From McMaster University take Cootes Drive towards Dundas. Turn right onto Olympic Drive. Follow Olympic Drive to its intersection with Valley Road and York Road. Turn left onto Valley Road and follow it along until it intersects with Rock Chapel Road. Turn left onto Rock Chapel Road and follow it to the parking area on the left side of the road. From there, a pair of trails lead to the lookout point and the outcrop.
Features at this site...

Rock Chapel...

- A lookout point to the left of the carpark gives a broad view of Hamilton Harbour, Lake Ontario and the modern day beach barrier.

- Well-documented information boards describe the rocks and fossils found in the Niagara Escarpment and local area.

- Geological layers from the uppermost glacial till down to the Grimsby formation are exposed at the outcrop.
Directions:
From the parking lot....

To reach the Royal Botanical Gardens Geology Exhibit, walk southwest across the field from the parking lot. Here there is a lookout point over Hamilton and Lake Ontario.

A series of display boards are located at this site, describing the geology, ecology, and formation of the Niagara Escarpment:
The Formation of the Escarpment

The Niagara Escarpment is formed from layers of sediment deposited at the bottom of ancient oceans, hundreds of millions of years ago.

The Forces of Nature

3. Approximately 400 million years ago, a gradual uplift of the Michigan Basin caused this ocean to drain away, exposing the old sea floor. A cliff marked the outer rim of the Basin (see Fig. 3).

4. Wind, water and ice caused the cliff face to retreat over 200 km west from its original position. Rivers cut valleys deep into the rock, eroding the softer, lower layers, and undercutting the dolomite cap. This collapsed and accumulated on the lower slopes as talus deposits. The Niagara Escarpment was then taking shape.

5. Thick sheets of ice have scoured the landscape of southern Ontario at least 4 times in the past 2 million years, widening old river valleys, and scraping many layers of rock from the top of the Escarpment.

6. The face of the Escarpment continues to change today. Watch for freshly fallen rock along our trails — evidence of the force of running water, frost and tree roots.
INTERNATIONAL RECOGNITION AND PRESERVATION EFFORTS

THE NIAGARA ESCARPMENT: A FAMILIAR FACE

IT'S INTERNATIONALLY SIGNIFICANT!
According to the United Nations, the Niagara Escarpment ranks in global importance with the Florida Everglades and the Galapagos islands. In February 1990, the Escarpment was declared an 'International Biosphere Reserve', an honour bestowed on only 276 other natural features around the world.

WHY DID IT RECEIVE THIS DISTINCTION?
International Biosphere Reserves are areas demonstrating both environmental protection and sustainable use of resources. Rare plants and wildlife share this unique geological feature with its many human neighbours. A special land use plan balances society's needs with those of the environment.

PROTECTING A LEGACY FOR YOUR GRANDCHILDREN
The Niagara Escarpment Plan divides the lands along the Escarpment into seven zones. The most sensitive areas are protected, while other lands may be developed in an environmentally compatible manner.

ESCARPMENT PARKS
Did you know that Ontario has a Niagara Escarpment Parks System?
Royal Botanical Gardens is one of over 100 parks and natural areas, linked by the Bruce Trail, that provide public access and Escarpment information.

BEAUTY IS IN THE EYE OF THE BEHOLDER AT ROCK CHAPEL
The Niagara Escarpment has meant many different things to many different people over the course of history.

* To the early natives of this area, it was the source of a valuable material. Arrowheads were shaped from silica deposits (called chert) extracted from the uppermost rock formation.

* Though the Escarpment presented a challenge to early travellers, the settlers found that it also meant business: a source of water power for grist and saw mills. The destiny of the village of Rock Chapel was closely tied to a saw mill at Toner's Falls.

* Narrowly escaping development as a quarry in the 1920's, Rock Chapel has been protected since 1942 as a haven for wildlife, and a quiet place to enjoy the beauty of the natural world.

Produced by Royal Botanical Gardens, with the financial assistance of The Ontario Heritage Foundation through the Niagara Escarpment Trust Fund.

International Recognition and Preservation Efforts
Ecological Features of the Niagara Escarpment

ESCarpMENT ECOLOGY: Life on the Rocks

PLATEAU
Barley 30 cm (1 foot) of soil lies between your feet and solid rock. The meadow plants around you may be able to cope with the frequent dry spells that occur when this thin soil layer dries out, but think of the challenges forest trees face as their roots search for water.

CLIFF-FACE
Imagine living in a world unprotected from howling winter winds and blazing summer sun. Cliff-faces are exposed to temperature and moisture extremes that few plants can survive. Watch for lichens clinging to the surface: they create tiny fissures in the limestone that soon become home to other plants.

TALUS SLOPE
Thick moss carpets rock rubble that has fallen from the cliff. Springs trickle to the surface, creating a damp environment that harbours a variety of interesting and unusual plant and animal life.

Look carefully as you explore Rock Chapel: though the Escarpment seems to be a single feature, it is actually made up of many different environments.
Plant and animal survival depend on the special combination of temperature, light, moisture and soils found in each area.

Thaumalea americana - larva

UNIQUE ANIMALS IN AN UNUSUAL ENVIRONMENT
Take a closer look next time you pass an Escarpment spring. Water seeping between layers of rock is home to up to 70 species of animals, 13 of which may spend their entire life in an area no bigger than a sheet of paper. Two previously unknown fly species were recently discovered living in springs in the gorge below.

T. americana – adult

ANCIENT FORESTS
Take a second look at the cedar trees growing along this cliff: a tree trunk the diameter of a dollar coin may be two or three hundred years old!

Though white cedar rarely lives for more than 100 years, the Escarpment is home to many that are two or three times that age. Though the harsh environment slows their growth, some have even managed to survive for over 1000 years.

The Solitary Midge is just one of many local species that live in independent (from the Latin ‘solastra’ = lone) habitat along the Escarpment.

Slow growing trees such as this 350 year-old white cedar have much to tell us about how climate change affects plant life.

Photo by D. D. Lamson, Univ. of Guelph
Directions:
From the RBG Geology Exhibit....

From the display boards, follow the Escarpment Trail west along the edge of the escarpment. The walk to the top of the Rock Chapel Outcrop staircase takes approximately 7-10 minutes.

Between the Geology Exhibit and the Rock Chapel outcrop is a covered area with picnic tables next to this lookout over the Dundas Valley.
To access the outcrop, carefully descend these stairs.
Rock Chapel Outcrop
Highlighted formations are visible at this site.
A signboard near the Rochester Fm identifies the rock units (and their environments of deposition) that are visible at Rock Chapel.
Till is a poorly sorted mixture of clay, sand and gravel which rests upon the bedrock. It was deposited by glaciers that covered the area approximately 20,000 years ago.

Till is susceptible to erosion at this site and has been artificially stabilized. It is not well exposed at Rock Chapel.
Upper member of Lockport Fm (Ancaster Member) consists of heavily-fractured and jointed layers of thinly-bedded dolostone containing chert nodules.

Formed from sediments deposited in warm shallow seas under calm conditions.
Lockport Fm
(Gasport Member)

Thick-bedded, medium to coarse-grained dolostone deposited in a low to medium-energy tropical sea.
Crinoids – abundant in Lockport (Gasport member)

Dolostone contains many small cavities called vugs.
Rochester Formation

This shale layer has been extensively weathered and is susceptible to erosion.

Very fine-grained, bluish-grey calcareous shales formed from sediments deposited in quiet, muddy water (warm tropical sea).
Due to erosion of the Rochester Fm, artificial supports have been added to prevent collapse of the overlying Lockport Formation.
Irondequoit Formation

Massive unit 1-1.5 metres thick, contains vugs, fossilized crinoids and brachiopods. Also contains preserved burrows and trails (bioturbation).

Sediments deposited in warm, shallow seas.
Reynales Formation

Formation consists of medium-grained, dark grey/brown dolostone with thin shale interbeds.

Ripple Structures

Sediments deposited in warm shallow seas under conditions of changing wave and current energies.
Sediments from the Taconic Mountain Range were deposited in a marine environment with fluctuating current velocities.

Interbedded medium to fine-grained sandstone and thinly-bedded grey shale.

Thorold Formation has been heavily eroded.

(Eyles, N., 2002)
Ripple structures in sandstones were created by currents and waves in low-medium energy, shallow marine environments.

Interbedded shales result from mud deposition under quiet water conditions.
Red and grey shale with thin beds of sandstone. Shale is easily eroded and tends to be quickly vegetated.

Formation itself is difficult to see at Rock Chapel as it has been extensively covered by talus; however, the red tinge to the sediment indicates that the Grimsby shale is indeed present beneath the talus slopes.
Acknowledgements:

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