

December 16, 2020

NOTICE TO BUILDING CODE USERS

The enclosed replacement pages to the 2012 Building Code Compendium Edition¹ reflect recent amendments to the Building Code (O. Reg. 332/12) and *Building Code Act, 1992* which are currently in effect. In particular, the 2012 Building Code Compendium is amended by:

- O. Reg. 209/20 to address the delivery of Building Code services such as reviewing building permit applications and conducting inspections related to COVID-19 effective May 11, 2020.
- BCA changes that recognize the Minister's authority to make regulations described under section 34 of the Act effective July 21, 2020.
- O. Reg. 511/20 to add requirements for community benefits charges to the list of applicable law effective September 18, 2020.
- O. Reg. 762/20 to revise the following effective December 16, 2020:
 - the list of applicable law to reference section 3 of the *Building Transit Faster Act, 2020* with respect to the issuance of a permit under that section;
 - minor errors and omissions through housekeeping changes;
 - two spent provisions related to the *Emergency Management and Civil Protection Act*.

Changes to the Code are identified on the amendment pages by a unique symbol and a corresponding effective date. These pages should be inserted in your Code now.

ServiceOntario Publications is the official publisher and vendor of the 2012 Building Code Compendium and the amendment pages. You may contact ServiceOntario Publications by phone at 416-326-5300, 1-800-668-9938 (toll-free), TTY 1-800-268-7095 or www.serviceontario.ca/publications.

For further information, please visit the Building Code website at www.ontario.ca/buildingcode.

¹ The Compendium is not an official copy of the Act and Code. Official copies of the legislation can be accessed from www.e-laws.gov.on.ca.

2012 Building Code Compendium

Volume 1

**December 16 2020 update
(Containing O. Reg. 209/20, O. Reg. 511/20 and
O. Reg. 762/20)**

COMMENCEMENT

Ontario Regulation 332/12 comes into force on the 1st day of January, 2014.

- r1 Amending Ontario Regulation 151/13 comes into force on the 1st day of January, 2014.
 - r2 Amending Ontario Regulation 360/13 comes into force on the 1st day of January, 2014.
 - r2.1 Amending Ontario Regulation 360/13 comes into force on the 1st day of January, 2015.
 - r3 Amending Ontario Regulation 361/13 comes into force on the 1st day of January, 2014.
 - r3.1 Amending Ontario Regulation 361/13 comes into force on the 1st day of January, 2015.
 - r4 Amending Ontario Regulation 368/13 comes into force on the 1st day of January, 2015.
 - r5 Amending Ontario Regulation 191/14 comes into force on the 1st day of January, 2015.
 - r6 Amending Ontario Regulation 139/17 comes into force on the 1st day of July, 2017.
 - r6.1 Amending Ontario Regulation 139/17 comes into force on the 1st day of January, 2018.
 - r7 Amending Ontario Regulation 462/17 comes into force on the 1st day of January, 2018.
 - r8 Amending Ontario Regulation 563/17 comes into force on the 1st day of January, 2018.
 - r9 Amending Ontario Regulation 79/18 comes into force on the 3rd day of April, 2018.
 - r10 Amending Ontario Regulation 388/18 comes into force on the 20th day of July, 2018.
 - r11 Amending Ontario Regulation 88/19 comes into force on the 2nd day of May, 2019.
 - r11.1 Amending Ontario Regulation 88/19 comes into force on the 1st day of January, 2020.
 - r11.2 Amending Ontario Regulation 88/19 comes into force on the 1st day of January, 2022.
 - r12 Amending Ontario Regulation 87/19 comes into force on the 1st day of July, 2019.
 - r13 Amending Ontario Regulation 209/20 comes into force on the 11th day of May, 2020.
 - r14 Amending Ontario Regulation 511/20 comes into force on the 18th day of September, 2020.
 - r15 Amending Ontario Regulation 762/20 comes into force on the 16th day of December, 2020.
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- m1 Ruling of the Minister of Municipal Affairs and Housing (Minister's Ruling) MR-13-S-24 comes into force on the 1st day of January 2014.
 - m2 Ruling of the Minister of Municipal Affairs (Minister's Ruling) MR-16-S-25 comes into force on the 7th day of July 2016.
 - m3 Ruling of the Minister of Municipal Affairs (Minister's Ruling) MR-16-S-26 comes into force on the 7th day of July 2016.
 - m4 Ruling of the Minister of Municipal Affairs (Minister's Ruling) MR-16-S-27 comes into force on the 1st day of January 2017.
 - m5 Ruling of the Minister of Municipal Affairs (Minister's Ruling) MR-17-S-28 comes into force on the 1st day of January 2018.

EDITORIAL

- e1 Editorial correction issued for January 1st, 2014.
- e2 Editorial correction issued for January 1st, 2014.
- e2.1 Editorial correction issued for January 1st, 2015.
- e3 Editorial correction issued for January 1st, 2015.
- e4 Editorial correction issued for July 7th, 2016.
- e5 Editorial correction issued for January 1st, 2017.
- e6 Editorial correction issued for July 1st, 2017.
- e6.1 Editorial correction issued for January 1st, 2018.
- e7 Editorial correction issued for January 1st, 2018.
- e8 Editorial correction issued for January 1st, 2020.
- e8.1 Editorial correction issued for January 1st, 2022.
- e9 Editorial correction issued for July 1st, 2019.
- e10 Editorial correction issued for December 16th, 2020.

COVER PHOTO CREDITS

1	2	3	4
5	6	7	8

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Code Amendment History

The first Ontario Building Code was issued in 1975. The 1975 and subsequent editions of the Building Code have been issued as follows:

Building Code Edition	Date Filed	Effective Date
O. Reg. 925/75 (1975 Building Code)	November 24, 1975	December 31, 1975
O. Reg. 583/83 (1983 Building Code)	September 15, 1983	November 30, 1983
O. Reg. 419/86 (1986 Building Code)	July 18, 1986	October 20, 1986
O. Reg. 413/90 (1990 Building Code)	July 30, 1990	October 1, 1990
O. Reg. 403/97 (1997 Building Code)	November 3, 1997	April 6, 1998
O. Reg. 350/06 (2006 Building Code)	June 28, 2006	December 31, 2006
O. Reg. 332/12 (2012 Building Code)	November 2, 2012	January 1, 2014

The following Table lists the amendments to the 2012 Building Code made since the filing of O. Reg. 332/12.

Regulatory Amendments to the 2012 Building Code – Ontario Regulation 332/12			
Amendment	Date Filed	Effective Date	Nature of Amendment
O. Reg. 151/13	May 9, 2013	January 1, 2014	Sprinklering of retirement homes
O. Reg. 360/13	December 20, 2013	January 1, 2014	Fees
		January 1, 2015	
O. Reg. 361/13	December 20, 2013	January 1, 2014	Housekeeping changes, fireplace emission limits Revise Supplementary Standard SA-1
		January 1, 2015	EIFS
O. Reg. 368/13	December 27, 2013	January 1, 2015	Accessibility
O. Reg. 191/14	September 23, 2014	January 1, 2015	Midrise wood construction, accessibility, housekeeping changes Revise Supplementary Standards SA-1, SB-1, SB-2, SB-3, SB-12
O. Reg. 139/17	May 17, 2017	July 1, 2017	Retirement homes, 2 unit houses Revise Supplementary Standard SA-1
		January 1, 2018	Electric vehicle charging, pipe sizing, sewage systems Revise Supplementary Standard SA-1
O. Reg. 462/17	December 7, 2017	January 1, 2018	Applicable law
O. Reg. 563/17	December 19, 2017	January 1, 2018	Electric vehicle charging

Regulatory Amendments to the 2012 Building Code – Ontario Regulation 332/12 (Cont'd)			
Amendment	Date Filed	Effective Date	Nature of Amendment
O. Reg. 79/88	March 6, 2018	April 3, 2018	Applicable law
O. Reg. 388/18	July 20, 2018	July 20, 2018	Occupancy requirements - Lower Don Area
O. Reg. 87/19	May 2, 2019	July 1, 2019	Cannabis extraction operation
O. Reg. 88/19	May 2, 2019	May 2, 2019	Electric vehicle charging, leaching chambers
		January 1, 2020	Harmonization with 2015 mNBC and 2015 mNPC changes
		January 1, 2022	Stairs, ramps, handrails and guards
O. Reg. 209/20	May 11, 2020	May 11, 2020	Delivery of building code services, construction restrictions
O. Reg. 511/20	September 18, 2020	September 18, 2020	Applicable law - community benefits charges
O. Reg. 762/20	December 16, 2020	December 16, 2020	Applicable law, housekeeping changes

The following Table lists Minister’s Rulings that have been made to adopt amendments to codes, formulae, standards, guidelines or procedures referenced in the 2012 Building Code.

Minister’s Rulings to adopt amendments to codes, formulae, standards, guidelines or procedures referenced in the 2012 Building Code			
Ruling Number	Date of Ruling	Effective Date	Nature of Amendment
MR-13-S-24	September 1, 2013	January 1, 2014	Revise Table 1.3.1.2. of Division B Revise Supplementary Standards SA-1, SB-5 and SB-12
MR-16-S-25	July 7, 2016	July 7, 2016	Revise Table 1.3.1.2. of Division B Revise Supplementary Standard SB-5
MR-16-S-26	July 7, 2016	July 7, 2016	Revise Table 1.3.1.2. of Division B Revise Supplementary Standard SB-12
MR-16-S-27	December 22, 2016	January 1, 2017	Revise Table 1.3.1.2. of Division B Revise Supplementary Standard SB-10
MR-17-S-28	December 29, 2017	January 1, 2018	Revise Table 1.3.1.2. of Division B Revise Supplementary Standard SA-1

Building Code Act, 1992

S.O. 1992, Chapter 23

as amended by:	S.O. 1997	c. 24, s. 224 except s. 224(17) in force June 17, 1998
	S.O. 1997	c. 30, Schedule B, s. 1-20 in force April 6, 1998
	S.O. 1999	c. 12, Schedule M, s. 1-11 in force December 22, 1999
	S.O. 2000	c. 5, s. 7 in force January 1, 2001
	S.O. 2000	c. 26, Schedule K, s. 1 in force December 6, 2000
	S.O. 2002	c. 9, s. 5, 6(1), (2), 16, 24, 25, 27, 31(1), 34, 40(1), 41(1), 43, 51(6), (9), (11)-(15), 53(3), 54, 55 in force September 1, 2003
	S.O. 2002	c. 9, s. 1-4, 6(3), 7-15, 17-19, 20(1), (2), 21-23, 26, 28-30, 31(2), 32, 33, 35-39, 40(2), (3), 41(2), 42, 44-50, 51(1), (2), (4), (5), (7), (8), (10), 52, 53(1), (2) in force July 1, 2005
	S.O. 2002	c. 17, Schedule C, s. 1-6 in force July 1, 2005
	S.O. 2002	c. 17, Schedule F, Table in force January 1, 2003
	S.O. 2005	c. 33, s. 1 in force December 15, 2005
	S.O. 2006	c. 19, Schedule O, s. 1 in force June 22, 2006
	S.O. 2006	c. 21, Schedule F, s. 104, 136(1) in force July 25, 2007
	S.O. 2006	c. 22, s. 112 in force July 3, 2007
	S.O. 2006	c. 32, Schedule C, s. 3 in force January 1, 2007
	S.O. 2006	c. 33, Schedule Z.3, s. 4 in force January 1, 2009
	S.O. 2006	c. 35, Schedule C, s. 8 in force August 20, 2007
	S.O. 2009	c. 12, Schedule J in force May 14, 2009
	S.O. 2009	c. 33, Schedule 6, s. 43 in force June 1, 2011
	S.O. 2009	c. 33, Schedule 21, s. 2(1) in force December 15, 2009
	S.O. 2009	c. 33, Schedule 21, s. 2(4), (7), (8) and (9) in force July 1, 2010
	S.O. 2009	c. 33, Schedule 21, s. 2(2), (3), (5) and (6) in force January 1, 2011
	S.O. 2010	c. 19, Schedule 2, s. 1, s. 2(1), (2) in force April 1, 2011
	S.O. 2014	c. 7, Schedule 3, s. 1 in force July 23, 2014
	S.O. 2015	c. 28, Schedule 1, s. 147 in force January 1, 2018
	S.O. 2017	c. 10, Schedule 4, s. 1 in force May 30, 2017
	S.O. 2017	c. 34, Sched. 2, s. 1, 2(1)-(3), 3, 4(1), (2), 5, 6(1), (2), 7, 8(1), (2), 9, 10, 11, 12(1)-(3), 13(1)-(3), 14, 15, 16(1), (2), 17(1), (2), 18 (1), 20, 21(1)-(3), 22, 24(1), (5), (6), 25(1), (2) in force December 14, 2017
	S.O. 2019	c. 14, Sched. 14, s. 1-3 in force December 10, 2019
	S.O. 2020	c. 16, Sched. 1 TBD
	S.O. 2020	c. 18, Sched. 1, s. 1-3 in force July 21, 2020

Responsibility

(5) If sewage system inspectors have been appointed under this section, the chief building official and inspectors appointed under section 3 or 4 shall not exercise their powers under this Act in respect of sewage systems. 1997, c. 30, Sched. B, s. 3.

Certificate

(6) The medical officer of health or the secretary-treasurer of a planning board or conservation authority shall issue a certificate of appointment bearing his or her signature, or a facsimile of it, to each sewage system inspector appointed by the board of health, planning board or conservation authority. 1997, c. 30, Sched. B, s. 3; 1999, c. 12, Sched. M, s. 2(5).

Records

(7) Every board of health, planning board and conservation authority prescribed for the purposes of subsection (1) shall retain such records as may be prescribed by regulation for the prescribed period of time. 2002, c. 9, s. 7.

Provincial Enforcement

4(1) Subject to section 3.1, Ontario is responsible for the enforcement of this Act in a territory without municipal organization. 1992, c. 23, s. 4(1); 1997, c. 30, Sched. B, s. 4.

Agreements

(2) The council of a municipality and the Crown in right of Ontario represented by the Minister may enter into an agreement providing for the enforcement of this Act in the municipality by Ontario subject to such payment in respect of costs as is set out in the agreement. 1992, c. 23, s. 4(2).

Idem

(3) If an agreement under subsection (2) is in effect, Ontario has jurisdiction for the enforcement of this Act in the municipality. 1992, c. 23, s. 4(3).

Inspectors

(4) Inspectors necessary for the enforcement of this Act in the areas in which Ontario has jurisdiction shall be appointed under Part III of the *Public Service of Ontario Act, 2006*. 1992, c. 23, s. 4(4); 2006, c. 35, Sched. C, s. 8(1).

Chief Building Official

(5) The director is the chief building official for the areas in which Ontario has jurisdiction. 1992, c. 23, s. 4(5).

Certificate

(6) The Deputy Minister of Municipal Affairs and Housing shall issue a certificate of appointment bearing his or her signature or a facsimile of it to the director and each inspector appointed under subsection (4). 1992, c. 23, s. 4(6); 1997, c. 24, s. 224(5).

Enforcement by Registered Code Agency Appointed by a Principal Authority

4.1(1) Subject to this Act and the building code, a principal authority may enter into agreements with registered code agencies authorizing the agency to perform the functions specified in the agreement in respect of the construction of any building or class of building specified in the agreement. 2002, c. 9, s. 8.

Appointment

(2) After entering into the agreement with the registered code agency, the principal authority may appoint the agency to perform specified functions in respect of the construction of a building or class of buildings. 2002, c. 9, s. 8.

Delegation of Power to Appoint

(3) The principal authority may delegate, in writing, to the chief building official the authority to make appointments described in subsection (2), and may impose conditions or restrictions with respect to the delegation. 2002, c. 9, s. 8; 2020, c. 18, Sched. 1, s. 1.

Same

(4) Unless otherwise provided in the building code, an appointment of a registered code agency may authorize the agency to perform all of the applicable functions described in section 15.15,
(a) before a permit is issued under section 8;
(b) after a permit is issued under section 8; or
(c) both before and after a permit is issued under section 8. 2002, c. 9, s. 8.

Conflicts

(5) A registered code agency shall not accept an appointment in the circumstances set out in the building code or if it would have a conflict of interest as determined in accordance with the building code. 2002, c. 9, s. 8.

Effect of Appointment

(6) A registered code agency shall perform the functions specified in the appointment for the construction of a specified building or class of buildings and subject to the restrictions set out in this Act and the building code, and shall do so in the manner and subject to the restrictions, if any, set out in the building code. 2002, c. 9, s. 8.

Same

(7) The duty of the registered code agency to perform those functions begins when the appointment is made and ends when the appointment expires as described in section 15.19 or is terminated in accordance with section 15.20. 2002, c. 9, s. 8.

Notice to the Director

(8) A principal authority that appoints a registered code agency shall give the director such information as may be prescribed by regulation. 2002, c. 9, s. 8.

Enforcement by Registered Code Agency Appointed by an Applicant

4.2(1) This section applies only if a principal authority authorizes it, by regulation, by-law or resolution, as the case may be, to apply within the jurisdiction of the principal authority. 2002, c. 9, s. 8.

Appointment

(2) Subject to this Act and the building code, a prescribed person who is entitled to apply for a permit under section 8 of this Act may appoint a registered code agency to perform all of the functions described in section 15.15 in respect of the construction of a building. 2002, c. 9, s. 8.

Exception

- (3) Subsection (2) does not apply,
- (a) if a registered code agency has been appointed by a principal authority to perform any function in respect of the construction; or
 - (b) if an inspector has begun to perform any function in respect of the construction. 2002, c. 9, s. 8.

Manner of Appointment

(4) The appointment must be made in writing in the prescribed manner and is subject to the prescribed conditions and restrictions. 2002, c. 9, s. 8.

Conflicts

(5) A registered code agency shall not accept an appointment in the circumstances set out in the building code or if it would have a conflict of interest as determined in accordance with the building code. 2002, c. 9, s. 8.

Effect of Appointment

(6) A registered code agency shall perform its functions for the specified building subject to the restrictions set out in this Act and the building code and shall do so in the manner and subject to the restrictions, if any, set out in the building code. 2002, c. 9, s. 8.

Same

(7) The duty of the registered code agency to perform those functions begins when the appointment is made and ends when the appointment expires as described in section 15.19 or is terminated in accordance with section 15.20. 2002, c. 9, s. 8.

Replacement Agency

(8) A person who has appointed a registered code agency under subsection (2) in respect of the construction of a building cannot replace the agency after it has begun to perform any function in respect of the construction unless the appointment of that agency has expired as described in section 15.19 or has been terminated in accordance with section 15.20. 2002, c. 9, s. 8.

Notice to Director

(9) The person who appoints a registered code agency under this section shall give the director such information as may be prescribed by regulation. 2002, c. 9, s. 8.

Notice to Chief Building Official

(10) The person who appoints a registered code agency under this section shall give the chief building official such information as may be prescribed by regulation. 2002, c. 9, s. 8.

Agreements re Enforcement

5(1) The council of a municipality and the Crown in right of Ontario represented by the Minister may enter into an agreement providing for the enforcement of this Act by the municipality in such part of the territory without municipal organization and subject to such payment in respect of costs as is set out in the agreement. 1992, c. 23, s. 5(1); 2017, c. 34, Sched. 2, s. 3.

Area of Municipal Jurisdiction

(2) The municipality has jurisdiction for the enforcement of this Act in the area designated in the agreement. 1992, c. 23, s. 5(2).

Application

(3) An agreement under this section may apply to the enforcement of all or any part of this Act or the building code. 1997, c. 30, Sched. B, s. 5.

Agreement re Review of Plans

- 6(1) Two or more principal authorities may enter into an agreement providing for,
- (a) the review by a principal authority for compliance with the building code of plans and specifications for the construction of a building within its area of jurisdiction;

- (b) an expedited review by another principal authority for compliance with the building code of plans and specifications for the construction of substantially similar buildings;
- (c) the allocation of responsibility for reviews for compliance with the building code of plans and specifications for the construction of buildings;
- (d) the resolution of disagreements about whether plans and specifications comply with the building code;
- (e) indemnification; and
- (f) such other matters as may be necessary to give effect to the agreement. 2002, c. 9, s. 9.

Delegation

(2) A principal authority may delegate to the chief building official the authority to make such decisions under an agreement as may be necessary for its implementation. 2002, c. 9, s. 9.

Agreement re Plumbing

6.1(1) Despite any other provision of this Act, the council of an upper-tier municipality and of one or more municipalities in the upper-tier municipality may enter into an agreement for the enforcement by the upper-tier municipality of the provisions of this Act and the building code related to plumbing in the municipalities and for charging the municipalities the whole or part of the cost. 2002, c. 17, Sched. C, s. 3(1).

Delegation to Health Unit

(2) If an agreement under subsection (1) is in effect, the council of an upper-tier municipality may by agreement delegate its powers under subsection (1) to a board of health having jurisdiction in the municipalities that are parties to the agreement. 2002, c. 9, s. 10; 2002, c. 17, Sched. C, s. 3(2).

Delegation by Municipality

(3) A municipality that is not a party to an agreement under subsection (1) may enter into an agreement with the board of health having jurisdiction in the municipality for the enforcement of the provisions of this Act and the building code relating to plumbing. 2002, c. 9, s. 10.

Plumbing Inspectors

(4) The council of an upper-tier municipality or the board of health may appoint plumbing inspectors for the purpose of this section. 2002, c. 9, s. 10; 2002, c. 17, Sched. C, s. 3(3).

Powers

(5) A plumbing inspector appointed under this section or, if there is more than one inspector in the area of jurisdiction, the senior plumbing inspector has the same powers and duties in relation to plumbing as does the chief building official in respect of buildings other than the issuance of conditional permits. 2002, c. 9, s. 10.

Responsibility

(6) If plumbing inspectors have been appointed under this section, the chief building official and inspectors appointed under section 3 or 4 shall not exercise their powers under this Act in respect of plumbing. 2002, c. 9, s. 10.

Application

(7) Subsections 3(8) and (9) and section 7 apply with necessary modifications to the council of an upper-tier municipality or a board of health that has assumed responsibility for plumbing under this section. 2002, c. 9, s. 10; 2002, c. 17, Sched. C, s. 3(4).

Transition, Plumbing

(8) If, on July 1, 1993, an upper-tier municipality was carrying out plumbing inspections under the *Ontario Water Resources Act* in the municipalities that formed part of the upper-tier municipality, the upper-tier municipality shall enforce the provisions of this Act and the building code related to plumbing in all of the municipalities forming part of the upper-tier municipality until the council of the upper-tier municipality by by-law determines otherwise, whereupon section 3 applies. 2002, c. 17, Sched. C, s. 3(5).

Same

(9) Subsections (4) to (7) apply with necessary modifications to an upper-tier municipality that has assumed responsibility for plumbing under subsection (8). 2002, c. 9, s. 10; 2002, c. 17, Sched. C, s. 3(6).

Interpretation

(10) For the purpose of subsection (8), an upper-tier municipality that has been deemed to be a county by any general or special Act for the purposes of section 76 of the *Ontario Water Resources Act*, as it read on June 30, 1993, shall be deemed to be an upper-tier municipality that was carrying out plumbing inspections under the *Ontario Water Resources Act* in the municipalities that formed part of the upper-tier municipality for municipal purposes on July 1, 1993. 2002, c. 17, Sched. C, s. 3(7).

Agreement re Sewage Systems

6.2(1) Despite any other provision of this Act, the council of an upper-tier municipality and of one or more municipalities in the upper-tier municipality may enter into an agreement for the enforcement by the upper-tier

municipality of the provisions of this Act and the building code related to sewage systems in the municipalities and for charging the municipalities the whole or part of the cost. 2002, c. 17, Sched. C, s. 3(8).

Delegation

(2) A municipality that is not a party to an agreement under subsection (1) may enter into an agreement with a board of health or a conservation authority having jurisdiction in the municipality for the enforcement of the provisions of this Act and the building code related to sewage systems. 2002, c. 9, s. 10.

Inspectors

(3) The council of an upper-tier municipality, board of health or conservation authority may appoint sewage system inspectors for the purposes of this section. 2002, c. 9, s. 10; 2002, c. 17, Sched. C, s. 3(9).

Powers

(4) A sewage system inspector appointed under this section in an area of jurisdiction or, if there is more than one inspector in the area of jurisdiction, the inspector designated by the council of an upper-tier municipality, board of health or conservation authority has the same powers and duties in relation to sewage systems as does the chief building official in respect of buildings. 2002, c. 9, s. 10; 2002, c. 17, Sched. C, s. 3(10).

Responsibility

(5) If sewage system inspectors have been appointed under this section, the chief building official and inspectors appointed under section 3 or 4 shall not exercise their powers under this Act in respect of sewage systems. 2002, c. 9, s. 10.

Application

(6) Subsections 3(8) and (9) and section 7 apply with necessary modifications to the council of an upper-tier municipality, board of health or conservation authority that has assumed responsibility for sewage systems under this section. 2002, c. 9, s. 10; 2002, c. 17, Sched. C, s. 3(11).

By-Laws, Resolutions, Regulations

7(1) The council of a municipality or of an upper-tier municipality that has entered into an agreement under subsection 3(5) or a board of health prescribed for the purposes of section 3.1 may pass by-laws, a planning board prescribed for the purposes of section 3.1 may pass resolutions and a conservation authority prescribed for the purposes of section 3.1 or the Minister may make regulations, applicable to the matters for which and in the area in which the municipality, upper-tier municipality, board of health, planning board, conservation authority or

the Province of Ontario, respectively, has jurisdiction for the enforcement of this Act,

- (a) prescribing classes of permits under this Act, including permits in respect of any stage of construction or demolition;
- (b) providing for applications for permits and requiring the applications to be accompanied by such plans, specifications, documents and other information as is prescribed;
- (b.1) subject to the regulations made under subsection 34(2.1), establishing and governing a program to enforce standards prescribed under clause 34(2)(b), in addition to any programs established under subsection 34(2.2);
- (b.2) subject to the regulations made under subsection 34(2.2), governing a program established under subsection 34(2.2);
- (c) requiring the payment of fees and prescribing the amounts of the fees,
 - (i) on application for and on issuance of permits,
 - (ii) for maintenance inspections,
 - (iii) for providing documentation, records or other information under section 15.10.4, and
 - (iv) for providing information under subsection 15.10.6(2);
- (c.1) requiring the payment of interest and other penalties, including payment of collection costs, when fees are unpaid or are paid after the due date;
- (d) providing for refunds of fees under such circumstances as are prescribed;
- (e) requiring a person specified in the building code to give notice to the chief building official or an inspector or to a registered code agency if one is appointed, of any of the stages of construction specified in the building code, in addition to the stages of construction prescribed under subsection 10.2(1) and prescribing the period of time after such notice is given during which an inspection may be carried out;
- (f) prescribing forms respecting permits and applications for permits and providing for their use;
- (g) enabling the chief building official to require that a set of plans of a building or any class of buildings as constructed be filed with the chief building official on completion of the construction under such conditions as may be prescribed in the building code;
- (h) providing for the transfer of permits when land changes ownership;

- (i) requiring the person to whom a permit is issued to erect and maintain fences to enclose the site of the construction or demolition within such areas of the municipality as may be prescribed;
- (j) prescribing the height and description of the fences required under clause (i). 1992, c. 23, s. 7; 1997, c. 30, Sched. B, s. 6; 1999, c. 12, Sched. M, s. 3; 2002, c. 9, s. 11(1); 2002, c. 17, Sched. F, Table; 2006, c. 19, Sched. O, s. 1(5); 2006, c. 22, s. 112(3-5); 2017, c. 34, Sched. 2, s. 4(1); 2020, c. 18, Sched. 1, s. 2.

Fees

(2) The total amount of the fees authorized under clause (1)(c) must not exceed the anticipated reasonable costs of the principal authority to administer and enforce this Act in its area of jurisdiction. 2002, c. 9, s. 11(2).

Reduction in Fees

(3) A regulation, by-law or resolution establishing fees under subclause (1)(c)(i) must provide for reduced fees to be payable in respect of the construction of a building for which a registered code agency is appointed under section 4.2. 2002, c. 9, s. 11(2); 2017, c. 34, Sched. 2, s. 4(2).

Report on Fees

(4) Every 12 months, each principal authority shall prepare a report that contains such information as may be prescribed about any fees authorized under clause (1)(c) and costs of the principal authority to administer and enforce this Act in its area of jurisdiction. 2002, c. 9, s. 11(2).

Same

(5) The principal authority shall make its report available to the public in the manner required by regulation. 2002, c. 9, s. 11(2).

Change in Fees

(6) If a principal authority proposes to change any fee imposed under clause (1)(c), the principal authority shall,

- (a) give notice of the proposed changes in fees to such persons as may be prescribed; and
- (b) hold a public meeting concerning the proposed changes. 2002, c. 9, s. 11(2); 2006, c. 22, s. 112(6).

Same, Notice

(7) The notice of proposed changes in fees must contain the prescribed information, including information about the public meeting, and must be given in the prescribed manner. 2002, c. 9, s. 11(2).

Same, Public Meeting

(8) The public meeting concerning proposed changes in fees must be held within the period specified by regulation before the regulation, by-law or resolution to implement the proposed changes is made. 2002, c. 9, s. 11(2).

Fees May be Added to Tax Roll

(8.1) Section 398 of the *Municipal Act, 2001* or section 264 of the *City of Toronto Act, 2006*, as the case may be, applies, with necessary modifications, to fees established by a municipality or local board under clause (1)(c) and, with the approval of the treasurer of a local municipality, to fees established under clause (1)(c) by a conservation authority whose area of jurisdiction includes any part of the local municipality. 2006, c. 22, s. 112(7).

Forms

(9) The power to prescribe forms under clause (1)(f) does not include the power to prescribe a form for a particular purpose where there is a form for that purpose prescribed in the building code or approved by the Minister. 2002, c. 9, s. 11(2); 2006, c. 21, Sched. F, s. 104(4).

Code of Conduct

7.1(1) A principal authority shall establish and enforce a code of conduct for the chief building official and inspectors. 2002, c. 9, s. 12.

Purposes

(2) The following are the purposes of a code of conduct:

- 1. To promote appropriate standards of behaviour and enforcement actions by the chief building official and inspectors in the exercise of a power or the performance of a duty under this Act or the building code.
- 2. To prevent practices which may constitute an abuse of power, including unethical or illegal practices, by the chief building official and inspectors in the exercise of a power or the performance of a duty under this Act or the building code.
- 3. To promote appropriate standards of honesty and integrity in the exercise of a power or the performance of a duty under this Act or the building code by the chief building official and inspectors. 2002, c. 9, s. 12.

Contents

(3) A code of conduct must provide for its enforcement and include policies or guidelines to be used when responding to allegations that the code has been breached and disciplinary actions that may be taken if the code is breached. 2002, c. 9, s. 12.

Public Notice

(4) The principal authority shall ensure that the code of conduct is brought to the attention of the public. 2002, c. 9, s. 12.

Construction and Demolition

Building Permits

8(1) No person shall construct or demolish a building or cause a building to be constructed or demolished unless a permit has been issued therefor by the chief building official. 1992, c. 23, s. 8(1); 1997, c. 30, Sched. B, s. 7(1).

Application for Permit

(1.1) An application for a permit to construct or demolish a building may be made by a person specified by regulation and the prescribed form or the form approved by the Minister must be used and be accompanied by the documents and information specified by regulation. 2002, c. 9, s. 14(1); 2006, c. 21, Sched. F, s. 104(5).

Issuance of Permits

(2) The chief building official shall issue a permit referred to in subsection (1) unless,

- (a) the proposed building, construction or demolition will contravene this Act, the building code or any other applicable law;
- (b) the applicant is a builder or a vendor, as defined in clause (a) of the definition of “builder” or “vendor”, as the case may be, in section 1 of the Ontario New Home Warranties Plan Act, and is not registered under that Act;
- (b.1) the *Architects Act* or the *Professional Engineers Act* requires that the proposed construction of the building be designed by an architect or a professional engineer or a combination of both and the proposed construction is not so designed;
- (c) a person who prepared drawings, plans, specifications or other documents or gave an opinion concerning the compliance of the proposed building or construction with the building code does not have the applicable qualifications, if any, set out in the building code or does not have the insurance, if any, required by the building code;
- (d) the plans review certificate, if any, required for the application does not contain the prescribed information;
- (e) the application for the permit is not complete; or
- (f) any fees due have not been paid. 2002, c. 9, s. 14(2); 2014, c. 7, Sched. 3, s. 1; 2015, c. 28, Sched. 1, s. 147.

Restriction

(2.1) If the application includes a plans review certificate that contains the prescribed information, the chief building official is not entitled to refuse to issue the permit on the grounds that the proposed construction of the building to which the certificate relates does not comply with the building code. 2002, c. 9, s. 14(2).

Decision

(2.2) If an application for a permit meets the requirements prescribed by regulation, the chief building official shall, unless the circumstances prescribed by regulation apply, decide within the period prescribed by regulation whether to issue the permit or to refuse to issue it. 2009, c. 33, Sched. 21, s. 2(2).

Same, Reasons for Refusal

(2.3) If the chief building official refuses to issue the permit, he or she shall inform the applicant of all of the reasons for the refusal of the permit and shall do so within the period prescribed by regulation. 2002, c. 9, s. 14(2).

Conditional Permit

(3) Even though all requirements have not been met to obtain a permit under subsection (2), the chief building official may issue a conditional permit for any stage of construction if,

- (a) compliance with by-laws passed under sections 34 and 38 of the *Planning Act* and with such other applicable law as may be set out in the building code has been achieved in respect of the proposed building or construction;
- (b) the chief building official is of the opinion that unreasonable delays in the construction would occur if a conditional permit is not granted; and
- (c) the applicant and such other person as the chief building official determines agree in writing with the municipality, upper-tier municipality, board of health, planning board, conservation authority or the Crown in right of Ontario to,
 - (i) assume all risk in commencing the construction,
 - (ii) obtain all necessary approvals in the time set out in the agreement or, if none, as soon as practicable,
 - (iii) file plans and specifications of the complete building in the time set out in the agreement,
 - (iv) at the applicant’s own expense, remove the building and restore the site in the manner specified in the agreement if approvals are not obtained or plans filed in the time set out in the agreement, and

Service

27(1) A notice or order required by this Act to be served may be served personally, by email to the last known email address of the person to whom service is required to be made or by registered mail sent to the last known address of the person to whom notice is to be given or to that person's agent for service. 1992, c. 23, s. 27(1); 2019, c. 14, Sched. 14, s. 1(1).

Idem

(2) If a notice or order is served by registered mail, the service shall be deemed to have been made on the fifth day after the day of mailing unless the person to whom the notice or order is given or that person's agent for service establishes that, acting in good faith, through absence, accident, illness or other unintentional cause the notice was not received until a later date. 1992, c. 23, s. 27(2); 1997, c. 24, s. 224(15).

Same

(3) If a notice or order is served by email, the service shall be deemed to have been made on the day of sending unless,

- the document was sent after 5 p.m., in which case service shall be deemed to have been made on the following day; or
- the person to whom the notice or order is given or that person's agent for service establishes that, acting in good faith, through absence, accident, illness or other unintentional cause, the notice was not received until a later date. 2019, c. 14, Sched. 14, s. 1(2).

Authorizations and Rulings**Building Materials Evaluation Commission**

28(1) The Building Materials Evaluation Commission is continued under the name Building Materials Evaluation Commission in English and Commission d'évaluation des matériaux de construction in French and shall be composed of those persons appointed by the Lieutenant Governor in Council. 1992, c. 23, s. 28(1).

Chair

(2) The Lieutenant Governor in Council may designate one of the members as chair and one of the members as vice-chair. 1992, c. 23, s. 28(2).

Remuneration

(3) The members of the Commission shall receive such remuneration and expenses as the Lieutenant Governor in Council may determine. 1992, c. 23, s. 28(3).

Powers and Duties

(4) The Building Materials Evaluation Commission may,

- conduct research on, and examine, construction materials, systems and building designs or cause

- such research to be conducted and examinations to be undertaken;
- upon application therefor, authorize the use, subject to any conditions that may be set out, of any innovative material, system or building design in respect of any building or part thereof; and
- make recommendations to the Minister respecting changes in this Act or the building code. 1992, c. 23, s. 28(4); 2002, c. 9, s. 43.

Innovative Materials

(5) The use of any innovative material, system or building design in the manner approved by the Commission shall be deemed not to be a contravention of the building code. 1992, c. 23, s. 28(5).

Binding Interpretations by the Minister

28.1(1) The Minister may issue a written interpretation of any provision of the building code, and the Minister's interpretation is binding on any person exercising a power or performing a duty under this Act and on any person who is subject to this Act. 2002, c. 9, s. 44.

Public Notice

(2) A statement setting out the Minister's interpretation of a provision of the building code shall be made available to the public in the prescribed manner. 2002, c. 9, s. 44.

Legislation Act, 2006, Part III

(3) The Minister's interpretation of a provision of the building code is not a regulation within the meaning of Part III (Regulations) of the *Legislation Act, 2006*. 2002, c. 9, s. 44; 2006, c. 21, Sched. F, s. 136(1).

Delegation

(4) The Minister may delegate his or her power under subsection (1) to the director. 2002, c. 9, s. 44.

Rulings by Minister

29(1) The Minister may, subject to such conditions as the Minister in his or her discretion considers appropriate, make rulings,

- approving the use of innovative materials, systems or building designs evaluated by a materials evaluation body designated in the building code;
- adopting an amendment to a code, formula, standard, guideline, protocol or procedure that has been adopted by reference in the building code; or
- approving the use of alternative materials, systems and building designs which, in the opinion of the Minister, will achieve the level of performance required by the building code. 1997, c. 30, Sched. B, s. 14(1); 1999, c. 12, Sched. M, s. 9(1); 2002, c. 9, s. 45(1).

Delegation

(2) The Minister may by order delegate the power to make rulings to the director. 1992, c. 23, s. 29(2).

Status

(3) A ruling is not a regulation within the meaning of Part III (Regulations) of the *Legislation Act, 2006*. 1992, c. 23, s. 29(3); 2006, c. 21, Sched. F, s. 136(1).

Publication

(4) Notice of a ruling shall be published at least once in *The Ontario Gazette* and made available, upon request, to members of the public. 1992, c. 23, s. 29(4).

Application

(5) A ruling of the Minister under clause (1)(a) or (c) entitles a person to use the approved material, system or building design in all of Ontario unless the ruling states otherwise. 1999, c. 12, Sched. M, s. 9(2).

Approved Materials

(6) The use of an approved material, system or building design in the manner approved in a ruling under clause (1)(a) or (c) shall be deemed not to be a contravention of the building code. 1999, c. 12, Sched. M, s. 9(2).

Conflicts

(7) In the event of a conflict between an authorization of the Building Materials Evaluation Commission and a ruling of the Minister under clause (1)(a) or (c), the ruling prevails. 1992, c. 23, s. 29(7); 1997, c. 30, Sched. B, s. 14(4); 2002, c. 9, s. 45(2).

Restriction

(8) If a materials evaluation body designated in the building code has examined or has expressed its intention to examine an innovative material, system or building design, the Building Materials Evaluation Commission shall not exercise its power under subsection 28(4) in respect of that material, system or building design. 1992, c. 23, s. 29(8).

Inquiry

30(1) If it appears to the Minister that there is or may be a failure in construction or demolition standards or in the enforcement of this Act or the building code, the Minister may designate a person to conduct an inquiry into the failure. 1992, c. 23, s. 30(1).

Application of *Public Inquiries Act, 2009*

(2) Section 33 of the *Public Inquiries Act, 2009* applies to the inquiry. 2009, c. 33, Sched. 6, s. 43.

General

Immunity From Action

31(1) No action or other proceeding for damages shall be instituted against the director, a member of the Building Code Commission or the Building Materials Evaluation Commission, or anyone acting under their authority, a person conducting an inquiry under section 30, a chief building official, an inspector or an officer for any act done in good faith in the execution or intended execution of any power or duty under this Act or the regulations or for any alleged neglect or default in the execution in good faith of that power or duty. 1992, c. 23, s. 31(1); 1997, c. 24, s. 224(16).

Liability

(2) Subsection (1) does not relieve the Crown, a municipality, an upper-tier municipality, a board of health, a planning board or a conservation authority of liability in respect of a tort committed by their respective chief building official or inspectors to which they would otherwise be subject and the Crown, municipality or upper-tier municipality, board of health, planning board or conservation authority is liable for any such tort as if subsection (1) were not enacted. 2002, c. 17, Sched. F, Table.

Immunity re Registered Code Agencies

(3) The Crown, a municipality, an upper-tier municipality, a board of health, a planning board or a conservation authority is not liable for any harm or damage resulting from any act or omission by a registered code agency or by a person authorized by a registered code agency under subsection 15.17(1) in the performance or intended performance of any function set out in section 15.15. 2002, c. 9, s. 47; 2002, c. 17, Sched. C, s. 6(1).

Same

(4) The Crown, a municipality, an upper-tier municipality, a board of health, a planning board or a conservation authority is not liable for any harm or damage resulting from any act or omission in the execution or intended execution of any power or duty under this Act or the regulations by their respective chief building official or inspectors if the act was done or omitted in reasonable reliance on a certificate issued or other information given under this Act by a registered code agency or by a person authorized by a registered code agency under subsection 15.17(1). 2002, c. 9, s. 47; 2002, c. 17, Sched. C, s. 6(2).

32 REPEALED: 2002, c. 9, s. 48.

32.1 REPEALED: 2002, c. 9, s. 49.

33 REPEALED: 2002, c. 9, s. 50.

Regulations

34(0.1) The Minister may make such regulations as are desirable governing standards for the construction and demolition of buildings. 2020, c. 18, Sched. 1, s. 3(1).

Same

(1) Without limiting the generality of subsection (0.1), the Minister may make regulations,

1. designating structures that are to be defined as buildings under subsection 1(1);
- 1.0.1 prescribing persons for the purposes of the definition of “building owner” in subsection 1(1);
- 1.1 prescribing the functions for which a registered code agency may be appointed under subsection 4.1(4);
- 1.2 prescribing the information that a principal authority is required to give to the director under subsection 4.1(8);
- 1.3 prescribing the persons who may appoint a registered code agency under subsection 4.2(2);
- 1.4 prescribing the manner in which the appointment of a registered code agency under section 4.2 may be made and prescribing conditions and restrictions with respect to each appointment;
- 1.5 prescribing the information that a person who appoints a registered code agency is required to give to the director under subsection 4.2(9) or to the chief building official under subsection 4.2(10);
2. prescribing the conditions under which “as constructed plans” may be required by a chief building official under clause 7(g);
- 2.1 prescribing the information about the fees and costs to be included in a report under subsection 7(4) and the manner in which the report is to be made available to the public;
- 2.2 prescribing the persons to whom notice of proposed changes in fees is to be given under subsection 7(6), the information to be included in the notice and the manner in which the notice is to be given;
- 2.3 prescribing the period within which the public meeting referred to in subsection 7(6) must be held;
- 2.4 prescribing the records to be maintained by a principal authority and the period for which the records must be retained;
3. governing the manner of construction and types and quality of materials used therein;
- 3.1 establishing objectives governing the standards for the construction and demolition of buildings;
- 3.2 prescribing the persons who may apply for a permit under section 8 and the information to be provided with an application for a permit under section 8;
- 3.3 prescribing the information that a plans review certificate must contain for the purposes of clause 8(2)(d);
- 3.4 prescribing requirements and circumstances for the purposes of subsection 8(2.2) and prescribing the period within which the chief building official is required to make a decision under subsection 8(2.2) and the manner of determining when the period begins;
- 3.4.1 prescribing the period within which the chief building official is required to inform an applicant under subsection 8(2.3) and the manner of determining when the period begins;
- 3.5 prescribing the information that a plans review certificate must contain under subsection 8(2.1) and a change certificate must contain under subsection 8(14);
4. setting out the applicable laws with which compliance must be achieved before a conditional permit may be issued under subsection 8(3);
- 4.1 prescribing the information that a chief building official is required to give under subsection 8(8.1) and prescribing the period within which and the manner in which the chief building official shall give the information;
5. governing the design of buildings and the use to which they may be put;
6. REPEALED: 2009, c. 33, Sched. 21, s. 2(7).
7. setting out rules and policies to be observed in the interpretation of the building code by any person exercising a power or discretion conferred under the Act or the building code;
8. determining an increase in hazard for the purposes of section 10;
9. REPEALED: 2020, c. 18, Sched. 1, s. 3(3).
- 9.1 requiring any part of the construction of a building described in clauses 11(3)(a) and (b) of the *Architects Act* or subsection 12(4) and clause 12(5)(a) of the *Professional Engineers Act* to be designed by an architect or a professional engineer or a combination of both;
10. requiring any part of the design, construction or demolition of a building to be under the general review of an architect or a professional engineer or a combination of both and that copies of reports arising from the general review be provided to the chief building official or to a registered code agency;

11. designating organizations to test prefabricated building units to the standards prescribed by the building code and providing for the placing of their label on units that conform to the standards;
12. requiring the approval of an inspector or a registered code agency in respect of any method, matter or thing;
13. requiring the posting on buildings or sites of construction or demolition of such documents or information as is prescribed;
14. requiring such documents, information, records, drawings or specifications as are prescribed to be kept on the site of construction or demolition;
- 14.1 prescribing the records to be kept by any person and the returns of information and reports to be made by any person and providing for the inspection and examination of the records;
15. requiring notice to be given to the chief building official, an inspector or a registered code agency respecting any matter in the course of construction, including notice of readiness for inspection at the stages of construction of a building, and specifying the person required to give the notices;
- 15.1 prescribing the type and manner of inspections for the purposes of subsection 10.2(2) (readiness for inspection) and prescribing the period within which the inspections must be carried out;
- 15.2 prescribing the information that must be given to the chief building official about a person who is required by subsection 15.12(3) to have certain qualifications or to meet certain requirements or both;
- 15.3 prescribing the information that must be given to the chief building official under subsection 15.13(5) about any person required to have insurance coverage and about the coverage;
- 15.4 prescribing the manner in which a referral to the chief building official under subsection 14(5) must be made;
16. requiring notice to be given to the chief building official respecting the change in prescribed classes of use made of a building;
17. requiring the chief building official to transmit to the director such returns or reports as are prescribed;
- 17.1 prescribing documentation, records or other information for purposes of section 15.10.4, the manner in which the documentation, records or other information is to be provided and the persons to whom the documentation, records or other information is to be given;
- 17.2 prescribing matters for the purpose of subclause 15.10.5(1)(a)(ii);
- 17.3 prescribing provisions and matters relating to policies described in subsection 15.10.5(1);
- 17.4 governing the recording of complaints and enforcement action for the purpose of subsection 15.10.6(1);
- 17.5 prescribing information about complaints and enforcement action to be provided under subsection 15.10.6(2) and the circumstances and the manner in which the information is to be provided;
- 17.6 prescribing other means for indicating that the requirements of an order have been satisfied for the purpose of subsections 12(8), 13(3.3), 14(3.4), 15.9(5.5), 15.10(2.4), 15.10.1(9) and 15.10.3(7);
18. prescribing conditions under which a building or any part of a building may be occupied, including requiring notice to be given to a chief building official or registered code agency and requiring permission to be received from the official or agency before the building or part may be occupied;
19. exempting any building or person or class thereof from compliance with all or any part of this Act and the regulations and prescribing conditions for the exemption;
20. prescribing the form of a warrant and the form in which the information upon oath will be taken under section 21;
21. requiring the alteration of any part of an existing building where construction in relation to the building affects that part;
22. requiring the payment of fees in respect of applications to the Building Materials Evaluation Commission and prescribing the amounts thereof;
- 22.1 prescribing the manner in which the Minister's written interpretations under section 28.1 are to be made available to the public;
23. designating materials evaluation bodies for the purposes of section 29;
24. establishing criteria to be followed by the Minister in respect of a ruling under section 29;
25. prescribing procedures of the Building Code Commission and the Building Materials Evaluation Commission;
26. prescribing the persons to whom notice shall be given of the issuance of a permit, the time for giving the notice and the class of buildings for which notice is required;
27. defining, for the purposes of this Act and the building code, any word or expression not defined in this Act, and in so doing may define a word or expression differently for different provisions;
28. prescribing forms and providing for their use or requiring that forms provided by the Minister or the director be used, and prescribing the information that must be contained in the forms;
29. prescribing boards of health, planning boards and conservation authorities that are responsible for

- the enforcement of the provisions of this Act related to sewage systems and the municipalities and territory without municipal organization in which they will have jurisdiction to carry out the enforcement;
30. permitting chief building officials or registered code agencies, subject to such conditions as are set out in the building code, to allow the use of materials, systems and building designs other than those prescribed in the building code with respect to the construction of buildings;
 31. governing the location of sewage systems;
 32. designating areas in which any class of sewage system may not be established;
 33. prescribing qualifications for chief building officials, inspectors, registered code agencies, designers and other persons referred to in section 15.12 and related matters including,
 - i. requiring different qualifications for different classes of officials, inspectors, agencies, designers and other persons,
 - ii. requiring assessments or examinations in connection with obtaining or maintaining the required qualifications,
 - iii. establishing one or more registers identifying persons with qualifications and such other information as the regulation may require, and
 - iv. requiring fees to be paid in connection with the qualifications;
 34. establishing certification, registration or licensing schemes for chief building officials, inspectors, registered code agencies, designers and other persons referred to in sections 15.11 (qualifications) and 15.12 (qualifications re sewage systems) which may include provision for,
 - i. the eligibility or ineligibility of classes of persons to obtain certification, registration or a licence,
 - ii. categories or classes of certification, registration or licence,
 - iii. application for the issuance, amendment or renewal of a certificate, registration or a licence,
 - iv. the issuance, amendment or renewal of a certificate, registration or a licence or the refusal to do so,
 - v. suspension, revocation or cancellation of a certificate, registration or a licence,
 - vi. the imposition of conditions relating to a certificate, registration or licence, including conditions relating to the qualifications of directors, officers, partners, employees and others associated with the holder of the certificate, registration or licence, conditions relating to the manner in which specified persons carry out activities under this Act and the building code and conditions relating to insurance coverage, including the kinds and amounts of insurance and the circumstances in which a person will be considered to be covered by insurance,
 - vii. the establishment and maintenance of one or more registers containing information about the holders of certificates, registrations or licences and containing such information as may be given to the director under paragraph 35.1, and
 - viii. fees payable in connection with certification, registration or licensing;
 35. prescribing an appeal to a prescribed tribunal from a refusal to issue or renew a certificate, registration or licence or a suspension, revocation or cancellation of a certificate, registration or licence, prescribing the circumstances in which the decision appealed from takes effect immediately despite the appeal, and prescribing the circumstances in which the tribunal may stay the decision pending the outcome of the appeal;
 - 35.1 requiring the Ontario Association of Architects and the Association of Professional Engineers of Ontario to give the prescribed information to the director;
 - 35.2 prescribing fees payable to the Crown by the Ontario Association of Architects and the Association of Professional Engineers of Ontario in connection with the registers referred to in paragraphs 33 and 34 and in respect of the development of training materials for a purpose described in paragraph 33 or 34;
 - 35.3 prescribing the persons who are required under subsection 15.13(1) to have insurance coverage and prescribing the kinds and amounts of insurance that are required and the circumstances in which the person will be considered to be covered by insurance;
 - 35.4 prescribing additional functions that registered code agencies may perform;
 - 35.5 prescribing the manner in which registered code agencies and persons authorized by them under subsection 15.17(1) are required to perform any of their functions;
 - 35.6 prescribing the manner in which a registered code agency is authorized to collect, use and disclose information;
 - 35.7 prescribing circumstances in which a registered code agency may be appointed in respect of a building even though an inspector or another registered code agency has already carried out a function described in section 15.15;
 - 35.8 prescribing circumstances in which a registered code agency cannot be appointed, including

- circumstances that would constitute a conflict of interest for a registered code agency;
- 35.9 prescribing the information that a registered code agency is required to give to the director or to the chief building official;
- 35.10 prescribing the classes of persons that may be authorized by a registered code agency under subsection 15.17(1), the conditions to which the authorization may be subject and the information that must be included in a certificate of authorization;
- 35.11 prescribing certificates and the form of certificates referred to in subsection 15.18(2), the information that the certificates are required to contain and the circumstances and manner in which registered code agencies are permitted to issue them;
- 35.12 prescribing the circumstances in which the appointment of a registered code agency may be terminated and the conditions that must be met before the termination of an appointment, including,
- i. requiring the consent of the director and authorizing the director to impose conditions and restrictions in connection with the consent, and
 - ii. authorizing an appeal to a person specified in the regulations from a decision of the director or conditions imposed by the director;
36. designating persons, specifying powers of a chief building official or inspector that those designated persons may exercise to enforce this Act and the building code in relation to the qualifications of persons described in sections 15.11 and 15.12 and the requirement in section 15.13 for insurance coverage, and establishing conditions for the exercise of the specified powers;
37. prescribing any transitional matters necessary for the regulation of sewage systems, including matters relating to,
- i. licensing and certification and the qualifications of inspectors and persons described in subsection 15.12(1),
 - ii. certificates of approval and orders issued under the *Environmental Protection Act*,
 - iii. enforcement issues,
 - iv. matters commenced under the *Environmental Protection Act*, including appeals,
 - v. records and documents to be kept or transferred and the payment of associated costs,
 - vi. certification of records and their use in courts,
 - vii. the continuation of matters commenced under the *Environmental Protection Act*, and
 - viii. the transfer of responsibilities involving any municipality or any board of health, conservation authority or planning board prescribed under section 3.1;
38. permitting the Building Code Commission to sit in one or more divisions simultaneously upon such conditions as may be prescribed in the regulation;
39. authorizing one member of the Building Code Commission, with the approval of the chair or vice-chair, to hear and determine any matter and deeming the member to constitute the commission for that purpose, under such conditions as may be prescribed in the regulation;
- 39.1 prescribing relationships for the purposes of clause 23(3)(d) (eligibility to be a member of the Commission);
- 39.2 prescribing the period within which the Building Code Commission must hold a hearing in respect of a dispute described in clause 24(1)(b) or (c);
- 39.3 providing for transitional provisions relating to the effect of a repeal or re-enactment of any provision of this Act;
- 39.4 prescribing provisions of the building code for the purposes of section 97.1 of the *Municipal Act, 2001* and section 108.1 of the *City of Toronto Act, 2006*;
- 39.5 prescribing conditions and limits for the purposes of section 97.1 of the *Municipal Act, 2001* and section 108.1 of the *City of Toronto Act, 2006*;
- 39.6 providing for the approval of an inspector who is the chief of the fire department of a municipality respecting fire safety matters and prescribing circumstances under which approval of the inspector may be required;
40. prescribing any matter referred to in this Act as prescribed. 1992, c. 23, s. 34(1); 1997, c. 30, Sched. B, s. 17(1-4); 1999, c. 12, Sched. M, s. 11; 2002, c. 9, s. 51(1, 2, 4-14); 2006, c. 19, Sched. O, s. 1(12-17); 2006, c. 35, Sched. C, s. 8(3); 2009, c. 33, Sched. 21, s. 2(5-7); 2014, c. 7, Sched. 3, s. 3; 2017, c. 10, Sched. 4, s. 1; 2017, c. 34, Sched. 2, s. 24(1, 5); 2020, c. 18, Sched. 1, s. 3(2, 3).

Adoption by Reference

(1.1) The Minister may make regulations adopting by reference any of the following documents, in whole or in part, with such changes as the Minister considers necessary, and requiring compliance with any provision of a document so adopted:

1. The National Building Code of Canada 2015, the National Plumbing Code of Canada 2015, the National Energy Code of Canada for Buildings 2017, the National Farm Building Code of Canada 1995 or any subsequent versions of those codes.

2. A code, formula, standard, guideline, protocol or procedure that requires any part of the construction of a building to be designed by an architect or a professional engineer or a combination of both.
3. Any other code, formula, standard, guideline, protocol or procedure. 2020, c. 18, Sched. 1, s. 3(4).

Standards for Existing Buildings

(2) The Minister may make regulations to establish standards that existing buildings must meet even though no construction is proposed, including regulations,

- (a) prescribing any or all of the matters set out in subsections (0.1) and (1) as applicable to existing buildings;
- (b) establishing standards for maintenance, retrofit, operation, occupancy and repair;
- (c) prescribing standards related to resource conservation and environmental protection; and
- (d) prescribing standards, methods and equipment for the inspection, cleaning, disinfecting and emptying of sewage systems. 1992, c. 23, s. 34(2); 1997, c. 30, Sched. B, s. 17(5); 2006, c. 22, s. 112 (10); 2020, c. 18, Sched. 1, s. 3(5, 6).

Discretionary Maintenance Inspection Programs

(2.1) The Minister may make regulations governing programs established under clause 7(1)(b.1), including regulations,

- (a) governing the classes of buildings and area affected by a program;
- (b) governing the type and manner of inspections that are conducted under a program and the frequency of the inspections;
- (c) authorizing the principal authority that establishes a program, as an alternative to conducting an inspection, to accept a certificate, in a form approved by the Minister, that is signed by a person who belongs to a class of persons specified by the regulations and that confirms that the person has conducted an inspection and is of the opinion that the building that was inspected complies with the standards prescribed under clause (2)(b) that are enforced by the program. 2006, c. 22, s. 112 (11); 2020, c. 18, Sched. 1, s. 3(5).

Sewage System Maintenance Inspection Programs

(2.2) The Minister may make regulations establishing and governing programs to enforce standards prescribed under clause (2)(b) in relation to sewage systems, including regulations,

- (a) governing the classes of sewage systems affected by the program;
- (b) requiring a principal authority that has jurisdiction in the area affected by the program to administer the program for that area and to conduct inspections under the program;
- (c) governing the type and manner of inspections that are conducted under the program and the frequency of the inspections;
- (d) authorizing the principal authority that administers the program, as an alternative to conducting an inspection, to accept a certificate, in a form approved by the Minister, that is signed by a person who belongs to a class of persons specified by the regulations and that confirms that the person has conducted an inspection and is of the opinion that the sewage system that was inspected complies with the standards prescribed under clause (2)(b) that are enforced by the program. 2006, c. 22, s. 112 (11); 2020, c. 18, Sched. 1, s. 3(5).

Building Condition Evaluation Programs

(2.3) The Minister may make regulations establishing and governing programs to enforce standards prescribed under clause (2)(b) in relation to buildings other than sewage systems, including regulations,

- (a) governing the classes of buildings and area affected by or subject to the programs;
- (b) requiring a principal authority that has jurisdiction in an area affected by a program to administer the program for that area;
- (c) requiring building condition evaluations to be conducted by persons who belong to a specified class of persons, which may include a holder of any licence or certificate issued under the Architects Act or the Professional Engineers Act or a class of such holders;
- (d) governing the type and manner of building condition evaluations that are conducted under a program, the frequency of the evaluations or the manner for determining when evaluations are required;

- (e) authorizing a chief building official or inspector to require a building condition evaluation be conducted and governing the circumstances in which he or she may do so;
- (f) requiring a person described in clause (c) who conducts a building condition evaluation to prepare a report in a form approved by the Minister, that is signed by that person and that contains and confirms the prescribed information;
- (g) requiring a person described in clause (c) who prepares a report described in clause (f) to, in the prescribed circumstances and within the prescribed period, provide a copy of the report to the building owner, chief building official and other prescribed persons;
- (h) requiring a person described in clause (c) to notify the building owner, chief building official and other prescribed persons within a prescribed period if the person is of the opinion the building is unsafe within the meaning of subsection 15.9(2) or poses an immediate danger to the health or safety of persons;
- (i) requiring such documents, records or other information as may be prescribed to be kept as prescribed by any person and providing for their production to, or inspection and examination by, prescribed persons. 2017, c. 34, Sched. 2, s. 24(6); 2020, c. 18, Sched. 1, s. 3(5).

Application

(3) A regulation made under this section applies to buildings whether erected before or after the coming into force of this Act. 1992, c. 23, s. 34(3).

Limited Application

(4) Any regulation made under this section may be limited in its application territorially or to any class of activity, matter, person or thing. 1997, c. 30, Sched. B, s. 17(6).

Same

(4.1) A class under this Act may be defined with respect to any attribute, quality or characteristic and may be defined to consist of, include or exclude any specified member whether or not with the same attributes, qualities or characteristics. 1997, c. 30, Sched. B, s. 17(6).

Retroactive

(4.2) A regulation made under paragraph 37 of subsection (1) may be retroactive. 1997, c. 30, Sched. B, s. 17(6).

Purposes

(5) The purposes of the regulations made under this section are,

- (a) to establish standards for public health and safety, fire protection, structural sufficiency, conservation, including, without limitation, energy and water conservation, and environmental integrity, and to establish barrier-free requirements, with respect to buildings; and
- (b) to establish processes for the enforcement of the standards and requirements. 2002, c. 9, s. 51(15); 2009, c. 12, Sched. J, s. 1(1).

(6) REPEALED: 2019, c. 14, Sched. 14, s. 2.

(7) REPEALED: 2019, c. 14, Sched. 14, s. 2.

34.1 REPEALED: 2019, c. 14, Sched. 14, s. 3.

Municipal By-Laws

35(1) This Act and the building code supersede all municipal by-laws respecting the construction or demolition of buildings. 1992, c. 23, s. 35(1).

Different Treatments

(2) In the event that this Act or the building code and a municipal by-law treat the same subject-matter in different ways in respect to standards for the use of a building described in section 10 or standards for the maintenance or operation of a sewage system, this Act or the building code prevails and the by-law is inoperative to the extent that it differs from this Act or the building code. 1992, c. 23, s. 35(2); 1997, c. 30, Sched. B, s. 18(1).

Interpretation

(3) For the purpose of this section, a municipal by-law includes a by-law of an upper-tier municipality and a local board as defined in the *Municipal Affairs Act*. 2002, c. 17, Sched. F, Table.

Status of Conservation Authority Regulations

35.1 A regulation made by a conservation authority under this Act is not a regulation within the meaning of Part III (Regulations) of the *Legislation Act, 2006*. 2002, c. 9, s. 52; 2006, c. 21, Sched. F, s. 136(1).

1.4.1.3. Definition of Applicable Law (See Appendix A.)

- (1) For the purposes of clause 8(2)(a) of the Act, *applicable law* means,
- (a) the statutory requirements in the following provisions with respect to the following matters:
- r15 (0.0.i) section 3 of the *Building Transit Faster Act, 2020* with respect to the issuance of a permit under that section;
 - r6 (0.i) section 14 of Ontario Regulation 137/15 (General) made under the *Child Care and Early Years Act, 2014* with respect to the approval of plans for a new *building* to be erected or an existing *building* to be used, altered or renovated for use as a *child care centre* or for alterations or renovations to be made to premises used by a *child care centre*,
 - r9 (i) section 114 of the *City of Toronto Act, 2006* with respect to the approval by the City of Toronto or the Local Planning Appeal Tribunal of plans and drawings,
 - (ii) section 59 of the *Clean Water Act, 2006* with respect to the issuance of a notice by the risk management official for the *construction* of a *building*,
 - r6 (iii) reserved,
 - (iv) section 194 of the *Education Act* with respect to the approval of the Minister for the *demolition* of a *building*,
 - r11 (v) reserved,
 - (vi) section 5 of the *Environmental Assessment Act* with respect to the approval of the Minister or the Environmental Review Tribunal to proceed with an undertaking,
 - (vii) section 46 of the *Environmental Protection Act* with respect to the approval of the Minister to use land or land covered by water that has been used for the disposal of waste,
 - (viii) section 47.3 of the *Environmental Protection Act* with respect to the issuance of a renewable energy approval,
 - (ix) section 168.3.1 of the *Environmental Protection Act* with respect to the *construction* of a *building* to be used in connection with a change of use of a property,
 - (x) paragraph 2 of subsection 168.6(1) of the *Environmental Protection Act* if a certificate of property use has been issued in respect of the property under subsection 168.6(1) of that Act,
 - (xi) section 14 of the *Milk Act* with respect to the permit from the Director for the *construction* or alteration of any *building* intended for use as a plant,
 - (xii) section 11.1 of Ontario Regulation 267/03 (General), made under the *Nutrient Management Act, 2002*, with respect to a proposed *building* or structure to house farm animals or store nutrients if that Regulation requires the preparation and approval of a nutrient management strategy before *construction* of the proposed *building* or structure,
 - (xiii) subsection 30(2) of the *Ontario Heritage Act* with respect to a consent of the council of a *municipality* to the alteration or *demolition* of a *building* where the council of the *municipality* has given a notice of intent to designate the *building* under subsection 29(3) of that Act,
 - (xiv) section 33 of the *Ontario Heritage Act* with respect to the consent of the council of a *municipality* for the alteration of property,
 - (xv) section 34 of the *Ontario Heritage Act* with respect to the consent of the council of a *municipality* for the *demolition* of a *building*,
 - (xvi) section 34.5 of the *Ontario Heritage Act* with respect to the consent of the Minister to the alteration or *demolition* of a designated *building*,
 - (xvii) subsection 34.7(2) of the *Ontario Heritage Act* with respect to a consent of the Minister to the alteration or *demolition* of a *building* where the Minister has given a notice of intent to designate the *building* under section 34.6 of that Act,
 - (xviii) section 42 of the *Ontario Heritage Act* with respect to the permit given by the council of a *municipality* for the erection, alteration or *demolition* of a *building*,
 - r7 (xviii.1) section 17.4 of the *Ontario New Home Warranties Plan Act* with respect to the provision of a confirmation by the Registrar for the *construction* of a residential condominium conversion project,
 - (xix) section 14 of the *Ontario Planning and Development Act, 1994* with respect to any conflict between a development plan made under that Act and a zoning by-law that affects the proposed *building* or structure,
 - r14 (xix.1) section 37 of the *Planning Act*,
 - (A) with respect to the payment of money or making arrangements satisfactory to the council of a municipality for the payment of money, where the payment is required by a community benefits charge by-law passed under subsection 37(2) of the *Planning Act*, and
 - (B) with respect to the provision of facilities, services or matters in accordance with subsection 37(6) of the *Planning Act* or making arrangements satisfactory to the council of a municipality for their provision,

- r9 (xx) section 41 of the *Planning Act* with respect to the approval by the council of the *municipality* or the Local Planning Appeal Tribunal of plans and drawings,
- (xxi) section 42 of the *Planning Act* with respect to the payment of money or making arrangements satisfactory to the council of a *municipality* for the payment of money, where the payment is required under subsection 42(6) of that Act,
- r3 (xxii) section 2 of Ontario Regulation 239/13 (Activities on Public Lands and Shore Lands — Work Permits and Exemptions), made under the *Public Lands Act*, with respect to the work permit authorizing the *construction* or placement of a *building* on public land,
- r3 (xxii.1) section 5 of Ontario Regulation 239/13 with respect to the exemption from the requirement to obtain a work permit authorizing the *construction* or placement of a *building* within an unpatented mining claim,
- (xxiii) section 34 or 38 of the *Public Transportation and Highway Improvement Act* with respect to the permit from the Minister for the placement, erection or alteration of any *building* or other structure or the use of land,
- (b) the following provisions of Acts and regulations:
- (i) subsection 102(3) of the *City of Toronto Act, 2006*,
 - (ii) sections 28 and 53 of the *Development Charges Act, 1997*,
 - (iii) sections 257.83 and 257.93 of the *Education Act*,
 - (iv) subsection 5(4) of the *Environmental Assessment Act*,
 - (v) subsection 133(4) of the *Municipal Act, 2001*,
 - (vi) subsection 24(3) of the *Niagara Escarpment Planning and Development Act*,
 - (vii) subsection 27(3) of the *Ontario Heritage Act*,
 - (viii) section 33 of the *Planning Act* except where, in the case of the *demolition* of a residential property, a permit to *demolish* the property is obtained under that section,
 - (ix) section 46 of the *Planning Act*,
- r6 (b.1) by-laws made by a *municipality* under an agreement entered into under section 5.81 of the *Aeronautics Act* (Canada),
- (c) regulations made by a conservation authority under clause 28(1)(c) of the *Conservation Authorities Act* with respect to permission of the authority for the *construction* of a *building* or structure if, in the opinion of the authority, the control of flooding, erosion, dynamic beaches or pollution or the conservation of land may be affected by the development,
- (d) by-laws made under section 108 of the *City of Toronto Act, 2006*, but only with respect to the issuance of a permit for the *construction* of a green roof if the *construction* of the roof is prohibited unless a permit is obtained,
- (e) by-laws made under section 40.1 of the *Ontario Heritage Act*,
- (f) by-laws made under section 34 or 38 of the *Planning Act*,
- r6 (g) subject to Clause (h), by-laws made under Ontario Regulation 173/16 (Community Planning Permits) made under the *Planning Act*,
- (h) by-laws referred to in Clause (g) in relation to the development of land, but only with respect to the issuance of a development permit if the development of land is prohibited unless a development permit is obtained,
- r6 (i) by-laws made under Ontario Regulation 246/01 (Development Permits) made under the *Planning Act* which continue in force despite the revocation of that Regulation by reason of section 19 of Ontario Regulation 173/16 (Community Planning Permits) made under that Act,
- (j) orders made by the Minister under section 47 of the *Planning Act* or subsection 17(1) of the *Ontario Planning and Development Act, 1994*, and
- (k) by-laws made under any private Act that prohibit the proposed *construction* or *demolition* of the *building* unless the by-law is complied with.
- (2) For the purposes of clause 10(2)(a) of the Act, *applicable law* means any general or special Act, and all regulations and by-laws enacted under them that prohibit the proposed use of the *building* unless the Act, regulation or by-law is complied with.

1.4.1.4. Other Definitions for the Purposes of the Act

- (1) For the purposes of the Act, *architect*, *as constructed plans* and *professional engineer* have the same meaning as that set out in Clause 1.4.1.2.(1)(c).

1.4.2. Symbols and Other Abbreviations

1.4.2.1. Symbols and Other Abbreviations

(1) In this Code, a symbol or abbreviation listed in Column 1 of Table 1.4.2.1. has the meaning listed opposite it in Column 2.

Table 1.4.2.1.
Symbols and Abbreviations
Forming Part of Sentence 1.4.2.1.(1)

Symbol or Abbreviation	Meaning
1 in 2	slope of 1 vertical to 2 horizontal
ABS	acrylonitrile-butadiene-styrene
ASWG	American Steel Wire Gage
Bq	becquerel(s)
CBOD ₅	the five day carbonaceous biochemical oxygen demand
r5 cd	candela(s)
CFU	colony forming units
cm	centimetre(s)
cm ²	square centimetre(s)
CO ₂ e	<i>carbon dioxide equivalent</i>
CPVC	chlorinated poly (vinyl chloride)
dB(A)	A-weighted sound level
°	degree(s)
°C	Degree(s) Celsius
diam	diameter
DWV	drain, waste and vent
ft	foot (feet)
g	gram(s)
ga	gauge
gal	imperial gallon(s)
gal/min	imperial gallon(s) per minute
h	hour(s)
HVAC	heating, ventilating and air-conditioning
Hz	hertz
in.	inch(es)
J	joule(s)
kg	kilogram(s)
kg/m ²	kilograms per square metre
kN	kilonewton(s)
kPa	kilopascal(s)
r6 kV	kilovolt(s)
kW	kilowatt(s)
Column 1	2

Table 1.4.2.1. (Cont'd)
Symbols and Abbreviations
 Forming Part of Sentence 1.4.2.1.(1)

Symbol or Abbreviation	Meaning
L	litre(s)
L/min	litre(s) per minute
L/s	litre(s) per second
LPF	litres per flush
lx	lux
m	metre(s)
m ²	square metre(s)
m ³	cubic metre(s)
m/s	metre(s) per second
max.	maximum
mg/L	milligram(s) per litre
min	minute(s)
min.	minimum
MJ	megajoule(s)
mm	millimetre(s)
MPa	megapascal(s)
N	newton
N/A	not applicable
ng	nanogram(s)
No.	number(s)
nom.	nominal
o.c.	on centre
OSB	oriented strandboard
Pa	pascal(s)
PB	polybutylene
PE	polyethylene
PE/AL/PE	polyethylene/aluminum/polyethylene
PEX	crosslinked polyethylene
PEX/AL/PEX	crosslinked polyethylene/aluminum/crosslinked polyethylene
PVC	poly (vinyl chloride)
RSI	thermal resistance, International System of Units
s	second(s)
temp.	temperature
T&G	tongue and groove
r6 V	volt(s)
W	watt(s)
wt	weight
e1 %	percent
µg	microgram(s)
µm	micron
Column 1	2

F11.1

Table 1.3.1.2. (Cont'd)
Documents Referenced in the Building Code
 Forming Part of Sentence 1.3.1.2.(1)

Issuing Agency	Document Number	Title of Document ⁽¹⁾	Code Reference
ASTM	C412M-11	Concrete Drain Tile (Metric)	Table 5.10.1.1. 9.14.3.1.(1)
ASTM	C444M-03	Perforated Concrete Pipe (Metric)	Table 5.10.1.1. 9.14.3.1.(1)
ASTM	C494 / C494M-13	Chemical Admixtures for Concrete	9.3.1.8.(1)
ASTM	C553-13	Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications	Table 5.10.1.1.
ASTM	C612-14	Mineral Fiber Block and Board Thermal Insulation	Table 5.10.1.1.
ASTM	C700-13	Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated	Table 5.10.1.1. 9.14.3.1.(1)
ASTM	C726-12	Mineral Wool Roof Insulation Board	Table 5.10.1.1. 9.25.2.2.(1)
ASTM	C834-10	Latex Sealants	Table 5.10.1.1. 9.27.4.2.(2)
ASTM	C840-13	Application and Finishing of Gypsum Board	Table 5.10.1.1.
ASTM	C920-14	Elastomeric Joint Sealants	Table 5.10.1.1. 9.27.4.2.(2)
ASTM	C954-11	Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness	9.24.1.4.(1)
ASTM	C991-08e1	Flexible Fibrous Glass Insulation for Metal Buildings	Table 5.10.1.1.
ASTM	C1002-07	Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs	Table 5.10.1.1. 9.24.1.4.(1) 9.29.5.7.(1)
ASTM	C1053-00	Borosilicate Glass Pipe and Fittings for Drain, Waste and Vent (DWV) Applications	7.2.8.1.(1)
ASTM	C1177 / C1177M-13	Glass Mat Gypsum Substrate for Use as Sheathing	3.1.5.12.(6) 3.1.5.12A.(4) Table 5.10.1.1. Table 9.23.16.2.A.
ASTM	C1178 / C1178M-13	Coated Glass Mat Water-Resistant Gypsum Backing Panel	3.1.5.12.(6) 3.1.5.12A.(4) Table 5.10.1.1. 9.29.5.2.(1)
ASTM	C1184-13	Structural Silicone Sealants	Table 5.10.1.1. 9.27.4.2.(2)
ASTM	C1311-10	Solvent Release Sealants	Table 5.10.1.1. 9.27.4.2.(2)
ASTM	C1330-02	Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants	Table 5.10.1.1. 9.27.4.2.(3)
ASTM	C1396 / C1396M-14	Gypsum Board	3.1.5.12.(6) 3.1.5.12A.(4) Table 5.10.1.1. Table 9.23.16.2.A. 9.29.5.2.(1) Table 9.29.5.3.
Column 1	2	3	4

F11.1
F15

Table 1.3.1.2. (Cont'd)
Documents Referenced in the Building Code
Forming Part of Sentence 1.3.1.2.(1)

Issuing Agency	Document Number	Title of Document ⁽¹⁾	Code Reference
ASTM	C1658 / C1658M-13	Glass Mat Gypsum Panels	3.1.5.12.(6) Table 5.10.1.1.
ASTM	D323-08	Vapor Pressure of Petroleum Products (Reid Method)	1.4.1.2.(1) of Division A
ASTM	D374-99	Thickness of Solid Electrical Insulation	3.15.4.1.(1)
ASTM	D568-77	Rate of Burning and/or Extent and Time of Burning of Flexible Plastics in a Vertical Position	3.15.4.1.(1)
ASTM	D635-06	Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position	3.15.4.1.(1)
ASTM	D1227-95	Emulsified Asphalt Used as a Protective Coating for Roofing	Table 5.10.1.1. 9.13.2.2.(2) 9.13.3.2.(2)
ASTM	D2178 / D2178M-13a	Asphalt Glass Felt Used in Roofing and Waterproofing	Table 5.10.1.1.
ASTM	D2898-10	Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing	3.1.5.5.(3) 3.1.5.25.(1) 3.2.3.7.(5) 3.2.3.7.(7)
ASTM	D3019-08	Lap Cement Used with Asphalt Roll Roofing, Non-Fibered, Asbestos-Fibered, and Non-Asbestos-Fibered	Table 5.10.1.1. 9.13.3.2.(2) Table 9.26.2.1.B.
ASTM	D3261-16	Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing	7.2.5.5.(3)
ASTM	D4479 / D4479M-07e1	Asphalt Roof Coatings - Asbestos-Free	Table 5.10.1.1. 9.13.2.2.(2) 9.13.3.2.(2) Table 9.26.2.1.B.
ASTM	D4637 / D4637M-12	EPDM Sheet Used In Single-Ply Roof Membrane	Table 5.10.1.1. 9.13.3.2.(2) Table 9.26.2.1.B.
ASTM	D4811 / D4811M-06	Nonvulcanized (Uncured) Rubber Sheet Used as Roof Flashing	Table 5.10.1.1. 9.13.3.2.(2) Table 9.26.2.1.B.
ASTM	D5456-10a	Evaluation of Structural Composite Lumber Products	3.1.11.7.(4)
ASTM	D6878 / D6878M-11a	Thermoplastic Polyolefin Based Sheet Roofing	Table 5.10.1.1. 9.13.3.2.(2) Table 9.26.2.1.B.
ASTM	E90-09	Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements	5.8.1.2.(1) 5.8.1.4.(2) 9.11.1.2.(1)
ASTM	E96 / E96M-13	Water Vapor Transmission of Materials	5.5.1.2.(3) 9.13.2.2.(2) 9.25.4.2.(1) 9.25.5.1.(1)
ASTM	E283-04	Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen	5.10.4.4.(2)
Column 1	2	3	4

R11.1

Table 1.3.1.2. (Cont'd)
Documents Referenced in the Building Code
 Forming Part of Sentence 1.3.1.2.(1)

Issuing Agency	Document Number	Title of Document ⁽¹⁾	Code Reference
CSA	O151-09	Canadian Softwood Plywood	Table 5.10.1.1. 9.23.14.2.(1) 9.23.15.2.(1) Table 9.23.16.2.A. 9.27.8.1.(1) 9.30.2.2.(1) Table A-13 Table A-14 Table A-15
CSA	O153-13	Poplar Plywood	Table 5.10.1.1. 9.23.14.2.(1) 9.23.15.2.(1) Table 9.23.16.2.A. 9.27.8.1.(1) 9.30.2.2.(1)
CSA	O177-06	Qualification Code for Manufacturers of Structural Glued-Laminated Timber	4.3.1.2.(1) Table A-11 Table A-16
CSA	O325-07	Construction Sheathing	Table 5.10.1.1. 9.23.14.2.(1) 9.23.14.4.(2) Table 9.23.14.5.B. 9.23.15.2.(1) 9.23.15.3.(2) Table 9.23.15.7.B. Table 9.23.16.2.B. 9.29.9.1.(2) 9.29.9.2.(5) Table A-13 Table A-14 Table A-15
CSA	O437.0-93	OSB and Waferboard	Table 5.10.1.1. 9.23.14.2.(1) 9.23.14.4.(2) 9.23.15.2.(1) 9.23.15.3.(2) Table 9.23.16.2.A. 9.27.10.1.(1) 9.29.9.1.(2) 9.30.2.2.(1) Table A-13 Table A-14 Table A-15
CSA	S16-14	Design of Steel Structures	Table 4.1.8.9. 4.3.4.1.(1)
CSA	S37-13	Antennas, Towers, and Antenna-Supporting Structures	4.1.6.15.(1) 4.1.7.11.(1)
Column 1	2	3	4

F11.1

Table 1.3.1.2. (Cont'd)
Documents Referenced in the Building Code
 Forming Part of Sentence 1.3.1.2.(1)

Issuing Agency	Document Number	Title of Document ⁽¹⁾	Code Reference
CSA	S136-16	North American Specification for the Design of Cold Formed Steel Structural Members (using the Appendix B provisions applicable to Canada)	4.1.8.1.(5) Table 4.1.8.9. 4.3.4.2.(1)
CSA	CAN/CSA-S157-05 / S157.1-05	Strength Design in Aluminum / Commentary on CSA S157-05, Strength Design in Aluminum	4.3.5.1.(1)
CSA	S304-14	Design of Masonry Structures	Table 4.1.8.9. 4.3.2.1.(1)
CSA	S307-M1980	Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings	9.23.13.11.(5)
CSA	S367-12	Air-, Cable-, and Frame-Supported Membrane Structures	4.4.1.1.(1)
CSA	S406-16	Permanent Wood Foundations for Housing and Small Buildings	9.13.2.7.(1) 9.15.2.4.(1) 9.16.5.1.(1)
CSA	S413-14	Parking Structures	4.4.2.1.(1)
CSA	S478-95	Guideline on Durability in Buildings	5.1.4.2.(3)
CSA	Z32-09	Electrical Safety and Essential Electrical Systems in Health Care Facilities	3.2.7.3.(4) 3.2.7.6.(1) 3.7.5.1.(1)
CSA	CAN/CSA-Z91-02	Health and Safety Code for Suspended Equipment Operations	4.4.4.1.(1)
CSA	Z240 MH Series-09	Manufactured Homes	3.1.1.1.(2) of Division C 3.2.4.1.(3) of Division C
CSA	Z240.2.1-09	Structural Requirements for Manufactured Homes	9.1.1.9.(1) 9.12.2.2.(6) 9.15.1.3.(1)
CSA	Z240.10.1-16	Site Preparation, Foundation, and Installation of Buildings	9.15.1.3.(1) 9.23.6.3.(1)
CSA	CAN/CSA-Z241 Series-03	Park Model Trailers	9.38.1.1.(1) 9.38.2.1.(1) 3.1.1.1.(2) of Division C 3.2.4.1.(3) of Division C
CSA	CAN/CSA-Z317.2-10	Special Requirements for Heating, Ventilation and Air Conditioning (HVAC) Systems in Health Care Facilities	6.2.1.1.(1) 6.2.3.14.(1)
CSA	CAN/CSA-Z662-15	Oil and Gas Pipeline Systems	3.2.3.21.(1)
CSA	Z7396.1-12	Medical Gas Piping Systems - Part 1: Pipelines for Medical Gases, Medical Vacuum, Medical Support Gases, and Anaesthetic Gas Scavenging Systems	3.7.5.2.(1)
CSA / IAPMO	CSA B45.5-11 / IAPMO Z124-2011	Plastic Plumbing Fixtures	7.2.2.2.(6)
CWC	2014	Engineering Guide for Wood Frame Construction	9.4.1.1.(1)
DBR	Technical Paper No. 194, May 1965	Fire Endurance of Protected Steel Columns and Beams	Table 11.5.1.1.A. Table 11.5.1.1.B. Table 11.5.1.1.C. Table 11.5.1.1.D/E. Table 11.5.1.1.F.
Column 1	2	3	4

1.3.2. Abbreviations

1.3.2.1. Abbreviations of Proper Names (See Appendix A.)

(1) In this Code, an abbreviation of proper names listed in Column 1 of Table 1.3.2.1. has the meaning assigned opposite it in Column 2.

Table 1.3.2.1.
Abbreviations of Proper Names
Forming Part of Sentence 1.3.2.1.(1)

Abbreviation	Meaning
ACGIH	American Conference of Governmental Industrial Hygienists
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
APHA	American Public Health Association
r15 ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
ASME	The American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASSE	American Society of Sanitary Engineering
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BCMOH	British Columbia Ministry of Health
BNQ	Bureau de Normalisation du Québec
CAN	National Standard of Canada designation The number or name following the CAN designation represents the agency under whose auspices the standard is issued. CAN1 designates CGA, CAN2 designates CGSB, CAN3 designates CSA, and CAN4 designates ULC.
CCBFC	Canadian Commission on Building and Fire Codes
CGSB	Canadian General Standards Board
CSA	Canadian Standards Association
CWC	Canadian Wood Council
DBR	Division of Building Research, known as the Institute for Research in Construction since 1985
EPA	Environmental Protection Agency
FINA	Fédération Internationale de Natation
r15 GRHC	Green Roofs for Healthy Cities
HI	Hydronics Institute
r15 HPVA	Hardwood Plywood & Veneer Association
Column 1	2

Table 1.3.2.1. (Cont'd)
Abbreviations of Proper Names
 Forming Part of Sentence 1.3.2.1.(1)

Abbreviation	Meaning
HRAI	Heating, Refrigerating and Air-Conditioning Institute of Canada
HUD	U.S. Department of Housing and Urban Development
HVI	Home Ventilating Institute
r5 IAPMO	International Association of Plumbing and Mechanical Officials
IESNA	Illuminating Engineering Society of North America
ISO	International Organization for Standardization
r6 MMA	Ontario Ministry of Municipal Affairs
MMAH	Ontario Ministry of Municipal Affairs and Housing
MOE	Ontario Ministry of the Environment
NFPA	National Fire Protection Association
NLGA	National Lumber Grades Authority
NRCan	Natural Resources Canada
NSF	NSF International, formerly called National Sanitation Federation
r15 SEI	Structural Engineering Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association Inc.
r15 SPRI	Single Ply Roofing Industry
TC	Transport Canada
TPIC	Truss Plate Institute of Canada
UL	Underwriters Laboratories Inc.
ULC	Underwriters' Laboratories of Canada
USDA	United States Department of Agriculture
WEF	World Environment Federation
r10 WT	Waterfront Toronto
Column 1	2

3.1.5.4. Combustible Glazing and Skylights

- (1) *Combustible* skylight assemblies are permitted in a *building* required to be of *noncombustible construction* if the assemblies have a *flame-spread rating* not more than,
- (a) 150, provided the assemblies,
 - (i) have an individual area not more than 9 m²,
 - (ii) have an aggregate horizontal projected area of the openings through the ceiling not more than 25% of the area of the ceiling of the room or space in which they are located, and
 - (iii) are spaced not less than 2 500 mm from adjacent assemblies and 1 200 mm from required *fire separations*, or
 - (b) 75, provided the assemblies,
 - (i) have an individual area not more than 27 m²,
 - (ii) have an aggregate horizontal projected area of the openings through the ceiling not more than 33% of the area of the ceiling of the room or space in which they are located, and
 - (iii) are spaced not less than 1 200 mm from adjacent assemblies and from required *fire separations*.
- (See Appendix A.)

(2) *Combustible* vertical glazing installed no higher than the second *storey* is permitted in a *building* required to be of *noncombustible construction*.

(3) Except as permitted by Sentence (4), the *combustible* vertical glazing permitted by Sentence (2) shall have a *flame-spread rating* not more than 75.

(4) The *flame-spread rating* of *combustible* glazing in Sentence (2) is permitted to be not more than 150 if the aggregate area of glazing is not more than 25% of the wall area of the *storey* in which it is located, and,

- (a) the glazing is installed in a *building* not more than 1 *storey* in *building height*,
- (b) the glazing in the *first storey* is separated from the glazing in the second *storey* in accordance with the requirements of Article 3.2.3.17. for opening protection, or
- (c) sprinklers are installed in,
 - (i) any *storey* with *combustible* glazing, and
 - (ii) the *storey* immediately above the *storey* with *combustible* glazing.

(5) *Combustible* window sashes and frames are permitted in a *building* required to be of *noncombustible construction* provided,

- r11.1
- (a) each window in an exterior wall face is an individual unit separated by a wall of *noncombustible construction* from every other opening in the exterior wall,
 - (b) windows in exterior walls in contiguous *storeys* are separated by not less than 1 000 mm of *noncombustible construction*, and
 - (c) the aggregate area of openings in an exterior wall face of a *fire compartment* is not more than 40% of the area of the wall face.

r11.1 3.1.5.5. Combustible Components for Exterior Walls

(1) Except as provided in Sentences (2) and (4), *combustible* components are permitted to be used for an exterior non-loadbearing wall assembly in a *building* required to be of *noncombustible construction*, provided that,

- (a) the *building* is,
 - (i) not more than 3 *storeys* in *building height*, or
 - (ii) not more than 6 *storeys* in *building height* if *sprinklered*,
- (b) when tested in accordance with CAN/ULC-S134, "Fire Test of Exterior Wall Assemblies", the wall assembly satisfies the following criteria for testing and conditions of acceptance:
 - (i) flaming on or in the wall assembly does not spread more than 5 m above the opening, and (See Appendix A.)
 - (ii) the heat flux during the flame exposure on the wall assembly is not more than 35 kW/m² measured at 3.5 m above the opening, and (See Appendix A.)
- (c) the interior surfaces of the wall assembly are protected by a thermal barrier conforming to Sentence 3.1.5.12.(5). (See Appendix A.)

- (2) Except as permitted by Articles 3.2.3.10. and 3.2.3.11., where the *limiting distance* in Tables 3.2.3.1.B. to 3.2.3.1.E. permits an area of *unprotected openings* of not more than 10% of the *exposing building face*, the construction requirements of Table 3.2.3.7. shall be met.
- (3) A wall assembly permitted by Sentence (1) that includes *combustible* cladding of *fire-retardant treated wood* shall be tested for fire exposure after the cladding has been subjected to an accelerated weathering test as specified in ASTM D2898, “Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing”.
- (4) The requirements of this Article do not apply where foamed plastic insulation is used in an exterior wall assembly of a *building* and the insulation is protected in conformance with Sentences 3.2.3.8.(1) and (2).

r11.1 3.1.5.5A. Factory-Assembled Panels

- (1) Except as permitted in Sentence (2), factory-assembled wall and ceiling panels containing foamed plastic insulation with a *flame-spread rating* not more than 500 are permitted to be used in a *building* required to be of *noncombustible construction*, provided that,
- (a) the *building*,
 - (i) is *sprinklered*,
 - (ii) is not more than 18 m high, measured from *grade* to the underside of the roof, and
 - (iii) does not contain a Group A, Group B or Group C *major occupancy*, and
 - (b) the panels,
 - (i) do not contain an air space,
 - (ii) when tested in accordance with CAN/ULC-S138, “Test for Fire Growth of Insulated Building Panels in a Full-Scale Room Configuration”, meet the criteria set out in that document, and
 - (iii) when a sample panel with an assembled joint typical of field installation is subjected to the applicable test described in Subsection 3.1.12., have a *flame-spread rating* not more than that permitted for the room or space that they bound.
- (2) Factory-assembled exterior wall panels containing thermosetting foamed plastic insulation are permitted to be used in a *building* required to be of *noncombustible construction*, provided that,
- (a) the *building*,
 - (i) is not more than 18 m high, measured from *grade* to the underside of the roof, and
 - (ii) does not contain a Group B or Group C *major occupancy*, and
 - (b) the wall panels,
 - (i) do not contain an air space,
 - (ii) are protected on both sides by sheet steel not less than 0.38 mm thick,
 - (iii) remain in place for not less than 10 min when tested in accordance with CAN/ULC-S101, “Fire Endurance Tests of Building Construction and Materials”, where the exposed surface includes typical vertical and horizontal joints, and
 - (iv) when a sample panel with an assembled joint typical of field installation is subjected to the applicable test described in Subsection 3.1.12., have a *flame-spread rating* not more than that permitted for the room or space that they bound.
- (3) A walk-in cooler or freezer consisting of factory-assembled wall, floor or ceiling panels containing foamed plastic insulation with a *flame-spread rating* not more than 500 is permitted to be used in a *building* required to be of *noncombustible construction*, provided that,
- (a) the *building* is *sprinklered*, and
 - (b) the panels,
 - (i) are protected on both sides by sheet metal not less than 0.38 mm thick with a melting point not less than 650°C,
 - (ii) do not contain an air space,
 - (iii) when tested in accordance with CAN/ULC-S138, “Test for Fire Growth of Insulated Building Panels in a Full-Scale Room Configuration”, meet the criteria set out in that document, and

e10

3.1.8.17. Temperature Rise and Area Limits Waived

- (1) The temperature rise limits and glass area limits required by Articles 3.1.8.15. and 3.1.8.16. are waived for a *closure* between an *exit* enclosure and an enclosed vestibule or corridor provided,
- (a) the vestibule or corridor is separated from the remainder of the *floor area* by a *fire separation* having a *fire-resistance rating* not less than 45 min,
 - (b) the *fire separation* required by Clause (a) contains no wired glass or glass block within 3 m of the *closure* into the *exit* enclosure, and
 - (c) the vestibule or corridor contains no *occupancy*.
- (See Appendix A.)

3.1.8.18. Sprinkler Protected Glazed Wall Assembly

- (1) A sprinkler protected glazed wall assembly shall be constructed in accordance with the requirements of ULC/ORD C263.1, “Sprinkler-Protected Windows Systems”.
- e2 (2) A sprinkler protected glazed wall assembly shall not be installed in,
- (a) *fire separations* requiring a *fire-resistance rating* of more than two hours,
 - (b) a *firewall*,
 - (c) a *high hazard industrial occupancy*, or
- r1 (d) any part of an *exit* serving,
- (i) a *floor area* subject to the requirements of Subsection 3.2.6.,
 - (ii) a *care occupancy*,
 - (iii) a *care and treatment occupancy*,
 - (iv) a *detention occupancy*, or
 - (v) a *residential occupancy*.
- (3) Where a sprinkler protected glazed wall assembly is installed in an *exit fire separation* permitted in Sentence (2),
- (a) the *building* shall be *sprinklered*, and
 - (b) the *exits* protected with the sprinkler protected glazed wall assemblies shall not comprise more than one-half of the required number of *exits* from any *floor area*.

3.1.9. Penetrations in Fire Separations and Fire-Rated Assemblies

(See Appendix A.)

3.1.9.1. Fire Stops

- r11.1 (1) Except as provided in Sentences (2) to (5) and Article 3.1.9.3A., penetrations of a *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* shall be,
- r3 (a) sealed by a *fire stop* that, when subjected to the fire test method in CAN/ULC-S115, “Fire Tests of Firestop Systems”, has an F rating not less than the *fire-protection rating* required for *closures* in the *fire separation* in conformance with Table 3.1.8.4., or
- (b) tightly fitted. (See Appendix A.)
- (2) Penetrations of a *firewall* or a horizontal *fire separation* that is required to have a *fire-resistance rating* in conformance with Article 3.2.1.2. shall be sealed at the penetration by a *fire stop* that, when subjected to the fire test method in CAN/ULC-S115, “Fire Tests of Firestop Systems”, has an FT rating not less than the *fire-resistance rating* required for the *fire separation*.
- (3) Penetrations of a *fire separation* in conformance with Sentence 3.6.4.2.(2) shall be sealed by a *fire stop* that, when subjected to the fire test method in CAN/ULC-S115, “Fire Tests of Firestop Systems”, has an FT rating not less than the *fire-resistance rating* required for the *fire separation* of the assembly.

(4) Sprinklers are permitted to penetrate a *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* without having to meet the *fire stop* requirements of Sentence (1), (2) or (3), provided the annular space created by the penetration of a fire sprinkler is covered by a metal escutcheon plate in accordance with NFPA 13, “Installation of Sprinkler Systems”.

(5) Unless specifically designed with a *fire stop*, *fire dampers* are permitted to penetrate a *fire separation* or a membrane forming part of an assembly required to have a *fire-resistance rating* without having to meet the *fire stop* requirements of Sentence (1), (2) or (3), provided the *fire damper* is installed in conformance with NFPA 80, “Fire Doors and Other Opening Protectives”.

3.1.9.2. Combustibility of Service Penetrations

(1) Except as permitted by Articles 3.1.9.3. and 3.1.9.4., pipes, ducts, electrical outlet boxes, totally enclosed raceways or other similar service equipment that penetrate an assembly required to have a *fire-resistance rating* shall be *noncombustible* unless the assembly has been tested incorporating that service equipment. (See Appendix A.)

3.1.9.3. Penetration by Wires, Cables and Outlet Boxes

(1) Optical fibre cables and electrical wires and cables in totally enclosed *noncombustible* raceways are permitted to penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2.

(2) Except as permitted by Sentence (3), totally enclosed nonmetallic raceways conforming to Article 3.1.5.20., optical fibre cables, and electrical wires and cables, single or grouped, with *combustible* insulation, jackets or sheathes that conform to the requirements of Clause 3.1.5.18.(1)(a) and that are not installed in totally enclosed *noncombustible* raceways are permitted to penetrate an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the overall diameter of the single or grouped wires or cables, or the raceways is not more than 25 mm.

(3) Single conductor metal sheathed cables with *combustible* jacketing that are more than 25 mm in overall diameter are permitted to penetrate a *fire separation* required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the cables are not grouped and are spaced a minimum of 300 mm apart.

(4) *Combustible* totally enclosed raceways that are embedded in a concrete floor slab are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the concrete cover between the raceway and the bottom of the slab is not less than 50 mm.

(5) *Combustible* electrical outlet boxes are permitted in an assembly required to have a *fire-resistance rating* without being incorporated in the assembly at the time of testing as required by Article 3.1.9.2., provided the opening through the membrane into the box is not more than 160 cm².

r15 (6) Reserved.

r15 (7) Reserved.

3.1.11.5. Fire Blocks in Horizontal Concealed Spaces

- (1) Except for a crawl space conforming to Sentence 3.1.11.6.(1), a horizontal concealed space within a floor assembly or roof assembly of *combustible construction*, in which sprinklers are not installed, shall be separated by construction conforming to Article 3.1.11.7. into compartments not more than,
- (a) 600 m² in area with no dimension more than 60 m, if the exposed construction materials within the space have a *flame-spread rating* not more than 25, and
 - (b) 300 m² in area with no dimension more than 20 m, if the exposed construction materials within the space have a *flame-spread rating* more than 25.
- (See Appendix A.)
- (2) A concealed space in an exterior cornice, a mansard style roof, a balcony or a *canopy* in which exposed construction materials within the space have a *flame-spread rating* more than 25, shall be separated by construction conforming to Article 3.1.11.7.,
- (a) at locations where the concealed space extends across the ends of required vertical *fire separations*, and
 - (b) so that the maximum dimension in the concealed space is not more than 20 m.
- r5 (3) Except as provided by Sentence (4), a horizontal concealed space within a floor assembly or roof assembly of *combustible construction* in a *building* within the scope of Article 3.2.2.43A. or 3.2.2.50A. shall be separated by construction conforming to Article 3.1.11.7. into compartments not more than,
- (a) 600 m² in area with no dimension more than 60 m, if the exposed construction materials within the space have a *flame-spread rating* not more than 25, and
 - (b) 300 m² in area with no dimension more than 20 m, if the exposed construction materials within the space have a *flame-spread rating* more than 25.
- (See Appendix A.)
- r5 (4) Sentence (3) does not apply if the horizontal concealed space within the floor assembly or roof assembly is entirely filled with *noncombustible* insulation such that any air gap between the top of the insulation and the underside of the floor or roof deck does not exceed 50 mm.

3.1.11.6. Fire Blocks in Crawl Spaces

- (1) A crawl space that is not considered as a *basement* by Article 3.2.2.9. and in which sprinklers are not installed, shall be separated by construction conforming to Article 3.1.11.7. into compartments not more than 600 m² in area with no dimension more than 30 m.

3.1.11.7. Fire Block Materials

- r11.1 e10 (1) Except as permitted by Sentences (2) to (4) and (7), *fire blocks* shall remain in place and prevent the passage of flames for not less than 15 min when subjected to the standard fire exposure in CAN/ULC-S101, “Fire Endurance Tests of Building Construction and Materials”.
- (2) Gypsum board not less than 12.7 mm thick and sheet steel not less than 0.38 mm thick need not be tested in conformance with Sentence (1) provided all joints have continuous support.
- (3) In a *building* required to be of *noncombustible construction*, wood nailing elements described in Article 3.1.5.6. need not be tested in conformance with Sentence (1).
- r11.1 (4) In a *building* permitted to be of *combustible construction*, in a *combustible* roof system permitted by Sentence 3.1.5.3.(2), and in a raised platform permitted by Sentence 3.1.5.8.(2), *fire blocks* are permitted to be,
- (a) solid lumber or a structural composite lumber product conforming to ASTM D5456, “Evaluation of Structural Composite Lumber Products”, not less than 38 mm thick,
 - (b) phenolic bonded plywood, OSB or waferboard not less than 12.5 mm thick with joints supported, or

- (c) two thicknesses of lumber or a structural composite lumber product conforming to ASTM D5456, “Evaluation of Structural Composite Lumber Products”, each not less than 19 mm thick with joints staggered, where the width or height of the concealed space requires more than one piece of lumber or structural composite lumber product not less than 38 mm thick to block off the space.
- r11.1 (5) Openings through *fire blocks* shall be protected to maintain the integrity of the construction.
- r11.1 (6) Where *fire blocks* are penetrated by construction elements or by service equipment, a *fire stop* shall be used to seal the penetration. (See Appendix A.)
- (7) In a *building* permitted to be of *combustible construction*, semi-rigid fibre insulation board, produced from glass, rock or slag, is permitted to be used to block the vertical space in a double wythe wall assembly formed at the intersection of the floor assembly and the walls, provided the insulation board,
- (a) has a density not less than 45 kg/m³,
 - (b) is securely fastened to one set of studs,
 - (c) extends from below the bottom of the top plates in the lower *storey* to above the top of the bottom plate in the upper *storey*, and
 - (d) completely fills the portion of the vertical space between the headers and between the wall plates.

3.1.12. Flame-Spread Rating and Smoke Developed Classification

3.1.12.1. Determination of Ratings

- (1) Except as required by Sentence (2) and as permitted by Sentence (3), the *flame-spread rating* and smoke developed classification of a material, assembly, or structural member shall be determined on the basis of no fewer than three tests conducted in conformance with CAN/ULC-S102, “Test for Surface Burning Characteristics of Building Materials and Assemblies”.
- (2) The *flame-spread rating* and smoke developed classification of a material or assembly shall be determined on the basis of no fewer than three tests conducted in conformance with CAN/ULC-S102.2, “Test for Surface Burning Characteristics of Flooring, Floor Coverings, and Miscellaneous Materials and Assemblies”, if the material or assembly,
- (a) is designed for use in a relatively horizontal position with only its top surface exposed to air,
 - (b) cannot be tested in conformance with Sentence (1) without the use of supporting material that is not representative of the intended installation, or
 - (c) is thermoplastic.
- (3) A material, assembly, or structural member is permitted to be assigned a *flame-spread rating* and smoke developed classification on the basis of MMAH Supplementary Standard SB-2, “Fire Performance Ratings”.

3.1.13. Interior Finish

3.1.13.1. Interior Finish Description

- (1) Interior finish material shall include any material that forms part of the interior surface of a floor, wall, *partition* or ceiling, including,
- (a) interior cladding of plaster, wood or tile,
 - (b) surfacing of fabric, paint, plastic, veneer or wallpaper,
 - (c) doors, windows and trim,
 - (d) lighting elements, such as light diffusers and lenses forming part of the finished surface of the ceiling, and
 - (e) carpet material that overlies a floor that is not intended as the finished floor.

3.2.7.8. Emergency Power for Fire Alarm Systems

(1) Fire alarm systems, including those incorporating a voice communication system, shall be provided with an emergency power supply conforming to Sentences (2) to (4).

(2) The emergency power supply required by Sentence (1) shall be supplied from,

- (a) a generator,
- (b) batteries, or
- (c) a combination of the items described in Clauses (a) and (b).

(3) The emergency power supply required by Sentence (1) shall be capable of providing,

- (a) supervisory power for not less than 24 h, and
- r5 (b) immediately following, emergency power under full load for not less than,
 - (i) 2 h for a *building* within the scope of Subsection 3.2.6.,
 - r6 (ii) 1 h for a *building* classified as Group B *major occupancy* that is not within the scope of Subsection 3.2.6.,
 - (ii.1) 1 h for a *building* that contains a Group C *major occupancy retirement home* and that is not within the scope of Subsection 3.2.6.,
 - (iii) 1 h for a *building* within the scope of Article 3.2.2.43A. or 3.2.2.50A.,
 - (iv) 5 min for a *building* not required to be equipped with an annunciator, and
 - (v) 30 min for any other *building*.

(See Appendix A.)

(4) The emergency power supply required by Sentence (1) shall be designed so that, in the event of a failure of the normal power source, there is an immediate automatic transfer to emergency power with no loss of information.

3.2.7.9. Emergency Power for Building Services

(1) An emergency power supply capable of operating under a full load for not less than 2 h shall be provided by an emergency generator for,

- (a) every elevator serving *storeys* above the *first storey* in a *building* that is more than 36 m high measured between *grade* and the floor level of the top *storey* and every elevator for firefighters in conformance with Sentence (2),
- (b) water supply for firefighting in conformance with Article 3.2.5.7., if the supply is dependent on electrical power supplied to the *building*, and the *building* is within the scope of Subsection 3.2.6.,
- r11.1 (c) fans and other electrical equipment that are installed to maintain the air quality specified in Articles 3.2.6.2. and e10 3.3.3.6., other than air handling systems described in Sentence 3.2.6.2.(5.1), and
- (d) fans required for venting by Article 3.2.6.6.

(See Appendix A.)

(2) Except as permitted by Sentence (3), the emergency power supply for elevators required by Clause (1)(a) shall be capable of operating all elevators for firefighters plus one additional elevator simultaneously.

(3) Sentence (2) does not apply if the time to recall all elevators under emergency power supply is not more than 5 min, each from its most remote *storey* to,

- (a) the *storey* containing the entrance for firefighter access referred to in Articles 3.2.5.4 and 3.2.5.5., or
- (b) to a transfer lobby.

(4) Except as provided by Sentence (5), an emergency power supply capable of operating under a full load for not less than 30 min shall be provided by emergency generator for water supply for firefighting in conformance with Article 3.2.5.7., if the supply is dependent on electrical power supplied to the *building*, and the *building* is not within the scope of Subsection 3.2.6.

(5) Sentence (4) does not apply to the water supply for a standpipe system.

3.2.7.10. Protection of Electrical Conductors

- r11.1 (1) Electrical conductors shall conform to Sentences (2) to (9) and (11) if they,
- (a) are within *buildings* identified in Article 3.2.6.1. and serve,
 - (i) fire alarm systems, or
 - (ii) emergency equipment within the scope of Articles 3.2.6.2. to 3.2.6.8.,
 - (b) serve fire pumps required to be installed under Article 3.2.5.19.,
 - (c) serve mechanical systems related to,
 - (i) compartments referred to in Clause 3.3.3.6.(1)(b),
 - (ii) *contained use areas* referred to in Clauses 3.3.3.7.(4)(a) and (b), or
 - (iii) provisions of Articles 3.2.8.4. to 3.2.8.6. and 3.2.8.9., or
 - (d) serve emergency lighting described in Article 3.2.7.3.
- (2) Except as required by Sentence (3) and except as permitted in this Article, electrical conductors referred to in Sentence (1) shall,
- r11.1 (a) conform to CAN/ULC-S139, “Fire Test for Evaluation of Integrity of Electrical Power, Data and Optical Fibre Cables”, including the hose stream application, to provide a circuit integrity rating of not less than 1 h, or (See Appendix A.)
- (b) be located in a *service space* that is separated from the remainder of the *building* by a *fire separation* that has a *fire-resistance rating* of not less than 1 h.
- (3) Electrical conductors that are used in conjunction with systems referred to in Clause (1)(c) shall,
- r11.1 (a) conform to CAN/ULC-S139, “Fire Test for Evaluation of Integrity of Electrical Power, Data and Optical Fibre Cables”, including the hose stream application, to provide a circuit integrity rating of not less than 2 h, or (See A-3.2.7.10.(2)(a) in Appendix A)
- (b) be located in a *service space* that is separated from the remainder of the *building* by a *fire separation* that has a *fire-resistance rating* of not less than 2 h.
- (4) The *service spaces* referred to in Clause (2)(b) or (3)(b) shall not contain any *combustible* materials other than the electrical conductors being protected.
- (5) Except as permitted by Sentences (7) and (9), the electrical conductors referred to in Sentence (1) are those that extend from the source of emergency power to,
- (a) the equipment served, or
 - (b) the distribution equipment supplying power to the equipment served, if both are in the same room. (See Appendix A.)
- (6) If a fire alarm transponder or annunciator located in one *fire compartment* is connected to a central processing unit or another transponder or annunciator located in a different *fire compartment*, the electrical conductors connecting them shall be protected in accordance with Sentence (2).
- (7) Fire alarm system branch circuits within a *storey* that connect transponders and individual devices need not conform to Sentence (2). (See Appendix A.)
- (8) Except as permitted by Sentence (9), if a distribution panel supplies power to emergency lighting, the power supply conductors leading up to the distribution panel shall be protected in accordance with Sentence (2).
- (9) Conductors leading from a distribution panel referred to in Sentence (8) to emergency lighting units in the same *storey* need not conform to Sentence (2).
- r11.1 (10) Distribution panels serving emergency lighting units located on other *storeys* shall be installed in a *service room* separated from the *floor area* by a *fire separation* having a *fire-resistance rating* of at least 1 h.

- (c) arranged so that,
 - (i) at least two of the designated spaces are side by side, and
 - (ii) at least one fixed seat for a companion is located beside,
 - (A) each group of designated spaces, if two or more designated spaces are arranged side by side in a group, and
 - (B) each designated space that is not part of a group described in Sub-subclause (A),
 (See Appendix A.)
 - (d) located adjoining a *barrier-free* path of travel without infringing on egress from any row of seating or any aisle requirements, and
 - (e) situated, as part of the designated seating plan, to provide a choice of viewing location and a clear view of the event taking place.
- (2) Fixed seats designated for *adaptable seating* required by Sentence 3.8.2.1.(4) shall be,
- (a) located adjoining a *barrier-free* path of travel without infringing on egress from any row of seating or any aisle requirements,
 - (b) equipped with a movable or removable armrest on the side of the seat adjoining the *barrier-free* path of travel, and
 - (c) situated, as part of the designated seating plan, to provide a choice of viewing location and a clear view of the event taking place.
- (3) In an *assembly occupancy* with fixed seats, space shall be provided for the storage of wheelchairs and *mobility assistive devices* in accordance with the following requirements:
- (a) at least one storage space not less than 810 mm by 1 370 mm shall be provided where the *assembly occupancy* has not more than 200 fixed seats and at least two such storage spaces shall be provided where the *assembly occupancy* has more than 200 fixed seats, and
 - (b) the storage space or spaces shall be located on the same level and in proximity to the spaces designated for wheelchair use and seats designated for *adaptable seating*.

3.8.3.7. Assistive Listening Devices

- (1) In *buildings* of *assembly occupancy*, all classrooms, auditoria, meeting rooms and *theatres* with an area of more than 100 m² and an *occupant load* of more than 75 shall be equipped with assistive listening systems encompassing the entire seating area. (See Appendix A.)

r4 3.8.3.8. Water Closet Stalls and Enclosures

- r11.1 (1) Every *barrier-free* water closet stall or enclosure in a washroom described in Sentence 3.8.2.3.(3) or (4) shall,
- (a) have a clear turning space within the stall or enclosure of at least 1 500 mm in diameter, (See Appendix A.)
 - (b) have a clear floor space in front of the stall or enclosure of at least 1 500 mm in diameter,
 - (c) be equipped with a door that,
 - e10 (i) is capable of being latched from the inside with a mechanism conforming to Subclause 3.8.1.5.(1)(c)(ii),
 - (ii) in an open position, has a clear opening of at least 860 mm wide,
 - (iii) swings outward, unless 820 mm by 1 440 mm clear floor area is provided within the stall to permit the door to be closed without interfering with the wheelchair, (See Appendix A.)
 - (iv) is self-closing so that, when at rest, the door remains open not more than 50 mm beyond the jamb,
 - (v) is provided with a horizontal, D-shaped, visually contrasting door pull on both sides of the door, mounted on the vertical centre line of the door, located at a height not less than 800 mm and not more than 1 000 mm above the finished floor, (See Appendix A.)
 - (vi) is aligned with a clear transfer space required by Subclause (2)(a)(ii) or Clause (2)(b), and
 - (vii) is capable of having the latch required by Subclause (i) released from the outside in case of an emergency,
 - (d) be equipped with a water closet conforming to Article 3.8.3.9. that is located in accordance with Clause (2)(a) or (b),
 - (e) be equipped with a coat hook mounted not more than 1 200 mm above the finished floor on a side wall and projecting not more than 50 mm from the wall,
 - (f) have a clearance of at least 1 700 mm between the outside of the stall face and the face of an in-swinging washroom door and 1 400 mm between the outside of the stall face and any wall-mounted fixture or other obstruction, and (See Appendix A.)

- (g) be equipped with a toilet paper dispenser mounted on the side wall closest to the water closet so that,
 - (i) the dispenser is located below the grab bar,
 - (ii) the closest edge of the dispenser is 300 mm from the front of the water closet seat, and
 - (iii) the bottom of the dispenser is 600 mm to 800 mm above the finished floor.
- r11.1 (2)** A water closet described in Clause (1)(d) shall be,
- (a) located so that,
 - (i) the centre line of the water closet is not less than 460 mm and not more than 480 mm from one side wall, and
 - (ii) a clear transfer space at least 900 mm wide and 1 500 mm deep is provided on the other side of the water closet, or
 - (b) located so that a clear transfer space at least 900 mm wide and 1 500 mm deep is provided on each side of the water closet. (See Appendix A.)
- (3)** Where a water closet is located in accordance with Clause (2)(a),
- (a) a grab bar conforming to Sentences (5) and (7) shall be provided on the side wall referred to in Subclause (2)(a)(i),
 - (b) a fold-down grab bar may be provided and, if one is provided, it shall conform to Sentence (8) and be provided on the side of the water closet opposite the grab bar described in Clause (a), and
 - (c) a grab bar conforming to Sentences (6) and (7) shall be provided on the wall behind the water closet. (See Appendix A.)
- (4)** Where a water closet is located in accordance with Clause (2)(b),
- (a) a fold-down grab bar conforming to Sentence (8) shall be provided on each side of the water closet, and
 - (b) a grab bar conforming to Sentences (6) and (7) shall be provided on the wall behind the water closet. (See A-3.8.3.8.(3) in Appendix A.)
- r5 (5)** A grab bar described in Clause (3)(a) shall,
- (a) be continuous L-shaped with 750 mm long horizontal and vertical components, and
 - (b) be wall mounted with the horizontal component 750 mm above the finished floor and the vertical component 150 mm in front of the water closet. (See A-3.8.3.8.(3) and A-3.8.3.8.(5) in Appendix A.)
- (6)** A grab bar described in Clause (3)(c) or (4)(b) shall,
- (a) be at least 600 mm in length, and
 - (b) be wall mounted horizontally from 840 mm to 920 mm above the finished floor and, where the water closet has a water tank, be wall mounted 150 mm above the tank. (See A-3.8.3.8.(3) in Appendix A.)
- r11.1 (7)** A grab bar described in Clause (3)(a) or (c) or (4)(b) shall,
- (a) be installed to resist a load of at least 1.3 kN applied vertically or horizontally,
 - (b) be not less than 30 mm and not more than 40 mm in diameter,
 - r5 (c)** have a clearance of not less than 38 mm and not more than 50 mm from the wall to the inside surface of the grab bar, and
 - (d) have a slip-resistant surface. (See A-3.8.3.8.(3) in Appendix A.)
- (8)** A fold-down grab bar described in Clause (3)(b) or (4)(a) shall,
- (a) be mounted on the wall behind the water closet,
 - (i) with the horizontal component 750 mm above the finished floor, and
 - (ii) not less than 390 mm and not more than 410 mm from the centre line of the water closet,
 - (b) not require a force of more than 22.2 N to pull it down,
 - r5 (c)** be at least 750 mm in length,
 - (d) be installed to resist a load of at least 1.3 kN applied vertically or horizontally,
 - r11.1 (e)** be not less than 30 mm and not more than 40 mm in diameter, and
 - (f) have a slip-resistant surface. (See A-3.8.3.8.(3) and A-3.8.3.8.(8) in Appendix A.)

Table 4.1.2.1.B.
Importance Categories for Buildings
 Forming Part of Sentence 4.1.2.1.(3)

Use and <i>Occupancy</i>	Importance Category
<i>Buildings</i> that represent a low direct or indirect hazard to human life in the event of failure, including: <ul style="list-style-type: none"> • low human-<i>occupancy buildings</i>, where it can be shown that collapse is not likely to cause injury or other serious consequences • minor storage <i>buildings</i> 	Low ⁽¹⁾
All <i>buildings</i> except those listed in Importance Categories Low, High and Post-disaster	Normal
<i>Buildings</i> that are likely to be used as post-disaster shelters, including <i>buildings</i> whose primary use is: <ul style="list-style-type: none"> • as an elementary, middle or secondary school • as a community centre Manufacturing and storage facilities containing toxic, explosive or other hazardous substances in sufficient quantities to be dangerous to the public if released ⁽¹⁾	High
<i>Post-disaster buildings</i>	Post-disaster
Column 1	2

Notes to Table 4.1.2.1.B.:

(1) See Appendix A.

4.1.2.2. Loads Not Listed

 (1) Where a *building* or structural member can be expected to be subjected to loads, forces or other effects not listed in Article 4.1.2.1., such effects shall be taken into account in the design based on the most appropriate information available.

4.1.3. Limit States Design (See Appendix A.)

4.1.3.1. Definitions

- (1) In this Part, the term,
 - (a) “limit states” means those conditions of a *building* structure that result in the *building* ceasing to fulfill the function for which it was designed. (Those limit states concerning safety are called ultimate limit states (ULS) and include exceeding the load-carrying capacity, overturning, sliding and fracture; those limit states that restrict the intended use and *occupancy* of the *building* are called serviceability limit states (SLS) and include deflection, vibration, permanent deformation and local structural damage such as cracking; and those limit states that represent failure under repeated loading are called fatigue limit states),
 - (b) “specified loads (C, D, E, H, L, P, S, T and W)” mean those loads set out in Table 4.1.2.1.A.,
 - (c) “principal load” means the specified variable load or rare load that dominates in a given load combination,
 - (d) “companion load” means a specified variable load that accompanies the principal load in a given load combination,
 - (e) “service load” means a specified load used for the evaluation of a serviceability limit state,
 - (f) “principal-load factor” means a factor applied to the principal load in a load combination to account for the variability of the load and load pattern and the analysis of its effects,
 - (g) “companion-load factor” means a factor that, when applied to a companion load in the load combination, gives the probable magnitude of a companion load acting simultaneously with the factored principal load,
 - (h) “importance factor, I,” means a factor applied in Subsections 4.1.6. to 4.1.8. to obtain the specified load and take into account the consequences of failure as related to the limit state and the use and *occupancy* of the *building*,
 - (i) “factored load” means the product of a specified load and its principal-load factor or companion-load factor,
 - (j) “effects” refers to forces, moments, deformations or vibrations that occur in the structure,
 - (k) “nominal resistance, R,” of a member, connection or structure, is based on the geometry and on the specified properties of the structural materials,

- (l) “resistance factor, Φ ,” means a factor applied to a specified material property or to the resistance of a member, connection or structure, and that, for the limit state under consideration, takes into account the variability of dimensions and material properties, workmanship, type of failure and uncertainty in the prediction of resistance, and
- (m) “factored resistance, ΦR ,” means the product of nominal resistance and the applicable resistance factor.

4.1.3.2. Strength and Stability

- (1) A *building* and its structural components shall be designed to have sufficient strength and stability so that the factored resistance, ΦR , is greater than or equal to the effect of factored loads, which shall be determined in accordance with Sentence (2).
- (2) Except as provided in Sentence (3), the effect of factored loads for a *building* or structural component shall be determined in accordance with the requirements of this Article and the following load combination cases, the applicable combination being that which results in the most critical effect:
 - (a) for load cases without crane loads, the load combinations listed in Table 4.1.3.2.A., and
 - (b) for load cases with crane loads, the load combinations listed in Table 4.1.3.2.B.
 (See Appendix A.)
- (3) Other load combinations that must also be considered are the principal loads acting with the companion loads taken as zero.
- e1 (4) Where the effects due to lateral earth pressure, **H**, restraint effects from pre-stress, **P**, and imposed deformation, **T**, affect the structural safety, they shall be taken into account in the calculations, with load factors of 1.5, 1.0 and 1.25 assigned to **H**, **P** and **T** respectively. (See Appendix A.)
- e10 (5) Except as provided in Sentence 4.1.8.16.(2), the counteracting factored *dead load*, $0.9\mathbf{D}$ in load combination cases 2, 3 and 4 and $1.0\mathbf{D}$ in load combination case 5 of Table 4.1.3.2.A. and $0.9\mathbf{D}$ in load combination cases 1 to 5 and $1.0\mathbf{D}$ in load combination case 6 of Table 4.1.3.2.B., shall be used when the *dead load* acts to resist overturning, uplift, sliding, failure due to stress reversal, and to determine anchorage requirements and the factored resistance of members. (See Appendix A.)
- (6) The principal-load factor 1.5 for *live loads*, **L** in Table 4.1.3.2.A. and L_{xc} in Table 4.1.3.2.B. may be reduced to 1.25 for liquids in tanks.
- r11.1 (7) The companion-load factor for *live loads*, **L** in Table 4.1.3.2.A. and L_{xc} in Table 4.1.3.2.B. shall be increased by 0.5 for storage areas and for equipment areas and *service rooms* referred to in Table 4.1.5.3.
- (8) Except as provided in Sentence (9), the load factor 1.25 for *dead load*, **D**, for *soil*, superimposed earth, plants and trees given in Tables 4.1.3.2.A. and 4.1.3.2.B. shall be increased to 1.5, except that when the *soil* depth exceeds 1.2 m, the factor may be reduced to $1 + 0.6/h_s$ but not less than 1.25, where h_s is the depth of *soil* in metres supported by the structure.
- (9) A principal-load factor of 1.5 shall be applied to the weight of saturated *soil* used in load combination case 1 of Table 4.1.3.2.A.
- e10 (10) Earthquake load, **E**, in load combination case 5 of Table 4.1.3.2.A. and case 6 of Table 4.1.3.2.B. includes horizontal earth pressure due to earthquake determined in accordance with Sentence 4.1.8.16.(7).
- (11) Provision shall be made to ensure adequate stability of the structure as a whole and adequate lateral, torsional and local stability of all structural parts.
- (12) Sway effects produced by vertical loads acting on the structure in its displaced configuration shall be taken into account in the design of *buildings* and their structural members.

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Table 4.1.3.2.A.
Load Combinations Without Crane Loads for Ultimate Limit States
 Forming Part of Sentences 4.1.3.2.(2) and (5) to (10)

Case	Load Combination ⁽¹⁾	
	Principal Loads	Companion Loads
1	1.4D ⁽²⁾	—
2	(1.25D ⁽³⁾ or 0.9D ⁽⁴⁾) + 1.5L ⁽⁵⁾	1.0S ⁽⁶⁾ or 0.4W
3	(1.25D ⁽³⁾ or 0.9D ⁽⁴⁾) + 1.5S	1.0L ⁽⁶⁾⁽⁷⁾ or 0.4W
4	(1.25D ⁽³⁾ or 0.9D ⁽⁴⁾) + 1.4W	0.5L ⁽⁷⁾ or 0.5S
5	1.0D ⁽⁴⁾ + 1.0E ⁽⁸⁾	0.5L ⁽⁶⁾⁽⁷⁾ + 0.25S ⁽⁶⁾
Column 1	2	3

Notes to Table 4.1.3.2.A.:

- (1) See Sentences 4.1.3.2.(2), (3) and (4).
- (2) See Sentence 4.1.3.2.(9).
- (3) See Sentence 4.1.3.2.(8).
- (4) See Sentence 4.1.3.2.(5).
- (5) See Sentence 4.1.3.2.(6).
- (6) See Article 4.1.5.5.
- (7) See Sentence 4.1.3.2.(7).
- (8) See Sentence 4.1.3.2.(10).

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Table 4.1.3.2.B.
Load Combinations With Crane Loads for Ultimate Limit States
 Forming Part of Sentences 4.1.3.2.(2), (5) to (8) and (10)

Case	Load Combination ⁽¹⁾	
	Principal Loads	Companion Loads
1	(1.25D ⁽²⁾ or 0.9D ⁽³⁾) + (1.5C + 1.0L _{xc})	1.0S ⁽⁴⁾ or 0.4W
2	(1.25D ⁽²⁾ or 0.9D ⁽³⁾) + (1.0C + 1.5L _{xc} ⁽⁵⁾)	1.0S ⁽⁴⁾ or 0.4W
3	(1.25D ⁽²⁾ or 0.9D ⁽³⁾) + 1.5S	1.0C + 1.0L _{xc} ⁽⁴⁾⁽⁶⁾
4	(1.25D ⁽²⁾ or 0.9D ⁽³⁾) + 1.4W	1.0C ⁽⁷⁾ + 0.5L _{xc} ⁽⁴⁾⁽⁶⁾
5	(1.25D ⁽²⁾ or 0.9D ⁽³⁾) + C ₇	—
6	1.0D ⁽³⁾ + 1.0E ⁽⁸⁾	1.0C _d + 0.5L _{xc} ⁽⁴⁾⁽⁶⁾ + 0.25S ⁽⁴⁾
Column 1	2	3

Notes to Table 4.1.3.2.B.:

- (1) See Sentences 4.1.3.2.(2) to (4).
- (2) See Sentence 4.1.3.2.(8).
- (3) See Sentence 4.1.3.2.(5).
- (4) See Article 4.1.5.5.
- (5) See Sentence 4.1.3.2.(6).
- (6) See Sentence 4.1.3.2.(7).
- (7) Side thrust due to cranes need not be combined with full wind load.
- (8) See Sentence 4.1.3.2.(10).

4.1.3.3. Fatigue

- (1) A *building* and its structural components, including connections, shall be checked for fatigue failure under the effect of the cyclical loads, as required in the standards listed in Section 4.3. (See Appendix A.)
- (2) Where vibration effects, such as resonance and fatigue resulting from machinery and equipment, are likely to be significant, a dynamic analysis shall be carried out. (See Appendix A.)

4.1.3.4. Serviceability

- (1) A *building* and its structural components shall be checked for serviceability limit states as defined in Clause 4.1.3.1.(1)(a) under the effect of service loads for serviceability criteria specified or recommended in Articles 4.1.3.5. and 4.1.3.6. and in the standards listed in Section 4.3. (See Appendix A.)

4.1.3.5. Deflection

- (1) In proportioning structural members to limit serviceability problems resulting from deflections, consideration shall be given to,
 - (a) the intended use of the *building* or member,
 - (b) limiting damage to non-structural members made of materials whose physical properties are known at the time of design,
 - (c) limiting damage to the structure itself, and
 - (d) creep, shrinkage, temperature changes and prestress.(See Appendix A.)
- (2) The lateral deflection of *buildings* due to service wind and gravity loads shall be checked to ensure that structural elements and non-structural elements, whose nature is known at the time the structural design is carried out, will not be damaged.
- (3) Except as provided in Sentence (4), the total drift per *storey* under service wind and gravity loads shall not exceed 1/500 of the *storey* height unless other drift limits are specified in the design standards referenced in Section 4.3. (See Appendix A.)
- (4) The deflection limits required in Sentence (3) do not apply to industrial *buildings* or sheds if experience has proven that greater movement will have no significant adverse effects on the strength and function of the *building*.
- (5) The *building* structure shall be designed for lateral deflection due to E, in accordance with Article 4.1.8.13.

4.1.3.6. Vibration

- (1) Floor systems susceptible to vibration shall be designed so that vibrations will have no significant adverse effects on the intended *occupancy* of the *building*. (See Appendix A.)
- (2) Where the fundamental vibration frequency of a structural system supporting an *assembly occupancy* used for rhythmic activities, such as dancing, concerts, jumping exercises or gymnastics, is less than 6 Hz, the effects of resonance shall be investigated by means of a dynamic analysis. (See Appendix A.)
- e10 (3) A *building* susceptible to lateral vibration under wind load shall be designed in accordance with Article 4.1.7.1. so that the vibrations will have no significant adverse effects on the intended use and *occupancy* of the *building*. (See Appendix A.)

4.1.5.6. Loads for Dining Areas

(1) The minimum specified *live load* listed in Table 4.1.5.3. for dining areas may be reduced to 2.4 kPa for areas in *buildings* that are being converted to dining areas, provided that the *floor area* does not exceed 100 m² and the dining area will not be used for other assembly purposes, including dancing.

4.1.5.7. More Than One Occupancy

(1) Where an area of floor or roof is intended for 2 or more *occupancies* at different times, the value to be used from Table 4.1.5.3. shall be the greatest value for any of the *occupancies* concerned.

4.1.5.8. Variation With Tributary Area (See Appendix A.)

(1) An area used for *assembly occupancies* designed for a *live load* of less than 4.8 kPa and roofs designed for the minimum loading specified in Table 4.1.5.3. shall have no reduction for tributary area.

(2) Where a structural member supports a tributary area of a floor or a roof, or a combination of them, that is greater than 80 m² and either used for *assembly occupancies* designed for a *live load* of 4.8 kPa or more, or used for storage, manufacturing, retail stores, garages or as a footbridge, the specified *live load* due to use and *occupancy* is the load specified in Article 4.1.5.3. multiplied by,

$$0.5 + \sqrt{20/A}$$

where,

“A” is the tributary area in square metres for this type of use and *occupancy*.

(3) Where a structural member supports a tributary area of a floor or a roof or a combination of them, that is greater than 20 m² and used for any use or *occupancy* other than *assembly occupancies* and those indicated in Sentences (1) and (2), the specified *live load* due to use and *occupancy*, is the load specified in Article 4.1.5.3. multiplied by,

$$0.3 + \sqrt{9.8/B}$$

where,

“B” is the tributary area in square metres for this type of use and *occupancy*.

(4) Where the specified *live load* for a floor is reduced in accordance with Sentence (2) or (3), the structural drawings shall indicate that a *live load* reduction factor for tributary area has been applied.

4.1.5.9. Concentrated Loads

(1) The specified *live load* due to possible concentrations of load resulting from the use of an area of floor or roof shall not be less than that listed in Table 4.1.5.9. applied over the loaded area noted in Table 4.1.5.9. and located so as to cause maximum effects, except that for *occupancies* not listed in Table 4.1.5.9., the concentrations of load shall be determined in accordance with Article 4.1.5.2.

Table 4.1.5.9.
Specified Concentrated Live Loads on an Area of Floor or Roof
 Forming Part of Sentence 4.1.5.9.(1)

Area of Floor or Roof	Minimum Specified Concentrated Load, kN	Loaded Area, mm x mm
Roof surfaces	1.3	200 x 200
Floors of classrooms	4.5	750 x 750
Floors of offices, manufacturing <i>buildings</i> , hospital wards and <i>stages</i>	9.0	750 x 750
Floors and areas used by vehicles not exceeding 4000 kg gross weight	18	120 x 120
Floors and areas used by vehicles exceeding 4000 kg but not exceeding 9000 kg gross weight	36	120 x 120
Floors and areas used by vehicles exceeding 9000 kg gross weight	54 ⁽¹⁾	250 x 600 ⁽¹⁾
Driveways and sidewalks over areaways and <i>basements</i>	54 ⁽¹⁾	250 x 600 ⁽¹⁾
Column 1	2	3

Notes to Table 4.1.5.9.:

(1) See Appendix A.

4.1.5.10. Sway Forces in Assembly Occupancies

- e10 (1) The floor assembly and other structural elements that support fixed seats in any *building* used for *assembly occupancies* accommodating large numbers of people at one time, such as grandstands, stadia and *theatre* balconies, shall be designed to resist a horizontal force equal to not less than 0.3 kN for each metre length of seats acting parallel to each row of seats, and not less than 0.15 kN for each metre length of seats acting at right angles to each row of seats, based on the assumption that these forces are acting independently of each other.

4.1.5.11. Crane-Supporting Structures and Impact of Machinery and Equipment

(See Appendix A.)

(1) The minimum specified load due to equipment, machinery or other objects that may produce impact shall be the sum of the weight of the equipment or machinery and its maximum lifting capacity, multiplied by an appropriate factor listed in Table 4.1.5.11.

(2) Crane-supporting structures shall be designed for the appropriate load combinations listed in Article 4.1.3.2.

Table 4.1.5.11.
Factors for the Calculation of Impact Loads
 Forming Part of Sentence 4.1.5.11.(1)

Cause of Impact	Factor
Operation of cab or radio-operated cranes	1.25
Operation of pendant or hand-operated cranes	1.10
Operation of elevators	⁽¹⁾
Supports for light machinery, shaft or motor-driven	1.20
Supports for reciprocating machinery (e.g. compressors)	1.50
Supports for power-driven units (e.g. piston engines)	1.50
Column 1	2

Notes to Table 4.1.5.11.:

(1) See ASME A17.1 / CSA B44, "Safety Code for Elevators and Escalators."

Table 4.1.6.2.A.
Importance Factor for Snow Load, I_s
 Forming Part of Sentence 4.1.6.2.(1)

Importance Category	Importance Factor, I_s	
	ULS	SLS
Low	0.8	0.9
Normal	1	0.9
High	1.15	0.9
Post-disaster	1.25	0.9
Column 1	2	3

- (2) The basic roof snow load factor, C_b , shall be,
- (a) for $l_c \leq (70/C_w^2)$, 0.8, and
 - (b) for $l_c > (70/C_w^2)$,
 - (i) calculated using the following formula:

$$\frac{1}{C_w} \left[1 - (1 - 0.8C_w) \exp\left(-\frac{l_c C_w^2 - 70}{100}\right) \right]$$

where,

l_c = characteristic length of the upper or lower roof, defined as $2w-w^2/l$, in metres,

w = smaller plan dimension of the roof, in metres, and

l = larger plan dimension of the roof, in metres, or

- (ii) determined in accordance with Table 4.1.6.2.B., using linear interpolation for intermediate values of $l_c C_w^2$.

(See Appendix A.)

- (3) Except as provided for in Sentence (4), the wind exposure factor, C_w , shall be 1.0.

- (4) For *buildings* in the Low and Normal Importance Categories as set out in Table 4.1.2.1.B., the wind exposure factor given in Sentence (3) may be reduced to 0.75 in rural areas, or to 0.5 in exposed areas north of the treeline, where,

- e10 (a) the *building* is exposed on all sides to wind over open terrain as defined in Clause 4.1.7.3.(5)(a), and is expected to remain so during its life,
- (b) the area of roof under consideration is exposed to the wind on all sides with no significant obstructions on the roof, such as parapet walls, within a distance of at least 10 times the difference between the height of the obstruction and $C_b C_w S_s / \gamma$ metres, where γ is the unit weight of snow on roofs as specified in Article 4.1.6.13., and
- (c) the loading does not involve the accumulation of snow due to drifting from adjacent surfaces.

- (5) Except as provided for in Sentences (6) and (7), the slope factor, C_s , shall be,

- (a) 1.0 where the roof slope, α , is equal to or less than 30° ,
- (b) $(70^\circ - \alpha)/40^\circ$ where α is greater than 30° but not greater than 70° , and
- (c) 0 where α exceeds 70° .

- (6) The slope factor, C_s , for unobstructed slippery roofs where snow and ice can slide completely off the roof shall be,

- (a) 1.0 when the roof slope, α , is equal to or less than 15° ,
- (b) $(60^\circ - \alpha)/45^\circ$ when α is greater than 15° , but not greater than 60° , and
- (c) 0 when α exceeds 60° .

- (7) Except as otherwise provided in this Subsection, the slope factor, C_s , shall be 1.0 when used in conjunction with accumulation factors for increased snow loads.

Table 4.1.6.2.B
Basic Roof Snow Load Factor for $I_e > (70/C_w^2)$
Forming Part of Sentence 4.1.6.2.(2)

Value of $I_e C_w^2$	Value of C_b where $C_w = 1.0$	Value of C_b where $C_w = 0.75$	Value of C_b where $C_w = 0.5$
70	0.80	0.80	0.80
80	0.82	0.85	0.91
100	0.85	0.94	1.11
120	0.88	1.01	1.27
140	0.90	1.07	1.40
160	0.92	1.12	1.51
180	0.93	1.16	1.60
200	0.95	1.19	1.67
220	0.96	1.21	1.73
240	0.96	1.24	1.78
260	0.97	1.25	1.82
280	0.98	1.27	1.85
300	0.98	1.28	1.88
320	0.98	1.29	1.90
340	0.99	1.30	1.92
360	0.99	1.30	1.93
380	0.99	1.31	1.95
400	0.99	1.31	1.96
420	0.99	1.32	1.96
440	1.00	1.32	1.97
460	1.00	1.32	1.98
480	1.00	1.32	1.98
500	1.00	1.33	1.98
520	1.00	1.33	1.99
540	1.00	1.33	1.99
560	1.00	1.33	1.99
580	1.00	1.33	1.99
600	1.00	1.33	1.99
620	1.00	1.33	2.00
Column 1	2	3	4

- (8) The accumulation factor, C_a , shall be 1.0, which corresponds to the uniform snow load case, except that where appropriate for the shape of the roof, it shall be assigned other values that account for,
- increased non-uniform snow loads due to snow drifting onto a roof that is at a level lower than other parts of the same *building* or at a level lower than another *building* within 5 m of it horizontally, as prescribed in Articles 4.1.6.5., 4.1.6.6. and 4.1.6.8.,
 - increased non-uniform snow loads on areas adjacent to roof projections, such as penthouses, large *chimneys* and equipment, as prescribed in Articles 4.1.6.7. and 4.1.6.8.,
 - non-uniform snow loads on,
 - gable roofs, as prescribed in Article 4.1.6.9., and
 - arched roofs, curved roofs and domes, as prescribed in Article 4.1.6.10.,
 - increased snow or ice loads due to snow sliding, as prescribed in Article 4.1.6.11.,

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Table 4.1.6.10.
Load Cases for Arch Roofs, Curved Roofs and Domes
 Forming Part of Sentences 4.1.6.10.(3), (4) and (9)

Load Case	Range of Application	Factors			
		Arch Roofs, Curved Roofs and Domes	Arch and Curved Roofs		Domes
		C_w	C_a Upwind Side	C_a Downwind Side	C_a Downwind Side
Case I	All values of h/b	As prescribed in Sentences 4.1.6.2.(3) and (4)	1.0	1.0	1.0
Case II	Slope at edge $\leq 30^\circ$ $h/b > 0.05$ all values of x	1.0	0.0	$C_a = (xh/0.03C_b b^2)$ for $h/b \leq 0.12$ $C_a = (4x/C_b b)$ for $h/b > 0.12$	$C_a(x,y) = C_a(x,0)(1 - y/r)$
	Slope at edge $> 30^\circ$ $h/b > 0.05$ $0 < x < x_{30}$	1.0	0.0	$C_a = (xh/0.06C_b x_{30} b)$ for $h/b \leq 0.12$ $C_a = (2x/C_b x_{30})$ for $h/b > 0.12$	$C_a(x,y) = C_a(x,0)(1 - y/r)$
	Slope at edge $> 30^\circ$ $h/b > 0.05$ $x_{30} \leq x$	1.0	0.0	$C_a = (h/0.06C_b b)$ for $h/b \leq 0.12$ $C_a = (2/C_b)$ for $h/b > 0.12$	$C_a(x,y) = C_a(x,0)(1 - y/r)$
Column 1	2	3	4	5	6

(4) For arch roofs with slope at the edge $\alpha_e > 30^\circ$ as shown in Figure 4.1.6.10.A. and as described in Table 4.1.6.10., C_a , shall be,

- (a) taken as 0 on the upwind side of the peak, and
 (b) on the downwind side of the peak,

(i) for the part of the roof between the peak and point where the slope $\alpha = 30^\circ$, taken as,

$$C_a = \frac{xh}{0.06C_b x_{30} b} \text{ for } 0.05 < \frac{h}{b} \leq 0.12 \text{ and}$$

$$C_a = \frac{2x}{C_h x_{30}} \text{ for } \frac{h}{b} > 0.12$$

where,

x, h, b = as specified in Sentence (2), and
 x_{30} = value of x where the slope $\alpha = 30^\circ$, and

(ii) for the part of the roof where the slope $\alpha > 30^\circ$, taken as,

$$C_a = \frac{h}{0.06C_b b} \text{ for } 0.05 < \frac{h}{b} \leq 0.12 \text{ and}$$

$$C_a = \frac{2}{C_h} \text{ for } \frac{h}{b} > 0.12$$

(5) Except as provided in Sentence (6), C_a for curved roofs shall be determined in accordance with the requirements for arch roofs stated in Sentences (3) and (4).

(6) Where the slope, α , of a curved roof at its peak is greater than 10° , C_a shall be determined in accordance with the requirements for gable roofs described in Article 4.1.6.9. using a slope equal to the mean slope of the curved roof.

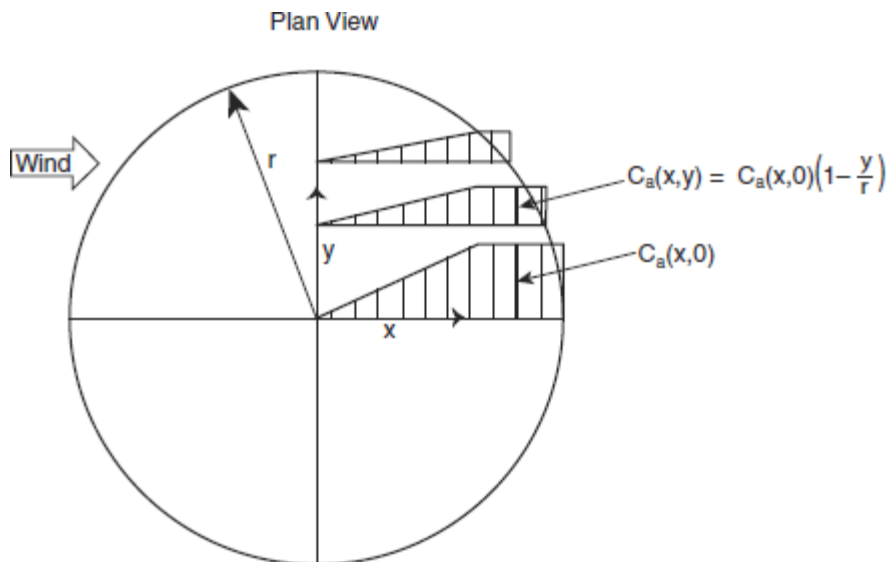
- (7) For domes of circular plan form as shown in Figure 4.1.6.10.B., C_a shall,
- along the central axis parallel to the wind, vary in the same way as for an arch roof with the same rise-to-span ratio, h/b , and
 - off this axis, vary according to,

$$C_a(x,y) = C_a(x,0) \left(1 - \frac{y}{r}\right)$$

where,

- $C_a(x,y)$ = value of C_a at location (x,y) ,
 $C_a(x,0)$ = value of C_a on the central axis parallel to the wind,
 x = distance along the central axis parallel to the wind,
 y = horizontal coordinate normal to the x direction, and
 r = radius of dome.

Figure 4.1.6.10.B.
Unbalanced Snow Accumulation Factor on a Circular Dome⁽¹⁾⁽²⁾
 Forming Part of Sentence 4.1.6.10.(7)



Notes to Figure 4.1.6.10.B.:

- Refer to Table 4.1.6.10. for applicable values of C_w and Sentences 4.1.6.2.(5) and (6) for applicable values of C_s .
 - Refer to Sentences 4.1.6.10.(3) and (4) for the calculation of $C_a(x,0)$.
- (8) For all arch roofs, curved roofs and domes, the slope factor, C_s , shall be as prescribed in Sentences 4.1.6.2.(5) and (6).
- (9) For all arch roofs, curved roofs and domes, the wind exposure factor, C_w , shall be as prescribed in Table 4.1.6.10.

r11.1 4.1.6.11. Snow Loads Due to Sliding

- (1) Except as provided in Sentence (2), where an upper roof, or part thereof, slopes downwards with a slope $\alpha > 0$ towards a lower roof, the snow load, S , on the lower roof, determined in accordance with Articles 4.1.6.2. and 4.1.6.5., shall be augmented in accordance with Sentence (3) to account for the additional load resulting from sliding snow.

Table 4.1.7.3.
Importance Factor for Wind Load, I_w
 Forming Part of Sentence 4.1.7.3.(1)

Importance Category	Importance Factor, I_w	
	ULS	SLS
Low	0.8	0.75
Normal	1.0	0.75
High	1.15	0.75
Post-disaster	1.25	0.75
Column 1	2	3

- (4) The reference velocity pressure, q , shall be the appropriate value determined in conformance with Subsection 1.1.2. based on a probability of being exceeded in any one year of 1-in-50.
- (5) The exposure factor C_e , shall be based on the reference height, h , determined in accordance with Sentence (6) for the surface or part of the surface under consideration and shall be,
- $(h/10)^{0.2}$ but not less than 0.9 for open terrain, where open terrain is level terrain with only scattered *buildings*, trees or other obstructions, open water or shorelines thereof,
 - $0.7(h/12)^{0.3}$ but not less than 0.7 for rough terrain, where rough terrain is suburban, urban or wooded terrain extending upwind from the *building* uninterrupted for at least 1 km or 20 times the height of the *building*, whichever is greater, or
 - an intermediate value between the two exposures defined in Clauses (a) and (b) in cases where the site is less than 1 km or 20 times the height of the *building* from a change in terrain conditions, whichever is greater, provided an appropriate interpolation method is used. (See Appendix A.)
- (6) The reference height, h , shall be determined as follows:
- for *buildings* with height less than or equal to 20 m and less than the smaller plan dimension, h shall be the mid-height of the roof above *grade*, but shall not be less than 6 m,
 - for other *buildings*, h shall be,
 - the actual height above *grade* of the point on the windward wall for which external pressures are being calculated,
 - the mid-height of the roof for pressures on surfaces parallel to the wind direction, and
 - the mid-height of the *building* for pressures on the leeward wall, and
 - for any structural element exposed to wind, h shall be the mid-height of the element above the ground.
- (7) The exposure factor for internal pressure, C_{ei} , shall be determined as follows:
- for *buildings* whose height is greater than 20 m and that have a dominant opening, C_{ei} shall be equal to the exposure factor for external pressures, C_e , calculated at the mid-height of the dominant opening, and
 - for other *buildings*, C_{ei} shall be the same as the exposure factor for external pressures, C_e , calculated for a reference height, h , equal to the mid-height of the *building* or 6 m, whichever is greater.
- (8) Except as provided in Sentences (9) and 4.1.7.6.(1), the gust effect factor, C_g , shall be one of the following values:
- 2.0 for the *building* as a whole and main structural members, or
 - 2.5 for external pressures and suctions on secondary structural members including cladding.
- (9) For cases where C_g and C_p are combined into a single product, $C_p C_g$, as provided in Article 4.1.7.6., the values C_p and C_g need not be independently specified. (See Appendix A.)

- e10 (10) The internal gust effect factor, C_{gi} , shall be 2.0, except it is permitted to be calculated using the following equation for large structures enclosing a single large unpartitioned volume that does not have numerous overhead doors or openings:

$$C_{gi} = 1 + \frac{1}{\sqrt{1 + \frac{V_0}{6950A}}}$$

where,

V_0 = internal volume in m^3 , and

A = total area of all exterior openings of the volume in m^2 .

(See Appendix A.)

4.1.7.4. Topographic Factor

- (1) Except as provided in Sentence (2), the topographic factor, C_t , shall be taken as 1.0.
- (2) For *buildings* on hills or escarpments with slope, $H_h/(2L_h)$, greater than 0.1 as shown in Figure 4.1.7.4., the topographic factor, C_t , shall be calculated as follows:

$$C_t = \left(1 + \frac{\Delta S}{C_g}\right) (1 + \Delta S)$$

where,

$$\Delta S = \Delta S_{\max} \left(1 - \frac{|x|}{kL_h}\right) \exp(-\alpha z/L_h)$$

where,

ΔS_{\max} = applicable values from Table 4.1.7.4.,

x = horizontal distance from the peak of the hill or escarpment,

L_h = horizontal distance upwind from the peak to the point where the ground surface lies at half the height of the hill or escarpment, or $2H_h$ where H_h is the height of the hill or escarpment, whichever is greater,

Z = height above ground, and

k and α = applicable constants from Table 4.1.7.4. based on shape of hill or escarpment.

(10) Deflections obtained from a linear analysis shall include the effects of torsion and be multiplied by R_s/I_E to get realistic values of expected deflections.

(11) The deflections described in Sentence (10) shall be used to calculate the largest interstorey deflection, which shall not exceed,

- (a) $0.01h_s$ for post-disaster buildings,
- (b) $0.02h_s$ for High Importance Category *buildings*, and
- (c) $0.025h_s$ for all other *buildings*,

where h_s is the interstorey height as defined in Article 4.1.8.2.

(12) When earthquake forces are calculated using $R_s = 1.5$, the following elements in the SFRS shall have their design forces due to earthquake effects increased by 33%:

- (a) diaphragms and their chords, connections, struts and collectors,
- (b) tie downs in wood or drywall shear walls,
- (c) connections and anchor bolts in steel- and wood-braced frames,
- (d) connections in precast concrete, and
- (e) connections in steel moment frames.

(13) Except as provided in Sentence (14), where cantilever parapet walls, other cantilever walls, exterior ornamentation and appendages, towers, chimneys or penthouses are connected to or form part of a *building*, they shall be designed, along with their connections, for a lateral force, V_{sp} , distributed according to the distribution of mass of the element and acting in the lateral direction that results in the most critical loading for design using the following equation:

$$V_{sp} = 0.1F_sI_EW_p$$

where W_p is the weight of a portion of a structure as defined in Article 4.1.8.2.

(14) The value of V_{sp} shall be doubled for unreinforced masonry elements.

(15) Structures designed in accordance with this Article need not comply with the seismic requirements stated in the applicable design standard referenced in Section 4.3.

4.1.8.2. Notation (See Appendix A.)

(1) In this Subsection,

A_r = response amplification factor to account for type of attachment of mechanical/electrical equipment, as defined in Sentence 4.1.8.18.(1),

A_x = amplification factor at level x to account for variation of response of mechanical/electrical equipment with elevation within the *building*, as defined in Sentence 4.1.8.18.(1),

e10 B_x = ratio at level x used to determine torsional sensitivity, as defined in Sentence 4.1.8.11.(10),

e10 B = maximum value of B_x , as defined in Sentence 4.1.8.11.(10),

C_p = seismic coefficient for mechanical/electrical equipment, as defined in Sentence 4.1.8.18.(1),

D_{nx} = plan dimension of the *building* at level x perpendicular to the direction of seismic loading being considered,

e_x = distance measured perpendicular to the direction of earthquake loading between centre of mass and centre of rigidity at the level being considered, (See Appendix A.)

F_a = site coefficient, as defined in Sentence 4.1.8.4.(7),

$F(\text{PGA})$ = site coefficient for PGA, as defined in Sentence 4.1.8.4.(5),

$F(\text{PGV})$ = site coefficient for PGV, as defined in Sentence 4.1.8.4.(5),

F_s = site coefficient, as defined in Sentence 4.1.8.1.(2),

- $F(T)$ = site coefficient for spectral acceleration, as defined in Sentence 4.1.8.4.(5),
- e10 F_t = portion of V to be concentrated at the top of the structure, as defined in Sentence 4.1.8.11.(7),
- F_v = site coefficient, as defined in Sentence 4.1.8.4.(7),
- e10 F_x = lateral force applied to level x , as defined in Sentence 4.1.8.11.(7),
- h_i, h_n, h_x = the height above the base ($i = 0$) to level i, n , or x respectively, where the base of the structure is the level at which horizontal earthquake motions are considered to be imparted to the structure,
- h_s = interstorey height ($h_i - h_{i-1}$),
- I_E = earthquake importance factor of the structure, as described in Sentence 4.1.8.5.(1),
- e10 J = numerical reduction coefficient for base overturning moment, as defined in Sentence 4.1.8.11.(6),
- e10 J_x = numerical reduction coefficient for overturning moment at level x , as defined in Sentence 4.1.8.11.(8),
- Level i = any level in the *building*, $i = 1$ for first level above the base,
- Level n = level that is uppermost in the main portion of the structure,
- Level x = level that is under design consideration,
- e10 M_v = factor to account for higher mode effect on base shear, as defined in Sentence 4.1.8.11.(6),
- e10 M_x = overturning moment at level x , as defined in Sentence 4.1.8.11.(8),
- N = total number of *storeys* above exterior *grade* to level n ,
- \bar{N}_{60} = Average Standard Penetration Resistance for the top 30 m, corrected to a rod energy efficiency of 60% of the theoretical maximum,
- PGA = Peak Ground Acceleration expressed as a ratio to gravitational acceleration, as defined in Sentence 4.1.8.4.(1),
- PGA_{ref} = reference PGA for determining $F(T)$, $F(PGA)$ and $F(PGV)$, as defined in Sentence 4.1.8.4.(4),
- PGV = Peak Ground Velocity, in m/s, as defined in Sentence 4.1.8.4.(1),
- PI = plasticity index for clays,
- R_d = ductility-related force modification factor reflecting the capability of a structure to dissipate energy through reversed cyclic inelastic behaviour, as given in Article 4.1.8.9.,
- R_o = overstrength-related force modification factor accounting for the dependable portion of reserve strength in a structure designed according to these provisions, as defined in Article 4.1.8.9.,
- R_s = combined overstrength and ductility-related modification factor, as defined in Sentence 4.1.8.1.(7),
- S_p = horizontal force factor for part or portion of a *building* and its anchorage, as given in Sentence 4.1.8.18.(1),
- e10 $S(T)$ = design spectral response acceleration, expressed as a ratio to gravitational acceleration, for a period of T , as defined in Sentence 4.1.8.4.(9),
- $S_a(T)$ = 5% damped spectral response acceleration, expressed as a ratio to gravitational acceleration, for a period of T , as defined in Sentence 4.1.8.4.(1),
- SFRS = Seismic Force Resisting System(s) is that part of the structural system that has been considered in the design to provide the required resistance to the earthquake forces and effects defined in Subsection 4.1.8.,
- S_u = average undrained shear strength in the top 30 m of *soil*,
- T = period in seconds,
- T_a = fundamental lateral period of vibration of the *building* or structure in seconds in the direction under consideration, as defined in Sentence 4.1.8.11.(3),

r15	T_s = fundamental lateral period of vibration of the <i>building</i> or structure in seconds in the direction under consideration, as defined in Sentence 4.1.8.11.(7),
e10	T_x = floor torque at level x, as defined in Sentence 4.1.8.11.(11),
	TDD = Total Design Displacement of any point in a seismically isolated structure, within or above the isolation system, obtained by calculating the mean + ($I_E \times$ the standard deviation) of the peak horizontal displacements from all sets of ground motion histories analyzed, but not less than $\sqrt{I_E} \times$ the mean, where the peak horizontal displacement is based on the vector sum of the two orthogonal horizontal displacements considered for each time step,
	V = lateral earthquake design force at the base of the structure, as determined by Article 4.1.8.11.,
	V_d = lateral earthquake design force at the base of the structure, as determined by Article 4.1.8.12.,
	V_e = lateral earthquake elastic force at the base of the structure, as determined by Article 4.1.8.12.,
	V_{ed} = lateral earthquake design elastic force at the base of the structure, as determined by Article 4.1.8.12.,
	V_p = lateral force on a part of the structure, as determined by Article 4.1.8.18.,
	V_s = lateral earthquake design force at the base of the structure, as determined by Sentence 4.1.8.1.(7),
	\bar{V}_{s30} = average shear wave velocity in the top 30 m of <i>soil</i> or <i>rock</i> ,
	W = <i>dead load</i> , as defined in Article 4.1.4.1., except that the minimum <i>partition</i> load as defined in Sentence 4.1.4.1.(3) need not exceed 0.5 kPa, plus 25% of the design snow load specified in Subsection 4.1.6., plus 60% of the storage load for areas used for storage, except that <i>storage garages</i> need not be considered storage areas, and the full contents of any tanks, (See Appendix A.)
	W_i, W_x = portion of W that is located at or is assigned to level i or x respectively,
	W_p = weight of a part or portion of a structure, e.g., cladding, <i>partitions</i> and appendages,
	W_t = sum of W_i over the height of the <i>building</i> ,
e10	δ_{ave} = average displacement of the structure at level x, as defined in Sentence 4.1.8.11.(10), and
e10	δ_{max} = maximum displacement of the structure at level x, as defined in Sentence 4.1.8.11.(10).

4.1.8.3. General Requirements

- (1) The *building* shall be designed to meet the requirements of this Subsection and of the design standards referenced in Section 4.3.
- (2) Structures shall be designed with a clearly defined load path, or paths, that will transfer the inertial forces generated in an earthquake to the supporting ground.
- (3) The structure shall have a clearly defined Seismic Force Resisting System(s) (SFRS), as defined in Article 4.1.8.2.
- (4) The SFRS shall be designed to resist 100% of the earthquake loads and their effects. (See Appendix A.)
- (5) All structural framing elements not considered to be part of the SFRS must be investigated and shown to behave elastically or to have sufficient non-linear capacity to support their gravity loads while undergoing earthquake-induced deformations calculated from the deflections determined in Article 4.1.8.13.
- (6) Stiff elements that are not considered part of the SFRS, such as concrete, masonry, brick or pre-cast walls or panels, shall be,
 - (a) separated from all structural elements of the *building* such that no interaction takes place as the *building* undergoes deflections due to earthquake effects as calculated in this Subsection, or
 - (b) made part of the SFRS and satisfy the requirements of this Subsection.
 (See Appendix A.)

- (7) Stiffness imparted to the structure from elements not part of the SFRS, other than those described in Sentence (6), shall not be used to resist earthquake deflections but shall be accounted for,
- (a) in calculating the period of the structure for determining forces if the added stiffness decreases the fundamental lateral period by more than 15%,
 - (b) in determining the irregularity of the structure, except the additional stiffness shall not be used to make an irregular SFRS regular or to reduce the effects of torsion, and (See Appendix A.)
 - (c) in designing the SFRS if inclusion of the elements not part of the SFRS in the analysis has an adverse effect on the SFRS. (See Appendix A.)
- (8) Structural modelling shall be representative of the magnitude and spatial distribution of the mass of the *building* and of the stiffness of all elements of the SFRS, including stiff elements that are not separated in accordance with Sentence 4.1.8.3.(6), and shall account for,
- (a) the effect of cracked sections in reinforced concrete and reinforced masonry elements,
 - (b) the effect of the finite size of members and joints,
 - (c) sway effects arising from the interaction of gravity loads with the displaced configuration of the structure, and
 - (d) other effects that influence the lateral stiffness of the *building*.
- (See Appendix A.)

4.1.8.4. Site Properties

- (1) The peak ground acceleration (PGA), peak ground velocity (PGV) and the 5% damped spectral response acceleration values, $S_a(T)$, for the reference ground conditions (Site Class C in Table 4.1.8.4.A.) for periods T of 0.2 s, 0.5 s, 1.0 s, 2.0 s, 5.0 s and 10.0 s, shall be determined in accordance with Subsection 1.1.2. and are based on a 2% probability of exceedance in 50 years.
- (2) Site classifications for ground shall conform to Table 4.1.8.4.A. and shall be determined using \bar{V}_{s30} , or where \bar{V}_{s30} is not known, using Sentence (3).
- (3) If average shear wave velocity, \bar{V}_{s30} , is not known, Site Class shall be determined from energy-corrected Average Standard Penetration Resistance, \bar{N}_{60} , or from *soil* average undrained shear strength, s_u , as noted in Table 4.1.8.4.A., \bar{N}_{60} and s_u being calculated based on rational analysis. (See Appendix A.)
- (4) For the purpose of determining the values of $F(T)$ to be used in the calculation of design spectral acceleration, $S(T)$, in Sentence (9), and the values of $F(\text{PGA})$ and $F(\text{PGV})$, the value of PGA_{ref} to be used with Tables 4.1.8.4.B. to 4.1.8.4.I. shall be taken as,
- (a) 0.8 PGA, where the ratio $S_a(0.2)/\text{PGA} < 2.0$, and
 - (b) 1 PGA, in all other cases.
- (5) The values of the site coefficient for design spectral acceleration at period T , $F(T)$, and of similar coefficients $F(\text{PGA})$ and $F(\text{PGV})$ shall conform to Tables 4.1.8.4.B. to 4.1.8.4.I. using linear interpolation for intermediate values of PGA_{ref} .
- (6) Site-specific evaluation is required to determine $F(T)$, $F(\text{PGA})$ and $F(\text{PGV})$ for Site Class F. (See Appendix Note A-4.1.8.4.(3))
- (7) For all applications in Subsection 4.1.8., $F_a = F(0.2)$ and $F_v = F(1.0)$.
- (8) For structures with a fundamental period of vibration equal to or less than 0.5 s that are built on liquefiable *soils*, Site Class and the corresponding values of $F(T)$ may be determined as described in Tables 4.1.8.4.A., 4.1.8.4.B., and 4.1.8.4.C. by assuming that the *soils* are not liquefiable. (See Appendix Note A-4.1.8.4.(3))

4.1.8.5. Importance Factor

- (1) The earthquake importance factor, I_E , shall be determined according to Table 4.1.8.5.

Table 4.1.8.5.
Importance Factor for Earthquake Loads and Effects, I_E
 Forming Part of Sentence 4.1.8.5.(1)

Importance Category	Importance Factor, I_E	
	ULS	SLS
Low	0.8	(1)(2)
Normal	1.0	(1)(2)
High	1.3	(1)(2)
Post-disaster	1.5	(1)(2)
Column 1	2	3

Notes to Table 4.1.8.5.:

- (1) See Article 4.1.8.13.
 (2) See Appendix A.

4.1.8.6. Structural Configuration

- (1) Structures having any of the features listed in Table 4.1.8.6. shall be designated irregular.
- (2) Structures not classified as irregular according to Sentence 4.1.8.6.(1) may be considered regular.
- (3) Except as required by Article 4.1.8.10., in cases where $I_E F_a S_a(0.2)$ is equal to or greater than 0.35, structures designated as irregular must satisfy the provisions referenced in Table 4.1.8.6.

Table 4.1.8.6.
Structural Irregularities⁽¹⁾⁽⁷⁾
 Forming Part of Sentence 4.1.8.6.(1)

Type	Irregularity Type and Definition	Notes
1	Vertical Stiffness Irregularity Vertical stiffness irregularity shall be considered to exist when the lateral stiffness of the SFRS in a <i>storey</i> is less than 70% of the stiffness of any adjacent <i>storey</i> , or less than 80% of the average stiffness of the three <i>storeys</i> above or below.	(2)(3)
2	Weight (mass) Irregularity Weight irregularity shall be considered to exist where the weight, W_i , of any <i>storey</i> is more than 150% of the weight of an adjacent <i>storey</i> . A roof that is lighter than the floor below need not be considered.	(2)
3	Vertical Geometric Irregularity Vertical geometric irregularity shall be considered to exist where the horizontal dimension of the SFRS in any <i>storey</i> is more than 130% of that in an adjacent <i>storey</i> .	(2)(3)(4)
4	In-Plane Discontinuity in Vertical Lateral-Force-Resisting Element Except for braced frames and moment-resisting frames, an in-plane discontinuity shall be considered to exist where there is an offset of a lateral-force-resisting element of the SFRS or a reduction in lateral stiffness of the resisting element in the <i>storey</i> below.	(2)(3)(4)
5	Out-of-Plane Offsets Discontinuities in a lateral force path, such as out-of-plane offsets of the vertical elements of the SFRS.	(2)(3)(4)
6	Discontinuity in Capacity – Weak Storey A weak <i>storey</i> is one in which the <i>storey</i> shear strength is less than that in the <i>storey</i> above. The <i>storey</i> shear strength is the total strength of all seismic-resisting elements of the SFRS sharing the <i>storey</i> shear for the direction under consideration.	(2)(3)
e10 7	Torsional Sensitivity (to be considered when diaphragms are not flexible) Torsional sensitivity shall be considered to exist when the ratio B calculated according to Sentence 4.1.8.11.(10) exceeds 1.7.	(2)(3)(5)
8	Non-Orthogonal Systems A non-orthogonal system irregularity shall be considered to exist when the SFRS is not oriented along a set of orthogonal axes.	(2)(6)
9	Gravity-Induced Lateral Demand Irregularity Gravity-induced lateral demand irregularity on the SFRS shall be considered to exist where the ratio α calculated in accordance with Sentence 4.1.8.10.(5) exceeds 0.1 for SFRS with self-centering characteristics and 0.03 for other systems.	(2)(3)(6)
Column 1	2	3

Notes to Table 4.1.8.6.:

- (1) One-*storey* penthouses with a weight of less than 10% of the level below need not be considered in the application of this Table.
 (2) See Article 4.1.8.7.
 (3) See Article 4.1.8.10.
 (4) See Article 4.1.8.15.
 e10 (5) See Sentences 4.1.8.11.(10) and (11) and 4.1.8.12.(4).
 (6) See Article 4.1.8.8.
 (7) See Appendix A.

4.1.8.7. Methods of Analysis

- (1) Analysis for design earthquake actions shall be carried out in accordance with the Dynamic Analysis Procedure described in Article 4.1.8.12., except that the Equivalent Static Force Procedure described in Article 4.1.8.11. may be used for structures that meet any of the following criteria: (See Appendix A.)
- in cases where $I_E F_a S_a(0.2)$ is less than 0.35,
 - regular structures that are less than 60 m in height and have a fundamental lateral period, T_a , less than 2 s in each of two orthogonal directions as defined in Article 4.1.8.8., or
 - structures with structural irregularity, of Type 1, 2, 3, 4, 5, 6 or 8 as defined in Table 4.1.8.6., that are less than 20 m in height and have a fundamental lateral period, T_a , less than 0.5 s in each of two orthogonal directions as defined in Article 4.1.8.8.

4.1.8.8. Direction of Loading

- (1) Earthquake forces shall be assumed to act in any horizontal direction, except that the following shall be considered to provide adequate design force levels in the structure:
- where components of the SFRS are oriented along a set of orthogonal axes, independent analyses about each of the principal axes of the structure shall be performed,
 - where the components of the SFRS are not oriented along a set of orthogonal axes and $I_E F_a S_a(0.2)$ is less than 0.35, independent analyses about any two orthogonal axes is permitted, or
 - where the components of the SFRS are not oriented along a set of orthogonal axes and $I_E F_a S_a(0.2)$ is equal to or greater than 0.35, analysis of the structure independently in any two orthogonal directions for 100% of the prescribed earthquake loads applied in one direction plus 30% of the prescribed earthquake loads in the perpendicular direction, with the combination requiring the greater element strength being used in the design.

4.1.8.9. SFRS Force Reduction Factors, System Overstrength Factors, and General Restrictions

- (1) Except as provided in Sentence 4.1.8.20.(7), the values of R_d and R_o and the corresponding system restrictions shall conform to Table 4.1.8.9. and the requirements of this Subsection.
- (2) When a particular value of R_d is required by this Article, the corresponding R_o shall be used.
- (3) For combinations of different types of SFRS acting in the same direction in the same *storey*, $R_d R_o$ shall be taken as the lowest value of $R_d R_o$ corresponding to these systems.
- e10 (4) For vertical variations of $R_d R_o$, excluding rooftop structures not exceeding two *storeys* in height whose weight is less than the greater of 10% of W and 30% of W_i of the level below, the value of $R_d R_o$ used in the design of any *storey* shall be less than or equal to the lowest value of $R_d R_o$ used in the given direction for the *storeys* above, and the requirements of Sentence 4.1.8.15.(6) must be satisfied. (See Appendix A.)
- (5) If it can be demonstrated through testing, research and analysis that the seismic performance of a structural system is at least equivalent to one of the types of SFRS mentioned in Table 4.1.8.9., then such a structural system will qualify for values of R_d and R_o corresponding to the equivalent type in that Table. (See Appendix A.)

Table 4.1.8.9.
SFRS Ductility-Related Force Modification Factors, R_d ,
Overstrength-Related Force Modification Factors, R_o , and General Restrictions⁽¹⁾
 Forming Part of Sentences 4.1.8.9.(1) and (5)

Type of SFRS	R_d	R_o	Restrictions ⁽²⁾				
			Cases Where $I_e F_a S_a(0.2)$				Cases Where $I_e F_v S_a(1.0)$
			< 0.2	≥ 0.2 to < 0.35	≥ 0.35 to ≤ 0.75	> 0.75	> 0.3
Steel Structures Designed and Detailed According to CSA S16 ⁽³⁾⁽⁶⁾							
Ductile moment-resisting frames	5.0	1.5	NL	NL	NL	NL	NL
Moderately ductile moment-resisting frames	3.5	1.5	NL	NL	NL	NL	NL
Limited ductility moment-resisting frames	2.0	1.3	NL	NL	60	30	30
Moderately ductile concentrically braced frames							
Tension-compression braces	3.0	1.3	NL	NL	40	40	40
Tension only braces	3.0	1.3	NL	NL	20	20	20
Limited ductility concentrically braced frames							
Tension-compression braces	2.0	1.3	NL	NL	60	60	60
Tension only braces	2.0	1.3	NL	NL	40	40	40
Ductile buckling-restrained braced frames	4.0	1.2	NL	NL	40	40	40
Ductile eccentrically braced frames	4.0	1.5	NL	NL	NL	NL	NL
Ductile plate walls	5.0	1.6	NL	NL	NL	NL	NL
Limited ductility plate walls	2.0	1.5	NL	NL	60	60	60
Conventional construction of moment-resisting frames, braced frames or plate walls							
<i>Assembly occupancies</i>	1.5	1.3	NL	NL	15	15	15
<i>Other occupancies</i>	1.5	1.3	NL	NL	60	40	40
Other steel SFRS(s) not defined above	1.0	1.0	15	15	NP	NP	NP
Concrete Structures Designed and Detailed According to CAN/CSA-A23.3							
Ductile moment-resisting frames	4.0	1.7	NL	NL	NL	NL	NL
Moderately ductile moment-resisting frames	2.5	1.4	NL	NL	60	40	40
Ductile coupled walls	4.0	1.7	NL	NL	NL	NL	NL
Moderately ductile coupled walls	2.5	1.4	NL	NL	NL	60	60
Ductile partially coupled walls	3.5	1.7	NL	NL	NL	NL	NL
Moderately ductile partially coupled walls	2.0	1.4	NL	NL	NL	60	60
Ductile shear walls	3.5	1.6	NL	NL	NL	NL	NL
Moderately ductile shear walls	2.0	1.4	NL	NL	NL	60	60
Conventional construction							
Moment-resisting frames	1.5	1.3	NL	NL	20	15	10 ⁽⁴⁾
Shear walls	1.5	1.3	NL	NL	40	30	30
Two-way slabs without beams	1.3	1.3	20	15	NP	NP	NP
Tilt-up Construction							
Moderately ductile walls and frames	2.0	1.3	30	25	25	25	25
Limited ductility walls and frames	1.5	1.3	30	25	20	20	20 ⁽⁵⁾
Conventional walls and frames	1.3	1.3	25	20	NP	NP	NP
Other concrete SFRS(s) not listed above	1.0	1.0	15	15	NP	NP	NP
Column 1	2	3	4	5	6	7	8

Table 4.1.8.9. (Cont'd)
SFRS Ductility-Related Force Modification Factors, R_d ,
Overstrength-Related Force Modification Factors, R_o , and General Restrictions⁽¹⁾
 Forming Part of Sentence 4.1.8.9.(1)

Type of SFRS	R_d	R_o	Restrictions ⁽²⁾				
			Cases Where $I_e F_a S_a(0.2)$				Cases Where $I_e F_v S_a(1.0)$
			< 0.2	≥ 0.2 to < 0.35	≥ 0.35 to ≤ 0.75	> 0.75	> 0.3
Timber Structures Designed and Detailed According to CSA O86							
Shear walls							
Nailed shear walls: wood-based panel	3.0	1.7	NL	NL	30	20	20
Shear walls: wood-based and gypsum panels in combination	2.0	1.7	NL	NL	20	20	20
Braced or moment-resisting frames with ductile connections							
Moderately ductile	2.0	1.5	NL	NL	20	20	20
Limited ductility	1.5	1.5	NL	NL	15	15	15
Other wood- or gypsum-based SFRS(s) not listed above	1.0	1.0	15	15	NP	NP	NP
Masonry Structures Designed and Detailed According to CSA S304							
Moderately ductile shear walls	2.0	1.5	NL	NL	60	40	40
Ductile shear walls	3.0	1.5	NL	NL	60	40	40
Conventional construction							
Shear walls	1.5	1.5	NL	60	30	15	15
Moment-resisting frames	1.5	1.5	NL	30	NP	NP	NP
Unreinforced masonry	1.0	1.0	30	15	NP	NP	NP
Other masonry SFRS(s) not listed above	1.0	1.0	15	NP	NP	NP	NP
Cold-Formed Steel Structures Designed and Detailed According to CSA S136							
Shear walls							
Screw-connected shear walls - wood-based panel	2.5	1.7	20	20	20	20	20
Screw-connected shear walls - wood-based and gypsum panels in combination	1.5	1.7	20	20	20	20	20
Diagonal strap concentrically braced walls							
Limited ductility	1.9	1.3	20	20	20	20	20
Conventional construction	1.2	1.3	15	15	NP	NP	NP
Other cold-formed SFRS(s) not listed above	1.0	1.0	15	15	NP	NP	NP
Column 1	2	3	4	5	6	7	8

Notes to Table 4.1.8.9.:

- (1) See Article 4.1.8.10.
- (2) NP = system is not permitted.
 NL = system is permitted and not limited in height as an SFRS; height may be limited in other Parts of the Code.
 Numbers in Columns 4 to 8 are maximum height limits above grade in m.
 The most stringent requirement governs.
- (3) Higher design force levels are prescribed in CSA S16 for some heights of *buildings*.
- (4) Frames limited to a maximum of 2 *storeys*.
- (5) Frames limited to a maximum of 3 *storeys*.
- (6) See Appendix A.

4.1.8.10. Additional System Restrictions

- (1) Except as required by Clause (2)(b), structures with a Type 6 irregularity, Discontinuity in Capacity – Weak Storey, as described in Table 4.1.8.6., are not permitted unless $I_E F_a S_a(0.2)$ is less than 0.2 and the forces used for design of the SFRS are multiplied by $R_d R_o$.
- r15 (2) *Post-disaster buildings* shall,
- (a) not have any irregularities conforming to Types 1, 3, 4, 5, 7 and 9 as described in Table 4.1.8.6., in cases where $I_E F_a S_a(0.2)$ is equal to or greater than 0.35,
- (b) not have a Type 6 irregularity as described in Table 4.1.8.6.,
- (c) have an SFRS with an R_d of 2.0 or greater, and
- (d) have no *storey* with a lateral stiffness that is less than that of the *storey* above it.
- (3) For *buildings* having fundamental lateral periods, T_a , of 1.0 s or greater and where $I_E F_v S_a(1.0)$ is greater than 0.25, shear walls that are other than wood-based and form part of the SFRS shall be continuous from their top to the *foundation* and shall not have irregularities of Type 4 or 5 as described in Table 4.1.8.6.
- (4) For *buildings* constructed with more than 4 *storeys* of continuous wood construction and where $I_E F_a S_a(0.2)$ is equal to or greater than 0.35, timber SFRS of shear walls with wood-based panels, braced frames or moment-resisting frames as defined in Table 4.1.8.9. within the continuous wood construction shall not have irregularities of Type 4 or 5 as described in Table 4.1.8.6. (See Appendix A.)
- e10 (5) The ratio, α , for Type 9 irregularity as described in Table 4.1.8.6. shall be determined independently for each orthogonal direction using the following equation:

$$\alpha = Q_G / Q_y$$

where,

Q_G = gravity-induced lateral demand on the SFRS at the critical level of the yielding system, and

Q_y = the resistance of the yielding mechanism required to resist the minimum earthquake loads, which need not be taken less than R_o multiplied by the minimum lateral earthquake force as determined in Article 4.1.8.11. or 4.1.8.12, as appropriate.

(See Appendix A.)

- (6) For *buildings* with a Type 9 irregularity as described in Table 4.1.8.6. and where $I_E F_a S_a(0.2)$ is equal to or greater than 0.5, deflections determined in accordance with Article 4.1.8.13. shall be multiplied by 1.2.
- (7) Structures where the value of α , as determined in accordance with Sentence (5), exceeds twice the limits in Table 4.1.8.6. for a Type 9 irregularity, and where $I_E F_a S_a(0.2)$ is equal to or greater than 0.5 are not permitted unless determined to be acceptable based on non-linear dynamic analysis studies. (See Appendix A.)

4.1.8.11. Equivalent Static Force Procedure for Structures Satisfying the Conditions of Article 4.1.8.7.

- (1) The static loading due to earthquake motion shall be determined according to the procedures given in this Article.
- (2) Except as provided in Sentence (12), the minimum lateral earthquake force, V , shall be calculated using the following formula:

$$V = S (T_a) M_v I_E W / (R_d R_o)$$

except,

- (a) for walls, coupled walls and wall-frame systems, V shall not be less than,

$$S (4.0) M_v I_E W / (R_d R_o)$$

- (b) for moment-resisting frames, braced frames and other systems, V shall not be less than,

$$S (2.0) M_v I_{EW} / (R_d R_o)$$

- (c) for *buildings* located on a site other than Class F and having an SFERS with an R_d equal to or greater than 1.5, V need not be greater than the larger of,

$$^{2/3} S (0.2) I_{EW} / (R_d R_o)$$

and

$$S (0.5) I_{EW} / (R_d R_o)$$

- (3) Except as provided in Sentence (4), the fundamental lateral period, T_a , in the direction under consideration in Sentence (2) shall be determined as,

- (a) for moment-resisting frames that resist 100% of the required lateral forces and where the frame is not enclosed by or adjoined by more rigid elements that would tend to prevent the frame from resisting lateral forces, and where h_n is in metres,

- (i) $0.085 (h_n)^{3/4}$ for steel moment frames,
- (ii) $0.075 (h_n)^{3/4}$ for concrete moment frames, or
- (iii) 0.1 N for other moment frames,

- (b) $0.025 h_n$ for braced frames where h_n is in metres,

- (c) $0.05 (h_n)^{3/4}$ for shear wall and other structures where h_n is in metres, or

- (d) other established methods of mechanics using a structural model that complies with the requirements of Sentence 4.1.8.3.(8), except that,

- (i) for moment-resisting frames, T_a shall not be taken greater than 1.5 times that determined in Clause (a),
- (ii) for braced frames, T_a shall not be taken greater than 2.0 times that determined in Clause (b),
- (iii) for shear wall structures, T_a shall not be greater than 2.0 times that determined in Clause (c),
- (iv) for other structures, T_a shall not be taken greater than that determined in Clause (c), and
- (v) for the purpose of calculating the deflections, the period without the upper limit specified in Subclauses (d)(i) to (iv) may be used, except that, for walls, coupled walls and wall-frame systems, T_a shall not exceed 4.0 s, and for moment-resisting frames, braced frames, and other systems, T_a shall not exceed 2.0 s.

(See Appendix A.)

- (4) For single-storey *buildings* with steel deck or wood roof diaphragms, the fundamental lateral period, T_a , in the direction under consideration is permitted to be taken as,

- (a) $0.05 (h_n)^{3/4} + 0.004 L$ for shear walls,

- (b) $0.035 h_n + 0.004 L$ for steel moment frames and steel braced frames, or

- (c) the value obtained from methods of mechanics using a structural model that complies with the requirements of Sentence 4.1.8.3.(8), except that T_a shall not be greater than 1.5 times the value determined in Clause (a) or (b), as applicable,

where L is the shortest length of the diaphragm, in m, between adjacent vertical elements of the SFERS in the direction perpendicular to the direction under consideration.

- (5) The weight, W , of the *building* shall be calculated using the formula,

$$W = \sum_{i=1}^n W_i$$

- (6) The higher mode factor, M_v , and its associated base overturning moment reduction factor, J , shall conform to Tables 4.1.8.11.A. to 4.1.8.11.E.

Table 4.1.8.11.A.
Higher Mode Factor, M_v , and Base Overturning Reduction Factor, $J^{(1)(2)(3)(4)}$ for Moment-Resisting Frames
 Forming Part of Sentence 4.1.8.11.(6)

r_{15}	S(0.2)/S(5.0)	M_v For $T_a \leq 0.5$	M_v For $T_a = 1.0$	M_v For $T_a = 2.0$	M_v For $T_a \geq 5.0$	J For $T_a \leq 0.5$	J For $T_a = 1.0$	J For $T_a = 2.0$	J For $T_a \geq 5.0$
	5	1	1	1	(5)	1	0.97	0.92	(5)
	20	1	1	1	(5)	1	0.93	0.85	(5)
	40	1	1	1	(5)	1	0.87	0.78	(5)
	65	1	1	1.03	(5)	1	0.80	0.70	(5)
	Column 1	2	3	4	5	6	7	8	9

Notes to Table 4.1.8.11.A.:

- r_{15} (1) For intermediate values of the spectral ratio S(0.2)/S(5.0), M_v and J shall be obtained by linear interpolation.
- (2) For intermediate values of the fundamental lateral period, T_a , $S(T_a)M_v$ shall be obtained by linear interpolation using the values of M_v obtained in accordance with Note (1).
- (3) For intermediate values of the fundamental lateral period, T_a , J shall be obtained by linear interpolation using the values of J obtained in accordance with Note (1).
- (4) For a combination of different seismic force resisting systems (SFRS) not given in Table 4.1.8.11.A. that are in the same direction under consideration, use the highest M_v factor of all the SFRS and the corresponding value of J.
- (5) For fundamental lateral periods, T_a , greater than 2.0 s, use the 2.0 s values obtained in accordance with Note (1). See Clause 4.1.8.11.(2)(b).

Table 4.1.8.11.B.
Higher Mode Factor, M_v , and Base Overturning Reduction Factor, $J^{(1)(2)(3)(4)}$ for Coupled Walls⁽⁵⁾
 Forming Part of Sentence 4.1.8.11.(6)

r_{15}	S(0.2)/S(5.0)	M_v For $T_a \leq 0.5$	M_v For $T_a = 1.0$	M_v For $T_a = 2.0$	M_v For $T_a \geq 5.0$	J For $T_a \leq 0.5$	J For $T_a = 1.0$	J For $T_a = 2.0$	J For $T_a \geq 5.0$
	5	1	1	1	1 ⁽⁶⁾	1	0.97	0.92	0.80 ⁽⁷⁾
	20	1	1	1	1.08 ⁽⁶⁾	1	0.93	0.85	0.65 ⁽⁷⁾
	40	1	1	1	1.30 ⁽⁶⁾	1	0.87	0.78	0.53 ⁽⁷⁾
	65	1	1	1.03	1.49 ⁽⁶⁾	1	0.80	0.70	0.46 ⁽⁷⁾
	Column 1	2	3	4	5	6	7	8	9

Notes to Table 4.1.8.11.B.:

- r_{15} (1) For intermediate values of the spectral ratio S(0.2)/S(5.0), M_v and J shall be obtained by linear interpolation.
- (2) For intermediate values of the fundamental lateral period, T_a , $S(T_a)M_v$ shall be obtained by linear interpolation using the values of M_v obtained in accordance with Note (1).
- (3) For intermediate values of the fundamental lateral period, T_a , J shall be obtained by linear interpolation using the values of J obtained in accordance with Note (1).
- (4) For a combination of different seismic force resisting systems (SFRS) not given in Table 4.1.8.11.B. that are in the same direction under consideration, use the highest M_v factor of all the SFRS and the corresponding value of J.
- (5) A "coupled" wall is a wall system with coupling beams, where at least 66% of the base overturning moment resisted by the wall system is carried by the axial tension and compression forces resulting from shear in the coupling beams.
- (6) For fundamental lateral periods, T_a , greater than 4.0 s, use the 4.0 s values of $S(T_a)M_v$ obtained by interpolation between 2.0 s and 5.0 s using the value of M_v obtained in accordance with Note (1). See Clause 4.1.8.11.(2)(a).
- (7) For fundamental lateral periods, T_a , greater than 4.0 s, use the 4.0 s values of J obtained by interpolation between 2.0 s and 5.0 s using the value of J obtained in accordance with Note (1). See Clause 4.1.8.11.(2)(a).

Table 4.1.8.11.C.
Higher Mode Factor, M_v , and Base Overturning Reduction Factor, $J^{(1)(2)(3)(4)}$ for Braced Frames
Forming Part of Sentence 4.1.8.11.(5)

r15	S(0.2)/S(5.0)	M_v For $T_a \leq 0.5$	M_v For $T_a = 1.0$	M_v For $T_a = 2.0$	M_v For $T_a \geq 5.0$	J For $T_a \leq 0.5$	J For $T_a = 1.0$	J For $T_a = 2.0$	J For $T_a \geq 5.0$
	5	1	1	1	(5)	1	0.95	0.89	(5)
	20	1	1	1	(5)	1	0.85	0.78	(5)
	40	1	1	1	(5)	1	0.79	0.70	(5)
	65	1	1.04	1.07	(5)	1	0.71	0.66	(5)
	Column 1	2	3	4	5	6	7	8	9

Notes to Table 4.1.8.11.C.:

- r15 (1) For intermediate values of the spectral ratio S(0.2)/S(5.0), M_v and J shall be obtained by linear interpolation.
- (2) For intermediate values of the fundamental lateral period, T_a , $S(T_a)M_v$ shall be obtained by linear interpolation using the values of M_v obtained in accordance with Note (1).
- (3) For intermediate values of the fundamental lateral period, T_a , J shall be obtained by linear interpolation using the values of J obtained in accordance with Note (1).
- (4) For a combination of different seismic force resisting systems (SFRS) not given in Table 4.1.8.11.C. that are in the same direction under consideration, use the highest M_v factor of all the SFRS and the corresponding value of J.
- (5) For fundamental lateral periods, T_a , greater than 2.0 s, use the 2.0 s values obtained in accordance with Note (1). See Clause 4.1.8.11.(2)(b).

Table 4.1.8.11.D.
Higher Mode Factor, M_v , and Base Overturning Reduction Factor, $J^{(1)(2)(3)(4)}$ for Walls, Wall Frame Systems
Forming Part of Sentence 4.1.8.11.(5)

r15	S(0.2)/S(5.0)	M_v For $T_a \leq 0.5$	M_v For $T_a = 1.0$	M_v For $T_a = 2.0$	M_v For $T_a \geq 5.0$	J For $T_a \leq 0.5$	J For $T_a = 1.0$	J For $T_a = 2.0$	J For $T_a \geq 5.0$
	5	1	1	1	1.25 ⁽⁵⁾	1	0.97	0.85	0.55 ⁽⁶⁾
	20	1	1	1.18	2.30 ⁽⁵⁾	1	0.80	0.60	0.35 ⁽⁶⁾
	40	1	1.19	1.75	3.70 ⁽⁵⁾	1	0.63	0.46	0.28 ⁽⁶⁾
	65	1	1.55	2.25	4.65 ⁽⁵⁾	1	0.51	0.39	0.23 ⁽⁶⁾
	Column 1	2	3	4	5	6	7	8	9

Notes to Table 4.1.8.11.D.:

- r15 (1) For intermediate values of the spectral ratio S(0.2)/S(5.0), M_v and J shall be obtained by linear interpolation.
- (2) For intermediate values of the fundamental lateral period, T_a , $S(T_a)M_v$ shall be obtained by linear interpolation using the values of M_v obtained in accordance with Note (1).
- (3) For intermediate values of the fundamental lateral period, T_a , J shall be obtained by linear interpolation using the values of J obtained in accordance with Note (1).
- (4) For a combination of different seismic force resisting systems (SFRS) not given in Table 4.1.8.11.D. that are in the same direction under consideration, use the highest M_v factor of all the SFRS and the corresponding value of J.
- (5) For fundamental lateral periods, T_a , greater than 4.0 s, use the 4.0 s values of $S(T_a)M_v$ obtained by interpolation between 2.0 s and 5.0 s using the value of M_v obtained in accordance with Note (1). See Clause 4.1.8.11.(2)(a).
- (6) For fundamental lateral periods, T_a , greater than 4.0 s, use the 4.0 s values of J obtained by interpolation between 2.0 s and 5.0 s using the value of J obtained in accordance with Note (1). See Clause 4.1.8.11.(2)(a).

Table 4.1.8.11.E.
Higher Mode Factor, M_v , and Base Overturning Reduction Factor, $J^{(1)(2)(3)(4)}$ for Other Systems
 Forming Part of Sentence 4.1.8.11.(5)

r_{15}	S(0.2)/S(5.0)	M_v For $T_a \leq 0.5$	M_v For $T_a = 1.0$	M_v For $T_a = 2.0$	M_v For $T_a \geq 5.0$	J For $T_a \leq 0.5$	J For $T_a = 1.0$	J For $T_a = 2.0$	J For $T_a \geq 5.0$
	5	1	1	1	(5)	1	0.97	0.85	(5)
	20	1	1	1.18	(5)	1	0.80	0.60	(5)
	40	1	1.19	1.75	(5)	1	0.63	0.46	(5)
	65	1	1.55	2.25	(5)	1	0.51	0.39	(5)
	Column 1	2	3	4	5	6	7	8	9

Notes to Table 4.1.8.11.E.:

- r_{15} (1) For intermediate values of the spectral ratio S(0.2)/S(5.0), M_v and J shall be obtained by linear interpolation.
- (2) For intermediate values of the fundamental lateral period, T_a , S(T_a) M_v shall be obtained by linear interpolation using the values of M_v obtained in accordance with Note (1).
- (3) For intermediate values of the fundamental lateral period, T_a , J shall be obtained by linear interpolation using the values of J obtained in accordance with Note (1).
- (4) For a combination of different seismic force resisting systems (SFRS) not given in Table 4.1.8.11.E. that are in the same direction under consideration, use the highest M_v factor of all the SFRS and the corresponding value of J.
- (5) For fundamental lateral periods, T_a , greater than 2.0 s, use the 2.0 s values obtained in accordance with Note (1). See Clause 4.1.8.11.(2)(b).

(7) The total lateral seismic force, V, shall be distributed such that a portion, F_t , shall be assumed to be concentrated at the top of the *building*, where F_t is equal to $0.07 T_a V$ but need not exceed $0.25 V$ and may be considered as zero, where the fundamental lateral period, T_a , does not exceed 0.7 s; the remainder, $V - F_t$, shall be distributed along the height of the *building*, including the top level, in accordance with the formula,

$$F_x = (V - F_t) W_x h_x / \left(\sum_{i=1}^n W_i h_i \right)$$

(8) The structure shall be designed to resist overturning effects caused by the earthquake forces determined in Sentence (7) and the overturning moment at level x, M_x , shall be determined using the formula,

$$M_x = J_x \sum_{i=x}^n F_i (h_i - h_x)$$

where,

$$J_x = 1.0 \text{ for } h_x \geq 0.6h_n, \text{ and}$$

$$J_x = J + (1 - J)(h_x / 0.6h_n) \text{ for } h_x < 0.6h_n$$

where,

e_{10} J = base overturning moment reduction factor conforming to Tables 4.1.8.11.A. to 4.1.8.11.E.

(9) Torsional effects that are concurrent with the effects of the forces mentioned in Sentence (7) and are caused by the simultaneous actions of the following torsional moments shall be considered in the design of the structure according to Sentence (11):

- (a) torsional moments introduced by eccentricity between the centres of mass and resistance and their dynamic amplification, and
- (b) torsional moments due to accidental eccentricities.

(10) Torsional sensitivity shall be determined by calculating the ratio B_x for each level x according to the following equation for each orthogonal direction determined independently:

$$B_x = \delta_{\max} / \delta_{\text{ave}}$$

where,

- B = maximum of all values of B_x in both orthogonal directions, except that the B_x for one-storey penthouses with a weight less than 10% of the level below need not be considered,
- δ_{\max} = maximum storey displacement at the extreme points of the structure, at level x in the direction of the earthquake induced by the equivalent static forces acting at distances $\pm 0.10 D_{nx}$ from the centres of mass at each floor, and
- δ_{ave} = average of the displacements at the extreme points of the structure at level x produced by the above-mentioned forces.

(11) Torsional effects shall be accounted for as follows:

- (a) for a *building* with $B \leq 1.7$ or where $I_E F_a S_a(0.2)$ is less than 0.35, by applying torsional moments about a vertical axis at each level throughout the *building*, derived for each of the following load cases considered separately,
 - (i) $T_x = F_x(e_x + 0.10 D_{nx})$, and
 - (ii) $T_x = F_x(e_x - 0.10 D_{nx})$

where F_x is the lateral force at each level determined according to Sentence (6) and where each element of the *building* is designed for the most severe effect of the above load cases, or

- (b) for a *building* with $B > 1.7$, in cases where $I_E F_a S_a(0.2)$ is equal to or greater than 0.35, by a Dynamic Analysis Procedure as specified in Article 4.1.8.12.

(12) Where the fundamental lateral period, T_a , is determined in accordance with Clause (3)(d) and the *building* is constructed with more than 4 storeys of continuous wood construction and has a timber SFRS consisting of shear walls with wood-based panels, braced frames or moment-resisting frames as defined in Table 4.1.8.9., the lateral earthquake force, V , as determined in accordance with Sentence (2) shall be multiplied by 1.2 but need not exceed the value determined by using Clause (2)(c). (See Appendix Note A-4.1.8.10.(4))

4.1.8.12. Dynamic Analysis Procedure

- (1) Except as provided in Articles 4.1.8.19. and 4.1.8.21., the Dynamic Analysis Procedure shall be in accordance with one of the following methods:
 - (a) Linear Dynamic Analysis by either the Modal Response Spectrum Method or the Numerical Integration Linear Time History Method using a structural model that complies with the requirements of Sentence 4.1.8.3.(8), or (See Appendix A)
 - (b) Non-Linear Dynamic Analysis, in which case a special study shall be performed. (See Appendix A.)
- e10 (2) The spectral acceleration values used in the Modal Response Spectrum Method shall be the design spectral acceleration values, $S(T)$, defined in Sentence 4.1.8.4.(9).
- e10 (3) The ground motion histories used in the Numerical Integration Linear Time History Method shall be compatible with a response spectrum constructed from the design spectral acceleration values, $S(T)$, defined in Sentence 4.1.8.4.(9). (See Appendix A.)
- (4) The effects of accidental torsional moments acting concurrently with the lateral earthquake forces that cause them shall be accounted for by the following methods:
 - (a) the static effects of torsional moments due to $(\pm 0.10 D_{nx})F_x$ at each level x , where F_x is either determined from the elastic dynamic analysis or determined from Sentence 4.1.8.11.(7) multiplied by $R_d R_o / I_E$, shall be combined with the effects determined by dynamic analysis, or (See Appendix A.)
 - (b) if B , as defined in Sentence 4.1.8.11.(10), is less than 1.7, it is permitted to use a three-dimensional dynamic analysis with the centres of mass shifted by a distance of $-0.05 D_{nx}$ and $+0.05 D_{nx}$.

(5) Except as provided in Sentence (6), the design elastic base shear, V_{ed} , is equal to the elastic base shear, V_e , obtained from a Linear Dynamic Analysis.

(6) For structures located on sites other than Class F that have an SFRS with R_d equal to or greater than 1.5, the elastic base shear obtained from a Linear Dynamic Analysis may be multiplied by the larger of the following factors to obtain the design elastic base shear, V_{ed} :

$$\frac{2S(0.2)}{3S(T_a)} \leq 1.0$$

and

$$S(0.5) / S(T_a) \leq 1.0$$

(7) The design elastic base shear, V_{ed} , shall be multiplied by the importance factor, I_E , as determined in Article 4.1.8.5., and shall be divided by $R_d R_o$, as determined in Article 4.1.8.9., to obtain the design base shear, V_d .

(8) Except as required by Sentence (9) or (12), if the base shear, V_d , obtained in Sentence (7) is less than 80% of the lateral earthquake design force, V , of Article 4.1.8.11., V_d shall be taken as 0.8 V .

(9) For irregular structures requiring dynamic analysis in accordance with Article 4.1.8.7., V_d shall be taken as the larger of the V_d determined in Sentence (7) and 100% of V .

(10) Except as required by Sentence (11), the values of elastic *storey* shears, *storey* forces, member forces, and deflections obtained from the Linear Dynamic Analysis, including the effect of accidental torsion determined in Sentence (4), shall be multiplied by V_d/V_e to determine their design values, where V_d is the base shear.

(11) For the purpose of calculating deflections, it is permitted to use a value for V based on the value for T_a determined in Clause 4.1.8.11.(3)(d) to obtain V_d in Sentences (8) and (9).

(12) For *buildings* constructed with more than 4 *storeys* of continuous wood construction, having a timber SFRS consisting of shear walls with wood-based panels, braced frames or moment-resisting frames as defined in Table 4.1.8.9., and whose fundamental lateral period, T_a , is determined in accordance with Clause 4.1.8.11.(3)(d), the design base shear, V_d , shall be taken as the larger value of V_d determined in accordance with Sentence (7) and 100% of V . (See A-4.1.8.10.(4) in Appendix A.)

4.1.8.13. Deflections and Drift Limits

(1) Except as provided in Sentences (5) and (6), lateral deflections of a structure shall be calculated in accordance with the loads and requirements defined in this Subsection.

(2) Lateral deflections obtained from a linear elastic analysis using the methods given in Articles 4.1.8.11. and 4.1.8.12. and incorporating the effects of torsion, including accidental torsional moments, shall be multiplied by $R_d R_o / I_E$ and increased as required by Sentences 4.1.8.10.(6) and 4.1.8.16.(1) to give realistic values of anticipated deflections.

(3) Based on the lateral deflections calculated in Sentences (2), (5) and (6), the largest interstorey deflection at any level shall be limited to 0.01 h_s for *post-disaster buildings*, 0.02 h_s for High Importance Category *buildings*, and 0.025 h_s for all other *buildings*.

(4) The deflections calculated in Sentence (2) shall be used to account for sway effects as required by Sentence 4.1.3.2.(12). (See Appendix A.)

(5) The lateral deflections of a seismically isolated structure shall be calculated in accordance with Article 4.1.8.20.

(6) The lateral deflections of a structure with supplemental energy dissipation shall be calculated in accordance with Article 4.1.8.22.

- (8) At sites where $I_E F_a S_a(0.2)$ is greater than 0.75, the following requirements shall be satisfied:
- (a) *piles*, drilled piers, or caissons shall be designed and detailed to accommodate cyclic inelastic behaviour when the design moment in the element due to earthquake effects is greater than 75% of its moment capacity, and (See Appendix A.)
 - (b) spread footings founded on *soil* defined as Site Class E or F shall be interconnected by continuous ties in no fewer than two directions.
- (9) Each segment of a tie between elements that is required by Clause (6)(a) or (8)(b) shall be designed to carry by tension or compression a horizontal force at least equal to the greatest factored *pile* cap or column vertical load in the elements it connects, multiplied by a factor of 0.10 $I_E F_a S_a(0.2)$, unless it can be demonstrated that equivalent restraints can be provided by other means. (See Appendix A.)
- (10) The potential for liquefaction of the *soil* and its consequences, such as significant ground displacement and loss of *soil* strength and stiffness, shall be evaluated based on the ground motion parameters referenced in Subsection 1.1.2., as modified by Article 4.1.8.4., and shall be taken into account in the design of the structure and its *foundations*. (See Appendix A.)

4.1.8.17. Site Stability

- (1) The potential for slope instability and its consequences, such as slope displacement, shall be evaluated based on site-specific material properties and ground motion parameters referenced in Subsection 1.1.2., as modified by Article 4.1.8.4., and shall be taken into account in the design of the structure and its *foundations*. (See Appendix A.)

4.1.8.18. Elements of Structures, Non-Structural Components and Equipment

(See Appendix A.)

- (1) Except as provided in Sentences (2), (7) and (16), elements and components of *buildings* described in Table 4.1.8.18. and their connections to the structure shall be designed to accommodate the *building* deflections calculated in accordance with Article 4.1.8.13. and the element or component deflections calculated in accordance with Sentence (9), and shall be designed for a lateral force, V_p , applied through the centre of mass of the element or component that is equal to:

$$V_p = 0.3 F_a S_a(0.2) I_E S_p W_p$$

where,

F_a = as defined in Sentence 4.1.8.4.(7),

$S_a(0.2)$ = spectral response acceleration value at 0.2 s, as defined in Sentence 4.1.8.4.(1),

I_E = importance factor for the *building*, as defined in Article 4.1.8.5.,

S_p = $C_p A_r A_x / R_p$ (the maximum value of S_p shall be taken as 4.0 and the minimum value of S_p shall be taken as 0.7), where,

C_p = element or component factor from Table 4.1.8.18.,

A_r = element or component force amplification factor from Table 4.1.8.18.,

A_x = height factor $(1 + 2 h_x / h_n)$,

R_p = element or component response modification factor from Table 4.1.8.18., and

W_p = weight of the component or element.

(2) For *buildings* other than *post-disaster buildings*, seismically isolated *buildings* and *buildings* with supplemental energy dissipation systems, where $I_E F_a S_a(0.2)$ is less than 0.35, the requirements of Sentence (1) need not apply to Categories 6 through 22 of Table 4.1.8.18.

e10 (3) For the purpose of applying Sentence (1) for Categories 11 and 12 of Table 4.1.8.18., elements or components shall be assumed to be flexible or flexibly connected unless it can be shown that the fundamental period of the element or component and its connection is less than or equal to 0.06 s, in which case the element or component is classified as being rigid or rigidly connected.

(4) The weight of access floors shall include the *dead load* of the access floor and the weight of permanent equipment, which shall not be taken as less than 25% of the floor *live load*.

(5) When the mass of a tank plus its contents or the mass of a flexible or flexibly connected piece of machinery, fixture or equipment is greater than 10% of the mass of the supporting floor, the lateral forces shall be determined by rational analysis.

(6) Forces shall be applied in the horizontal direction that results in the most critical loading for design, except for Category 6 of Table 4.1.8.18., where the forces shall be applied up and down vertically.

(7) Connections to the structure of elements and components listed in Table 4.1.8.18. shall be designed to support the component or element for gravity loads, shall conform to the requirements of Sentence (1), and shall also satisfy these additional requirements:

- (a) friction due to gravity loads shall not be considered to provide resistance to seismic forces,
- e10 (b) R_p for non-ductile connections, such as adhesives or power-actuated fasteners, shall be taken as 1.0,
- e10 (c) R_p for anchorage using shallow expansion, chemical, epoxy or cast-in-place anchors shall be 1.5, where shallow anchors are those with a ratio of embedment length to diameter of less than 8,
- (d) power-actuated fasteners and drop-in anchors shall not be used for tension loads,
- (e) connections for non-structural elements or components of Category 1, 2 or 3 of Table 4.1.8.18. attached to the side of a *building* and above the first level above *grade* shall satisfy the following requirements:
 - (i) for connections where the body of the connection is ductile, the body shall be designed for values of C_p , A_r and R_p given in Table 4.1.8.18., and all of the other parts of the connection, such as anchors, welds, bolts and inserts, shall be capable of developing 2.0 times the nominal yield resistance of the body of the connection, and
 - (ii) connections where the body of the connection is not ductile shall be designed for values of $C_p = 2.0$, $R_p = 1.0$ and A_r given in Table 4.1.8.18., and
- (f) a ductile connection is one where the body of the connection is capable of dissipating energy through cyclic inelastic behaviour.

Table 4.1.8.18.
Elements of Structures and Non-Structural Components and Equipment⁽⁴⁾
 Forming Part of Sentences 4.1.8.18.(1), (2), (3), (6) and (7)

Category	Part or Portion of <i>Building</i>	C _p	A _r	R _p
1	All exterior and interior walls except those in Category 2 or 3	1.00	1.00	2.50
2	Cantilever parapet and other cantilever walls except retaining walls	1.00	2.50	2.50
3	Exterior and interior ornamentations and appendages	1.00	2.50	2.50
4	Floors and roofs acting as diaphragms ⁽¹⁾	---	---	---
5	Towers, <i>chimneys</i> , smokestacks and penthouses when connected to or forming part of a <i>building</i>	1.00	2.50	2.50
6	Horizontally cantilevered floors, balconies, beams, etc.	1.00	1.00	2.50
7	Suspended ceilings, light fixtures and other attachments to ceilings with independent vertical support	1.00	1.00	2.50
8	Masonry veneer connections	1.00	1.00	1.50
9	Access floors	1.00	1.00	2.50
10	Masonry or concrete fences more than 1.8 m tall	1.00	1.00	2.50
11	Machinery, fixtures, equipment and tanks (including contents) - that are rigid and rigidly connected	1.00	1.00	1.25
	Machinery, fixtures, equipment and tanks (including contents) - that are flexible or flexibly connected	1.00	2.50	2.50
12	Machinery, fixtures, equipment and tanks (including contents) containing toxic or explosive materials, materials having a <i>flash point</i> below 38°C or firefighting fluids - that are rigid and rigidly connected	1.50	1.00	1.25
	Machinery, fixtures, equipment and tanks (including contents) containing toxic or explosive materials, materials having a <i>flash point</i> below 38°C or firefighting fluids - that are flexible or flexibly connected	1.50	2.50	2.50
13	Flat bottom tanks (including contents) attached directly to a floor at or below <i>grade</i> within a <i>building</i>	0.70	1.00	2.50
14	Flat bottom tanks (including contents) attached directly to a floor at or below <i>grade</i> within a <i>building</i> containing toxic or explosive materials, materials having a <i>flash point</i> below 38°C or firefighting fluids	1.00	1.00	2.50
15	Pipes, ducts (including contents)	1.00	1.00	3.00
16	Pipes, ducts (including contents) containing toxic or explosive materials	1.50	1.00	3.00
17	Electrical cable trays, bus ducts, conduits	1.00	2.50	5.00
18	Rigid components with ductile material and connections	1.00	1.00	2.50
19	Rigid components with non-ductile material or connections	1.00	1.00	1.00
20	Flexible components with ductile material and connections	1.00	2.50	2.50
21	Flexible components with non-ductile material or connections	1.00	2.50	1.00
22	Elevators and Escalators ⁽²⁾ – Machinery and equipment, rigid and rigidly connected	1.00	1.00	1.25
	Elevators and Escalators ⁽²⁾ – Machinery and equipment, flexible or flexibly connected	1.00	2.50	2.50
	Elevators and Escalators ⁽²⁾ – Elevator rails	1.00	1.00	2.50
23	Floor-mounted steel pallet storage racks ⁽³⁾	1.00	2.50	2.50
24	Floor-mounted steel pallet storage racks on which are stored toxic or explosive materials or materials having a <i>flash point</i> below 38°C ⁽³⁾	1.50	2.50	2.50
Column 1	2	3	4	5

Notes to Table 4.1.8.18.:

- (1) See Sentence 4.1.8.18.(8).
- (2) See also ASME A17.1 / CSA B44, "Safety Code for Elevators and Escalators".
- (3) See Sentence 4.1.8.18.(13).
- (4) See Appendix A.

- (8) Floors and roofs acting as diaphragms shall satisfy the requirements for diaphragms stated in Article 4.1.8.15.
- (9) Lateral deflections of elements or components shall be based on the loads defined in Sentence (1) and lateral deflections obtained from an elastic analysis shall be multiplied by R_p/I_E to give realistic values of the anticipated deflections.
- (10) The elements or components shall be designed so as not to transfer to the structure any forces unaccounted for in the design, and rigid elements such as walls or panels shall satisfy the requirements of Sentence 4.1.8.3.(6).
- (11) Seismic restraint for suspended equipment, pipes, ducts, electrical cable trays, etc. shall be designed to meet the force and displacement requirements of this Article and be constructed in a manner that will not subject hanger rods to bending.
- e10 (12) Isolated suspended equipment and components, such as pendent lights, may be designed as a pendulum system provided that adequate chains or cables capable of supporting 2.0 times the weight of the suspended component are provided and the deflection requirements of Sentence (11) are satisfied.
- (13) Free-standing steel pallet storage racks are permitted to be designed to resist earthquake effects using rational analysis, provided the design achieves the minimum performance level required by this Subsection. (See Appendix A.)
- (14) Except as provided in Sentence (15), the relative displacement of glass in glazing systems, D_{fallout} , shall be equal to the greater of,
- 13 mm, or
 - $D_{\text{fallout}} \geq 1.25I_E D_p$,
- where,
- D_{fallout} = relative displacement at which glass fallout occurs, and
- D_p = relative earthquake displacement that the component must be designed to accommodate, calculated in accordance with Article 4.1.8.13. and applied over the height of the glass component.
- (See Appendix A.)
- (15) Glass need not comply with Sentence (14), provided at least one of the following conditions is met:
- $I_E F_a S_a(0.2) < 0.35$,
 - the glass has sufficient clearance from its frame such that $D_{\text{clear}} \geq 1.25 D_p$ calculated as follows:
- $$D_{\text{clear}} = 2C_1(1 + h_p C_2 / (b_p C_1))$$
- where,
- D_{clear} = relative horizontal displacement measured over the height of the glass panel, which causes initial glass-to-frame contact,
- C_1 = average of the clearances on both sides between the vertical glass edges and the frame,
- h_p = height of the rectangular glass panel,
- C_2 = average of the top and bottom clearances between the horizontal glass edges and the frame, and
- b_p = width of the rectangular glass panel,
- the glass is fully tempered, monolithic, installed in a *building* that is not a *post-disaster building*, and no part of the glass is located more than 3 m above a walking surface, or
 - the glass is annealed or heat-strengthened laminated glass in a single thickness with an interlayer no less than 0.76 mm and captured mechanically in a wall system glazing pocket with the perimeter secured to the frame by a wet, glazed, gunable, curing, elastomeric sealant perimeter bead of 13 mm minimum glass contact width.
- (See Appendix Note A-4.1.8.18.(14))

- (16) For a structure with supplemental energy dissipation, the following criteria shall apply:
- (a) the value of $S_a(0.2)$ used in Sentence (1) shall be determined from the mean 5% damped floor spectral acceleration values at 0.2 s by averaging the individual 5% damped floor spectra at the base of the structure determined using Non-Linear Dynamic Analysis, and
 - (b) the value of F_a used in Sentence (1) shall be 1.

4.1.8.19. Seismic Isolation

- (1) For the purposes of this Article and Article 4.1.8.20., the following terms shall have the meaning stated herein:
- (a) “seismic isolation” is an alternative seismic design concept that consists of installing an isolation system with low horizontal stiffness, thereby substantially increasing the fundamental period of the structure,
 - (b) “isolation system” is a collection of structural elements at the level of the isolation interface that includes all individual isolator units, all structural elements that transfer force between elements of the isolation system, all connections to other structural elements, and may also include a wind-restraint system, energy-dissipation devices, and a displacement restraint system,
 - (c) “seismically isolated structure” includes the upper portion of the structure above the isolation system, the isolation system, and the portion of the structure below the isolation system,
 - (d) “isolator unit” is a structural element of the isolation system that permits large lateral deformations under lateral earthquake design forces and is characterized by vertical-load-carrying capability combined with increased horizontal flexibility and high vertical stiffness, energy dissipation (hysteretic or viscous), self-centering capability, and lateral restraint (sufficient elastic stiffness) under non-seismic service lateral loads,
 - (e) “isolation interface” is the boundary between the isolated upper portion of the structure above the isolation system and the lower portion of the structure below the isolation system, and
 - (f) “wind-restraint system” is the collection of structural elements of the isolation system that provides restraint of the seismically isolated structure for wind loads and is permitted to be either an integral part of the isolator units or a separate device.
- (2) Every seismically isolated structure and every portion thereof shall be analyzed and designed in accordance with,
- (a) the loads and requirements prescribed in this Article and Article 4.1.8.20.,
 - (b) other applicable requirements of this Subsection, and
 - (c) appropriate engineering principles and current engineering practice.
- (See Appendix A.)

- e10 (3) For the analysis and modeling of the seismically isolated structure, the following criteria shall apply:
- (a) three-dimensional Non-Linear Dynamic Analysis of the structure shall be performed in accordance with Article 4.1.8.12, (See Appendix A.)
 - (b) unless verified from rational analysis, the inherent equivalent viscous damping — excluding the hysteretic damping provided by the isolation system or supplemental energy dissipation devices — used in the analysis shall not be taken as more than 2.5% of the critical damping at the significant modes of vibration,
 - (c) all individual isolator units shall be modeled with sufficient detail to account for their non-linear force-deformation characteristics, including effects of the relevant loads, and with consideration of variations in material properties over the design life of the structure, and
 - (d) except for elements of the isolation system, other components of the seismically isolated structure shall be modeled using elastic material properties in accordance with Sentence 4.1.8.3.(8).
- (4) The ground motion histories used in Sentence (3) shall be,
- (a) appropriately selected and scaled following good engineering practice,
 - (b) compatible with,
 - (i) a response spectrum derived from the design spectral acceleration values, $S(T)$, defined in Sentence 4.1.8.4.(9) for ground conditions of Site Classes A, B and C, and
 - (ii) a 5% damped response spectrum based on a site-specific evaluation for ground conditions of Site Classes D, E and F, and

- (c) amplitude-scaled in an appropriate manner over the period range of $0.2 T_1$ to $1.5 T_1$, where T_1 is the period of the isolated structure determined using the post-yield stiffness of the isolation system in the horizontal direction under consideration, or the period specified in Sentence 4.1.8.20.(1) if the post-yield stiffness of the isolation system is not well defined.

(See Appendix A.)

4.1.8.20. Seismic Isolation Design Provisions

- (1) The period of the isolated structure, determined using the post-yield stiffness of the isolation system in the horizontal direction under consideration, shall be greater than three times the period of the structure above the isolation interface calculated as a fixed base.
- (2) The isolation system shall be configured to produce a restoring force such that the lateral force at the TDD at the centre of mass of the isolated structure above the isolation interface is at least $0.025W_b$ greater than the lateral force at 50% of the TDD at the same location, in each horizontal direction, where W_b is the portion of W above the isolation interface.
- (3) The values of *storey* shears, *storey* forces, member forces, and deflections used in the design of all structural framing elements and components of the isolation system shall be obtained from analysis conforming to Sentence 4.1.8.19.(3) using one of the following values, whichever produces the most critical effect:
- mean plus I_E times the standard deviation of the results of all Non-Linear Dynamic Analyses, or
 - $\sqrt{I_E}$ times the mean of the results of all Non-Linear Dynamic Analyses.
- (4) The force-deformation and damping characteristics of the isolation system used in the analysis and design of the seismically isolated structures shall be validated by testing at least two full-size specimens of each predominant type and size of isolator unit of the isolation system, which shall include,
- the individual isolator units,
 - separate supplemental damping devices, if used, and
 - separate sacrificial wind-restraint systems, if used.
- (5) The force-deformation characteristics and damping value of a representative sample of the isolator units installed in the *building* shall be validated by tests prior to their installation.
- (6) A diaphragm or horizontal structural elements shall provide continuity immediately above the isolation interface to transmit forces due to non-uniform ground motions from one part of the structure to another.
- (7) All structural framing elements shall be designed for the forces described in Sentence (3) with $R_d R_o = 1.0$, except,
- for structures with $I_E < 1.5$, all the SFRS shall be detailed in accordance with the requirements for $R_d \geq 1.5$ and the applicable referenced design standards, and
 - for structures with $I_E = 1.5$, all the SFRS shall be detailed in accordance with the requirements for $R_d \geq 2.0$ and the applicable referenced design standards.
- (8) The height restrictions noted in Table 4.1.8.9. need not apply to seismically isolated structures.
- (9) All isolator units shall be,
- designed for the forces described in Sentence (3), and
 - able to accommodate the TDD determined at the specific location of each isolator unit.
- (10) The isolation system, including a separate wind-restraint system if used, shall limit lateral displacement due to wind loads across the isolation interface to a value equal to that required for the least *storey* height in accordance with Sentence 4.1.3.5.(3).

4.3.6. Glass

4.3.6.1. Design Basis for Glass

- r11.1 (1) Glass used in *buildings* shall be designed in conformance with,
- (a) CAN/CGSB-12.20-M, “Structural Design of Glass for Buildings”, using an adjustment factor on the wind load, W , of not less than 0.75, or
 - (b) ASTM E1300, “Determining Load Resistance of Glass in Buildings”, using an adjustment factor on the wind load, W , of not less than 1.0.
- (See Appendix A.)

Section 4.4. Design Requirements for Special Structures

4.4.1. Air-Supported Structures

4.4.1.1. Design Basis for Air-Supported Structures

- r11.1 (1) The structural design of *air-supported structures* shall conform to CSA S367, “Air-, Cable-, and Frame-Supported Membrane Structures” using the loads stipulated in Section 4.1., in accordance with limit states design in Subsection 4.1.3.

4.4.2. Parking Structures

r11.1 4.4.2.1. Design Basis for Storage Garages and Repair Garages

e10

- (1) *Storage garages* and *repair garages* shall be designed in conformance with CSA S413, “Parking Structures”. (See Appendix A.)

4.4.3. Guards Over Retaining Walls

4.4.3.1. Guards Over Retaining Walls

- (1) Every retaining wall that is designated in Sentence 1.3.1.1.(1) of Division A shall be protected by *guards* on all open sides where the public has access to open space at the top of the retaining wall.

4.4.4. Anchor Systems on Building Exterior

4.4.4.1. Anchor Systems on Building Exterior

- (1) Where suspended maintenance and window cleaning operations are intended to be carried out on the exterior of a *building* described in Article 1.1.2.2. of Division A, anchor systems shall be provided where any portion of the roof is more than 8 m above adjacent ground level.
- (2) Except as provided in Sentence (3), the anchor systems in Sentence (1) shall be designed, installed and tested in conformance with CAN/CSA-Z91, “Health and Safety Code for Suspended Equipment Operations”.
- (3) Other anchor systems may be used where such systems provide an equal level of safety.

- r11.1 (4) The anchor system material shall be made of stainless steel, or other corrosion resistant base material, or from steel that is hot dipped galvanized, in accordance with CAN/CSA-G164-M, “Hot Dip Galvanizing of Irregularly Shaped Articles”.

4.4.5. Manure Storage Tanks

4.4.5.1. Liquid Manure Storage Tanks

- (1) *Liquid manure* storage tanks shall be constructed of steel, reinforced concrete or prestressed concrete.
- (2) *Liquid manure* storage tank walls, bases and appurtenances, including piping for the conveyance of *liquid manure* and associated connections and joints, shall be designed and constructed to prevent leakage of contents.
- (3) Concrete for *liquid manure* storage tanks shall,
 - (a) be made from HS or HSb cement,
 - (b) have a 28-day strength of at least 32 MPa, and
 - (c) have a water/cement materials ratio of not more than 0.45.
- (4) *Liquid manure* storage tanks shall be placed on undisturbed *soil* free of any organic, deleterious and extraneous materials and capable of supporting the superimposed design loads from the tanks.
- (5) Where granular *fills* are used between the bases of *liquid manure* storage tanks and the undisturbed *soil*, the granular *fills* shall be compacted to a Standard Proctor density of not less than 95%.

- (4) Where rooms with different requirements for window glass area are combined as described in Sentence 9.5.1.4.(1), the more restrictive requirement shall govern

9.7.3. Performance of Windows, Doors and Skylights

9.7.3.1. General Performance Criteria

- (1) Except as provided in Sentences (2) to (4), windows, doors and skylights and their components separating *conditioned space* from unconditioned space or the exterior shall be designed, constructed and installed so that, when in the closed position, they,
- e10 (a) resist the ingress of precipitation into interior space, (See Appendix Note A-9.7.4.2.(1))
- (b) resist wind loads,
- (c) control air leakage,
- (d) resist the ingress of insects and vermin,
- (e) where required, resist forced entry, and
- (f) are easily operable, unless they are fixed units.
- (2) Skylights and their components shall be designed, constructed and installed so that, when in the closed position, they resist snow loads.
- (3) Main entrance doors and their components shall be designed, constructed and installed so that, when in the closed position, they,
- (a) control air leakage,
- (b) resist the ingress of insects and vermin,
- (c) resist forced entry, and
- (d) are easily operable.
- r3 (4) Storm doors, sliding doors and their components shall be designed, constructed and installed so that, when in the closed position, they,
- (a) resist wind loads,
- (b) control air leakage to a minimum allowable 5 m³h/m and a maximum allowable 8.35 m³h/m,
- (c) resist the ingress of insects and vermin, and
- (d) are easily operable.
- (5) Compliance with the performance requirements described in Sentences (1) to (4) shall be demonstrated by,
- (a) compliance with the requirements in,
- (i) Subsection 9.7.4. or 9.7.5., and
- (ii) Subsection 9.7.6., or
- (b) design and construction conforming to Part 5.

9.7.3.2. Heat Transfer Performance

- (1) Windows, doors and skylights described in Clause 9.7.1.1.(1)(a) and their components shall be designed, constructed and installed to,
- (a) minimize surface condensation on the warm side of the component, and (See Appendix A.)
- (b) ensure comfortable conditions for the occupants.
- (2) Compliance with the heat transfer performance requirements described in Sentence (1) shall be demonstrated by,
- (a) compliance with the requirements in Article 9.7.3.3., or
- (b) design and construction conforming to Part 5.

9.7.3.3. Thermal Characteristics of Windows, Doors and Skylights

- (1) Except as permitted in Sentence (2), metal frames and sash of windows, doors and skylights shall incorporate a thermal break.
- (2) Windows and doors described in Sentence (1) do not require a thermal break where they are installed as,
- vehicular access doors,
 - storm windows and doors, or
 - windows and doors that are required to have a *fire-resistance rating*.
- (3) Windows, doors and skylights, with or without storm doors or sash, that are installed in *buildings* where the intended use of the interior space will not result in high moisture generation shall have a maximum thermal transmittance (U-value) or minimum temperature index (I) in accordance with Table 9.7.3.3.
- e10 (4) Windows, doors and skylights, with or without storm doors or sash, that are installed in portions of *buildings* where the intended use of the interior space will result in high moisture generation shall be designed in conformance with Subsection 5.3. (See Appendix Note A-9.25.5.2.)

Table 9.7.3.3.
Maximum U-value or Minimum Temperature Index (I) for Windows, Doors and Skylights⁽¹⁾⁽²⁾⁽³⁾
 Forming Part of Sentence 9.7.3.3.(3)

Component	2.5% January Design Temperature			
	Between -15°C and -30°C		Colder than -30°C	
	max. U-value, W/m ² K	min. I	max. U-value, W/m ² K	min. I
Windows and Doors	2.0	68	1.7	77
Skylights	3.0	(2)	2.7	(2)
Column 1	2	3	4	5

Notes to Table 9.7.3.3.:

- r11.1 (1) U-values for specific products can be determined according to measures referenced in AAMA/WDMA/CSA 101/I.S.2/A440, "NAFS - North American Fenestration Standard/Specification for Windows, Doors, and Skylights". Temperature index (I) is determined according to the physical test procedure given in CSA A440.2/A440.3, "Fenestration Energy Performance/User Guide to CSA A440.2-14, Fenestration Energy Performance".
- (2) There is no appropriate test procedure available for testing the condensation resistance of sloped glazing.
- r6 (3) Where the U-value in this Table differs from the U-value provided in MMA Supplementary Standard SB-10, "Energy Efficiency Requirements" or MMA Supplementary Standard SB-12, "Energy Efficiency for Housing", the most restrictive U-value shall apply.

9.15.5.2. Support of Beams

- e10 (1) Not less than a 190 mm depth of *solid masonry* shall be provided beneath beams supported on masonry.
- (2) Where the beam referred to in Sentence (1) is supported below the top of the *foundation* walls, the ends of such beams shall be protected from the weather.

9.15.5.3. Pilasters

- (1) Pilasters shall be provided under beams that frame into unit masonry *foundation* walls 140 mm or less in thickness.
- (2) Pilasters required in Sentence (1) shall be not less than 90 mm by 290 mm and shall be bonded or tied into the wall.
- r11.1 (3) The top 200 mm of pilasters required in Sentence (1) shall be *solid masonry* with the cells of hollow or semi-solid units filled with mortar, grout or concrete.

9.15.6. Parging and Finishing of Foundation Walls

9.15.6.1. Foundation Walls Below Ground

- (1) Concrete block *foundation* walls shall be parged on the exterior face below ground level as required in Section 9.13.

9.15.6.2. Foundation Walls Above Ground

- (1) Exterior surfaces of concrete block *foundation* walls above ground level shall have tooled joints, or shall be rendered, parged or otherwise suitably finished.

9.15.6.3. Form Ties

- (1) All form ties shall be removed at least flush with the concrete surface.

Section 9.16. Floors-on-Ground

9.16.1. Scope

9.16.1.1. Application

- (1) This Section applies to floors that are supported on ground or granular *fill* and that do not provide structural support for the superstructure.

9.16.1.2. Structural Floor Slabs

- (1) Floors-on-ground that support loads from the superstructure shall be designed in conformance with Part 4.

9.16.1.3. Required Floors-on-Ground

- (1) All spaces within *dwelling units*, except crawl spaces, shall be provided with a floor-on-ground, where,
 - (a) access is provided to the space, and
 - (b) a floor supported by the structure is not provided.

9.16.1.4. Dampproofing and Waterproofing

- (1) Dampproofing and waterproofing shall conform to Section 9.13.

9.16.2. Material Beneath Floors

9.16.2.1. Required Installation of Granular Fill

- (1) Except as provided in Sentence (2), not less than 100 mm of coarse clean granular material containing not more than 10% of material that will pass a 4 mm sieve shall be placed beneath floors-on-ground.
- (2) Granular material need not be installed under,
 - (a) slabs in garages, carports or accessory *buildings*, or
 - (b) *buildings* of *industrial occupancy* where the nature of the process contained in the *occupancy* permits or requires the use of large openings in the *building* envelope even during the winter.

9.16.2.2. Support of Floors

- (1) Material that is susceptible to changes in volume due to variations in moisture content or chemical-microbiological oxidation shall not be used as *fill* beneath floors-on-ground in a concentration that will damage the *building* to a degree that would adversely affect its stability or the performance of assemblies separating dissimilar environments.
- (2) Material that is susceptible to changes in volume due to freezing shall not be used as *fill* beneath floors-on-ground that will be subjected to freezing temperatures.
- (3) Except as provided in Sentence (4), *fill* beneath floors-on-ground shall be compacted.
- (4) *Fill* beneath floors-on-ground need not be compacted where the material is clean coarse aggregate containing not more than 10% of material that will pass a 4 mm sieve.

9.16.3. Drainage

9.16.3.1. Control of Water Ingress

- (1) Except as provided in Article 9.16.3.2. or where it can be shown to be unnecessary, ingress of water underneath a floor-on-ground shall be prevented by grading or drainage.

9.16.3.2. Hydrostatic Pressure

- (1) Where *groundwater* levels may cause hydrostatic pressure beneath a floor-on-ground, the floor-on-ground shall be,
 - (a) a cast-in-place concrete slab, and
 - (b) designed to resist such pressures.

9.16.3.3. Floor Drains

- (1) When floor drains are required, the floor surface shall be sloped so that no water can accumulate.

9.16.4. Concrete

9.16.4.1. Surface Finish

- (1) The finished surface of concrete floor slabs shall be trowelled smooth and even.
- (2) Dry cement shall not be added to the floor surfaces to absorb surplus water.

9.16.4.2. Topping Course

- (1) Where a topping course is provided for a concrete floor slab, it shall consist of 1 part cement to 2.5 parts clean, well graded sand by volume, with a water/cement ratio approximately equal to that of the base slab.
- (2) When concrete topping is provided it shall not be less than 20 mm thick.

9.16.4.3. Thickness

- (1) Concrete slabs shall be not less than 75 mm thick exclusive of concrete topping. (See Appendix A.)

9.16.4.4. Bond Break

- (1) A bond-breaking material shall be placed between the slab and footings or *rock*.

9.16.4.5. Compressive Strength

- (1) Where dampproofing is not provided, the concrete used for floors-on-ground shall have a compressive strength of not less than 25 MPa after 28 days.
- e10 (2) Where dampproofing is provided as described in Article 9.13.2.2., the concrete used for floors-on-ground shall have a compressive strength of not less than 15 MPa after 28 days.

9.16.5. Wood

9.16.5.1. Wood Frame Floors

- r11.1 (1) Floors-on-ground constructed of wood shall conform to CSA S406, "Permanent Wood Foundations for Housing and Small Buildings".

Section 9.17. Columns

9.17.1. Scope

9.17.1.1. Application

- (1) This Section applies to columns used to support,
 - (a) beams carrying loads from not more than 2 wood frame floors where,
 - (i) the supported length of joists bearing on such beams does not exceed 5 m, and
 - (ii) the *live load* on any floor does not exceed 2.4 kPa,
 - (b) beams or header joists carrying loads from not more than 2 levels of wood frame balconies, decks or other accessible exterior platforms, or 1 level and the roof, where,
 - (i) the supported length of joists bearing on such beams or joists does not exceed 5 m,
 - (ii) the sum of the specified snow load and the load due to use and *occupancy* does not exceed 4.8 kPa, and
 - (iii) the platform serves only a single *suite of residential occupancy*, or
 - (c) carport roofs.
- (2) Columns for applications other than as described in Sentence (1) shall be designed in accordance with Part 4.

9.17.2. General

9.17.2.1. Location

- (1) Columns shall be centrally located on a footing conforming to Section 9.15.

9.17.2.2. Lateral Support

- (1) Columns shall be securely fastened to the supported member to reduce the likelihood of lateral differential movement between the column and the supported member.
- (2) Except as permitted by Sentence (3), columns shall be laterally supported,
 - (a) directly, or
 - (b) by connection to the supported members.(See Appendix A.)
- (3) Columns need not be provided with lateral support as described in Sentence (2) where,
 - (a) the length of the columns are not more than 600 mm measured from the finished ground to the underside of the supported member, and
 - (b) the columns support a deck with no superstructure.

9.20.8.2. Cavity Walls Supporting Framing Members

- r11.1 (1) Floor joists supported on *cavity walls* shall be supported on *solid masonry units* not less than 57 mm high.
- (2) Floor joists described in Sentence (1) shall not project into the cavity.
- (3) Roof and ceiling framing members bearing on *cavity walls* shall be supported on,
- r11.1 (a) *solid masonry units* not less than 57 mm high, bridging the full thickness of the wall, or
- (b) a wood plate not less than 38 mm thick, bearing not less than 50 mm on each wythe.

9.20.8.3. Bearing of Beams and Joists

- (1) The bearing area under beams and joists shall be sufficient to carry the supported load.
- (2) In no case shall the minimum length of end bearing of beams supported on masonry be less than 90 mm.
- (3) The length of end bearing of floor, roof or ceiling joists supported on masonry shall be not less than 40 mm.

9.20.8.4. Support of Beams and Columns

- (1) Beams and columns supported on masonry walls shall be supported on pilasters where the thickness of the masonry wall or wythe is less than 190 mm.
- (2) Not less than 190 mm depth of solid masonry or concrete shall be provided under the beam or column referred to in Sentence (1).
- (3) Pilasters required in Sentence (1) shall be bonded or tied to masonry walls.
- (4) Concrete pilasters required in Sentence (1) shall be not less than 50 mm by 300 mm.
- (5) Unit masonry pilasters required in Sentence (1) shall be not less than 100 mm by 290 mm.

r11.1 9.20.8.5. Projection of Masonry Veneer Beyond Supporting Members

- (1) Masonry veneer of *solid masonry units* resting on a bearing support shall not project more than one-third of the thickness of the veneer. (See Appendix A.)
- (2) Where the masonry veneer described in Sentence (1) is rough stone masonry,
- (a) the projection shall be measured as the average projection of the units, and
- (b) the thickness of the veneer shall be measured as the average thickness of the veneer.

9.20.9. Bonding and Tying

9.20.9.1. Joints to be Offset or Reinforced

- (1) Vertical joints in adjacent masonry courses shall be offset unless each wythe of masonry is reinforced with the equivalent of no fewer than two corrosion-resistant steel bars of 3.76 mm diam placed in the horizontal joints at vertical intervals not exceeding 460 mm.
- (2) Where joints in the reinforcing referred to in Sentence (1) occur, the bars shall be lapped not less than 150 mm.

9.20.9.2. Bonding or Tying of Other Than Masonry Veneer

- e10 (1) Except as provided in Article 9.20.9.5 for masonry veneer, masonry walls that consist of two or more wythes shall have the wythes bonded or tied together with masonry bonding units as described in Article 9.20.9.3. or with metal ties as described in Article 9.20.9.4.

9.20.9.3. Bonding

- (1) Where wythes are bonded together with masonry units, the bonding units shall comprise not less than 4 percent of the wall surface area.
- (2) Bonding units described in Sentence (1) shall be spaced not more than 600 mm vertically and horizontally in the case of brick masonry and 900 mm o.c. in the case of block or tile.
- (3) Units described in Sentence (1) shall extend not less than 90 mm into adjacent wythes.

9.20.9.4. Tying

- (1) Where two or more wythes are tied together with metal ties of the individual rod type, the ties shall conform to the requirements in Sentences (3) to (6).
- (2) Other ties may be used where it can be shown that such ties provide walls that are at least as strong and as durable as those made with the individual rod type.
- (3) Metal ties of the individual rod type shall,
 - (a) be corrosion-resistant,
 - (b) have a minimum cross-sectional area of not less than 17.8 mm², and
 - (c) have not less than a 50 mm portion bent at right angles at each end.
- (4) Metal ties of the individual rod type shall,
 - (a) extend from within 25 mm of the outer face of the wall to within 25 mm of the inner face of the wall,
 - (b) be completely embedded in mortar except for the portion exposed in *cavity walls*, and
 - (c) be staggered from course to course.
- (5) Where two or more wythes in walls other than *cavity walls* and masonry veneer/masonry back-up walls are tied together with metal ties of the individual rod type, the space between wythes shall be completely filled with mortar.
- (6) Ties described in Sentence (5) shall be,
 - (a) located within 300 mm of openings and spaced not more than 900 mm apart around openings, and
 - (b) spaced not more than 900 mm apart horizontally and 460 mm apart vertically at other locations.
- (7) Except as required in Sentences (8) and (9), where the inner and outer wythes of *cavity walls* are tied with individual wire ties, the ties shall be spaced not more than 900 mm apart horizontally and 400 mm apart vertically.
- (8) Within 100 mm of the bottom of each floor or roof assembly where the cavity extends below the assemblies, the ties described in Sentence (7) shall be spaced not more than 600 mm apart horizontally.
- (9) Within 300 mm of any openings, the ties described in Sentence (7) shall be spaced not more than 900 mm apart.

9.20.9.5. Ties for Masonry Veneer

- (1) Masonry veneer 70 mm or more in thickness and resting on a bearing support shall be tied to masonry back-up or to wood framing members with straps that are,
 - (a) corrosion-resistant,

- (b) not less than 0.76 mm thick,
- (c) not less than 22 mm wide,
- (d) shaped to provide a key with the mortar, and
- (e) spaced in accordance with Table 9.20.9.5.

R11.1

Table 9.20.9.5.
Veneer Tie Spacing
Forming Part of Sentence 9.20.9.5.(1)

Maximum Vertical Spacing, mm	Maximum Horizontal Spacing, mm
406	813
508	610
610	406
Column 1	2

- (2) The straps described in Sentence (1) that are fastened to the wood framing members shall be,
 - (a) bent at a right angle within 6 mm from the fastener, and
 - (b) fastened with corrosion resistant 3.18 mm diam screws or spiral nails having a wood penetration of not less than 30 mm.
- (3) Masonry veneer individually supported by masonry or wood frame back-up shall be secured to the back-up in conformance with Subsection 4.3.2.
- (4) The straps described in Sentence (1) may be installed against one of the sheathings listed in Table 9.23.16.2.A. provided that,
 - (a) the tie is in contact with the exterior surface of the sheathing, and
 - (b) the sheathing beneath the tie is not compressed.

9.20.9.6. Reinforcing for Glass Block

- (1) Glass block shall have horizontal joint reinforcement of two corrosion-resistant bars of not less than 3.76 mm diam or expanded metal strips not less than 75 mm wide,
 - (a) spaced at vertical intervals of not more than 600 mm for units 190 mm or less in height, and
 - (b) installed in every horizontal joint for units higher than 190 mm.
- (2) Reinforcement required in Sentence (1) shall be lapped not less than 150 mm.

9.20.10. Lateral Support

9.20.10.1. Lateral Support Required

- (1) Masonry walls shall be laterally supported by floor or roof construction or by intersecting masonry walls or buttresses.
- (2) The spacing of supports required in Sentence (1) shall be not more than,
 - (a) 20 times the wall thickness for all *loadbearing* walls and exterior non-*loadbearing* walls, and
 - (b) 36 times the wall thickness for interior non-*loadbearing* walls.
- (3) In applying Sentence (2), the thickness of *cavity walls* shall be taken as the greater of,
 - (a) two-thirds of the sum of the thicknesses of the wythes, or
 - (b) the thickness of the thicker wythe.

(4) Floor and roof structural elements providing lateral support for walls as required in Sentence (1) shall be constructed to transfer lateral loads to walls or buttresses approximately at right angles to the laterally supported walls.

9.20.11. Anchorage of Roofs, Floors and Intersecting Walls

9.20.11.1. Anchorage of Floor or Roof Assemblies

(1) Where required to receive lateral support, masonry walls shall be anchored to each floor or roof assembly at maximum intervals of 2 m, except that anchorage of floor joists not more than 1 m above grade may be omitted.

(2) Anchors required in Sentence (1) shall be corrosion-resistant and be not less than the equivalent of 40 mm by 4.76 mm thick steel straps.

(3) Anchors required in Sentence (1) shall be shaped to provide a mechanical key with the masonry and shall be securely fastened to the horizontal support to develop the full strength of the anchor.

(4) When joists are parallel to the wall, anchors required in Sentence (1) shall extend across no fewer than three joists.

9.20.11.2. Bonding and Tying of Intersecting Walls

(1) Where required to provide lateral support, intersecting walls shall be bonded or tied together.

(2) Where bonding is used to satisfy the requirements of Sentence (1), 50% of the adjacent masonry units in the intersecting wall, distributed uniformly over the height of the intersection, shall be embedded in the laterally supported wall.

(3) Where tying is used to satisfy the requirements of Sentence (1), the ties shall be,

- (a) corrosion-resistant metal,
- (b) equivalent to not less than 4.76 mm by 40 mm steel strapping,
- (c) spaced not more than 800 mm o.c. vertically, and
- (d) shaped at both ends to provide sufficient mechanical key to develop the strength of the ties.

9.20.11.3. Wood Frame Walls Intersecting Masonry Walls

(1) Wood frame walls shall be tied to intersecting masonry walls with not less than 4.76 mm diam corrosion-resistant steel rods spaced not more than 900 mm o.c. vertically.

(2) Ties required in Sentence (1) shall be anchored to the wood framing at one end and shaped to provide a mechanical key at the other end to develop the strength of the tie.

9.20.11.4. Wood Frame Roof Systems

(1) Except as permitted in Sentence (2), roof systems of wood frame construction shall be tied to exterior masonry walls by not less than 12.7 mm diam anchor bolts,

- (a) spaced not more than 2.4 m apart,
- (b) embedded not less than 90 mm into the masonry, and
- (c) fastened to a rafter plate of not less than 38 mm thick lumber.

(2) The roof system described in Sentence (1) is permitted to be anchored by nailing the wall furring strips to the side of the rafter plate.

9.23.8.2. Priming of Steel Beams

- (1) Exterior steel beams susceptible to corrosion shall be shop primed with rust-inhibitive paint.

9.23.8.3. Built-up Wood Beams (See Appendix A.)

- (1) Where a beam is made up of individual pieces of lumber that are nailed together, the individual members shall be 38 mm or greater in thickness and installed on edge.
- (2) Except as permitted in Sentence (3), where individual members of a built-up beam are butted together to form a joint, the joint shall occur over a support.
- (3) Where a beam is continuous over more than one span, individual members are permitted to be butted together to form a joint at or within 150 mm of the end quarter points of the clear spans, provided the quarter points are not those closest to the ends of the beam.
- e10 (4) Members joined at quarter points shall be continuous over adjacent supports.
- (5) Joints in individual members of a beam that are located at or near the end quarter points shall not occur in adjacent members at the same quarter point and shall not reduce the effective beam width by more than half.
- (6) Not more than one butt joint shall occur in any individual member of a built-up beam within any one span.
- (7) Except as provided in Sentence (8), where 38 mm members are laid on edge to form a built-up beam, individual members shall be nailed together with a double row of nails not less than 89 mm in length, spaced not more than 450 mm apart in each row with the end nails located 100 mm to 150 mm from the end of each piece.
- (8) Where 38 mm members in built-up wood beams are not nailed together as provided in Sentence (7), they shall be bolted together with not less than 12.7 mm diam bolts equipped with washers and spaced not more than 1.2 m o.c., with the end bolts located not more than 600 mm from the ends of the members.

9.23.9. Floor Joists

9.23.9.1. End Bearing for Joists

- (1) Except when supported on ribbon boards, floor joists shall have not less than 38 mm length of end bearing.
- (2) Ribbon boards referred to in Sentence (1) shall be not less than 19 mm by 89 mm lumber let into the studs.

9.23.9.2. Joists Supported by Beams

- (1) Floor joists may be supported on the tops of beams or may be framed into the sides of beams.
- (2) When framed into the side of a wood beam, joists referred to in Sentence (1) shall be supported on,
 - (a) joist hangers or other acceptable mechanical connectors, or
 - (b) not less than 38 mm by 64 mm ledger strips nailed to the side of the beam, except that 38 mm by 38 mm ledger strips may be used provided each joist is nailed to the beam by at least four 89 mm nails, in addition to the nailing for the ledger strip required in Table 9.23.3.4.
- (3) When framed into the side of a steel beam, joists referred to in Sentence (1) shall be supported on the bottom flange of the beam or on not less than 38 mm by 38 mm lumber bolted to the web with not less than 6.3 mm diam bolts spaced not more than 600 mm apart.

(4) Joists referred to in Sentence (3) shall be spliced above the beam with not less than 38 mm by 38 mm lumber at least 600 mm long to support the flooring.

(5) Not less than a 12 mm space shall be provided between the splice required in Sentence (4) and the beam to allow for shrinkage of the wood joists.

9.23.9.3. Restraint of Joist Bottoms

(1) Except as provided in Sentence 9.23.9.4.(1), bottoms of floor joists shall be restrained from twisting at each end by toe-nailing to the supports, end-nailing to the header joists or by providing continuous strapping, blocking between the joists or cross-bridging near the supports.

9.23.9.4. Strapping and Bridging in Tables A-1 and A-2

(1) Except as permitted by Sentence (5), where strapping is specified in Table A-1, it shall be,

- (a) not less than 19 mm by 64 mm, nailed to the underside of floor joists,
- (b) located not more than 2.1 m from each support or other rows of strapping, and
- (c) fastened at each end to a sill or header.

(2) Where bridging is specified in Table A-1, it shall consist of not less than 19 mm by 64 mm or 38 mm by 38 mm cross bridging located not more than 2.1 m from each support or other rows of bridging.

(3) Where bridging and strapping are specified in Table A-1,

- (a) bridging shall,
 - (i) comply with Sentence (2), or
 - (ii) consist of 38 mm solid blocking located not more than 2.1 m from each support or other rows of bridging and securely fastened between the joists, and
- (b) except as provided in Sentence (5), strapping shall comply with Sentence (1) and be installed under the bridging.

(4) Bridging specified in Table A-2 shall consist of,

- (a) bridging as described in Sentence (2), or
- (b) 38 mm solid blocking located not more than 2.1 m from each support or other rows of bridging and securely fastened between the joists.

(5) Strapping described in Sentence (1) and Clause (3)(b) is not required where,

- (a) furring strips complying with Table 9.29.3.1. are fastened directly to the joists, or
- (b) a panel-type ceiling finish complying with Subsection 9.29.5., 9.29.6., 9.29.7., 9.29.8., or 9.29.9. is attached directly to the joists.

(6) Where a ceiling attached to wood furring is specified in Table A-2,

- (a) the ceiling finish shall consist of gypsum board, plywood or OSB not less than 12.7 mm thick, and
- (b) the furring shall be,
 - (i) 19 mm by 89 mm wood furring spaced at not more than 610 mm o.c., or
 - (ii) 19 mm by 64 mm wood furring spaced at not more than 406 mm o.c.

9.23.9.5. Header Joists

(1) Header joists around floor openings shall be doubled when they exceed 1.2 m in length.

(2) The size of header joists exceeding 3.2 m in length shall be determined by calculations.

Table 9.23.13.11.
Maximum Roof Truss Deflections
 Forming Part of Sentence 9.23.13.11.(1)

Truss Span	Type of Ceiling	Maximum Deflection
4.3 m or less	Plaster or gypsum board	1/360 of the span
	Other than plaster or gypsum board	1/180 of the span
Over 4.3 m	Plaster or gypsum board	1/360 of the span
	Other than plaster or gypsum board	1/240 of the span
Column 1	2	3

(2) The joint connections used in trusses described in Sentence (1) shall be designed in conformance with the requirements in Subsection 4.3.1. (See Appendix A.)

(3) Where the length of compression web members in roof trusses described in Sentence (1) exceeds 1.83 m, such web members shall be provided with continuous bracing to prevent buckling.

(4) Bracing required in Sentence (3) shall consist of not less than 19 mm by 89 mm lumber nailed at right angles to the web members near their centres with at least two 63 mm nails for each member.

e10 (5) Where the ability of a truss design to satisfy the requirements of Sentence (1) is demonstrated by testing, it shall consist of a full scale load test carried out in conformance with CSA S307-M, “Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings”.

r11.1 (6) Where the ability of a truss design to satisfy the requirements of Sentence (1) is demonstrated by analysis, it shall be carried out in accordance with good engineering practice such as described in TPIC, “Truss Design Procedures and Specifications for Light Metal Plate Connected Wood Trusses”.

9.23.14. Subflooring

9.23.14.1. Subflooring Required

(1) Subflooring shall be provided beneath finish flooring where the finish flooring does not have adequate strength to support the design loads.

9.23.14.2. Material Standards

- r3 (1) Except as provided in Sentence (2), wood-based panels for subfloors shall conform to,
- (a) CSA O121, “Douglas Fir Plywood”,
 - (b) CSA O151, “Canadian Softwood Plywood”,
 - r11.1 (c) CSA O153, “Poplar Plywood”,
 - r5 (d) CSA O325, “Construction Sheathing”, or
 - (e) CSA O437.0, “OSB and Waferboard”.

(2) Particleboard subflooring may be used only where a *building* is constructed in a factory so that the subfloor will not be exposed to the weather.

(3) Subflooring described in Sentence (2) shall conform to grade D-2 or D-3 in ANSI A208.1, “Particleboard”.

(4) Subflooring described in Sentence (2) shall have its upper surface and all edges treated to restrict water absorption where the subfloor is used in bathrooms, kitchens, laundry rooms or other areas subject to periodic wetting. (See Appendix A.)

9.23.14.3. Edge Support

(1) Where the edges of panel-type subflooring are required to be supported, such support shall consist of tongue-and-groove panel edges or not less than 38 mm by 38 mm blocking securely nailed between framing members.

9.23.14.4. Direction of Installation

(1) Plywood subflooring shall be installed with the surface grain at right angles to the joists and with joints parallel to floor joists staggered.

- r5 (2) OSB subflooring conforming to CSA O325, “Construction Sheathing”, or to O-1 and O-2 grades in CSA O437.0, “OSB and Waferboard”, and waferboard subflooring conforming to R-1 grade in CSA O437.0 shall be installed so that the direction of face orientation is at right angles to the joists and the joints parallel to the floor joists are staggered. (See Appendix A.)

9.23.14.5. Subfloor Thickness or Rating

(1) Except as provided in Sentences (2) and (3), subfloors shall conform to Table 9.23.14.5.A. or 9.23.14.5.B.

r5

Table 9.23.14.5.A.
Thickness of Subflooring
 Forming Part of Sentences 9.23.14.5.(1) and 9.23.15.7.(1)

Maximum Spacing of Supports, mm	Plywood and OSB, O-2 Grade Minimum Thickness, mm	OSB, O-1 Grade, and Waferboard, R-1 Grade Minimum Thickness, mm	Particleboard Minimum Thickness, mm	Lumber Minimum Thickness, mm
406	15.5	15.9	15.9	17.0
508	15.5	15.9	19.0	19.0
610	18.5	19.0	25.4	19.0
Column 1	2	3	4	5

r5

Table 9.23.14.5.B.
Rating for Subfloor when Applying CSA O325
 Forming Part of Sentences 9.23.14.5.(1) and 9.23.15.7.(1)

Maximum Spacing of Supports, mm	Subfloor, Panel Mark	Subfloor Used with Panel-Type Underlay, Panel Mark
406	1F16	2F16
508	1F20	2F20
610	1F24	2F24
Column 1	2	3

(2) Where the finished flooring consists of not less than 19 mm matched wood strip flooring laid at right angles to joists, spaced not more than 610 mm o.c., subflooring shall be permitted to consist of not less than,

- (a) 12.5 mm thick plywood,
- (b) 12.5 mm thick OSB conforming to O-2 grade,
- (c) 12.7 mm thick OSB conforming to O-1 grade,
- (d) 12.7 mm thick waferboard conforming to R-1 grade, or
- (e) OSB conforming to 2R32 / 2F16 grade.

9.26.10.2. Underlay

- (1) Where eave protection is not provided, an underlay conforming to the requirements in Article 9.26.6.1. for wood shingles shall be laid as a strip not less than 900 mm wide along the eaves.
- e10 (2) A strip of material similar to that described in Sentence (1) not less than 450 mm wide shall be interlaid between each course of shakes with the bottom edge of the strip positioned above the butt line at a distance equal to double the exposure of the shakes.
- e10 (3) Interlaid strips in Sentence (2) shall be lapped at least 150 mm at hips and ridges in a manner that will prevent water from reaching the roof sheathing.

9.26.10.3. Spacing and Joints

- (1) Shakes shall be spaced 6 mm to 9 mm apart and the joints in one course shall be separated not less than 40 mm from joints in adjacent courses.

9.26.10.4. Fastening

- (1) Shakes shall be fastened with nails located approximately 20 mm from the sides of the shakes and 40 mm above the exposure line.

9.26.10.5. Exposure

- (1) The exposure of wood shakes shall not exceed,
- (a) 190 mm for shakes not less than 450 mm long, and
 - (b) 240 mm for shakes not less than 600 mm long.

9.26.10.6. Flashing

- (1) Flashing shall conform to Subsection 9.26.4.

9.26.10.7. Eave Protection

- (1) Eave protection shall conform to Subsection 9.26.5.

9.26.10.8. Grade

- (1) Shakes shall be not less than No. 1 or Handsplit grade.

9.26.11. Built-Up Roofs**9.26.11.1. Quantity of Materials**

- (1) The quantities of bituminous materials used on built-up roofs shall conform to Table 9.26.11.1.

Table 9.26.11.1.
Quantities of Bitumen for Built-Up Roofs
 Forming Part of Sentence 9.26.11.1.(1)

Type of Roof	Amount of Bitumen per Square Metre of Roof Surface	
	Mopping Coats Between Layers	Flood Coat
Asphalt and aggregate	1 kg	3 kg
Coal-tar and aggregate	1.2 kg	3.6 kg
Cold process roofing	0.75 L cold process cement	2 L cold process top coating
Column 1	2	3

9.26.11.2. Coal-Tar and Asphalt Products

- (1) Coal-tar products and asphalt products shall not be used together in built-up roof construction.

9.26.11.3. Roof Felts

- (1) Bitumen roofing felts shall be not less than No.15 felt.

9.26.11.4. Aggregate Surfacing

- (1) Aggregate used for surfacing built-up roofs shall be clean, dry and durable and shall consist of particles of gravel, crushed stone or air-cooled blast furnace slag having a size of from 6 mm to 15 mm.
- (2) The minimum amount of aggregate surfacing per square metre of roof surface shall be 15 kg gravel or crushed stone or 10 kg crushed slag.

9.26.11.5. Flashing

- (1) Flashing shall conform to Subsection 9.26.4.

9.26.11.6. Number of Layers

- (1) Built-up roofing shall consist of at least three mopped-down layers of roofing felt flood coated with bitumen.

9.26.11.7. Installation of Layers

- (1) In hot process applications, each layer of bitumen-saturated felt shall be laid while the bitumen is hot, with each layer overlapping the previous one.
- (2) The full width under each lap referred to in Sentence (1) shall be coated with bitumen so that in no place does felt touch felt.
- (3) Felt shall be laid free of wrinkles and shall be rolled directly into the hot bitumen and broomed forward and outward from the centre to ensure complete adhesion.

9.26.11.8. Roofing Over Wood-Based Sheathing

- (1) Except as permitted in Sentence (2), built-up roofing applied over wood, plywood, OSB or waferboard roof sheathing shall be laid over an additional base layer of felt laid dry over the entire roof deck with at least a 50 mm headlap and a 50 mm sidelap between each sheet.

9.27.3.3. Required Sheathing Membrane and Installation

- (1) Except as provided in Articles 9.27.3.4. to 9.27.3.6., at least one layer of sheathing membrane shall be applied beneath siding, stucco or masonry veneer.
- (2) Sheathing membrane required in Sentence (1) shall be applied so that joints are lapped not less than 100 mm.
- (3) Where sheathing membrane required in Sentence (1) is applied horizontally, the upper sheets shall overlap the lower sheets.

9.27.3.4. Insulating Sheathing in Lieu of Sheathing Membrane

- (1) Where non-wood-based rigid exterior insulating sheathing, or exterior insulating sheathing with an integral sheathing membrane is installed, a separate sheathing membrane is not required.
- (2) Where insulating sheathing is installed as provided in Sentence (1),
 - (a) sheathing panels subject to moisture deterioration shall be sealed at all joints, and
 - (b) the joints of sheathing panels not subject to moisture deterioration shall be,
 - (i) sealed at all joints, or
 - (ii) lapped or tongue and groove, and detailed to ensure drainage of water to the exterior.
 (See Appendix A.)

9.27.3.5. Sheathing Membranes in Lieu of Sheathing

- (1) Except as provided in Article 9.27.3.6., where no sheathing is used, at least two layers of sheathing membrane shall be applied beneath the cladding. (See Appendix A.)
- (2) All joints in the sheathing membrane required in Sentence (1) shall occur over framing, and the membrane shall be fastened to the framing with roofing nails or staples spaced not more than 150 mm along the edges of the outer layer of sheathing paper.
- (3) Wall sheathing is permitted to be used in lieu of one layer of sheathing membrane required in Sentence (1), and the thickness need not conform to Table 9.23.16.2.A.

9.27.3.6. Face Sealed Cladding (See Appendix A.)

- (1) Sheathing membrane is permitted to be omitted beneath cladding when the joints in the cladding are formed to effectively prevent the passage of wind and rain in conformance with Sentence (2) or (3), as applicable.
- (2) Cladding consisting of sheets of plywood, hardboard, OSB, waferboard or fibre cement is considered to meet the requirements of Sentence (1), provided the cladding is applied so that,
 - (a) all edges are directly supported by framing,
 - (b) the vertical joints between adjacent sheets are sealed and,
 - (i) covered with battens,
 - (ii) shiplapped, or
 - (iii) otherwise matched to provide weathertight joints, and
 - (c) the horizontal joints between adjacent sheets are sealed and,
 - (i) shiplapped, or
 - (ii) otherwise matched to provide weathertight joints.
- (3) Metal siding consisting of sheets of metal is considered to meet the requirements of Sentence (1) where the joints between sheets are of the locked-seam type.

9.27.3.7. Flashing Materials

- (1) Flashing shall consist of not less than,
 - (a) 1.73 mm thick sheet lead,
 - (b) 0.33 mm thick galvanized steel,
 - (c) 0.46 mm thick copper,
 - (d) 0.46 mm thick zinc,
 - (e) 0.48 mm thick aluminum, or
 - (f) 1.02 mm thick vinyl.

9.27.3.8. Flashing Installation

- (1) Except as provided in Sentence (2), flashing shall be installed at,
 - (a) every horizontal junction between claddings elements,
 - (b) every horizontal offset in the cladding, and
 - (c) every horizontal line where the cladding substrates change and where,
 - (i) the substrates differ sufficiently for stresses to be concentrated along that line, or
 - (ii) the installation of the cladding on the lower substrate may compromise the drainage of moisture from behind the cladding above.

(See Appendix A.)

- (2) Flashing need not be installed as described in Sentence (1),
 - (a) where the upper cladding elements overlap the lower cladding elements by not less than 25 mm,
 - (b) where,
 - (i) the cladding above and below the joint is installed outboard of a drained and vented air space, and
 - (ii) the horizontal detail is constructed so as to minimize ingress of precipitation into the air space, or
 - (c) at horizontal construction joints in stucco, where,
 - (i) the joint is finished with an expansion-contraction strip, and
 - (ii) the cladding is installed outboard of a drained and vented air space.

(3) Flashing shall be installed over exterior wall openings where the vertical distance from the bottom of the eave to the top of the trim is more than one-quarter of the horizontal overhang of the eave. (See Appendix A.)

- (4) Flashing described in Sentences (1) and (3) shall,
 - e10 (a) extend not less than 50 mm upward inboard of the sheathing membrane or sheathing installed in lieu of the sheathing membrane,
 - (b) have a slope of not less than 6% toward the exterior after the expected shrinkage of the *building* frame,
 - (c) terminate at each end with an end-dam,
 - (i) with a height in millimetres not less than 25 mm or 1/10 of the value of the 1 in 5 driving rain wind pressure in Pa, and
 - (ii) at the height defined in Subclause (i), extending to the face of the adjacent cladding,
 - (d) lap not less than 10 mm vertically over the *building* element below, and
 - (e) terminate in a drip extending not less than 5 mm outward from the outer face of the *building* element below.
- (See Appendix A.)

(5) Where the sills of windows and doors installed in exterior walls are not self-flashing, flashing shall be installed between the underside of the window or door and the wall construction below. (See Appendix A.)

9.27.4. Sealants

9.27.4.1. Required Sealants

- (1) Sealant shall be provided where required to prevent the entry of water into the structure.

- (2) Sealant shall be provided between masonry, siding or stucco and the adjacent door and window frames or trim, including sills unless such locations are completely protected from the entry of rain.
- (3) Sealant shall be provided at vertical joints between different cladding materials unless the joint is suitably lapped or flashed to prevent the entry of rain.

9.27.4.2. Materials

- (1) Sealants shall be,
 - (a) non-hardening types suitable for exterior use,
 - (b) selected for their ability to resist the effects of weathering, and
 - (c) compatible with, and adhere to, the substrate to which they are applied.
 (See Appendix A.)
- (2) Sealants shall conform to,
 - (a) ASTM C834, “Latex Sealants”,
 - (b) ASTM C920, “Elastomeric Joint Sealants”,
 - (c) ASTM C1184, “Structural Silicone Sealants”, or
 - (d) ASTM C1311, “Solvent Release Sealants”.
- (3) Backer rod shall conform to ASTM C1330, “Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants”.

9.27.5. Attachment of Cladding

9.27.5.1. Attachment

- r11.1
e10 (1) Except as permitted in Sentences (2) to (4), cladding shall be fastened to the framing members or furring members, or to blocking between the framing members.
 - (2) Vertical lumber and stucco lath or reinforcing are permitted to be attached to sheathing only where the sheathing consists of not less than,
 - (a) 14.3 mm lumber,
 - (b) 12.5 mm plywood, or
 - (c) 12.5 mm OSB or waferboard.
 - (3) Vertically applied metal siding and wood shingles and shakes are permitted to be attached to the sheathing only where the sheathing consists of not less than,
 - (a) 14.3 mm lumber,
 - (b) 7.5 mm plywood, or
 - (c) 7.5 mm OSB or waferboard.
- r11.1 (4) Where wood shingles or shakes are applied to sheathing that is not suitable for attaching the shingles or shakes, the shingles or shakes may be attached to a wood lath not less than 38 mm by 9.5 mm thick securely nailed to the framing and applied as described in Article 9.27.7.5.

9.27.5.2. Blocking

- (1) Blocking for the attachment of cladding shall be not less than 38 mm by 38 mm lumber securely nailed to the framing and spaced not more than 610 mm o.c.

9.27.5.3. Furring

- r11.1** (1) Except as permitted in Sentence 9.27.5.1.(4), furring for the attachment of cladding shall be not less than 19 mm by 38 mm lumber when applied over sheathing.
- (2) When applied without sheathing, furring referred to in Sentence (1) shall be not less than,
- (a) 19 mm by 64 mm lumber on supports spaced not more than 406 mm o.c., or
- (b) 19 mm by 89 mm on supports spaced not more than 610 mm o.c.
- (3) Furring referred to in Sentence (1) shall be,
- (a) securely fastened to the framing, and
- (b) spaced not more than 610 mm o.c.

9.27.5.4. Size and Spacing of Fasteners

- (1) Nail or staple size and spacing for the attachment of cladding and trim shall conform to Table 9.27.5.4.

r11.1 **Table 9.27.5.4.**
Attachment of Cladding
 Forming Part of Sentence 9.27.5.4.(1)

Type of Cladding	Minimum Nail or Staple Length, mm	Minimum Number of Nails or Staples	Maximum Nail or Staple Spacing, mm (o.c.)
Wood trim	51	—	600
Lumber siding or horizontal siding made from sheet metal	51	—	600
Metal cladding	38	—	600 (nailed to framing) 400 (nailed to sheathing only)
Wood shakes			
up to 200 mm in width	51	2	—
over 200 mm in width	51	3	—
Wood shingles			
up to 200 mm in width	32	2	—
over 200 mm in width	32	3	—
Panel or sheet type cladding			
up to 7 mm thick	38	—	150 (along edges)
more than 7 mm thick	51	—	300 (along intermediate supports)
Column 1	2	3	4

9.27.5.5. Fastener Materials

- (1) Nails or staples for the attachment of cladding and wood trim shall be corrosion-resistant and shall be compatible with the cladding material.

9.27.5.6. Expansion and Contraction

- (1) Fasteners for metal or vinyl cladding shall be positioned to permit expansion and contraction of the cladding.

9.27.5.7. Penetration of Fasteners

- (1) Fasteners for shakes and shingles shall penetrate through the nail-holding base or not less than 19 mm into the framing.
- (2) Fasteners for cladding other than that described in Sentence (1) shall penetrate through the nail-holding base or not less than 25 mm into the framing.

9.27.6. Lumber Siding

9.27.6.1. Materials

- (1) Lumber siding shall be sound, free of knot holes, loose knots, through checks or splits.

9.27.6.2. Thickness and Width

- (1) Drop, rustic, novelty, lapped board and vertical wood siding shall be not less than 14.3 mm thick and not more than 286 mm wide.
- (2) Bevel siding shall be,
 - (a) not less than 5 mm thick at the top, and
 - (b) not less than,
 - (i) 12 mm thick at the butt for sidings 184 mm or less in width, and
 - (ii) 14.3 mm thick at the butt for sidings wider than 184 mm.
- (3) Bevel siding shall be not more than 286 mm wide.

9.27.6.3. Joints

- (1) Lumber siding shall prevent water from entering at the joints by the use of lapped or matched joints or by vertical wood battens.
- (2) Siding shall overlap not less than 1 mm per 16 mm width of lumber, but not less than,
 - (a) 9.5 mm for matched siding,
 - (b) 25 mm for lapped bevel siding, or
 - (c) 12 mm for vertical battens.

9.27.7. Wood Shingles and Shakes

9.27.7.1. Materials

- (1) Shingles and shakes shall conform to,
 - (a) CSA O118.1, "Western Red Cedar Shakes and Shingles", or
 - e10 (b) CSA O118.2, "Eastern White Cedar Shingles".
- (2) Western cedar shakes shall be not less than No. 1 grade or Handsplit grade, and western cedar shingles not less than No. 2 grade, except that No. 3 grade may be used for undercoursing.
- e10 (3) Eastern white cedar shingles shall be at least B (clear) grade, except that C grade may be used for undercoursing.

9.27.7.2. Width

- (1) Shingles and shakes shall be not less than 65 mm or more than 350 mm wide.

9.27.7.3. Fasteners

- (1) Shingles or shakes shall be fastened with nails located approximately 20 mm from each edge and not less than 25 mm above the exposure line for single-course applications, or approximately 50 mm above the butt for double-course applications.

9.27.7.4. Offsetting of Joints

- (1) In single-course application, joints in succeeding courses shall be offset at least 40 mm so that joints in any two of three consecutive courses are staggered.

- (2) In double-course application, joints in the outer course shall be offset from joints in the under-course by not less than 40 mm, and joints in succeeding courses shall be offset not less than 40 mm.

9.27.7.5. Fastening to Lath

- es (1) When lath is used with double-course application (see Sentence 9.27.5.1.(4)), it shall be spaced according to the exposure and securely fastened to the framing.
- (2) The butts of the under-course of the application referred to in Sentence (1) shall rest on the top edge of the lath.
- (3) The outer course of the application referred to in Sentence (1) shall be fastened to the lath with nails of sufficient length to penetrate through the lath.
- (4) The butts of the shingles or shakes shall be so located that they project not less than 12 mm below the bottom edge of the lath referred to in Sentence (1).
- (5) If wood lath is not used, the butts of the under-course shingles or shakes of the application referred to in Sentence (1) shall be located 12 mm above the butts of the outer course.

9.27.7.6. Exposure and Thickness

- (1) The exposure and butt thickness of shingles and shakes shall conform to Table 9.27.7.6.

Table 9.27.7.6.
Exposure and Thickness of Wood Shingles and Shakes
 Forming Part of Sentence 9.27.7.6.(1)

Shake or Shingle Length, mm	Maximum Exposure, mm		Minimum Butt Thickness, mm
	Single Coursing	Double Coursing	
400	190	305	10
450	216	356	11
600	292	406	13
Column 1	2	3	4

- (7) Where air intake and exhaust openings are in exposed locations, provision shall be made to protect them from the entry of precipitation by the use of louvres, weather cowls or other suitable protection.
- (8) Air intake openings shall incorporate screens or grilles to protect against the entry of animals and insects.
- (9) Except for exhaust outlets serving heat recovery ventilators, exhaust outlets shall incorporate backdraft dampers.
- (10) Except for clothes dryers, exhaust outlets shall be fitted with screens of mesh not larger than 15 mm, except where climatic conditions may require larger openings.
- (11) Where a screen or grille required by Sentences (8) and (10) has a screen mesh less than 6 mm, the screen or grille shall be removable for cleaning.
- (12) The gross area of the screens or grilles installed in intake and exhaust openings shall be three times that of the duct served.
- (13) Screens and grilles shall be of corrosion-resistant material.
- (14) The net free area of an air intake or exhaust outlet shall be equal to or greater than the cross-sectional area of the duct served.

9.32.3.13. Installation

- (1) Installation of fans and heat recovery ventilators shall be in accordance with manufacturer's instructions for minimizing noise and vibration transmission and achieving the required sound rating.
- (2) Where flow-regulating dampers are required, they shall be adjustable and accessible without requiring the removal of fans, motors, or insulating materials and without the need for specialized tools.
- (3) Ventilation equipment shall be accessible for inspection, maintenance, repair and cleaning.
- (4) Ventilation equipment installed in unheated spaces shall be installed so as to avoid condensation of moisture on fans and motors in accordance with the manufacturer's instructions.

Section 9.33. Heating and Air-Conditioning

9.33.1. General

9.33.1.1. Design and Installation Requirements (See Appendix A.)

- (1) The design and installation of central heating systems, including requirements for combustion air, shall conform to Part 6 and this Section.
- (2) The design and installation of *air-conditioning* systems shall conform to Part 6.
- (3) Repairs or component replacements that change the capacity or extent of safety of an existing heating, ventilating or *air-conditioning* system and that alter the method of operation shall conform to this Code.

9.33.1.2. Solid Fuel-Burning Appliances

- r5 (1) The design, construction and installation, including the provision of combustion air, of solid-fuel burning *appliances* and equipment, including *stoves*, *cooktops* and *space heaters*, shall conform to CSA B365, “Installation Code for Solid-Fuel-Burning Appliances and Equipment”. (See Appendix A.)
- r3 (2) Solid fuel-burning *stoves*, *furnaces* and hydronic heating systems designed to burn solid fuels, other than coal, shall conform to the particulate emission limits of,
- r15 (a) CSA B415.1, “Performance Testing of Solid-Fuel-Burning Heating Appliances”, or
- (b) the “Standards of Performance for New Residential Wood Heaters”, set out in Subpart AAA of Part 60 of Title 40 of the Code of Federal Regulations, published by the United States Environmental Protection Agency, as it read on March 16, 2015.

9.33.1.3. Structural Movement

- (1) Where the *building* is in a location where the spectral response acceleration, $S_a(0.2)$, is greater than 0.55, heating and *air-conditioning* equipment with fuel or power connections shall be secured to the structure to resist overturning and displacement.

9.33.2. Required Heating Systems

9.33.2.1. Residential Heating Systems

- (1) Residential *buildings* intended for use in the winter months on a continuing basis shall be equipped with heating facilities conforming to this Section.

9.33.2.2. Equipment Sizing

- (1) The heating system capacity shall be based on the heating load calculated in accordance with Sentence 6.2.1.1.(1).
- (2) Where a cooling system is installed, the cooling system capacity shall be based on the cooling load calculated in accordance with Sentence 6.2.1.1.(1).
- r3.1 (3) The heating and cooling equipment capacities shall be determined in accordance with the requirements of CSA F280, “Determining the Required Capacity of Residential Space Heating and Cooling Appliances”.

9.33.3. Design Temperatures

9.33.3.1. Indoor Design Temperatures

- (1) At the outside design temperature, required heating facilities shall be capable of maintaining an indoor air temperature of not less than,
- (a) 22°C in all living spaces,
- (b) 22°C in unfinished *basements*, and
- (c) 15°C in heated crawl spaces.

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Table A-10
Maximum Spans for Built-up Floor Beams Supporting Not More than Three Floors⁽¹⁾⁽²⁾
 Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length, m ⁽³⁾⁽⁴⁾	Maximum Span, m ⁽⁵⁾⁽⁶⁾								
			Size of Built-up Beam, mm								
			3 – 38 × 184	4 – 38 × 184	5 – 38 × 184	3 – 38 × 235	4 – 38 × 235	5 – 38 × 235	3 – 38 × 286	4 – 38 × 286	5 – 38 × 286
Douglas Fir – Larch (includes Douglas Fir and Western Larch)	Select Structural	2.4	2.38	2.74	2.95	2.91	3.36	3.75	3.37	3.89	4.35
		3.0	2.13	2.46	2.74	2.60	3.00	3.36	2.92	3.48	3.89
		3.6	1.88	2.24	2.51	2.24	2.74	3.06	2.53	3.18	3.56
		4.2	1.66	2.08	2.32	1.99	2.49	2.84	2.25	2.81	3.29
		4.8	1.50	1.88	2.17	1.80	2.24	2.65	2.04	2.53	3.02
		5.4	1.38	1.71	2.05	1.65	2.04	2.44	1.88	2.31	2.75
		6.0	1.28	1.58	1.88	1.53	1.89	2.24	1.75	2.14	2.53
	No. 1 and No. 2	2.4	1.85	2.14	2.39	2.26	2.61	2.92	2.63	3.03	3.39
		3.0	1.66	1.91	2.14	2.02	2.34	2.61	2.35	2.71	3.03
		3.6	1.51	1.74	1.95	1.85	2.13	2.39	2.14	2.48	2.77
		4.2	1.40	1.62	1.81	1.71	1.98	2.21	1.99	2.29	2.56
		4.8	1.31	1.51	1.69	1.60	1.85	2.07	1.86	2.14	2.40
		5.4	1.23	1.42	1.59	1.51	1.74	1.95	1.75	2.02	2.26
		6.0	1.17	1.35	1.51	1.43	1.65	1.85	1.66	1.92	2.14
Hem – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	2.4	2.22	2.70	2.91	2.64	3.31	3.70	2.98	3.78	4.29
		3.0	1.85	2.35	2.70	2.21	2.79	3.31	2.50	3.14	3.78
		3.6	1.61	2.02	2.43	1.92	2.40	2.89	2.18	2.71	3.24
		4.2	1.43	1.78	2.14	1.71	2.13	2.54	1.95	2.40	2.86
		4.8	1.30	1.61	1.92	1.56	1.92	2.28	1.77	2.18	2.58
		5.4	1.19	1.47	1.74	1.44	1.76	2.08	1.64	2.00	2.35
		6.0	1.11	1.36	1.61	1.34	1.63	1.92	1.53	1.85	2.18
	No. 1 and No. 2	2.4	1.94	2.24	2.51	2.37	2.74	3.06	2.75	3.18	3.56
		3.0	1.74	2.00	2.24	2.12	2.45	2.74	2.46	2.84	3.18
		3.6	1.58	1.83	2.05	1.92	2.24	2.50	2.18	2.60	2.90
		4.2	1.43	1.69	1.89	1.71	2.07	2.32	1.95	2.40	2.69
		4.8	1.30	1.58	1.77	1.56	1.92	2.17	1.77	2.18	2.51
		5.4	1.19	1.47	1.67	1.44	1.76	2.04	1.64	2.00	2.35
		6.0	1.11	1.36	1.58	1.34	1.63	1.92	1.53	1.85	2.18
Column 1	2	3	4	5	6	7	8	9	10	11	12

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Table A-10 (Cont'd)
Maximum Spans for Built-up Floor Beams Supporting Not More than Three Floors⁽¹⁾⁽²⁾
 Forming Part of Sentence 9.23.4.2.(3)

Commercial Designation	Grade	Supported Length, m ⁽³⁾⁽⁴⁾	Maximum Span, m ⁽⁵⁾⁽⁶⁾								
			Size of Built-up Beam, mm								
			3 – 38 × 184	4 – 38 × 184	5 – 38 × 184	3 – 38 × 235	4 – 38 × 235	5 – 38 × 235	3 – 38 × 286	4 – 38 × 286	5 – 38 × 286
Spruce – Pine – Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select Structural	2.4	2.35	2.58	2.78	2.89	3.30	3.55	3.24	3.89	4.33
		3.0	2.02	2.40	2.58	2.40	3.00	3.30	2.71	3.42	3.89
		3.6	1.74	2.20	2.43	2.08	2.62	3.06	2.35	2.95	3.54
		4.2	1.55	1.94	2.31	1.85	2.31	2.77	2.10	2.61	3.12
		4.8	1.40	1.74	2.09	1.68	2.08	2.48	1.91	2.35	2.80
		5.4	1.28	1.59	1.90	1.54	1.90	2.26	1.76	2.16	2.55
	6.0	1.19	1.47	1.74	1.44	1.76	2.08	1.64	2.00	2.35	
	No. 1 and No. 2	2.4	2.01	2.32	2.60	2.46	2.84	3.17	2.85	3.29	3.68
		3.0	1.80	2.08	2.32	2.20	2.54	2.84	2.55	2.95	3.29
		3.6	1.64	1.90	2.12	2.01	2.32	2.59	2.33	2.69	3.01
		4.2	1.52	1.75	1.96	1.85	2.15	2.40	2.10	2.49	2.78
		4.8	1.40	1.64	1.84	1.68	2.01	2.24	1.91	2.33	2.60
5.4		1.28	1.55	1.73	1.54	1.89	2.12	1.76	2.16	2.46	
6.0	1.19	1.47	1.64	1.44	1.76	2.01	1.64	2.00	2.33		
Northern Species (includes any Canadian species covered by the NLGA Standard Grading Rules)	Select Structural	2.4	1.91	2.20	2.46	2.33	2.69	3.01	2.70	3.12	3.49
		3.0	1.70	1.97	2.20	2.08	2.41	2.69	2.42	2.79	3.12
		3.6	1.56	1.80	2.01	1.90	2.20	2.46	2.18	2.55	2.85
		4.2	1.43	1.66	1.86	1.71	2.03	2.27	1.95	2.36	2.64
		4.8	1.30	1.56	1.74	1.56	1.90	2.13	1.77	2.18	2.47
		5.4	1.19	1.47	1.64	1.44	1.76	2.01	1.64	2.00	2.33
	6.0	1.11	1.36	1.56	1.34	1.63	1.90	1.53	1.85	2.18	
	No. 1 and No. 2	2.4	1.61	1.86	2.08	1.97	2.28	2.55	2.29	2.64	2.96
		3.0	1.44	1.67	1.86	1.76	2.04	2.28	2.05	2.36	2.64
		3.6	1.32	1.52	1.70	1.61	1.86	2.08	1.87	2.16	2.41
		4.2	1.22	1.41	1.57	1.49	1.72	1.93	1.73	2.00	2.23
		4.8	1.14	1.32	1.47	1.40	1.61	1.80	1.62	1.87	2.09
5.4		1.08	1.24	1.39	1.32	1.52	1.70	1.53	1.76	1.97	
6.0	1.02	1.18	1.32	1.25	1.44	1.61	1.45	1.67	1.87		
Column 1	2	3	4	5	6	7	8	9	10	11	12

Notes to Table A-10:

- (1) Beam spans apply only where the floors serve residential areas as described in Table 4.1.5.3., or the uniformly distributed *live load* on the floors does not exceed that specified for residential areas as described in Table 4.1.5.3.
- (2) When the floors have a concrete topping of not more than 51 mm, the spans must be multiplied by 0.8.
- (3) Supported length means half the sum of the joists spans on both sides of the beam.
- (4) Straight interpolation may be used for other supported lengths.
- (5) Spans are clear spans between supports. For total span, add two bearing lengths.
- (6) 3-ply beams with supported lengths greater than 4.2 m require minimum bearing length of 152 mm. All other beams require minimum bearing length of 114 mm.

Table A-17
Maximum Allowable Clear Spans for Lintels in Flat Loadbearing Insulating Concrete Form (ICF) Walls⁽¹⁾⁽²⁾⁽³⁾ (1-10M Bottom Bar)
 Forming Part of Sentence 9.20.17.4.(3)

Minimum Lintel Thickness, mm	Minimum Lintel Depth, mm	Maximum Clear Span, m			
		Supporting Light-Frame Roof Only		Supporting ICF Second Storey and Light-Frame Roof	
		Maximum Ground Snow Load, kN/m ²			
		1.50	3.33	1.50	3.33
140	200	1.41	1.18	1.03	0.93
	300	1.78	1.50	1.30	1.18
	400	2.08	1.75	1.53	1.38
	500	2.33	1.97	1.72	1.56
	600	2.55	2.16	1.89	1.71
150	200	1.41	1.18	1.02	0.92
	300	1.78	1.50	1.29	1.17
	400	2.08	1.75	1.51	1.37
	500	2.33	1.97	1.70	1.54
	600	2.54	2.15	1.87	1.70
160	200	1.41	1.18	1.01	0.91
	300	1.78	1.50	1.28	1.16
	400	2.07	1.75	1.50	1.36
	500	2.32	1.96	1.68	1.53
	600	2.53	2.15	1.85	1.68
190	200	1.41	1.19	0.98	0.89
	300	1.78	1.50	1.24	1.13
	400	2.06	1.74	1.45	1.32
	500	2.30	1.95	1.63	1.49
	600	2.51	2.13	1.78	1.63
200	200	1.41	1.19	0.97	0.89
	300	1.77	1.49	1.23	1.12
	400	2.06	1.74	1.43	1.31
	500	2.30	1.95	1.61	1.48
	600	2.50	2.13	1.77	1.62
240	200	1.41	1.19	0.94	0.86
	300	1.76	1.49	1.18	1.09
	400	2.04	1.73	1.38	1.27
	500	2.27	1.93	1.55	1.43
	600	2.47	2.11	1.70	1.56
Column 1	2	3	4	5	6

Notes to Table A-17:

- (1) Deflection criteria is $L/240$, where "L" is the clear span of the lintel.
- (2) Linear interpolation is permitted between ground snow loads and between lintel depths.
- (3) 10M stirrups are required at a maximum $d/2$ spacing for spans greater than 1 200 mm, where "d" is the distance from the top of the lintel to the level of the bottom reinforcing bar in the lintel.

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Table A-18

Maximum Allowable Clear Spans for Lintels in Flat Loadbearing Insulating Concrete Form (ICF) Walls⁽¹⁾⁽²⁾⁽³⁾ (1-15M Bottom Bar)
Forming Part of Sentence 9.20.17.4.(3)

Minimum Lintel Thickness, mm	Minimum Lintel Depth, mm	Maximum Clear Span, m			
		Supporting Light-Frame Roof Only		Supporting ICF Second Storey and Light-Frame Roof	
		Maximum Ground Snow Load, kN/m ²			
		1.50	3.33	1.50	3.33
140	200	1.63	1.46	1.31	1.23
	300	2.43	2.08	1.81	1.64
	400	2.90	2.44	2.13	1.93
	500	3.26	2.75	2.41	2.18
	600	3.58	3.03	2.65	2.40
150	200	1.67	1.49	1.33	1.25
	300	2.48	2.08	1.79	1.62
	400	2.90	2.44	2.11	1.91
	500	3.26	2.75	2.38	2.16
	600	3.57	3.02	2.62	2.38
160	200	1.70	1.53	1.35	1.26
	300	2.48	2.08	1.78	1.61
	400	2.90	2.44	2.09	1.90
	500	3.25	2.75	2.36	2.14
	600	3.56	3.02	2.59	2.36
190	200	1.80	1.61	1.36	1.24
	300	2.48	2.09	1.73	1.58
	400	2.89	2.44	2.03	1.85
	500	3.23	2.74	2.29	2.09
	600	3.53	3.00	2.51	2.30
200	200	1.83	1.64	1.35	1.23
	300	2.48	2.09	1.71	1.57
	400	2.88	2.44	2.01	1.84
	500	3.22	2.74	2.26	2.07
	600	3.52	2.99	2.48	2.28
240	200	1.93	1.65	1.30	1.20
	300	2.47	2.08	1.66	1.52
	400	2.86	2.43	1.94	1.78
	500	3.19	2.72	2.18	2.01
	600	3.47	2.97	2.39	2.20
Column 1	2	3	4	5	6

Notes to Table A-18:

- (1) Deflection criteria is $L/240$, where "L" is the clear span of the lintel.
- (2) Linear interpolation is permitted between ground snow loads and between lintel depths.
- (3) 10M stirrups are required at a maximum $d/2$ spacing for spans greater than 1 200 mm, where "d" is the distance from the top of the lintel to the level of the bottom reinforcing bar in the lintel.

1.3.1.2. Applications for Permits Under Section 8 of the Act

- (1) An application for a permit under section 8 of the Act to *construct* or *demolish* a *building* shall be made by,
 - (a) the owner of the property on which the proposed *construction* or *demolition* is to take place, or
 - (b) the authorized agent of the owner referred to in Clause (a).
- (2) An application referred to in Sentence (1) shall be in a form approved by the *Minister*.
- (3) In Sentence (1),
 “owner” includes, in respect of the property on which the *construction* or *demolition* will take place, the registered owner, a lessee and a mortgagee in possession.

1.3.1.3. Period Within Which a Permit is Issued or Refused

- (1) Subject to Sentences (2) and (3) and unless the circumstances set out in Sentence (6) exist, if an application for a permit under subsection 8(1) of the Act that meets the requirements of Sentence (5) is submitted to a *chief building official*, the *chief building official* shall, within the time period set out in Column 2 of Table 1.3.1.3. corresponding to the class of *building* described in Column 1 of Table 1.3.1.3. for which the application is made,
 - (a) issue the permit, or
 - (b) refuse to issue the permit and provide in writing all of the reasons for the refusal.
- (2) If an application for a permit under subsection 8(1) of the Act proposes *construction* or *demolition* of two or more *buildings* of different classes described in Column 1 of Table 1.3.1.3. that have different time periods in Column 2 of Table 1.3.1.3., the longer of the time periods shall be the time period for the purposes of Sentence (1).
- (3) If an application for a permit under subsection 8(1) of the Act proposes *construction* or *demolition* of a *building* described in Sentence (4), the time period for the purposes of Sentence (1) shall be the longer of,
 - (a) 10 days, and
 - (b) the time period corresponding to the class of the *building* described in Column 1 of Table 1.3.1.3. that the *building* described in Sentence (4) serves, if any.
- (4) A *building* referred to in Sentence (3) is,
 - (a) a structure occupying an area of 10 m² or less that contains *plumbing*, including the *plumbing* appurtenant to it,
 - (b) *plumbing* not located in a structure,
 - (c) a *sewage system*, or
 - (d) a structure designated in Article 1.3.1.1. of Division A.
- (5) The requirements that an application for a permit under subsection 8(1) of the Act must meet for the purposes of Sentence (1) are,
 - (a) that the application is made in the form described in Sentence 1.3.1.2.(2),
 - (b) that the applicant for the permit is a person described in Clause 1.3.1.2.(1)(a) or (b),
 - (c) that all applicable fields on the application form and required schedules are completed,
 - (d) that all required schedules are submitted with the application,
 - (e) that payment is made of all fees that are required, under the applicable by-law, resolution or regulation made under clause 7(1)(c) of the Act, to be paid when the application is made, and
 - (f) that the applicant has declared in writing that,
 - (i) the application meets all the requirements set out in Clauses (a) to (e),
 - (ii) the application is accompanied by the plans and specifications prescribed by the applicable by-law, resolution or regulation made under clause 7(1)(b) of the Act,
 - (iii) the application is accompanied by the information and documents prescribed by the applicable by-law, resolution or regulation made under clause 7(1)(b) of the Act which enable the *chief building official* to determine whether the proposed *building*, *construction* or *demolition* will contravene any *applicable law*, and
 - (iv) the proposed *building*, *construction* or *demolition* will not contravene any *applicable law*.

- (6) The *chief building official* is not required to make a decision within the time period required by Sentence (1) with respect to an application that meets the requirements of Sentence (5) if the *chief building official*,
- (a) determines that,
 - (i) the application is not accompanied by the plans, specifications, information and documents referred to in Subclauses (5)(f)(ii) and (iii), or
 - (ii) the proposed *building, construction* or *demolition* will contravene any *applicable law*, and
 - (b) advises the applicant of his or her determination and provides in writing the reasons for the determination within two days.

(7) Subject to Sentences (9) and (10), the time period described in Sentences (1) to (3) and in Clause (6)(b) shall begin on the day following the day on which an application that meets the requirements of Sentence (5) is submitted to the *chief building official*.

(8) The time periods described in Column 2 of Table 1.3.1.3. and in Clause (6)(b) shall not include Saturdays, holidays and all other days when the offices of the *principal authority* are not open for the transaction of business with the public.

r13 (8.1) Despite Sentence (8), the time periods described in Column 2 of Table 1.3.1.3. and in Clause (6)(b) include days when the offices of the *principal authority* are not open for the transaction of business with the public if the reason given by the *principal authority* for the offices not being open is related to coronavirus (COVID-19).

- (9) The time period in Sentence (10) applies where,
- (a) an application is made for the *construction* of a *building* that is served by a *sewage system*,
 - (b) *construction* is proposed in respect of the *sewage system* that serves the *building*, and
 - (c) a board of health, conservation authority, planning board or the council of an upper-tier municipality is responsible for the enforcement of the provisions of the Act and this Code related to the *sewage system* under section 3.1 of the Act or pursuant to an agreement under section 6.2 of the Act.

(10) The time period described in Sentences (1) to (3) and in Clause (6)(b) for an application referred to in Clause (9)(a) shall begin on the day following the later of,

- (a) the day on which an application that meets the requirements of Sentence (5) is submitted to the *chief building official*, and
- (b) the day on which a permit for the *construction* of the *sewage system* referred to in Clause (9)(b) is issued.

Table 1.3.1.3.
Period Within Which Permit Shall be Issued or Refused
Forming Part of Article 1.3.1.3.

Item	Class of Building	Time Period
r6 1	(a) Except for a <i>retirement home</i> , a <i>house</i> , where no <i>dwelling unit</i> is located above another <i>dwelling unit</i> . (b) A detached structure that serves a <i>building</i> described in Clause (a) and does not exceed 55 m ² in <i>building area</i> . (c) A tent to which Section 3.14. of Division B applies. (d) A sign to which Section 3.15. of Division B applies.	10 days
2	(a) <i>Buildings</i> described in Clause 1.1.2.4.(1)(a), (b) or (c) of Division A, other than <i>buildings</i> described in Column 1 of any of Items 1 and 4 of this Table. (b) <i>Farm buildings</i> that do not exceed 600 m ² in <i>building area</i> .	15 days
r6 3	(a) <i>Buildings</i> described in Clause 1.1.2.2.(1)(a) or (b) of Division A, other than <i>buildings</i> described in Column 1 of any of Items 1 and 4 of this Table. (b) <i>Farm buildings</i> exceeding 600 m ² in <i>building area</i> . (c) <i>Retirement homes</i> .	20 days
4	(a) <i>Post-disaster buildings</i> . (b) <i>Buildings</i> to which Subsection 3.2.6. of Division B or any provision in Articles 3.2.8.3. to 3.2.8.11. of Division B applies.	30 days
	Column 1	2

1.3.1.4. Permits Under Section 10 of the Act

- r1 (1) Except as provided in Sentence (2), the following changes in use of a *building* or part of a *building* constitute an increase in hazard for the purposes of section 10 of the Act and require a permit under section 10 of the Act:
- (a) a change of the *major occupancy* of all or part of a *building* that is designated with a “Y” in Table 1.3.1.4. takes place,
 - (b) a *suite* of a Group C *major occupancy* is converted into more than one *suite* of Group C *major occupancy*,
 - (c) a *suite* or part of a *suite* of a Group A, Division 2 or a Group A, Division 4 *major occupancy* is converted to a *gaming premises*,
 - (d) a *farm building* or part of a *farm building* is changed to a *major occupancy*,
 - (e) a *building* or part of a *building* is changed to a *post-disaster building*,
- r6 (f) a *building* or part of a *building* is changed to a *retirement home*, or
- (g) the use of a *building* or part of a *building* is changed and the previous *major occupancy* of the *building* or part of the *building* cannot be determined.
- (2) A person is exempt from the requirement to obtain a permit under section 10 of the Act where the change in use of the *building* or part of the *building* will result from proposed *construction* and a permit under section 8 of the Act has been issued in respect of such *construction*.
- (3) A person is exempt from the requirement to obtain a permit under section 10 of the Act for the change of use of a *building* in unorganized territory.

Table 1.3.1.4.
Permit Required for Change of Use
 Forming Part of Sentence 1.3.1.4.(1)⁽¹⁾

		FROM ⁽²⁾												
		A-1	A-2	A-3	A-4	B-1	B-2	B-3	C	D	E	F-1	F-2	F-3
TO ⁽³⁾	A-1	N ⁽⁵⁾	Y	Y	N ⁽⁵⁾	Y	Y	Y	Y	Y	Y	Y	Y	Y
	A-2	Y	N ⁽⁵⁾	Y	N ⁽⁵⁾	Y	Y	Y	Y	Y	Y	Y	Y	Y
	A-3	Y	Y	N ⁽⁵⁾	N ⁽⁵⁾	Y	Y	Y	Y	Y	Y	Y	Y	Y
	A-4	Y	Y	Y	N ⁽⁵⁾	Y	Y	Y	Y	Y	Y	Y	Y	Y
	B-1	Y	Y	Y	N ⁽⁵⁾	N ⁽⁵⁾	Y	Y	Y	Y	Y	Y	Y	Y
	B-2	Y	Y	Y	N ⁽⁵⁾	Y	N ⁽⁵⁾	Y	Y	Y	Y	Y	Y	Y
	B-3	Y	Y	Y	N ⁽⁵⁾	Y	N ⁽⁵⁾	N ⁽⁵⁾	Y	Y	Y	Y	Y	Y
	C	Y	Y	Y	N ⁽⁵⁾	Y	N ⁽⁵⁾	N ⁽⁵⁾	(4)	Y	Y	Y	Y	Y
	D	N ⁽⁵⁾	N ⁽⁵⁾	Y	N ⁽⁵⁾	Y	N ⁽⁵⁾	N ⁽⁵⁾	Y	N ⁽⁵⁾	Y	Y	N ⁽⁵⁾	N ⁽⁵⁾
	E	Y	Y	Y	N ⁽⁵⁾	Y	Y	Y	Y	Y	N ⁽⁵⁾	Y	Y	Y
	F-1	Y	Y	Y	N ⁽⁵⁾	Y	Y	Y	Y	Y	Y	N ⁽⁵⁾	Y	Y
	F-2	Y	Y	Y	N ⁽⁵⁾	Y	Y	Y	Y	Y	Y	N ⁽⁵⁾	N ⁽⁵⁾	Y
F-3	Y	N ⁽⁵⁾	Y	N ⁽⁵⁾	Y	Y	Y	Y	N ⁽⁵⁾	N ⁽⁵⁾	N ⁽⁵⁾	N ⁽⁵⁾	N ⁽⁵⁾	
Col. 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Notes to Table 1.3.1.4.:

- r5 (1) See Clause 1.3.1.4.(1)(a), Subclause 3.17.1.1.(1)(a)(i) of Division B and Clause 9.40.1.1.(1)(a) of Division B.
- (2) *Major occupancy* of all or part of a *building* before change of use.
- (3) *Major occupancy* of all or part of a *building* after change of use.
- r5 (4) See Clause 1.3.1.4.(1)(b), Subclause 3.17.1.1.(1)(a)(ii) of Division B and Clauses 9.40.1.1.(1)(b) and 11.4.2.3.(1)(b) of Division B.
- (5) “N” is only applicable where the *major occupancy* of the entire *suite* is changed.

1.3.1.5. Conditional Permits

- (1) The *chief building official* shall not issue a conditional permit for any stage of *construction* under subsection 8(3) of the Act unless compliance with the following applicable laws has been achieved in respect of the proposed *building* or *construction*:
- r15 (0.a) section 3 of the *Building Transit Faster Act, 2020* with respect to the issuance of a permit under that section,
- (a) regulations made by a conservation authority under clause 28(1)(c) of the *Conservation Authorities Act* with respect to permission of the authority for the construction of a building or structure if, in the opinion of the authority, the control of flooding, erosion, dynamic beaches or pollution or the conservation of land may be affected by the development,
- (b) section 5 of the *Environmental Assessment Act* with respect to the approval of the Minister or the Environmental Review Tribunal to proceed with an undertaking,
- (c) subsection 24(3) of the *Niagara Escarpment Planning and Development Act*,
- (d) subsection 27(3) of the *Ontario Heritage Act*,
- (e) subsection 30(2) of the *Ontario Heritage Act* with respect to a consent of the council of a *municipality* to the alteration or *demolition* of a *building* where the council of the *municipality* has given a notice of intent to designate the *building* under subsection 29(3) of that Act,
- (f) section 33 of the *Ontario Heritage Act* with respect to the consent of the council of a *municipality* for the alteration of property,
- (g) section 34 of the *Ontario Heritage Act* with respect to the consent of the council of a *municipality* for the *demolition* of a *building*,
- (h) section 34.5 of the *Ontario Heritage Act* with respect to the consent of the Minister to the alteration or *demolition* of a designated *building*,
- (i) subsection 34.7(2) of the *Ontario Heritage Act* with respect to a consent of the Minister to the alteration or *demolition* of a *building* where the Minister has given a notice of intent to designate the *building* under section 34.6 of that Act,
- (j) by-laws made under section 40.1 of the *Ontario Heritage Act*,
- (k) section 42 of the *Ontario Heritage Act* with respect to the permit given by the council of a *municipality* for the erection, alteration or *demolition* of a *building*,
- r7 (l) section 17.4 of the *Ontario New Home Warranties Plan Act* with respect to the provision of a confirmation by the Registrar for the *construction* of a residential condominium conversion project.
- (2) For the purposes of issuing a conditional permit under subsection 8(3) of the Act, a person is exempt from the requirement in clause 8(3)(a) of the Act of compliance with by-laws passed under sections 34 and 38 of the *Planning Act* where,
- (a) a committee of adjustment has made a decision under section 45 of the *Planning Act* authorizing one or more minor variances from the provisions of any by-laws made under sections 34 and 38 of that Act,
- (b) such minor variance or variances result in the achievement of full compliance with such by-laws, and
- (c) no person informed the committee of adjustment of objections to the minor variances either in writing or in person at the hearing of the application.
- (3) For the purposes of issuing a conditional permit under subsection 8(3) of the Act, a person is exempt from the requirement in clause 8(3)(a) of the Act of compliance with by-laws passed under sections 34 and 38 of the *Planning Act* where the *construction* in respect of which the conditional permit is issued is required in order to comply with an order issued under subsection 21(1) of the *Fire Protection and Prevention Act, 1997* or under subsection 15.9(4) of the Act.
- r15 (3.1) Reserved.
- r15 (3.2) Reserved.
- (4) A permit issued under subsection 8(3) of the Act shall indicate its conditional nature.

1.3.1.6. Information to be Given to Tarion Warranty Corporation

- (1) This Article prescribes, for the purposes of subsection 8(8.1) of the Act, the information relating to permits issued under section 8 of the Act and the applications for those permits that the *chief building official* is required to give to *Tarion Warranty Corporation* and the time within which the information is required to be given.
- (2) The *chief building official* shall give the following information to *Tarion Warranty Corporation* with respect to permits issued under section 8 of the Act in respect of the *construction* of *buildings* described in Sentence (4),
 - (a) the dates the permits are issued and the numbers or other identifying symbols for the permits, and
 - (b) the information contained in the application forms submitted in respect of the permits, other than the information contained in the schedules or other attachments to the application forms.
- (3) Despite Sentence (2), the *chief building official* is not required to give to *Tarion Warranty Corporation* information which relates to the extension or material alteration or repair of an existing *building*.
- (4) The *buildings* referred to in Sentence (2) are any *building* whose proposed use is classified as a Group C *major occupancy* and which is not a *boarding, lodging or rooming house* or a *building* containing a *hotel*.
- (5) The *chief building official* shall give the information described in Sentence (2) within 45 days after the day on which the permits to which the information relates are issued.
- (6) The time period described in Sentence (5) shall not include Saturdays, holidays and all other days when the offices of the *principal authority* are not open for the transaction of business with the public.

1.3.2. Site Documents

1.3.2.1. Permit Posting

- (1) Where a permit has been issued pursuant to the Act, the person to whom it is issued shall have the permit or a copy of it posted at all times during *construction* or *demolition* in a conspicuous place on the property in respect of which the permit was issued.

1.3.2.2. Documentation on Site

- (1) The person in charge of the *construction* of the *building* shall keep and maintain on the site of the *construction*,
 - (a) at least one copy of drawings and specifications certified by the *chief building official* or a person designated by the *chief building official* to be a copy of those submitted with the application for the permit to *construct* the *building*, together with changes that are authorized by the *chief building official* or a person designated by the *chief building official*,
 - (b) copies of authorizations of the Building Materials Evaluation Commission on the basis of which the permit was issued, and
 - (c) copies of rulings of the *Minister*, made under clause 29(1)(a) or (c) of the Act, on the basis of which the permit was issued.

1.3.3. Occupancy of Buildings

1.3.3.1. Occupancy Permit — General

- (1) Except as permitted in Sentence 1.3.3.2.(1), a person may occupy or permit to be occupied any *building* or part of it that has not been fully completed at the date of occupation where the *chief building official* or a person designated by the *chief building official* has issued a permit authorizing occupation of the *building* or part of it prior to its completion in accordance with Sentence (3).

- r5 (2) Sentence (1) does not apply in respect of the occupancy of a *building* to which Article 1.3.3.4. or 1.3.3.5. applies.
- (3) The *chief building official* or a person designated by the *chief building official* shall issue a permit authorizing occupation of a *building*, where,
- (a) the structure of the *building* or part of it is completed to the roof,
 - (b) the enclosing walls of the *building* or part of them are completed to the roof,
 - (c) the walls enclosing the space to be occupied are completed, including balcony *guards*,
 - (d) all required *fire separations* and *closures* are completed on all *storeys* to be occupied,
 - r5 (e) all required *exits* are completed, including all *fire separations*, doors, door hardware, self-closing devices, *guards* and handrails, from the uppermost floor to be occupied down to *grade* level and below if an *exit* connects with lower *storeys*,
 - (f) all shafts including *closures* are completed to the floor-ceiling assembly above the *storey* to be occupied and have a temporary *fire separation* at such assembly,
 - r5 (g) measures have been taken to prevent access to parts of the *building* and site that are incomplete or still under construction,
 - r5 (h) floors, halls, lobbies and required *means of egress* are free of loose materials and other hazards,
 - r5 (i) if *service rooms* should be in operation, required *fire separations* and *closures* are completed,
 - (j) all *building drains*, *building sewers*, *water systems*, *drainage systems* and *venting systems* are complete and tested as operational for the *storeys* to be occupied,
 - (k) required lighting, heating and electrical supply are provided for the *suites*, rooms and common areas to be occupied,
 - (l) required lighting in corridors, stairways and *exits* is completed and operational up to and including all *storeys* to be occupied,
 - (m) required standpipe, sprinkler and fire alarm systems are complete and operational up to and including all *storeys* to be occupied, together with required pumper connections for such standpipes and sprinklers,
 - (n) required fire extinguishers have been installed on all *storeys* to be occupied,
 - r5 (o) main garbage rooms, chutes and ancillary services are completed to all *storeys* to be occupied,
 - (p) required firefighting access routes have been provided and are accessible, and
 - (q) the *sewage system* has been completed and is operational.
- (4) Where a *registered code agency* has been appointed to perform the functions described in clause 4.1(4)(b) or (c) of the Act in respect of the *construction* of the *building*, the *chief building official* or a person designated by the *chief building official* shall issue the permit referred to in Sentence (3) after receipt of a *certificate for the occupancy of a building not fully completed* issued by the *registered code agency* in respect of the *building*.

1.3.3.2. Conditions for Residential Occupancy

- (1) A person may occupy or permit to be occupied a *building* intended for *residential occupancy* that has not been fully completed at the date of occupation provided that,
- (a) the *building*,
 - (i) is of three or fewer *storeys* in *building height* and has a *building area* not exceeding 600 m²,
 - (ii) has not more than 1 *dwelling unit* above another *dwelling unit*,
 - (iii) has not more than 2 *dwelling units* sharing a common *means of egress*,
 - (iv) has no accommodation for tourists, and
 - (v) is not used for a *retirement home*.
 - r6 (b) the following *building* components and systems are complete, operational and inspected:
 - (i) required *exits*, handrails and *guards*, fire alarm and detection systems, and *fire separations*,
 - (ii) required exhaust fume barriers and self-closing devices on doors between an attached or built-in garage and a *dwelling unit*,
 - (iii) water supply, sewage disposal, lighting and heating systems, and
 - (iv) protection of foamed plastics required by Article 9.10.17.10. of Division B,
 - (c) the following *building* components and systems are complete, operational, inspected and tested:
 - (i) *water systems*,
 - (ii) *building drains* and *building sewers*, and
 - (iii) *drainage systems* and *venting systems*, and
 - (d) where applicable, the *building* conforms to Article 9.1.1.7. of Division B.

- r5 (2) Sentence (1) does not apply in respect of the occupancy of a *building* to which Article 1.3.3.4. or 1.3.3.5. applies.

1.3.3.3. Notification

- (1) Where a person has occupied or permitted the occupancy of a *building* under Article 1.3.3.1. or 1.3.3.2., such person shall notify the *chief building official* forthwith upon completion of the *building*.

1.3.3.4. Occupancy Permit — Certain Buildings of Residential Occupancy

- (1) No person shall occupy or permit to be occupied a *building* described in Sentence (3), or part of it, unless the *chief building official* or a person designated by the *chief building official* has issued a permit authorizing occupation of the *building* or part of it in accordance with Sentence (4).

- (2) This Article does not apply in respect of the *occupancy* of an existing *building*, or part of it, that has been subject to extension or material alteration or repair.

- (3) A *building* referred to in Sentence (1) is a *building* intended for *residential occupancy* that,
- (a) is of three or fewer *storeys* in *building height* and has a *building area* not exceeding 600 m²,
 - (b) has no accommodation for tourists,
 - (c) does not have a *dwelling unit* above another *dwelling unit*,
 - (d) does not have any *dwelling units* sharing a common *means of egress*, and
 - r6 (e) does not contain a *retirement home*.

- (4) The *chief building official* or a person designated by the *chief building official* shall issue a permit authorizing occupation of a *building* described in Sentence (3), where,
- (a) the structure of the *building* with respect to the *dwelling unit* to be occupied is substantially complete and ready to be used for its intended purpose,
 - (b) the *building* envelope, including, but not limited to, cladding, roofing, windows, doors, assemblies requiring *fire-resistance ratings*, *closures*, insulation, *vapour barriers* and air barriers, with respect to the *dwelling unit* to be occupied, is substantially complete,
 - (c) the walls enclosing the *dwelling unit* to be occupied conform to Sentence 9.25.2.3.(7) of Division B,
 - (d) required electrical supply is provided for the *dwelling unit* to be occupied,
 - (e) required firefighting access routes to the *building* have been provided and are accessible,
 - r5 (f) the following *building* components and systems are complete and operational for the *dwelling unit* to be occupied:
 - (i) required *exits*, floor access and egress systems, handrails, *guards*, *smoke alarms*, carbon monoxide alarms and *fire separations*, including, but not limited to, *fire stops*,
 - (ii) required exhaust fume barriers and self-closing devices on doors between an attached or built-in garage and the *dwelling unit*,
 - (iii) water supply, sewage disposal, lighting and heating systems, and
 - (iv) protection of foamed plastics required by Article 9.10.17.10. of Division B,
 - (g) the following *building* components and systems are complete, operational and tested for the *dwelling unit* to be occupied:
 - (i) *water system*,
 - (ii) *building drain* and *building sewer*, and
 - (iii) *drainage system* and *venting system*,
 - (h) required *plumbing fixtures* in the *dwelling unit* to be occupied are substantially complete and operational, and
 - (i) where applicable, the *building* conforms to Article 9.1.1.7. of Division B with respect to the *dwelling unit* to be occupied.

- (5) Where a *registered code agency* has been appointed to perform the functions described in clause 4.1(4)(b) or (c) of the Act in respect of the *construction* of a *building* described in Sentence (3), the *chief building official* or a person designated by the *chief building official* shall issue the permit referred to in Sentence (4) after receipt of a *certificate for the occupancy of a building described in Sentence 1.3.3.4.(3) of Division C* issued by the *registered code agency* in respect of the *building*.

r5 1.3.3.5. Occupancy Permit — Buildings Within the Scope of Article 3.2.2.43A. or 3.2.2.50A.

(1) No person shall occupy or permit to be occupied a *building* within the scope of Article 3.2.2.43A. or 3.2.2.50A. of Division B, or part of it, unless the *chief building official* or a person designated by the *chief building official* has issued a permit authorizing occupation of the *building* or part of it in accordance with Sentence (3).

(2) This Article does not apply in respect of the occupancy of an existing *building*, or part of it, that has been subject to extension or material alteration or repair.

(3) The *chief building official* or a person designated by the *chief building official* shall issue a permit authorizing occupation of a *building* described in Sentence (1), where,

- (a) the structure of the *building* is completed to the roof,
- (b) the *building* envelope, including, but not limited to, cladding, roofing, windows, doors, assemblies requiring *fire-resistance ratings*, *closures*, insulation, *vapour barriers* and air barriers, is complete,
- (c) the walls enclosing the space to be occupied are completed, including balcony *guards*,
- (d) all required *fire separations* and *closures* are completed,
- (e) all required *exits* are completed, including all *fire separations*, doors, door hardware, self-closing devices, *guards* and handrails,
- (f) all shafts including *closures* are completed,
- (g) measures have been taken to prevent access to parts of the *building* and site that are incomplete or still under construction,
- (h) floors, halls, lobbies and required *means of egress* are free of loose materials and other hazards,
- (i) if *service rooms* should be in operation, required *fire separations* and *closures* are completed,
- (j) all *building drains*, *building sewers*, *water systems*, *drainage systems* and *venting systems* are complete and tested as operational for the *storeys* to be occupied,
- (k) required lighting, heating and electrical supply are provided for the *suites*, rooms and common areas to be occupied,
- (l) required lighting in corridors, stairways and *exits* is completed and operational,
- (m) required standpipe, sprinkler and fire alarm systems are complete and operational, together with required pumper connections for such standpipes and sprinklers,
- (n) required *smoke alarms* and carbon monoxide alarms are complete and operational,
- (o) required fire extinguishers have been installed,
- (p) main garbage rooms, chutes and ancillary services are completed to all *storeys* to be occupied,
- (q) required firefighting access routes have been provided and are accessible, and
- (r) the *sewage system* has been completed and is operational.

(4) Where a *registered code agency* has been appointed to perform the functions described in clause 4.1(4)(b) or (c) of the Act in respect of the *construction* of a *building* described in Sentence (1), the *chief building official* or a person designated by the *chief building official* shall issue the permit referred to in Sentence (3) after receipt of a *certificate for the occupancy of a building described in Sentence 1.3.3.5.(1) of Division C* issued by the *registered code agency* in respect of the *building*.

r10 1.3.3.6. Occupancy Permit — Buildings in the Lower Don Area of Toronto

(1) Except as provided in Sentence (2), this Article applies to *buildings* constructed on land in the City of Toronto being the land outlined in red on a map numbered 230 and filed at the Toronto office of the Ministry of Municipal Affairs and Housing located at 777 Bay Street.

(2) This Article does not apply to a *building* that complies with,

- (a) the official plan of the City of Toronto approved under section 17 of the *Planning Act* as the official plan read on the day Ontario Regulation 388/18 is filed, or
- (b) a by-law made by the City of Toronto under section 34 of the *Planning Act* as the by-law read on the day Ontario Regulation 388/18 is filed.

1.3.5.2. Additional Notices

- (1) A by-law, resolution or regulation made by a *principal authority* under clause 7(1)(e) of the Act may require that notice of one or more of the following stages of *construction* be given by the person to whom a permit is issued under section 8 of the Act:
- (a) commencement of *construction* of the *building*,
 - (b) substantial completion of structural framing for each *storey*, if the *building* is a type of *building* that is within the scope of Division B, other than Part 9,
 - (c) commencement of *construction* of,
 - (i) masonry fireplaces and masonry *chimneys*,
 - (ii) factory-built fireplaces and allied *chimneys*, or
 - (iii) *stoves*, ranges, *space heaters* and add-on *furnaces* using solid fuels and allied *chimneys*,
 - (d) substantial completion of interior finishes,
 - (e) substantial completion of heating, ventilating, *air-conditioning* and air-contaminant extraction equipment,
 - (f) substantial completion of exterior cladding,
 - (g) substantial completion of site grading,
 - (h) substantial completion of the pool deck and dressing rooms for a *public pool* or *public spa* and readiness for inspection of the emergency stop system for a *public pool* or *public spa*,
 - (i) completion and availability of drawings of the *building* as constructed, and
 - r5 (j) completion of a *building* for which an occupancy permit is required under Article 1.3.3.4. or 1.3.3.5.

1.3.5.3. Prescribed Inspections

- (1) Except as provided in Sentence (2), an *inspector* or *registered code agency*, as the case may be, shall, not later than two days after receipt of a notice given under Sentence 1.3.5.1.(2), undertake a site inspection of the *building* to which the notice relates.
- (2) Where a notice given under Sentence 1.3.5.1.(2) relates to matters described in Clause 1.3.5.1.(2)(l) or (m), an *inspector* or *registered code agency*, as the case may be, shall, not later than five days after receipt of the notice, undertake a site inspection of the *sewage system* to which the notice relates.
- (3) When undertaking an inspection required under Sentence (1) or (2), the *inspector* or *registered code agency*, as the case may be, may consider reports concerning whether the *building* or a part of the *building* complies with the Act or this Code.
- (4) The time periods referred to in Sentences (1) and (2) shall begin on the day following the day on which the notice is given.
- (5) The time periods referred to in Sentences (1) and (2) shall not include Saturdays, holidays and all other days when the offices of the *principal authority* are not open for the transaction of business with the public.
- r13 (6) Despite Sentence (5), the time periods referred to in Sentences (1) and (2) include days when the offices of the *principal authority* are not open for the transaction of business with the public if the reason given by the *principal authority* for the offices not being open is related to coronavirus (COVID-19).

1.3.5.4. Construction of Sewage Systems

- (1) The following information is prescribed for the purposes of subsection 15.12(3) of the Act and must be provided to the *chief building official* before the commencement of the *construction* of a *sewage system*:
- (a) the information described in Sentence 3.3.4.1.(2) as it relates to,
 - (i) the person registered under Article 3.3.3.2., and
 - (ii) the person with the qualifications described in Clause 3.3.3.2.(1)(a) who will supervise *construction* on-site of the *sewage system*, and
 - (b) the name and telephone number of the representative of the person described in Subclause (a)(i) who may be contacted by the *chief building official* in respect of the *construction* of the *sewage system*.

1.3.5.5. Orders

(1) An order issued under subsection 12(2), 13(1) or (6), 14(1) or 15.10.1(2) or clause 18(1)(f) of the Act shall be in a form approved by the *Minister*.

1.3.6. As Constructed Plans

1.3.6.1. Application (See Appendix A.)

(1) Where a by-law, resolution or regulation has been made by a *principal authority* under clause 7(1)(g) of the Act, the *chief building official* may require that *as constructed plans* for the whole of, or any part or system of, a *building* or any class of *buildings* be provided by the persons responsible for the *construction*.

Section 1.4. Search Warrant

1.4.1. Forms

1.4.1.1. Information & Warrant Forms

- r3 (1) An information to obtain a warrant to enter and search a *building*, receptacle or place under subsection 21(1) of the Act shall be in Form 1.4.1.1.A.
- r3 (2) A warrant to enter and search a *building*, receptacle or place under subsection 21(1) of the Act shall be in Form 1.4.1.1.B.

2012 Building Code Compendium

Volume 2

**December 16, 2020 update
(Containing O. Reg. 209/20, O. Reg. 511/20 and
O. Reg. 762/20)**

COMMENCEMENT

Supplementary Standards SA-1, SB-1 to SB-13 and SC-1 come into force on the 1st day of January, 2014.

See “Code Amendment History” page in the Preface of Volume 1 for information concerning amendments to Supplementary Standards issued through Minister’s Rulings.

- a1** Amendment made to Appendix A or B issued for January 1st, 2014.
- a2** Amendment made to Appendix A or B issued for January 1st, 2014.
- a2.1** Amendment made to Appendix A or B issued for January 1st, 2015.
- a3** Amendment made to Appendix A or B issued for January 1st, 2015.
- a4** Amendment made to Appendix A or B issued for July 7th, 2016.
- a5** Amendment made to Appendix A or B issued for July 1st, 2017.
- a5.1** Amendment made to Appendix A or B issued for January 1st, 2018.
- a6** Amendment made to Appendix A or B issued for January 18, 2018.
- a7** Amendment made to Appendix A or B issued for May 4, 2018.
- a8** Amendment made to Appendix A or B issued for June 29, 2018.
- a9** Amendment made to Appendix A or B issued for July 20, 2018.
- a10** Amendment made to Appendix A or B issued for May 2, 2019.
- a10.1** Amendment made to Appendix A or B issued for January 1, 2020.
- a10.2** Amendment made to Appendix A or B issued for January 1, 2022.
- a11** Amendment made to Appendix A or B issued for December 16th, 2020.

EDITORIAL

- e1** Editorial correction issued for January 1st, 2014.
- e2** Editorial correction issued for January 1st, 2014.
- e2.1** Editorial correction issued for January 1st, 2015.
- e3** Editorial correction issued for January 1st, 2015.
- e4** Editorial correction issued for July 7th, 2016.
- e5** Editorial correction issued for January 1st, 2017.
- e6** Editorial correction issued for January 1st, 2018.
- e7** Editorial correction issued for January 1st, 2020.
- e7.1** Editorial correction issued for January 1st, 2022.
- e8** Editorial correction issued for December 16th, 2020.

COVER PHOTO CREDITS

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a2.1 A-3.8.3.8.(8) Fold-Down Grab Bars.

A fold-down grab bar is required to resist a load of 1.3 kN applied either vertically or horizontally and will require blocking in the wall so that the grab bar remains anchored to the wall when in use.

a2.1 A-3.8.3.8.(10) Ambulatory Water Closet Stalls.

An ambulatory water closet stall is designed to accommodate people requiring some mobility assistance using aids such as canes or crutches but who do not use wheelchairs. Ambulatory stalls include features such as a higher water closet seat height, grab bars and some additional space for mobility aids such as a cane. A door pull should be provided on both faces of the stall door.

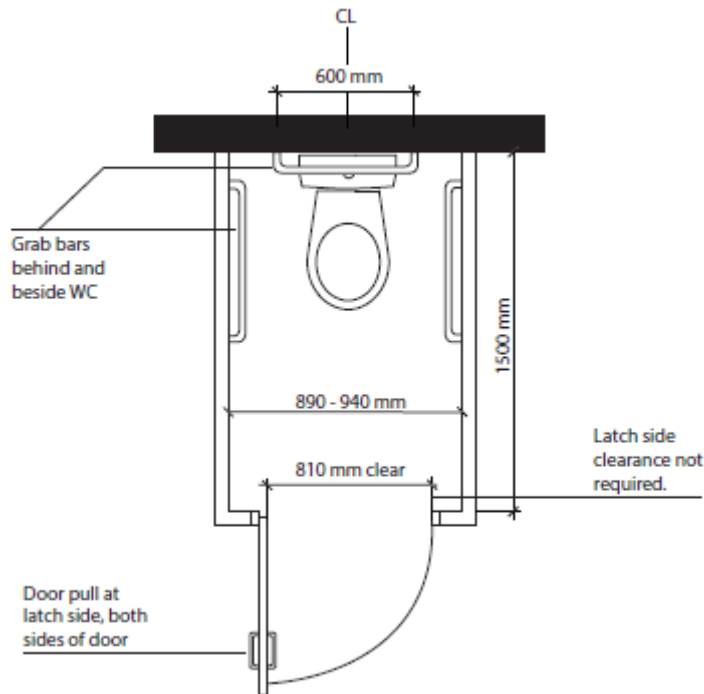


Figure A-3.8.3.8.(10)
Ambulatory Washroom Stall

a3 A-3.8.3.9. Water Closets.

Article 7.2.2.5. applies to water closets referenced in Articles 3.8.3.8., 3.8.3.9. and 3.8.3.12.

A shelf or projection should not be located behind a water closet such that it could present a hazard.

a2.1 A-3.8.3.9.(1)(c) Back Support at Water Closets.

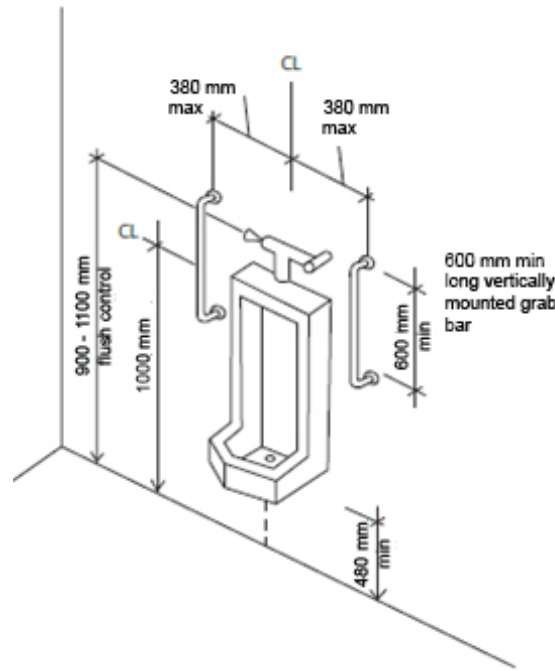
The purpose of the back support is to reduce the chance of imbalance or injury caused by a user leaning against exposed flush valves or pipes. A toilet seat lid, where provided, may be a suitable back support.

A-3.8.3.9.(1) Water Closets.

Wall-mounted water closets or floor models with receding bases are preferable because they provide the least amount of obstruction.

a2.1 A-3.8.3.10. Barrier-Free Urinals.

Where provided, barrier-free urinals require both properly mounted and supported grab bars and privacy screens. Privacy screens alone should not be used as both a privacy and support element.



a11 **Figure A-3.8.3.10. Accessible Urinal**

a2.1 **A-3.8.3.11. Washroom Accessories.**

Washroom accessories for barrier-free water closets and lavatories must be located within arm’s reach of a person in a seated position. Placement of towel dispensers and hand dryers should not require that a person seated in a wheelchair must travel beyond the reach range of the lavatory to dry his or her hands.

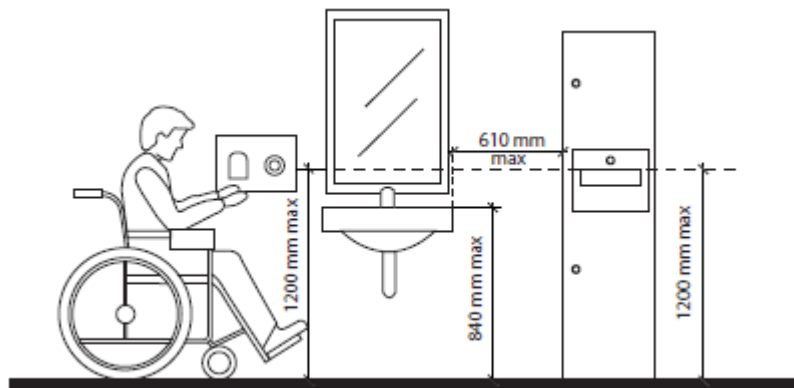


Figure A-3.8.3.11. Washroom Accessories

A-3.8.3.11.(1)(c) Clearances Beneath a Lavatory.

- a2.1 Barrier-free lavatories require sufficient knee and toe clearance below to permit a person in a wheelchair to move close enough to the faucet to easily access the water stream.
- a3 In order to meet the clearances contained in this Clause, and depending on the lavatory to be installed, it may be necessary to install an offset P.O. lavatory drain.

- a3 The emergency call button is intended to provide a local visual signal outside of the washroom to alert others that someone in the washroom needs assistance. It is not required to be linked to a central monitoring station. Where central monitoring is not provided, such as in the case of a small building or a standalone washroom in a park, an additional sign informing the washroom users that there is no central monitoring may be appropriate.

a2.1 **A-3.8.3.12.(6) Universal Washrooms for Small Buildings.**

The permission for a smaller universal washroom to be provided in small buildings recognizes the limited space available for construction of service and amenity spaces while still balancing available space with the needs of people with disabilities.

a2.1 **A-3.8.3.13.(1) Minimum Number of Barrier-Free Showers.**

The intent of the requirement for one or more barrier-free showers in a group of showers is to address the increased demand for accessible facilities in publicly accessible buildings such as arenas, community recreation centres and private health and fitness facilities where the accessible shower stall is located in the same room as non-accessible showers. It is not the intent of the Code to require single shower stalls or single private use showers that are part of a private office suite to be barrier-free accessible.

A-3.8.3.13.(2)(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.

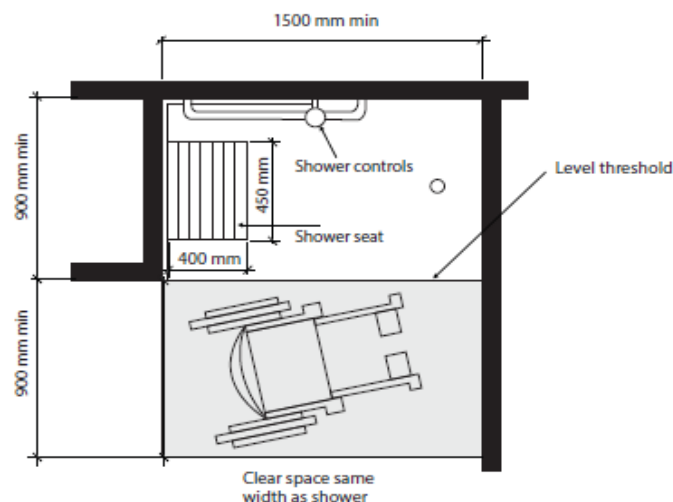


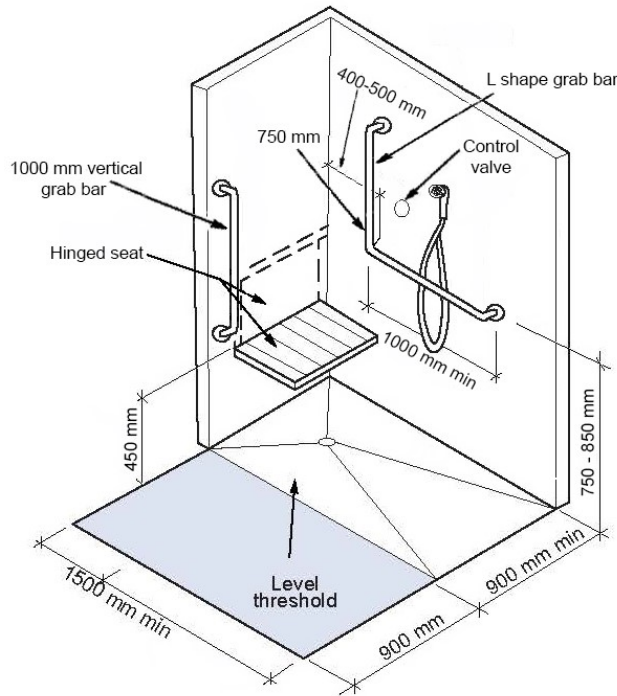
Figure A-3.8.3.13.(2)(b)
Shower Design

a10.1 **A-3.8.3.13.(2)(f) and (g) Shower Seat and Grab Bars.**

Only one grab bar is required, to be installed on the wall next to the seat; a grab bar behind the seat prevents the user from leaning against the wall, while one located on the wall opposite the seat cannot be reached from the seated position.

The use of two straight grab bars installed at a 90° angle to one another is not acceptable. The Code requires a continuous L-shaped grab bar. The seat itself may be used in conjunction with the bar for transfer. If design flexibility is required, fold away grab bars may be used as an alternative.

- a3 A grab bar installed within a barrier-free shower stall on the same wall as the shower controls should have 900 mm long horizontal and vertical components.



a11 **Figure A-3.8.3.13.(2)(e), (f) and (g)**
Accessible Shower

a2.1 **A-3.8.3.13.(4) Showers and Bathtubs.**

The grab bars and their mounting position must facilitate getting in and out of the bathtub from a seated or standing position, as appropriate, to limit the need for twisting the body.

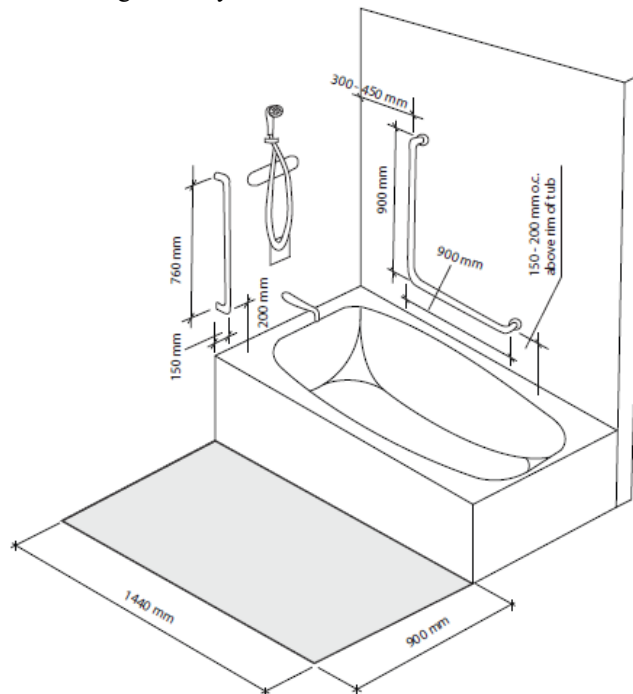


Figure A-3.8.3.13.(4)
Accessible Bathtub

A-4.2.4.1.(1) Innovative Designs.

It is important that innovative approaches to foundation design be carried out by a person especially qualified in the specific method applied and that the design provide a level of safety and performance at least equivalent to that provided for or implicit in the design carried out by the methods referred to in Part 4. Provision must be made for monitoring the subsequent performance of such structures so that the long-term sufficiency of the design can be evaluated.

e7 A-4.2.4.1.(3) Ultimate Limit States for Foundations.

Information on ultimate limit states for foundations, including terminology and resistance factors, can be found in the Commentary entitled “Foundations” in the *2015 Structural Commentaries (User’s Guide – NBC 2015: Part 4 of Division B)*.

e7 A-4.2.4.1.(5) Design of Foundations for Differential Movements.

Information on the design of foundations for differential movements can be found in the Commentary entitled “Foundations” in the *2015 Structural Commentaries (User’s Guide – NBC 2015: Part 4 of Division B)*.

A-4.2.4.4.(1) Depth of Foundations.

When adfreeze has occurred and subsequent freezing results in soil expansion beneath this area, the resulting uplift effect is sometimes referred to as frost jacking.

A heated building that is insulated to prevent heat loss through the foundation walls should be considered as an unheated structure unless the effect of the insulation is taken into account in determining the maximum depth of frost penetration.

e7 A-4.2.5.1.(1) Excavations.

Information on excavations can be found in the Commentary entitled “Foundations” in the *2015 Structural Commentaries (User’s Guide – NBC 2015: Part 4 of Division B)*.

e7 A-4.2.6.1.(1) Shallow Foundations.

Information on shallow foundations can be found in the Commentary entitled “Foundations” in the *2015 Structural Commentaries (User’s Guide – NBC 2015: Part 4 of Division B)*.

A-4.2.7.1.(1) Deep Foundation Units.

A deep foundation unit can be pre-manufactured or cast-in-place; it can be driven, jacked, jetted, screwed, bored or excavated; it can be of wood, concrete or steel or a combination thereof.

e7 A-4.2.7.2.(1) Deep Foundations.

Information on deep foundations can be found in the Commentary entitled “Foundations” in the *2015 Structural Commentaries (User’s Guide – NBC 2015: Part 4 of Division B)*.

A-4.2.7.2.(2) Load Testing of Piles.

ASTM D1143, “Piles Under Static Axial Compressive Load”, defines routine load test procedures that have been extensively used.

A-4.3.3.1.(1) Precast Concrete.

CAN/CSA-A23.3, “Design of Concrete Structures”, requires precast concrete members to conform to CSA A23.4, “Precast Concrete - Materials and Construction”.

A-4.3.4.1.(1) Welded Construction.

Qualification for fabricators and erectors of welded construction is found in Clause 24.3 of CSA S16, “Design of Steel Structures”.

A-4.3.4.2.(1) Cold-Formed Stainless Steel Members.

There is currently no Canadian standard for the design of cold-formed stainless steel structural members. As an interim measure, design may be carried out using the limit states design provisions of ASCE/SEI 8, “Design of Cold Formed Stainless Steel Structural Members”, except that load factors, load combinations and load combination factors shall be in accordance with Subsection 4.1.3.

A-4.3.4.3.(1) Steel Building Systems.

A steel building system is defined in Section 3 of CAN/CSA-A660, “Certification of Manufacturers of Steel Building Systems”.

a10.1 A-4.3.6.1.(1) Design Basis for Glass.

The load factors in Tables 4.1.3.2.A. and 4.1.3.2.B. must be applied to the adjusted wind load before designing in accordance with the referenced standard. Additional information is given in the Commentary entitled “Wind Load and Effects” in the *2015 Structural Commentaries (User’s Guide – NBC 2015: Part 4 of Division B)*.

a10.1 A-4.4.2.1.(1) Design Basis for Storage Garages and Repair Garages.

es See the Commentary entitled “Live Loads” in the *2015 Structural Commentaries (User’s Guide – NBC 2015: Part 4 of Division B)*.

A-5 Environmental Separation.

The requirements provided in Part 5 pertain to the separation of environmentally dissimilar spaces. Most obvious is the need to separate indoor conditioned spaces from unconditioned spaces, the outdoors or the ground. There are also cases where separation is needed between interior spaces which are intended to provide different environments. (See also Appendix Notes A-5.1.1.1.(1) and A-5.1.2.1.(1).)

A-5.1.1.1.(1) Scope.

Part 5 provides explicit requirements related to the transfer of heat, air, moisture and sound in various forms. Control of the ingress of radon and other soil gases is addressed by the requirements related to air leakage.

A-5.1.2.1.(1) Application.

Subsection 1.1.2. of Division A specifies that Part 5 applies to all buildings except those within the scope of Part 9 or the scope of the National Farm Building Code of Canada. Because of their intended use, many buildings need only provide a limited degree of separation from the outdoor environment, the ground, or between interior spaces. The provisions in Part 5 are written to allow exemptions for these buildings.

Part 5 applies to building elements that separate dissimilar environments and to site conditions that may affect environmental loading on the building envelope.

The provisions address

- the design and construction, or selection, of building components, such as windows and doors,
- the design and construction of building assemblies, such as walls, floors and roofs,
- the design and construction of the interfaces between the above-mentioned elements, and
- the design or selection, and installation, of site materials, components and assemblies, such as backfill and drainage, and grading.

Part 5 applies not only to building elements that separate indoor space from outdoor space, but also to those elements that separate indoor space from the ground and that separate adjacent indoor spaces having significantly different environments. Indoor spaces that require separation include interior conditioned spaces adjacent to indoor unconditioned spaces, and adjacent interior conditioned spaces that are intended to provide different environments. An extreme example of the last would be a wall that separates an indoor ice rink from a swimming pool.

Some building elements are exposed to exterior environmental loads but do not separate dissimilar environments. Solid guards on exterior walkways are one example. Such elements are subject to the application of Part 5.

MMAH Supplementary Standard SA-1

Objectives and Functional Statements Attributed to the Acceptable Solutions

January 15, 2019 update

COMMENCEMENT

MMAH Supplementary Standard SA-1 comes into force on the 1st day of January, 2014.

- m1** Ruling of the Minister of Municipal Affairs and Housing (Minister's Ruling) MR-13-S-24 takes effect on the 1st day of January, 2014.
- r3** SA-1 as amended by Ontario Regulation 361/13 comes into force on the 1st day of January, 2014.
- r3.1** SA-1 as amended by Ontario Regulation 361/13 corresponding to Ontario Regulation 361/13 provisions that come into force on the 1st day of January, 2015.
- r4** SA-1 as amended by Ontario Regulation 361/13 corresponding to Ontario Regulation 368/13 provisions that come into force on the 1st day of January, 2015.
- r5** SA-1 as amended by Ontario Regulation 191/14 comes into force on the 1st day of January, 2015.
- r6** SA-1 as amended by Ontario Regulation 139/17 comes into force on the 1st day of July, 2017.
- r6.1** SA-1 as amended by Ontario Regulation 139/17 comes into force on the 1st day of January, 2018.
- m5** Ruling of the Minister of Municipal Affairs (Minister's Ruling) MR-17-S-28 takes effect on the 1st day of January, 2018.
- r11** SA-1 as amended by Ontario Regulation 88/19 comes into force on the 2nd day of May, 2019.
- r11.1** SA-1 as amended by Ontario Regulation 88/19 comes into force on the 1st day of January, 2020.
- r11.2** SA-1 as amended by Ontario Regulation 88/19 comes into force on the 1st day of January, 2022.

EDITORIAL

- e1** Editorial correction issued for January 1st, 2014.
- e2** Editorial correction issued for January 1st, 2014.
- e2.1** Editorial correction issued for January 1st, 2015.
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- e6** Editorial correction issued for May 2nd, 2019.
- e6.1** Editorial correction issued for January 1st, 2020.
- e6.2** Editorial correction issued for January 1st, 2022.
- e7** Editorial correction issued for December 16th, 2020.

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Acceptable Solutions	Objectives and Functional Statements
(3)	[F03-OP1.2] [F03-OS1.2]
(4)	[F03-OP1.2] [F03-OS1.2]
(5)	[F03-OP1.2] [F03-OS1.2]
(6)	
3.1.8.13.	Door Latches
(1)	[F03-OP1.2] [F03-OS1.2]
3.1.8.14.	Wired Glass and Glass Block
(1)	
(2)	
(3)	[F04-OP1.2] Applies to portion of Code text: "Glass blocks permitted by Sentence (1) shall be ... reinforced with steel reinforcement in each horizontal joint." [F04-OS1.2] Applies to portion of Code text: "Glass blocks permitted by Sentence (1) shall be ... reinforced with steel reinforcement in each horizontal joint."
3.1.8.15.	Temperature Rise Limit for Doors
(1)	[F03-OP1.2] [F03, F31-OS1.2] [F05-OS1.5]
3.1.8.16.	Area Limits for Wired Glass and Glass Block
(1)	[F31-OS1.2] [F05-OS1.5] [F30-OS3.1]
(2)	[F31-OS1.2] [F05-OS1.5]
3.1.8.17.	Temperature Rise and Area Limits Waived
(1)	
3.1.8.18.	Sprinkler Protected Glazed Wall Assembly
(1)	[F03-OP1.2] [F04-OP1.3] [F03-OS1.2] [F04-OS1.3]
(2)	[F03-OP1.2] [F04-OP1.3] [F03-OS1.2] [F04-OS1.3]
(3)	[F03, F06-OS1.2] [F05, F06-OS1.5] [F03, F06-OP1.2]
3.1.9.1.	Fire Stopping of Service Penetrations
(1)	[F03-OP1.2] [F04-OP1.3] [F03-OS1.2] [F04-OS1.3]
(2)	[F03-OP1.2] [F03-OP3.1] [F03-OS1.2]
(3)	(a) [F03-OP1.2] (a) [F03-OS1.2] [F10-OS1.5]
(4)	
(5)	
3.1.9.2.	Combustibility of Service Penetrations
(1)	[F03-OP1.2] [F02, F04-OP1.3] Applies to portion of Code text: "Except as permitted by Articles 3.1.9.3. and 3.1.9.4., pipes, ducts, electrical outlet boxes, totally enclosed raceways or other similar service equipment that penetrate an assembly required to have a <i>fire-resistance rating</i> shall be <i>noncombustible</i> ..." [F03-OS1.2] [F02, F04-OS1.3] Applies to portion of Code text: "Except as permitted by Articles 3.1.9.3. and 3.1.9.4., pipes, ducts, electrical outlet boxes, totally enclosed raceways or other similar service equipment that penetrate an assembly required to have a <i>fire-resistance rating</i> shall be <i>noncombustible</i> ..."
3.1.9.3.	Penetration by Wires, Cables and Outlet Boxes
(1)	

e7
r11.1

Acceptable Solutions	Objectives and Functional Statements
(2)	
(3)	
(4)	
(5)	
(6)	
(7)	
3.1.9.3A.	Penetration by Outlet Boxes
(1)	[F03-OP1.2] [F03-OS1.2]
(2)	
(3)	[F03-OP1.2] [F03-OS1.2]
3.1.9.4.	Combustible Piping Penetrations
(1)	[F03-OP1.2] [F02, F04-OP1.3] [F03-OS1.2] [F02, F04-OS1.3]
(2)	[F03-OP1.2] [F02, F04-OP1.3] [F03-OS1.2] [F02, F04-OS1.3]
(3)	
(4)	
(5)	
(6)	
(7)	[F03-OP1.2] [F02, F04-OP1.3] [F03-OS1.2] [F02, F04-OS1.3]
(8)	
3.1.9.5.	Openings Through a Membrane Ceiling
(1)	[F04-OP1.3] [F04-OS1.3]
(2)	[F04-OP1.3] [F04-OS1.3]
3.1.9.6.	Plenums
(1)	
3.1.10.1.	Prevention of Firewall Collapse
(1)	[F04-OP1.2] [F04-OP3.1] [F04-OS1.2]
(2)	[F03, F04-OP1.2] [F03, F04-OP3.1] [F03, F04-OS1.2]
(3)	
(4)	[F04-OP1.2] [F04-OP3.1] [F04-OS1.2]
3.1.10.2.	Rating of Firewalls
(1)	[F03-OP1.2] Applies to portion of Code text: "A firewall which separates a building or buildings with floor areas containing a Group E or a Group F, Division 1 or 2 major occupancy shall be constructed as a fire separation of noncombustible construction having a fire-resistance rating not less than 4 h ..." [F03-OP3.1] Applies to portion of Code text: "A firewall which separates a building or buildings with floor areas containing a Group E or a Group F, Division 1 or 2 major occupancy shall be constructed as a fire separation of noncombustible construction having a fire-resistance rating not less than 4 h ..." [F03-OS1.2] Applies to portion of Code text: "A firewall which separates a building or buildings with floor areas containing a Group E or a Group F, Division 1 or 2 major occupancy shall be constructed as a fire separation of noncombustible construction having a fire-resistance rating not less than 4 h ..."

e7

Acceptable Solution	Objectives and Functional Statements
4.2.3.2.	Preservation Treatment of Wood
(1)	[F80-OS2.3] [F80-OP2.3]
4.2.3.3.	Plain and Reinforced Masonry
(1)	
4.2.3.4.	Prevention of Deterioration of Masonry
(1)	[F80-OS2.3] [F80-OP2.3]
4.2.3.5.	Concrete
(1)	
4.2.3.6.	Protection Against Chemical Attack
(1)	[F80-OS2.3] [F80-OP2.3]
4.2.3.7.	Steel
(1)	
4.2.3.8.	Steel Piles
(1)	[F20-OS2.3] [F20-OP2.3]
4.2.3.9.	High Strength Steel Tendons
(1)	[F20, F80-OS2.5, OS2.6] [F20, F80-OP2.5, OP2.6] [F20, F80-OP4.1, OP4.4]
4.2.3.10.	Corrosion of Steel
(1)	[F80-OS2.3] [F80-OP2.3] [F80-OP4.1]
4.2.4.1.	Design Basis
(1)	[F20-OS2.2] [F20, F21-OS2.6] [F20-OP2.2] [F21-OP2.5] [F21-OP4.1, OP4.4]
(2)	
(3)	
(4)	
(5)	[F21-OS2.5] [F21-OP2.4, OP2.5]
(6)	
4.2.4.2.	Subsurface Investigation
(1)	[F20-OS2.2] [F20, F21-OS2.6] [F20-OP2.2] [F21-OP2.6] [F21-OP4.1, OP4.4]
4.2.4.3.	Identification
(1)	[F20-OS2.2] [F20, F21-OS2.6] [F20-OP2.2] [F21-OP2.6] [F21-OP4.1, OP4.4]
4.2.4.4.	Depth of Foundations
(1)	[F21-OP2.4] Applies to portion of Code text: "... the <i>bearing surface</i> of a <i>foundation</i> shall be below the level of potential damage, including damage resulting from <i>frost action</i> ..." [F21-OP2.4] Applies to portion of Code text: "... the <i>foundation</i> shall be designed to prevent damage resulting from <i>adfreezing</i> and <i>frost jacking</i> ."
(2)	[F21-OP2.4]

Acceptable Solution	Objectives and Functional Statements
4.2.4.5.	Sloping Ground
(1)	[F21-OS2.2] [F21-OP2.2, OP2.4, OP2.6]
4.2.4.6.	Eccentric and Inclined Loads
(1)	[F20-OS2.1, OS2.2] [F20-OP2.1, OP2.2, OP2.4]
4.2.4.7.	Dynamic Loading
(1)	[F20-OS2.2] [F20-OP2.2, OP2.4, OP2.6] [F20-OH4]
4.2.4.8.	Hydrostatic Uplift
(1)	[F22-OP2.1, OP2.4]
4.2.4.9.	Groundwater Level Charge
(1)	[F21-OP4.1]
4.2.4.10.	Permafrost
(1)	[F20-OS2.2] [F21-OS2.5] [F20-OP2.2] [F20, F21-OP2.4] [F21-OP2.6]
4.2.4.11.	Swelling and Shrinking Soils
(1)	[F21-OP2.4, OP2.6]
4.2.4.12.	Expanding and Deteriorating Rock
(1)	[F21-OP2.4, OP2.6]
4.2.4.13.	Construction on Fill
(1)	(a) [F20-OS2.2] [F21-OS2.5] (b) [F20-OP2.2] [F20, F21-OP2.4] [F21-OP2.6] (c) [F01-OS1.1]
4.2.4.14.	Structural Design
(1)	
4.2.5.1.	Design of Excavations
(1)	
4.2.5.2.	Excavation Construction
(1)	[F21-OP4.1]
(2)	[F20-OS2.6] [F20-OP2.3] [F20, F21-OP4.1]
4.2.5.3.	Supported Excavations
(1)	[F20-OS2.6] [F21-OP4.1]
4.2.5.4.	Unsupported Excavations
(1)	[F20-OS2.6] [F21-OP4.1]
4.2.5.5.	Control of Water Around Excavations
(1)	[F60-OS2.6] [F60-OP4.1, OP4.4]
4.2.5.6.	Loss of Ground
(1)	[F21-OP4.1]
4.2.5.7.	Protection and Maintenance at Excavations
(1)	[F80-OS2.6] [F80-OP4.1]

Acceptable Solution	Objectives and Functional Statements
4.2.5.8.	Backfilling
(1)	[F21-OP4.1] (a) [F21-OP2.1, OP2.4] (a) [F21-OS2.1]
(2)	[F21-OP2.4]
4.2.6.1.	Design of Shallow Foundations
(1)	
4.2.6.2.	Support of Shallow Foundations
(1)	[F20-OS2.2] [F20-OP2.2] [F20, F21-OP2.4]
4.2.6.3.	Incorrect Placement of Shallow Foundations
(1)	[F20-OS2.2] [F20-OP2.2] [F20, F21-OP2.4]
4.2.6.4.	Damaged Shallow Foundations
(1)	[F20-OS2.1] [F20-OP2.1] [F20, F22-OP2.4]
4.2.7.1.	General
(1)	
4.2.7.2.	Design for Deep Foundations
(1)	
(2)	
(3)	[F20-OS2.1, OS2.2] [F21-OS2.5] [F20-OP2.1, OP2.2] [F21, F22-OP2.4]
(4)	
(5)	[F20-OS2.1] [F20-OP2.1] [F20, F22-OP2.4]
(6)	[F20-OP2.1, OP2.4]
4.2.7.3.	Tolerance in Alignment and Location
(1)	[F20-OS2.1] [F20-OP2.1] [F20, F22-OP2.4]
4.2.7.4.	Incorrect Alignment and Location
(1)	[F20-OS2.1] [F20-OP2.1] [F20, F22-OP2.4]
4.2.7.5.	Installation of Deep Foundations
(1)	[F81-OS2.1] [F21-OS2.2, OS2.6] (a), (b) [F81-OP2.1] [F21-OP2.2] [F21, F81-OP2.4] (c) [F21-OP4.1]
4.2.7.6.	Damaged Deep Foundation Units
(1)	[F20-OS2.1] [F20-OP2.1] [F22-OP2.4]
4.2.8.1.	General
(1)	
4.2.8.2.	Use of Existing Foundations
(1)	[F20-OS2.1, OS2.2] [F20-OP2.1, OP2.2] [F22-OP2.4]
4.3.1.1.	Design Basis for Wood
(1)	[F20-OS2.1] [F80-OS2.3] [F20-OP2.1] [F80-OP2.3] [F21, F22, F80-OP2.4] [F21, F22, F80-OH4]

Acceptable Solution	Objectives and Functional Statements
4.3.1.2.	Glue-Laminated Members
(1)	[F20-OS2.1] [F20-OP2.1] [F21, F22-OP2.4] [F21, F22-OH4]
4.3.1.3.	Termites
(1)	
4.3.2.1.	Design Basis for Plain and Reinforced Masonry
(1)	[F20-OS2.1] [F80-OS2.3] [F20-OP2.1] [F80-OP2.3] [F21, F22, F80-OP2.4] [F21, F22, F80-OH4]
4.3.3.1.	Design Basis for Plain, Reinforced and Prestressed Concrete
(1)	[F20-OS2.1] [F80, F81-OS2.3] [F20-OP2.1] [F80, F81-OP2.3] [F21, F22, F80, F81-OP2.4] [F21, F22, F80, F81-OH4]
4.3.4.1.	Design Basis for Structural Steel
(1)	[F20-OS2.1] [F80-OS2.3] [F20-OP2.1] [F80-OP2.3] [F20, F22, F80-OP2.4] [F22, F80-OH4]
4.3.4.2.	Design Basis for Cold Formed Steel
(1)	[F20-OS2.1] [F80-OS2.3] [F20-OP2.1] [F80-OP2.3] [F20, F22, F80-OP2.4] [F22, F80-OH4]
4.3.4.3.	Steel Building Systems
(1)	
4.3.5.1.	Design Basis for Aluminum
(1)	[F20-OS2.1] [F80-OS2.3] [F20-OP2.1] [F80-OP2.3] [F20, F22, F80-OP2.4] [F22, F80-OH4]
4.3.6.1.	Design Basis for Glass
(1)	[F20-OS2.1] [F20-OP2.1]
4.4.1.1.	Design Basis for Air-Supported Structures
(1)	[F20-OS2.1] [F80-OS2.3] [F20-OP2.1] [F80-OP2.3] [F22-OP2.4] [F22-OH4]
e7 4.4.2.1.	Design Basis for Storage Garages and Repair Garages
(1)	[F21, F61, F80-OS2.3] [F21, F61, F80-OP2.3, OP2.4] [F21, F61, F80-OH4]
4.4.3.1.	Guards Over Retaining Walls
(1)	[F30-OS3.1]
4.4.4.1.	Anchor Systems on Building Exterior
(1)	[F30-OS3.1]
(2)	[F20-OS2.1] [F30-OS3.1]
(3)	
(4)	[F81-OS2.3]
e7 4.4.5.1.	Manure Storage Tanks
(1)	
(2)	
(3)	[F43-OS3.4] [F110-OE]

Acceptable Solution	Objectives and Functional Statements
(4)	[F80-OP2.3]
	[F80-OS2.3]
(5)	[F20-OP2.1] [F22-OP2.4]
	[F20-OS2.1]
	[F43-OS3.4]
	[F110-OE]

Table 5
Objectives and Functional Statements Attributed to the Acceptable Solutions in Part 5 of Division B

Acceptable Solution	Objectives and Functional Statements
5.1.1.1.	Scope
(1)	
5.1.2.1.	Exposure to Exterior Space or the Ground and Separation of Dissimilar Environments
(1)	
5.1.3.1.	Reserved
5.1.4.1.	Structural and Environmental Loads
(1)	[F61-OH4] (a) [F20, F51, F55-OS1.4] Applies where required life safety systems are incorporated in environmental separators. (a) [F60, F61, F63-OS2.2, OS2.3] (a) [F55, F61, F63-OH1.1, OH1.2, OH1.3] (b) [F20-OS2.1] [F21, F22-OS2.3, OS2.4] Applies to snow fences and sloped glazing. (b) [F20-OS3.1] Applies to snow fences and sloped glazing. (b) [F20, F21, F22-OH1.1, OH1.2, OH1.3] (b) [F20-OH4]
(1.1)	
(2)	
(3)	[F20-OS2.1] [F21, F22-OS2.3, OS2.4] [F20, F21, F22-OH1.1, OH1.2, OH1.3]
(4)	(a), (b) [F20-OS2.1] [F21, F22-OS2.3, OS2.4] (a), (b) [F20, F21, F22-OH1.1, OH1.2, OH1.3]
(5)	[F20, F21, F22-OH1.1, OH1.2, OH1.3] (a) [F20-OS2.1, OS2.3] (b), (c) [F21, F22-OS2.3] (b), (c) [F22-OH4]
5.1.4.2.	Resistance to Deterioration
(1)	[F80, F81-OS1.4] Applies where required life safety systems are incorporated in environmental separators. [F80, F81-OS2.3] [F80, F81-OS3.1] Applies to floor assemblies. [F80, F81-OH1.1, OH1.2, OH1.3] [F80, F81-OH4] Applies to floor assemblies.
(2)	
(3)	
5.1.5.1.	Requirements in Other Parts of the Code
(1)	
5.2.1.1.	Exterior Environmental Loads
(1)	
(2)	[F20-OS2.1] [F20, F40-OH1.1] [F20-OH1.2, OH1.3]
(3)	
5.2.1.2.	Interior Environmental Loads
(1)	[F51, F55, F61, F63-OS1.4] Applies where required life safety systems are incorporated in environmental separators. [F55, F61, F63-OS2.3] [F51, F55, F61, F63-OH1.1, OH1.2]
5.2.1.3.	Environmental Load and Transfer Calculations
(1)	[F51, F61, F63-OS2.3] Applies to heat, air and moisture transfer calculations. [F51, F55, F61, F63-OH1.1, OH1.2] [F51, F61-OH1.3] Applies to heat, air and moisture transfer calculations. [F56-OH3.1] Applies to sound transmission calculations.
(2)	
(3)	[F20-OS1.4] Applies where required life safety systems are incorporated in environmental separators.

F11.1

- (6) A vertical service space, other than an elevator shaft, that passes through the floor above the lowest exit storey, is provided with a tight-fitting noncombustible seal or fire stop at the floor level of the storey immediately below that storey, except where the vertical service space is vented to the outdoors at the top as described in Sentence (10) of Measure F.
- (7) A supply of air required by Sentence (3) is carried in ducts as described in Sentence (13) of Measure F.
- (8) The central control facility required by Article 3.2.6.7. of Division B is provided with additional controls capable of
 - (a) opening closures to vents in shafts that may be required by Sentence (6),
 - (b) stopping air handling systems as required by provisions for existing sprinklered buildings, and
 - (c) initiating the mechanical air supply to stair shafts as may be required in Sentence (3).

Measures B and C Open Corridor Access to Stairs and Elevators

General

Measures B and C can be applied to a building where habitable floor areas are approached along access ways open to the outdoors.

Each corridor that provides access to stairs or elevators is permanently open to the outside as shown in Figures 2 and 19. The situation is illustrated by the pressure characteristic diagram shown in Figure 20. Air flow through openings that may exist in floors is likely to be more pronounced than with other smoke control methods because of the reduction in the influence of vertical shafts, so it is desirable that openings through the floor-ceiling assembly be minimized. This should not, however, present an immediate smoke problem except on the floor directly above the floor where a fire occurs.

Measure C is the same as Measure B, except that no steps are taken to limit smoke movement into upper storeys through vertical service spaces or shafts in Measure C.

Where shafts enclosing plumbing and electrical services penetrate floor spaces and a decision has been made to use Measure B for control of smoke movement, these shafts should be sealed at least at every fifth storey at a horizontal fire separation and at the floor immediately below the lowest exit storey or have vents to the outside at the top. In the latter case there is still some possibility that smoke may pass into the uppermost floor because the air pressures in these floor areas are in the same range as the outside pressures. It is therefore important that any leakage areas in the enclosing walls between floor areas and shaft be kept to a minimum.

In order to avoid creation of pressures that may interfere with the opening of doors to stair shafts and elevator shafts, it is recommended that the building heating system be so designed that temperatures in heated stair shafts and elevator shafts be not more than 12°C above outside air temperature.

Where Measure B is adopted and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that the occupants of the fire floor will walk down stairs to a safe floor area. In buildings more than 36 m high, occupants of other floors may remain until advised to evacuate by the person operating the central alarm and control facility.

Where Measure C is adopted, and a fire is detected by an automatic device or a manual pull station is actuated, it is intended that a fire alarm will sound on all floors simultaneously, and that occupants of all floors will walk down stairs to the street floor or to a safe intermediate floor area.

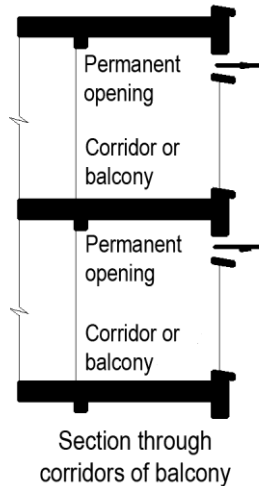


Figure 19 Illustration of Measures B and C designs

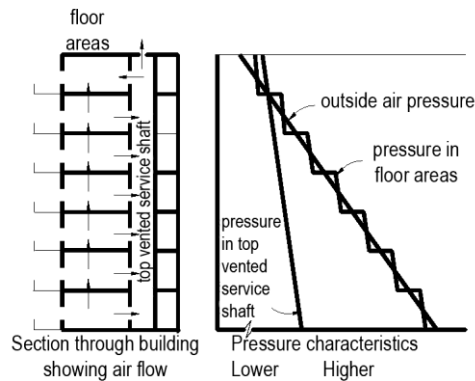


Figure 20 Pressure characteristics in a Measure B design

Measure B (including restriction on the movement of smoke from floor to floor)

- (1) The requirements of measures to limit smoke movement in existing buildings may be met by incorporating the requirements in Sentences (2) to (9).
- (2) All public corridors leading to the required exit stairs and elevators for firefighters from every floor area on a floor above the lowest exit storey are provided with permanent openings to the outdoors that
 - (a) are distributed along the length of the corridor,
 - (b) have the top of the opening not more than 250 mm below the ceiling of the corridor, and
 - (c) have an aggregate open area that is not less than 10 percent of the floor area of the corridor or 1 m², whichever is greater.
- (3) A stairway serving storeys below the lowest exit level is protected as described in Sentence (3) of Measure A.
- (4) Any elevator shaft that passes through the floor above the lowest exit storey does not penetrate the floor of the storey immediately below the lowest exit storey except where there is a vestibule between the elevator door or doors and each floor area below grade as described in Sentence (3) of Measure D.