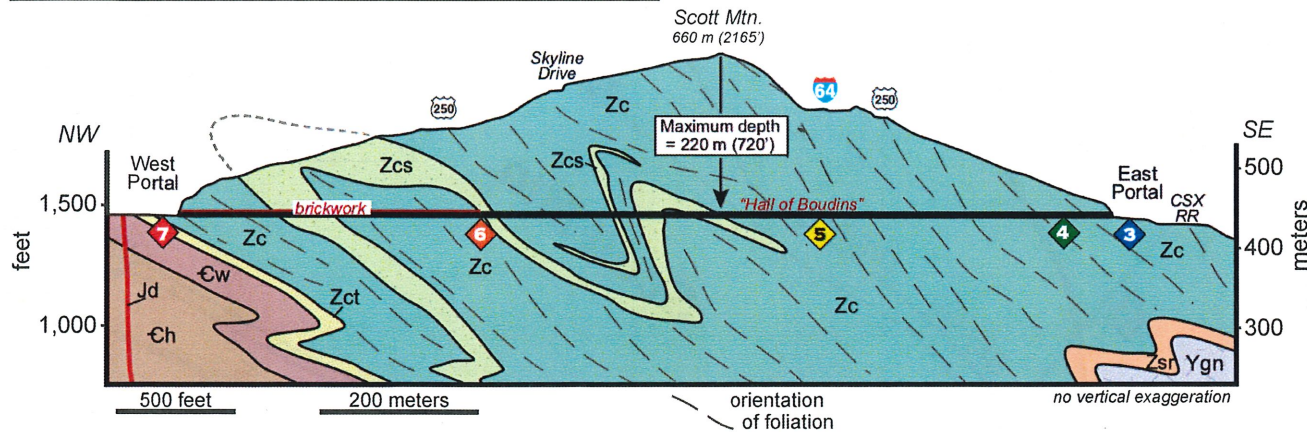
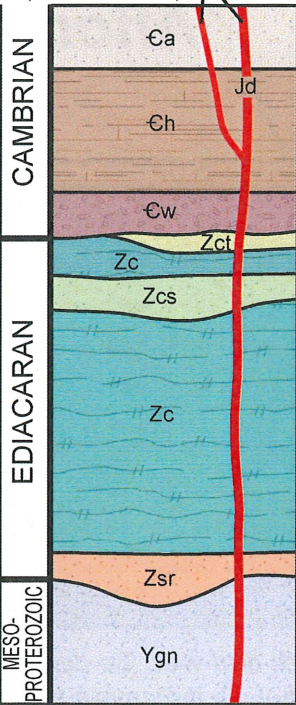


A GEOLOGICAL CROSS SECTION OF THE BLUE RIDGE TUNNEL



GEOLOGIC UNITS

diabase dikes
(~1 to 5 m wide)



Antietam Formation- well-cemented quartz sandstone w/ *Skolithos* (~220 m thick)

Harpers Formation- fine-grained sandstone, siltstone, and ferruginous sandstone (~700 m thick)

Weverton Formation- quartz sandstone, siltstone, and pebbly conglomerate (~150 m thick)

Catoctin Formation- primarily meta- basalt/greenstone (Zc) with interlayers of meta-arkose and phyllite (Zcs), meta-tuff (Zct), and epidote breccia (700 to ~1000 m thick)

Swift Run Formation- quartzose to arkosic phyllite, meta-sandstone/conglomerate (0 to 50 m thick)

Blue Ridge basement complex- granitic gneiss and charnockitic gneiss

Glossary

Catoctin Formation - a geologic unit that contains metamorphosed greenstones that were part of ancient volcanic lava flows ~555-575 million years ago.

Foliation - a planar texture in deformed & metamorphosed rocks created by elongated minerals that are parallel to one another.

Metamorphic rock - a rock that has undergone heating & deformation causing recrystallization of minerals.

Joints - an set of extensional fracture that shows little to no lateral movement (cracks in rock).

Fault - a shear fracture that shows significant displacement or movement of rocks.

Boudins - a section of rock that have an asymmetric, 'sausage-link' appearance due to the ductile deformation of the layers of materials with variable competencies.

Metaconglomerate - a metamorphosed sedimentary rock that contains clasts ranging from pebbles to boulders in size.

Limestone - a sedimentary rock composed primarily of calcium carbonate.

Phyllite - a low-grade metamorphic rock similar to slate but is typically coarser grained and with a shiny foliation.

Diabase - a medium- to fine-grained intrusive igneous rock, similar in composition to basalt.

Dike - a tabular body of intrusive rock that cross-cuts a host rock.

A Geological Guide to the Blue Ridge Tunnel, Virginia



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The historic Blue Ridge Tunnel, a mid-19th century engineering marvel designed by Claudius Crozet, cuts through the Blue Ridge Mountains beneath Rockfish Gap.

The tunnel is nearly a mile in length, with a maximum depth of 720 feet below the crest of the Blue Ridge. The Blue Ridge bedrock proved to be a formidable challenge to cut through, requiring extensive use of explosives.

The tunnel was completed in 1858 and today it's open to the public as a "rail trail" that connects Nelson and Augusta counties. This guide explains the geology along the trail and in the tunnel.

8 STOP 8

As the trail makes a sharp bend, look for large rounded boulders of **diabase**. This dark igneous rock is the youngest unit in the Blue Ridge and formed 200 million years ago when magma was injected into the Earth's crust, forming **igneous dikes**.

7 STOP 7 - West Portal

As we move towards the West Portal, **limestone** blocks quarried from the Shenandoah Valley frame the tunnel in an archway. Outcrops in the rail cut to the north expose **phyllite** (a metamorphic rock) at the north end. These rocks are ~20 million years younger than the upper Catoclin rocks at the tunnel's eastern end.

6 STOP 6

Bricks clad the northwestern third of the tunnel. At the start of the brickwork, there is a **metaconglomerate** with pink potassium feldspar and sandstone clasts.

5 STOP 5

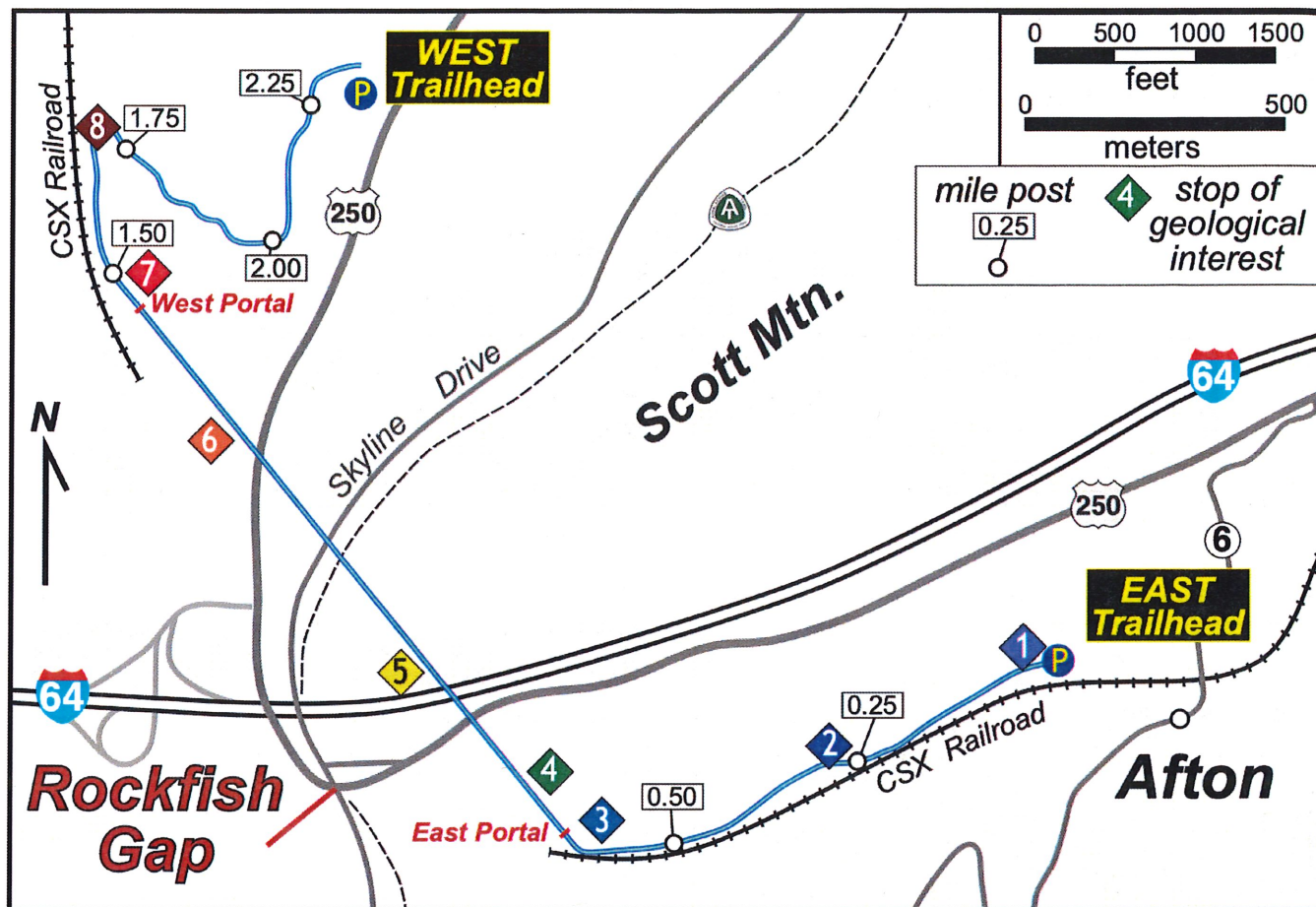
Now hundreds of feet below I-64, interlayered greenstone and metasandstone occur. The sandstone layers were more competent than the greenstone when the rocks were deformed, which resulted in **boudins** (sausage-shaped deformational features). This area of the tunnel is affectionately known as the **Hall of Boudins**.

4 STOP 4

The southeastern part of the tunnel is carved into well-foliated greenstones as well. A few hundred feet from the East Portal, water pours from a narrow **fault** zone in the rocks. The cracked rocks create an easy pathway along which groundwater percolates and flows down the walls of the tunnel.

3 STOP 3 - East Portal

East of the abrupt bend of the rail trail, greenstone in the Catoclin Formation is exposed. These rocks are cross-cut by sets of parallel fractures (**joints**). In the cut, the foliated nature of the greenstone is evident.

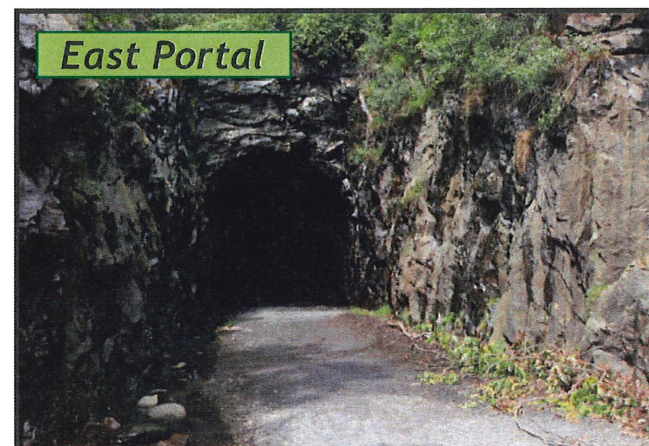


2 STOP 2

This outcrop was cut during the rail trail's construction and exposed greenstone in the Catoclin Formation. Initially, it formed as basalt lava flows, which flooded over the Earth's surface ~555-575 million years ago. New minerals such as chlorite, epidote, and actinolite formed during metamorphism, producing a greenish-grey **metamorphic** rock.

1 STOP 1

This exposed outcrop just past the parking lot marks the beginning of the rail trail. The outcrop is moderately deformed greenstone with foliation from the **Catoclin Formation**. **Foliation** is a planar feature resulting from aligned mineral grains at a micro-scale. Elongated, linear structures made of chlorite are sitting in the foliation plane.



CAUTION! Tunnel is dark and wet. Be careful when navigating the tunnel. Bring ample lighting!