City of Coquitlam | Planning and Development

Steep Slopes & Retaining Walls

Coquitlam has a varied topography and is situated at the foot of a major mountain range with various water courses flowing through the city. Heavy rains, the passage of time and general erosion contribute to landslides and other natural but unfortunate occurrences on sloped and rugged terrain.

It is important for the City of Coquitlam and its residents to address the issues of slope stability and retaining walls in order to anticipate and avoid future problems.

This brochure provides a general guide on how to build and maintain stable retaining walls on your property, and describes the responsibilities and roles of both the homeowner and the City.

Steep Slopes

Property owners and developers must consider and pay attention to slope stability and earth retention issues for sites already developed or any they wish to develop.

Slope Stability Risk Areas

- near creeks and ravines
- at the top or bottom of cliffs
- near bodies of water such as lakes and rivers
- near dikes or areas where flooding is known to occur
- close to gravel operations or large excavations
- where trees and vegetation have been significantly removed

If you notice any of the above-listed concerns on your property, please contact a Structural or Geotechnical Engineer. To report any unusual activity or risk areas on City of Coquitlam property, please call 604-927-3500.

Look for These Changes Around Your Property

- cracks and/or ground settlement
- erosion that is causing soil or other ground cover to slide or slough away
- soils moving away from house foundations, patios, or pool decks
- leaning of brick chimneys, house foundations and other heavy structures
- sidewalks or driveways cracking near the slope
- leaning, curving, or uprooting of trees or vegetation
- soils moving to/from your property to/from a neighbouring property
- raising, lowering or altering of slopes by a neighbouring property owner
- removal of vegetation that would otherwise stabilize the soils and prevent erosion

Tips to Improve Slope Safety

- Do not remove trees and other vegetation from the slope.
- Obtain all required permits for work at or near slopes including garden sheds, pools, etc.
- Do not place any foreign or heavy materials on the slope (including compost or yard trimmings).
- Ensure that drainage is directed away from the slope.
- If the slope is used for drainage, ensure that all piping is installed from top to bottom of slope.
- Inspect slopes on your property twice a year and during heavy rainfalls.
- If any sloughing or slippage is observed on your property, have the slope inspected by a Professional Engineer.

Retaining Walls

Retaining walls are used to stabilize and modify slopes, level sites and to correct grade differences between properties. If you have a retaining wall or are planning to build one, it is important to ensure its structural integrity. Failure of the wall could lead to landslides or other problems.

Some retaining walls were built before the City required permits for such construction. In addition, wood retaining walls may well have been in service for a long time and could be coming to the end of their lifespan as various types of wood (including treated wood) does not last forever.

These walls should be reviewed for:

- structural performance,
- slumping,
- insect infestation and degradation,
- rot, and
- slope stability.

If the retaining wall is no longer fully functioning, homeowners should make the necessary repairs or replace it entirely.

Existing Retaining Walls

If you have a retaining wall on your property it is your responsibility to:

- Ensure your wall does not trespass onto neighbouring properties; and
- Monitor your wall and regularly inspect it for signs of any weak areas or risk of failure, such as:
  - cracks in the wall face, particularly if made of concrete or mortar;
  - splitting of wood in timber retaining walls;
  - bowing or bellying of the wall—horizontally or vertically;
  - leaning and/or uprooted vegetation or hedges;
  - shifting of the wall as a whole, or creeping down the slope;
  - insect infestations such as termites and carpenter ants in timber;
  - alterations to the wall by a neighbour or previous owner;
  - leaning of the wall away from the slope (most walls should lean into the slope);
  - cracking or shifting of landscape or paving (i.e. pools, pool decks, and patios);
  - the removal of soils supporting the base of the wall (this can result in the whole wall sliding down to a new resting place on the slope); and
  - added construction at the top of the wall such as decks, additional walls, or sheds which add more pressure and weight.

New Retaining Wall Construction

Walls are installed to deal with grade differences between private properties for reasons such as:

- creating a level site for construction;
- leveling a back yard near a slope;
- holding back a natural or man-made slope;
- accommodating a swimming pool or fish pond;
- landscaping between properties or on an individual property;
- retaining a driveway access to a carport or to access a detached garage; or
- creating building lots through subdivision.

If you plan on building a retaining wall, obtain all required City of Coquitlam permits for construction. Additionally, obtain professional advice and competent contractors for the design and construction. Structural Engineers and Geotechnical Engineers possess the expertise and training for retaining wall construction and assessments.

Most common retaining wall construction methods are:

- reinforced steel cast-in-place concrete
- brick or interlocking blocks (i.e. allen block system)
- split rock and mortar
- wood cribbed/uncribbed
- gabion style wire baskets filled with rock or gravel
- boulders and stones (not to exceed 1.2m (4 feet) in height)
- stacked logs
- heavy timber treated wood (creosote materials not permitted)

Note: *Large block material typically used for construction and highway work is not permitted in residential zones.*

Drainage

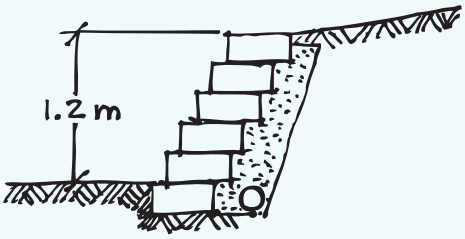
Many of the failures associated with retaining walls can be largely attributed to lack of proper drainage - the weight of saturated soils behind a wall can push against it causing the wall to bow or even pull apart. Dealing with the water that can cause such events is crucial to maintaining the retaining wall's structural stability and its lifespan.

Walls should be designed with proper drainage and storm water must be directed to a City-approved Storm Water Management System.

Poor Drainage and rotting wood contributued to this wall failure.

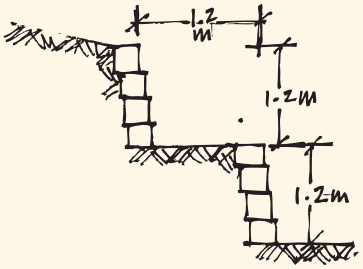
Minimum Design Factors

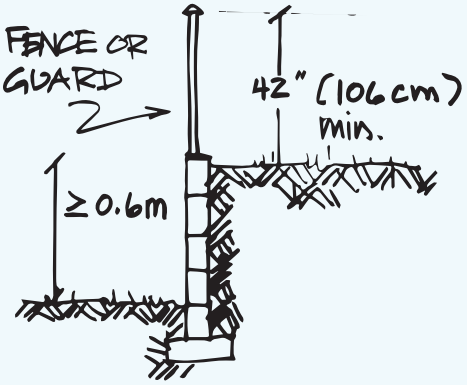
The following examples illustrate the regulations found in

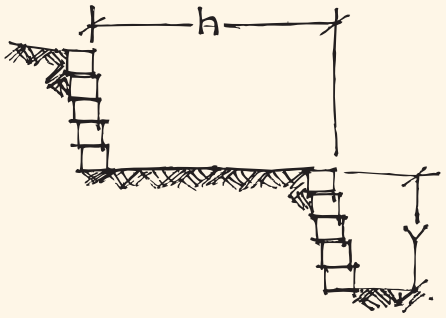


Single Wall Systems

1. A retaining wall exceeding 1.2 metres (4 feet) in height will require a building permit and shall be designed by a professional engineer.
2. A retaining wall is not permitted to exceed 2.4 metres (8 feet) in height under any circumstances.
3. Walls exceeding 0.6m (2ft.) in height should have a guard or fence installed on top of it.







Section 516 of the City's Zoning Bylaw.

Multiple Wall Systems (stepped)

1. A minimum of 1.2 metres (4 feet) horizontal separation is required between any two retaining walls in a stepped design.

   Stepped retaining walls shall be spaced horizontally a minimum distance of one times the height of the immediate lower wall (1h:1v).

2. Stepped retaining walls (regardless of the height of individual walls) that are spaced horizontally less than a minimum distance of two times the height of the immediate lower retaining wall (2h:1v) will require a professional design and a building permit.

3. A maximum height of 4.8 metres (16 feet) may be permitted for a combination of two walls, with a maximum height of 3.6 metres (12 feet) for any individual wall. This is permitted in rear or side yards only.

General

1. Land adjacent or between retaining walls shall have a finished slope not exceeding 2h:1v in native materials, and 3h:1v in man-made fills unless certified by a Geotechnical Engineer.

2. Retaining walls systems shall incorporate a design for drainage and show a connection to a sump and municipal storm service.

3. Unique site circumstances may warrant further inspection by a City Building Official.

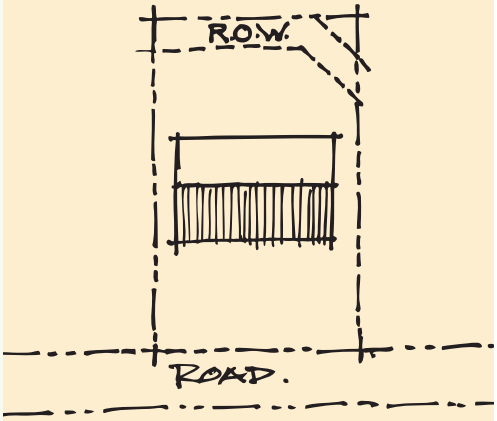
For more information on application requirements for a building permit, visit our website at **coquitlam.ca/building**, call us at **604 927-3441**, or visit the Building Permits Division counter located on the main floor at City Hall, 3000 Guildford Way.

You Should Be Aware of ... Rights of Way.

A Right of Way (ROW) is placed on a property to provide the City with unrestricted access to underground services. It can also be used to protect above-ground structures such as drainage swales or buildings containing special equipment. You should be aware of any ROW on your property. Your Certificate of Title will list any that are registered on your lot.

If a ROW exists on your lot, you will not be permitted to build any structure over it. This will protect services from excess loads being placed on them and ensures unrestricted access to the services if excavation and maintenance is required. Buildings such as sheds and garages, or structures such as retaining walls, patios and planters that are placed on a ROW, may have to be removed at the homeowner's expense if maintenance, repair or replacement of an underground service is required.

In some cases, low retaining walls, planters and patio surfaces may be permitted to cross a ROW. You will require permission from the City prior to construction. If you have a ROW on your property and are planning to build on or near it, contact Engineering Customer Service at **604 927-3500** before you dig!



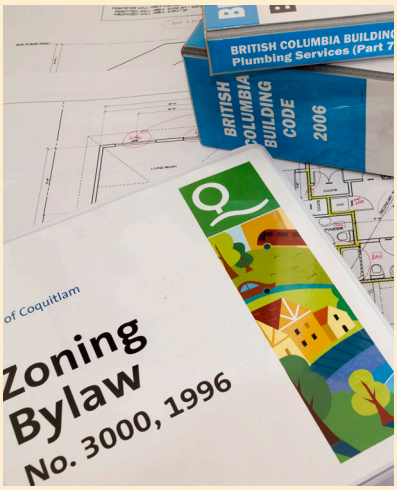
Roles and Responsibilities

Property Owner

The property owner has the right to enjoy their property in a way that does not put at risk their family or family's health and safety, or that of neighbours or the public. Due diligence is necessary when considering a potential property purchase and when developing and maintaining your own property.

Property owners are obliged to plan work in a responsible manner. If a property owner doesn't have the expertise to fulfill this responsibility, he or she should seek professionals for advice and qualified contractors for construction.

Any retaining wall must not intrude on neighbouring properties or rights-of-way. In addition, monitoring and maintaining a retaining wall is the responsibility of the property owner where the wall has been built.



City

If you have concerns with retaining walls or slopes on or near your property, City staff will do its best to provide guidance. However, retaining walls and slopes on private property are the sole responsibility of the property owner and, like the roof on your home, they can last for many years without a concern. The City has no responsibility for maintenance of retaining walls on private property.

Contractor

Slope stabilization and the construction of retaining walls require specific skills and knowledge, as well as the scheduling and coordination of trade workers. The property owner should take great care in selecting an experienced contractor taking into consideration their:

- history of completed projects;
- financial stability; and
- experience in similar work, and opinions and experiences of previous clients.

Structural and Geotechnical Engineers

Owners considering repairs or replacement of retaining walls or the stabilization of slopes should hire experts such as Structural or Geotechnical Engineers. Engineers can:

- assess the stability of slopes;
- assess the condition of existing installations;
- make recommendations for measures appropriate to the conditions they observe;
- provide designs and specifications that meet appropriate standards; and
- assess the work undertaken by the owner or his contractor for compliance with the engineers' designs and specifications.

Permits

The City regulates any replacement or repairs and new construction in accordance with its Building and Zoning Bylaws. Construction generally requires a Building Permit; however, this process does not guarantee that work done under any permit is correct or has been competently done. The City relies on the Registered Professionals, contractors and, ultimately, the property owner to ensure that permitted work provides the level of health and safety required by current standards, codes and practices.