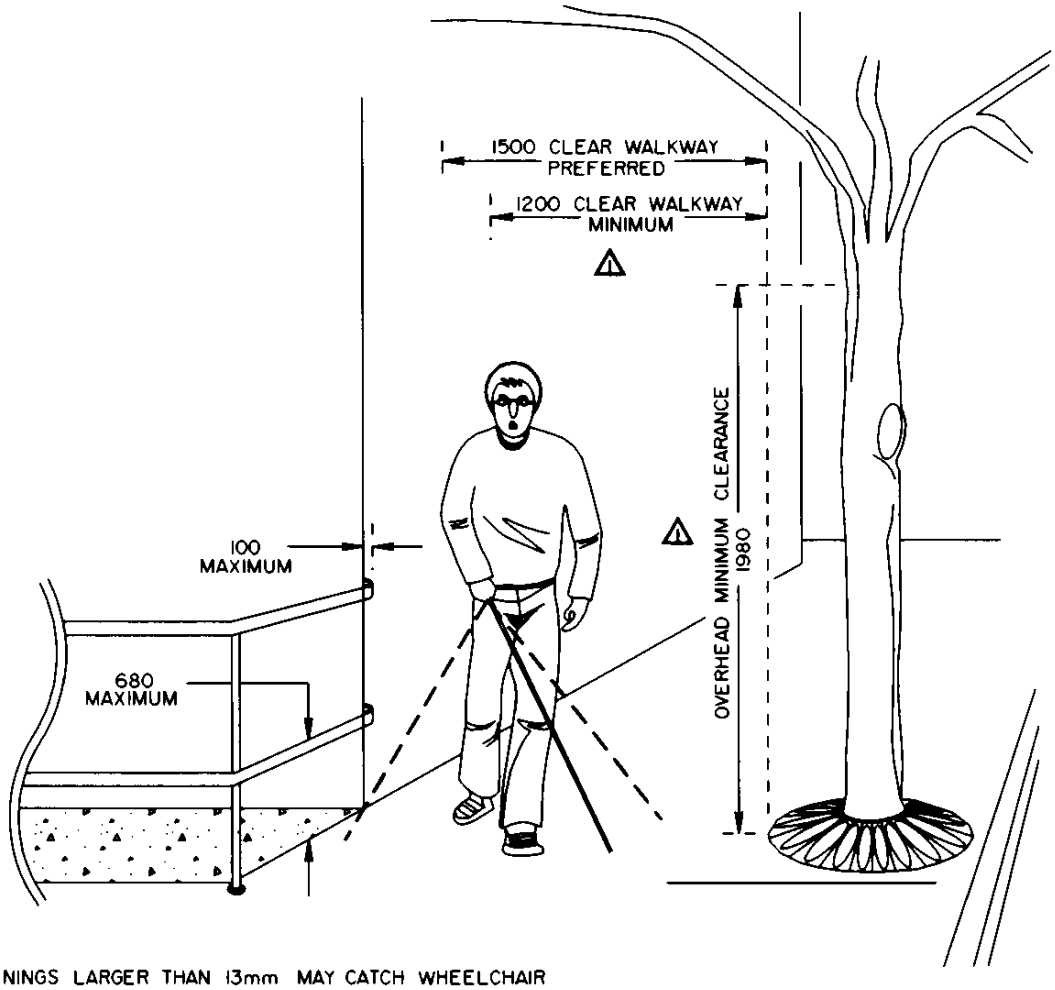
Date: DECEMBER 4, 1995

Alberta
TRANSPORTATION AND UTILITIES

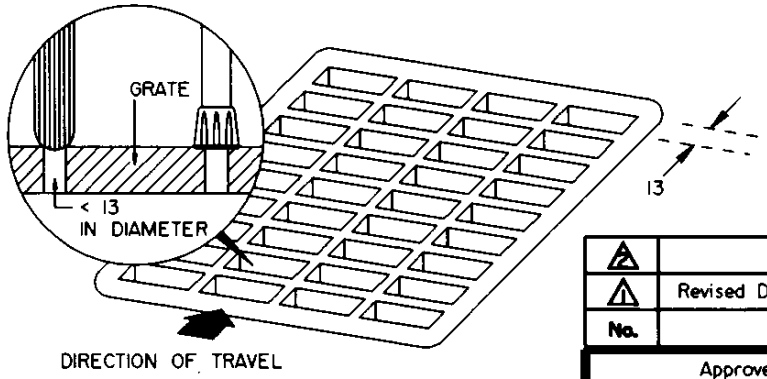
WHEELCHAIR RAMP SPECIAL CATCH BASIN MANHOLE COVER

Prepared By: R.M.	Checked By: B.K.	Scale: N.T.S.	Dwg No: CB6-4.2M96

GRAPHICS FILE: cb642m96.man



OPENINGS LARGER THAN 13mm MAY CATCH WHEELCHAIR WHEELS OR CANES, AND MAY CAUSE A PERSON TO TRIP.



NOTES

1. NOMINAL DIMENSIONS IN mm.
2. IT IS PREFERRED THAT GRATES BE LOCATED OFF THE CLEAR PATH OF PEDESTRIAN TRAVEL. WHERE IT IS NECESSARY TO INSTALL GRATES IN A PATH, THE COVER SHOULD BE ORIENTED AS SHOWN HERE i.e. SO THAT THE LONG DIMENSION OF THE ELONGATED OPENING IS PERPENDICULAR TO THE PEDESTRIAN PATH OF TRAVEL.
3. THIS DRAWING IS ADOPTED FROM ALBERTA LABOUR'S BARRIER FREE DESIGN GUIDE.

No.	REVISIONS	BY	DATE
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1	Revised Dimension Notes	BK	10/96

Approved:

Executive Director
Technical Standards Branch

Date: DECEMBER 4, 1995

Alberta
TRANSPORTATION AND UTILITIES

PEDESTRIAN PATH OF TRAVEL
- DIMENSIONS OF ENVELOPE
- GRATE SIZE & ORIENTATION

Prepared By: R.M.	Checked By: B.K.	Scale: N.T.S.	Dwg No.: CB6-4.2M97

GRAPHICS FILE: cb642m97.man

APPENDIX II

LIST OF RESOURCE PUBLICATIONS

Alberta Labour

"Barrier-Free Design Guide" (Based on the 1990 Alberta Building Code), Edmonton, Alberta.

BC Transit

"Design Guidelines for Accessible Bus Stops" (Adapted from Ontario's guidelines), Victoria, B.C., Undated.

Canadian National Institute for the Blind

"Access Needs of Blind and Visually Impaired Travellers in Transportation Terminals: A Study and Design Guidelines", Prepared for the Transportation Development Centre of Transport Canada, Toronto, Ontario, December 1987.

UMA Engineering Ltd. and Walker, Wright, Young Associates Ltd.

"Transit Related Community Planning Issues", Prepared for the Government of Ontario and various municipalities in Ontario, Toronto, Ontario, October 1989.

END