Arriola, Ginger

From:	j stoch [redacted]
Sent:	June 23, 2020 9:54 AM
To:	Clerks
Subject:	Re: Electronic meeting Tuesday, June 23rd, 2020 at 5 PM
Attachments:	What are the human activities that trigger landslides.docx
Categories:	Red Category

The document I have included I would like presented, in full, as one of the ways I can participate at tonight's meeting.

Thank you,

Jerry Stochansky
2235 Ninth Avenue, New Westminster, BC
[redacted]

Rez Ref # N/A

Bylaw # 14170

Re: Public Hearing Tuesday June 23, 2020 at 5 PM
Burnaby Zoning Bylaw 1965, Amendment Bylaw No. 7, 2020 – Bylaw No. 14161
From: Jerry Stochansky
Address: 2235 Ninth Avenue, New Westminster, BC
Below are examples and information pertaining to retaining walls being built in BC.
My questions I would like to have addressed are at the end of this document

What are the human activities that trigger landslides?
Human causes

- Deforestation.
- Excavation.
- Loading.
- Water management (Groundwater Draw-down and Water leakage)
- Land use (e.g. construction of roads, houses etc.)
- Mining and Quarrying.
- Vibration.

Source: Wikipedia

After the 2005 slide, the District of North Vancouver improved the existing storm sewer system and constructed drainage works and a debris basin at the bottom of the slide area.

Pawlowski made 12 recommendations in his report, mostly directed to the provincial government. They include:

- Develop a landslide hazard management strategy with a focus on prevention and mitigation of risk.
- Develop provincial landslide safety levels for area residents.
- Establish provincial standards for how and when landslide risk assessments should be carried out.
- Develop an internet-based databank to provide landslide hazard and risk information to stakeholders.

Source: CBC News 2008

Burnaby landslide sends mud, rocks, concrete onto public lane

Cornelia Naylor / Burnaby Now JANUARY 23, 2020 12:24 PM

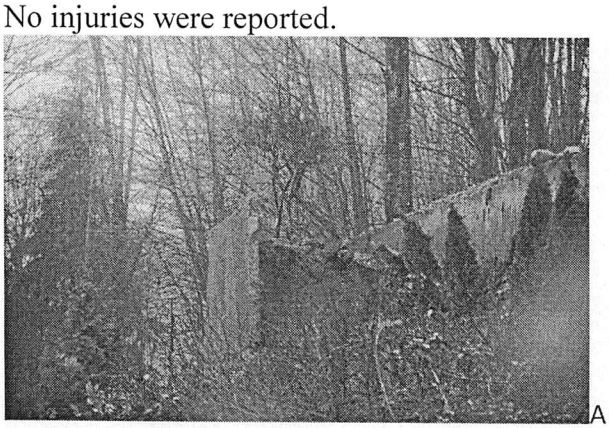
A small landslide buried a section of a Burnaby lane in mud, rocks and other debris Thursday morning.

Firefighters were called to the lane between Barnet Road and Braeside Drive at about 9:30 a.m., according to assistant fire Chief Barry Mawhinney.

City public works officials were already on scene investigating the slope failure.

Firefighters secured the scene, evacuating some residents in the area, Mawhinney said.

No injuries were reported.



A retaining wall failed, sending debris down-slope. - Cornelia Naylor

Brian Carter, manager of public works operations, told the ***NOW*** a retaining wall had failed and toppled over, sending mud, rocks, trees and other debris down the slope and onto the lane.

Carter said the site has been secured in case more of the wall or slope comes down. "If more of the wall did come down or more of the slope did come down, potentially it could take some of the hydro poles down," he said. Carter said it will be up to geotechnical and structural engineers to figure out what caused the collapse but rain can cause problems for improperly built retaining walls.

"Retaining walls on slopes like that have to be properly engineered and they have to have drainage in behind them to release that pore pressure that you get from the build-up of water," Carter said, "but I don't know the root cause of the failure that this point."

B.C. Hydro arrived on scene at 11 a.m. to shut down power in the area until an assessment is made of the retaining wall and slope."At this point we're just making the site safe for the public," Carter said.

Source: Burnaby Now 2020

Collapsed retaining wall snarls Kelowna traffic

CBC News · Posted: Nov 20, 2011 2:56 PM PT | Last Updated: November 21, 2011

The retaining wall collapsed, spilling debris onto the road. (Brady Strachan/CBC)

A collapsed retaining wall on Highway 97 is causing headaches for drivers in West Kelowna, B.C.

The retaining wall of the Westside Road Interchange overpass gave way Sunday morning, spilling rocks and soil onto the southbound lane of Highway 97.

Traffic was backed up for several kilometres onto the W.R. Bennett Bridge for much of the day.

"I think it's bogus. I don't like it," said David Taylor, one of thousands of motorists stuck in the traffic jam for hours.

The overpass only opened a few weeks, and the collapse doesn't sit well with drivers like Morris O'Conner.

"They should get some good builders when they are doing something," he said. "They go the cheapest way and that's where we are."

'Slow going'

Ministry of Transportation spokesperson Murray Tekano said traffic will be diverted into

"It will be slow going for people as you leave Kelowna and I thank them for their patience and recognize that it is an inconvenience but we ask them to drive cautiously," he said.

Tekano said repairing the retaining wall could take several days.

"This will be diverted certainly for the morning commute [Monday] and I think for a few days yet," said Tekano.

"The detour will be in place and we will be bringing in traffic control people for 24 hours a day until this is solved."

The cause of the wall damage has not been determined. Structural engineers are assessing the wall and the overpass.

9/8

Causes for Retaining Wall Failure

Following the common causes for retaining wall failures:

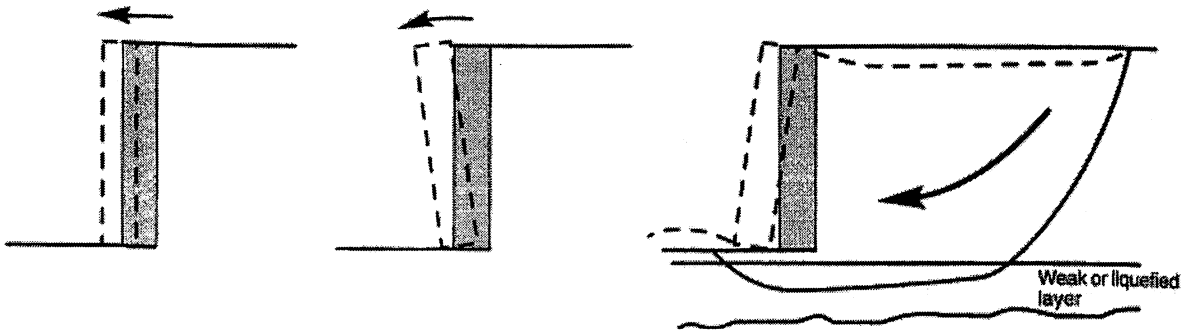
- Improper reinforcement placement
- Saturated backfill
- Weep holes that do not weep
- Design error
- Calculation errors
- Unanticipated loads
- Mistakes in utilizing software
- Detailing errors
- Foundation issues
- Inadequate specifications and notes
- Shoddy construction
- Retaining wall age

Source: The Constructor website for civil engineers

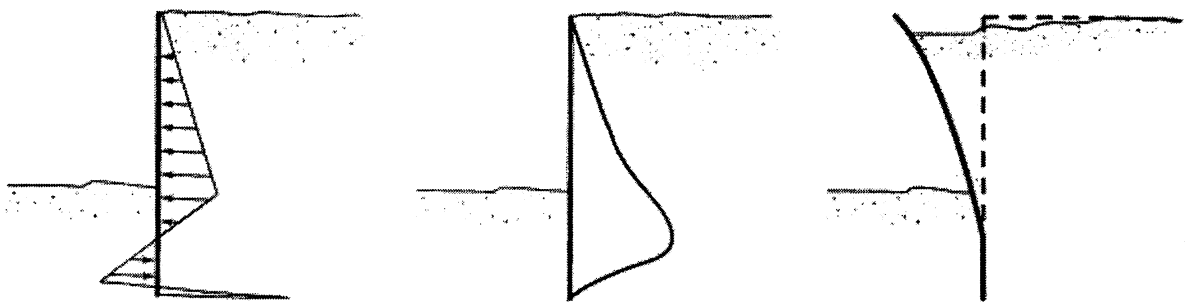
https://theconstructor.org/structural-engg/retaining-wall-failure/14230/#:~:text=Following%20the%20common%20causes%20for,holes%20that%20do%20not%20weep

Types of retaining wall failures:

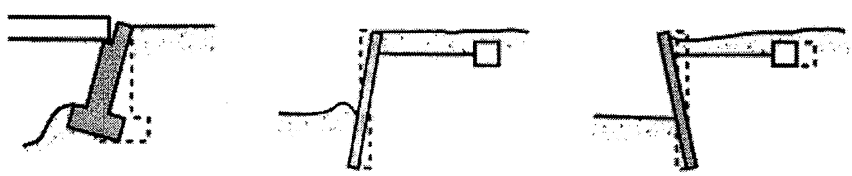
To design retaining walls, it is necessary to define "failure" and to know how walls can fail. Under static conditions, retaining walls are acted upon by body forces related to the mass of the wall, by soil pressures, and by external forces such as those transmitted by braces. A properly designed retaining wall will achieve equilibrium of these forces without inducing shear stresses that approach the shear strength of the soil. During an earthquake, however, inertial forces and changes in soil strength may violate equilibrium and cause permanent deformation of the wall. Failure, whether by sliding, tilting, bending, or some other mechanism, occurs when these permanent deformations become excessive. The question of what level of deformation is excessive depends on many factors and is best addressed on a site-specific basis.



Gravity walls usually fail by rigid-body mechanisms such as sliding and/or overturning or by gross instability. Sliding occurs when horizontal force equilibrium is not maintained (i.e., when the lateral pressures on the back of the wall produce a thrust that exceeds the available sliding resistance on the base of the wall). Overturning failures occur when moment equilibrium is not satisfied; bearing failures at the base of the wall are often involved. Gravity walls may also be damaged by gross instability of the soils behind and beneath them. Such failures may be treated as slope stability failures that encompass the wall. Composite wall systems, such as crib walls, bin walls, and mechanically stabilized walls, can fail in the same ways or by a number of internal mechanisms that may involve shearing, pullout, or tensile failure of various wall elements.



Cantilever walls are subject to the same failure mechanisms as gravity walls, and also to flexural failure mechanisms. Soil pressures and bending moments in cantilever walls depend on the geometry, stiffness, and strength of the wall—soil system. If the bending moments required for equilibrium exceed the flexural strength of the wall, flexural failure may occur. The structural ductility of the wall itself may influence the level of deformation produced by flexural failure.



Braced walls usually fail by gross instability, tilting, flexural failure, and/or failure of bracing elements. Tilting of braced walls typically involves rotation about the point at which the brace acts on the wall, often the top of the wall as in the cases of basement and bridge abutment walls. Anchored walls with inadequate penetration may tilt by "kicking out" at their toes. As in the case of cantilever walls, anchored walls may fail in flexure, although the point of failure (maximum bending moment) is likely to be different. Failure of bracing elements can include anchor pullout, tierod failure, or bridge buckling. Backfill settlements can also impose additional axial and transverse loading on bracing elements such as tierods and tiebacks.

Source: CivilEngineeringBible.com

QUESTION:

1) **What guarantees can be given that home foundations and concrete work backing onto 10 Avenue (back lane) will not shift due to construction of a retaining wall on the Translink site below and if they do shift who will end up paying for repairs (City of Burnaby? Translink? Homeowner?)?**

2) **If the retaining wall collapses in the future (examples of such are provided above) how will the environmental damage be remediated and who would be responsible?**