

# Cypress Provincial Park geology: a self-guided tour

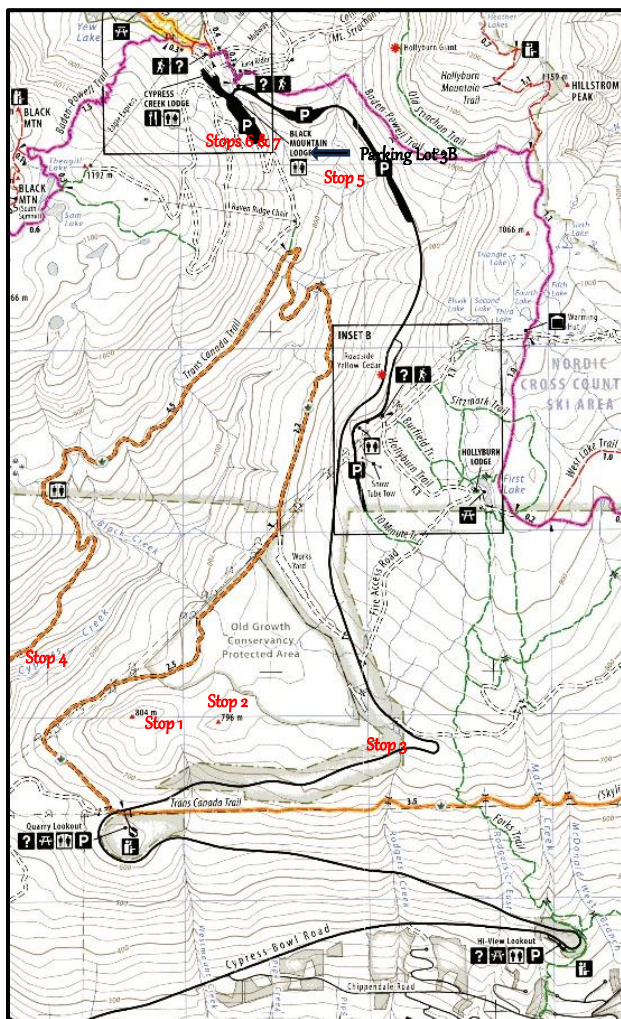
Points of geological interest along the Cypress Parkway also known as the Cypress Bowl Road.

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The following description is designed to be a self-guiding geological tour along the Cypress Parkway, Cypress Provincial Park located in the District of West Vancouver.

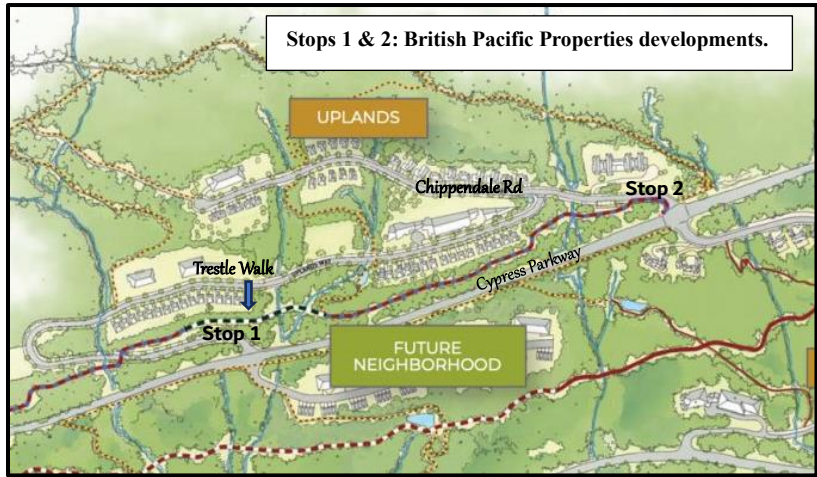
It is designed for the use of Nature Vancouver, Friends of Cypress Provincial Park Society, geology students & members of the general public who wish to improve their knowledge of the geology of the area.

Geological terms in bold are defined in the Glossary.



All 7 stops along the Cypress Parkway (also known as the Cypress Bowl Rd).

**Stops of interest:**



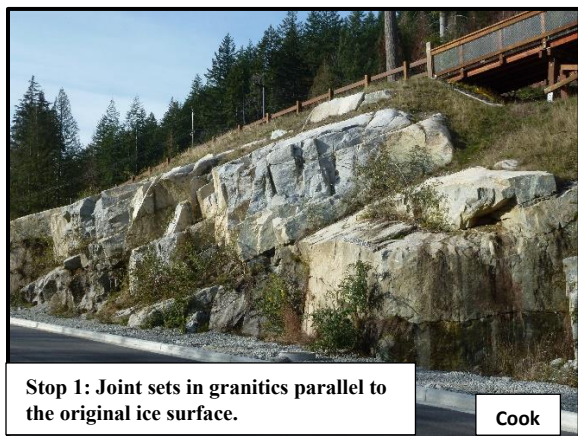
**Stop 1:** Intersection of Cypress Parkway & The Trestle Walk parking lot: **Xenoliths in granitic (quartz diorite** according to Ney 1973); **glacial pavement** (below Trestle Walk but above parking lot); **joint sets** more or less parallel to topography (jointing probably resulted from release of stress due to release of weight of the ice during the waning stages of the glaciation over 10,000 years ago); vertical fault face with **slickensides**.



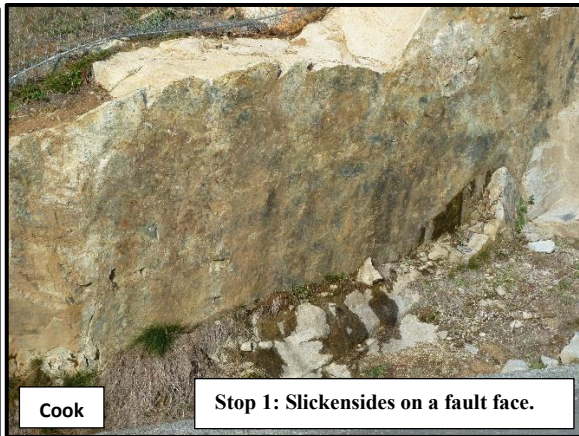
Stop 1: Xenoliths in granitics.



Stop 1: Glacial pavement on granitics.

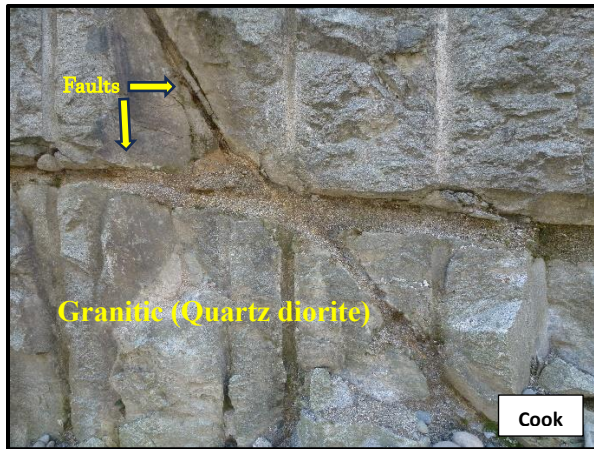


Stop 1: Joint sets in granitics parallel to the original ice surface.



Stop 1: Slickensides on a fault face.

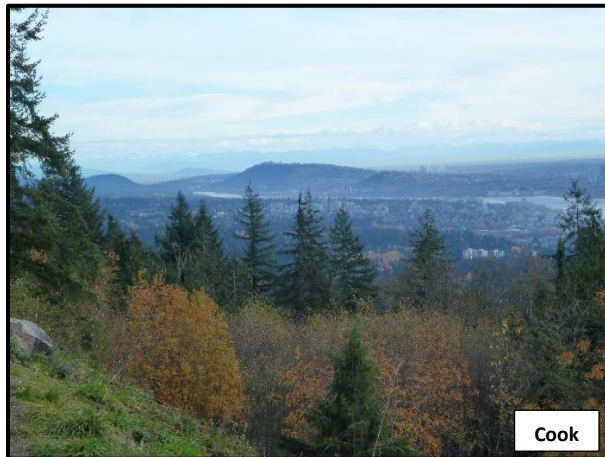
**Stop 2:** Intersection of Cypress Parkway & Chippendale Road: Faulting in granitics.



**Stop 2:** Two prominent intersecting faults in the granitics with 15 cm (6”) & 5 cm (2”) of crush & gouge infill. Note lack of displacement indicating faults occurred at the same time.

**Stop 3:** High View (Hiview) Lookout or Barrett’s View:

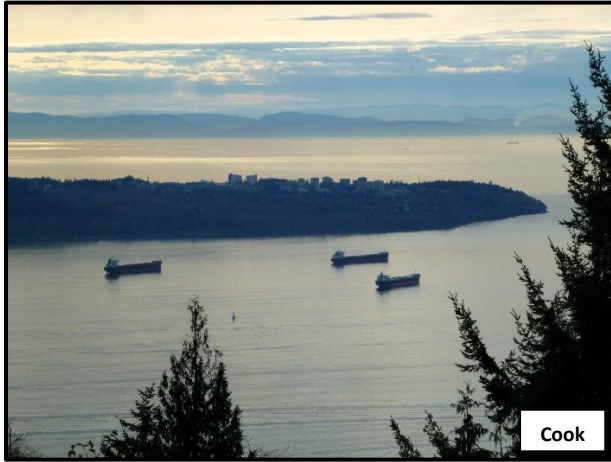
“The eastern switchback viewpoint [High View Lookout] at elevation 1,300 feet [396 metres] affords an excellent view along the mountain front north of the Fraser Lowland. The upwarp of the mountain area and the relative downwarp of the lowland can be readily appreciated in this view. Eroded remnants of the upturned edges of the sedimentary basin [Georgia Basin], called **cuestas**, are apparent in Sentinel Hill, Stanley Park, Burnaby Mountain, [Capitol Hill] and if the air is unusually clear, Grant Hill near Haney.” (Ney 1973).



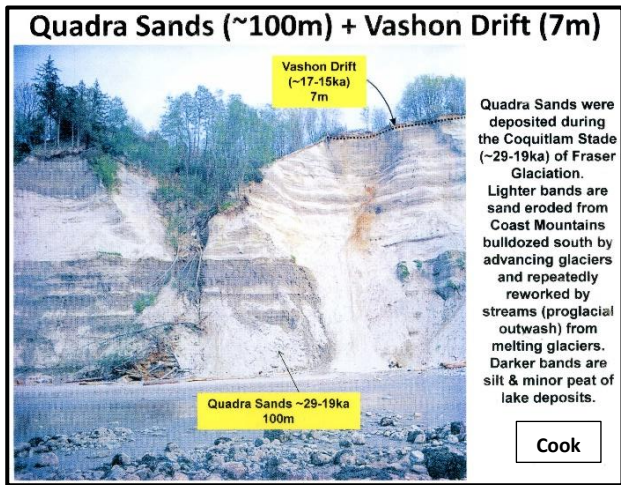
**Stop 3:** View from High View lookout. The most prominent mountain in the view is Burnaby Mountain with Capitol Hill to its right. To its left in the far distance & barely visible is Grant Hill near Haney. All are sedimentary strata of the Georgia basin (although some contain lava flows) & fit the definition of a cuesta. The prominent rounded hill on the far left of the field of view is Chilliwack Hill which is an igneous intrusion & is not a cuesta.

Point Grey, where the University of British Columbia is located, are elevated glacial deposits on the far shore formed when the sea-level was higher. These deposits consist of 100 metres of unconsolidated sands (Quadra Sands) deposited between 29,000 and 19,000 years ago topped by a veneer of Vashon Drift (**till**). “They are a late Pleistocene lithostratigraphic unit with widespread distribution in the Georgia Depression [Georgia Basin], British Columbia and Puget

Lowland, Washington. The unit consists mainly of horizontally and cross-stratified, well sorted sand. It is overlain by till deposited during the Fraser Glaciation and is underlain by fluvial and marine sediments deposited during the preceding nonglacial interval. Thick, well sorted sand was deposited in part as distal outwash aprons at successive positions in front of, and perhaps along the margins of, glaciers advancing from the Coast Mountains into the Georgia-Puget Lowland during late Wisconsin time.” Clague 1976.



**Stop 3: Point Grey upon which UBC is built is made up of Quadra Sands overlain by a thin veneer of Vashon Drift.**



**Stop 3: Section through Point Grey cliffs of Quadra Sands topped by a thin veneer of Vashon Drift.**

**Stop 4:** Bullet boulder in Picnic Area or Quarry Lookout. Between kilometre 8 & 9 posts.



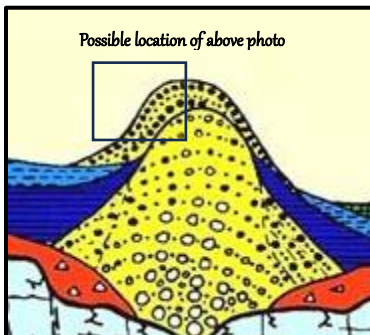
**Stop 4:** The bullet boulder is shaped like a bullet. It is blunt at one end, rounded at the other and is smoothed where it has been dragged through a furrow in the basement rock by glacial ice. The boulder is upside down from its original position at the bottom of the glacier.

**Stop 5:** An esker: At the beginning (southern end) of Parking Lot 3B on the east side of the Cypress Parkway is a possible **esker**.

It is dipping to the left (north). This thick deposit of glacial gravels is possibly an esker. Its upper section is green suggesting montmorillonite clay.

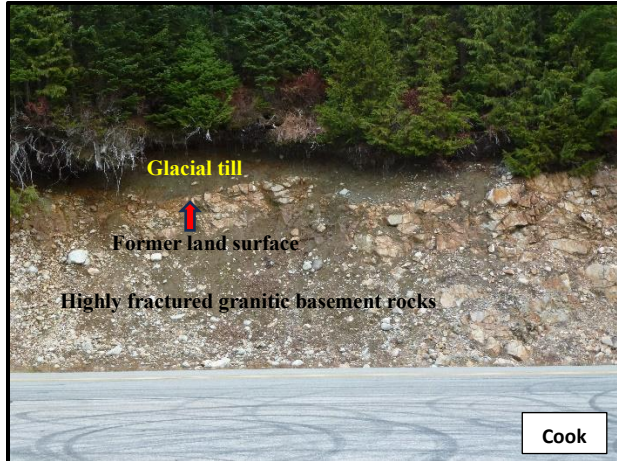


**Stop 5.** An esker?



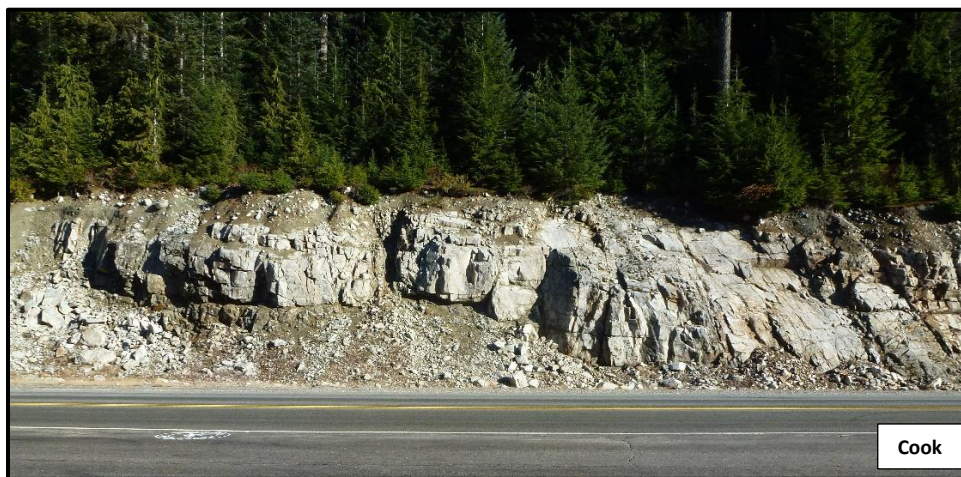
**Cross section through an esker (yellow).**

**Stop 6:** Parking Lot 3B: Halfway along the length of parking lot 3B is an exposure of glacial till overlying a former iron-stained land surface shaped by the passing glaciation about 16,000 years ago. You can clearly see the former undulating land surface created by the moving ice. You will note there has been very little soil development since the ice left about 16,000 years ago. The soil layer is about 1 metre thick & is hidden to view by the overhanging vegetation.



**Stop 6:** Section through bedrock (granitic rocks), glacial till & present-day soil profile (the latter hidden by overhanging vegetation). The old undulating land surface can be seen as the interface between the till & granitics.

**Stop 7:** The rock-cut along the full length of Parking Lot 3B is highly jointed, fractured & faulted granitics. This is indicative of the highly unstable nature of the granitic terrain due to plate tectonics. “Most of the road-cuts [along the Parkway] are in massive gray granitic rock of the low-potash type called quartz diorite.....with widely spaced **joint sets**..... It remains solid and little decomposed right to the surface, or to the point where it is overlain by glacial till. (Ney 1973).



**Stop 7:** North end of the road-cut at Parking Lot 3B showing intense jointing & fracturing of the granitic rock. A fault can be seen cutting horizontally through the left-hand half of the view.

## **References & Literature cited:**

**Clague, J.J. (1976):** Quadra Sand and its relation to the late Wisconsin glaciation of southwest British Columbia, Geological Survey of Canada. Can. Jour. of Earth Sciences. Vol 13.

**Mathews, W.H. & J. Monger (2005):** Roadside geology of Southern British Columbia.

**Ney, C.S. (1973):** An unpublished report by Charles S. Ney (Geologist).

## **Glossary:**

**Crush & gouge:** Shattered rock found in a fault. Caused by the movement of the faulted rock. Rock fragments from fragments (crush) to pulverized (gouge).

**Cuesta:** A ridge or hill with a gentle slope (dip) on one side and a steep slope (scarp) on the other. In geology the term is more specifically applied to a ridge where a harder sedimentary rock overlies a softer layer, the whole being tilted somewhat from the horizontal. This results in a long and gentle backslope called a dip slope that conforms with the dip of resistant strata, called caprock. Where erosion has exposed the front-slope of this, a steep slope or escarpment occurs.

**Glacial pavement:** A rock surface that has been shaped by glaciers moving over it. Rock fragments frozen into the base of the ice scratched the underlying rock. These scratches are called striations if they are small and grooves if they are large. Striations are typically less than 1 cm wide and 1 mm deep, while grooves can be several centimeters wide and up to 1 meter deep. The striations & grooves show the direction of ice movement. However, in the example given below at The Trestle Walk at Stop 1, the rock has no striations & is thought to have been polished by water at very high pressure containing abrasive rock flour passing between the ice and the rock.

**Granitic or granitoid:** Generic terms for all types of granites.

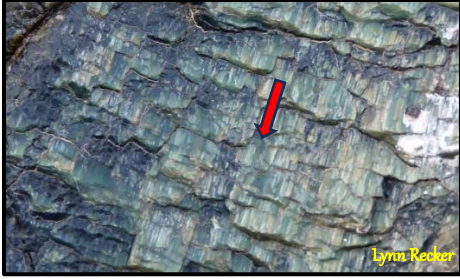
**Joint or Joint sets:** A joint is a break (fracture) of natural origin in a layer or body of rock that lacks visible or measurable movement parallel to the surface (plane) of the fracture. Although joints can occur singly, they most frequently appear as joint sets and systems. A joint set is a family of parallel, evenly spaced joints.

**ka:** Thousands of years ago.

**Quartz diorite:** An intrusive igneous rock compositionally intermediate between granodiorite & diorite. Together with granodiorite, it is the most common granitic rock in the western Canadian Cordillera.

**Sill:** When a glacier filling a fjord slows down and recedes, the sediments are dumped at the front of it to form a terminal moraine or sill.

**Slickensides:** Is a smoothly polished surface caused by frictional movement between rocks along a fault. This surface is typically striated with linear features in the direction of movement. The minerals forming slickensides are usually quartz, calcite, serpentinite, pyrite, chlorite, tourmaline or smectite & have a fibrous form with fibres in the direction of faulting. Often slickensides stair-step so that the fractures on which the slickensides grow, step-down in one direction, making it possible to determine the relative direction of faulting. This can be done by running your fingers across the surface. The direction which is smoother to the touch is the direction of faulting which in this image is the block towards the viewer.



Slickensides of fibrous serpentinite coating a fault surface. Smooth in one direction (arrow), rough in the opposite direction which gives an indication of the relative direction the fault blocks. Image taken from the internet to clarify what slickensides are.

**Till:** Unsorted rock material deposited by glacial ice and showing no stratification.

**Xenolith:** A fragment of solid rock within another igneous rock when in its liquid form that has been introduced from elsewhere, usually the surrounding country rock.