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RETAINING WALLS AND ROCK WALLS

This informational bulletin clarifies building permit requirements for the installation of retaining walls under the 2006 International Building Code §105.2 and the 2006 International Residential Code §105.2

A *retaining wall* is a wall designed to resist lateral earth and/or fluid pressures, including any surcharge, in accordance with accepted engineering practice.

The Covington Municipal Code adopts, by reference, IBC §105.2, item 5 and IRC §105.2, item 3, which state:

“A building permit shall not be required for ... retaining walls that are not over four feet in height measured from the bottom of the footing to the top of the wall, unless supporting a surcharge ...”

It is common misconception that this section of the IBC and IRC allows retaining walls of up to four feet in *exposed wall height* to be constructed without a permit regardless of the back slope conditions.

In order to interpret this building code section correctly, a clear understanding of the following terms is essential:

Retained Wall Height is the vertical distance measured from the bottom of the footing to the finish grade at the top of the wall (upper soil grade). This is the height referred to in IBC §105.2, item 5 and IRC §105.2, item 3, and it includes the wall and depth of footing below grade.

Exposed Wall Height is the vertical distance measure from the finish grade at the bottom of the wall (lower soil grade) to the finish grade at the top of the wall (upper soil grade). This height does not include the wall and depth of footing below grade.

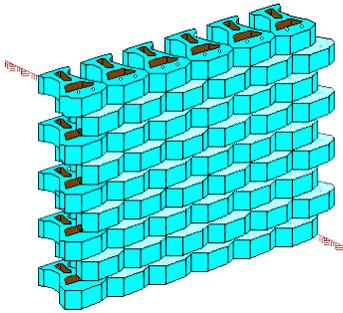
Surcharge is a vertical load imposed on the retained soil that may impose a lateral force in addition to the lateral earth pressure of the retained soil. Examples of surcharges are:

- Sloping retained soil
- Structure footings supported by the retained soil
- Adjacent vehicle loads supported by the retained soil
- Solid fences that are attached or directly adjacent to a retaining wall when wind pressures act on the fence

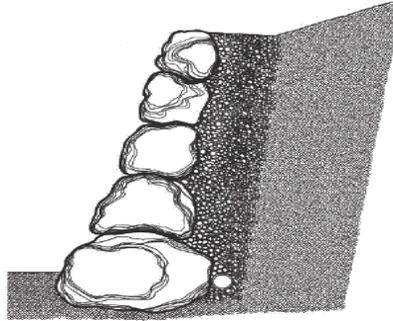
Cantilever Retaining Wall is typically constructed of reinforced concrete masonry units or reinforced concrete stem wall supported on a reinforced concrete footing.

Segmental Gravity Wall is typically constructed of manufactured (i.e. Allan Block, Earthstone, Keystone, etc.) modular concrete units stacked in a running bond pattern without mortar or reinforcement.

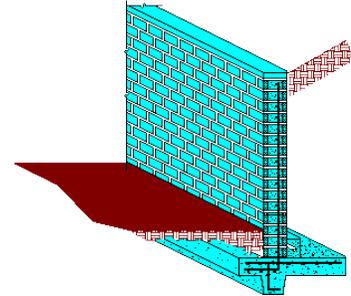
Rock Wall (Rockery) is typically constructed of un-cemented, interlocking rows of large rocks that are not tied together. Rock walls are gravity walls and have a low tolerance for movement. The rocks are naturally shaped quarry stone or boulders. Typically, they are only constructed on slopes that are relatively stable. They are not structural walls and are usually employed for slope stability or erosion control.



Cantilever Wall



Rock Wall



Segmental Gravity Wall

A typical cantilever reinforced masonry (or concrete) retaining wall or rock wall will utilize a footing with a thickness of at least 12 inches. Based on this minimum footing thickness, a retaining wall with a maximum *retained wall height* of four feet would correspond to maximum *exposed wall height* of three feet.

Contractors and homeowners are usually more aware of the vertical offset between the upper and lower grade elevations that will be required for the retaining wall. This is simply the *exposed wall height* and it is for this reason that the Community Development Department interprets IBC §106.2, item 5 and IRC §105.2, item 3 as follows:

“A building permit shall not be required for ... retaining walls that are not over three feet in exposed wall height unless supporting a surcharge ...”

Building Permit Requirements

Building permit not required

A building permit is not required for:

- Cantilever or segmental gravity retaining walls with an exposed wall height of three feet or less, where the retained soil does not support a surcharge (i.e. level backfill only).
- Wood retaining walls with an exposed wall height of two feet or less, where the retained soil does not support a surcharge. All wood retaining walls shall be constructed entirely of treated wood.
- Rock walls with an exposed wall height of three feet or less, where the retained soil does not support a surcharge (i.e. level backfill only).

All other retaining wall conditions such as taller walls, tiered walls, and/or walls supporting sloping backfill (or other surcharges) will generally require a building permit.

Building permit required

Building permit application requirements:

1. Site plan showing the location, extent, and height of the retaining wall in relations to any building structure, pool, property lines, and public utility easements.
2. Complete construction details of the retaining wall, stamped and signed by a Washington registered civil or structural engineer. For segmental gravity retaining walls, the details must clearly identify the block manufacturer, block type, drainage requirements, and maximum wall height.
3. Structural calculations stamped and signed by a Washington registered civil or structural engineer (or standardized engineering calculations and ICC Evaluation Report for applicable segmental gravity retaining walls).
4. Rock Walls (Rockeries) are required to be designed by a Washington State licensed Geotechnical Engineer and monitored during construction by the designer for stone placement, size of stone the quality of the stone, compaction, proper keying of base stones, drainage, fill reinforcement such as geo-grid, impacts to surface drainage and proper inclination of face stones.

Cautionary Notes

Segmental Gravity Walls

Segmental gravity retaining walls such as Keystone, Allan Block, etc. are frequently available from local building supply warehouse stores. Regardless of the permit requirements, it is important to follow the manufacturer's recommendations for each block type, since the allowable wall heights vary significantly for each block type. For example, Keystone limits their *Garden Wall* (4" high x 12" wide x 9" deep) product to two feet in height, or six blocks in height total. The Keystone *Legacy Block* (6" high x 16" wide x 10½" deep) product is recommended when the retaining wall is supporting a sloping backfill, any other surcharge, or a solid fence.

Tiered Retaining Walls

Use of tiered walls is a special condition where two or more short walls, horizontally offset from one another, are used in lieu of a single tall retaining wall. When tiered walls are not properly offset from each other, the upper wall may impose a surcharge condition on the lower wall. In order for the walls to be treated as separate retaining walls, a general rule of thumb is that the tiered walls be horizontally offset by a minimum distance of two times the exposed wall height of the lower wall.

For example, two tiered retaining walls, each with an exposed wall height of three feet and level backfill, which are horizontally offset by a distance of two feet, would be treated as a single 6-foot-tall wall. As a result, a building permit would be required.

Rock Walls (Rockery)

Rock walls are to be built according to the ARC rock wall construction guidelines.

Retaining walls and rock walls require thought and planning just like any other building project. Soil properties, wall height, wall type or function, drainage surcharge loads, adjacent grading, etc. must be taken into consideration. An experienced geotechnical engineer is required design any retaining wall or rock wall that exceeds three feet of exposed height. A contractor with extensive experience should be considered to avoid possible failures and/or costly repairs.