

Ensuring adequate support for concrete block masonry walls during construction

Not long after work had finished for the day on a building construction site, a concrete block masonry wall at the edge of the building collapsed outward onto two adjacent properties. The wall was non-load bearing and more than 15 metres (50 feet) high. Except at the wall base, no temporary or permanent supports had been installed to laterally brace the wall, so the wall had very low resistance to lateral loads such as wind. There were no injuries, but one neighbouring building was destroyed, and two others were badly damaged. This bulletin explains the potential hazards of masonry walls and discusses ways to reduce the risk of a collapse.

Concrete block masonry walls are common on construction sites throughout B.C. Masonry is often selected for walls that require a high level of fire resistance, sound isolation, or durability.

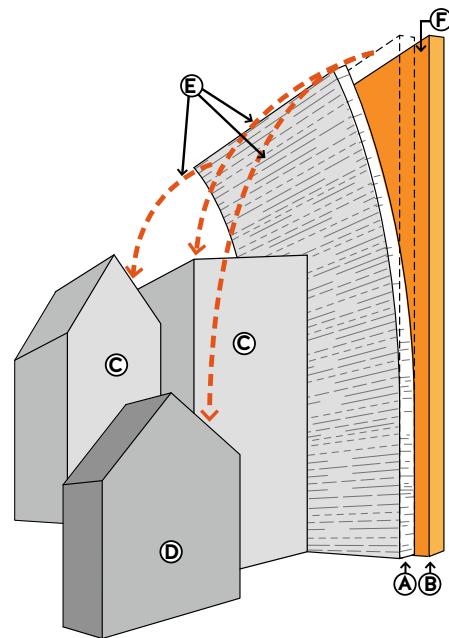
The engineering drawings for a building typically detail how masonry walls are to be permanently supported by the other components of the building structure. However, these engineering drawings don't usually address how masonry walls are to be supported during construction.

Contractors must ensure that masonry walls are supported adequately during construction, particularly when it comes to lateral stability. During construction, lateral support of a masonry wall is typically achieved by one or both of the following:

- Installing permanent supports as wall construction progresses
- Restraining the wall with temporary braces

What is the hazard?

If sufficient lateral support of a masonry wall is not maintained during construction, the wall could collapse catastrophically due to its low resistance to lateral loads such as wind. A collapse of this type



The masonry wall collapse incident

- (A) Non-load-bearing masonry wall of new building
- (B) Structural wall of new building
- (C) Buildings damaged by falling masonry
- (D) Building destroyed by falling masonry
- (E) Paths of falling masonry blocks during wall collapse
- (F) No lateral supports installed between masonry wall and structural wall

could result in serious injuries or fatalities, as well as damage to adjacent structures or equipment.

Lateral stability is a concern for all masonry walls. Types of masonry walls that are particularly at risk of lateral instability during construction include:

- Load-bearing walls (i.e., walls that vertically support floor or roof members) with large distances between points of lateral support. The walls of gymnasiums, warehouses, and similar structures sometimes fit into this category.
- Non-load-bearing walls (i.e., walls that do not vertically support floor or roof members) that are multiple storeys tall. Examples include firewalls at the perimeters of new buildings. The masonry wall described at the start of this bulletin was this type of wall.

How to prevent masonry wall collapses

Masonry contractors

Develop safe work procedures that specify how masonry walls will be supported during construction. This may require written instructions from a professional engineer and input from the prime contractor. These procedures should answer questions such as the following:

- Who will install the permanent supports from the masonry wall to the building structure? Best practice is to document who is responsible for the permanent supports.
- When and where will the permanent supports be installed?
- Are the permanent supports adequate for the forces imposed during construction?
- Is temporary bracing of the masonry wall required?
- If temporary bracing is required, what does it consist of? When will it be installed? Who will install it? At what point can it be removed?
- What is the maximum height of masonry wall that can be built above a line of temporary bracing and/or permanent supports?

Ensure workers are trained in the safe work procedures and effectively supervised.

Ensure regular inspections are conducted to confirm that temporary bracing and permanent supports for masonry walls are installed as required.

Owners and prime contractors

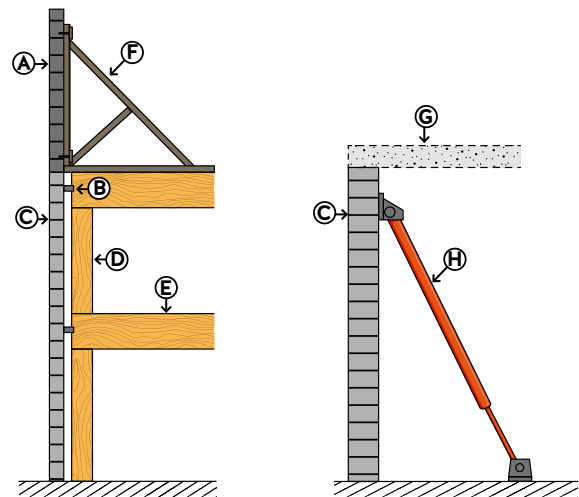
Ensure safe work procedures are in place specifying how masonry walls will be supported.

Coordinate work activities, especially the installation of temporary bracing and permanent supports, to prevent the development of unsafe conditions.

Ensure regular inspections are conducted to confirm that supports are installed as required.

Regulation requirements

- [Section 20.14, Temporary support](#)
- [Section 4.2, Safe buildings and structures](#)
- [Section 3.5, General requirement](#) (for workplace inspections)



Lateral supports for non-load-bearing (left) and load-bearing (right) masonry walls during construction

- (A) Section of the masonry wall built after installation of the top permanent lateral support
- (B) Permanent lateral support for the masonry wall
- (C) Masonry wall
- (D) Wall structure
- (E) Floor structure
- (F) Temporary brace (may not be required if the wall above the top permanent support is laterally stable on its own)
- (G) Floor or roof structure yet to be installed
- (H) Temporary brace