RETAINING WALL

HANDBOOK

Date: May 1, 2023, Version: 2

MUNICIPALITY OF NORTH Cowichan

RETAINING WALL HANDBOOK

This handbook serves as a general guide for constructing and maintaining retaining walls in North Cowichan, a coastal area characterized by mild temperatures, high humidity, strong winds, and abundant rainfall throughout the year. Some of the ways the climate can affect retaining walls include:

1. **Soil saturation and erosion:** High levels of precipitation can cause soil to become saturated, increasing the likelihood of landslides, slope failures, and erosion. These factors can exert added pressure on retaining walls, making proper design, construction, and drainage systems crucial for their long-term stability.
2. **Corrosion of materials:** The humid environment and occasional exposure to saltwater from the ocean can lead to accelerated corrosion of certain materials used in retaining wall construction, such as metal reinforcements or fasteners. To mitigate this risk, it is essential to choose corrosion-resistant materials or apply protective coatings to vulnerable components.
3. **Freeze-thaw cycles:** While North Cowichan experiences relatively mild winters, occasional freezing temperatures may still occur. Freeze-thaw cycles can cause soil to expand and contract, putting stress on retaining walls and potentially causing damage or destabilization. Properly designed and constructed walls with adequate drainage can help minimize the impact of freeze-thaw cycles.
4. **Wind loading:** Strong winds, particularly during storms, can create additional pressure on retaining walls, particularly if they support structures, fences, or vegetation. Careful consideration of wind loading should be factored into the design and construction of retaining walls to ensure stability during adverse weather conditions.

Understanding the impact of North Cowichan's coastal climate on retaining walls is essential to constructing and maintaining walls that are durable, stable, and able to withstand the challenges posed by the region's environmental conditions.

HOW TO USE THIS HANDBOOK

This handbook is divided into two distinct sections:

1. Building & Zoning Regulations
2. Building & Zoning Definitions

These sections offer comprehensive explanations of essential terms and concepts associated with retaining walls, as well as a thorough analysis of individual regulations outlined in both Zoning Bylaw 2950 and Building Bylaw 3172.

It is recommended to use this guide as a resource and to consult the Planning or Building Departments for any questions or concerns regarding retaining wall projects.

MUNICIPALITY OF NORTH Cowichan

BUILDING BYLAW REGULATIONS

SECTION 19.2 - RETAINING WALL BUILDING PERMIT

(1) A building permit must be obtained prior to the construction of a retaining wall over 1.2 m in height.

What this means is that if a retaining wall is over 1.2 m in height, a property owner must apply for a building permit before construction can begin. The purpose of this regulation is to ensure that all retaining walls constructed are safe and compliant with building codes and standards, particularly when an 8-inch, laterally unsupported wall exceeds 1.2 meters in height, which requires a Structural Engineer for the design. This helps to maintain the structural integrity and safety of the retaining walls.

(2) Multiple retaining walls over 1.2 m in height will require separate building permits except where they form a single terraced retaining wall system.

If a property has multiple retaining walls, then any wall over 1.2 m in height will require a building permit. However, if the walls are terraced to form 'steps', then they only require one building permit as they are considered to be part of a system.

(3) The horizontal separation between terraced retaining walls must not be less than the height of the retaining wall with the greater height. Where the horizontal separation between retaining walls is less than 5x the height of the retaining wall with the greatest height, the retaining walls shall be considered to be components of a single terraced retaining wall system.

What this means is that the horizontal distance between two retaining walls (measured from the ground) has to be equal to or greater than the taller of the two walls. For instance, if one wall was 2.0 m in height and the other wall was 1.4 m in height, then the horizontal distance between the walls is required to be at least 2.0 m in height.

However, if the horizontal distance between the walls is greater than 5 times the height of the tallest wall, then the walls are not part of a 'single' terraced retaining wall system and are considered to be separate and independent. For instance, if the tallest wall was 2.0 m in height, but the horizontal separation between the two inner-facing walls is 10.5 m, then they are considered to be two separate walls. But, if the distance is 10 m or less (2.0 m height x 5 = 10.0 m), the two walls would be considered as components of a single system.

(4) It is the responsibility of the property owner to install guardrails as appropriate to mitigate any falling hazards associated with retaining walls.

To minimize the risk of falling hazards from retaining walls, property owners are responsible for taking necessary precautions, such as installing guardrails, to ensure the safety of everyone on the property, including themselves, guests, or people passing by. This duty obliges property owners to prevent accidents or injuries caused by retaining walls and maintain a secure environment for all.

MUNICIPALITY OF NORTH Cowichan

(5) Guardrails, where installed, must be built to Section 9.8.8 of the BC Building Code.

If a guardrail is built in compliance with Section 9.8.8 of the BC Building Code, it means that it adheres to the necessary design, construction, and installation requirements, ensuring safety and effectiveness in preventing falls or other hazards. Guardrails not meeting this standard may represent a safety hazard.

(6) Guardrails are not included in the overall height of the retaining wall.

If a retaining wall has a guardrail installed on top of it, the height of the guardrail is excluded from the overall height of the retaining wall. This provision allows for added safety features on retaining walls without requiring an owner to reduce the overall height of the wall.

(7) Retaining walls greater than 1.2 m in height will require engineering oversight (designed and inspected by a registered professional) including letters of assurance in the form of a Schedule B (field review and oversight by registered professional) and Schedule C-B (final report and sign off by registered professional).

When a retaining wall is greater than 1.2 meters in height, it requires engineering oversight. What this means is that the retaining wall must be designed and inspected by a registered professional engineer, who will also provide letters of assurance in the form of a “Schedule B” and “Schedule C-B” (see below). This is to ensure walls are constructed safely and in compliance with building codes and regulations since failure of a wall ≥ 1.2 m is potentially a significant safety risk.

- A **Schedule B refers to a field review** and oversight of the retaining wall by the registered professional engineer during construction. The engineer will visit the site and review the retaining wall's construction to ensure that it is being built according to the approved design plans and that it meets all applicable building codes and regulations.
- A **Schedule C-B refers to a final report and sign off** by the registered professional engineer. Once the retaining wall has been completed, the engineer will provide a final report that includes documentation of all inspections and tests, as well as any changes made to the original design plans. The engineer will then sign off on the retaining wall, indicating that it has been built in accordance with the approved plans and meets all applicable building codes and regulations.

ZONING BYLAW REGULATIONS

SECTION 37.2 RETAINING WALLS

Maximum allowable height

(1) Retaining walls located in yards are subject to fence height restrictions in subsection 37.1 (8), whether or not combined with fencing elements, except where authorized on an accepted grading plan within the subdivision process.

What this means is that any retaining wall, or retaining wall/fence combination, can be as tall as a fence based on the maximum fence height restrictions by zone and yard location.

For instance, if the property is zoned A3 (see highlighted maximum fence heights below), a retaining wall can be up to 2 m in height in both the side and year yards, but no more than 1.2 m in the front.

ZONE	NAME	MAXIMUM FENCE HEIGHT RESTRICTIONS		
		YARD, FRONT	YARD, SIDE	YARD, REAR
A1	Agriculture	No restrictions		
A2	Rural	No restrictions		
A3	Rural Restricted	1.2 m	2.0 m	2.0 m

There is an exception to this restriction, however. If the retaining wall is part of a larger subdivision project and meets the requirements of an accepted grading plan, height restrictions may not apply, allowing for greater flexibility in large parcel subdivision to create buildable individual lots. Any subsequent retaining walls built on lots and not shown on the subdivision accepted grading plan are subject to the height limits.

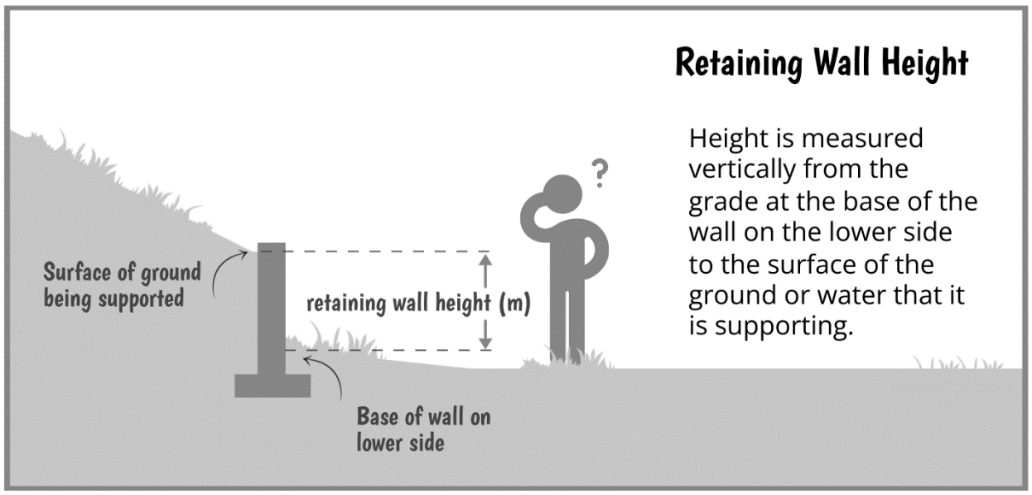
(2) No retaining wall in any location shall be greater than 2 m in height, except where authorized on an accepted grading plan within the subdivision process.

If a retaining wall is being considered for a development, and it is proposed to be higher than the maximum permitted height of 2 m, it cannot be constructed without first obtaining an approved variance. This applies regardless of any maximum fence heights in excess of 2 m.

The exception to the rule is that if the retaining wall has been approved as part of an accepted grading plan within the subdivision process, it may be allowed to be taller than 2 m.

Measuring retaining wall height

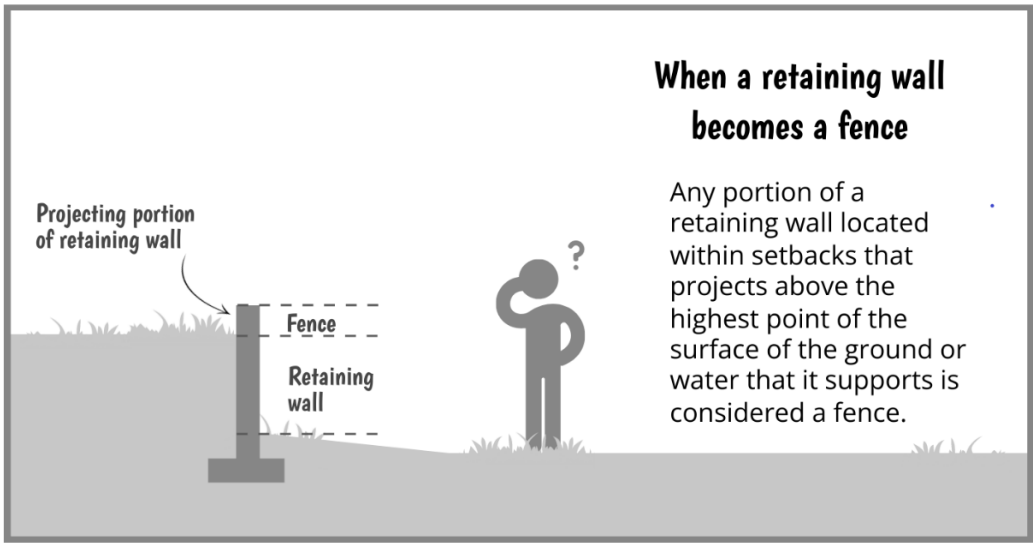
(3) Retaining wall height shall be measured vertically from the grade at the base of the wall on the lower side to the surface of the ground or water it supports.



To obtain the height of a retaining wall, first determine the base location. In the above diagram, the base location of the retaining wall is at ground level where the lower side of the wall meets the ground. Then, identify the upper side where the wall meets the ground or water it is supporting. With these two points determined, take a vertical measurement between them for an accurate height assessment.

Portion of retaining wall considered as a fence

(4) Any portion of a retaining wall that projects above the highest point of the surface of the ground or water it supports is considered a fence.

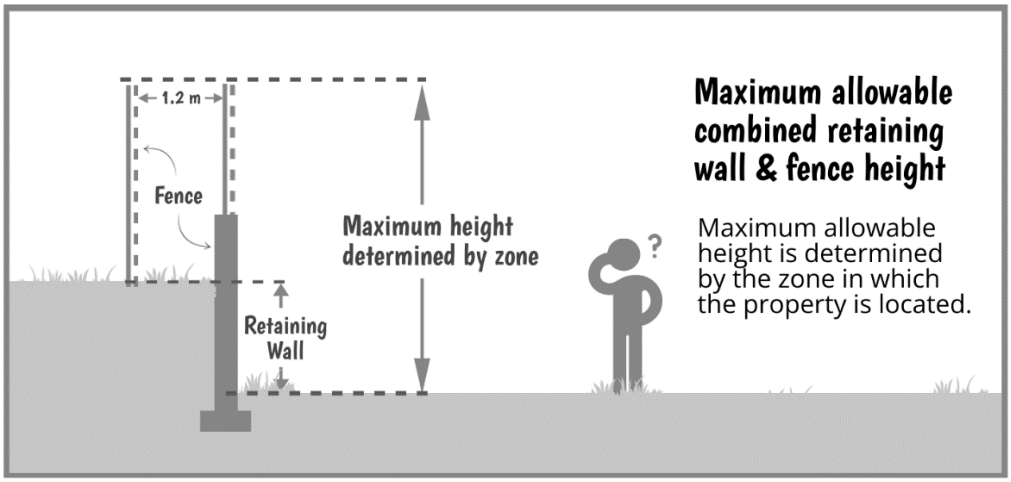


If any part of a retaining wall extends past the highest point of the ground or water it is supporting, it is a projection that is considered to be a fence.

This distinction is important because different regulations or restrictions may apply to fences compared to retaining walls, such as height limitations, materials, or design requirements. By classifying the portion above the highest point as a fence, the regulation prevents “stacking” a full height fence on top of an over height retaining wall.

Maximum allowable retaining wall height when combining a retaining wall and fence

(5) The combined height of a retaining wall and fence (where the fence is located within 1.2 m of that retaining wall), or any portion of a retaining wall considered to be a fence, shall not exceed the applicable maximum allowable fence height as per subsection 37.1 (8), except where the retaining wall is authorized on an accepted grading plan within the subdivision process, in which case the fence component of a combined retaining wall and fence shall be subject to the maximum fence heights specified in subsection 37.1(8).



If a fence is situated directly on top of a retaining wall, the overall height of the combined structure must comply with the maximum allowable fence heights as specified in subsection 37.1(8) which speaks to fence height by zone and yard location.

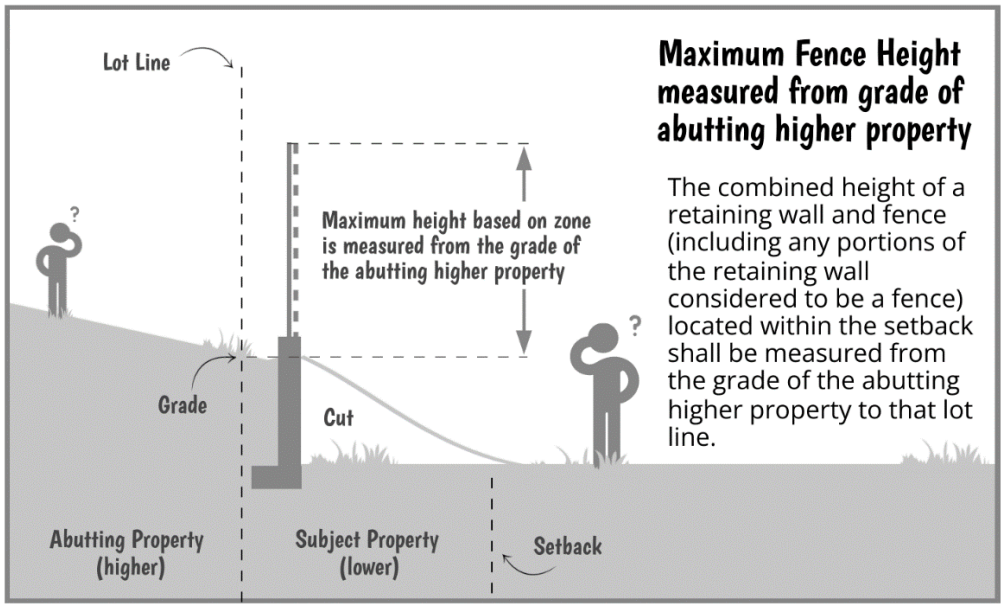
If a fence is positioned within 1.2 m of a retaining wall, it is considered to be part of the retaining wall-fence combination. In such cases, measurements should be taken from the base on the lower side of the retaining wall to the highest point of the fence. The combined height of the retaining wall and fence must not surpass the maximum fence height outlined in subsection 37.1(8).

If a fence is situated more than 1.2 m away from a retaining wall, it is not considered to be part of the structure, which means its height is measured from its own base rather than the base of the adjoining retaining wall.

Despite all this, there is an exception to the rule. If the retaining wall is approved as part of an accepted grading plan within the subdivision process, despite retaining wall approvals, the fence component of the combined retaining wall and fence is still subject to the maximum fence heights mentioned in subsection 37.1(8). This means that, in such cases, the height restrictions for the fence component will follow the same limitations as any other standalone fence, as outlined in subsection 37.1(8).

Maximum height measured from grade of higher abutting property

(6) In the case of a retaining wall constructed in accordance with subsection 37.2 (5), the combined height of a retaining wall and fence (including any portions of the retaining wall considered to be a fence) located within the setback shall be measured from the grade of the abutting higher property to that lot line.

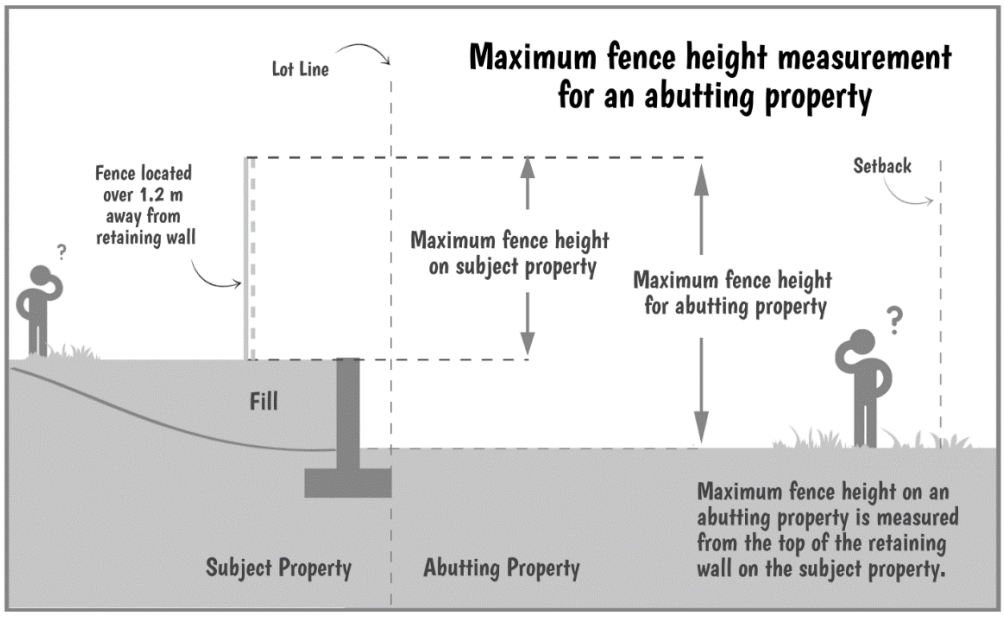


This means that when a property owner on a slope chooses to construct a retaining wall (within setbacks) along a lot line with a higher neighbouring property, the fence portion of the retaining wall is to be measured from the ground level (at grade) of the uphill neighbouring property to the top of the fence.

The purpose behind this regulation is to ensure privacy between neighbours by affording equal levels of privacy and addressing potential privacy issues that may arise due to differences in elevation between properties.

Maximum fence height measurement for an abutting property

(7) Notwithstanding subsection 37.1 (2) "Measuring Height" and subsection 37.2 (6), where a retaining wall exists on the subject property and is located within 1.2 m of the lot line, the maximum height for a fence located within the setback on the abutting property shall be measured from the top of the retaining wall on the subject property to the top of the fence.



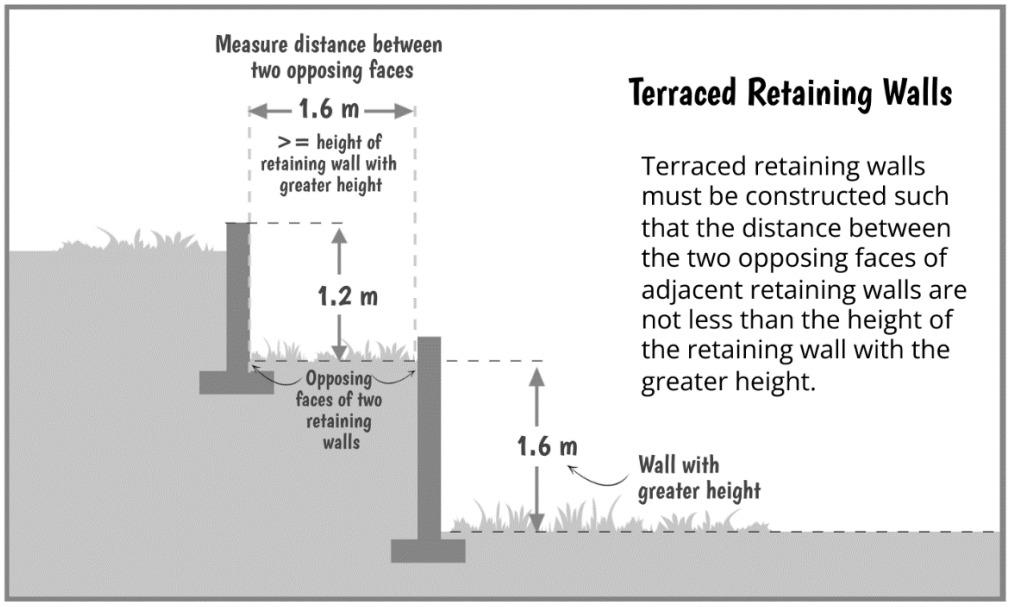
This means that if a higher elevation property owner decides to construct a retaining wall within setbacks along a shared property line with a lower neighbour, the height of the lower neighbour's fence (if located within setbacks) would be measured starting from the top of their neighbour's retaining wall to the top of their own fence.

For example, if the higher elevation neighbour builds a 2 m retaining wall within setbacks - assuming the maximum fence height restriction by zone and yard location is 2 m - the lower elevation neighbour is permitted to build a 4 m fence (if also located within setbacks).

The purpose behind this regulation is to ensure privacy between neighbours by affording equal levels of privacy and addressing potential privacy issues that may arise due to differences in elevation between properties. In situations where a property owner builds a retaining wall that overlooks the neighbour's yard, this regulation allows the affected property owner to determine their maximum fence height from the top of the neighbouring retaining wall, rather than their own parcel's grade level.

Terraced retaining walls

(8) Terraced retaining walls must be constructed such that the distance between the two opposing faces of adjacent terraced retaining walls are not less than the height of the retaining wall with the greater height.



What this means is that the distance between the opposing inner sides of terraced retaining walls (measured horizontally at grade) must be equal to or greater than the height of the tallest retaining wall.

For instance, if one wall is 1.6 m and the other is 2 m in height, then the distance between the two walls cannot be less than 2 meters. This is to ensure that the retaining walls are structurally sound and able to withstand the weight of the soil and water they are retaining.

The purpose behind this regulation is to ensure that one retaining wall is not bearing on the other, thereby creating overly steep, overbearing terraces, which could pose structural and safety risks while also negatively impacting the aesthetics of the landscape. For instance, a 45-degree angle from the footing should not intersect another retaining wall; if it did, then one wall would be supporting the other wall, which could lead to structural issues and safety hazards.

By maintaining a sufficient distance between terraced retaining walls, the regulation promotes structural soundness, safety, and a more visually appealing landscape.

The area between the terraced retaining walls

(9) The backfilled area between terraced retaining walls may include drainage, irrigation, and landscaping, and shall be level and maintained in good condition free of debris, yard waste, graffiti and invasive species.

The intent of this regulation is to ensure the structural integrity and stability of the terraced retaining walls, while also maintaining the aesthetic appeal and environmental quality of the surrounding area. Proper maintenance of the area between the walls will contribute to the longevity of the retaining walls

and prevent potential issues such as erosion, water damage, or infestations of invasive species (click here to see more on Invasive Species Management).

Adding a guardrail onto a retaining wall

(10) Guardrails up to a maximum height of 1.07 m located on retaining walls are excluded from the overall maximum allowable retaining wall height.

What this regulation means is that when constructing a retaining wall, property owners are permitted to add guardrails up to 1.07 meters in height on top of the wall without affecting the maximum allowable retaining wall height.

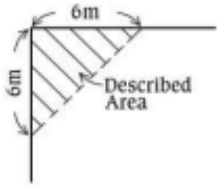
This allowance provides an opportunity for enhanced safety measures, particularly in areas where there may be a risk of falls or accidents, without causing the retaining wall to exceed the height restrictions set forth by the municipality.

By allowing guardrails as an additional feature without penalizing the overall height, the regulation encourages the incorporation of safety elements without compromising the structural, aesthetic, or privacy concerns associated with taller retaining walls.

Vision clearance

(11) Retaining walls are subject to vision clearance provisions of section 36.

"Section 36 - Vision Clearance: No obstruction of sight above 1.1 m (3.60') in height from street level shall be permitted at a road junction or intersection within the triangular area formed by the two intersection lot lines and the line joining the points on such lot lines 6 m (19.69') from the point of intersection, except in the Commercial General Zone (C2)."



The purpose of this regulation (Section 36 - Vision Clearance) is to ensure safety at road junctions and intersections by maintaining clear visibility for drivers and pedestrians. By restricting obstructions, such as retaining walls or fences, to a maximum height of 1.1 meters within the specified triangular area at intersections, the regulation aims to reduce the likelihood of accidents due to obstructed sightlines.

The exception as stated for the Commercial General Zone (C2) acknowledges that different considerations may apply in those areas due to the unique nature of commercial areas. In general, commercial zones may have different requirements for building heights, signage, and landscaping to accommodate the diverse needs of businesses. As a result, the vision clearance regulations for the C2 zone might be more flexible to allow for greater visibility of commercial establishments while still maintaining safety for drivers and pedestrians.

This means that any retaining wall located within the corner area of an intersection as described in the diagram must be no taller than 1.1 m in height, except in the Commercial General Zone (C2) where alternative considerations apply.

Easements, covenants, and rights-of-way

(12) All retaining walls, or any portion thereof, shall be located entirely on the applicable parcel, and shall not be located within any right-of-way, easement or covenant area, except with the express written permission of the right-of-way holder, easement holder, or covenantee, as the case may be.

What this regulation means is that, when constructing a retaining wall, property owners must ensure that it is located solely within the boundaries of their property and does not encroach upon any right-of-way, easement, or covenant areas.

This requirement is in place to respect the legal rights and agreements associated with the land, as well as to prevent potential conflicts or disputes with neighbouring properties or other parties who may hold rights to the area in question.

If a retaining wall is proposed to be built within a right-of-way, easement, or covenant area, the property owner must obtain express written permission from the holder of the right-of-way, easement, or covenant before proceeding with construction.

By adhering to this regulation, property owners can avoid potential legal issues and maintain positive relationships with surrounding property owners, right-of-way holders, and other parties with an interest in the land.

BUILDING BYLAW DEFINITIONS

"retaining wall" means a vertical or near-vertical structure constructed to hold back Geotechnical Materials and safely deal with any hydrostatic pressure. Retaining Walls can be created out of a variety of structural and Geotechnical Materials. Retaining Walls typically stabilize soil and rock against downslope movement and provide lateral support for steep to vertical grade changes (Engineers and Geoscientists of BC definition, February 25, 2020);

A "retaining wall" is a vertical or near-vertical structure built with the purpose of holding back geotechnical materials, such as soil and rock, while safely managing hydrostatic pressure. Hydrostatic pressure is the force exerted by fluids (usually water) on the retaining wall due to the weight of the fluid. Retaining walls are essential in preventing erosion, landslides, or other geotechnical issues caused by natural forces or human activities.

Retaining walls can be constructed using a variety of structural and geotechnical materials, such as concrete, steel, stone, or even wood. The choice of materials depends on factors like the size and height of the wall, the specific site conditions, and the intended purpose of the wall.

The primary function of retaining walls is to stabilize soil and rock against downslope movement, which is the gradual shifting or sliding of materials downhill due to gravity. Additionally, retaining walls provide lateral support for steep to vertical grade changes, making the terrain safer and more usable for construction, landscaping, or other purposes. In the context of sloped terrain, retaining walls play a crucial role in creating buildable lots by enabling the development of stable, level surfaces for construction, thus maximizing the utility and value of the land.

"structure" means any construction fixed to, supported by, or sunk into land or water but excludes concrete slabs on finished or natural grade, and decks on grade which are less than 0.61 m (2') in height;

The definition of a "structure" covers a wide range of construction types, such as buildings, infrastructures, and facilities, including houses, bridges, piers, and dams. These constructions are usually designed for specific purposes and can be composed of various materials like concrete, steel, wood, or a combination thereof.

Despite its broad scope, the definition of a structure explicitly omits certain elements. For example, concrete slabs on finished or natural grade are not deemed structures. Finished or natural grade refers to the surface level of the ground, which may be flat or sloping. Although concrete slabs are often used for walkways, patios, or driveways, they are not categorized as structures due to their simple construction and absence of supporting elements.

Moreover, decks on grade, built directly on the ground with a height of less than 0.61 meters, are also excluded from the definition of a structure. These low-height decks do not necessitate the same degree of structural support or intricacy as other constructions, and as such, are not considered structures.

ZONING BYLAW DEFINITIONS

*"**fence**" means a free-standing structure used to enclose all or part of a lot. It can include retaining walls but does not include hedges or similar landscaping;*

A fence as a structure:

A free-standing structure refers to any architectural construction that stands independently and is self-supporting, without the need for attachment or support from other structures or buildings. For example, a vinyl or wooden privacy fence surrounding a backyard would be considered a free-standing structure. These structures are designed to bear their own weight and resist external forces, such as wind and gravity.

How a fence can be used:

A fence may be used to enclose all or part of a lot for several reasons, including for:

- **Security**: Fences can provide a physical barrier to deter unauthorized access or intrusion onto the property, offering protection to the residents and their belongings.
- **Privacy:** Enclosing a lot with a fence helps create a private space for the occupants, shielding them from the view of neighbours or passers-by, which can enhance their sense of personal space and comfort.
- **Boundary demarcation:** Fences can clearly define property lines, helping to avoid disputes between neighbours by establishing the extent of each owner's property.
- **Aesthetic appeal:** A well-designed fence can improve the overall appearance of a property by complementing the landscaping and architectural elements of the buildings on the lot.
- **Safety:** Fences can be used to create a safe outdoor space, particularly for children or pets, by preventing them from wandering off the property and potentially into hazardous situations, such as busy roads or unsafe areas.
- **Containment:** Fences can also serve as a means of containing livestock or other animals on agricultural or rural properties, preventing them from roaming onto neighbouring lands or public areas.
- **Noise reduction:** In some cases, fences may help reduce noise pollution from nearby sources, such as busy roads or industrial areas, by serving as a barrier to minimize the transmission of sound waves.

By enclosing all or part of a lot, a fence can provide a range of functional and aesthetic benefits that contribute to the overall enjoyment and value of the property.

Types of fence materials:

Fences can be constructed from various materials, such as wood, metal, vinyl, or even stone.

Fences and retaining walls:

Retaining walls and fences are distinct structures, but they can sometimes be combined. Retaining walls are specialized structures designed to hold back or stabilize land, and when the top part of a retaining

wall projects above the surface of the land or water it is retaining, it is considered a fence. On the other hand, a standalone fence serves a broader range of functions, such as providing privacy, security, or decoration, without the purpose of retaining land or water.

What fences are not:

Fences do not encompass hedges or similar landscaping features. Hedges are typically made up of shrubs or small trees planted close together to form a natural barrier. These living barriers serve similar purposes as fences but are not considered free-standing structures, as they rely on the plants' growth and maintenance.

*"**guardrail**" means a barrier such as a bar or a rail placed along the edge of something such as a retaining wall or staircase so as to improve safety and prevent falls.*

A "guardrail" refers to a safety barrier, often composed of bars or rails, that is installed along the edge of structures like retaining walls, staircases, balconies, or bridges. The primary purpose of a guardrail is to enhance safety by preventing falls, accidents, or unintended movement off the edge of the structure.

Guardrails are designed to provide both physical protection and visual cues to help people maintain a safe distance from the edge. They can be made from various materials, including metal, wood, plastic, or even glass, depending on the specific application and aesthetic requirements. Guardrails are commonly found in both indoor and outdoor settings, such as in homes, commercial buildings, parks, highways, and other public spaces.

"retaining wall" means a structure erected to hold back, stabilize or support water or land. It involves the alteration of land and is used to stabilize or modify slopes, level sites, and correct grade differences. Retaining walls may also form a system containing one or more terraced retaining walls;

A retaining wall is a structure specifically designed and built to hold back, stabilize, or support water or land. Its primary purpose is to prevent erosion, landslides, or other issues that may arise due to natural forces or human activities. Retaining walls are typically constructed to achieve the following objectives:

1. **Alteration of land:** Retaining walls can change the natural contours of the land, making it suitable for various purposes like construction, landscaping, or preventing soil erosion.
2. **Stabilizing or modifying slopes:** In areas with steep slopes, retaining walls help to stabilize the soil and prevent landslides, making the terrain safer and more usable.
3. **Leveling sites:** Retaining walls can be used to create level surfaces in areas with uneven terrain, facilitating the construction of buildings, roads, or other infrastructure.
4. **Correcting grade differences:** Retaining walls can help adjust elevation differences between two areas, allowing for a smoother transition and improving drainage.
5. **Terracing:** In some cases, retaining walls can be used to create a system of terraced walls, which divide a slope into smaller, more manageable sections. This can be useful in agriculture, landscaping, or hillside construction.

“structure” means any construction fixed to, supported by, or sunk into land or water but excludes concrete slabs on finished or natural grade, and decks on grade which are less than 0.61 m in height;

In the context of a residential neighbourhood, a "structure" refers to any construction that is fixed to, supported by, or sunk into the ground or water. This includes a wide range of building types, such as houses, garages, and sheds, which are commonly found in residential areas. These constructions typically serve specific purposes related to living, storage, or recreational activities and are made from various materials like concrete, steel, wood, or a combination of these materials.

However, certain elements are excluded from the definition of a structure within a residential setting. Concrete slabs on finished or natural grade, such as patios or walkways, are not considered structures. Additionally, decks that are built on grade (directly on the ground) and are less than 0.61 meters (approximately 2 feet) in height are also not classified as structures in this context.