Notes to Part 3
Fire Protection, Occupant Safety and Accessibility

A-3 Application of Part 3. In applying the requirements of this Part, it is intended that they be applied with discretion to buildings of unusual configuration that do not clearly conform to the specific requirements, or to buildings in which processes are carried out which make compliance with particular requirements in this Part impracticable. The definition of "building" as it applies to this By-law is general and encompasses most structures, including those which would not normally be considered as buildings in the layman's sense. This occurs more often in industrial uses, particularly those involving manufacturing facilities and equipment that require specialized design that may make it impracticable to follow the specific requirements of this Part. Steel mills, aluminum plants, refining, power generation and liquid storage facilities are examples. A water tank or an oil refinery, for example, has no floor area, so it is obvious that requirements for exits from floor areas would not apply. Requirements for structural fire protection in large steel mills and pulp and paper mills, particularly in certain portions, may not be practicable to achieve in terms of the construction normally used and the operations for which the space is to be used. In other portions of the same building, however, it may be quite reasonable to require that the provisions of this Part be applied (e.g., the office portions). Similarly, areas of industrial occupancy which may be occupied only periodically by service staff, such as equipment penthouses, normally would not need to have the same type of exit facility as floor areas occupied on a continuing basis. It is expected that judgment will be exercised in evaluating the application of a requirement in those cases when extenuating circumstances require special consideration, provided the occupants' safety is not endangered.

The provisions in this Part for fire protection features installed in buildings are intended to provide a minimum acceptable level of public safety. It is intended that all fire protection features of a building, whether required or not, will be designed in conformance with good fire protection engineering practice and will meet the appropriate installation requirements in relevant standards. Good design is necessary to ensure that the level of public safety established by the By-law requirements will not be reduced by a voluntary installation.

Firefighting Assumptions

The requirements of this Part are based on the assumption that firefighting capabilities are available in the event of a fire emergency. These firefighting capabilities may take the form of a paid or volunteer public fire department or in some cases a private fire brigade. If these firefighting capabilities are not available, additional fire safety measures may be required.

Firefighting capability can vary from municipality to municipality. Generally, larger municipalities have greater firefighting capability than smaller ones. Similarly, older, well established municipalities may have better firefighting facilities than newly formed or rapidly growing ones. The level of municipal fire protection considered to be adequate will normally depend on both the size of the municipality (i.e., the number of buildings to be protected) and the size of buildings within that municipality. Since larger buildings tend to be located in larger municipalities, they are generally, but not always, favoured with a higher level of municipal protection.

Although it is reasonable to consider that some level of municipal firefighting capability was assumed in developing the fire safety provisions in Part 3, this was not done on a consistent or defined basis. The requirements in the By-law, while developed in the light of commonly prevailing municipal fire protection levels, do not attempt to relate the size of building to the level of municipal protection. The responsibility for controlling the maximum size of building to be permitted in a municipality in relation to local firefighting capability rests with the municipality. If a proposed building is too large, either in terms of floor area or building height, to receive reasonable protection from the municipal fire department, fire protection requirements in addition to those prescribed in this By-law, may be necessary to compensate for this deficiency. Automatic sprinkler protection may be one option to be considered.

Alternatively, the municipality may, in light of its firefighting capability, elect to introduce zoning restrictions to ensure that the maximum building size is related to available municipal fire protection facilities. This is, by necessity, a somewhat arbitrary decision and should be made in consultation with Vancouver Fire and Rescue Services, who should have an appreciation of their capability to fight fires.

The requirements of Subsection 3.2.3. are intended to prevent fire spread from thermal radiation assuming there is adequate firefighting available. It has been found that periods of from 10 to 30 minutes usually elapse between the outbreak of fire in a building that is not protected with an automatic sprinkler system and the attainment of high radiation levels. During this period, the specified spatial separations should prove adequate to inhibit ignition of an exposed building face or the interior of an adjacent building by radiation. Subsequently, however, reduction of the fire intensity by firefighting and the protective wetting of the exposed building face will often be necessary as supplementary measures to inhibit fire spread.

In the case of a building that is sprinklered throughout, the automatic sprinkler system should control the fire to an extent that radiation to neighbouring buildings should be minimal. Although there will be some radiation effect on a sprinklered building from a fire in a neighbouring building, the internal sprinkler system should control any fires that might be ignited in the building and thereby minimize the possibility of the fire spreading into the exposed building. NFPA 80A, "Protection of Buildings from Exterior Fire Exposures," provides additional information on the possibility of fire spread at building exteriors.

The water supply requirements for fire protection installations depend on the requirements of any automatic sprinkler installations and also on the number of fire streams that may be needed at any fire, having regard to the length of time the streams will have to be used. Both these factors are largely influenced by the conditions at the building to be equipped, and the quantity and pressure of water needed for the protection of both the interior and exterior of the building must be ascertained before the water supply is decided upon. Acceptable water supplies may be a public waterworks system that has adequate pressure and discharge capacity, automatic fire pumps, pressure tanks, manually controlled fire pumps in combination with pressure tanks, gravity tanks, and manually controlled fire pumps operated by remote control devices at each hose station.

A-3.1.2. Use Classification. The purpose of classification is to determine which requirements apply. This By-law requires classification in accordance with every major occupancy for which the building is used or intended to be used. Where necessary, an application clause has been inserted in this Part to explain how to choose between the alternative requirements which multiple occupancy classification may present.

A-3.1.2.1.(1) Major Occupancy Classification. The following are examples of the major occupancy classifications described in Table 3.1.2.1.:

Group A, Division 1

Motion picture theatres
Opera houses
Television studios admitting a viewing audience
Theatres, including experimental theatres

Group A, Division 2

Art galleries
Auditoria
Bowling alleys
Churches and similar places of worship
Clubs, nonresidential
Community halls
Courtrooms
Dance halls
Daycare Facilities for Children
Exhibition halls (other than classified in Group E)
Gymnasia
Lecture halls
Libraries
Licensed beverage establishments
Museums
Passenger stations and depots
Recreational piers
Restaurants
Schools and colleges, nonresidential
Undertaking premises

Group A, Division 3

Arenas
Indoor swimming pools, with or without spectator seating
Rinks

Group A, Division 4

Amusement park structures (not elsewhere classified)
Bleachers
Grandstands
Reviewing stands
Stadia

Group B, Division 1

Jails
Penitentiaries
Police stations with detention quarters
Prisons
Psychiatric hospitals with detention quarters
Reformatories with detention quarters

Group B, Division 2

Care facilities with treatment
Convalescent /recovery/rehabilitation centres with treatment
Hospices with treatment
Hospitals
Infirmaries
Nursing homes with treatment
Psychiatric hospitals without detention quarters
Respite centres with treatment

Group B, Division 3

Assisted/supportive living facilities
Care facilities without treatment
Children's custodial homes
Convalescent/recovery/rehabilitation centres without treatment
Group homes
Hospices without treatment
Nursing homes without treatment
Reformatories without detention quarters
Respite centres without treatment

Group C

Apartments
Boarding houses
Clubs, residential
Colleges, residential
Convents
Dormitories
Hotels
Houses
Lodging houses
Monasteries
Motels
Schools, residential

Group D

Banks
Barber and hairdressing shops
Beauty parlours
Dental offices

Dry cleaning establishments, self-service, not using flammable or explosive solvents or cleaners
Laundries, self-service
Medical offices
Offices
Police stations without detention quarters
Radio stations
Small tool and appliance rental and service establishments

Group E

Department stores
Exhibition halls
Markets
Shops
Stores
Supermarkets

Group F, Division 1

Bulk plants for flammable liquids
Bulk storage warehouses for hazardous substances
Cereal mills
Chemical manufacturing or processing plants
Distilleries
Dry cleaning plants
Feed mills
Flour mills
Grain elevators
Lacquer factories
Mattress factories
Paint, varnish and pyroxylin product factories
Rubber processing plants
Spray painting operations
Waste paper processing plants

Group F, Division 2

Aircraft hangars
Box factories
Candy plants
Cold storage plants
Dry cleaning establishments not using flammable or explosive solvents or cleaners
Electrical substations
Factories
Freight depots
Helicopter landing areas on roofs
Laboratories
Laundries, except self-service
Mattress factories
Planing mills
Printing plants
Repair garages
Salesrooms
Service stations
Storage rooms
Television studios not admitting a viewing audience
Warehouses
Wholesale rooms
Woodworking factories
Workshops

Group F, Division 3

Creameries
Factories
Laboratories
Light-aircraft hangars (storage only)
Power plants
Salesrooms
Sample display rooms
Storage garages, including open air parking garages
Storage rooms
Warehouses
Workshops

A-3.1.2.3.(1) Arena Regulation. The use of an arena is regulated in the Fire By-law.

A-3.1.2.6. Group A, Division 2, Low Occupant Load. A suite of Group A, Division 2 assembly is permitted to be classified as a Group D business and personal services occupancy provided the requirements of Article 3.1.2.6. are complied with. This re-classification permits the suite to be located in a building to which Part 9 of the By-law is applicable.

A-3.1.2.8. Child Care Facilities. A child care facility is regulated under the provincial enactments, and includes facilities more simply identified as "daycare" facilities which are typically occupied for a period of less than 24 hours each day (i.e., is not a residential facility). The term "daycare" is not meant to exclude facilities that provide short term care during the night for a period of less than 24 hours each day.

A-3.1.4.1.(1) Combustible Construction and Materials Permitted. The permission to use combustible construction or combustible materials stated in Articles 3.1.4.1., 3.1.5.5., 3.1.5.14. and 3.1.5.15. does not waive the requirements regarding construction type and cladding stated in Article 3.2.3.7.

A-3.1.4.2. Protection of Penetrations. Where foamed plastics are required to be protected from adjacent spaces within a building, the protection should be continuous so as to cover the foamed plastics so they are not exposed to the interior of the building. However, minor penetrations of the protective covering by small electrical and mechanical components, such as electrical outlets and fixtures, sprinkler piping, and mechanical vents, are acceptable because the penetrant and associated fittings and seals will prevent the small amount of foamed plastic surrounding the penetration from being exposed to the interior of the building.

Foamed plastics that are penetrated by larger components or assemblies, such as windows, are unlikely to be exposed to the interior of the building as they are protected by associated framing and finishes and/or the installation of a closure.

Small amounts of foamed plastics, such as air sealants used between major components of exterior wall construction, are not required to be protected. (See Sentence 3.1.5.2.(1).)

Penetrations of a fire separation or of a membrane forming part of an assembly required to have a fire-resistance rating are nevertheless required to be provided with a fire stop in accordance with Subsection 3.1.9.

A-3.1.4.2.(1) Concealed Space. The term "concealed space" includes any space that is not visibly apparent and that is provided with an opening to allow access for repair and periodic inspections.

A-3.1.4.2.(1)(c) Thermal Barrier in Combustible Construction. Any thermal barrier that is accepted under the requirements of Sentence 3.1.5.15.(2) for noncombustible construction is also acceptable for combustible construction.

A-3.1.4.2.(2) and 3.1.5.7.(3) Walk-in Coolers and Freezers. Sentences 3.1.4.2.(2) and 3.1.5.7.(3) are intended to apply to walk-in coolers and freezers that are constructed as stand-alone structures within a building.

A-3.1.4.3.(1)(b)(i) Raceway Definition. The term raceway is defined in CSA C22.1, "Canadian Electrical Code, Part I," and includes both rigid and flexible conduit.

A-3.1.4.3.(1) Wire and Cable Equivalence. Electrical wires and cables that conform to the requirements of Sentence 3.1.5.21.(1) are deemed to satisfy the requirements of Sentence 3.1.4.3.(1).

3.1.4.3.(2) FT6 Rating. Wires and cables are required by Sentences 3.1.4.3.(2) and 3.1.5.23.(2), and Article 3.6.4.3. to be FT6 rated are required to not only meet the requirements of the By-law, but are also required to be tested and listed to meet the appropriate requirements of the Canadian Electrical Code as referenced by the Electrical By-law.

A-3.1.4.8.(1) Exterior Cladding. The requirements in Sentence 3.1.4.8.(1) are intended to limit the potential for fire spread on the exterior cladding of buildings of combustible construction through the use of noncombustible finishes on the exterior of the wall assembly or the use of a cladding/wall assembly that has been assessed with regard to its ability to resist flame propagation up the outside of a building. These cladding and wall assembly combinations can be used as infill or panel-type walls between structural elements, or attached directly to a loadbearing structural system. Note that these requirements apply independently of the provisions contained in Subsection 3.2.3. regarding spatial separation and exposure protection.

A-3.1.5.4.(1) Skylight Spacing. The minimum spacing dimensions for skylight assemblies are based on the distance that flame must travel along a flat ceiling surface. If ceilings have projecting beams or other features that would increase the distance the flame would have to travel along the surface, the distances specified may be measured accordingly.

A-3.1.5.5. Combustible Cladding on Exterior Walls. The requirements of Article 3.1.5.5. are not intended to limit the permissions for minor combustible components permitted by Article 3.1.5.2. For the purposes of this Article, a cladding system is considered as those materials outboard of the sheathing membrane.

A-3.1.5.5.(1)(b) Combustible Cladding on Exterior Walls. The performance of the wall assembly is assessed with regard to its ability to resist flame propagation up the outside of a building.

A-3.1.5.5.(1)(b)(i) Flame-Spread Distance. The maximum flame-spread distance referred to in Subclause 3.1.5.5.(1)(b)(i) means the distance between the top of the opening and the highest observable instance of flaming along the wall assembly; thus, intermittent flaming to a height of 5 m above the opening is acceptable.

A-3.1.5.5.(1)(b)(ii) Heat Flux Measurement. The heat flux to the assembly referred to in Subclause 3.1.5.5.(1)(b)(ii) is the maximum one-minute averaged heat flux measured by transducers located 3.5 m above the top of the opening. The intent of this criterion is to limit the spread of fire on the wall assembly to a height of 3.5 m above the opening.

Fire tests have shown that flame does not spread on the exterior surface of a wall assembly where the heat flux is less than 35 kW/m^2 above the opening.

A-3.1.5.6. Combustible Components in Exterior Walls. The requirements of Article 3.1.5.6. are not intended to limit the permissions for minor combustible components permitted by Article 3.1.5.2. The requirements of this article do not waive others specifically intended for the protection of combustible insulation in buildings of noncombustible construction.

A-3.1.5.14.(5)(d) Foamed Plastic Insulation Protection. The standard fire exposure temperature in CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," is the same as in CAN/ULC-S124, "Test for the Evaluation of Protective Coverings for Foamed Plastic." A thermal barrier that, when tested in conformance with CAN/ULC-S101, does not exceed an average temperature rise of 140°C on its unexposed face after a period of 10 min satisfies this requirement.

A-3.1.5.21.(1) Wire and Cable Flammability. In regulating the flammability characteristics of electrical wires and cables installed in a building, it is intended that the requirements of this Sentence and of other similar Sentences in the Code apply to wires and cables that are essentially a part of the distribution systems for power or communications. These distribution systems will normally include branch circuits that terminate at an outlet box in the space to be served and at that location cable terminators or plugs for individual items of equipment will be plugged in.

A-3.1.6. Tents and Air-Supported Structures. The requirements in this Subsection are intended to be limited to certain types of structure. For instance, the word "tent" as used in the By-law is intended to refer to a temporary shelter which is used at an open air event such as a fair or an exhibition. A tent will normally be constructed of a fabric held up by poles and attached to the ground by ties. The requirements for tents, however, are not intended to be applied to fabric structures located on buildings.

The term "air-supported structure," as used in the By-law, refers to an envelope which is held up by air pressure alone and which is erected on the ground or above a basement. The structure will usually require ballast or a positive ground anchorage system around the entire perimeter to secure it to the ground or basement. To reinforce this intent, the By-law prohibits the location of an air-supported structure above the first storey of any building.

The requirements of Subsection 3.1.6. are not intended to apply to air-supported roof assemblies on buildings, such as domed stadia, or to other types of air-supported structures, such as those over swimming pools situated on the roofs of buildings, which would not be anchored at or near ground level. These assemblies or structures are normally designed and evaluated on the basis of alternative solutions as permitted by Article 1.2.1.1. of Division A.

A-3.1.8.1.(1)(b) Barrier to Control Smoke Spread. Although a fire separation is not always required to have a fire-resistance rating, the fire separation should act as a barrier to the spread of smoke and fire until some response is initiated. When choosing products for fire stopping, the physical characteristics of the material used at the joints as well as the nature of the assembly and its potential movement should be taken into consideration.

If the fire-resistance rating of a fire separation is waived on the basis of the presence of an automatic sprinkler system, it is intended that the fire separation will be constructed so that it will remain in place and act as a barrier against the spread of smoke for a period of time until the sprinklers have actuated and controlled the fire.

A-3.1.8.1.(2) Installation of Closures. Although there is no explicit performance statement in the Building By-law that means of egress should be free of smoke, it is the intent that during the period when occupants are using a means of egress to evacuate from a floor area, the smoke contamination should not reach levels that would inhibit movement to the exit. This is particularly critical for persons with disabilities, who may not move at the same rate as other persons and who could be more susceptible to the effects of smoke contamination. NFPA 80, "Fire Doors and Other Opening Protectives," requires that a fire door protecting a means of egress be designed to minimize the possibility of smoke passing through the opening.

Although self-closing devices are not required for all doors in a fire separation (See Article 3.1.8.13.), it is assumed that in a fire situation every door in a fire separation is closed. Article 3.3.3.5. prohibits grilles and similar openings for certain doors in hospitals and nursing homes with treatment.

Although fire dampers that release on the fusion of a fusible link will help to control the spread of fire, a substantial quantity of smoke could have passed through the opening before that event. They are frequently located below the upper levels of a room and so the release of the fusible link of the fire damper that protects an opening will be delayed until the temperature at the level of the opening becomes high enough to fuse the link.

Similar concern has to be considered for other closure devices that are permitted to remain open on fusible links, and their location should be restricted in accordance with NFPA 80 and the Building By-law, except where their installation in another location will not allow the products of combustion to spread into means of egress.

A-3.1.8.3.(4) Fire Separation Continuity. The continuity of a fire separation where it abuts against another fire separation, a floor, a ceiling or an exterior wall assembly is maintained by filling all openings at the juncture of the assemblies with a material that will ensure the integrity of the fire separation at that location.

A-3.1.8.10.(1) Combination Smoke/Fire Dampers. A combination smoke/fire damper may be used in lieu of a fire damper to meet the requirement of Sentence 3.1.8.10.(3).

A-3.1.8.10.(5) Damper Access. It is intended that an access door be provided in the duct and, if the duct is enclosed with an architectural finish, that a second access door be provided through that finish.

A-3.1.8.18.(1) Wired Glass and Glass Block. The permission to include wired glass and glass block in doors and fire separations between an exit and the adjacent floor area does not permit the inclusion of those items in fire separations between exits and other parts of the building that are not included in the floor area. Examples include other exit facilities and vertical service spaces, including those used for building services and elevator hoistways.

A-3.1.8.19.(1) Fire-Protection Rating for Doors. The provisions in Articles 3.1.8.17., 3.1.8.18. and 3.1.8.19. do not waive a requirement for a door to have a fire-protection rating. To achieve this rating in a door test, it may be necessary to limit the area of glass in the door. If this area is less than the area limits of Article 3.1.8.18., it is the governing criterion. Conversely, if the area limits of Article 3.1.8.18. are less than the area required to achieve a fire-protection rating, then the area limits of this Article govern.

A-3.1.9. Penetrations. In the application of Subsection 3.1.9., a building service is considered to penetrate an assembly if it passes into or through the assembly. In some situations a service item enters an assembly through a membrane at one location, runs within the assembly, and then leaves the assembly through a membrane at another location.

The term "membrane penetration" usually designates an opening made through one side (wall, floor or ceiling membrane) of an assembly, whereas the term "through-penetration" designates an opening that passes through an entire assembly. Fire stopping of membrane penetrations involves installing a material, device or construction to resist for a prescribed time period the passage of flame and heat through openings in a protective membrane caused by cables, cable trays, conduit, tubing, pipes or similar items.

Fire stopping of a through-penetration involves installing an assemblage of specific materials or products that are designed, tested and fire-resistance rated to resist for a prescribed period of time the spread of fire through penetrations.

Products for fire stopping within a barrier are required to address movement of the assembly and to control smoke spread; as such, the flexibility of the material used at the flexible joints as well as the nature of the assembly and its potential movement must be taken into consideration.

A-3.1.9.1.(1)(b) Cast in Place Penetrations. The intention behind the use of the term "cast in place" is to reinforce that there are to be no gaps between the building service or penetrating item and the membrane or assembly it penetrates. The term "cast in place" describes a typical means of fire stopping for a service penetration through a concrete slab or wall.

A-3.1.9.1.(1)(c) Tightly Fitted Penetrations. The intention behind the term "tightly fitted" is to reinforce that there are to be no substantial gaps between the building service or penetrating item and the membrane or assembly it penetrates.

A-3.1.9.2.(1) Penetration of Fire Separations by Electrical Boxes. The provisions dealing with outlet boxes assume size, quantities and concentrations of partial depth penetrations that would not significantly affect the fire resistance of the assembly, including the temperature rise on the unexposed side of a wall. Sentence 3.1.9.2.(1) is not intended to allow large electrical distribution and control boxes to be recessed into an assembly required to have a fire-resistance rating unless they were incorporated in the assembly at the time of testing.

A-3.1.9.4. Outlet Boxes. For the purposes of Article 3.1.9.4., outlet boxes include, but are not limited to, electrical boxes, junction boxes, high and low voltage outlets, switches, enclosures for electrical equipment, laundry boxes, and shower diverters.

A-3.1.10.2.(4) Firewall Construction. Inherent in the use of a firewall is the intent that this specialized wall construction provide the required fire-resistance rating while also being designed to resist physical damage – arising out of normal use – that would compromise the rating of the assembly. Traditionally, this has been accomplished by prescribing the use of noncombustible materials, which was in fact restricted to concrete or masonry. Sentences 3.1.10.2.(3) and (4) are intended to retain both of the characteristics of firewalls, while permitting greater flexibility in the use of materials and designs. The fire-resistance rating and damage protection attributes of a firewall may be provided by a single fire- and damage-resistant material such as concrete or masonry, by a fire- and damage-resistant membrane on a structural frame, or by separate components – one that provides the fire-resistance rating and another one that protects the firewall against damage.

If the firewall is composed of separate components, the fire-resistance rating of the fire-resistive component needs to be determined for this assembly on its own. In addition, if the damage protection component is physically attached to the fire-resistive component (for example, as a sacrificial layer), then for the purposes of determining the overall performance of the assembly, it is also necessary to determine through testing whether failure of the damage protection component during a fire affects the performance of the fire-resistive component.

A-3.1.11.5.(1) Fire Blocks in Combustible Construction. Combustible construction referred to in Sentence 3.1.11.5.(1) includes all types of construction that do not comply with the requirements for noncombustible construction. All the elements within the concealed space can be combustible, unless required to be of noncombustible materials (e.g., certain categories of pipework and ducts), but the value of the flame-spread rating of the combustible materials determines the permitted extent of the concealed space between fire blocks. The materials to be considered include all construction materials regulated by this By-law, including the framing and building services that are located in the concealed space. When designing fire blocking, consideration should be given to avoid restricting venting capabilities within concealed spaces. (See also Note A-5.6.2.1.)

A-3.1.11.5.(3) Fire Blocks in Concealed Spaces. To reduce the risk of fire spread in combustible concealed spaces within the types of buildings referred to in Sentence 3.1.11.5.(3), fire blocking is required regardless of whether the horizontal concealed space is protected by sprinklers or not, unless the space is filled with noncombustible insulation so that any air gap at the top of the insulation is very small. See also Note A-3.1.11.5.(1) for roof venting.

A 5- or 6-storey building constructed in accordance with Article 3.2.2.50. and buildings constructed in accordance with Article 3.2.2.58. are required to be sprinklered in accordance with NFPA 13, "Installation of Sprinkler Systems" (See Article 3.2.5.12.).

NFPA 13 generally requires sprinklering of any concealed spaces of combustible construction or where large amounts of combustibles are present. However, NFPA 13 allows combustible concealed spaces to be unsprinklered in certain cases, including where concealed spaces are filled almost entirely with noncombustible insulation, where spaces contain only materials with a low flame-spread rating, and where limited access or the size of the space makes it impractical to install sprinklers. For certain types of construction in unsprinklered combustible concealed spaces, NFPA 13 mandates fire blocking beyond the minimum specified in Sentence 3.1.11.5.(3).

A-3.1.11.7.(6) Integrity of Fire Blocks. Sentence 3.1.11.7.(6) together with Article 3.1.9.1., is intended to ensure that the integrity of fire blocks is maintained at areas where they are penetrated. This requirement is satisfied by the use of generic fire stops such as mineral wool, gypsum plaster or Portland cement mortar, as well as rated fire stops.

A-3.1.11.7.(7) Fire Blocks. Figure A-3.1.11.7.(7) shows the location of the semi-rigid fibre insulation board at the intersection between walls and floors in wood-frame construction. The figure is intended to illustrate the fire block detail and not a design of a fire separation.

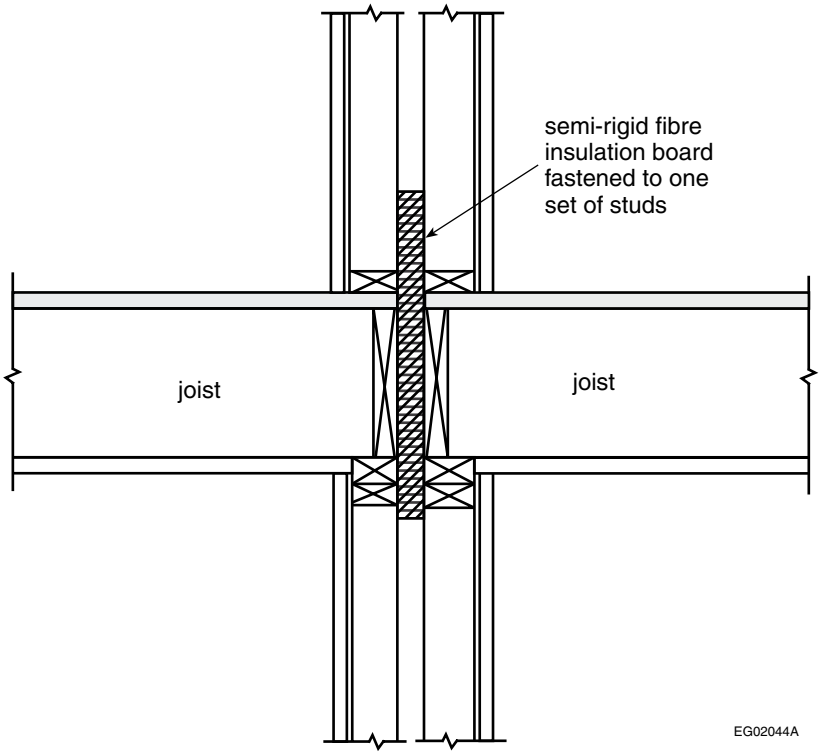

Figure A-3.1.11.7.(7)
Fire block

A-3.1.13.2.(2) Folding Partition. Folding partitions used to divide a space into separate rooms are not considered as doors for the purposes of this Sentence.

A-3.1.14.3. Skylight Glazing. This sentence requires glazing to remain in place when fractured and when subject to impact by flying objects for conditions not regulated elsewhere in this By-law. Other types of glazing such as tempered, annealed or heat strengthened glass have long been recognized as a potential hazard when located overhead and normally requires protective screens to protect occupants below from injury caused by falling glass.

A-3.1.17.1. Exercise Rooms. Fitness centres, yoga studios, tai-chi studios, martial arts training centres and other similar uses are considered exercise rooms. Where an exercise room, without equipment, is exclusively used as a yoga studio, a tai-chi studio or a martial arts training centre an occupant load factor of 4.6m^2 per person is permitted.

A-3.2.1.1.(1) Roof-top Enclosures for Private Residential Decks. Roof-top enclosures containing stairs for the exclusive purpose of providing access to private residential decks may be considered as part of the storey below. Such enclosures may not include spaces that could be otherwise used or occupied. Likewise, the roof deck associated with a private residential suite may not include any enclosed occupiable floor area or the requirements applicable to a storey would apply.

Regardless of whether an enclosure is considered a storey or not, designers must remain aware that the roof-top location of the deck is inherently remote from the remainder of the suite, and consider the ability of the deck occupants to remain aware of conditions within the suite and building below. Measures to promote situational awareness are appropriate and could include the installation of an audible and visual fire alarm signaling device in the vicinity of the egress door, and direct line of sight to the egress door from any location on the deck.

A-3.2.1.1.(3) Mezzanine Area. The following sketches illustrate the intent of this Sentence.

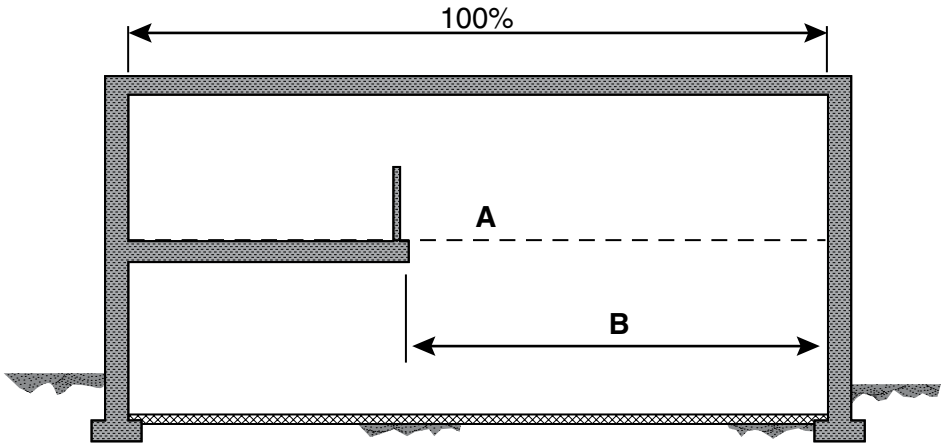

Figure A-3.2.1.1.(3)-A
Concept of Horizontal Plane

Notes to Figure A-3.2.1.1.(3)-A

(1) The horizontal plane (A, the dashed line) is measured at the mezzanine floor finish line.

(2) At least 60% of the horizontal plane (B) must be open to the floorspace below.

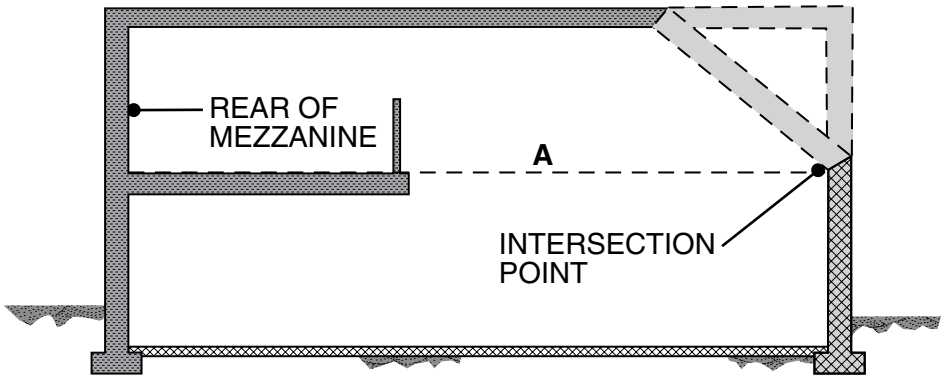

Figure A-3.2.1.1.(3)-B
Intersection Point

Notes to Figure A-3.2.1.1.(3)-B

(1) This Figure describes Clause 3.2.1.1.(3)(a).

(2) The length of the horizontal plane (A) is taken from the rear of the mezzanine to the point at which it intersects a wall, ceiling, roof or other major component.

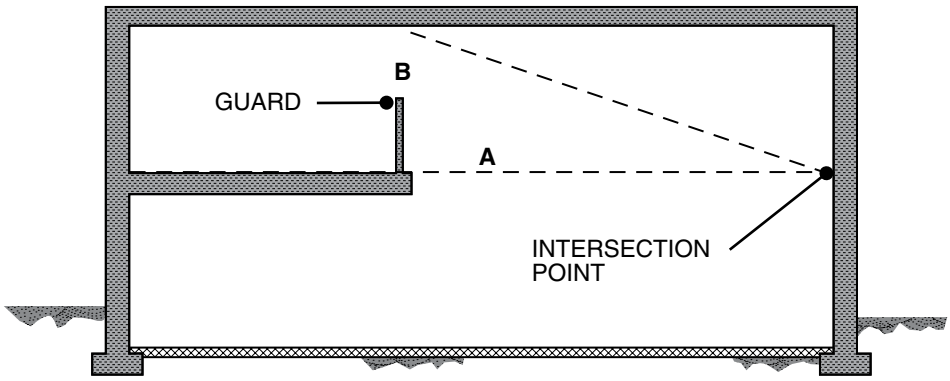

Figure A-3.2.1.1.(3)-C
Projections, Including Guards

Notes to Figure A-3.2.1.1.(3)-C

(1) This Figure describes Clause 3.2.1.1.(3)(b).

(2) Projections should not be permitted below the horizontal plane (A, the dashed line). This includes large beams, trusses, the roofline, or any other projection that will impede vision lines.

(3) Visual obstructions on the mezzanine may include 1 070 mm high guards, columns, posts and other structural elements of a minor nature.

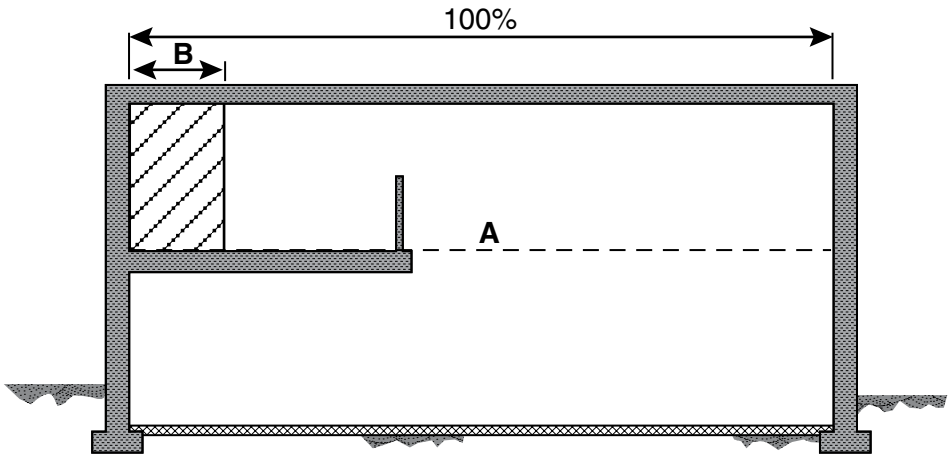

Figure A-3.2.1.1.(3)-D
Enclosed Spaces within a Mezzanine

Notes to Figure A-3.2.1.1.(3)-D

(1) This Figure describes Sentence 3.2.1.1.(7).

(2) The horizontal plane is demonstrated by the dashed line, A.

(3) Up to 10% of the horizontal plane may be enclosed. This must be located so as to avoid contravening the open requirements of Clause 3.2.1.1.(3)(b); in effect no dead areas are permitted.

If a floor has more than one mezzanine, each may be treated individually. For example in a one storey building with five tenancies, each tenant would be permitted to have a mezzanine up to the limits indicated, without the building being considered two storeys in building height. However, should one of the mezzanines exceed any of the limitations, the building would then be considered to be two storeys in building height.

Regarding the floor space under a mezzanine, there are no restrictions on partition construction in this area. The space on the floor beyond the mezzanine, i.e. below the open portion of the horizontal plane, should, with discretion, be visually open to view from the mezzanine.

A-3.2.1.1.(4) Mezzanines in Suites. The defined term "suite" in this case could be equally applicable to a suite in an apartment or commercial building, or even an entire storey such as may occur in a curling rink. There may be more than one enclosed mezzanine in the suite but in no instance can the combined total mezzanine area exceed 10% of the suite in which they are located.

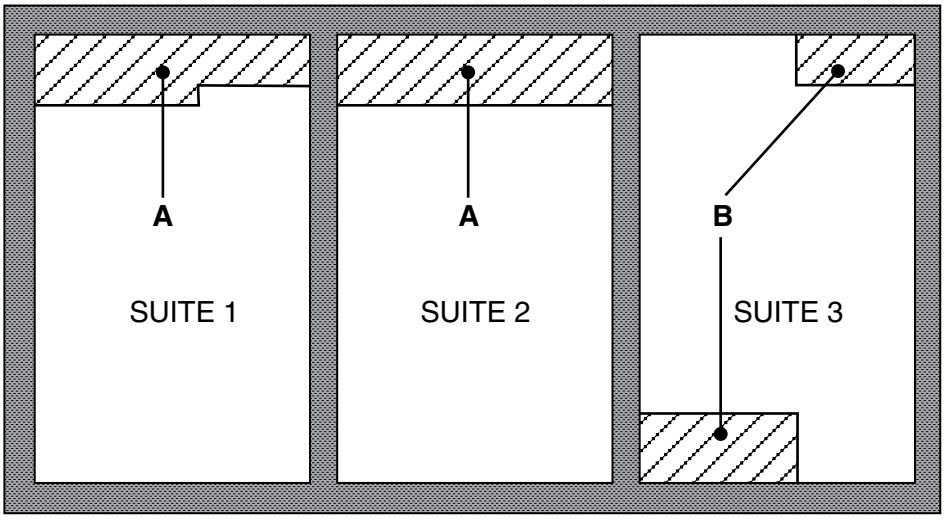

Figure A-3.2.1.1.(4)-A
Mezzanines in Suites

Notes to Figure A-3.2.1.1.(4)-A

(1) This Figure describes Clause 3.2.1.1.(4)(b).

(2) Mezzanines up to 10% of area of a suite (A) may be enclosed.

(3) More than one mezzanine (B) is permitted in a suite provided the total area of mezzanines does not exceed 10% of the suite in which they are located.

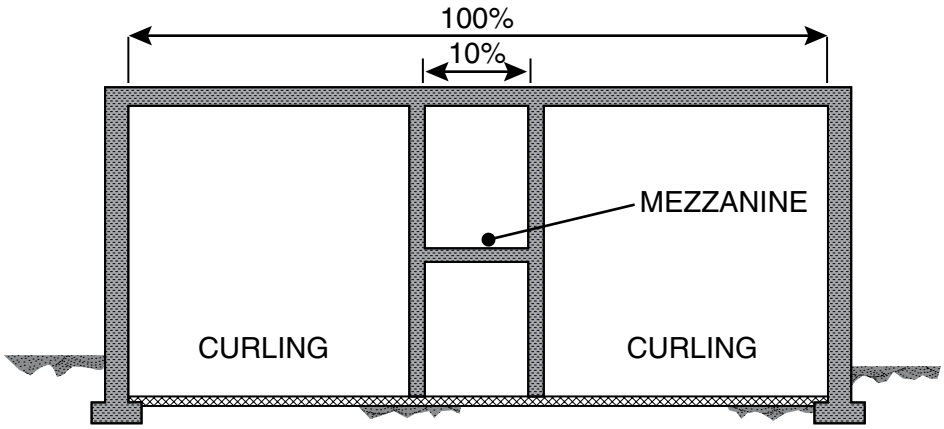

Figure A-3.2.1.1.(4)-B
Mezzanines in Multi-Room Suites

Notes to Figure 3.2.1.1.(4)-B

(1) This Figure describes Clauses 3.2.1.1.(4)(a) and (b)

(2) The curling rink has several 'rooms,' but should be regarded as 'one suite.' The enclosed mezzanine may be up to 10% of the area of the entire suite.

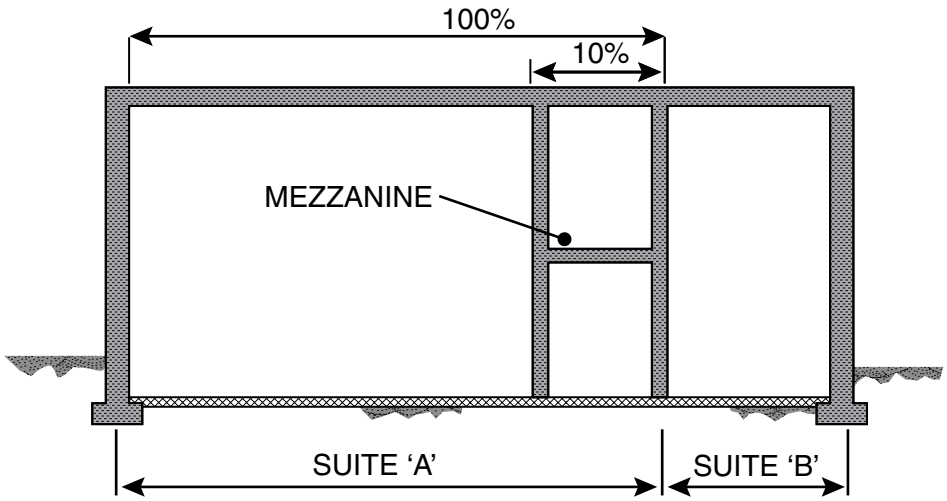

Figure A-3.2.1.1.(4)-C
Mezzanines in Multi-Tenanted Suites

Notes to Figure A-3.2.1.1.(4)-C

(1) This Figure describes Clauses 3.2.1.1.(4)(a) and (b).

(2) In this example, the 10% of the suite area is of Suite 'A' as if it is part of that series of rooms, or suite. It has no user-of-tenancy relationship with Suite 'B.' (Suite 'B' may also have 10% of totally enclosed mezzanines.)

A-3.2.1.1.(8) Accessible Service Space. These service spaces are often referred to as interstitial spaces and are designed to allow service personnel to enter and undertake maintenance or installation within the space. Catwalks or flooring are usually included to provide a walking or access surface. Even when flooring is included, it is not intended that the interstitial space should be considered as a storey for the purposes of the By-law unless the space is used for purposes other than servicing or the storage of materials and equipment to be used for building services within that space.

A-3.2.1.7.(4) Major Occupancies Other than Group C or D in 6 Storey Combustible Buildings. The requirements of 3.2.2.50. and 3.2.2.58 enable the introduction of major occupancies into buildings of predominantly residential or office occupancy that exceed the normal size limits permitted under the present construction requirements of Subsection 3.2.2. In order to ensure that an appropriate level of fire and life safety is being met, additional fire compartmentation and protection of floor areas above the 3rd storey is required by this By-law.

The requirements of 3.2.1.7.(4) are intended to supplement the requirements of 3.2.1.7.(1) by creating further compartmentation by subdividing a building into floor areas not exceeding 1,000 m^2. The terminology "horizontal *fire compartment* on each *storey*" is intended to require that floor areas on each *storey* be individually broken up into *fire compartments* that are both horizontally and vertically separated from each other. Furthermore, each compartment thus created is required to have direct access to at least one exit in addition to the applicable requirements of Sections 3.3. and 3.4. of this By-law. In the case of ground level suites, this may be achieved by exits directly to the exterior, in addition to protected exits as otherwise required by this By-law.

A-3.2.1.7.(5) Encapsulated Mass Timber. The provisions of Sentence 3.2.1.7.(5) are intended to provide a pathway for the limited use of mass timber with certain protective features, and in certain specific circumstances. It is not intended to be a general endorsement of construction of mass timber. A great deal of research has been undertaken by the National Research Council of Canada, and general requirements that would permit a broader use of these materials in a building of *noncombustible construction* outside of an alternative solution will require specific construction requirements to be endorsed at the national and provincial levels.

A-3.2.2.2.(1) Special and Unusual Structures. Examples of structures which cannot be identified with the descriptions of buildings in Articles 3.2.2.20. to 3.2.2.90. include grain elevators, refineries and towers. Publications that may be consulted to establish good engineering practice for the purposes of Article 3.2.2.2. include the NFPA "Fire Protection Handbook," Factory Mutual Data Sheets, and publications of the Society for Fire Protection Engineering.

A-3.2.2.7.(2) Fire Separations and Fire-Resistance Ratings. Fire separations and their corresponding fire resistance rating if required may or may not be governed by the structural fire requirements under Subsection 3.2.2. In establishing the fire separation and fire-resistance rating requirements the practitioner must remember to consult all requirements for fire separations and fire resistance ratings as detailed in Division B Sections 3.1, 3.2, 3.3, 3.4, and 3.5. (See Article 3.1.3.1.)

A-3.2.2.15.(2) Storeys below Ground. Occupancies located below grade represent an unusual level of challenge for both occupant egress and emergency response since the availability of paths of travel to enter or leave the underground space is usually limited. This may subject occupants to a greater risk of exposure to untenable conditions during evacuation. Similarly, emergency responders must share limited means of egress with occupants which could further impact occupant evacuation, impede an effective response, or expose first responders to unsafe conditions.

It is not the intent of the Building By-law to limit the inclusion of occupancies below grade where they can be shown to demonstrate an appropriate level of fire and life safety. Rather the intent of this requirement is to cause a conscientious review of certain underground occupancies to ensure that they are sufficiently protected, and that the arrangement can provide an acceptable level of emergency response for a variety of conditions. The measures described in Sentence 3.2.2.15.(2) provide a minimum for fire safety under many circumstances, but may not be sufficient to address all potential uses or occupancies below grade. It should be confirmed that the proposed use and building design is acceptable to the Chief Building Official.

A-3.2.2.18.(2) Sprinkler Extent. A literal interpretation of Article 3.2.2.6. and Sentences 3.2.2.4.(1) and (2) could require installation of an automatic sprinkler system throughout all storeys of a building regardless of options in Articles 3.2.2.20. to 3.2.2.90. to construct one or more storeys without installation of sprinklers. It is the intent of the By-law that all storeys below a storey in which an automatic sprinkler system is installed should also be protected by an automatic sprinkler system to ensure that a fire in a lower storey does not incapacitate the automatic sprinkler system or overwhelm an automatic sprinkler system in an upper storey. Persons in an upper storey in which waivers or reductions of other fire safety systems are permitted would be exposed to an increased risk from a fire on a lower storey. This concept also applies to situations in which an automatic sprinkler system has been installed within a floor area in order to modify other safety requirements applying within the floor area. If the uppermost storey or storeys of a building can be constructed without the installation of an automatic sprinkler system it is not necessary that an automatic sprinkler system required in a lower storey be extended into the upper storey or storeys.

A-3.2.2.35.(4) Sprinkler Requirements. Spaces in a building of Group A, Division 4 occupancy that are intended to be equipped with sprinklers include, but are not limited to, dressing and changing rooms, concession stands and areas, toilet rooms, locker rooms, storage areas, service rooms, offices and other spaces that provide service to the building. The enclosure of seating areas with glazing needs special consideration in determining the requirements for sprinklers. For example, if the enclosed area is used for the consumption of food and beverages, it should be classified as Group A, Division 2 and the appropriate requirements of that classification applied. Enclosure of limited spaces above seating areas for press and media purposes is not considered to require the installation of sprinklers.

A-3.2.2.50.(5) and 3.2.2.58.(4) Occupancy Combinations in Buildings of Mixed Construction Hybrid Structures. Buildings conforming to the building height and area limits, as well as the other fire protection requirements of Articles 3.2.2.50. or 3.2.2.58. are permitted to be entirely constructed of combustible construction and incorporate the occupancies specifically permitted by Sentences 3.2.2.50.(5). or 3.2.2.58.(4)., for example, Group A, Division 2 or Group E major occupancies on the first to second storeys, and a parking garage on the first to third storeys. Alternatively, the requirements of Articles 3.2.2.4. to 3.2.2.8. for superimposed major occupancies can be applied, resulting in buildings of mixed (hybrid) construction conforming to the building height and area limits for combustible construction where the lower storeys are of noncombustible construction and the upper storeys are of combustible construction. For example, a Group B, Division 3 or a Group A, Division 2 major occupancy could be located on the first 4 storeys of a 6-storey Group C building constructed in accordance with Article 3.2.2.50., provided that these first 4 storeys are constructed of noncombustible construction in accordance with Article 3.2.2.24. for a Group A, Division 2 major occupancy or Article 3.2.2.42. for a Group B, Division 3 major occupancy. (See also Articles 3.2.2.6. and 3.2.2.7.)

A-3.2.3. Fire Protection Related to Limiting Distance versus Separation Between Buildings. By-law provisions that address protection against fire spread from building to building use the limiting distance (See the definition in Article 1.4.1.2. of Division A.) for a building rather than using the distance between adjacent buildings on separate properties, since this would result in situations where the design and construction of a building on one property affects the design and construction of a building on an adjacent property.

The By-law requirements that deal with reducing the probability of building-to-building fire spread were originally developed based on the assumption that the exposing building faces of adjacent buildings are of similar size and configuration, and are equidistant from the shared property line. Where buildings are of different sizes, the smaller building may be subject to a higher heat flux in the event of a fire compared to the larger building. Where buildings are closely spaced and not equidistant from the property line, the construction of the building with the greater limiting distance does not recognize the proximity of the building with the lesser limiting distance.

The By-law has more stringent requirements for buildings with lesser limiting distance as regards the maximum area and spacing of unprotected openings, and the construction, cladding and fire resistance of walls. This increased stringency recognizes that the fire

hazard is greater where buildings are closer together and that adjacent buildings may have exposing building faces of different sizes, configurations or limiting distances, which could further increase the hazard.

The Chief Building Official may also address limiting distances through legal agreements with the parties involved that stipulate that the limiting distance be measured to a line that is not the property line. Such agreements would normally be registered with the titles of both properties.

A-3.2.3.1.(4) Spatial Separation Design. In the application of Sentences 3.2.3.1.(3) and (4), it is intended that Sentence (3) be used first to establish the basic requirements for the exterior wall in terms of fire-resistance rating, type of construction and type of cladding. The percentage of unprotected openings determined from the application of Sentence (3) would be unnecessarily restrictive if the actual unprotected openings occur in a plane that is set back from the front of the building face. Sentence (4) applies to the calculation of the allowable percentage of unprotected openings based upon projection onto a plane that is in front of all unprotected openings. The application of these two Sentences is shown in Figure A-3.2.3.1.(4). The modifications permitted by Article 3.2.3.12. would be applied, if applicable, to the area of unprotected openings derived from Sentence (4).

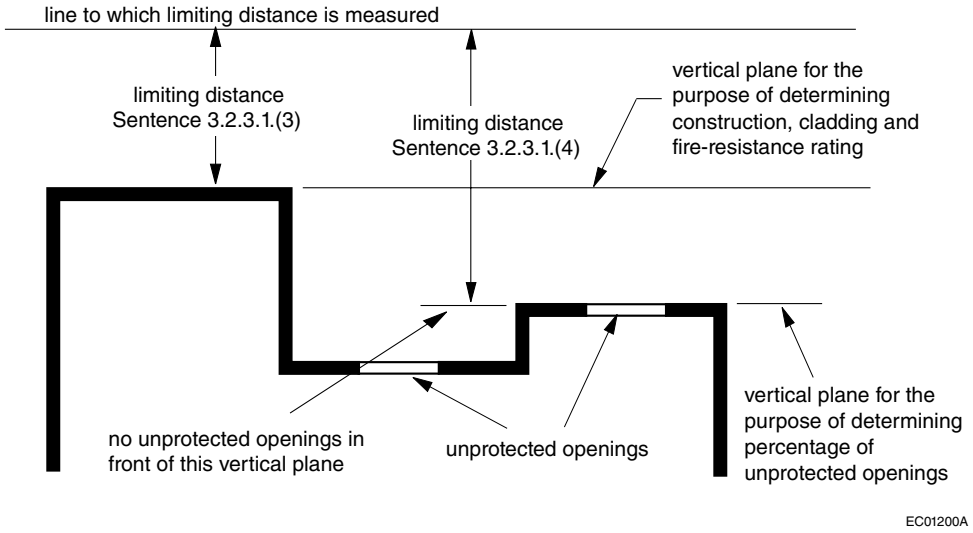

Figure A-3.2.3.1.(4)
Spatial separation design

A-3.2.3.1.(8) Intervention Time and Limiting Distance. The total time from the start of a fire until fire suppression by the fire department depends on the time taken for a series of actions. Sentence 3.2.3.1.(8) is only concerned with the time from receipt of notification of a fire by the fire department until the arrival of the first fire department vehicle at the building. It specifies a 10-min time limit which must be met in more than 90% of the calls to the building served by the fire department. This reliability level and provision for flexibility is essentially consistent with NFPA 1710, "Organization and Deployment of Fire Suppression Operations, Emergency Medical Operations, and Special Operations to the Public by Career Fire Departments."

Clause 4.1.2.1 of NFPA 1710 establishes "time objectives" for fire incidents as follows:

- 1 min (60 s) for turn-out of responders after receipt of notification of a fire, and
- 4 min (240 s) or less for arrival of the first arriving engine company at a fire suppression incident and/or 8 min (480 s) or less for the deployment of a full first alarm assignment at a fire suppression incident.

The standard requires that the fire department establish a "performance objective" of not less than 90% for each response time objective. This reliability level is referred to in NFPA 1710 as a "performance objective."

Where the 10-min limit cannot be met by the fire department at least 90% of the time, Sentence 3.2.3.1.(8) specifies that a value corresponding to half the actual limiting distance be used in requirements that depend on limiting distance to define other criteria. For new subdivisions, legal agreements may be made for the construction of fire stations to serve those areas. The fire department response time in those subdivisions may temporarily exceed 10 min until the fire station is constructed.

See also Sentences 9.10.14.3.(1) and 9.10.15.3.(1).

A-3.2.3.4.(1) Party Walls. By definition, a party wall is a wall jointly owned and used by two parties under easement agreement or by right in law, and is erected at or upon a line that separates two parcels of land that are, or are capable of being, separate real estate entities. With the exception of some Part 9 residential occupancies, both Part 3 and Part 9 of the By-law require that, where party walls are constructed on property lines, they be constructed as a 2- or 4-hour firewall (See also Article 9.10.11.1.).

Buildings on each side of a party wall that is constructed as a firewall are considered as separate buildings (See Article 1.3.3.4. of Division A.).

In a Part 9 residential building that has no dwelling unit above another, a party wall constructed on a property line between two dwelling units need not be constructed as a firewall, but must be constructed as a continuous fire separation that extends from the top of the footings to the underside of the roof, with a fire-resistance rating of at least 1 hour (See Article 9.10.11.2.). These party walls do not create separate buildings.

Where two parties share a party wall on a property line, each party is responsible for fire safety in their unit, but is still subject to possible fire risks from activities in the adjoining units. The separating party wall is intended to provide a significant degree of fire protection between the adjacent units, often exceeding even that required between suites in multiple-unit residential and non-residential occupancies.

When a building spans a property line, constructing a party wall on the property line is not mandated by the By-law, but subdividing the building at the property line is an option the owner can consider. The By-law permits a building constructed on more than one property to be designed as a single undivided building, whether the properties have a common owner or not. However, if a subdividing wall is constructed on the property line within the building for the purpose of separating the two real estate entities and is shared by two different owners, the wall would, by definition, be deemed a party wall. As such, this party wall would need to meet the construction requirements described above, depending on the building's occupancy classification and size.

A building that spans two or more properties, but that does not have a party wall at the property line, may need to address the By-law requirements for party walls in the future.

A-3.2.3.6.(2) Protection of Roof Soffits Near Property Lines. Sentences 3.2.3.6.(2) to (5) and parallel Sentences 9.10.14.5.(5) to (7) and 9.10.15.5.(5) to (7) provide requirements for the protection of soffits where the soffit of the subject building is located close to the property line or to an imaginary line between two buildings on the same property. Fire from inside the roof space of the subject building can exit unprotected soffits and expose the adjacent building to flames.

A-3.2.3.14.(1) Wall Exposed to Another Wall. The requirements of Article 3.2.3.14. are to ensure that the control of fire spread by the interior fire separations between fire compartments is not defeated through the spread of fire by thermal radiation outside the building. Minimum spatial separations are specified between the openings in separate fire compartments where the exterior faces of these compartments are deemed to expose each other to a thermal radiation hazard. This situation may arise where the angle, θ, between the intersecting planes of the exposing building faces is 135° or less. Examples of situations that would be addressed by this Article are shown in Figures A-3.2.3.14.(1)-A, A-3.2.3.14.(1)-B and A-3.2.3.14.(1)-C.

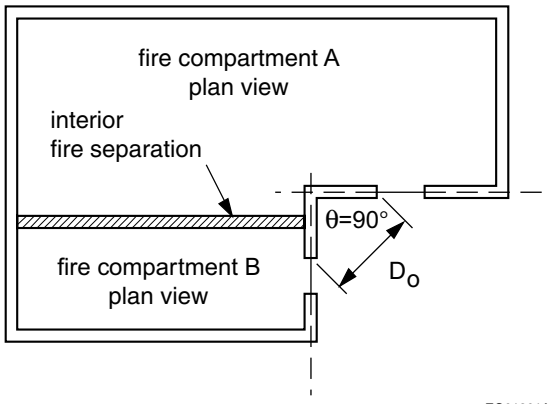

Figure A-3.2.3.14.(1)-A
Openings in walls at a right-angle corner

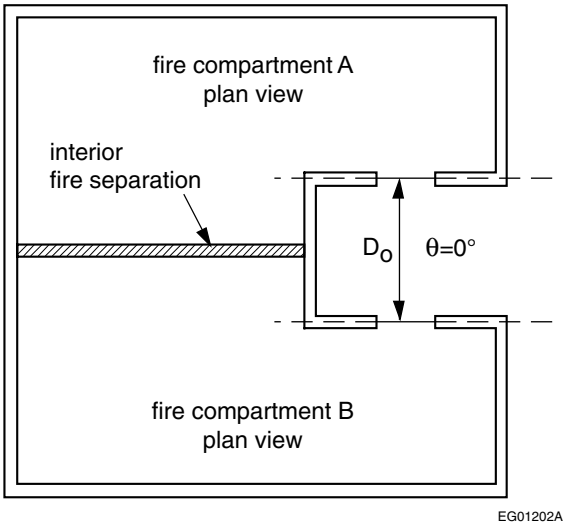

Figure A-3.2.3.14.(1)-B
Openings in walls that are parallel to one another

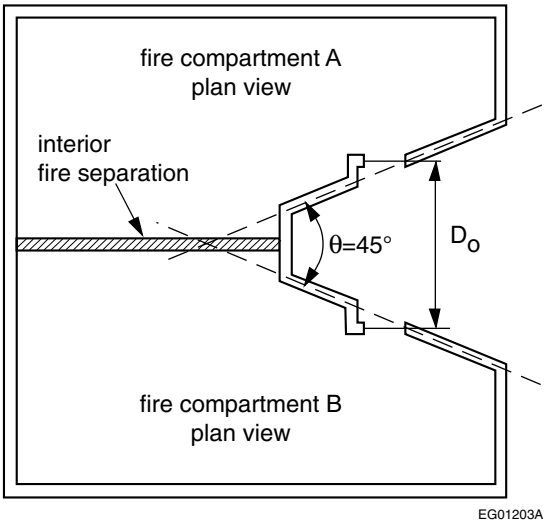

Figure A-3.2.3.14.(1)-C
Openings in walls with an included angle of 45°

A-3.2.4. Fire Alarm System. The term "fire alarm system" used in this Subsection applies to fire alarm systems with or without voice communication capability.

A-3.2.4.4.(1) Single Stage Fire Alarm System. This requirement, in combination with Article 3.2.4.22., is intended to allow for the provision of voice communication capability as an integral part of a single stage fire alarm system.

A-3.2.4.4.(2)(c) Fire Alarm Alert Signal. In a 2-stage fire alarm system described in Sentence 3.2.4.4.(2), the alert signal may be transmitted to audible signal devices in designated locations or to audible signal devices throughout the building. If actuated, the second stage alarm signal in a 2-stage fire alarm system may sound throughout all zones in the building. All manual station key switches would typically initiate the alarm signal.

Sentence 3.2.4.4.(2) also allows the implementation of a "zoned 2-stage" sequence of operation, whereby the alarm signal sounds in the zone of key switch actuation (and perhaps in the adjacent zones, which may be the storey above and the storey below) and the alert signal sounds throughout the rest of the building. This sequencing would be created automatically by the fire alarm control unit. The key or special device referred to in Clause 3.2.4.4.(2)(c) should be immediately available to all persons on duty who have been given authority to sound an alarm signal.

A-3.2.4.4.(2) Two-Stage Fire Alarm System. Sentence 3.2.4.4.(2), in combination with Article 3.2.4.22., is intended to allow for the provision of voice communication capability as an integral part of a 2-stage fire alarm system.

A-3.2.4.6.(2) Access to Silencing Switches. This requirement is intended to prevent easy access to silencing switches. The satisfactory operation of a fire alarm system to alert the occupants of a building to an emergency is predicated on the assumption that the alarm signal will be silenced only after responsible staff have verified that no emergency exists. Details on the emergency procedures to be used in case of fire are contained in the Fire By-law.

A-3.2.4.6.(3) Silencing Alarms. This requirement is intended to provide the Vancouver Fire Department and building management the ability to silence the fire alarm at the main annunciator (in addition to the main control panel). A special keyed switch is considered to meet the intent of this requirement.

A-3.2.4.7.(4) Design and Installation of Fire Department Notification. In some jurisdictions, the fire department may utilize, or have available, a municipal fire alarm system or equipment intended for receiving notification by means of a direct connection. If used, it is expected that these systems and installations conform to the requirements of Sentence (4) so as to achieve and provide a uniform and reliable level of service. It is also intended that a proprietary central station as well as a fire brigade used by a large corporation, university campus or similar site comply with Sentence (4).

CAN/ULC-S561, "Installation and Services for Fire Signal Receiving Centres and Systems," which is referenced in Sentence 3.2.4.7.(4), and CAN/ULC-S524, "Installation of Fire Alarm Systems," which is referenced in Sentence 3.2.4.5.(1), go hand-in-hand: conformity to CAN/ULC-S561 entails conformity with the fire alarm system components required in that standard, which include the fire alarm transmitter (signal transmitting unit), the interconnections, and the communication path.

A-3.2.4.7.(5)(b) Emergency Telephone Number. In many municipalities an emergency telephone number, for example 911, is used for all emergency services and it is preferable to post that number.

A-3.2.4.8.(2) Fire Alarm Zones. Alarm initiating devices referred to in this Sentence include fire detectors, waterflow switches and manual stations. If a room or space in a building extends through more than one storey of the building, as in the case of multi-level dwelling units and machinery rooms, judgment must be exercised in the zoning and annunciation of the fire detectors in that room or space. In general, the lowest storey on which access is provided into the room or space should be indicated on the annunciator to avoid unnecessary delays for the responding firefighters. Consideration should also be given to the use of numbers or letters on the annunciator that correspond to those used in the building elevators.

A-3.2.4.8.(11) Annunciator Zone Indication. Although an alphanumeric display can identify any specific alarm initiating device that is activated or requires maintenance service, an annunciator panel provided with an alphanumeric display only is not acceptable to the fire department in emergency situations. In emergency situations, indicator lamps provide status information of all zones at a single glance without having to scroll through the information provided by an alphanumeric display.

A-3.2.4.9.(3)(f) Supervision for Fire Pumps. Specific electrical supervision for fire pumps is stated in NFPA 20, "Installation of Stationary Pumps for Fire Protection," which is referenced in NFPA 13, "Installation of Sprinkler Systems."

A-3.2.4.11.(1) Smoke Detector Location. In the design and installation of the smoke detection system, consideration must be given to all features which could have a bearing on the location and sensitivity of the detectors, including ceiling height, sloped ceilings, diffusion from air conditioning and ventilating currents, obstructions, baffles, and other pertinent physical configurations that might interfere with the proper operation of the system.

A-3.2.4.11.(3) Visible Signals. If staff located in each zone or compartment can see each sleeping room door, visible signals may be located above each door. If staff cannot see every door, it is intended that the visible signals be provided at the location where the staff are normally in attendance. The audible signal is intended to alert staff of the need to check the visible signals.

A-3.2.4.16.(1) Manual Station. Only one manual station need be provided near a group of doors serving as a principal entrance or as a single exit facility. Egress facilities that are provided for convenience and that do not include all the features of required exits need not be provided with a manual pull station.

A-3.2.4.18. Acoustic Measurement and Terminology. The following notes on acoustic measurement and terminology are intended to assist in the application of the requirements for audibility of fire alarm system sounding devices.

The background or ambient measurement should be a spatial averaged A-weighted equivalent sound level measured for 60 s. This can be obtained using an integrating sound level meter with the integration time set to 60 s. During the measurement period the meter should be slowly moved about so as to sample the space uniformly but coming no closer than 0.5 m from any solid wall, floor or ceiling. Alternatively, measurements can be made at 3 or more positions throughout the space and an energy average calculated.

The measurement of the alarm level depends on the type of alarm signal. If the signal is a continuous signal from a bell or siren, the spatial averaged A-weighted equivalent sound level should be obtained. The integration time should be long enough to obtain a reasonable spatial average of the space, but not less than 10 s.

If the alarm has a temporal pattern, then the A-weighted sound level should be measured using the 'fast' time constant during the 'on' part of the cycle. In this situation it is not appropriate to use an integrating sound level meter. Since the duty cycle of the alarm is only 37.5% at best, that type of meter would give a reading that is 4 or more decibels lower than the level while the alarm is 'on.' A number of measurements should be made about the space in question and the average value used to obtain a good spatial representation.

Strictly speaking, the energy average of the measurements should be used; however, the frequency spectrum associated with most alarms is of a type that should give little variation about the space. If the measured levels don't vary by more than 2 to 3 dB, then an arithmetic average rather than an energy average can be used.

Effect of Furnishings

The final inspection of a fire alarm system is seldom made when the building is furnished and ready for occupancy. This results in measured levels which may be several decibels higher than will be found in the occupied building. The importance of this difference depends on the situation.

If the building is complete except for furnishings, so that the sources of ambient noise are present, then the amount by which the alarm signal exceeds the ambient level will not change appreciably with the introduction of furnishings. In this case both levels will be reduced by about the same amount.

If the primary source of ambient noise will be office equipment and workers, as would be expected in an open plan office, then measurements made prior to occupancy may differ substantially from those made afterwards. This may be true for both the absolute sound levels and the difference between the alarm level and the ambient.

A problem arises in trying to estimate what the absolute sound levels will be after the building is occupied.

In general, if the measurement is made in a totally bare room then the level will be about 3 dB higher than if the room were carpeted, assuming a reasonable carpet with an underlay. In most cases this will account for most of the absorption in the room and no further correction will be necessary. Adding heavy drapes and absorptive furnishings to a carpeted room can reduce the sound level by a further 2 to 3 dB.

Commercial buildings are more problematic. For example, if an open plan office is measured before any office screens are installed, there could be a substantial difference in the before and after levels, depending on the distance to the nearest alarm device.

Glossary of Acoustical Terms

Audible: A signal is usually considered to be clearly audible if the A-weighted sound level exceeds the level of ambient noise by 15 dB or more.

Awakening threshold: The level of sound that will awaken a sleeping subject 50% of the time.

A-weighted: A frequency weighting network which emphasizes the middle frequency components similar to the response of the human ear. The A-weighted sound level correlates well with subjective assessment of the disturbing effects of sounds. The quantity is expressed in dBA.

Masked threshold: The level of sound at which a signal is just audible in ambient noise.

Sound level: A sound pressure level obtained using a signal to which a standard frequency-weighting has been applied.

Sound pressure: A fluctuating pressure superimposed on the static pressure by the presence of sound. The unqualified term means the root-mean-square sound pressure. In air, the static pressure is barometric pressure.

Sound pressure level: Ten times the common logarithm of the ratio of the square of the sound pressure under consideration to the square of the standard reference pressure of 20 mPa. The quantity obtained is expressed in decibels.

A-3.2.4.18.(1) Alert and Alarm Signals. Alert signals are part of a 2 stage fire alarm system. The intent of the first, alert, stage is to notify persons in authority of a potential threat to building occupants. If a continuously staffed location is available, the alert signal can be restricted to that location.

A-3.2.4.18.(2) Alarm Signal Temporal Pattern. The temporal pattern of an alarm signal relates to the time during which the signal is produced and the intervals between the individual signal pulses. The international standard ISO 8201, "Acoustics – Audible emergency evacuation signal," includes a pattern that is becoming widely used in different countries and it is appropriate for this pattern to be adopted in Canada. The temporal pattern can be produced on most signalling devices. Most existing alarm

systems can be modified, and this pattern could be phased in when the systems require modification. The characteristic of the pattern is a 3-pulse phase followed by an off phase. The 3 pulses each consist of an on phase lasting for 0.5 ± 0.05 s followed by an off phase lasting for 0.5 ± 0.05 s sounded for 3 successive on periods and then followed by an off phase lasting for 1.5 ± 0.15 s.

Figure A-3.2.4.18.(2)-A indicates the pattern that is intended.

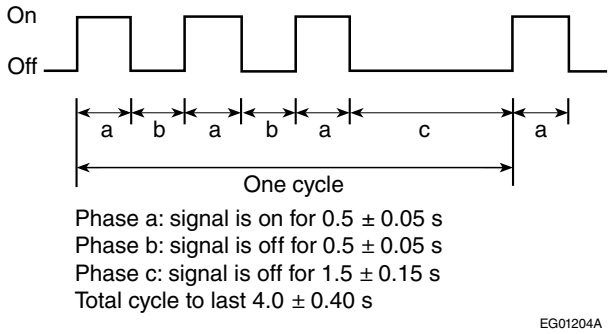

Figure A-3.2.4.18.(2)-A
Temporal pattern for fire alarm signal

Although the diagram shows a square wave form, the wave can have other shapes that produce a similar effect.

If single stroke bells are to be used, the temporal pattern can be produced by having the bell struck three times at a rate of one stroke per second followed by an interval of 2 s of silence. Figure A-3.2.4.18.(2)-B shows the pattern that results.

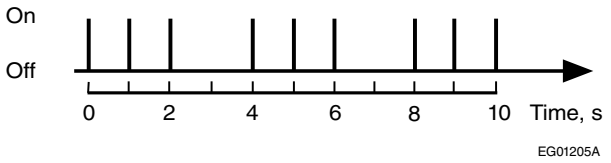

Figure A-3.2.4.18.(2)-B
Temporal pattern imposed on a single stroke bell or chime

Note to Figure A-3.2.4.18.(2)-B:
(1) The on phase represents the time that the striker mechanism is actuated. The sound produced by the bell or chime will continue at a level that decreases until the striker mechanism is re-actuated.

A-3.2.4.18.(3) Audibility of Alarm Systems. It is very difficult to specify exactly what types of sound patterns are considered to be "significantly different" from one another. The intent is to ensure that there is a noticeable or measurable difference between the alert signals and the alarm signals such that it reduces the possibility of confusion.

A-3.2.4.18.(4) Sound Pressure Level. For the purposes of this requirement, an audible signalling device should not produce a sound pressure level more than 110 dBA when measured at a distance of 3 m.

A-3.2.4.18.(5) Residential Sound Level. In a building in which corridors or hallways serve more than one suite or dwelling unit, there will be situations in which an audible signal device cannot be placed in the corridor or hallway to alert persons sleeping in suites and dwelling units, because the sound level in the vicinity of the device would exceed that permitted by Sentence 3.2.4.18.(4).

In these situations it will be necessary to supplement the building fire alarm system with an audible signal device in the suite or dwelling unit. These devices could be piezoelectric devices similar to the sounding units in many smoke alarms, subject to the device emitting the appropriate temporal pattern required by Sentence 3.2.4.18.(2).

A-3.2.4.18.(7) Disconnect Device for Dwelling Units. In order to minimize the annoyance caused by false and unwanted alarms, the disconnect will permit a person to silence the local audible device within the dwelling unit. At that time the person would be aware of sounds from devices in common spaces and could plan appropriate action. The disconnect will reduce the possibility of tampering with the audible devices.

A-3.2.4.18.(8) and (9) Signal Circuits. Clause 3.2.4.18.(8)(a) permits Class A wiring, or Class B wiring with signal circuit isolators located outside of the suites, to serve audible signal devices within residential suites.

Clause 3.2.4.18.(8)(b) permits a separate signal circuit to serve each suite without the need for signal circuit isolators or Class A wiring.

Open circuits and Class A and Class B wiring circuits are terms defined in CAN/ULC-S524, "Installation of Fire Alarm Systems."

A-3.2.4.19.(2) Visual Alarm Signal. CAN/ULC-S526, "Visible Signal Devices for Fire Alarm Systems, Including Accessories," applies to visual signalling units. This document is referenced by the most recent standard for the installation of fire alarm systems and would automatically apply. Current Canadian technology does not integrate visual and audible alarms to have the same temporal pattern. Visual and audible alarms should have as close a temporal pattern as possible but without interference beats that might have a deleterious effect on some persons. Visual signalling devices with the same temporal pattern as required for audible devices are available from some sources and they should become available in Canada. Not all units that comply with the ULC standard will have sufficient power to adequately cover large areas; care will have to be taken to specify units with adequate power when large spaces are being designed.

A-3.2.4.20.(7)(a) Smoke Alarm Installation. CSA C22.1, "Canadian Electrical Code, Part I," which is adopted by the Electrical Safety Regulation, permits a smoke alarm to be installed on most residential circuits that carry lighting outlets and receptacles. It is the intent of the Building By-law that any other item on a circuit with a smoke alarm should be unlikely to be overloaded and trip the breaker with a resultant loss of power that is not sufficiently annoying for the breaker to be restored to the on position. It is considered that an interior bathroom light or a kitchen light fulfills this intent, but that circuits restricted to receptacles do not fulfill this intent.

A-3.2.4.20.(8) Smoke Detectors in lieu of Smoke Alarms. It is intended that the smoke detector in this application will function as per the requirements of a smoke alarm; specifically, it will be a localized alarm to that suite. The advantage of this type of installation is that the detector would be monitored by the fire alarm panel, which would provide notification to supervisory personnel and be inspected as per CAN/ULC-S524, "Installation of Fire Alarm Systems."

A-3.2.4.22.(1)(b) Voice Messages. The concept of intelligibility expressed in Clause 3.2.4.22.(1)(b) is intended to mean that a person with average hearing and cognitive abilities is able to understand the messages that are transmitted into the space occupied by the person. There is no absolute measure to predetermine the effect of loudspeakers and it may be necessary, once the building has been furnished and occupied, to increase the number of loudspeakers to improve the quality of the messages.

The intelligibility of the message depends on the speech level, the background level, and the reverberation time of the space. ISO 7731, "Ergonomics – Danger signals for public and work areas – Auditory danger signals," addresses audibility. The standard suggests that an A-weighted sound level at least 15 dBA above the ambient is required for audibility, but allows for more precise calculations using octave or 1/3 octave band frequencies to tailor the alarm signal for particular ambient noise conditions. Design of the alarm system is limited to ensuring that all areas receive an adequately loud alarm signal.

If a public address system is to be used to convey instructions during an emergency, then the requirements of the system are less straightforward. In general, however, a larger number of speakers operating at lower sound levels would be required.

Additional guidance on how to design and evaluate the intelligibility of a communication system can be found in the following documents:

- IEC 60268-16, "Sound System Equipment – Part 16: Objective Rating of Speech Intelligibility by Speech Transmission Index"
- ISO 7240-19, "Fire Detection and Alarm Systems – Part 19: Design, Installation, Commissioning and Service of Sound Systems for Emergency Purposes"
- NEMA SB 50, "Emergency Communications Audio Intelligibility Applications Guide"
- Annex A.7.4.1.4 of NFPA 72, "National Fire Alarm and Signaling Code"

A-3.2.5.4.(1) Fire Department Access for Detention Buildings. Buildings of Group B, Division 1 used for housing persons who are under restraint include security measures that would prevent normal access by local fire departments. These security measures include fencing around the building site, exterior walls without openings or openings which are either very small or fitted with bars, and doors that are equipped with security hardware that would prevent easy entry. These buildings would have firefighting equipment installed and the staff would be trained to handle any small incipient fires. It is expected that appropriate fire safety planning would be undertaken in conjunction with local fire departments in order that special emergencies could be handled in a cooperative manner.

A-3.2.5.5. Location of Access Routes and Paths of Travel. The national building code and the provincial building code prescriptive requirements for access routes, paths of travel and hydrant locations, currently, do not reflect the operational requirements of the Vancouver Fire and Rescue Services nor the existing City of Vancouver fire hydrant locations. Therefore, the VBBL has been modified from the national and provincial building codes to reflect the unique to Vancouver requirements.

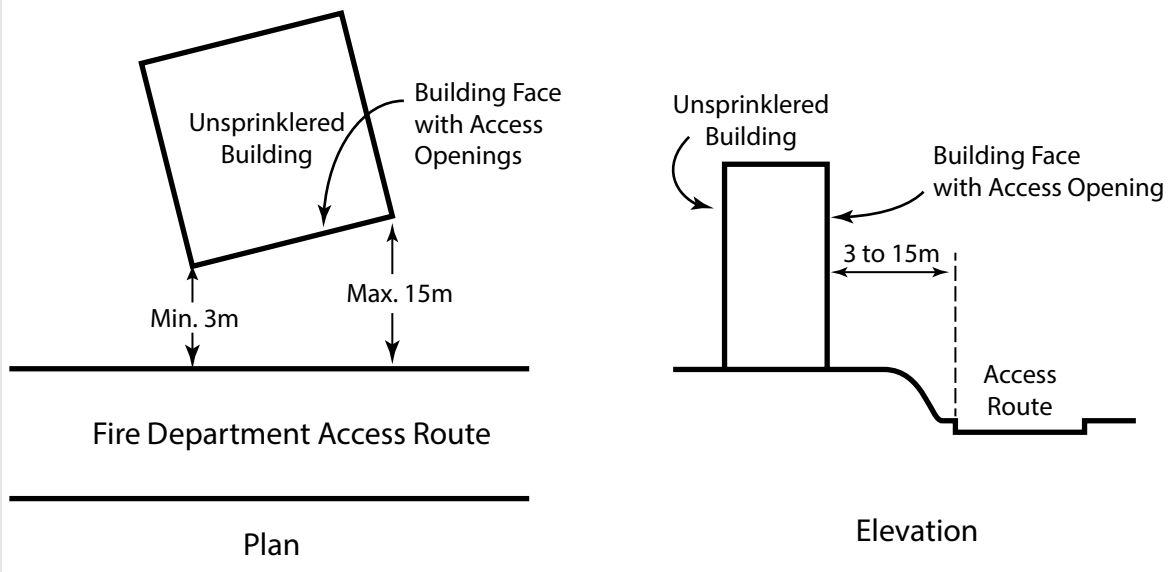

Figure A-3.2.5.5.-A

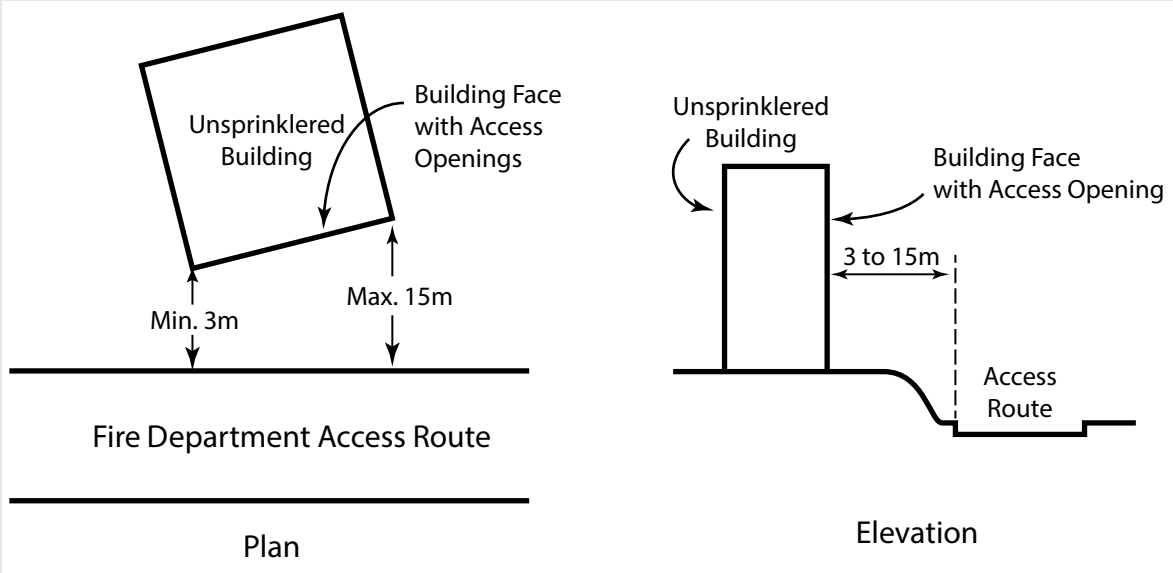

Figure A-3.2.5.5.-B

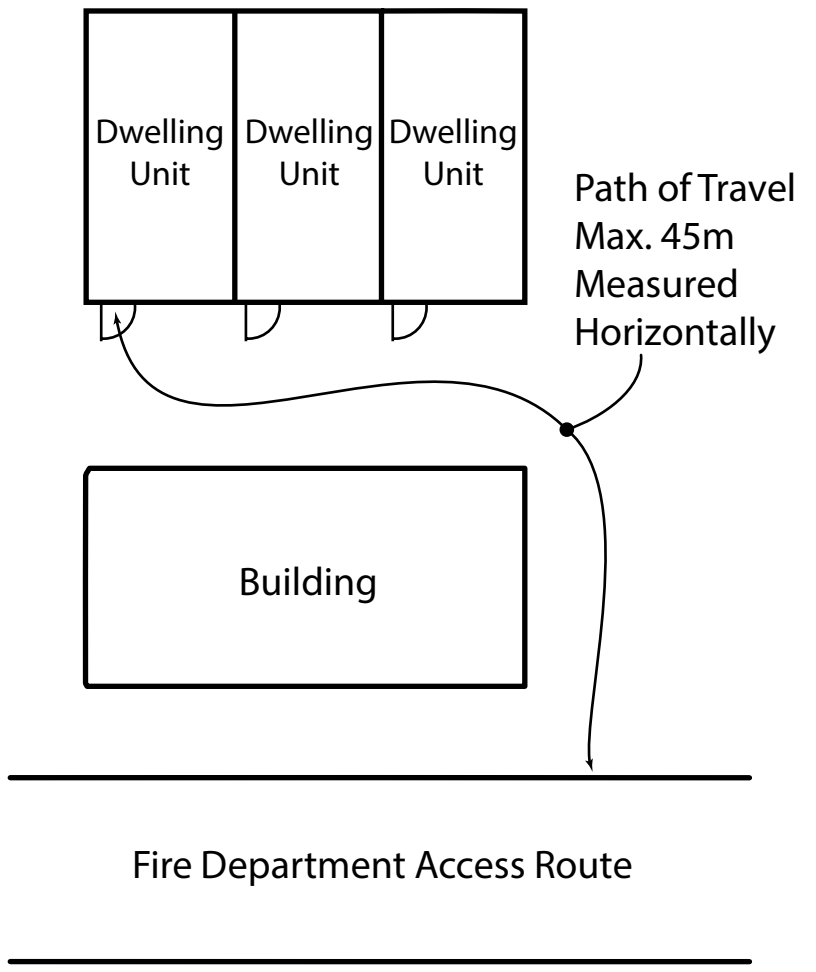

Figure A-3.2.5.5.-C

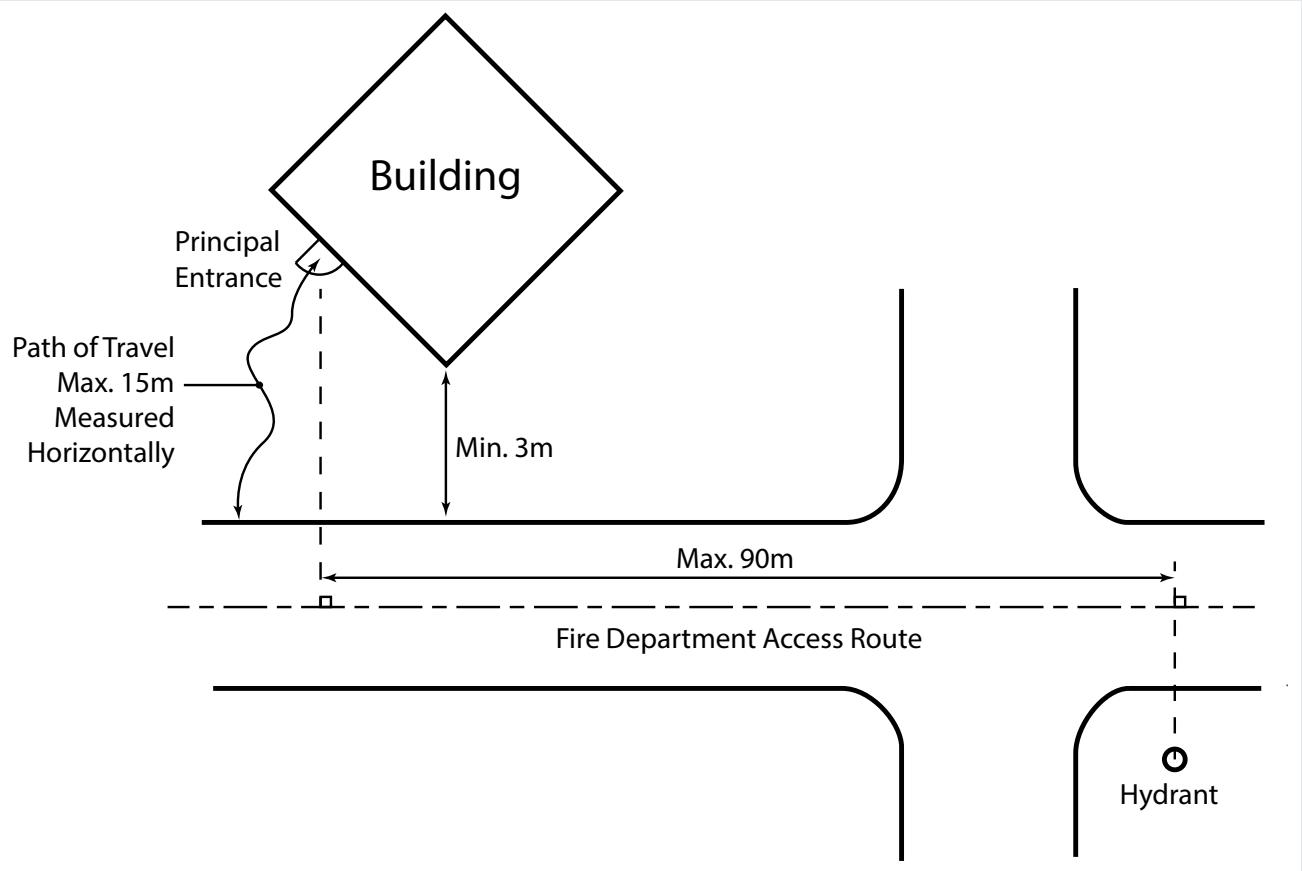

Figure A-3.2.5.5.-D

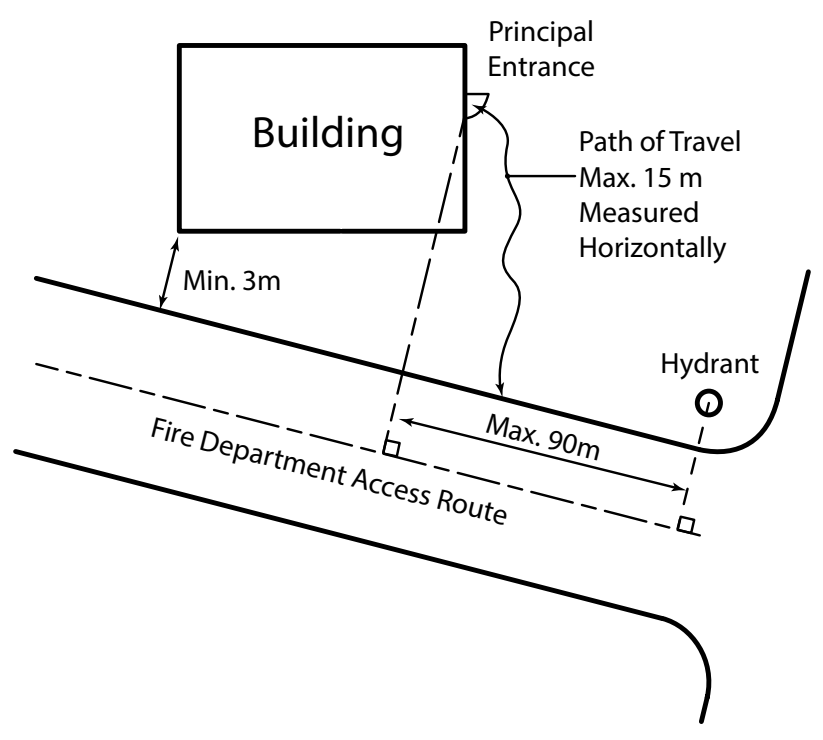

Figure A-3.2.5.5.-E

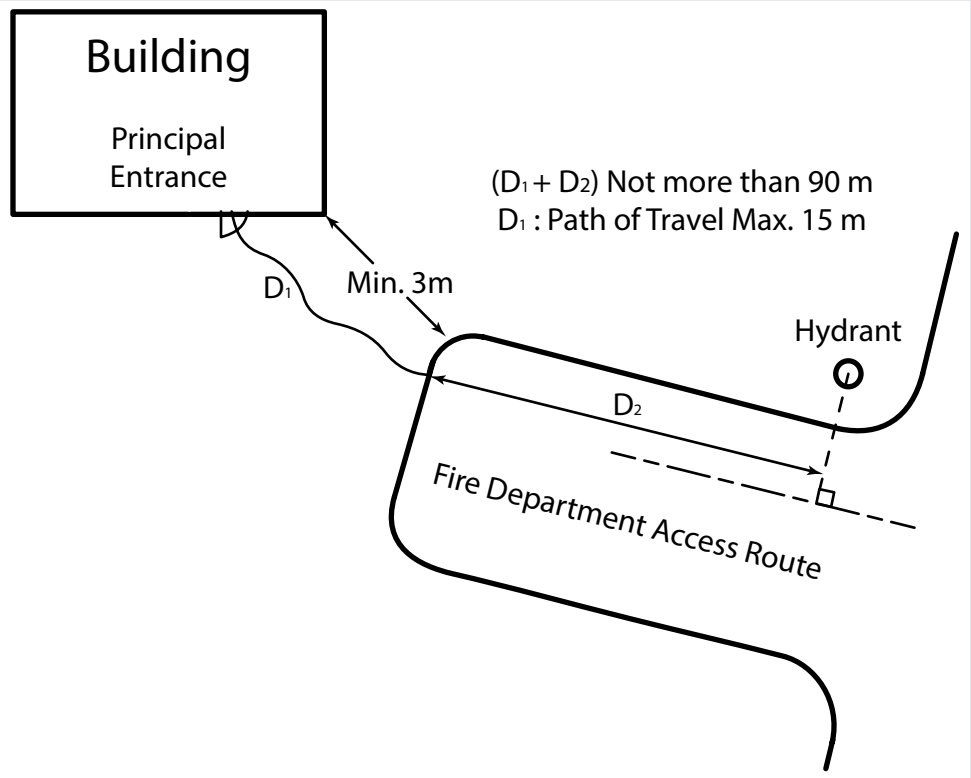

Figure A-3.2.5.5.-F

A-3.2.5.5.(1), (2) and (3)(d) Access Route and Path of Travel. Except as indicated below, no building face or portion thereof should be located less than 3m from an access route nor should the principal entrance of each building be located more than 15m from an access route. These provisions are provided to facilitate Fire Department vehicle staging to the building and to provide direct access for fire fighters from the access route to the principal entrance of each building. For sprinklered detached houses or sprinklered residential row houses, the path of travel from the access route to the entrance door of each residential suite may not be more than 45 m. See Figure A-3.2.5.5.-A, Figure A-3.2.5.5.-B and Figure A-3.2.5.5.-C.

A-3.2.5.5.(4), (5) and (6) Location of Hydrant and Principal Entrance. In the City of Vancouver, hydrants are normally located at street intersections with typical City block lengths of approximately 200 m. If the principal entrance of a building is located mid-block, then the operational procedures and equipment used by the Fire Department will facilitate the 90 m distance between the hydrant location and the principal entrance location as measured in Figure A-3.2.5.5.-D, Figure A-3.2.5.5.-E and Figure A-3.2.5.5.-F.

A-3.2.5.6.(1) Design of Access Routes and Paths of Travel. The design and construction of fire department access routes involves the consideration of many variables, some of which are specified in the requirements in the By-law. All these variables should be considered in relation to the type and size of fire department vehicles available in the municipality or area where the building will be constructed. It is appropriate, therefore, that the local fire department be consulted prior to the design and construction of access routes.

A-3.2.5.6.(3) Width of Fire Department Access Path. The required unobstructed width of the fire department access path assumes that the access path serving one or more dwelling units may be shared. Portions of a path serving only one dwelling unit (whether principal or ancillary) may be 900 mm in width, but where those path are conjoined thereby serving more than one dwelling unit, the path is to be increased from that point to a minimum 1200 mm until it reaches the curb of the access route.

A-3.2.5.7.(1) Water Supply. The intent of Sentence 3.2.5.7.(1) is that an adequate water supply for firefighting be readily available and of sufficient volume and pressure to enable emergency response personnel to control fire growth so as to enable the safe evacuation of occupants and the conduct of search and rescue operations, prevent the fire from spreading to adjacent buildings, and provide a limited measure of property protection.

The water supply requirements for buildings containing internal fire suppression systems, including sprinkler systems and standpipe systems, are contained in specific standards referenced in the By-law. Compliance with the referenced standard, including any

variations made by this By-law, is deemed to satisfy the intent of Sentence 3.2.5.7.(1). However, it will be necessary to verify that an adequate source of water is available at the building site to meet the required quantities and pressures. For a building with no internal fire suppression system, the determination of the minimum requirements applicable to the water supply for firefighting is relevant mainly to building sites not serviced by municipal water supply systems. For building sites serviced by municipal water supply systems, where the water supply duration is not a concern, water supply flow rates at minimum pressures is the main focus of this provision. However, where municipal water supply capacities are limited, it may be necessary for buildings to have supplemental water supplies on site or readily available.

The sources of water supply for firefighting purposes may be natural or developed. Natural sources may include ponds, lakes, rivers, streams, bays, creeks, and springs. Developed sources may include aboveground tanks, elevated gravity tanks, cisterns, swimming pools, wells, reservoirs, aqueducts, artesian wells, tankers, hydrants served by a public or private water system, and canals.

Consideration should be given to ensuring that water sources will be accessible to fire department equipment under all climatic conditions.

The volume of on-site water supply is dependent on the building size, construction, occupancy, exposure and environmental impact potential, and should be sufficient to allow at least 30 minutes of fire department hose stream use.

For the purposes of calculating adequate water supply requirements for fire fighting, the following documents may be useful:

- Insurance Services Office (ISO), "Needed Fire Flow Guide,"
- NFPA 1142, "Standard on Water Supplies for Suburban and Rural Fire Fighting," and
- American Water Works Association, "Distribution Requirements for Fire Protection."

A-3.2.5.9.(5)(c) Fire Department Pumping Equipment. Availability of appropriate pumping equipment from the local fire department or, in the case of industrial plants or complexes, from their fire brigade, is considered sufficient to meet the intent of this requirement.

A-3.2.5.11.(2) Hose Stations. A building that is partially sprinklered may have some floor areas where local sprinklers are installed that do not cover the entire floor area. It is intended that hose stations be provided in these floor areas to allow emergency responders to fight fires that cannot be controlled by local sprinklers.

A-3.2.5.12.(1) Sprinkler System Design. In NFPA 13, "Installation of Sprinkler Systems," reference is made to other NFPA standards that contain additional sprinkler design criteria. These criteria apply to industrial occupancies with high fire loads and industrial occupancies intended for the use, manufacture or storage of highly flammable materials. Therefore, while only NFPA 13 is called up directly by Sentence 3.2.5.12.(1), the additional criteria in the other NFPA standards are included automatically.

In some NFPA standards, certain aspects of sprinkler protection are dependent on the fire-resistance rating of the vertical structural members. In these cases, the sprinkler system design options can be affected by the fire-resistance rating of these elements.

For example, in buildings used for the storage of rubber tires, sprinklers directed at the sides of a column are required if the column does not have the required fire-resistance rating.

Other NFPA standards may require that certain occupancies be sprinklered in conformance with NFPA 13, as in the case of some garages. These requirements do not supersede the requirements in the By-law. An occupancy is required to be sprinklered only when this is specified in the By-law, but when it is so required, it must be sprinklered in conformance with NFPA 13 and its referenced standards.

Additionally, while Part 4 contains seismic force provisions that apply to the design of sprinklers, NFPA 13 contains other structural requirements for sprinklers that are also required to be met.

A-3.2.5.12.(2) Sprinklering of Residential Buildings above a Storage Garage Considered as a Separate Building. For the purpose of determining whether NFPA 13R, "Installation of Sprinkler Systems in Low-Rise Residential Occupancies," applies to a residential building constructed over a storage garage, it is not intended that a storage garage constructed as a separate building in accordance with Article 3.2.1.2. be considered as a storey when determining the building height of the residential building. Similarly, this would not preclude the use of NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," for any one- or two-family home constructed above such a storage garage.

A-3.2.5.12.(6) Sprinklering of Roof Assemblies. Sprinkler protection for roof assemblies in lieu of fire resistance is based on the assumption that the sprinklers will protect the roof assembly from the effects of fire in spaces below the roof. If a ceiling membrane is installed, the sprinklers would have to be located below the membrane in order to react quickly to the fire. In certain instances, however, sprinklers may be required within the concealed spaces as well as below the membrane. NFPA 13, "Installation of Sprinkler Systems," requires sprinklers in certain concealed spaces.

According to NFPA 13 and 13R, some small rooms and closets within a dwelling unit in a sprinklered building, including those that may be in the storey immediately below the roof assembly, do not require sprinklers. However, the Building By-law requires sprinkler protection within all rooms and closets immediately below the roof so as to control any fire that might start in that space and thereby limit the probability of the fire spreading into the roof assembly.

Moreover, NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," also allows the omission of sprinklers in such rooms and closets under certain circumstances, provided the building is sprinklered in conformance with this standard. In this case, the Building By-law concurs with the provisions of the NFPA 13D standard.

A-3.2.5.12.(7) Fast-Response Sprinklers. Several types of sprinkler will respond to a fire faster than a conventional standard response sprinkler. The Response Time Index (RTI) is used to quantify the sensitivity of the sprinkler link for any given sprinkler. The RTI for the group of fast-response sprinklers described below will on average range from 22 $s^{0.5}•m^{0.5}$ to 33 $s^{0.5}•m^{0.5}$. RTI values for standard response sprinklers will typically be in the range of 83 $s^{0.5}•m^{0.5}$ to 110 $s^{0.5}•m^{0.5}$. Any confusion as to the appropriate type of fast-response sprinkler for different types of building should be alleviated by considering the testing criteria described below and the reference to the appropriate NFPA installation standards.

Although the By-law specifies where fast-response sprinklers are required, it does not prevent the appropriate use of fast-response sprinklers in other occupancies.

Residential sprinklers are tested in accordance with ANSI/UL-1626, "Residential Sprinklers for Fire-Protection Service." They are installed in accordance with NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height," with NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," and with Section 5-4.5 of NFPA 13, "Installation of Sprinkler Systems," for residential occupancies and for dwelling units.

Quick-response sprinklers are tested in accordance with ANSI/UL-199, "Automatic Sprinklers for Fire-Protection Service." They are installed in accordance with NFPA 13, "Installation of Sprinkler Systems," for spacing, density and location. They are acceptable for limited use as described in NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height," but are not permitted for use under NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes."

Early-suppression fast-response sprinklers are tested in accordance with FM Approvals Class Number 2008, "Approval Standard for Quick Response Storage Sprinklers for Fire Protection." They are installed in accordance with NFPA 13, "Installation of Sprinkler Systems," but are not accepted for use under either NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height," or NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes."

Quick-response extended-coverage sprinklers are tested in accordance with ANSI/UL 199, "Automatic Sprinklers for Fire-Protection Service." They are installed in accordance with NFPA 13, "Installation of Sprinkler Systems," for spacing, density and location. They are acceptable for limited use as permitted by NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height," but are not permitted for use under NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes."

A-3.2.5.12.(8) Balconies and Decks. The intent of Sentence 3.2.5.12.(7) is to suppress or control the spread of a fire originating from a balcony or deck to the roof assembly or other parts of the building.

A-3.2.5.12.(9) Sprinkler Rating. The requirements of this Sentence can be met by using sprinklers with a rating of 79°C to 107°C.

A-3.2.5.13.(1) Hazard Classification for Sprinkler Selection. The reference to light hazard occupancies is based on the descriptions of these occupancies given in NFPA 13, "Installation of Sprinkler Systems," and is intended only for use in the design of sprinkler systems. These descriptions should not be confused with the occupancy classifications in the By-law.

In NFPA 13, a light hazard occupancy is one in which the quantity or combustibility of contents is low and fires with relatively low rates of heat release are expected. Typical buildings or parts of buildings include: churches; clubs; eaves and overhangs, if of combustible construction with no combustibles beneath; educational buildings; hospitals; institutional buildings; libraries, except very large stack rooms; museums; nursing or convalescent homes; offices, including data processing rooms; residential buildings; restaurant seating areas; theatres and auditoria, excluding stages and proscenia; and unused attics.

Although NFPA 13R, "Installation of Sprinkler Systems in Low-Rise Residential Occupancies," and NFPA 13D, "Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes," as referenced by NFPA 13, are concerned with specific types of residential occupancy, namely apartment buildings up to four storeys, houses containing up to two dwelling units, and

mobile homes, for the purpose of acceptance of combustible sprinkler piping these occupancies are considered to be included in the category of residential buildings under light hazard occupancies.

A-3.2.5.18.(1) Fire Pumps. In order to ensure an adequate water supply, it may be necessary to install a fire pump for a building that has either a standpipe system or an automatic sprinkler system installed.

A-3.2.5.20. Radio Antenna System. Buildings of noncombustible construction or buildings that have glazing with a low emissivity rating can cause interference with radio signals that are necessary for emergency, firefighting and rescue operations. The installation of a radio antenna system should be shown on drawings submitted for building permit, and related permits. A complete design of the radio antenna system will be required on plans to be submitted for the building permit and should be design in accordance with the general specification provided by Vancouver Fire and Rescue Services. See Fire Department publication "Vancouver Fire Rescue Services Specifications for Radio Antenna System Design, Installation and Acceptance Testing" as updated from time to time. By-law users are advised to keep up-to-date. The technical specifications as of May 2019 are reproduced here for convenience.

Specifications for Radio Antenna System - Design, Installation and Acceptance Testing (May 2019)

1. SCOPE

1.1. This Specification describes the requirements for the design, installation, and acceptance testing of a radio antenna system in a building.

12. The installation of radio antenna system equipment and devices not covered by this Specification shall be in accordance with good engineering practice and the manufacturer's installation instructions.

1.3. The work in this section shall be performed under the supervision of a registered professional engineer in British Columbia

2. REQUIREMENTS OF RADIO ANTENNA SYSTEMS

2.1. GENERAL

2.1.1. Radio antenna systems for emergency responders are an integral component of the life safety equipment of a building or structure. The primary function is to provide reliable emergency responder communications at the required signal strength within the specified areas.

2.1.2. Provide an in-building radio antenna system to provide coverage in the building for the public safety agencies as required by the local fire department and other agencies and authorities having jurisdiction. System users shall receive and transmit radio broadcasts from their portable radio units within the building. This shall be accomplished utilizing the following components, which if applicable shall conform to UL 2524 "Standard for In-building 2-Way Emergency Radio Communication Enhancement Systems":

a) Bi Directional Amplifiers (Signal Boosters)
b) Coaxial Cable
c) Frequency filters
d) Donor and discrete antennas
e) Other components and interconnecting circuitry as required

2.1.3. Radio antenna systems shall not rely on mobile repeaters installed on fire department apparatus.

2.1.4. The entire system shall meet with approval of the Fire Chief, Chief Building Official, and Director of Planning for the City of Vancouver (the authorities having jurisdiction, AHJ).

2.1.5. All permits necessary for the installation of the work shall be obtained from the AHJ prior to the commencement of the work. All permit costs and inspection fees shall be included as the part of the required work.

2.2. FEDERAL LICENSE

2.2.1. All active systems shall be licensed by the federal regulator, Innovation, Science & Economic Development Canada (ISED), and shall comply with the applicable Standard Radio Systems Plan (SRSP).

2.2.2. The installing contractor shall arrange to obtain the federal license to operate on behalf of the owner.

2.2.3. The installing contractor shall be responsible for any fees and costs to obtain the federal license for the first year of operation.

2.2.4. Any license required shall be renewed annually by the building owner and the cost of the licensing borne solely by the building owner.

3. PLANS AND SUPPORTING DOCUMENTS

3.1 The plans and supporting documents for the radio antenna system shall include a complete and detailed description of the following:

a) Installation instructions
b) Location of in-building antenna
c) Location of donor antenna
d) Location of riser and trunk on each floor
e) Location of amplifier, repeater, and head-end equipment
f) Connection to the fire alarm system for a common trouble zone
g) Critical locations requiring coverage
h) Method of Acceptance Testing

4. INSTALLATION OF RADIO ANTENNA EQUIPMENT

4.1 AMPLIFIERS, REPEATERS AND HEAD-END EQUIPMENT

4.1.1. Amplifiers, repeaters, and head-end equipment shall be located in a service room that is provided with not less than 1 h fire-resistance rating.

4.1.2. All amplifiers, repeaters, and head-end equipment required by the radio antenna system shall be protected by enclosures rated CSA Type 3 or higher.

4.1.3. All amplifiers, repeaters and head-end equipment shall be provided with drip shield to guard against water spray from fire sprinklers located in the room unless the enclosures are rated CSA Type 4 or higher.

4.2 DISTRIBUTED ANTENNA SYSTEM

4.2.1. One in-building antenna shall be located within 20 m of the elevator door opening at each odd-numbered storey.

4.2.2. One in-building antenna shall be located inside each exit stair shaft at the landing of each even numbered storey.

4.2.3. Additional in-building antennas shall be installed to provide 98 percent radio coverage inside each critical area as described in the Vancouver Building By-law.

4.2.4. Sufficient antenna isolation shall be maintained between the donor antenna and all in-building antenna (D.A.S.) under all operating conditions

4.3 WIRING

4.3.1. Cables and wires shall be FT-4 rated, and where installed inside plenums, cables and wires shall be FT-6 rated.

4.3.2. Except within service rooms containing the amplifiers, repeaters and head-end equipment, cables and wires installed in the risers shall be mechanically protected per the Electrical Code.

4.4 INTERCONNECTION TO THE FIRE ALARM SYSTEM

4.4.1. The radio antenna system shall be monitored by the building fire alarm system for common trouble

4.5 PROVISION FOR RADIO ANTENNA SYSTEM EXPANSION

4.5.1. Raceways shall be installed to allow installation of future in-building antenna in the floor area of each storey not already provided with wiring or horizontal distribution.

5. ACCEPTANCE TESTING

5.1 Adequate Radio Coverage

5.1.1. The intent is to achieve -95 dBm on the current public safety bands. Good design should provide a margin of not less than 10 dB to allow for uncontrolled variables. Based on the foregoing, the design target for indoor coverage should be -85 dBm.

5.1.2. The radio frequency range to be supported shall be any frequencies used by the public safety communications service provider's network. If signal amplifiers are used, they shall include filters that will protect the amplifiers from overload and the system from interference by out-of-band signals.

5.1.3. In the event that active amplification is required to meet the foregoing communication quality requirements in the building, coordination with the public safety communications service provider is required to ensure that its outdoor radio communication performance is not degraded. If there is a trade-off to be made between maintaining the public safety communications service provider's outdoor radio communication performance and restoration of signal strength in the building, the trade-off decision shall be made by the public safety communications service provider and communicated to the Fire Chief by the building owner.

5.2 System Verification Procedures

5.2.1. Tests shall be performed by RF technicians under supervision of a professional engineer registered in the Province of British Columbia. Test reports shall bear the seal of the engineer.

5.2.2. If required by the engineer, during the engineer's acceptance test, portable handheld radios used for speech and coverage acceptance shall be the same type used by Vancouver Fire and Rescue Services.

5.2.3. Acceptance tests and measurements shall be performed after completion of installation of the Radio Antenna System. Tests shall be performed using radio frequencies assigned by the public safety communications service provider, after proper coordination with an authorized representative of that system and with the Fire Chief.

5.2.4. Where the floor area of a critical location is greater than 4,500 m² the area shall be divided into a uniform grid of not more than 15 m on a side, or if the floor area is smaller than 4,500 m² it shall be divided into a uniform grid of approximately 20 equal areas, to a minimum of 9 m², and measurements shall be taken in each grid area. The size of the grids shall also be reduced, or the number of grids increased, upon recommendation of the Fire Chief or inspector in areas where special construction or other obstruction may significantly affect communications.

5.2.5. If the Radio Antenna System fails to provide acceptable communication in any of the critical locations as stipulated in the Building By-law, the building owner shall have the system rectified to meet the 98% coverage requirement for these areas; otherwise the Radio Antenna System will not be accepted.

5.3 Tests for Optimization

5.3.1. The radio antenna system shall be optimized to provide maximum coverage of the remainder of the floor areas while providing 98 % coverage in the critical locations.

5.4 Tests of Power Supply

5.4.1. Backup batteries and power supplies shall be tested under full load using a minimum of a 90% duty cycle for a period of at least one hour. If within the one-hour period, the battery shows no symptom of failure or impending failure, the test shall be continued for additional one-hour periods to determine the integrity of the battery. The battery shall not fail within a four-hour continuous test period.

5.4.2. Alternatively, the power supply may be connected to the building emergency generator with the backup batteries to supply a four-hour continuous power supply.

6. DOCUMENTATION

6.1 DOCUMENTATION REQUIRED

6.1.1. The documentation required by this section shall be maintained on site in a box located in a location acceptable to the Fire Chief.

6.1.2. Documentation for the radio antenna system shall include the following description of the radio antenna system:

a) Instructions for resetting the system
b) Equipment operating instructions or manuals
c) Equipment maintenance instructions
d) Equipment testing instructions
e) Optimization tests
f) Signal strength tests at critical locations
g) Results of battery test
h) Results of testing of connection to the fire alarm system

6.1.3. The designer of the radio antenna system shall prepare the Health SC6 report which certifies the system meets Safety Code 6.

6.1.4. After installation of the radio antenna system is completed, the designer shall provide confirmation that the radio antenna system meets Safety Code 6.

6.1.5. A copy of the annual operating licence issued by Federal communications agency shall be included in the fire safety plan for the building.

A-3.2.6. Smoke Control for High Buildings. Experience with high buildings has shown that the time required for complete evacuation can exceed that which is considered necessary for the safe egress of all occupants. Studies of the "chimney effect" and observations of smoke movement in actual fires have shown that fire compartmentation to contain a fire on any one storey will not usually prevent the movement of smoke through elevator, stair and other vertical shafts to the upper floors of a high building.

Occupants of a high building in which an automatic sprinkler system is not installed, and particularly those on upper storeys, could be faced with severe smoke conditions from fires occurring in storeys below them before their own evacuation is possible.

The requirements of Subsection 3.2.6. are intended to maintain safe conditions for occupants of a high building who may have to remain in the building during a fire, and to assist the firefighters by providing efficient access to the fire floor. The Notes for Subsection 3.2.6. are intended to assist a designer in complying with the requirements of Subsection 3.2.6. The knowledge requirements are well within the capabilities of a competent designer. The designer should appreciate, however, that successful application requires a clear understanding of the principles that govern smoke movement. Subsection 3.2.6. contains only those items that relate to the design and construction of a building; operation of the facilities and recommended actions to be taken by the building owner, occupant and fire department are covered by the Fire By-law.

The designer is cautioned that the tabular and graphical information in the Notes for Subsection 3.2.6. was developed for buildings having conventional configurations. The designer has to judge the extent to which the building under consideration has characteristics that will allow the application of this information; this is particularly true of designs employing air-handling systems for which a realistic assessment of the leakage characteristics of the enclosures of spaces may be critical.

It is assumed that buildings regulated by Subsection 3.2.6. will be in an area served by a fire department capable of an early response and that all firefighting and rescue situations will be under the direct control of the officer-in-charge of the fire department responding to the emergency. It is important that firefighters be provided with a smoke-free access to fire floors below grade. Provisions are included to separate exit stairways serving storeys above grade from those serving storeys below grade, and to limit entry of smoke into these shafts. Similarly, elevator hoistways and service shafts are required to be provided with a separation near grade, or be designed to limit their functioning as paths of smoke movement into upper floor areas from storeys below grade.

It is assumed that in the event of fire, occupants of the floor on which the fire occurs will leave by exit stairs immediately following the sounding of a fire alarm, and that occupants of the floor immediately above the floor on which the fire occurs will be advised to leave by the first fire department officer on the scene or other person assigned this responsibility. Occupants of all other floors may remain on their floors unless otherwise directed. It is also assumed that the owner of the building has complied with the Emergency Planning Section of the Fire By-law by preparing a comprehensive fire safety plan to safeguard the building occupants and that the building supervisory staff are familiar with the requirements of Subsection 3.2.6. and with their responsibilities under the fire safety plan.

The Building By-law requires that a check be made of the smoke control and mechanical venting systems.

Testing will indicate deficiencies caused by inexact estimates of the leakage characteristics or of air supply requirements and, in all but the most extreme cases, will provide an opportunity for appropriate adjustments before the system is put into service.

3.2.6.1.(2) Six Storey Buildings. One of the key concerns for high-buildings is the potential for increased smoke movement in a fire as a consequence of stack-effect. One of the provisions of 3.2.6.1.(2) is to prohibit stairs or elevators from directly connecting more than 6 storeys consecutively. This prohibition is intended to limit the potential for smoke to enter the stairs or elevator shafts and contaminate floor areas above. However, this prohibition is not intended to restrict the potential for stairs or elevators to serve other floors or levels as long as they are provided with acceptable measures to limit the uncontrolled movement of smoke between floor levels. Designers may wish to consider the use of vestibules or other measures described in note A-3.2.6.2.(4) as part of a design solution to control smoke movement.

A-3.2.6.2.(2) Stairway Protection Below Lowest Exit Level. A stairway serving floors below the lowest exit level is considered to comply with the intent of Sentence 3.2.6.2.(2) if the following conditions are satisfied.

1) The stairway has a vent or door to the outdoors at or near the top of the stair shaft that has an openable area of not less than 0.1 m^2 for each storey served by the stairway, less 0.01 m^2 for each weatherstripped door and 0.02 m^2 for each door that is not weatherstripped opening into the stairway.

2) The stairway is enclosed in a shaft that

a) does not pass through the floor above the lowest exit level and is separate from a shaft that contains a stairway serving upper storeys, or

b) contains a stairway serving upper storeys, but is separated from that stairway at the lowest exit level by a fire separation having a fire-resistance rating not less than that required for the shaft enclosure.

3) The stairway is provided with equipment capable of maintaining a flow of air introduced at or near the bottom of the stair shaft, at a rate equal to 0.47 m^3/s for each storey served by the stairway.

A-3.2.6.2.(3) Pressurization of Stair Shafts. The purpose of providing open doors and vents at the bottom of a stair shaft is to create a positive pressure in the shaft relative to adjacent floor areas and thus keep it free of smoke. The pressure depends on the temperature differential between the interior and the exterior of the building which is most pronounced during winter months

when stack effect is greatest. If a shaft does not have a direct opening to the exterior, alternative means must be provided to achieve smoke control. If a corridor or vestibule is used as a link between the exit level of an interior stair shaft and the outdoors to provide a venting system, it will be necessary to assess the reliability of the overall system. The probability of all doors or closures being opened at the same time has to be addressed, as well as the size of the vestibule and its impact on the overall smoke control system.

If mechanical methods are used to develop a positive pressure in a stair shaft, a minimum pressure differential of 12 Pa is recommended to prevent smoke migration from floor areas in a sprinklered building where fire temperatures are controlled and smoke movement may be dominated by stack effect in a stair shaft. During a fire emergency, persons will be entering and exiting a stair shaft as they move to a place of safety and under these conditions the number of doors open to the stair shaft cannot be predetermined.

The number will vary depending on the occupancy of the building, population density and the evacuation plan for the building.

It should be assumed that two doors are open. This is based in part as a practical level for most buildings and considers the positive fire experience in sprinklered buildings.

The maximum pressure differential created by a mechanical system should not prevent doors to the stair shafts from being opened.

A specific maximum value cannot be given, as this value will depend on the door opening force and size of the door. These values should be calculated for each specific case. Although a maximum value of 130 N is suggested by research as the force that can be opened by the majority of people in most occupancies, this value is above the maximum value of 90 N generally specified in this By-law.

The use of values below 130 N can create a practical problem in achieving effective smoke control as it is difficult to design for the acceptable minimum and maximum pressure differential range. Special consideration may need to be given for doors located in an accessible path of travel.

Care should be taken by designers and by building and fire officials in implementation of these requirements. Assumptions involved in the design of a smoke control system may be different from final construction conditions. For this reason each system should be tested after installation to ensure that the design intent is met. The minimum pressure differential is not intended to apply to locations in stair shafts when doors in their proximity are open to adjacent floor areas.

A-3.2.6.2.(4) Limiting Smoke Movement. Measures to prevent the migration of smoke from floor areas below the lowest exit storey into upper storeys include the following.

1) An elevator hoistway that passes through the floor above the lowest exit storey should not penetrate the floor of the storey immediately below the lowest exit storey, unless there is a vestibule between the shaft and each floor area below the lowest exit storey that

a) has a fire separation, with a fire-resistance rating not less than 45 min, between the vestibule and any public corridor,

b) has a fire separation, with a fire-resistance rating not less than that required for an exit by Article 3.4.4.1., between the vestibule and any stair or elevator enclosure or any part of a floor area, other than a public corridor, and

c) except for elevator hoistway entrances, has a self-closing device on any door through the fire separation required by Clauses (a) and (b), with the door opening in the direction of travel from the floor area to the exit stairway.

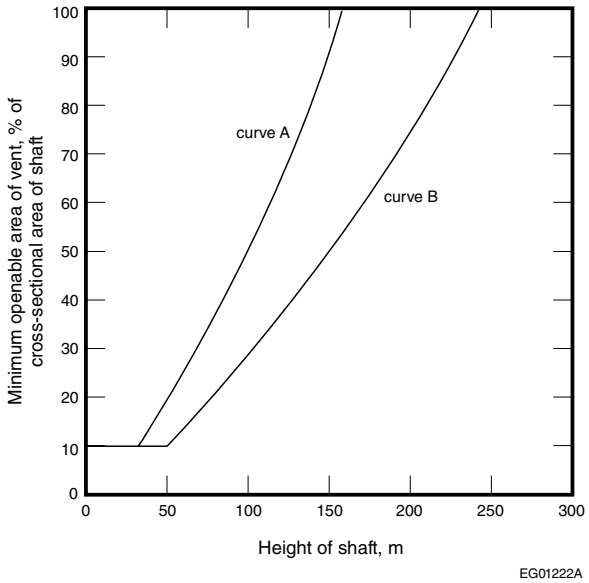

Figure A-3.2.6.2.(4)-A
Vent to a vertical service space with no other pressurized shaft in the building

Notes to Figure A-3.2.6.2.(4)-A:

(1) Curve A applies to a vertical service space that is enclosed by unplastered unit masonry or by plaster and steel stud construction with all openings in the shaft sealed to the degree required by Articles 3.1.9.1. to 3.1.9.5.

(2) Curve B applies to a vertical service space that is enclosed by monolithic concrete or by plastered unit masonry with all openings in the shaft sealed tightly to minimize air leakage.

(3) A shaft having a vent that is 100% of the cross-sectional area of the shaft is acceptable for buildings up to 1.5 times the height shown by the appropriate curve in Figures A-3.2.6.2.(4)-A and A-3.2.6.2.(4)-B.

(4) The total leakage area, based on measurements in typical high buildings, is assumed to be 0.025 m^2 for every 10 m^2 of shaft wall area in the case of Curve A and 0.015 m^2 for every 10 m^2 of shaft wall area in the case of Curve B.

2) A vertical service space, other than an elevator hoistway, that passes through the floor assembly above the lowest exit storey, should be provided with a tight-fitting noncombustible seal or fire stop at the floor assembly of the storey immediately below the lowest exit storey, unless

a) the vertical service space is vented to the outdoors at the top and the vent has an openable area that is not less than
   i) that obtained from Figure A-3.2.6.2.(4)-A if the vertical service space is in a building in which other shafts are not mechanically pressurized, or
   ii) that obtained from Figure A-3.2.6.2.(4)-B if the vertical service space is in a building in which other shafts are mechanically pressurized,

b) for a shaft that serves floor areas above the lowest exit storey, a vent is located
   i) at or near the top of the shaft if the shaft is above the mid-height of the building, or
   ii) at or near the foot of the shaft at or near the exit level if the top of the shaft is below the mid-height of the building, or

c) for a shaft that serves floor areas below the lowest exit storey, a vent is located at or near the top of the shaft.

3) Any closure provided for a vent opening referred to in Sentence (2) must be openable:

a) manually,

b) on a signal from a smoke detector located at or near the top of the shaft, and

c) by a control device located at the central alarm and control facility.

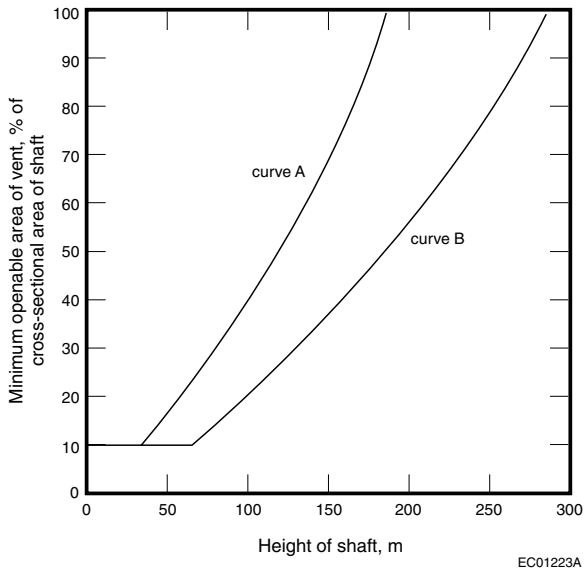

Figure A-3.2.6.2.(4)-B
Vent to a vertical service space with other pressurized shafts in the building

Notes to Figure A-3.2.6.2.(4)-B:

(1) Curve A applies to a vertical service space that is enclosed by unplastered unit masonry or by plaster and steel stud construction with all openings in the shaft sealed to the degree required by Articles 3.1.9.1. to 3.1.9.5.

(2) Curve B applies to a vertical service space that is enclosed by monolithic concrete or by plastered unit masonry with all openings in the shaft sealed tightly to minimize air leakage.

(3) A shaft having a vent that is 100% of the cross-sectional area of the shaft is acceptable for buildings up to 1.5 times the height shown by the appropriate curve in Figures A-3.2.6.2.(4)-A and A-3.2.6.2.(4)-B.

(4) The total leakage area, based on measurements in typical high buildings, is assumed to be 0.025 m^2 for every 10 m^2 of shaft wall area in the case of Curve A and 0.015 m^2 for every 10 m^2 of shaft wall area in the case of Curve B.

A-3.2.6.3.(1) Connected Buildings. The measures described here are intended to prevent movement of smoke from one building to another. They are of particular significance for two buildings of unequal height that are joined together. The techniques suggested are the provision of a large opening to the outdoors in a connecting vestibule so that smoke entering through leakage areas around doors will be vented to the outdoors, or pressurization to maintain a higher pressure in the vestibule than in adjacent spaces, as illustrated in Figures A-3.2.6.3.(1)-A, A-3.2.6.3.(1)-B and A-3.2.6.3.(1)-C.

The provisions for protection of openings are described in terms appropriate to a doorway. Openings other than doorways should be avoided if possible. Openings should be protected by an airlock that gives the same standard of protection as the vestibule referred to below.

The requirement of Article 3.2.6.3. that limits movement of smoke from one building to another may be met by incorporating in the link between the buildings the provisions of Sentences (1) and (2).

1) A firewall conforming to Subsection 3.1.10. is constructed between one building and the other with any opening in the firewall protected against the passage of smoke by a vestibule that has

a) a fire separation between the vestibule and a public corridor with a fire-resistance rating not less than 45 min,

b) a fire separation between the vestibule and the remainder of the floor area, other than a public corridor, with a fire-resistance rating not less than that required by Article 3.4.4.1. for an exit,

c) a fire separation between the vestibule and a stair enclosure or elevator hoistway with a fire-resistance rating not less than that required by Article 3.4.4.1. for an exit, and

d) any door in the fire separation required by Clauses (a), (b) or (c), except for an elevator entrance, provided with a self-closing device as required by Article 3.1.8.13. and opening in the direction of travel from the floor area to the exit stairway.

2) The vestibule referred to in Sentence (1) should have

a) a vent to the outdoors that has a net area of $10(0.023\ d + 0.00045\ a)\ m^2$, where 'd' is the number of doors having a perimeter not more than 6 m that open into the vestibule, or if the perimeter of doors exceeds 6 m, the value 'd' is increased in direct proportion to the increase in the perimeter, and 'a' is the area in square metres of enclosing walls, floors and ceilings whose outer face is in contact with the outside air, except that where the outer face of a

wall is in contact with the ground or fill, it is assumed that there is no leakage through that portion, and the value of 'a' is assumed to be zero, or

b) equipment capable of maintaining a supply of air into the vestibule sufficient to ensure that the air pressure in the vestibule when the doors are closed is higher by at least 12 Pa than that in adjacent floor areas when the outdoor temperature is equal to the January design temperature on a 2.5% basis.

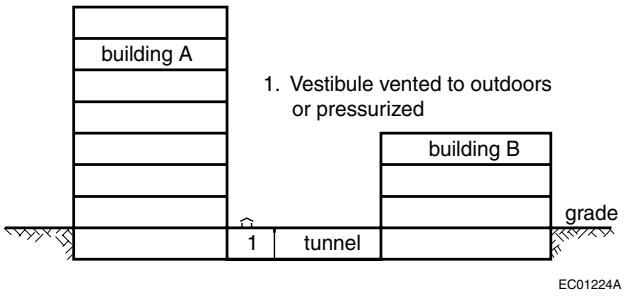

Figure A-3.2.6.3.(1)-A
Buildings connected by a tunnel

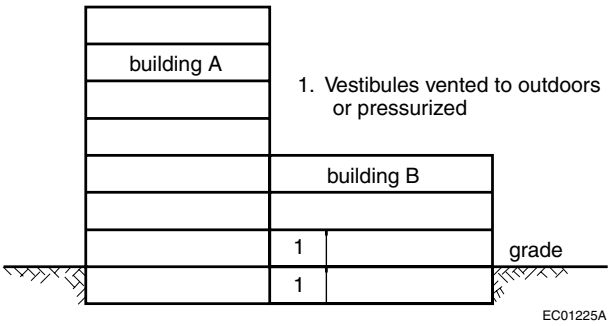

Figure A-3.2.6.3.(1)-B
Buildings connected at a firewall

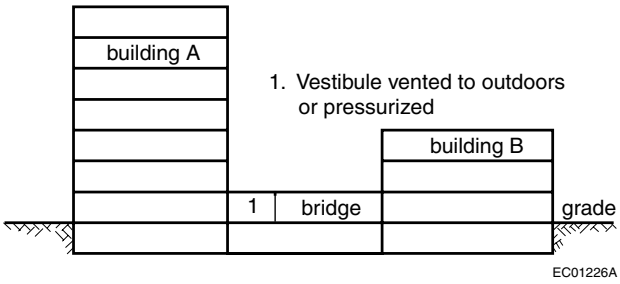

Figure A-3.2.6.3.(1)-C
Buildings connected by a bridge

A-3.2.6.5.(6)(b) Electrical Cable Protection. Electrical cables that provide continuous operation for 1 h when subjected to the fire exposure of the time/temperature curve of CAN/ULC-S101, "Fire Endurance Tests of Building Construction and Materials," do not need additional protection against exposure to fire.

A-3.2.6.6.(1) Venting to Aid Firefighting. The requirements of Sentence 3.2.6.6.(1) are met by incorporating in a floor area windows or wall panels, as described in Sentence (1), by smoke shafts as described in Sentences (2) to (8), or by the use of building exhaust systems as described in Sentence (9).

1) If windows or wall panels are used for venting, they must

a) be uniformly distributed along the exterior wall of each storey,

b) have a total area not less than 1% of the exterior wall area of each storey,

c) be readily openable from the interior without the use of wrenches or keys,

d) be readily identified from the interior, and from the exterior where they are accessible to firefighters, and

e) be designed so that when opened they will not endanger persons outside the building during a fire.

2) If one or more smoke shafts or vertical service spaces are used for venting, they must

a) have an opening or openings into each storey with an aggregate area not less than that obtained from Table A-3.2.6.6.(1)-A for the height of the building and the area of the largest floor area served by the smoke shaft, and the leakage characteristics of the shaft wall and closures obtained from Tables A-3.2.6.6.(1)-B and A-3.2.6.6.(1)-C,

b) have an aggregate unobstructed cross-sectional area equal to that required by Clause (a), and

c) be designed to comply with the requirements of Sentence (3).

3) Each smoke shaft or vertical service space described in Sentence (2) must

a) be separated from the remainder of the building by a fire separation that has a fire-resistance rating not less than that required for the floor assembly through which it passes, or be designed as a chimney conforming to Part 6, except that flue liners need not be provided,

b) have an opening to the outdoors at the top that has an area not less than the cross-sectional area of the shaft, with the opening protected from the weather,

c) terminate not less than 900 mm above the roof surface where it penetrates the roof, and

d) contain no combustible material, fuel lines or services that are required for use in an emergency.

4) Each opening required by Clause (2)(a) must be located so that the top of the opening is not more than 250 mm below the ceiling, except that the opening may be above the ceiling if the ceiling freely allows passage of air.

5) The opening into the smoke shaft must be provided with a closure that

a) has a fire-protection rating conforming to Sentence 3.1.8.4.(2), except that the temperature on the unexposed face of the closure shall be not more than 250 °C after 30 min during the fire test used to determine its rating,

b) is no closer to combustible material, except for paint or tightly-adhering paper covering not more than 1 mm thick applied to a noncombustible backing, than the distances described in Table A-3.2.6.6.(1)-D,

c) can be opened from a remote location such as a stair shaft, the storey immediately below, or the central alarm and control facility, and

d) does not open automatically on any floor, other than the fire floor, when smoke and hot gases pass through the shaft.

6) Closures for openings described in Clause (3)(b) must

a) be openable from outside the shaft, and

b) open automatically

i) on a signal from a smoke detector in the shaft,

ii) by operation of the fire alarm system, and

iii) when the closure required by Sentence (5) opens.

7) A smoke shaft opening referred to in Sentence (2) that is less than 1 070 mm above the floor must conform to Article 3.3.1.18.

8) If a closure is required to comply with Sentence (5), the leakage area between closure components and between closure and frame must not be more than 3% of the openable area of the closure.

9) The building air handling system may be used for smoke venting, provided

a) the system can maintain an exhaust to the outdoors at the rate of 6 air changes per hour from any floor area, and

b) emergency power to the fans providing the exhaust required by Clause (a) is provided as described in Article 3.2.7.9.

Table A-3.2.6.6.(1)-A
Minimum Size of Vent Openings into Smoke Shafts from Each Floor Area, m²[1][2]
Forming Part of Note A-3.2.6.6.(1)

Floor Area, m²	Leakage Area, %[3]	Building Height, m								
		18	37	73	110	146	183	220	256	293
200		0.10	0.11	0.13	0.15	0.16	0.18	0.19	0.20	0.22
500		0.22	0.25	0.29	0.32	0.36	0.37	0.39	0.41	0.43
1 000		0.43	0.48	0.53	0.59	0.63	0.67	0.71	0.75	0.77
2 000		0.83	0.91	1.01	1.08	1.16	1.22	1.29	1.34	1.39
3 000	0	1.21	1.33	1.46	1.55	1.67	1.75	1.82	1.90	1.97
4 000		1.62	1.75	1.90	2.02	2.15	2.25	2.35	2.44	2.53
5 000		2.01	2.17	2.34	2.46	2.63	2.74	2.86	2.88	3.07
6 000		2.39	2.57	2.76	2.91	3.10	3.23	3.37	3.47	3.58
200		0.10	0.12	0.15	0.19	0.22	0.27	0.35	0.43	0.55
500		0.23	0.27	0.35	0.40	0.49	0.57	0.69	0.83	1.04
1 000		0.44	0.50	0.71	0.72	0.86	1.01	1.19	1.43	1.73
2 000		0.85	0.97	1.15	1.33	1.56	1.81	2.10	2.48	2.95
3 000	1	1.26	1.42	1.67	1.91	2.23	2.56	2.97	3.47	4.08
4 000		1.66	1.88	2.18	2.49	2.37	3.28	3.79	4.40	5.16
5 000		2.07	2.32	2.69	3.05	3.51	3.99	4.60	5.32	6.21
6 000		2.47	2.76	3.18	3.59	4.14	4.68	5.37	6.20	7.23
200		0.10	0.13	0.18	0.24	0.37	0.61	1.28	4.60	89.57
500		0.24	0.29	0.39	0.52	0.75	1.13	2.10	6.11	94.50
1 000		0.46	0.55	0.72	0.94	1.30	1.90	3.27	8.29	102.11
2 000		0.88	1.05	1.34	1.73	2.32	3.28	5.36	12.14	116.80
3 000	2	1.31	1.53	1.95	2.47	3.29	4.58	7.28	15.63	130.83
4 000		1.73	2.01	2.55	3.20	4.23	5.83	9.12	19.97	144.03
5 000		2.15	2.49	3.13	3.92	5.15	7.05	10.90	22.15	157.05
6 000		2.57	2.96	3.73	4.63	6.07	8.26	12.65	25.39	169.29
200		0.11	0.14	0.21	0.37	0.88	2.06			
500		0.25	0.31	0.47	0.76	1.58	9.00			
1 000		0.47	0.59	0.86	1.33	2.60	11.99			
2 000		0.91	1.12	1.60	2.41	4.47	17.46			
3 000	3	1.35	1.64	2.31	3.43	5.21	22.48			
4 000		1.79	2.17	3.02	4.43	7.91	27.29			
5 000		2.22	2.68	3.71	5.42	9.55	31.95			
6 000		2.65	3.20	4.40	6.39	11.18	36.47			
200		0.11	0.15	0.28	0.70	24.83				
500		0.25	0.34	0.58	1.33	29.18				
1 000		0.49	0.63	1.06	2.27	36.07				
2 000		0.95	1.21	1.97	3.99	48.56				
3 000	4	1.41	1.78	2.84	6.63	60.15				
4 000		1.86	2.34	3.70	7.22	71.15				
5 000		2.21	2.90	4.55	8.79	81.81				
6 000		2.75	3.46	5.40	10.33	90.05				
200		0.11	0.16	0.36	3.33					

Table A-3.2.6.6.(1)-A *(continued)*
Minimum Size of Vent Openings into Smoke Shafts from Each Floor Area, m²[1][2]
Forming Part of Note A-3.2.6.6.(1)

Floor Area, m²	Leakage Area, %[3]	Building Height, m								
		18	37	73	110	146	183	220	256	293
500		0.28	0.36	0.76	5.09					
1 000		0.50	0.69	1.37	7.67					
2 000		0.99	1.31	2.54	12.35					
3 000	5	1.46	1.94	3.65	16.75					
4 000		1.92	2.55	4.75	20.99					
5 000		2.40	3.16	5.84	25.11					
6 000		2.87	3.74	6.92	29.11					

Notes to Table A-3.2.6.6.(1)-A:

(1) The minimum size of a vent opening into a smoke shaft is obtained from Table A-3.2.6.6.(1)-A and is dependant on the floor area and total leakage area of the smoke shaft walls and closures. This tal leakage area may be estimated by adding the leakage areas for the shaft wall obtained from Table A-3.2.6.6.(1)-B and for the dampered openings obtained from Table A-3.2.6.6.(1)-C, provided the cross-sectional area of the smoke shaft, the opening into the shaft and the opening to the outdoors at the top of the shaft are equal.

(2) The size of the vent opening refers to the free or unobstructed area of the opening.

(3) Leakage area is the total of the leakage area of smoke shaft wall obtained from Table A-3.2.6.6.(1)-B and the leakage area of openings in smoke shafts obtained from Table A-3.2.6.6.(1)-C.

Table A-3.2.6.6.(1)-B
Leakage Area of Smoke Shaft Wall
Forming Part of Note A-3.2.6.6.(1)

Wall Construction	Leakage Area as % of Wall Area
Monolithic Concrete	0.5
Masonry wall unplastered	1.5
Masonry wall plastered	0.5
Gypsum board on steel stud	1.0

Table A-3.2.6.6.(1)-C
Leakage Area of Closures in Openings into Smoke Shaft
Forming Part of Note A-3.2.6.6.(1)

Type of Closure	Leakage Area as % of Closure Area(1)(2)
Curtain fire damper	2.5
Single-blade fire damper	3.5
Multi-blade fire damper	4.5

Notes to Table A-3.2.6.6.(1)-C:

(1) Values include allowance for 0.5% leakage between frame and wall construction.

(2) These leakage data are based on clearances applicable to closures that have been tested in accordance with CAN/ULC-S112, “Fire Test of Fire Damper Assemblies.”

Table A-3.2.6.6.(1)-D
Minimum Distance from Closure to Combustible Material
Forming Part of Note A-3.2.6.6.(1)

Area of Closure(1), m^2	Minimum Distance in Front of or Above Closure, m	Minimum Distance to the Sides or Below Closure, m
0.5	0.35	0.20
1.0	0.50	0.25
1.5	0.60	0.30
2.0	0.70	0.35
2.5(2)	0.80	0.40

Notes to Table A-3.2.6.6.(1)-D:

(1) For closure areas between those given in Table A-3.2.6.6.(1)-D, interpolation may be used to determine the appropriate distances.

(2) For closure areas greater than 2.5 m^2, the minimum distance in front of or above the closure shall be one half of the square root of the closure area, and the minimum distance to the sides or below the closure shall be one quarter of the square root of the closure area.

A-3.2.6.7.(1) Protection of Central Control Room. The design of a room provided for a central alarm and control facility should take into account the nature and sensitivity of the electronic components of the equipment and the room should be adequately protected from fire and smoke. The room should be ventilated with a supply of fresh air so that it has a clean environment and should be provided with adequate lighting.

A-3.2.6.7.(2) Central Control Room Air Control. Depending on the method of mechanical venting and air control that is selected for the building, additional controls may be required at the central alarm and control facility. These additional controls include those with a capability of opening closures to vents in shafts, stopping air-handling systems, and initiating mechanical air supply to stair shafts.

A-3.2.6.9.(1) Testing for Smoke Control. The efficiency of a smoke control system may be checked by measuring pressure differences and the directions of airflow around doors and through separating walls of compartments. A pressure meter can be used to measure pressure differences on either side of a door or partition. Where this is impracticable, a punk stick held near a crack will indicate the direction of airflow. Measurements of airflow may be taken on the intake side of supply fans or in supply ducts to determine whether the specified airflow is being provided. In general, airflow should be from the spaces which may be occupied for various lengths of time during a fire emergency (e.g., vestibules, stair shafts, and elevator hoistways) toward the space in which the fire is assumed to have occurred. Measurements may be taken at certain critical locations to check the overall efficiency of the smoke control system.

In buildings where protection is obtained by venting corridors or vestibules to the outdoors, inspection of the building to determine whether the requirements have been met should be sufficient. Where service shafts are vented to the outdoors at the top, a check may be made of the wall between the shaft and the uppermost occupied floor areas, to ensure that the direction of flow is from each floor area into the shaft, when the vent to the outside is open and the outdoor air temperature is significantly less than that indoors.

Where mechanically pressurized vestibules are used, a check may be made to ensure that the pressure in each vestibule or area of refuge is greater than that in the adjacent floor areas at each floor level.

Doors to stair shafts, elevator hoistways and vestibules in locations subject to pressure differences that may interfere with normal opening should be checked when the outdoor temperature is near the January design temperature, with the air injection system operating and a number of windows open to the outdoors on each floor in turn.

A-3.2.7.4.(1) Emergency Power Reliability. In some areas power outages are frequent and may be of long duration. These local conditions should be taken into account in determining the type of system for supplying emergency power for lighting. This should be studied at the planning stage of a building project in conjunction with the local fire safety and building officials.

A-3.2.7.6.(1) Emergency Power for Treatment Occupancies. CSA Z32, "Electrical Safety and Essential Electrical Systems in Health Care Facilities," contains requirements for three classes of health care facilities – Class A, Class B and Class C. The intent of Article 3.2.7.6. is to apply specific requirements to emergency equipment for Class A facilities, which are designated as hospitals by the authorities having jurisdiction and where patients are accommodated on the basis of medical need and are provided with continuing medical care and supporting diagnostic and therapeutic services.

A-3.2.7.8.(3) Emergency Power Duration. The times indicated in this Sentence are the durations for which emergency power must be available for a building under fire emergency conditions. Additional fuel for generators or additional battery capacity is required to handle normal testing of the equipment, as indicated in the Fire By-law. If the operation of emergency generators

or batteries is intended for other than fire emergency conditions, such as power failures, fuel supplies or battery capacity must be increased to compensate for that use.

A-3.2.7.9.(1) Emergency Power Reliability. In some areas power outages are frequent and may be of long duration. These local conditions should be taken into account in determining the type of system for supplying emergency power for building services. This should be studied at the planning stage of a building project in conjunction with the local fire safety and building officials.

A-3.2.7.10.(1) Electrical Conductors. The intent of this Sentence is to provide protection of riser conductors serving components of a building fire alarm and voice communication system and equipment required for smoke control and smoke venting such as fans and dampers. Conductors supplying fire alarm and voice communication system devices, smoke control and smoke venting equipment on individual floors are not intended to be protected in conformance with this requirement.

Conductors supplying fire-fighters' elevators and fire pumps are intended to be protected in accordance with this requirement from the source of the emergency power supply (emergency generator) to the terminals of the equipment (fire pump or elevator motors).

The following issues for conductor protection are required to be considered:

1. A list of emergency equipment served by the protected conductors,
2. Specific methods of the conductor protection utilized for the project. (See note (a).)
3. Electrical plans indicating the routes for protected conductors from the emergency power supply to the equipment served.
4. The satisfactory operation of electrical equipment supplied by the protected conductors while operating at elevated temperatures (more than 30° C).
5. The protection of riser conductors from potential pressurized hot gases which could travel inside the electrical conduits originating from the fire floor. (See note (b).)
6. Access to electrical riser conductor junctions for maintenance or testing. (See notes (a) & (c).)
   (a) Acceptable protection methods for electrical conductors to ensure the operation of equipment for a period of at least one (1) hour are illustrated in the table below.
   (b) Derating of a conductors' ampacity may be required. Where conductors are protected in accordance with methods B to F, as illustrated in the table below and where the conductors are sized to accommodate 110% of the rated load current, then no additional derating of conductors is required. Where conductors are protected in accordance with method A, an assessment of the conductors performance (MI cables) under exposure to fire, would need to be provided by an electrical engineer.
   (c) Location of riser conductor junctions in exit stairwells is not acceptable.

Submission of the chosen methods of compliance and the submission of a Schedule B Letter of Assurance needs to be provided by the professional electrical engineer responsible for the project at the design stage. Upon completion of the installation, a Schedule C-B Letter of Assurance would be required.

Acceptable methods for the protection of electrical conductors from fire exposure to ensure operation of the emergency equipment for a period of at least one (1) hour (based on a sprinklered building) are illustrated in the table below.

Table A-3.2.7.10.

	Method of Protection
A	Provide mineral insulated cables or other cables that conform with the ULC S139 circuit integrity test and are marked "ULC S139 2 hr fire rated" cables.
B	Provide a minimum cover over the conduit of at least 100 mm in concrete. Floor slabs or walls that form part of fire separations. Cover from the ends of slabs or walls that form part of the fire separations shall be at least 125 mm.
C	Provide a minimum cover over the conduit of at least 125 mm in concrete columns, beams or walls that are not forming part of a fire separation.
D	Enclose conductors in a shaft enclosure of at least two hour fire resistance construction. These shaft enclosure walls can be of concrete or any ULC, cUL or WH listed wall or shaft wall assembly.
E	Any junction boxes or access points required for the protected conductors shall be protected with listed access panels which have been tested to limit the temperature rise on unexposed side to less than 90° C for one (1) hour. An air space shall be provided between the access panel and the conductors, to ensure that there will be no contact.
F	Conduits leading from protected enclosures to branch circuits must be protected at junction boxes at both ends of the connecting conduit. This protection will consist of plugging the conduits to a depth of at least 12 mm with an approved firestop caulking. An acceptable alternative to the above is to use an EYS fitting at the protected enclosure end.

The above provides options for the protection of electrical conductors. Other solutions may be proposed by a Fire Protection Engineer retained to analyze the arrangement and develop a solution on an equivalency basis for acceptance by the Chief Building Official.

A-3.2.7.10.(2)(a) and (3)(a) Protection of Electrical Conductors. It is important to understand that electrical conductors are part of a system that includes – among other components – raceways, conduits, splices, couplings, vertical supports, grounds and pulling lubricants. When selecting electrical conductors to provide a circuit integrity rating, it is therefore important to understand how they will be installed and to know if the fire performance of the system as a whole was tested.

A-3.2.7.10.(5)(b) Electrical Conductors in the Same Room. If the distribution panel and the equipment it serves are within the same room, only the electrical conductors leading up to the distribution panel need to be protected. It is assumed that the distribution panel and the equipment it serves are within sufficient proximity to each other such that a fire in the same area of origin would affect both.

A-3.2.7.10.(7) Fire Alarm Branch Circuits. In order to ensure continuous operation of the fire alarm and voice communication systems in a high-rise building for a sufficient duration of time to control and direct the evacuation of building occupants, a level of protection is required by Sentence 3.2.7.10.(2) for those electrical conductors interconnecting the major elements of the fire alarm system. Sentence 3.2.7.10.(7) permits the protection of electrical conductors to be waived for portions connecting a transponder or fault isolation device to fire alarm input devices (fire detectors, manual stations, etc.) or a voice communication transponder to a fire alarm audible signalling device, provided all circuits or portions of the circuits are contained within the same storey.

A-3.2.8.2.(3) Special Protection of Opening. In manufacturing operations involving the use of conveyor systems to transport material through fire separations, it may not be possible to use standard closure devices. NFPA 80, "Fire Doors and Other Opening Protectives," includes appendix information concerning protection of openings through vertical fire separations. NFPA 13, "Installation of Sprinkler Systems," includes methods of protecting openings through floor assemblies, however, it is assumed by that standard that the remainder of the building would be sprinklered. Combinations of methods may be required to ensure that the level of safety inherent in the requirements of the Code is maintained.

A-3.2.8.2.(6)(b) Restriction on Size of Openings Through Floors. The phrase "used only for stairways, escalators or moving walks" is intended to restrict the size of a floor opening to what is necessary to accommodate the stairway, escalator or moving walk.

A-3.2.8.2.(6)(c) Waiver of Occupancy Separation Continuity. The typical application of this Sentence is to buildings with a mixture of occupancies that are randomly located throughout the building. Examples include shopping centres, podia of large commercial and business complexes, and recreational buildings that are combined with mercantile and business operations. A shopping mall with two interconnected storeys is an example that is frequently encountered in many jurisdictions. The permission to breach the floor assembly between the storeys does not override requirements for separation of specific suites or occupancies.

For instance, although storage garages are Group F, Division 3 occupancies, the requirement in Article 3.3.5.6. for the storage garage to be separated from other occupancies by a fire separation with at least a 1.5 h fire-resistance rating must be observed. In a similar manner, a theatre or cinema (Group A, Division 1 occupancy) must be separated from other occupancies in accordance with Sentence 3.3.2.2.(1) and seats in an arena-type building (Group A, Division 3) must be separated from space below in accordance with Sentence 3.3.2.2.(3).

A-3.2.8.4.(1)(c) Contamination of Vestibule. The vestibule should have equipment capable of maintaining a supply of air into the vestibule that is sufficient to ensure that the air pressure in the vestibule when the doors are closed is higher by at least 12 Pa than the air pressure in the adjacent floor areas when the outdoor temperature is equal to the January design temperature on a 2.5% basis.

A-3.2.8.7.(1) Smoke Exhaust System. The mechanical exhaust system is intended as an aid to firefighters in removing smoke and is to be designed to be actuated manually by the responding fire department. Although smoke is normally removed from the top of the interconnected floor space, exhaust outlets at other locations may be satisfactory.

A-3.2.9.1.(1) Testing of Fire Protection and Life Safety Systems. Building owners should verify that fire protection and life safety systems and their components (i.e. fire alarm systems, sprinklers, standpipes, smoke control, ventilation, pressurization, door hold-open devices, elevator recalls, smoke and fire shutters and dampers, emergency power, emergency lighting, fire pumps, generators, etc.), including their interconnections with other building systems, are functioning according to the intent of their design.

CAN/ULC-S1001, "Integrated Systems Testing of Fire Protection and Life Safety Systems," provides the methodology for verifying and documenting that interconnections between building systems satisfy the intent of their design and that the systems function as intended by the By-law.

Clause 6.1.5 of CAN/ULC-S1001 allows the Integrated Testing Coordinator to accept documented evidence of any tests that have been performed on a system as part of its acceptance testing for the purpose of demonstrating compliance with the integrated testing requirements of that standard, so as to avoid duplication of work.

A-3.3. Safety Within Floor Areas. Section 3.3. regulates safety within floor areas including rooms and other spaces within a building. The requirements are grouped according to the occupancy of the floor area, room or space, which is not necessarily the same as the major occupancy for which the building is classified. For example, a building may be classified by major occupancy as an office building: therefore, the provisions for structural fire protection and fire protection equipment for office buildings prescribed in Section 3.2. apply. However, within that building, a room or floor area may be used for mercantile, care, treatment, detention, business, residential, industrial or other occupancy.

Life safety for the occupants of any floor area depends in the first instance on the use or occupancy of that floor area. The risks to the occupants occur in the early stages of a fire. These special life risks differ from one occupancy to another and, consequently, must be regulated differently. Section 3.3. regulates risks within floor areas: these requirements apply regardless of the major occupancy of the building that contains the floor areas. For example, an assembly room must comply with the requirements for assembly occupancy whether it is contained in an office building, hospital, hotel, theatre, industrial building or other major occupancy.

Since this By-law regulates new construction, alterations and changes of occupancy, the construction of kiosks and similar structures in public corridors must take into consideration all the requirements that apply to the remainder of the building, including structural fire protection, construction type, finish materials, egress widths and sprinkler installations. Special activities of an occasional nature that were not contemplated in the original design of a public corridor and that represent only a temporary change in occupancy are regulated by the Fire By-law. These regulations include maintaining egress paths clear of obstructions, controlling combustible contents and providing measures to ensure quick response for firefighting.

A-3.3.1.2.(1) Hazardous Substances. The term "hazardous substances" refers to dangerous goods that are regulated by TC SOR/2008-34, "Transportation of Dangerous Goods Regulations (TDGR)," or that are classified as "controlled products" under the "Workplace Hazardous Materials Information System (WHMIS)" established to meet the requirements of HC SOR/2015-17, "Hazardous Products Regulations." It also refers to materials and products that are not regulated by the TDGR or WHMIS, but that pose a fire or explosion hazard due to their own properties or because of the manner in which they are stored, handled or used.

These include combustible products, rubber tires, combustible fibres, combustible dusts, products producing flammable vapours or gases, etc.

A-3.3.1.2.(2) Cooking Equipment Ventilation. Cooking equipment manufactured for use in dwelling units and other residential suites is often installed in buildings used for assembly and care, treatment or detention purposes. It is not obvious from the By-law requirements or those of NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," whether a ventilation and grease removal system is required in all assembly and care, treatment or detention uses. If the equipment is to be used in a manner that will produce grease-laden vapours that are substantially more than would be produced in a normal household environment, then it would be appropriate to apply the requirements of NFPA 96. If the equipment is used primarily for reheating food prepared elsewhere or is used occasionally for demonstration or educational purposes, there would be no expectation of applying the requirements of NFPA 96. In all cases the circumstances should be reviewed with the authority having jurisdiction.

A-3.3.1.9.(4) Obstruction in Corridor. The sweep of a cane used by blind or visually impaired persons normally detects obstructions that are within 680 mm of the floor. Any obstruction above this height would not normally be detected and can, therefore, create a hazard if it projects more than 100 mm into the path of travel.

A-3.3.1.12.(3) Movable Partitions. Should an emergency situation arise outside of normal working hours but when occupants are still in the space, they could be left without a clear way out. This could occur during inventory or after closing time when all occupants have not yet left, but staff close the door to prevent other persons from entering. In many small tenant areas, the movable partitions (store fronts) provide the only way out. There should always be a second way out or a swinging door within or adjacent to the sliding partitions.

A-3.3.1.13.(4) Door Hardware. The permission to have additional door releasing devices is intended to allow the use of a security chain, night latch or dead bolt to supplement the normal door latching device. These are permitted for dwelling units and locations where guests in a hotel or motel require additional security. The height of these items is also governed by the maximum height stipulated in Sentence 3.3.1.13.(5) to ensure that they can be operated by persons with physical disabilities. This additional hardware should not require appreciable dexterity by the user and the general requirements on the ability to operate the device without the use of keys, special tools or specialized knowledge still apply.

A-3.3.1.13.(6) Controlled Egress Doors. It is intended that Sentence 3.3.1.13.(6) apply to doors used at the perimeter of a contained use area or an impeded egress zone. If the contained use area consists of a single room, the requirements would apply to that room. In the case of individual cells within a contained use area, exterior keyed locks could be used on the cell doors consistent with the fire safety plan and continuous supervision by staff who can release the doors in an emergency.

A-3.3.1.13.(7) Electromagnetic Locking Devices. Electromagnetic locks and similar door control security devices are not intended to be used indiscriminately as alternative to proper security design. Where improperly designed or installed, these may inadvertently entrap or delay persons during an emergency as a result of physically impeding egress or confining egress to high traffic areas. Designers and installers wishing to install electromagnetic locking devices are to demonstrate that the requirements of the By-law have been met.

This demonstration is to include a sequence of operation for the installation of any new maglocks and similar security devices that could singly or in combination, prevent, impede, or otherwise delay occupant egress or emergency responder access. This is to be provided to the Chief Building Official for acceptance, along with any necessary supporting documentation to demonstrate by-law compliance. (See also note A-3.4.6.16.(4).)

A-3.3.1.23.(1) Obstructions in Means of Egress. Obstructions including posts, counters or turnstiles should not be located in a manner that would restrict the width of a normal means of egress from a floor area or part of a floor area unless an alternative means of egress is provided adjacent to and plainly visible from the restricted means of egress.

A-3.3.2.1.(2) Use of NFPA 101. The intention of Sentence (2) is to allow By-law users the option of using NFPA 101, "Life Safety Code," to address the following issues: means of egress; egress routes within assembly occupancies; aisles and access serving seating not at tables; guards and railings; life safety evaluation; and smoke-protected assembly seating. However, opting to use NFPA 101 under this application entails adherence to all the provisions listed in Sentence (2): it is not intended that By-law users randomly select and apply a mix of provisions from both the Building By-law and the NFPA.

A-3.3.2.4.(2) Tablet Arms. Although it is intended that the motion to raise the tablet arm be essentially a single fluid motion, it is acceptable that the motion be a compound motion of raising the tablet arm and including an articulation to allow the tablet to fall back alongside the arm rest.

A-3.3.2.10. Installation Configurations of Handrails in Aisles with Steps. Figure A-3.3.2.10. illustrates possible installation configurations of handrails serving aisles with steps.

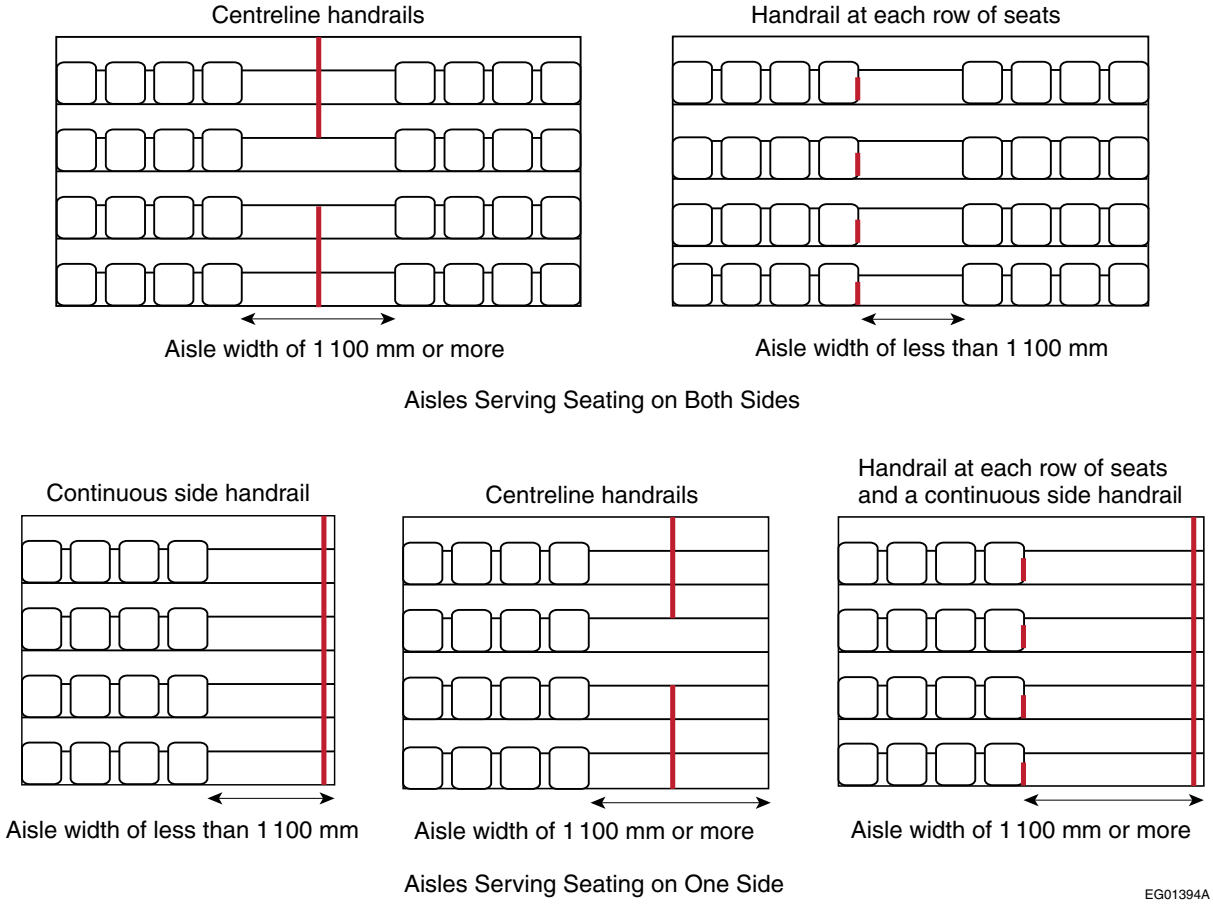

Figure A-3.3.2.10.
Handrail installation configurations

A-3.3.3.1.(1) Safety in Care, Treatment and Detention Occupancies. Fire safety for patients in bedroom areas in hospitals and nursing homes with treatment is predicated on the ability of staff to carry out at all times essential life safety functions in accordance with the fire safety plan. Details for a plan are contained in the Fire By-law.

Many factors may affect the ability of staff to carry out life safety functions, including the mobility of patients who cannot fend for themselves and the built-in protection for patients who cannot be moved except under exceptional circumstances.

Should a patient area in a hospital or nursing home with treatment contain factors which would increase the time normally required for staff to evacuate patients or to undertake other life safety measures, consideration should be given to providing additional fire protection measures to ensure that equivalent safety is available.

A-3.3.3.4.(2) Doorway Width. The 1050 mm minimum clear width of doorways accounts for door stops and, thus, is intended to allow for the use of 1100 mm doors.

A-3.3.3.5.(9) Intercommunicating Rooms. Rooms that are interconnected can include more than one sleeping room, together with ensuite toilet rooms, shower rooms, and storage closets used for the storage of personal items of the persons occupying the sleeping rooms. It is not intended that storage rooms for other purposes be included within the group of interconnected rooms.

A-3.3.3.5.(13) Grilles and Louvres. In order to permit the supply of make-up air to compensate for the removal of exhaust air from these toilet rooms, shower rooms and similar spaces, it is permitted to incorporate grilles and louvres for the transfer of air provided the air movement cannot allow smoke to pass through these spaces to other parts of the building. It is considered that in normal designs the air is exhausted directly to the exterior and is not circulated. If air is to be circulated back to other parts of the building, smoke operated dampers should be included in the air circulating system.

A-3.3.3.5.(17) Fire Damper Activation. This requirement is to ensure that fire dampers are activated by any smoke detector in either zone or fire compartment.

A-3.3.4.4.(1) Landing in Egress Stairway. A landing level used in an egress stairway from a dwelling unit is not considered to be a storey of that dwelling unit if the landing is used only for pedestrian travel purposes.

A-3.3.4.4.(7) Travel Distance in a Dwelling Unit. The egress requirements of 3.3.4.4.(7)(a) are limited by the total travel distance within the dwelling unit. For the purposes of determining this travel distance, only the horizontal component of the travel of travel within the exterior envelope, including any stairs, need be considered.

A-3.3.4.5.(1) Automatic Locking Prohibited. Doors that must be manually reset to lock them when they are opened from the inside meet the intent of this requirement.

A-3.3.6.1.(1) Design of Buildings Containing Dangerous Goods. Subsection 3.3.6. applies to the short- or long-term storage of products, whether raw or waste materials, goods in process, or finished goods.

This Subsection does not deal with products or materials that are directly supplied to appliances, equipment or apparatus through piping, hose, ducts, etc. For example, the gas cylinders that are mounted on propane barbecues are not covered by Subsection 3.3.6.; they are considered to be "in use" as opposed to "in storage" and are not intended to be regulated by the storage requirements stated in the Fire By-law.

A-3.3.6.2.(2) Storage of Reactive Materials. Reactive materials include various classes of unstable or reactive dangerous goods, such as flammable solids, pyrophoric materials, oxidizers, corrosives, water-reactive substances and organic peroxides.

In general, it is unsafe to store highly reactive oxidizers close to liquids with low flash points, combustible products or chemically incompatible products. Quantities of oxidizers or other dangerously reactive materials should therefore be limited and the storage area should be constructed of noncombustible materials, should be kept cool and ventilated, and should not impede egress. In some cases, depending on the quantity and nature of the oxidizing agent, normal fire protection measures (e.g. sprinklers, fire hose and extinguishers) are ineffective due to the self-yielding of oxygen by the oxidizing agent.

When containers of highly reactive oxidizers become damaged or are exposed to excessive heat, humidity or contamination (e.g. sawdust, petroleum products, or other chemicals), a very violent fire or explosion can result.

The following oxidizing substances, among others, are known to supply oxygen: organic and inorganic peroxides; pool chemicals (e.g. calcium hypochlorite, sodium dichloroisocyanurate); oxides; permanganates; perrhenates; chlorates; perchlorates; persulfates; organic and inorganic nitrates; bromates; iodates; periodates; perselenates; chromates, dichromates; ozone; perborates.

When containers of dangerously reactive materials become damaged or are exposed to water or humidity, a flammable gas (such as hydrogen, ammonia or methane) or a toxic gas (such as hydrogen chloride, hydrogen bromide or phosphine) can be released.

The following dangerously reactive materials, among others, are known to release a flammable gas in reaction to contact with water or humidity: alkali metals (e.g. sodium, potassium, cesium); reactive metals (e.g. zinc, aluminum, magnesium); metallic hydride (e.g. sodium borohydride, germanium tetrahydride, calcium hydride).

The following dangerously reactive materials, among others, are known to release a toxic gas in reaction to contact with water or humidity: organic and inorganic chloride (e.g. phosphorus trichloride, phosphorus oxide trichloride, acetyl chloride); organic and inorganic bromide (e.g. phosphorus tribromide, aluminum tribromide, acetyl bromide).

A-3.3.6.4.(2) Explosion Venting in Hazardous Locations. When a flammable mixture of air and vapour/gas/dust is ignited and causes an explosion, the exothermic reaction results in the rapid expansion of heated gases and the corresponding pressure waves travel through the mixture at sonic or supersonic velocities. The pressures developed by an explosion very rapidly reach levels that most buildings and equipment cannot withstand unless specifically designed to do so. Explosion venting consists of devices designed to open at a predetermined pressure to relieve internal pressure build-up inside a room or enclosure, hence limiting the structural and mechanical damage.

The major parameters to be considered in designing an explosion venting system for a building are:

- the physical and chemical properties of the flammable air mixture, such as the particle size or the droplet diameter, the moisture content, the minimum ignition temperature and explosive concentration, the burning velocity or explosibility classification, the maximum explosion pressure and the rate of pressure rise,
- the concentration and dispersion of the flammable mixture in the room,
- the turbulence and physical obstructions in the room,
- the size and shape of the room, the type of construction and its ability to withstand internal pressures, and
- the type, size and location of relief panels, which should also be designed to reduce the possibility of injury to people in the immediate vicinity of the panels.

A-3.3.6.5.(1) Measurement of Tire Storage Volume. The volume of tires in a storage area can be determined by measuring to the nearest 0.1 m the length, width and height of the piles or racks intended to contain the tires. In racks, the top shelf is assumed to be loaded to maximum possible height, while observing required clearances between structural elements and sprinklers.

A-3.3.6.6.(6) Products Stored with Ammonium Nitrate. Copper and its alloys should not be used where they can come into contact with ammonium nitrate. The presence of copper represents the single biggest hazard with respect to the accidental detonation of ammonium nitrate during a fire.

Steel and wood can be protected with special coatings such as sodium silicate, epoxy, or polyvinyl chloride.

Asphalt and similar hydrocarbon-based roof coverings should not be used. Stored ammonium nitrate may become sensitized during a fire if such roof coverings melt and leak into the interior of the building, causing burning droplets to fall on the stored product.

A-3.3.7.7.(2) Security for Storage Garage. The requirements of Sentence 3.3.7.7.(2) are intended to provide improved visibility into or out of a stair tower or vestibule which might otherwise occlude the line of sight of building occupants as a result of intervening construction. Glazing must provide the maximum practical improvement to visibility to improve occupant safety. The term 'stair tower' used in this Sentence is intended to apply to vertical stair enclosures connecting more than one floor or containing superimposed flights of stairs.

A-3.3.7.9. Multi-family Residential Mailbox Construction. The direct and indirect cost to persons as a result of mail theft are of increasing significance. The minimum construction requirements of the Building By-law are intended to reduce the risk of letter mail theft by resisting or discouraging this form of crime of opportunity. These requirements are not specifically intended to address parcel theft. The requirements of Article 3.3.7.9. are intended to conform with minimum standards required by Canada Post as required by Schedules II and III of the Federal Mail Receptacles Regulations SOR-83-743 as it pertains to "mail box assemblies" (defined term).

A-3.4.1.1.(1) Type of Exit Facility. The requirements for exits in Section 3.4. were developed for new construction. If alterations are made to an existing building or changes of occupancy occur, other design solutions than those in Section 3.4. may have to be developed to maintain an acceptable level of safety if it is not practicable to fully conform to the requirements of this Section. In some cases the use of fire escapes to supplement the existing exit facilities may be the only practicable solution. Because of the variety of conditions that may be encountered in existing buildings, it is difficult to standardize or codify such requirements.

Alternative means of providing acceptable levels of safety may have to be tailored to the particular building design. In all cases, however, the requirements described in Section 3.4. are intended to provide the level of safety to be achieved. If alternative measures are used, they should develop the level of safety implied in these requirements.

A-3.4.1.6.(2) Sleeping Area. Areas serving patients' sleeping rooms include sleeping areas and areas where patients are taken for treatment.

A-3.4.2.3.(1) Least Distance Between Exits. The least distance measurement does not apply to each combination of exits on a multi-exit storey. It only applies to at least 2 of the required exits from that storey.

A-3.4.3.2.(6) Evacuation of Interconnected Floor Space. This Sentence ensures that egress facilities allow for the simultaneous evacuation of all portions of an interconnected floor space. It does not contemplate the phased evacuation of occupants; thus in buildings where that type of evacuation is intended, fire protection requirements in addition to those prescribed in the By-law may be necessary.

In the first instance, this Sentence provides for cumulative exiting that can accommodate the efficient movement of all occupants in the exit stairs. Clause 3.4.3.2.(6)(a) permits an alternative approach that will accommodate all the occupants in the stairs but will restrict the egress flow rate. Clause 3.4.3.2.(6)(b) provides a second alternative that assumes the occupants must queue before entering the stair. A "protected floor space" conforming to Article 3.2.8.5. is intended to provide an intermediate area of safety that is protected from the hazards of the interconnected floor space. It does not provide a holding or refuge area for all occupants of a floor area for an extended period of time.

To ensure that evacuation is not unduly delayed and that queuing of the occupants in the protected floor space can be accommodated, requires careful consideration in the design of the interface between the interconnected floor space/protected floor space/exit.

It is not appropriate, for example, to share a common vestibule in complying with Sentences 3.2.8.4.(1) and 3.2.8.5.(1). Under evacuation conditions, occupants entering the vestibule would flow towards the exit, as opposed to the protected floor space, thus resulting in queuing outside the vestibule and potential exposure to fire. To comply with the intent, it is necessary to design the egress path such that the occupants enter the protected floor space through a vestibule, then in turn enter the exit stair from the protected floor space. In addition, sufficient space should be provided between the vestibule and the exit to allow for the queuing of occupants in the protected floor space.

A-3.4.3.2.(6)(a) Temporary Safety Area. The objective of Clause 3.4.3.2.(6)(a) is to provide an area of temporary safety in the exit stair shafts for the occupants of the interconnected floor space. This requirement is considered to be met if 0.3 m^2 per person is provided in the stair shaft between the floor level served and the floor level immediately beneath it.

A-3.4.3.4. Clear Height and Width. Clear height is intended to be measured from a line tangent to the nosings extended to the underside of the lowest element above the walking surface, over the clear width of the exit (See Figure A-3.4.3.4.). Examples of low elements above the walking surface include light fixtures or sprinkler heads and piping.

Clear width is intended to be measured from a line tangent to horizontal protrusions such as handrails.

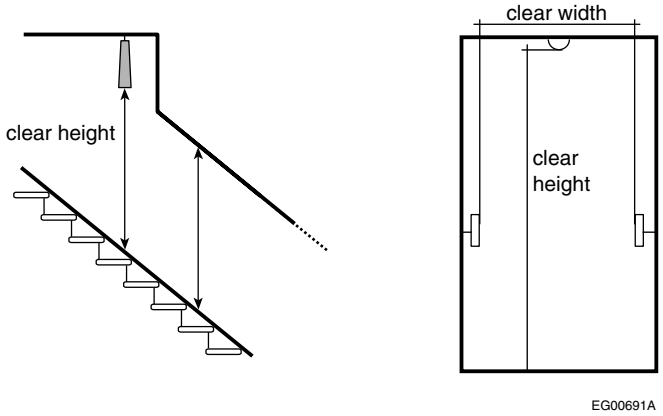

Figure A-3.4.3.4.
Measuring clear height

A-3.4.4.2.(2)(e) Requirements for Lobby. If an exit is permitted to lead through a lobby, the lobby must provide a level of protection approaching that of the exit. As well as meeting the width and height requirements for exits, the lobby must be separated from the remainder of the building by a fire separation having a fire-resistance rating at least equal to that required for the exit, unless one of the exceptions in this Clause is applied.

A-3.4.5.1.(2)(c) Graphical Symbols for Exit Signs. ISO 7010, "Graphical symbols – Safety colours and safety signs – Registered safety signs," identifies the following internationally recognized symbols for use at required exits.

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Figure A-3.4.5.1.(2)(c)-A
"E001 Emergency exit (left hand)" (E001) symbol from ISO 7010

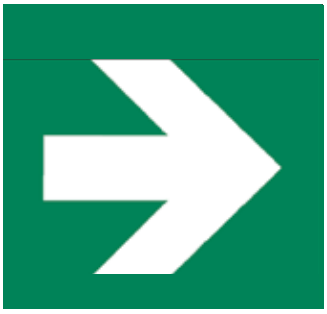

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Figure A-3.4.5.1.(2)(c)-B
"E005 Direction, arrow (90°-degree directional arrow (E005) increments), safe condition" symbol from ISO 7010

A-3.4.5.1.(3) Internally Illuminated Signs. Photoluminescent signs are not internally illuminated and therefore must conform to Sentence 3.4.5.1.(4).

A-3.4.5.1.(4) Externally Illuminated Signs. An external lighting source is required to properly charge photoluminescent signs. In addition to being continuously illuminated as required by Sentence 3.4.5.1.(4), Tthese types of signs must be lit in conformance with the charging requirements indicated on the exit signs in accordance with CAN/ULC-S572, "Photoluminescent and Self-Luminous Exit Signs and Path Marking Systems."

A-3.4.6. Application to Means of Egress. The requirements in Subsection 3.4.6. apply to interior and exterior exits, as well as to ramps, stairways and passageways used by the public as access to exit. The treads, risers, landings, handrails and guards for the latter access to exit facilities must thus be provided in conformance with the appropriate requirements for exit facilities.

A-3.4.6.4. Dimensions of Landings. A landing is a floor area provided at the top or bottom of a flight of stairs or a ramp, or a platform built as part of a stairway or ramp. Landings provide a safe surface for users to rest upon, allow design flexibility, and facilitate a change in direction.

Figure A-3.4.6.4. illustrates how to measure the length of a landing for various landing configurations turning less than 90°, including straight landings.

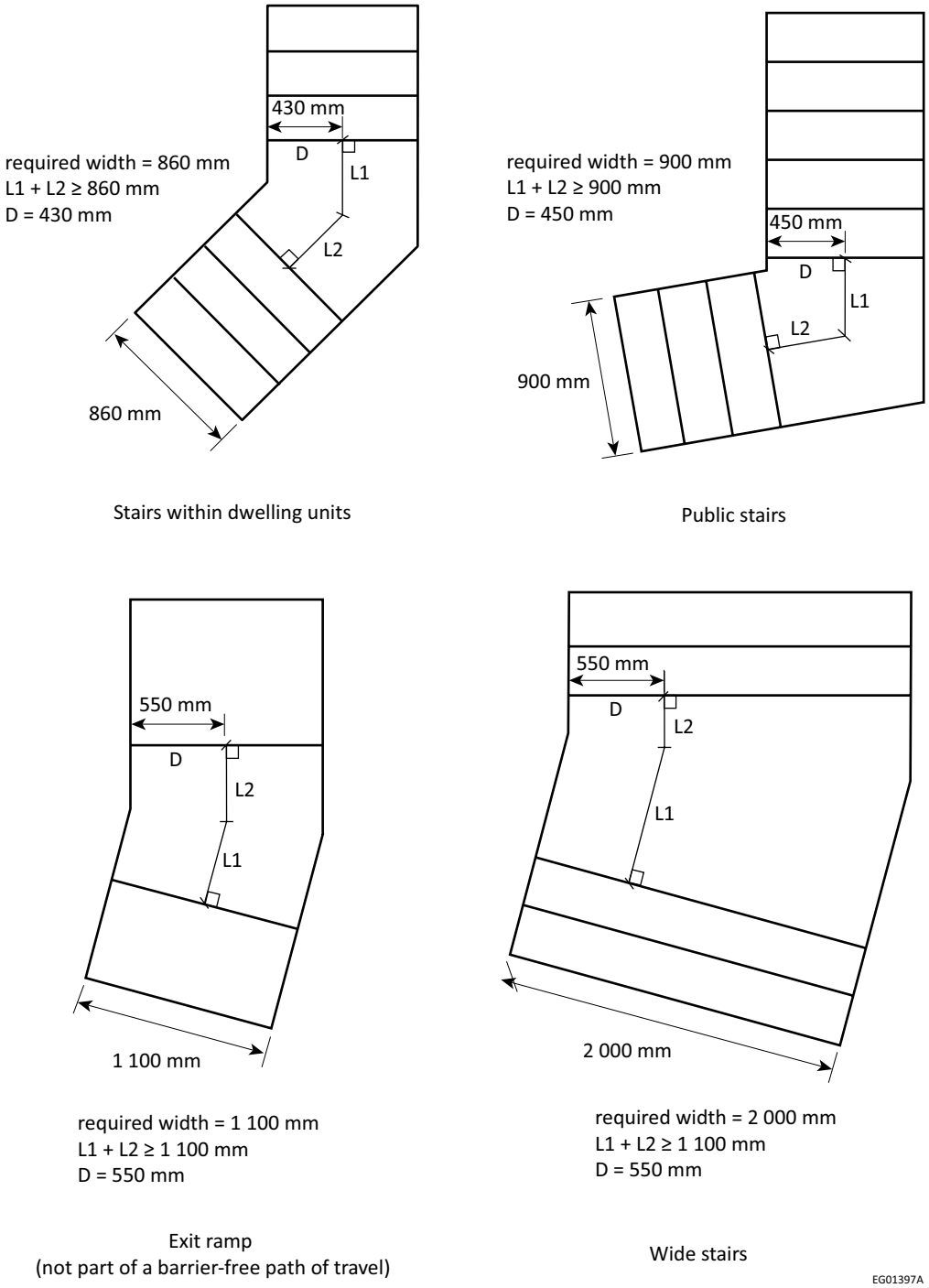

Figure A-3.4.6.4.
Landing configurations

Notes to Figure A-3.4.6.4.:

(1) L1 + L2 = length of the landing = the lesser of the required width of the stair or ramp, or 1 100 mm
See Sentences 3.4.6.4.(2) and 9.8.6.3.(2).

(2) D = distance from the narrow edge where the length of the landing is measured = half the required length of the landing
See Sentences 3.4.6.4.(3) and 9.8.6.3.(3).

A-3.4.6.5.(4) Wider Stairs than Required. The intent of Sentence 3.4.6.5.(4) is that handrails be installed in relation to the required exit width only, regardless of the actual width of the stair and ramp. The required handrails are provided along the assumed natural path of travel to, from and within the building.

A-3.4.6.5.(10) Continuity of Handrail. Blind or visually-impaired persons rely on handrails to guide them on stairways. A continuous handrail will assist them in negotiating stairs at changes in direction. The extended handrail is useful to persons with physical disabilities to steady themselves before using the stairs. Handrails should, however, return to the wall, floor or post, so as not to constitute a hazard to blind or visually-impaired persons.

A-3.4.6.10.(5) Door Swing. Although it is required that the door on the right hand side of a pair of doors shall swing in the direction of travel through the exit, the direction of swing of the door on the left side will depend on the function of the horizontal exit. If the horizontal exit provides for movement from one building to the adjacent building but does not require movement in the reverse direction, both doors must swing in the direction of travel to the adjacent building. If the design is based upon both buildings providing complementary movement in either direction, then the doors must swing in opposite directions. Location of a required exit sign directly above a door that swings in the direction of travel is deemed to meet the intent of Clause 3.4.6.10.(5)(b).

A-3.4.6.11.(4) Exit Concealment. Hangings or draperies placed over exit doors may conceal or obscure them.

A-3.4.6.16.(1) Fastening Device. Turnpieces of a type which must be rotated through an angle of more than 90° before releasing a locking bolt are not considered to be readily openable. The release of a locking bolt should allow the door to open without having to operate other devices on the door.

A-3.4.6.16.(4) Electromagnetic Lock. Electromagnetic locks are intended for use where there is a need for security additional to that provided by traditional exit hardware. They are not intended for indiscriminate use as alternative locking devices.

The design of these devices requires evaluation to ensure that their operation will be fail-safe in allowing exiting in the event of foreseeable emergencies. If more than one locking device is used in a building, it is expected that one switch will release and reset all devices simultaneously.

A-3.4.6.16.(4)(h) Time Delay for Electromagnetic Locks with Proximity Sensors. For the purposes of Clause 3.4.6.16.(4)(h), a door provided with a hardware arrangement complying with Sentence 3.4.6.16.(7) is not considered to have a delay.

A-3.4.6.16.(5) Electromagnetic Locks in Care and Treatment Occupancies. The installation of electromagnetic locks in care and treatment occupancies requires special provisions to address the compromised condition of residents and the nature of daily operations. Accordingly, to reduce the incidence of false operation by residents, transparent boxes that set off an audible signal when opened can be installed to cover the manual stations. Also, one optional additional release device (e.g. swipe card device, key pad) can be installed to facilitate the free movement of staff and visitors in the building.

A-3.4.6.17.(1) Special Security for Doors. The need for security in banks and in mercantile occupancies requires the ability to use positive locking devices on doors that may not readily be opened from inside the building. In a fully sprinklered building, the risk to persons inside the building is substantially reduced. The provisions of Sentences 3.4.6.17.(2) to (9) assume that the area is illuminated and that a means of communication is available to any occupant during times that the doors are locked.

A-3.4.6.19.(1)(d) Colour Contrast. The identification of floor and other signs intended to facilitate orientation for visually-impaired persons should offer maximum colour contrast to be effective. For this reason, it is recommended that white on black or black on white be used, as this combination produces the best legibility. It is also recommended that the sign surfaces be processed to prevent glare.

A-3.5.2.1.(1) Elevator Design. The reference to the Elevating Devices Safety Regulation in this Sentence implies conformance with all requirements of that standard for elevator cars, hoistways, pits and machine rooms, including restrictions on other services in these areas and detailed design criteria.

A-3.5.4.1.(1) Elevator Car Dimensions. In some circumstances it is necessary to maintain a patient on a stretcher in the prone position during transit to a hospital or to treatment facilities. Inclining the stretcher to load it into an elevator could be fatal or at the very least detrimental to the patient's health. Many ambulance services use a mobile patient stretcher whose size is 2010 mm, long and 610 mm wide. As well as space for the stretcher in the elevator, there should be sufficient additional space for at least two attendants who may also be providing treatment during transit. Common elevator units that can satisfy this requirement include:

- a 1134 kg elevator car with minimum interior dimensions of 2032 mm wide and 1295 mm deep with a right or left hand access door. The minimum access door width is 1067 mm and it must be on the 2032 mm side of the car.

- a 1134 kg elevator car with minimum interior dimensions of 2 032 mm deep and 1295 mm wide with a minimum 915 mm wide access door located on the 1295 mm side.

Limited-use/limited-application (LULA) elevators are limited in size, capacity, speed and rise and are not expected to meet the minimum elevator car dimensions stated in Sentence (1).

A-3.6.2.5.(1) Combustible Refuse Storage. Storage of refuse consisting of combustible materials including waste paper, cardboard and plastic, and noncombustible materials such as glass and metallic containers can be accumulated in these rooms for the purpose of recycling. This storage is allowed in consideration of a less stringent collection schedule when compared to that of garbage or refuse, which is collected regularly.

A-3.6.2.7.(5) Explosion Relief. Examples of good engineering practice for this application can be found in NFPA 68, "Standard on Explosion Protection by Deflagration Venting," NFPA 69, "Standard on Explosion Prevention Systems," and the NFPA "Fire Protection Handbook."

A-3.6.3.1.(1) Vertical Service Spaces. Sentence 3.6.3.1.(1) does not prohibit the internal subdivision of a vertical service space to allow different building services to be installed in physically separated spaces unless other requirements apply (See, for example, Sentences 3.2.7.10.(2) and (3).). Fire separation requirements apply to the perimeter of the group of service spaces. Article 3.6.3.3. has special requirements for linen chutes and refuse chutes.

A-3.6.3.5. Grease Duct Enclosures. NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations," presents two options for enclosing grease ducts for commercial cooking equipment: the first option is to use continuous fire-rated building component assemblies to enclose the ducts; and the second one consists of installing proprietary, fire-rated, field-applied or factory-built grease duct assemblies in accordance with the manufacturer's instructions. These types of enclosure assemblies are evaluated for their resistance to fire and their ability to protect adjacent combustibles through reduced clearances.

Although NFPA 96 references other standards that deal with grease duct assemblies, Sentence 3.6.3.5.(2) requires that CAN/ULC-S144, "Fire Resistance Test – Grease Duct Assemblies," be used to determine the fire-resistance rating of factory-built and field-applied grease duct assemblies.

A-3.6.4.2.(2) Ceiling Membrane Rating. In construction assemblies that utilize membrane ceiling protection and have been assigned a fire-resistance rating on the basis of a fire test, the membrane is only one of the elements that contribute to the performance of the assembly and does not in itself provide the protection implied by the rating. For the fire-resistance rating of membrane materials used in this form of construction, reference should be made to the results of fire tests which have been conducted to specifically evaluate the performance of this element.

A-3.6.5.6.(2) Clearance for Warm-Air Supply Ducts. Applicable to forced-air furnaces where permissible clearance C above plenum is 75 mm or less.

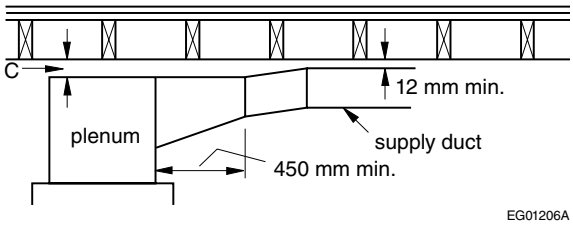

Figure A-3.6.5.6.(2)
Clearance for warm-air supply ducts

A-3.6.5.6.(3) Clearance for Warm-Air Supply Ducts. Applicable to forced-air furnaces where permissible clearance C above plenum is more than 75 mm but not more than 150 mm.

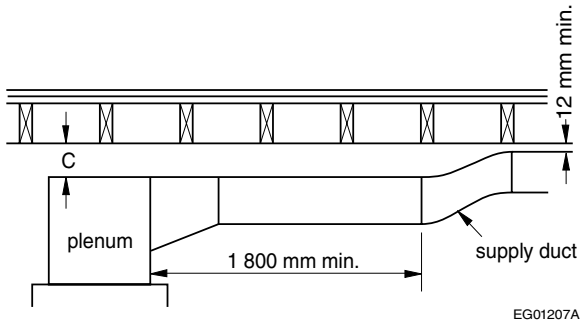

Figure A-3.6.5.6.(3)
Clearance for warm-air supply ducts

A-3.6.5.6.(4) Clearance for Warm-Air Supply Ducts. Applicable to forced-air furnaces where permissible clearance C above plenum is more than 150 mm.

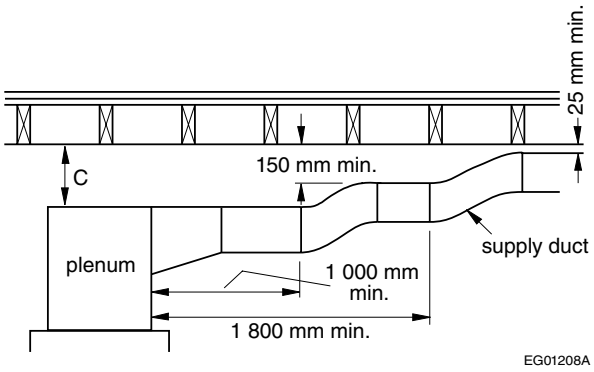

Figure A-3.6.5.6.(4)
Clearance for warm-air supply ducts

A-3.7.2.2.(1) Water Closets. Other than where gender neutral washrooms (See 3.7.2.11.) are provided, Sentence 3.7.2.2.(1) assumes that there will be a sufficient number of persons in the building to justify the provision of separate water closet facilities for both males and females. In some circumstances overall low occupant loads would not require more than one water closet for males and one water closet for females and yet the building has more than one storey.

It is deemed that rooms each containing a single water closet available for both males and females would satisfy the intent of the By-law. The total number of water closets must be adequate for the total number of occupants. In the case of universal and gender neutral washroom facilities, the acceptable number of water closets should be based upon the equivalent number of fixtures that would otherwise be provided.

Requirements for accessibility also need to be considered. If the entrance storey is accessible and the upper storeys are not required to be accessible, a room in the accessible storey must meet the requirements of Section 3.8. and can serve both males and females. If provided, a nonaccessible room, designed to serve both males and females, in each nonaccessible upper storey would be acceptable. Sentence 3.7.2.2.(4) permits a single water closet to serve both males and females if the total occupant load is low.

A-3.7.2.11. Gender Neutral Washroom Requirements. The gender neutral washroom requirements of the Building Bylaw introduce a new option for owners, operators, and employers to provide washroom facilities that do not impose unreasonable restrictions on persons who wish to use the washroom facility. The requirements of the Building Bylaw represent the minimum level of performance necessary to achieve the goals of personal security and functionality for all persons.

The intent of the gender neutral washroom is that they may replace washrooms that would otherwise be required by the Building By-law. Where gender neutral washrooms are provided, these are to be assigned proportionally as male or female, for the purposes of determining the building washroom capacity under Section 3.7 of the Building By-law. It is not intended that the gender neutral washrooms be assigned solely as contributing to the male or female washroom capacity exclusively, nor were these to be considered supplemental to the minimum washroom requirements of the building.

Signage for gender neutral washrooms are to reflect the intended use not only by persons outside the gender binary, but also by people with disabilities, the elderly, and anyone else who may require the assistance from someone of another gender. As such, signage

denoting this use is recommended to be neutral in tone and nature. Likewise, the iconography associated with these signs is also suggested to be indicative of the facility usage and function, and not of the individual who may use the facility.

The provision of regulations for gender neutral washrooms does not mean the elimination of gender-type washrooms. Typed washrooms, such as men's or women's multi-stall washrooms, and universal single-user washrooms may remain. It is up to each person to self-determine which washroom is most appropriate for them based on their gender identity. Further clarifying text may be added to washroom signage to signal that all persons are welcome.

A-3.8. Accessible Design Assumptions. This Section contains minimum provisions to persons with disabilities.

Building Access Handbook

An illustrated guide and commentary has been produced to assist users of Section 3.8. and other access requirements of the British Columbia Building Code. This handbook contains the entire text of Section 3.8. and other access requirements, and is supplemented by commentary and illustrations on specific requirements.

A-3.8.2.1. Accessibility. Industrial buildings often pose a greater risk to their occupants due to the presence of significant quantities of dangerous materials or the use of hazardous processes. For example, plants which are classified as Group F, Division 2 or 3, may store and use toxic or highly flammable substances in significant quantities, or house processes which involve very high temperatures and which have a high degree of automation. In some facilities, particularly in primary industries such as forestry and metallurgy, the construction normally used and the operations carried out within the space can make compliance with the requirements of Section 3.8. impracticable. It is therefore intended that these requirements be applied with discretion in buildings of Group F, Division 2 or 3 major occupancy. However, where industrial buildings contain subsidiary occupancies, such as offices or showrooms, it is reasonable to require that accessibility be provided in these spaces.

A-3.8.2.1.(1)(f) and (g) Access to Small Storeys. Elevators and elevating devices can be expensive and in small buildings may form a significant percentage of a building's cost. This Clause is intended to exempt such small second storeys or basements from access requirements when they are self-contained or contain the same facilities as on the accessible storey. An example where access is not required is the second storey of a restaurant which contains only additional seating. If, on the other hand, the restaurant's washrooms are in the less than 600 m² basement there must be access to them as they are an integral part of the principle function and occupancy on the accessible storey. Likewise, staff lunchrooms and washrooms are integral with the principle function and when they are on a small second storey or mezzanine they must be accessible when a person with disabilities could reasonably be expected to be employed there.

This exemption applies to buildings with not more than one storey above the first storey. A building with two or more storeys above the first storey must be fully accessible. Mezzanines that are not considered as storeys for the purposes of determining building height are considered storeys for the purposes of applying Clauses 3.8.2.1.(1)(f) and (g).

A-3.8.2.2. Entrances. An accessible route should exist from the sidewalk or roadway and parking area to an accessible building entrance. This route should be located so that persons with physical disabilities do not have to pass through dedicated smoking areas or behind parked cars. Accessible routes should coordinate with the routes to other buildings and to public transportation stops.

To provide more general access to buildings, not less than 50% of the pedestrian entrances are required to be accessible. This should include a principal entrance. If the 50% calculation results in a fraction, the number of accessible entrances should be the next higher unit value. For the purpose of determining the number of entrances to a building, several adjacent doors in a bank of doors are considered to be a single entrance. If an intercom system is provided, the system shall comply with the requirements for controls and should be useable by persons who communicate using visual language such as a video system.

A-3.8.2.3. Access to Rooms and Facilities. If access is required into suites or rooms in Subsection 3.8.2., it is intended that access be provided, with some exceptions identified in Sentence 3.8.2.3.(2), throughout each room or suite including access to all facilities and areas. Some examples of where access is required are as follows:

- within each suite (subject to Clauses 3.8.2.3.(2)(h) to (j).),
- within rooms or areas that serve the public or are designated for use by visitors, including interview rooms, holding rooms, changing rooms, areas in assembly occupancies with fixed seats so as to provide viewing of any entertainment areas, display areas and merchandising departments,
- within each type of membership facility,
- within rooms or areas for student use in assembly occupancies,
- within general work areas, including office areas and areas with lockers,

- within general use or general service areas, including shared laundry areas in residential occupancies, recreational areas, cafeterias, lounge rooms, lunch rooms and infirmaries,
- within sleeping rooms in hospitals and nursing homes with treatment,
- (if installed), into at least one passenger elevator or elevating device conforming to Articles 3.5.2.1. and 3.8.3.7.,
- into washrooms described in Sentences 3.8.2.8.(1) to (3),
- to any facility required by this Section to be designed to accommodate persons with physical disabilities,
- onto every balcony provided in conformance with Clause 11.3.7.1.(1)(c),
- to service counters used by the general public (examples include sales counters, refreshment stands, drinking fountains, cafeteria counters, checkout counters and bank service counters), and
- to equipment designed to serve the public including self-serve kiosks, automated banking machines and night deposit boxes.

Where one or more hairdressing sinks are provided in barber shops, hairdressing shops and beauty parlors, at least one shall be useable by persons using in wheelchairs. Where fitting rooms are provided in a store, an accessible fitting room is required. An enclosure not less than 1 500 mm by 1 500 mm is suggested.

The permission to waive an accessible path of travel for wheelchair access to certain specified areas of a building is not intended to waive accessibility requirements for persons whose physical disabilities do not require special provision for access to raised or sunken levels. Persons with vision impairments or who are deaf or hard of hearing that do not require the use of a wheelchair can be expected to move throughout a building.

The concept of providing similar amenities and facilities applies, among other things, to food, beverage, and entertainment facilities within restaurants, to smoking and non-smoking areas permitted in accordance with local regulations, and to window areas providing a view of an exterior attraction.

Availability of specific spaces depends on reservation policy and the sequence in which patrons arrive at a restaurant or other facility, and therefore is beyond the scope of this By-law.

Accessibility "within" a floor area means that in general all normally occupied spaces and levels are to be accessible, except those areas which are deemed not to require access. Examples of normally occupied floor areas include lobbies and passageways where persons are intended to use or pass through, but do not include spaces that are not normally used by the occupants such as storage platforms in industrial and other occupancies.

Further, an accessible path of travel should be provided where buildings are networked together and as a connection to public transportation stops.

A-3.8.2.4.(1) Path of Travel to Storeys Served by Escalators and Moving Walks. In some buildings, escalators and inclined moving walks are installed to provide transportation from one floor level to another floor level so as to increase the capacity to move large numbers of persons. Some buildings located on a sloping site are accessible from street level on more than one storey and an escalator or inclined moving walk is provided for internal movement from floor to floor. In both these situations, a person with a physical disability must be provided with an equally convenient means of moving between the same floor levels within the building. This can be accomplished by providing elevators or a platform-equipped passenger-elevating device.

A-3.8.2.5. Parking Areas. In localities where local regulations or bylaws do not govern the provision of or dimensions of accessible parking spaces, the following provides guidance to determine appropriate provisions. If more than 50 parking spaces are provided, parking spaces for use by persons with physical disabilities should be provided in the ratio of one for every 100 parking spaces or part thereof. Where parking spaces are provided, parking spaces for use by persons with physical disabilities should also be provided for each accessible viewing position and for each accessible sleeping room or bed space. Parking spaces for use by persons with physical disabilities should

(1) be not less than 2400 mm wide and provided on one side with an access aisle not less than 1500 mm wide,

(2) have a firm, slip-resistant and level surface,

(3) be located close to an entrance required to conform to Article 3.8.2.2.,

(4) be clearly marked as being for the use of persons with physical disabilities, and

(5) be identified by a sign located not less than 1500 mm above ground level, with the International Symbol of Access (Figure A-3.8.2.5.-A).

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Figure A-3.8.2.5.-A
International Symbol of Access" sign

Asphalt, concrete and firm, compacted gravel are acceptable parking surfaces. Curb ramps should be not less than 1,500 mm wide. Parallel parking spaces should be not less than 7,000 mm long. If more than one parking space is provided for persons with physical disabilities, a single access aisle can serve two adjacent parking spaces. The arrangement shown in Figure A-3.8.2.5.-B allows the shared use of an access aisle to serve two adjacent parking spaces provided for use by persons with physical disabilities. Parking to accommodate vans and other vehicles equipped with platform lifts or side ramps should be provided greater dedicated space.

The design of the path of travel should accommodate loading to and from lifts and ramps, where intended. Vertical clearance must also be considered.

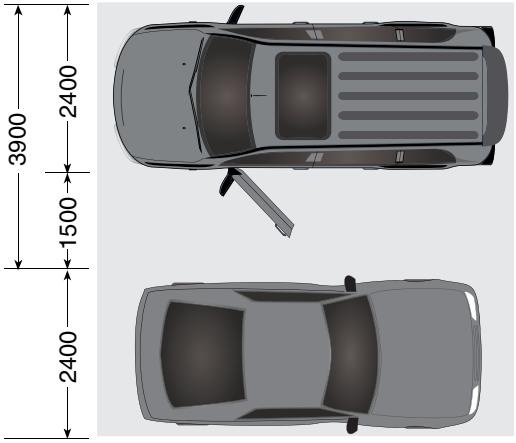

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Figure A-3.8.2.5.-B
Shared access aisle

A-3.8.2.5.(1) Path of Travel to Parking. It is not intended that a separate accessible entrance must be provided from the parking area. The designer may choose to designate the entrance leading to the parking area as the required entrance or to provide a properly identified and unobstructed path of travel from the parking area to the entrance which is accessible. The entrance chosen should, in any case, be the closest entrance to the parking area and one normally used by the occupants of the building. Long paths of travel are not recommended.

A-3.8.2.6.(1) Application to Security Access Systems. Sentence 3.8.2.6.(1) is not intended to reduce the functionality of security devices that limit access to secure areas and are addressed by other Sections of the Building By-law.

A-3.8.2.6.(2) Electrical Outlets. Electrical outlets intended for occupant use shall be located so that their height above the finished floor is not a barrier to use. Outlets that are dedicated for specific equipment or functions and not intended to be readily available to occupants need not conform to the location requirements.

A-3.8.2.8.(1) to (3) Washrooms. The primary intent of this requirement is that all regular washrooms be made accessible to all persons, including persons with disabilities, primarily persons who must use a wheelchair. Well-designed washrooms which can accommodate persons with disabilities need not be much larger than conventional washrooms.

The exception in Clause 3.8.2.8.(2)(b) recognizes situations where several washrooms may be provided on a large floor area. In such a case, not all washrooms need to be accessible, provided that an accessible washroom is available within a reasonable distance (45 m) of one that is not and that the location of that accessible washroom is clearly indicated as required by Sentence 3.8.2.10.(2). However, where several washrooms are provided in an area together, the accessible washrooms should be included among them.

Clause 3.8.2.8.(2)(d) is intended to address "strip malls" (a shopping mall with no public corridor). Section 3.7., which requires plumbing facilities, does not address the concept of suite and could permit, for instance, a shopping mall containing only mercantile occupancies to have only one washroom for each sex located in any one of the suites. It is desirable, however, that washrooms be located so as to be accessible at all times, since the owner or tenant of one suite has no control over the activities of another. These buildings may have either public accessible washrooms in a central location or washrooms which can accommodate persons with physical disabilities in each suite. This arrangement relieves any one tenant from having to provide "public" washrooms. Hence, the exception is meant as a relaxation to avoid an unnecessary burden on small facilities but should not be construed as meaning that these buildings need not provide accessible Sentence (3) requires an accessible universal washroom in every building required to have water closets. There are a significant number of persons with disabilities whose daily lives depend on assistance from their spouse or a care giver of the opposite sex. Providing this assistance in multiple stall public washrooms can be an added challenge. The universal washroom not only solves this problem but also serves the needs of other persons with disabilities who simply prefer the relative ease of using a universal washroom. It can also serve as a washroom for parents with small children and, with the addition of a counter, as a changing room for infants.

A-3.8.2.8.(9) Drinking Fountains. Similar to drinking fountains designed and located to be accessible, bottle filling stations should also be designed and located to be accessible. Drinking fountains and bottle filling stations should be indicated with appropriate signage.

A-3.8.2.9. Assistive Listening Devices. Assistive listening devices may be used where audible communication is expected but may be obstructed, such as at screened ticket windows or service counters in noisy areas. Available assistive listening devices should be indicated with appropriate signage.

A-3.8.2.11.(1) Counters with Work Surfaces. It is not intended that all counters be accessible, but that sufficient accessible counter space be available. Examples of counters that should be accessible for the purposes of extended business transactions include teller counters in financial institutions and reception areas as well as any counter at which processing and signing of documents takes place. The provision is not intended to apply to the simple exchange of money for goods or services such as at a retail check-out counter or check-in counters where tickets are presented, or to work surfaces in industrial occupancies.

A-3.8.3.1.(2) Enhanced Accessiblity for Residential Buildings. These measures are designed to provide a series of modest accessibility improvements to multi-unit residential buildings at minimal cost, using some of the concepts of universal design. They are designed to enable disabled persons to visit and socialize with people in their homes. They also include simple provisions which will facilitate future adaptation of a dwelling unit so that the unit may be occupied by a person with a range of physical mobility restrictions, and are intended to extend the length of time that elderly persons may remain safely in their own homes.

It should be noted that these improvements apply only to newly constructed multi-unit residential buildings containing three or more suites and served by an elevator and a common corridor. They are NOT intended to provide full accessibility and do not, except where explicitly stated, require conformance to Article 3.7.2.10. and Articles 3.8.1.1. to 3.8.2.3.

A-3.8.3.1.(1) Accessible Design Standards. By-law users who opt to apply the CSA B651 provisions listed in Table 3.8.3.1. must do so without exception: they cannot randomly select and apply a mix of provisions from the Building By-law and that standard.

A-3.8.3.2.(2) Surfaces in an Accessible Path of Travel. Floor finishes, including walk-off matts and carpet, should be selected, installed and securely fixed to provide a firm and stable surface so that persons using wheelchairs, walkers or other mobility aids can easily travel over them without tripping or expending undue energy. Other than very high-density, short-pile carpeting, most carpeting does not meet these criteria.

Furthermore, where the path of travel is exposed to intense light conditions, such as daylight or directional lighting, a low-glare or matte floor surface should be selected, as glare from floor surfaces can influence all users' perception and be particularly problematic for persons with low vision. For the same reasons, heavily patterned flooring should also be avoided.

A-3.8.3.2.(3) Passenger-Elevating Devices. Inclined moving walkways that are used to provide access should not have a running slope steeper than 1 in 20.

A-3.8.3.2.(6)(a) Mechanical Lifts. The provisions for mechanical lifts are not intended for general use to provide accessibility in an exterior location due to its susceptibility to weather or lack of maintenance. It is therefore intended that these be installed only where topography or other similar existing site constraints necessitate the use of a platform lift as the only feasible alternative. US ADA While the site constraint must reflect exterior conditions, the lift can be installed in the interior of a building. For example, a new building constructed between and connected to two existing buildings may have insufficient space to coordinate floor levels and also to provide ramped entry from the public way. In this example, an exterior or interior platform lift could be used to provide an accessible entrance or to coordinate one or more interior floor levels.

A-3.8.3.4.(2) Parking Requirements for Persons with Disabilities. The number, size and headroom clearance required for parking stalls for persons with disabilities must comply with the City of Vancouver Parking By-law. It should be noted that under the authority of the Parking By-law, the number of parking stalls for persons with disabilities may be relaxed by the Director of Planning. Unless specifically relaxed by the Director of Planning, the following table outlines the required number of parking stalls for persons with disabilities in accordance with Section 4 of the Parking By-law:

In accordance with Section 4 of the Parking By-law, all parking stalls for persons with disabilities are required to be provided with a minimum width of 4.0 m, a length of 5.5 m and a vertical clearance of 2.3 m. The minimum 2.3 m vertical clearance must be provided above the disability parking stall as well as above the entrance and drive aisle providing access to the required disability parking space in accordance with Section 4 of the Parking By-law. These requirements are intended to apply to existing buildings only where it is reasonable. In cases where no development permit is required, the Chief Building Official, in consultation with the Director of Planning and the City Engineer, may relax the length, width and vertical clearance requirements for existing buildings where the provisions cannot be reasonably accommodated. Relaxations for the size and vertical height clearance of disabled parking stalls may be granted to development permit applications by the Director of Planning in consultation with the Chief Building Official and City Engineer.

Table A-3.8.3.4.(2)
Table of Required Disability Parking Spaces

Required Number of Disability Parking Spaces	Total Number of Parking Spaces Provided		
	Column 1	Column 2	Column 3
0	0 – 9	0	0 - 24
1	10 - 39	1	25 - 74
2	40 - 74	2 - 29	75 - 149
3	75 - 124	30 - 44	150 - 249
4	125 - 174	45 - 59	250 - 349
One additional disability parking space	For any portion of each additional 50 parking spaces	For any portion of each additional 15 parking spaces	For any portion of each additional 100 parking spaces

Notes to Table A-3.8.3.4.(2):

Column 1 – Multiple dwelling units, retail uses, hospitals, health care offices, health enhancement centres, animal clinics, hotels, churches, chapels, funeral homes, places of worship or similar places of assembly.

Column 2 – Special Needs Residential Facilities - Community Care - Class B and Special Needs Residential Facilities - Congregate Housing for Seniors.

Column 3 – Office, theatre uses and all other uses not mentioned for Columns 1 and 2.

A-3.8.3.5.(1)(b) Ramp Slopes. Ramps with a slope of more than 1 in 16 can be very difficult for persons with certain physical disabilities to manage. Even though they pose less of a problem for persons using motorized wheelchairs, these ramps can be unsafe to descend, especially in cold climates. Although Article 3.8.3.5. permits slopes on ramps as great as 1 in 12 for distances of up to 9 m, slopes of 1 in 20 are safer and less strenuous. When limited space is available, as may be the case during renovations, ramps with a slope of up to 1 in 12 should be restricted to lengths not exceeding 3 m whenever possible. A strip contrasting in colour and texture should be used at the top and bottom of ramps to warn persons with low or no vision.

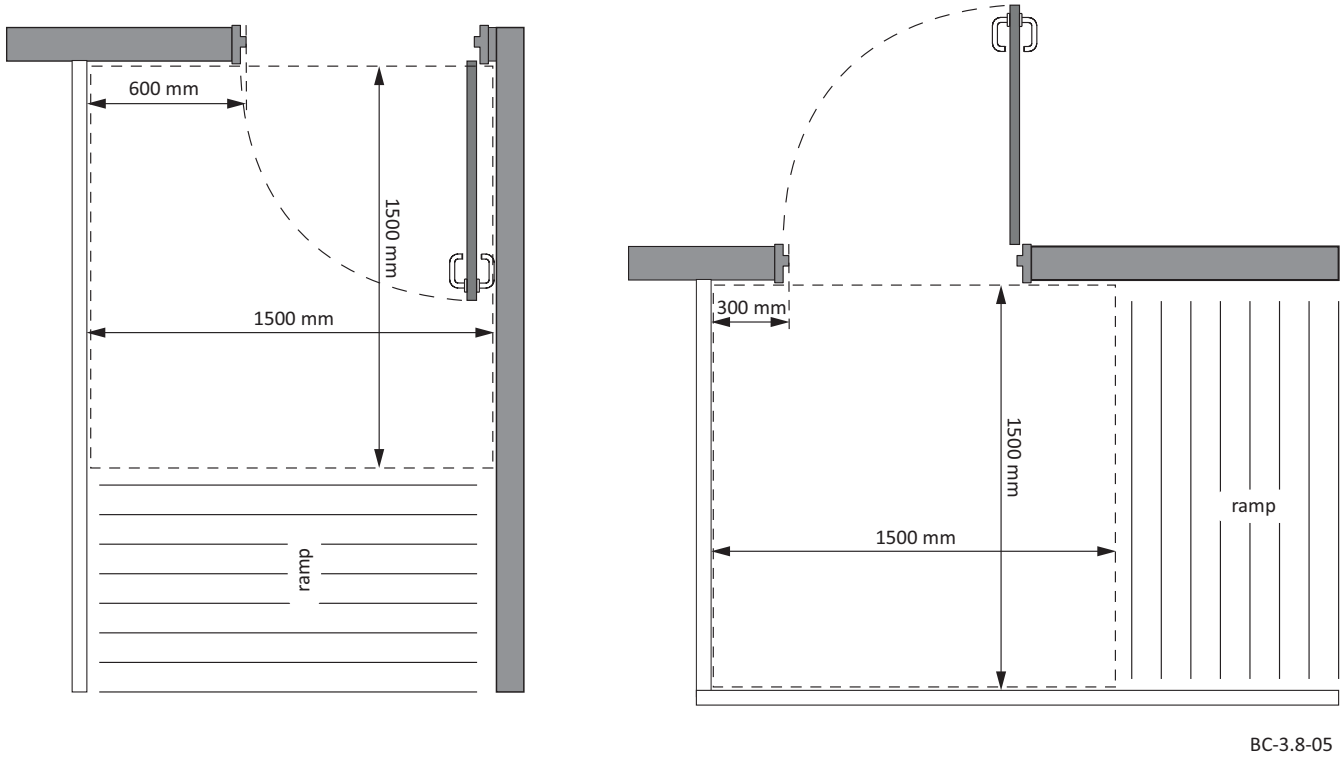

Figure A-3.8.3.5.(1)(c)
Landing design at doorways leading to ramps

A-3.8.3.5.(4)(a) Surface of Ramps. Sentence 3.8.3.2.(2) requires that all walking surfaces in an accessible path of travel be stable and firm to limit the effort required by persons using wheelchairs or other mobility aids. Therefore, Sentence 3.8.3.5.(4) requires that hard or resilient flooring be used on the surfaces of steeper ramps. Furthermore, carpet and like materials should not be installed on any ramp.

A-3.8.3.6.(2) Doorway Width. Standard wheelchair width specifications indicate a range of sizes from 584 mm overall to 685 mm overall. Every doorway that is located in an accessible path of travel must have a clear width of not less than 850 mm when the door is in the open position and therefore it is important that this dimension be measured correctly. Figure A-3.8.3.6.(2) shows a door opened to 90°. It is clear that the door, and to a lesser extent the stop, impinges on the space within the door frame. The clear width of not less than 850 mm is measured from the face of the door in the open position of 90° to the doorway to the outside edge of the stop on the door frame. It is not sufficient just to measure the inside width of the door frame. The hardware selected on sliding doors, such as d-shaped handles, may result in a clear width being substantially less than the inside dimension of the door frame. The clear width for sliding doors is measured from the edge of the open door to the outside edge of the stop on the door frame. Other factors, including location of door stops other than on the door frame, and the installation of door closers and exit devices, should be taken into account. The intrusion of a door handle or an exit device into the space is of lesser importance because its height above the floor does not typically obstruct passage of a wheelchair. It is recognized that there are many types of door frame and door mounts but the overall objective is to maintain a clear width of not less than 850 mm. The diagram Figure 3.8.3.6.(2) depicts a somewhat restrictive scenario, as many doors can open wider than 90°, however, a door smaller than 914 mm would not likely be wide enough to ensure the minimum clear width of 800850 mm that is required. Swing of a door beyond 90° may be of less benefit as extended reach to close the door may be required once the doorway is passed through.

In a doorway with multiple swinging leaves, the active leaf must be capable of providing the required clear width in the open position. The clear width is then measured from the face of the active leaf, in the open position of 90° to the doorway, to the outside edge of the adjacent leaf when the adjacent leaf is in the closed position.

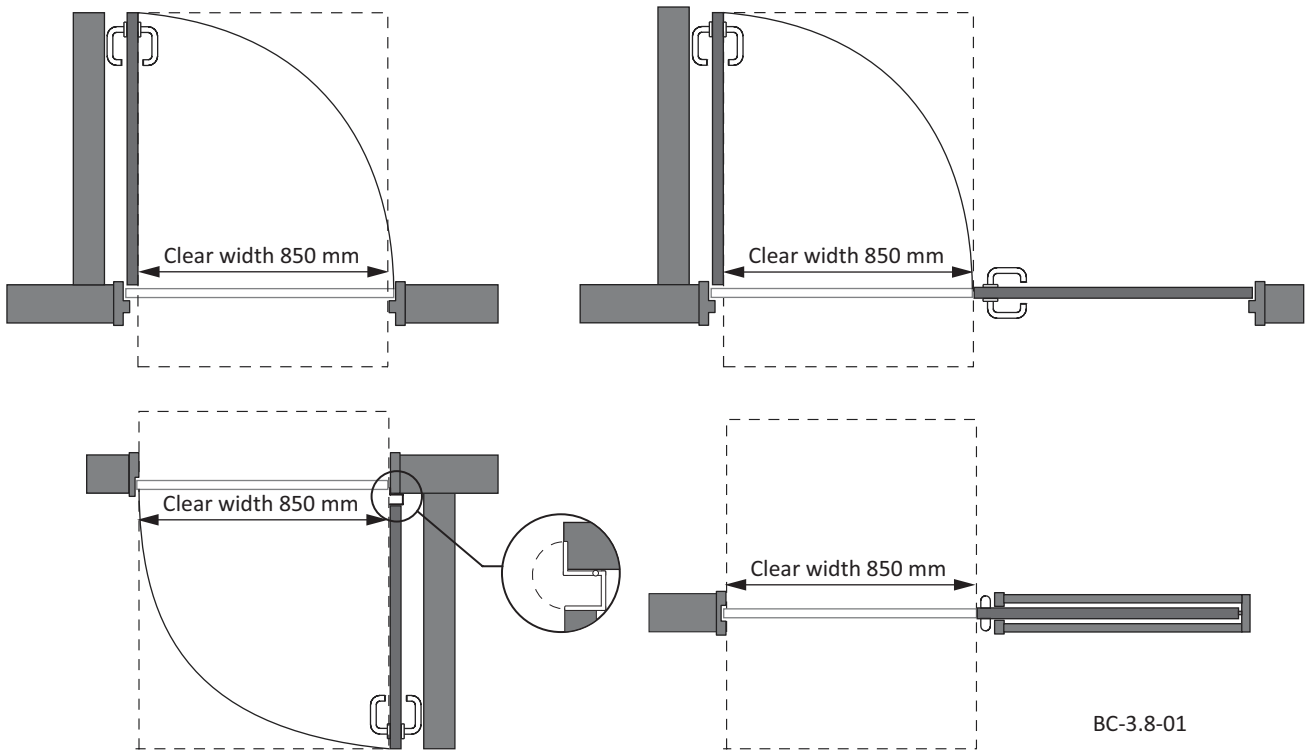

Figure A-3.8.3.6.(2)
Clear doorway width

A-3.8.3.6.(3) Washrooms in Residential Occupancies. This requirement ensures that the doorway to the washroom in a dwelling unit or a hotel or motel suite is at least large enough to accommodate someone using a wheelchair. The By-law does not require these washrooms to be accessible, in order to avoid a set of prescriptive requirements which could limit design flexibility.

However, it is relatively simple to make washrooms accessible through careful planning and positioning of fixtures and this can be achieved in an area not much larger than that of conventional washrooms.

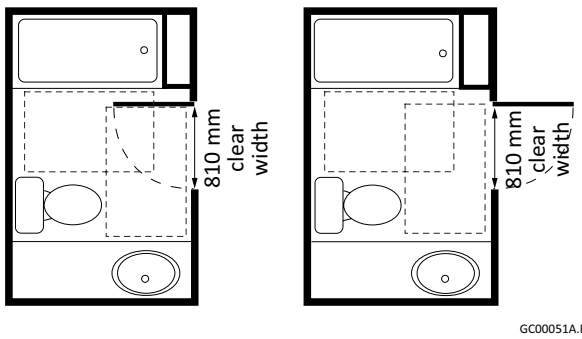

Figure A-3.8.3.6.(3)
Residential washrooms

A-3.8.3.6.(4) Lever Handles. Lever handles are usable by most persons with limited hand mobility and will meet the intent of this requirement. Lever handles with an end return towards the door are less prone to catch the clothing of someone passing through the doorway. Large D-shaped handles should be used on sliding doors.

A-3.8.3.6.(6) and (7) Doors with Power Operators. Doors equipped with a power operator actuated by a pressure plate identified with the international symbol for accessibility or, where security is required, by a key, card or radio transmitter, and that can otherwise be opened manually, meet the intent of the requirement. The location of these actuating devices should ensure that a wheelchair will not interfere with the operation of the door once it is actuated. Swinging doors equipped with power operators which

are actuated automatically and open into passing pedestrian traffic should be provided with a guard or other device designed to prevent pedestrians from stepping in the swing area of the door. These guards or devices should be detectable by blind persons. For example, inverted U-shaped guards should have an additional rail at a height not more than 680 mm so that it is detectable by the long cane.

These doors should also have a device (mat or other sensor) on the swing side to prevent the door from opening if someone is standing in the swing area.

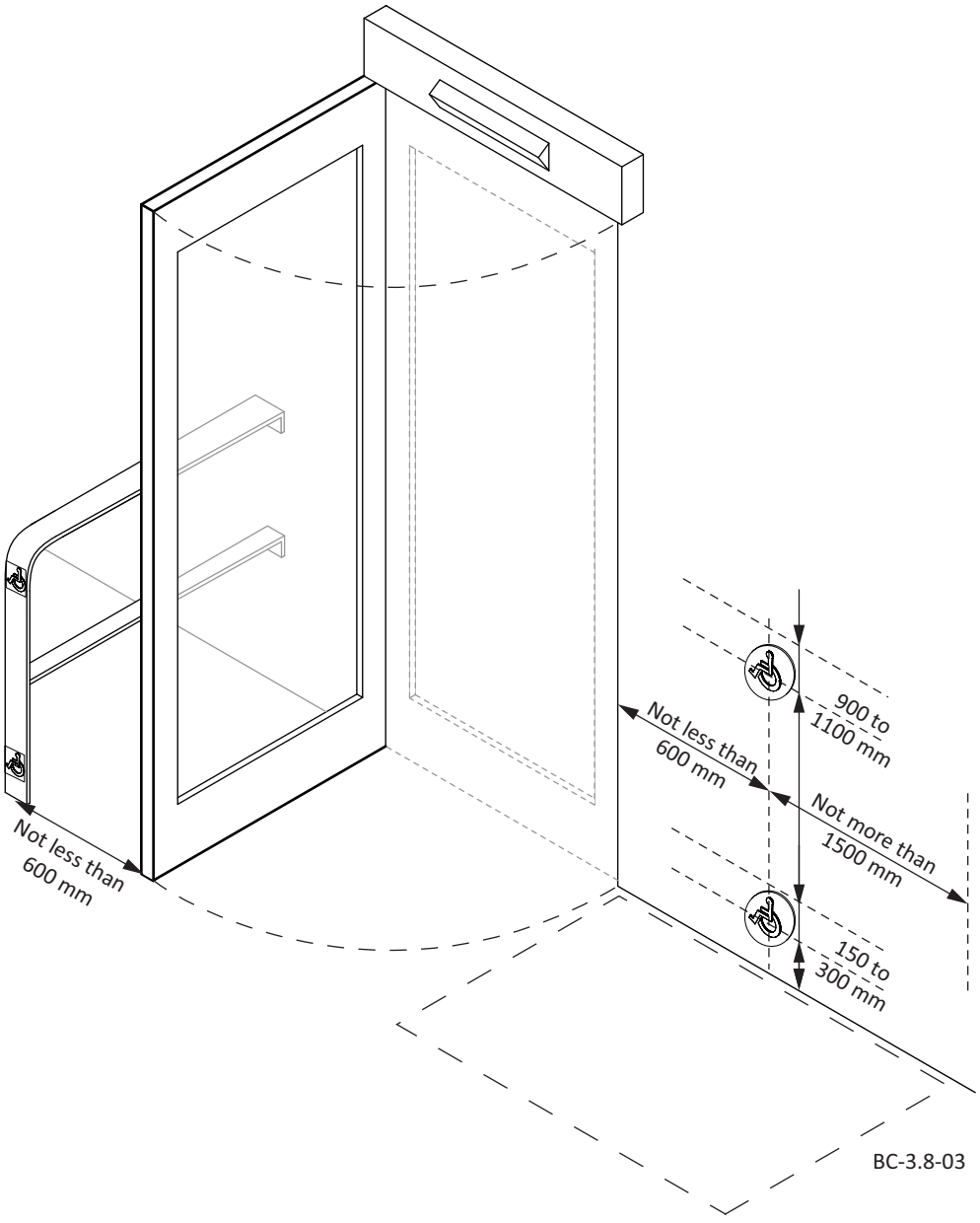

Figure A-3.8.3.6.(6) and (7)
Power operated doors

A-3.8.3.6.(9) Air Pressure Differences. Differences in air pressure on opposite sides of a door may be due to the operation of mechanical systems such as those associated with smoke control. So-called "stack action" in buildings in winter can also cause differential pressures due to the buoyancy of warm air. Stack action is usually most noticeable between stairwells and the remainder of the building, and at the entrances to buildings; the taller the building, the greater the effect. Doors with automatic closers have to operate with sufficient opening force to allow the return action to overcome the differential pressure.

A-3.8.3.6.(10) Delayed Action on Door Closers. In some circumstances, closers with a delay feature which keeps the door open for several seconds before it begins to close might be desirable. However, closers with this feature have limited back-check, a feature

of a normal door closer where resistance to opening increases as the door reaches the full arc of swing. Doors equipped with a to force it closed, thinking the closer has failed to operate. Delayed action closers are not recommended for such occupancies as schools.

A-3.8.3.6.(11) Clearance at Doorways. Sufficient clearance must be provided on the latch side of doors for a user to operate the door-opening mechanism and open the door without interference from the wheelchair. This is particularly important for a door swinging towards the approach side. See Figure A-3.8.3.6.(11).

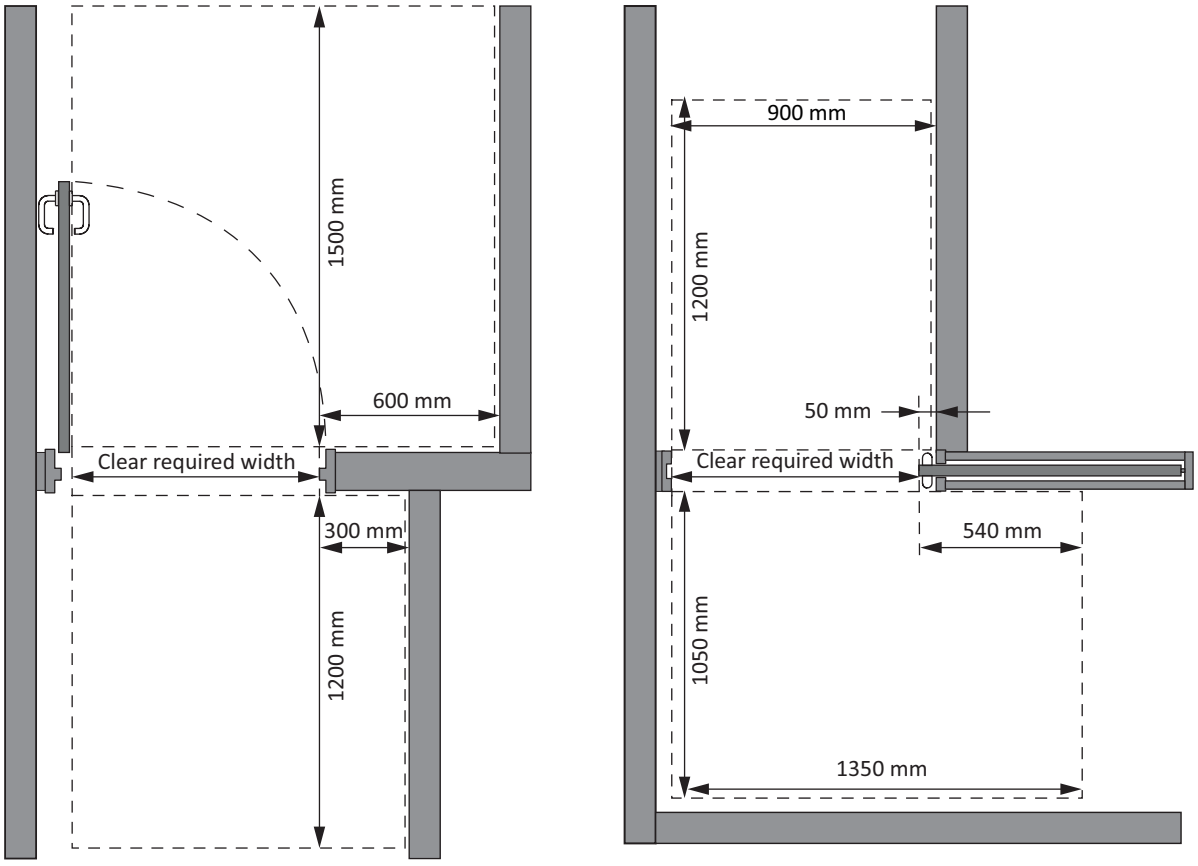

Figure A-3.8.3.6.(11)
Doorway clearance

A-3.8.3.9.(1) Accessibility Signs. The International Symbol of Access shown in Figure A-3.8.3.9.(1)-A indicates to persons with physical disabilities that they will have reasonable freedom of movement within a building so signed. The symbol is usually white on a blue background; where these colours do not stand out, the sign can be set on a white background. An arrow can be added to indicate direction or the location of an accessible space or facility.

Figure A-3.8.3.9.(1)-A
Signs indicating accessible facilities

The International Symbol of Access for Hearing Loss shown in Figure A-3.8.3.9.(1)-B, which indicates accessibility for persons who are deaf or hard of hearing, should be used to indicate the availability of variable volume controls on telephones, assistive listening systems, and text telephones (TT). These latter devices may also be referred to as teletypewriters (TTY) or telecommunications devices for the deaf (TDD).

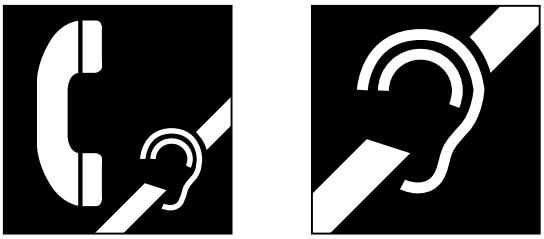

Figure A-3.8.3.9.(1)-B
Signs for assistive listening facilities

When characters are used on signs to indicate accessible features, Arabic numerals and sans-serif letters with a stroke width to height ratio from 1 in 6 to 1 in 10 and a character width to height ratio from 3 in 5 to 1 in 1 should be used. Characters identifying doors and openings that lead from public areas and through which the public is permitted to pass should consist of Arabic numerals or sans-serif letters or both, be not less than 25 mm high and raised between 0.7 mm and 3 mm with a stroke to height ratio for ease of reading by touch. This identification should be located at the side of the doors or openings, centred 1 350 mm above the finished floor and within 150 mm of the jamb.

A-3.8.3.9.(5) Tactile Walking Surface Indicators. Figure 3.8.3.9.(5) illustrates acceptable designs of tactile walking surface indicators.

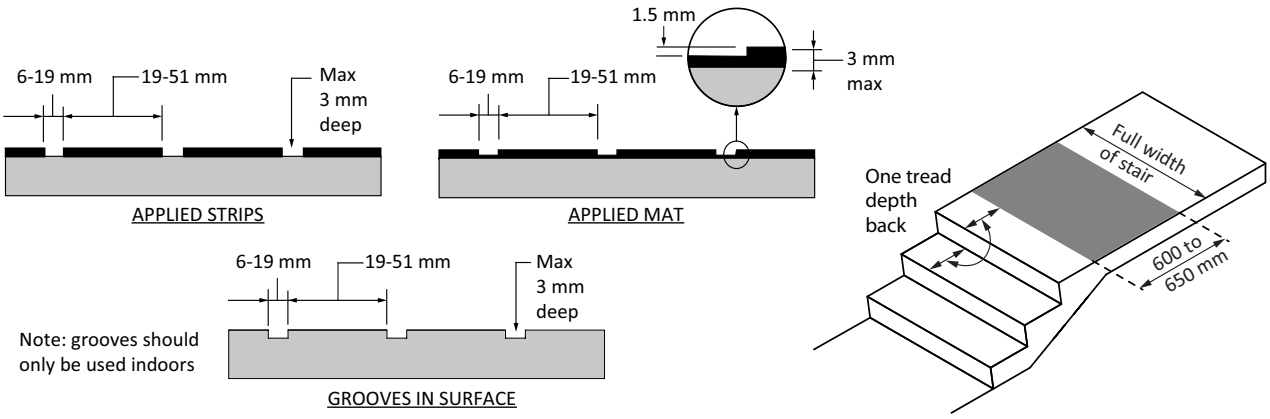

Figure A-3.8.3.9.(5)
Tactile walking surface indicators

A-3.8.3.11.(1)(c)(v) Water-closet Stalls. Doors to water-closet stalls for persons with physical disabilities should swing outward, preferably against a side wall.

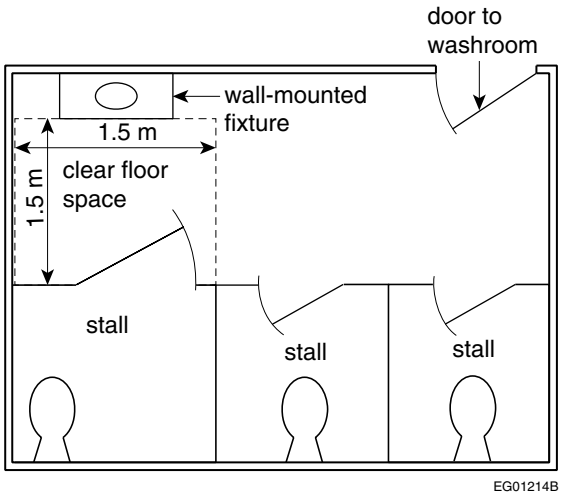

Figure A-3.8.3.11.(1)(c)(v)
Water-closet stalls

A-3.8.3.11.(1)(c)(vi) Door Pulls. The door pull should consist of a D-shaped handle mounted horizontally. The centre lines are the lines drawn through the long axis and the short axis of the handle. The midpoint of the handle must be located horizontally at 200 to 300 mm from the hinged side of the door and vertically at 900 to 1 100 mm above the finished floor surface.

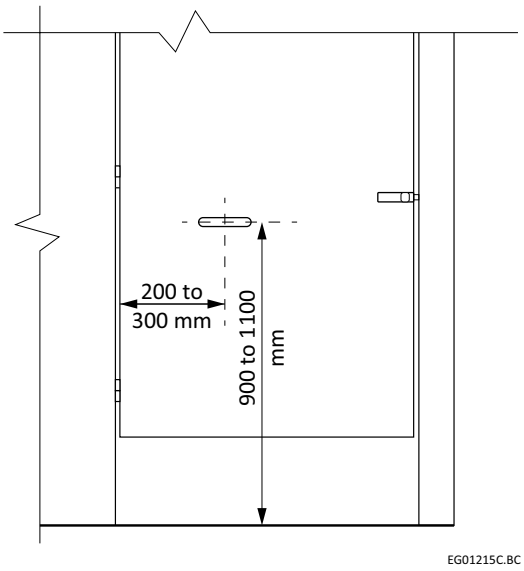

Figure A-3.8.3.11.(1)(c)(vi)-A
Door pull location

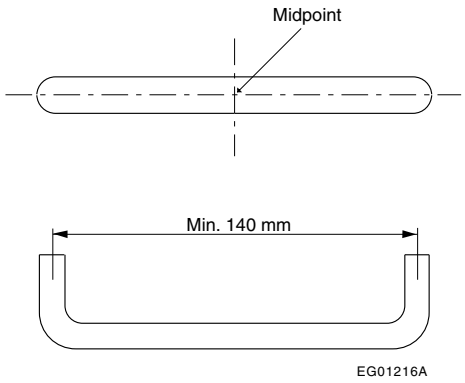

Figure A-3.8.3.11.(1)(c)(vi)-B
Door pull details

A-3.8.3.11.(1)(e)(ii) Additional Grab Bars. It is the designer's prerogative to exceed the minimum requirements found in the Building By-law and specify the installation of additional grab bars in other locations. These additional grab bars may be of different configurations and can be installed in other orientations.

A-3.8.3.12. Universal Washrooms. Unobstructed areas in front of the lavatory, in front of the water closet and on one side of the water closet are necessary for maneuverability of a wheelchair. Fixtures, including additional fixtures, should be located so as to be useable and also to provide maneuverability for persons using wheelchairs. Wall-mounted fixtures may project into the required floor space, provided that such projections do not restrict the maneuvering space required for persons using wheelchairs. Although power operated and outward swinging doors are preferable for accessibility, manually operated as well as inward swinging doors are also permitted. Figures A-3.8.3.12.-A and A-3.8.3.12.-B show design options that meet the intent of Article 3.8.3.12.

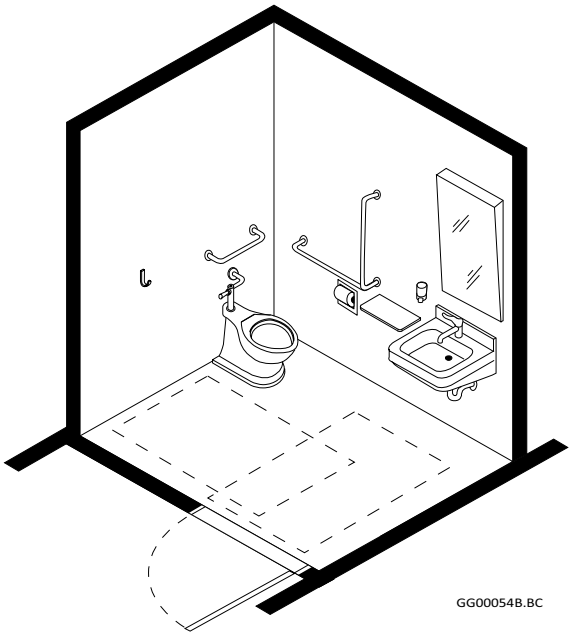

Figure A-3.8.3.12.-A
Universal washroom with outward swinging door

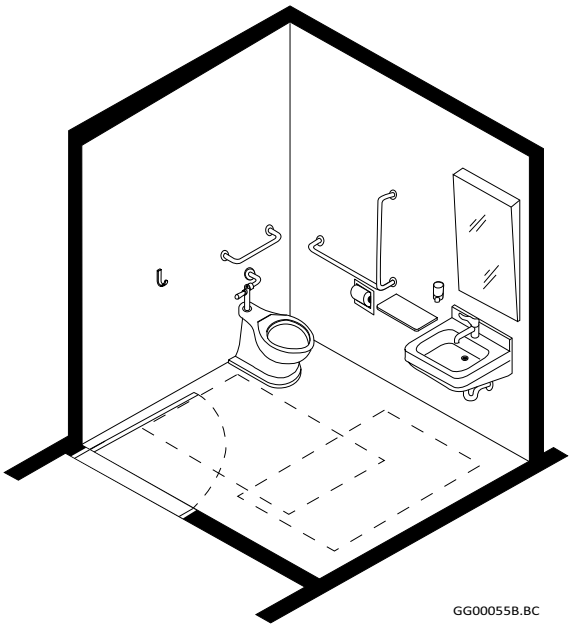

Figure A-3.8.3.12.-B
Universal washroom with inward swinging door

A-3.8.3.13.(1) Water Closets. Wall- or floor-mounted water closets with recessed bases are preferable because they provide the least amount of obstruction.

Wheelchair users generally require a higher water closet seat to facilitate transfer from their chair to the water closet. Removable high-lift seats are not recommended in public washrooms as they could be removed or damaged by vandals. Permanently installed vandal resistant high-lift seats are available for installation on standard height water closets and these could be considered in place of the high bowl required.

A-3.8.3.15.(1)(d) Clearances Beneath a Lavatory.

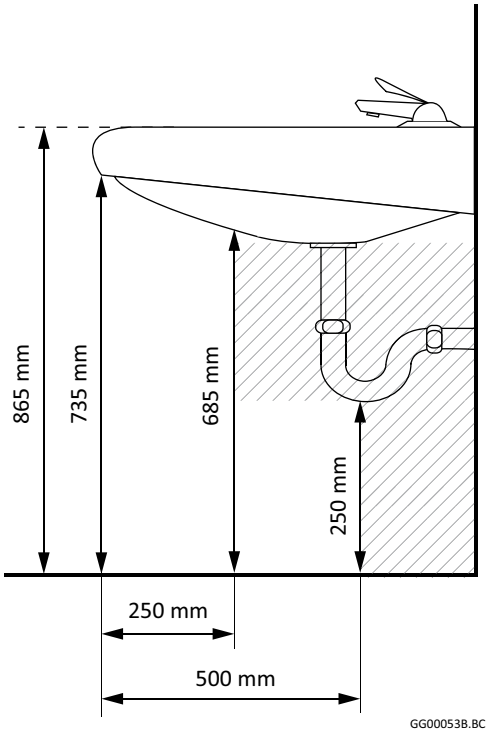

Figure A-3.8.3.15.(1)(d)
Clearances beneath a lavatory

A-3.8.3.15.(1)(e) Pipe Protection. The pipes referred to in Clause 3.8.3.15.(1)(e) include both supply and waste pipes. The hazard can be prevented by insulating the pipes, by locating the pipes in enclosures, or avoided by limiting the temperature of the hot water to a maximum of 45°C.

A-3.8.3.15.(1)(f) Soap Dispenser Location. The location of accessories, such as soap dispensers and faucets, serving accessible lavatories should be established while taking into consideration that their controls must be usable by and within the direct reach of a person in a seated position directly in front of the accessible lavatory.

A-3.8.3.16.(1)(b) Clear Space at Entrances to Showers. The clear space at the entrance to a shower may be encroached upon by fixtures such as a wall hung sink which does not interfere with the leg rests of the wheelchair. However, this sink could restrict movement for persons who need to make a lateral transfer if it were installed at the seat end of the shower.

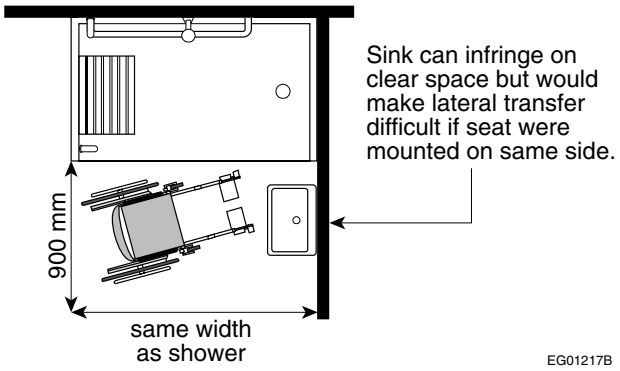

Figure A-3.8.3.16.(1)(b)
Shower design

A-3.8.3.16.(1)(f) Grab Bars. One L-shaped grab bar is required to be installed on the wall next to the seat. A grab bar behind the seat would prevent the user from leaning back against the wall, while one located on the wall opposite the seat cannot be reached from the seated position. The seat itself may be used in conjunction with the bar for transfer. If design flexibility is required, fold away grab bars can be used as an alternative.

A-3.8.3.17. Bathtubs. Hand showers should be located at the same end of the bath as the controls and accessories such as soap holders should be located and useable within direct reach of a person in a seated position.

A-3.8.3.18. Assistive Listening Systems. Wireless sound transmission systems, including FM, infrared or magnetic induction loop systems, improve sound reception for persons who are deaf or hard of with hearing disabilities by providing amplification which can be adjusted by each user while blocking out unwanted background noise. These systems transmit a signal that is picked up by a special receiver available for use by a person who is deaf or hard of with a hearing disability, whether or not a hearing aid is used. Neither system interferes with the listening enjoyment of others.

The transmitter can be jacked into an existing P.A. system amplifier or used independently with microphones. The induction loop system requires users to sit in the area circumscribed by the loop; though installation of the loop is relatively simple, the installer should be knowledgeable about these systems if proper functioning is to be achieved. FM or infrared systems can be designed to broadcast signals which cover the entire room and thus do not restrict seating to any one area. Figures A-3.8.3.18.-A and A-3.8.3.18.-B show the general configuration of FM and infrared systems. Although portable systems (FM in particular) are available, these are best suited to small audiences. Generally, the systems installed in church halls, auditoria, theatres and similar places of assembly are not easily portable, as they are installed in a fixed location by a sound technician and form an integral part of the P.A. system of the room or building.

Hard-wired systems (where a jack is provided at a particular seat) will not meet this requirement unless adequate provisions are made to accommodate persons with hearing aids. In choosing the most appropriate system, a number of factors must be taken into account including cost, installation and maintenance, suitability to the audience, ease of operation and the need for privacy. Information on designers and suppliers of these systems may be obtained from the Canadian Hearing Society.

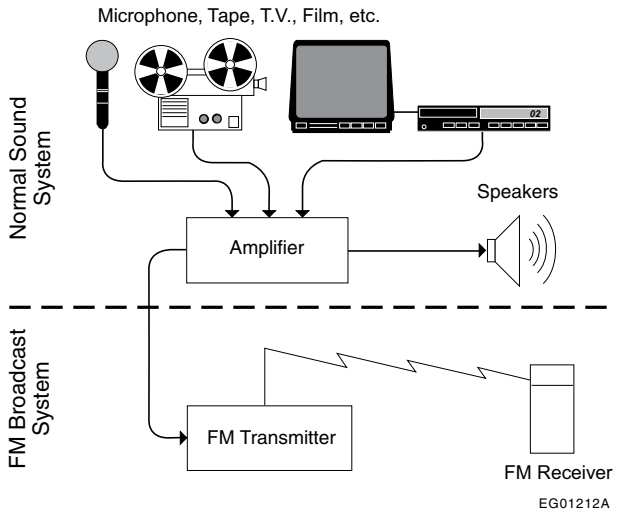

Figure A-3.8.3.18.-A
FM sound transmission system

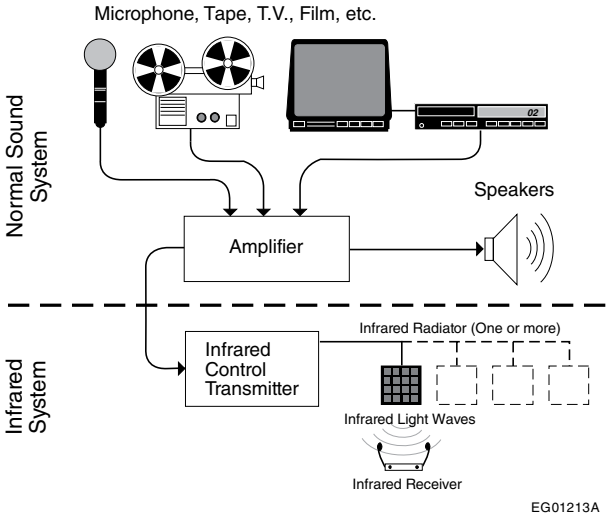

Figure A-3.8.3.18.-B
Infrared sound transmission system

A-3.8.3.20. Telephone Shelves or Counters. Built-in shelves or counters for public telephones must be designed to accommodate persons using text telephones (TT). These devices may also be referred to as teletypewriters (TTY) or telecommunication devices for the deaf (TDD). These devices require a level surface at least 305 mm deep by 250 mm wide with no obstruction above that space within 250 mm. If a wall-hung telephone or other obstruction extends to less than 250 mm from the shelf or counter, an equivalent clear space must be provided on either side of each telephone. At least one telephone should be equipped with a volume control on a receiver that generates a magnetic field compatible with the T-switch of a hearing aid. The lower portion of the shelf or counter is intended for persons using a wheelchair; therefore all parts of the operating mechanism of the telephone above this portion should be within reach of a wheelchair user.

Signage should identify accessible public telephones as being useable by persons using wheelchairs and persons who are deaf or hard of hearing.

A-3.8.3.22. Sleeping Rooms and Bed Spaces. Figure A-3.8.3.22. illustrates an acceptable layout of an accessible sleeping area.

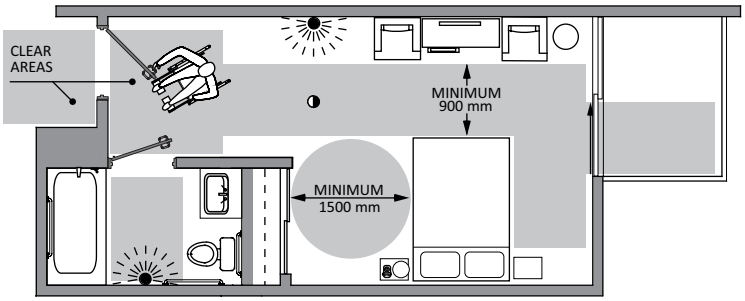

Figure A-3.8.3.22.
Sleeping rooms and bed spaces

A-3.8.5.3.(1) Entrance Doors to Dwelling Units. The Chief Building Official will accept the addition of one or two peepholes in a listed door in order to meet the requirements of Clause (1)(a) and to meet the required fire protection rating.

A-3.8.5.4.(1). Adaptable Dwelling Unit Doorways. Where sliding doors are used to provide access, it is necessary to consider the door hardware when determining clear width. Accessible hardware described in Sentence 3.8.3.6.(4) may result in a sliding door standing out from the jamb when in the open position. If not provided with the door during initial construction, accessible hardware when installed must not reduce the clear width of opening to less than required for access.

A-3.8.5.5. Adaptable Dwelling Unit Bathrooms. Figure A-3.8.5.5. illustrates an acceptable layout of an adaptable dwelling unit bathroom.

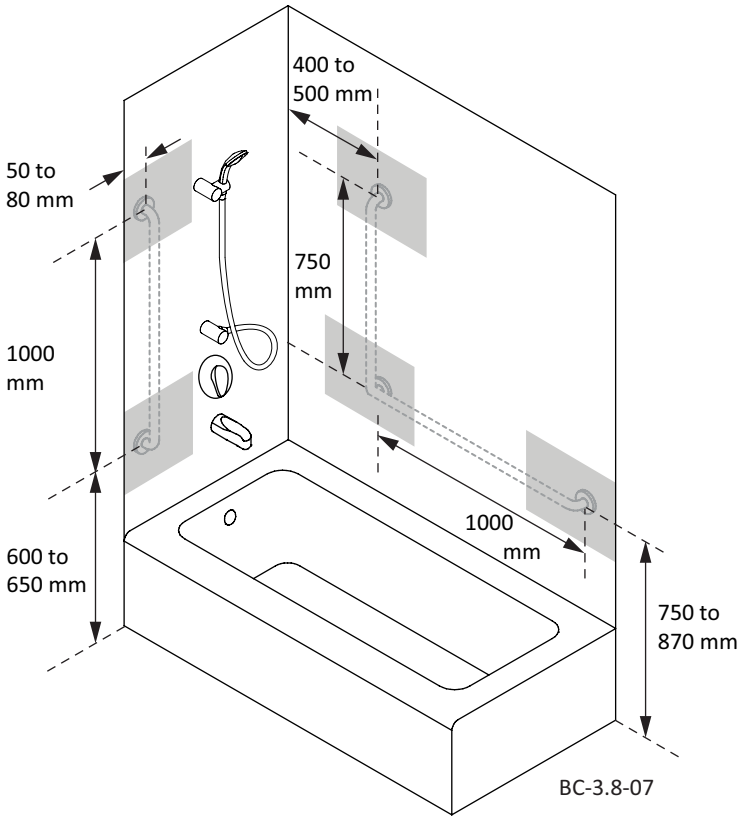

Figure A-3.8.5.5.
Adaptable Dwelling Unit Bathrooms

Despite the requirements of Article 3.8.5.5., the Chief Building Official may accept a lesser standard.

A-3.8.5.5.(3) Grab Bar Installation. This provision is intended to ensure there is adequate backing for the installation of grab bars by the occupant of the adaptable dwelling unit in the future. For example, plywood or solid lumber behind the wall finish and encompassing the location of future grab bars located as described in Clause 3.8.3.11.(1)(e) and Clause 3.8.3.16.(1)(f) or 3.8.3.17.(1)(f) would provide suitable backing for the grab bar fasteners.