U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science Directorate
Geologic Resources Division

Blue Ridge Parkway (Southern or North Carolina portion of the Parkway Geologic and Geohazards Maps)

GRI Ancillary Map Information Document

Produced to accompany the Geologic Resources Inventory (GRI) Digital Geologic Data for Blue Ridge Parkway

blri_geology.pdf

Version: 9/18/2015

Geologic Resources Inventory Ancillary Map Information Document for Blue Ridge Parkway (Southern or North Carolina portion of the Parkway Geologic and Geohazards Maps)

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Geologic Resources Inventory Map Document

Blue Ridge Parkway, North Carolina and Virginia

Document to Accompany Digital Geologic-GIS Data

blri_geology.pdf

Version: 9/18/2015

This document has been developed to accompany the digital geologic-GIS data developed by the Geologic Resources Inventory (GRI) program for Blue Ridge Parkway, North Carolina and Virginia (BLRI).

Attempts have been made to reproduce all aspects of the original source products, including the geologic units and their descriptions, geologic cross sections, the geologic report, references and all other pertinent images and information contained in the original publication.

National Park Service (NPS) Geologic Resources Inventory (GRI) Program staff have assembled the digital geologic-GIS data that accompanies this document.

For information about the status of GRI digital geologic-GIS data for a park contact:

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About the NPS Geologic Resources Inventory Program

Background

Recognizing the interrelationships between the physical (geology, air, and water) and biological (plants and animals) components of the Earth is vital to understanding, managing, and protecting natural resources. The Geologic Resources Inventory (GRI) helps make this connection by providing information on the role of geology and geologic resource management in parks.

Geologic resources for management consideration include both the processes that act upon the Earth and the features formed as a result of these processes. Geologic processes include: erosion and sedimentation; seismic, volcanic, and geothermal activity; glaciation, rockfalls, landslides, and shoreline change. Geologic features include mountains, canyons, natural arches and bridges, minerals, rocks, fossils, cave and karst systems, beaches, dunes, glaciers, volcanoes, and faults.

The Geologic Resources Inventory aims to raise awareness of geology and the role it plays in the environment, and to provide natural resource managers and staff, park planners, interpreters, researchers, and other NPS personnel with information that can help them make informed management decisions.

The GRI team, working closely with the Colorado State University (CSU) Department of Geosciences and a variety of other partners, provides more than 270 parks with a geologic scoping meeting, digital geologic-GIS map data, and a park-specific geologic report.

Products

Scoping Meetings: These park-specific meetings bring together local geologic experts and park staff to inventory and review available geologic data and discuss geologic resource management issues. A summary document is prepared for each meeting that identifies a plan to provide digital map data for the park.

Digital Geologic Maps: Digital geologic maps reproduce all aspects of traditional paper maps, including notes, legend, and cross sections. Bedrock, surficial, and special purpose maps such as coastal or geologic hazard maps may be used by the GRI to create digital Geographic Information Systems (GIS) data and meet park needs. These digital GIS data allow geologic information to be easily viewed and analyzed in conjunction with a wide range of other resource management information data.

For detailed information regarding GIS parameters such as data attribute field definitions, attribute field codes, value definitions, and rules that govern relationships found in the data, refer to the NPS Geology-GIS Data Model document available at: http://science.nature.nps.gov/im/inventory/geology/GeologyGISDataModel.cfm

Geologic Reports: Park-specific geologic reports identify geologic resource management issues as well as features and processes that are important to park ecosystems. In addition, these reports present a brief geologic history of the park and address specific properties of geologic units present in the park.

For a complete listing of Geologic Resource Inventory products and direct links to the download site visit the GRI publications webpage http://www.nature.nps.gov/geology/inventory/gre_publications.cfm

GRI geologic-GIS data is also available online at the NPS Data Store Search Application: http://irma.nps.gov/App/Reference/Search. To find GRI data for a specific park or parks select the appropriate park

(s), enter “GRI” as a Search Text term, and then select the Search Button.

For more information about the Geologic Resources Inventory Program visit the GRI webpage: http://www.nature.nps.gov/geology/inventory, or contact:

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The Geologic Resources Inventory (GRI) program is funded by the National Park Service (NPS) Inventory and Monitoring (I&M) Division.

GRI Digital Maps and Source Map Citations

The GRI digital geologic-GIS maps for the southern portion of Blue Ridge Parkway, North Carolina and Virginia (BLRI)

GRI Digital Geologic Map of the southern portion of Blue Ridge Parkway, North Carolina (*GRI MapCode BLRS*)

Produced using the following North Carolina Geological Survey digital data,

> Merschat, Carl, Carter, Mark, Wooten, Rick, 2008, Geologic Map of Blue Ridge Parkway, North Carolina portion (unpublished): North Carolina Geological Survey, scale 1:24,000. (*GRI Source Map ID 4160*).

In addition to the above source, surficial units and related contacts were obtained from the following source,

> Merschat, Carl, Carter, Mark, Wooten, Rick, 2008, Geologic Hazards of Blue Ridge Parkway, North Carolina portion (unpublished): North Carolina Geological Survey, scale 1:24,000. (*GRI Source Map ID 76004*).
>
> As noted below this source was also used for all feature classes/data layers present in the GRI Digital Geohazards Map of the southern portion of Blue Ridge Parkway, North Carolina (*GRI MapCode BRHZ*).

GRI Digital Geohazards Map of the southern portion of Blue Ridge Parkway, North Carolina (*GRI MapCode BRHZ*)

Produced using the following North Carolina Geological Survey digital data,

> Merschat, Carl, Carter, Mark, Wooten, Rick, 2008, Geologic Hazards of Blue Ridge Parkway, North Carolina portion (unpublished): North Carolina Geological Survey, scale 1:24,000. (*GRI Source Map ID 76004*).
>
> As noted above this source was also used for surficial units and contacts present in the GRI Digital Geologic Map of the southern portion of Blue Ridge Parkway, North Carolina (*GRI MapCode BLRS*).

Additional information pertaining to each source map is also presented in the Source Map Information (BLRIMAP) table included with the GRI geologic-GIS data.

Map Unit List

The geologic units present in the digital geologic-GIS data produced for the southern portion of Blue Ridge Parkway, North Carolina and Virginia (BLRI) are listed below. Units are listed with their assigned unit symbol and unit name (e.g., Qbf - Block field). Units are generally listed from youngest to oldest. No description for water is provided. Information about each geologic unit is also presented in the GRI Geologic Unit Information (BLRSUNIT) table included with the GRI geologic-GIS data. Several source unit symbols were changed in this document and in the GRI digital geologic-GIS data from their source (data) unit symbol. This was primarily done to improve unit symbol designation so that unit symbols better represented their unit name (e.g., two units of the Grandfather Mountain Formation, Zgfc and Zgfs, were denoted as Zgc and Zgs, respectively, in the source data. These unit symbol was changed to include a "f" to better represent the unit name and be consistent with the other two units of the Grandfather Mountain Formation that have a "f" in the unit symbol).

Cenozoic Era

Quaternary Period
Qbf - Block field
Qbs - Block stream
Qt - Talus
Qdf - Debris fan
Qdu - Debris, undifferentiated
Qcu - Colluvium, undifferentiated
Qc - Composite block field, block stream and talus

Paleozoic Era

PZpeg - Pegmatite
PZmg - Migmatitic gneiss

Cambrian Period
Ccu - Upper Chilhowee Quartzite
Ccp - Chilhowee Phyllite
Ccl - Lower Chilhowee Quartzite

Paleozoic Era? and Proterozoic Eon

Cambrian Period? and Neoproterozoic Era
PZZog - Otto Formation, metagraywacke
PZZogsi - Otto Formation, schistose metagraywacke
PZZos - Otto Formation, garnet-mica schist
PZZocs - Otto Formation, calc-silicate

Proterozoic Eon

Neoproterozoic Era
Zgsc - Great Smoky Group, granule metaconglomerate
Zgsg - Great Smoky Group, metagraywacke
Zgsa - Great Smoky Group, arkosic metasandstone

Zgssi - Great Smoky Group, schistose metagraywacke
Zgss - Great Smoky Group, schist
Zabg - Alligator Back Metamorphic Suite, metagraywacke
Zabsi - Alligator Back Metamorphic Suite, schistose metagraywacke
Zabs - Alligator Back Metamorphic Suite, mica schist
Zabsim - Alligator Back Metamorphic Suite, metasomatic schistose metagraywacke
Zaba - Alligator Back Metamorphic Suite, amphibolite
Zsl - Snowbird Group, Longarm Formation
Zag - Ashe Metamorphic Suite, Talluluah Falls Formation, metagraywacke
Zagg - Ashe Metamorphic Suite, Talluluah Falls Formation, gneissic metagraywacke
Zaggm - Ashe Metamorphic Suite, Talluluah Falls Formation, migmatitic gneissic metagraywacke
Zaggmy - Ashe Metamorphic Suite, Talluluah Falls Formation, mylonitic gneissic metagraywacke
Zaga - Ashe Metamorphic Suite, Talluluah Falls Formation, amphibolitic metagraywacke
Zagsi - Ashe Metamorphic Suite, Talluluah Falls Formation, schistose metagraywacke
Zas - Ashe Metamorphic Suite, Talluluah Falls Formation, garnet mica schist
Zass - Ashe Metamorphic Suite, Talluluah Falls Formation, sillimanite/kyanite schist
Zams - Ashe Metamorphic Suite, Talluluah Falls Formation, megacrystic muscovite schist
Zags - Ashe Metamorphic Suite, Talluluah Falls Formation, graphitic two-mica schist
Zac - Ashe Metamorphic Suite, Talluluah Falls Formation, metaconglomerate
Zaa - Ashe Metamorphic Suite, Talluluah Falls Formation, amphibolite
Zacs - Ashe Metamorphic Suite, Talluluah Falls Formation, calc-silicate
Zaua - Ashe Metamorphic Suite, Talluluah Falls Formation, altered ultramafic rock
Zgfg - Grandfather Mountain Formation, feldspathic metagraywacke
Zgfc - Grandfather Mountain Formation, metaconglomerate
Zgfv - Grandfather Mountain Formation, felsic volcanics
Zgfs - Grandfather Mountain Formation, siltstone
Zgfsm - Grandfather Mountain Formation, siltstone and mafic volcanics
Zl - Neoproterozoic Metaplutonic Rocks, Linville Metadiabase

Neoproterozoic and Mesoproterozoic Eras
ZYbg - Cartoogechaye Terrane Rocks, biotite granitic gneiss
ZYbga - Cartoogechaye Terrane Rocks, amphibolite
ZYlbgg - Cartoogechaye Terrane Rocks, layered biotite granitic gneiss
ZYbgh - Cartoogechaye Terrane Rocks, hornblende biotite granitoid gneiss

Mesoproterozoic Era
Yggs - Mesoproterozoic Metaplutonic Rocks, granitic gneiss (southern segment)
Yggn - Mesoproterozoic Metaplutonic Rocks, granitic gneiss (northern segment)
Yggmy - Mesoproterozoic Metaplutonic Rocks, mylonitic granitic gneiss
Ya - Mesoproterozoic Metaplutonic Rocks, amphibolite
Ybrg - Mesoproterozoic Metaplutonic Rocks, Blowing Rock Gneiss
Ybrgmy - Mesoproterozoic Metaplutonic Rocks, Blowing Rock Gneiss, mylonitic

Map Unit Descriptions

Descriptions of all geologic map units, generally listed from youngest to oldest, are presented below. Unit symbols present in unit description text are as per the source map. If the GRI changed a unit symbol (see the Map Unit List section for an explanation as to why some source unit symbols were changed) or changed a unit name, then the source unit symbol, name and age is listed just before a unit's description (e.g., for unit Ccu "Ccu - Upper quartzite (Cambrian)" is listed just before the unit's description as the unit's name was changed by the GRI to "Upper Chilhowee Quartzite"). Most often unit names were changed to include a group, metamorphic suite, terrane grouping and/or a formation name in a unit's name (e.g., for unit PZZog the name "Metagraywacke" was changed to "Otto Formation, metagraywacke" as the unit is a member of the Otto Formation").

Qbf - Block field (Quaternary)

An accumulation of boulders or angular blocks of rock, with little or no fine sediment in the upper part over bedrock or other hillslope deposit without a cliff or a ledge above as an apparent source. Block fields usually occur on high mountain slopes where they are most extensive along slopes parallel to contour. (*GRI Source Map ID 76004)* (Blue Ridge Parkway Geohazards South).

Qbs - Block stream (Quaternary)

A linear accumulation of boulders or angular blocks of rock, with little or no fine sediment in the upper part over bedrock or other hillslope deposit. Block streams usually occur at heads of ravines, as narrow bodies more extensive downslope than along slope. (*GRI Source Map ID 76004)* (Blue Ridge Parkway Geohazards South).

Qt - Talus (Quaternary)

Rock fragments of any size or shape, usually coarse and angular, derived from and lying at the base of a cliff or very steep rocky slope. (*GRI Source Map ID 76004)* (Blue Ridge Parkway Geohazards South).

Qdf - Debris fan (Quaternary)

A deposit of debris-sized material that is known or reasonably inferred to be emplaced by mass wasting processes and has a distinctive lobe, fan, or coalescing fan shape. Debris fans can include colluvial and alluvial components. Debris is an unconsolidated surficial soil or sediment that contains a significant proportion of coarse material in which 20% to 80% of the particles are greater than sand sized in the range of 0.08 inches (2 mm). (*GRI Source Map ID 76004)* (Blue Ridge Parkway Geohazards South).

Qdu - Debris, undifferentiated (Quaternary)

A deposit of debris sized material that is known or reasonably inferred to be emplaced by mass wasting processes but lacks the distinctive lobe, fan, or coalescing fan shape of a debris fan. Debris is an unconsolidated surficial soil or sediment that contains a significant proportion of coarse material in which 20% to 80% of the particles are greater than sand sized in the range of 0.08 inches (2 mm). (*GRI Source Map ID 76004)* (Blue Ridge Parkway Geohazards South).

Qcu - Colluvium, undifferentiated (Quaternary)

Slope movement deposits that mantle hillslopes without a distinctive fan shape or fabric indicating flow (e.g., imbrication). This deposit is primarily emplaced by creep; however, it can result from more rapid forms of mass wasting processes such as flow or sliding. It is a general term applied to a hillslope deposit when an emplacement mechanism is not known or reasonably inferred. This term is typically used for hillslope deposits that have not been field verified and are not fan-shaped. (*GRI Source Map ID 76004)* (Blue Ridge Parkway Geohazards South).

Qc - Composite block field, block stream and talus (Quaternary)

Composite block field and block stream deposits, including talus in the upslope areas in some localities. See descriptions for block field, block stream and talus above. (*GRI Source Map ID 76004)* (Blue Ridge Parkway Geohazards South).

PZpeg - Pegmatite (Paleozoic)

Pzpeg - Pegmatite (Paleozoic)
White to mottled white and pink; very coarse-grained; dominantly crosscutting; lenticular to tabular bodies; thickness ranges from centimeters to meters; consists of plagioclase, potassium feldspar, quartz, biotite, muscovite and other minor minerals. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

PZmg - Migmatitic gneiss (Paleozoic)

Pzmg - Migmatitic gneiss (Paleozoic)
White to very light gray; medium- to coarse-grained; equigranular; granoblastic; locally gradational into pegmatite; occurs as mappable bodies, lenses, and as thin, cross-cutting, leucocratic, vein-like, segregations derived from local melting during regional high grade metamorphism; non-foliated to weakly foliated; consists of quartz, plagioclase, potassium feldspar, muscovite, biotite, garnet, epidote group minerals. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Ccu - Upper Chilhowee Quartzite (Cambrian)

Ccu - Upper quartzite (Cambrian)
Yellowish gray to very light gray to light bluish gray; medium- to fine-grained; equigranular; granoblastic to mylonitic; Thin- to thick- bedded, locally foliated; consists of approximately 70% quartz, 15% muscovite, 5% plagioclase, 5% chlorite, 2% potassium feldspar, and minor accessory minerals. Interlayered with thin layers of feldspathic quartzite, gray metasiltstone, and slate. Cambrian index fossil scolithus reported to be found in this unit (Safford, 1856). (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Ccp - Chilhowee Phyllite (Cambrian)

Ccp - Phyllite (Cambrian)
Medium light gray to medium bluish gray; fine-grained; equigranular; lepidoblastic; foliated; consists of sericite, quartz, chlorite, and minor accessory minerals. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Ccl - Lower Chilhowee Quartzite (Cambrian)

Ccl - Lower quartzite (Cambrian)
Yellowish gray to very light gray; medium- to coarse-grained; equigranular to inequigranular; granoblastic to locally mylonitic; thick- to thin-bedded, locally foliated; consists of approximately 73% quartz, 20% muscovite, 5% potassium feldspar, 2% plagioclase, and minor accessory minerals. Interlayered with thin layers of feldspathic quartzite, grayish-green metasiltstone, slate, and quartz pebble conglomerate. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

PZZog - Otto Formation, metagraywacke (Paleozoic (Cambrian?) and Neoproterozoic)

PzZog - Metagraywacke (Paleozoic (Cambrian?) and Neoproterozoic)
Medium light gray to medium dark gray; medium- to coarse-grained; equigranular to inequigranular; granoblastic to weakly lepidoblastic; locally migmatitic; locally sulfidic; non-foliated to foliated; consists of quartz, plagioclase, biotite, muscovite, garnet, potassium feldspar and minor accessory minerals. Interlayered with calc-silicate, schistose metagraywacke and garnet mica schist. Metamorphic layering ranges from 1 centimeter to greater than 2 meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

PZZogsi - Otto Formation, schistose metagraywacke (Paleozoic (Cambrian?) and Neoproterozoic)

PzZogsi - Schistose metagraywacke (Paleozoic (Cambrian?) and Neoproterozoic)
Medium gray to medium dark gray; strongly foliated; fine- to medium-grained; equigranular to inequigranular; lepidoblastic to weakly granoblastic to porphyroblastic; locally migmatitic; consists of quartz, plagioclase, muscovite, biotite, chlorite, garnet, ilmenite, epidote group minerals, sillimanite, and iron sulfide minerals (pyrrhotite, pyrite). Interlayered with metagraywacke, garnet mica schist, and calc-silicate. Thickness of layering ranges from millimeters to centimeters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

PZZos - Otto Formation, garnet-mica schist (Paleozoic (Cambrian?) and Neoproterozoic)

PzZos - Garnet mica schist - (Paleozoic (Cambrian?) and Neoproterozoic)
Silvery gray to light gray; fine- to medium-grained; porphyroblastic; lepidoblastic; consists of sillimanite, garnet, quartz, biotite, muscovite schist interlayered with lesser amounts of metagraywacke and schistose metagraywacke. Schist may be variably migmatitic and/or sulfidic with bright yellow to orange-yellow stains. Subordinate metagraywacke layers range from a few centimeters to several meters thick. Layers and lenses of medium-grained calc-silicate occur. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

PZZocs - Otto Formation, calc-silicate (Paleozoic (Cambrian?) and Neoproterozoic)

PzZocs - Calc-silicate (Paleozoic (Cambrian?) and Neoproterozoic)
Very light gray to medium gray to pinkish gray with dark yellowish orange splotches on weathered surfaces; medium-grained; equigranular; granoblastic; massive to well foliated; consists of quartz, plagioclase, amphibole, garnet, epidote group minerals, biotite, with trace and accessory minerals. Interlayered with metagraywacke, schistose metagraywacke, and garnet mica schist. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zgsc - Great Smoky Group, granule metaconglomerate (Neoproterozoic)

Zgsc - Granule metaconglomerate (Neoproterozoic)
Medium gray to dark gray; medium- to coarse-grained; poorly sorted to graded; subangular to subrounded grains; granule to pebble conglomerate with a sandy matrix in which the larger grains are usually well sorted and consist of clear to white quartz, white feldspar, and finer blue quartz; rare lithic fragments; interbedded with metagraywacke, argillaceous metagraywacke and sulfidic, graphitic schist to phyllite. Thickness ranges from less than 1 meter to 3 meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zgsg - Great Smoky Group, metagraywacke (Neoproterozoic)

Zgsg - Metagraywacke (Neoproterozoic)
Medium light gray to medium dark gray; medium- to coarse-grained; equigranular to inequigranular; granoblastic to weakly lepidoblastic; locally migmatitic; locally sulfidic; non-foliated to foliated; consists of quartz, plagioclase, muscovite, potassium feldspar, garnet, epidote group minerals and minor accessory minerals. Interlayered with gneissic metagraywacke, calc-silicate, garnet mica schist, and graphitic mica schist. Thickness of layering ranges from meters to tens of meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zgsa - Great Smoky Group, arkosic metasandstone (Neoproterozoic)

Zgsa - Arkosic metasandstone (Neoproterozoic)
Medium light gray to grayish orange; medium- to coarse-grained; equigranular; granoblastic; foliated; locally mylonitic; consists of potassium feldspar, quartz, plagioclase feldspar, muscovite and minor accessory minerals. Interlayered with metagraywacke and schistose metagraywacke. Thickness of layering ranges from centimeters to meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zgssi - Great Smoky Group, schistose metagraywacke (Neoproterozoic)

Zgssi - Schistose metagraywacke (Neoproterozoic)
Medium gray to medium dark gray, commonly stained yellowish dark gray; strongly foliated; fine- to medium-grained; equigranular to inequigranular; lepidoblastic to weakly granoblastic; locally migmatitic; locally sulfidic; consists of quartz, plagioclase, muscovite, biotite, chlorite, garnet, epidote group minerals, kyanite and/or sillimanite, and iron sulfide minerals (pyrrhotite, pyrite). Interlayered with metagraywacke, garnet mica schist and thin layers and nodules of calc-silicate. Thickness of layering ranges from millimeters to centimeters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zgss - Great Smoky Group, schist (Neoproterozoic)

Zgss - Schist (Neoproterozoic)
Medium gray to medium dark gray to dark gray; medium- to coarse-grained; inequigranular; lepidoblastic; thinly foliated; locally sulfidic; locally graphitic; consists of muscovite, biotite, quartz, garnet, kyanite and/or sillimanite, pyrrhotite, pyrite, graphite, and other accessory minerals. Interlayered with metagraywacke and thin layers and nodules of calc-silicate. Thickness of layering ranges from millimeters to centimeters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zabg - Alligator Back Metamorphic Suite, metagraywacke (Neoproterozoic)

Zabg - Metagraywacke (Neoproterozoic)
Medium light gray to medium dark gray; medium- to fine-grained; equigranular to inequigranular; granoblastic; thinly foliated (pinstriped) to weakly foliated; consists of 33-59% quartz, 15-37% plagioclase, 10-12% biotite, 5-10% muscovite, 0-10% potassium feldspar, 0-5% garnet, and accessory minerals; typically more micaceous than the metagraywackes of the Ashe Metamorphic Suite. Interlayered with mica schist, amphibolites, and metasiltstones. Thickness of layering ranges from centimeters to tens of meters and is commonly more thin than layering of the Ashe Metamorphic Suite. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zabsi - Alligator Back Metamorphic Suite, schistose metagraywacke (Neoproterozoic)

Zabsi - Schistose metagraywacke (Neoproterozoic)
Light gray to medium gray; fine-grained; equigranular to inequigranular; granoblastic to lepidoblastic; foliated to thinly foliated (pinstriped); consists of approximately 42% muscovite (sericite), 28% bioitite, 20% quartz, 9% plagioclase, 1% potassium feldspar, and other minor minerals. Interlayered with metagraywacke and mica schist. Thickness of layers ranges from centimeters to meters. Characteristically thin layered. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zabs - Alligator Back Metamorphic Suite, mica schist (Neoproterozoic)

Zabs - Mica schist (Neoproterozoic)
Light gray to medium light gray; very fine-grained to medium-grained; equigranular to inequigranular; lepidoblastic to porphyroblastic; thinly foliated; consists of approximately 50% muscovite, 30% quartz, 10% biotite, 2% plagioclase and minor accessory minerals, with variable amounts of garnet, staurolite, and cross-biotite depending on grade of metamorphism. Interlayered with metagraywacke and amphibolite. Thickness of layers ranges from millimeters to tens of centimeters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zabsim - Alligator Back Metamorphic Suite, metasomatic schistose metagraywacke (Neoproterozoic)

Zabsim - Schistose metagraywacke with metasomatic schist (Neoproterozoic)
Light gray to light olive gray to medium gray; coarse-grained; inequigranular; lepidoblastic; foliated to thinly foliated; consists of muscovite, bioitite, quartz, plagioclase, potassium feldspar, and other accessory minerals. Interlayered with metagraywacke, schistose metagraywacke and mica schist. Coarse micas of this unit are attributed to contact metamorphism from nearby intrusions. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zaba - Alligator Back Metamorphic Suite, amphibolite (Neoproterozoic)

Zaba - Amphibolite (Neoproterozoic)
Dusky green to black; fine- to medium-grained; equigranular; nematoblastic to granoblastic to lepidoblastic; foliated; consists of approximately 42% hornblende, 36% plagioclase, 10% quartz, 7% biotite, 5% opaques, and minor epidote group minerals and other accessory minerals. Interlayered with metagraywacke and mica schist. Layering is characteristically thin but locally ranges up to tens of meters thick. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zsl - Snowbird Group, Longarm Formation (Neoproterozoic)

Zsl - Longarm Formation (Neoproterozoic)
Pinkish gray to grayish pink, mottled with white to very light gray quartz and grayish pink to grayish orange pink feldspar grains; medium- to coarse-grained; equigranular; granoblastic; locally cross-bedded; consists of quartz, potassium feldspar, plagioclase, muscovite, biotite and minor accessory minerals. Dominantly meta-arkose and metasubgraywacke; interlayered with subordinate metagraywacke and metasiltstone. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zag - Ashe Metamorphic Suite, Talluluah Falls Formation, metagraywacke (Neoproterozoic)

Zag - Metagraywacke (Neoproterozoic)
Medium light gray to medium dark gray; medium- to coarse-grained; equigranular to inequigranular; granoblastic to weakly lepidoblastic; locally migmatitic; locally sulfidic; non-foliated to foliated; consists of 5-60% quartz, 25-55% plagioclase, 6-25% biotite, 1-3% muscovite, trace to 1% potassium feldspar, 0-10% garnet, epidote group minerals, and hornblende, with minor accessory minerals and trace minerals. Interlayered with granule metaconglomerate, gneissic metagraywacke, amphibolite, calc-silicate, and thin layers of sillimanite/kyanite schist, garnet mica schist, megacrystic muscovite schist, and graphitic mica schist. Thickness of layering ranges from tens to hundreds of meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zagg - Ashe Metamorphic Suite, Talluluah Falls Formation, gneissic metagraywacke (Neoproterozoic)

Zagg - Gneissic metagraywacke (Neoproterozoic)
Medium light gray to medium dark gray; fine-to medium-grained; equigranular; granoblastic and lepidoblastic; migmatitic; coarsely foliated (gneissic); consists of quartz, plagioclase, potassium feldspar, biotite, muscovite, locally garnet, epidote group minerals, and hornblende, with minor accessory minerals and trace minerals. Interlayered with metagraywacke, megacrystic muscovite schist, sillimanite/kyanite schist, garnet mica schist and amphibolite. Thickness of layering ranges from meters to tens of meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zaggm - Ashe Metamorphic Suite, Talluluah Falls Formation, migmatitic gneissic metagraywacke (Neoproterozoic)

Zaggm - Migmatitic gneissic metagraywacke (Neoproterozoic)
White to Medium light gray to medium dark gray; fine- to coarse-grained; equigranular; granoblastic; migmatitic; coarsely foliated (gneissic); consists of quartz, plagioclase, potassium feldspar, biotite, muscovite, locally garnet, epidote group minerals, and hornblende, with minor accessory minerals and trace minerals. Interlayered with migmatite and metagraywacke. Thickness of layering ranges from centimeters to meters. Similar to gneissic metagraywacke unit but is more migmatitic with lenses of leucosome commonly disrupting gneissic layering. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zaggmy - Ashe Metamorphic Suite, Talluluah Falls Formation, mylonitic gneissic metagraywacke (Neoproterozoic)

Zaggmy - Mylonitic gneissic metagraywacke (Neoproterozoic)
Light to medium gray; medium-grained; migmatitic; porphyroclastic; protomylonitic to mylonitic; consists of quartz, plagioclase, biotite, garnet, muscovite. Interlayered with porphyrolcastic garnet, biotite,

muscovite schist, and muscovite, biotite granitoid gneiss. Layering ranges from 1-10 centimeters; migmatite and thin schistose layers display a wispy S-C texture. Garnets are strongly deformed, and often recrsytallized. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zaga - Ashe Metamorphic Suite, Talluluah Falls Formation, amphibolitic metagraywacke (Neoproterozoic)

Zaga - Amphibolitic metagraywacke (Neoproterozoic)
Medium gray to dark gray to black; medium- to coarse-grained; equigranular to inequigranular; granoblastic to nematoblastic; poorly to well foliated; locally migmatitic; consists of quartz, plagioclase, hornblende, biotite, muscovite, with minor accessory and trace minerals. Interlayered with metagraywacke, gneissic metagraywacke, and migmatite. Thickness of layering ranges from centimeters to meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zagsi - Ashe Metamorphic Suite, Talluluah Falls Formation, schistose metagraywacke (Neoproterozoic)

Zagsi - Schistose metagraywacke (Neoproterozoic)
Medium gray to medium dark gray; strongly foliated; fine- to medium-grained; equigranular to inequigranular; lepidoblastic to weakly granoblastic to porphyroblastic; locally migmatitic; consists of quartz, plagioclase, muscovite, biotite, chlorite, garnet, ilmenite, epidote group minerals, sillimanite, and iron sulfide minerals (pyrrhotite, pyrite). Interlayered with metagraywacke, gneissic metagraywacke, and garnet mica schist. Thickness of layering ranges from millimeters to centimeters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zas - Ashe Metamorphic Suite, Talluluah Falls Formation, garnet mica schist (Neoproterozoic)

Zas - Garnet mica schist (Neoproterozoic)
Light gray to medium light gray, with silvery sheen; medium- to coarse-grained; equigranular to inequigranular; lepidoblastic to porphryoblastic; locally sulfidic; thinly foliated; consists of 14-69% muscovite (sericite), 8-9% quartz, 5-25% garnet, 4-25% biotite, trace to 3% plagioclase, 0-31% kyanite, 0-11% high mg-chlorite, and other acessory minerals. Interlayered with metagraywacke, gneissic metagraywacke, megacrystic muscovite schist, sillimanite/kyanite schist, and amphibolite. Thickness of layering ranges from millimeters to centimeters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zass - Ashe Metamorphic Suite, Talluluah Falls Formation, sillimanite/kyanite schist (Neoproterozoic)

Zass - Sillimanite/kyanite schist (Neoproterozoic)
Light gray to medium gray to greenish gray; coarse-grained; equigranular to inequigranular; lepidoblastic to locally porphryoblastic; locally sulfidic; thinly foliated; consists of 30-53% muscovite (sericite), 5-30% quartz, 2-5% plagiolase, trace to 2% high mg-chlorite, 0-20% garnet, 0-10% sillimanite and/or kyanite. Interlayered with metagraywacke, gneissic metagraywacke, garnet mica schist, megacrystic muscovite schist, and amphibolite. Thickness of layering ranges from millimeters to centimeters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zams - Ashe Metamorphic Suite, Talluluah Falls Formation, megacrystic muscovite schist (Neoproterozoic)

Zams - Megacrystic muscovite schist (Neoproterozoic)
Light gray to medium light gray; coarse-grained; equigranular to inequigranular; lepidoblastic to porphyroblastic; locally sulfidic; thinly foliated; consists of approximately 25% biotite, 25% quartz, 20% muscovite (sericite), 20% plagioclase, 5% garnet, 2% kyanite, 2% sillimanite, 1% staurolite, and other accessory minerals. Megacrysts of muscovite possibly pseudomorphic after kyanite range in size from 3 to 30 mm. Interlayered with garnet muscovite schist, metagraywacke, gneissic metagraywacke, sillimanite/kyanite schist, and amphibolite. Thickness of layering ranges from millimeters to centimeters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zags - Ashe Metamorphic Suite, Talluluah Falls Formation, graphitic two-mica schist (Neoproterozoic)

Zags - Graphitic two-mica schist (Neoproterozoic)
Medium gray to medium dark gray; fine-grained; equigranular to inequigranular; lepidoblastic; thinly foliated; consists of muscovite, biotite, quartz, graphite, and accessory garnet, staurolite, and an iron sulfide mineral (pyrrhotite?). Interlayered with metagraywacke, gneissic metagraywacke, and garnet mica schist. Thickness of layering ranges from millimeters to centimeters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zac - Ashe Metamorphic Suite, Talluluah Falls Formation, metaconglomerate (Neoproterozoic)

Zac - Metaconglomerate (Neoproterozoic)
Medium light gray to medium dark gray; coarse-grained; inequigranular, locally very weakly graded; granoblastic to weakly lepidoblastic; non-foliated to foliated; consists of approximately 47% quartz, 43% plagioclase, 5% biotite, 3% muscovite, 2 % garnet, trace potassium feldspar, trace epidote group minerals and other accessory and trace minerals; Interlayered primarily with metagraywacke, gneissic metagraywacke, garnet mica schist, megacrystic muscovite schist and sillimanite/kyanite schist. Thickness of layering ranges from decimeters to several meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zaa - Ashe Metamorphic Suite, Talluluah Falls Formation, amphibolite (Neoproterozoic)

Zaa - Amphibolite (Neoproterozoic)
Greenish black to black; fine- to medium-grained; equigranular; nematoblastic to granoblastic; occurs in association with ultramafic bodies, as mappable units and as thin layers and lenses interlayered with other rock types in all map units; foliated; one sample consists of approximately 86% hornblende, 8% plagioclase, 2% quartz, 2% biotite, 2% epidote group minerals, and minor accessory minerals. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zacs - Ashe Metamorphic Suite, Talluluah Falls Formation, calc-silicate (Neoproterozoic)

Zagcs - Cal-silicate (Neoproterozoic)
Very light gray to medium gray to pinkish gray with dark yellowish orange splotches on weathered surfaces; fine- to medium-grained; equigranular; granoblastic; massive to well foliated; consists of

quartz, plagioclase, amphibole, garnet, epidote group minerals, biotite, with trace and accessory minerals. Interlayered with metagraywacke, gneissic metagraywacke, and garnet mica schist. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zaua - Ashe Metamorphic Suite, Talluluah Falls Formation, altered ultramafic rock (Neoproterozoic)

Zua - Altered ultramafic rock (Neoproterozoic)
Moderate olive brown to grayish olive; fine- to coarse-grained; equigranular; granoblastic to nematoblastic to lepidoblastic; non-foliated to foliated; consists of unaltered olivine, pyroxenes, plagioclase, and alteration minerals serpentine, tremolite, talc, vermiculite, chlorite, hornblende and others. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zgfg - Grandfather Mountain Formation, feldspathic metagraywacke (Neoproterozoic)

Zgfg - Feldspathic graywacke (Neoproterozoic)
Light greenish gray to greenish gray; medium- to coarse-grained; equigranular to inequigranular; granoblastic to lepidoblastic; characteristically thickly-bedded to massive with weak slaty cleavage; locally calcareous and sulfidic; consists of quartz, potassium feldspar, plagioclase, sericite, chlorite, and other minor minerals. Interlayered with granule metaconglomerate, metasiltstone, metaarkose, and mafic and felsic volcanics. Thickness of layers ranges from tens of centimeters to tens of meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zgfc - Grandfather Mountain Formation, metaconglomerate (Neoproterozoic)

Zgc - Conlomerate (Neoproterozoic)
Light greenish gray to greenish gray; very coarse-grained (granule to boulder); inequigranular to equigranular; granoblastic to lepidoblastic; locally calcareous and sulfidic; characteristically thickly-bedded to massive with weak slaty cleavage; consists of approximately 55% quartz,15% potassium feldspar, 20% sericite, 10% plagioclase, trace chlorite, and other minor minerals; lithic clasts include granite, granitic greisses, phyllite, slate and assorted mafic rocks. Interlayered with metagraywacke, meta-arkose, metasiltstone, and mafic and felsic volcanics. Thickness of layers ranges from tens of centimeters to tens of meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zgfv - Grandfather Mountain Formation, felsic volcanics (Neoproterozoic)

Zgfv - Felsic volcanics (Neoproterozoic)
Light to medium gray; fine-grained; inequigranular; granoblastic to porphryoblastic; weakly foliated; consists of anhedral and euhedral embayed quartz phenocrysts and euhedral potassium feldspar (microperthite) in a fine grained matrix of quartz, feldspar, sericite opaque minerals, and locally pyrite. Mineral content in two samples ranges from 28-55% plagioclase,15-30% sericite, 15-20% quartz, 2-5% biotite, 1-2% epidote, 0-30% potassium feldspar, 0-3% chlorite, 0-2% carbonate, 0-1% pyrite and other minor minerals. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zgfs - Grandfather Mountain Formation, siltstone (Neoproterozoic)

Zgs - Siltstone (Neoproterozoic)
Dark greenish gray to medium bluish gray; fine-grained; equigranular; granoblastic to lepidoblastic; locally calcareous; bedded to laminated with slaty cleavage; consists of approximately 35% quartz, 25%

sericite, 23% chlorite, 15% plagioclase, 2% black opaques, and other minor minerals. Interlayered with feldspathic metagraywacke, granule conglomerate and mafic volcanics. Layer thickness ranges from centimeters to meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zgfsm - Grandfather Mountain Formation, siltstone and mafic volcanics (Neoproterozoic)

Zgsm - Siltstone and mafic volcanics (Neoproterozoic)
Dark greenish gray to medium bluish gray; fine-grained; equigranular; granoblastic to lepidoblastic; commonly tuffaceous; locally cacareous; thin-bedded to laminated with slaty cleavage; consists of approximately 35% quartz, 25% plagioclase, 12% sericite, 12% chlorite, 11% black opaques, 5% carbonate, and other minor minerals. Brown weathered calcite and quartz-calcite segregations are common; epidote and chlorite segregations also occur. Interlayered with mafic volcanics (greenish black to greenish gray; fine- to medium-grained; equigranular to inequigranular); consists of approximately 35% quartz, 35% hornblende, 20% plagioclase, 3% sericite, 5% black opaques, and 2% epidote group minerals. Thickness of layers ranges from centimeters to meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Zl - Neoproterozoic Metaplutonic Rocks, Linville Metadiabase (Neoproterozoic)

Zl - Linville metadiabase (Neoproterozoic)
Dusky green to greenish black; fine- to medium-grained; inequigranular to equigranular; ophitic to nematoblastic to lepidoblastic to mylonitic; foliated to non-foliated; consists of actinolite or hornblende, plagioclase, chlorite, biotite, epidote group minerals, and minor accessory minerals. These intrusive bodies are both cross-cutting and concordant. Generally poorly exposed. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

ZYbg - Cartoogechaye Terrane Rocks, biotite granitic gneiss (Neoproterozoic and Mesoproterozoic)

ZYbg - Biotite granitic gneiss (Neoproterozoic and Mesoproterozoic)
Light gray to medium gray; medium- to coarse-grained; equigranular to inequigranular to megacrystic; granoblastic to lepidoblastic to locally weakly nematoblastic; well foliated; locally migmatitic; consists of plagioclase, quartz, biotite, potassium feldspar, hornblende, muscovite, garnet, epidote group minerals, ilmenite, and minor accessory minerals. Interlayered with layered biotite granitic gneiss, amphibolite, and biotite schist. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

ZYbga - Cartoogechaye Terrane Rocks, amphibolite (Neoproterozoic and Mesoproterozoic)

ZYbga - Amphibolite (Neoproterozoic and Mesoproterozoic)
Dark greenish gray to black; fine- to coarse-grained; equigranular; nematoblastic to granoblastic; well foliated to massive, commonly migmatitic; consists of hornblende, plagioclase, quartz, biotite, epidote group minerals, and minor accessory minerals. Occurs as layers or pods ranging from millimeters to tens of meters in thickness. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

ZYlbgg - Cartoogechaye Terrane Rocks, layered biotite granitic gneiss (Neoproterozoic and Mesoproterozoic)

ZYlbgg - Layered biotite granitic gneiss (Neoproterozoic and Mesoproterozoic)
Very light gray to pale orange to medium light gray; equigranular to inequigranular; granoblastic to lepidoblastic; layer thickness ranges from millimeters to meters; consists of plagioclase, quartz, biotite, potassium feldspar, epidote group minerals, ilmenite, and traces of hornblende, garnet, sphene, apatite and zircon. Interlayered with biotite gneiss, amphibolite, and biotite schist. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

ZYbgh - Cartoogechaye Terrane Rocks, hornblende biotite granitoid gneiss (Neoproterozoic and Mesoproterozoic)

ZYbgh - Hornblende biotite granitoid gneiss (Neoproterozoic and Mesoproterozoic)
Medium light gray to dark gray; medium- to coarse-grained; equigranular to inequigranular; granoblastic to nematoblastic; well foliated; locally migmatitic; consists of plagioclase, biotite, hornblende, quartz, potassium feldspar, muscovite, garnet, epidote group minerals and minor accessory minerals. Interlayered with layered biotite granitic gneiss, biotite granitic gneiss, and amphibolite. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Yggs - Mesoproterozoic Metaplutonic Rocks, granitic gneiss (southern segment) (Mesoproterozoic)

Ygg - Granitic gneiss (southern segment) (Mesoproterozoic)
Pinkish gray to brownish gray to light gray; medium- to coarse-grained; equigranular to inequigranular; granoblastic to mylonitic; weakly foliated to foliated; consists of plagioclase, quartz, potassium feldspar, biotite, muscovite and accessory minerals. Interlayered with mylonitic granitic gneiss and biotite granitic gneiss. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Yggn - Mesoproterozoic Metaplutonic Rocks, granitic gneiss (northern segment) (Mesoproterozoic)

Ygn - Granitic gneiss (northern segment) (Mesoproterozoic)
Pinkish gray to brownish gray; medium- to coarse-grained; equigranular; granoblastic to mylonitic; weakly foliated to foliated; consists of approximately 35% plagioclase, 35% quartz, 15% potassium feldspar, 8% sericite, 4% biotite, 3% epidote group minerals, and accessory minerals. Interlayered with mylonitic granitic gneiss. Thickness of layers ranges from centimeters to tens of meters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Yggmy - Mesoproterozoic Metaplutonic Rocks, mylonitic granitic gneiss (Mesoproterozoic)

Ygnmy - Mylonitic granitic gneiss (Mesoproterozoic)
Very light gray to brownish gray; fine- to medium-grained; inequigranular to equigranular; mylonitic; foliated; consists of plagioclase, quartz, potassium feldspar, sericite, biotite, epidote group minerals, and accessory minerals. Interlayered with granitic gneiss. Thickness of layers ranges from millimeters to centimeters. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Ya - Mesoproterozoic Metaplutonic Rocks, amphibolite (Mesoproterozoic)

Ygna - Amphibolite (Mesoproterozoic)
Dark gray to greenish black; medium- to coarse-grained; granoblastic to nematoblastic; massive to well foliated; consists of hornblende, plagioclase, quartz, biotite, black opaque minerals, and epidote. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Ybrg - Mesoproterozoic Metaplutonic Rocks, Blowing Rock Gneiss (Mesoproterozoic)

Ybrg - Blowing Rock Gneiss (Mesoproterozoic)
Very pale orange to brownish gray; coarse-grained; inequigranular, granoblastic to protomylonitic; contains potassium feldspar augens; ranges from granitic to granodioritic in composition; consists of potassium feldspar, plagioclase, quartz, biotite, epidote, titanite and black opaques. Interlayered with biotite gneiss, amphibolite and phyllonite. Locally cross-cut by light colored granitic gneiss. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

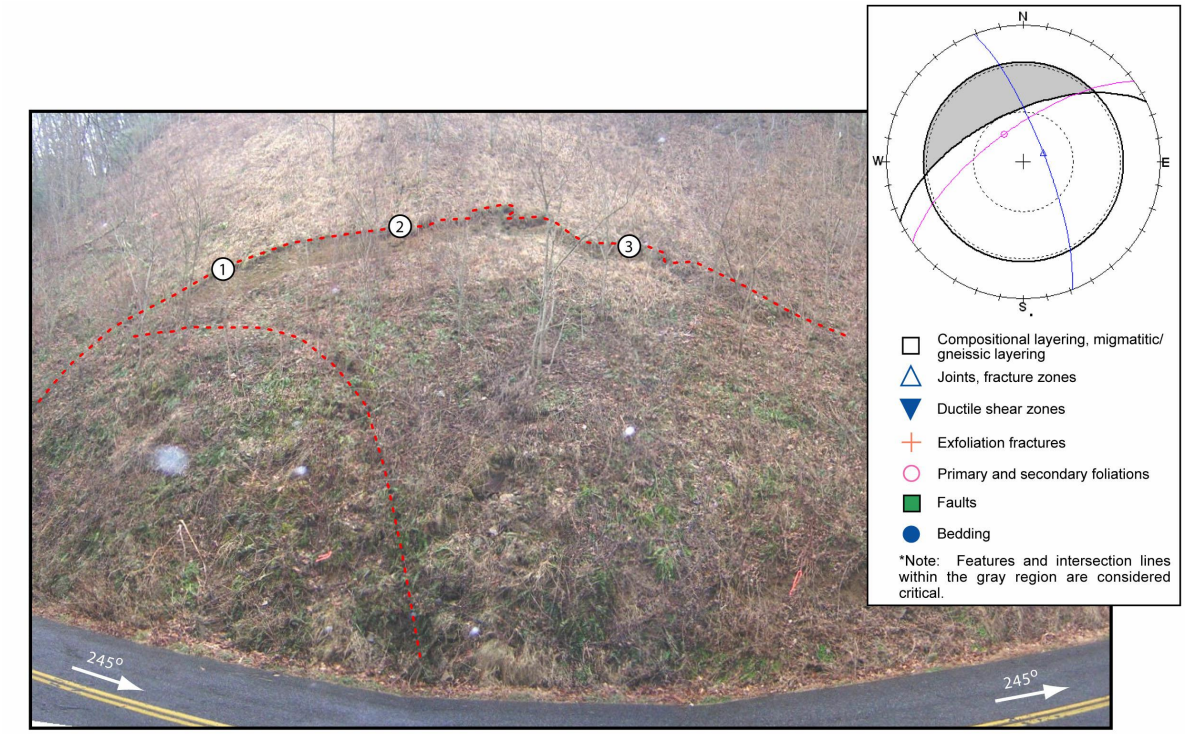
Ybrgmy - Mesoproterozoic Metaplutonic Rocks, Blowing Rock Gneiss, mylonitic (Mesoproterozoic)

Ybrgmy - Mylonitic Blowing Rock Gneiss (Mesoproterozoic)
Light gray to silvery green to blue gray; medium-grained; inequigranular, mylonitic to phyllonitic; contains potassium feldspar augens; foliated to thinly foliated; consists of potassium feldspar, plagioclase, quartz, and biotite that has been variably altered to sericite and chlorite. Interlayered with biotite gneiss, amphibolite, and light colored granitic gneiss. (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Annotated Photographs

A number of field verification localities/stations present in the GRI digital geologic-GIS data, in the Geologic Observation Localities (blrsgol) feature class/data layer, have an associated annotated photograph. Each photograph is denoted by a location ID (e.g., BBR-003), and corresponds to a locality/station in the GIS data with the same location ID. A number of annotated photographs included in this document, however do not have a corresponding locality in the GIS data. Although the latter have no geographic locality they are included in this document as additional graphics/photographs relevant to the geology of the parkway.

BBR-003

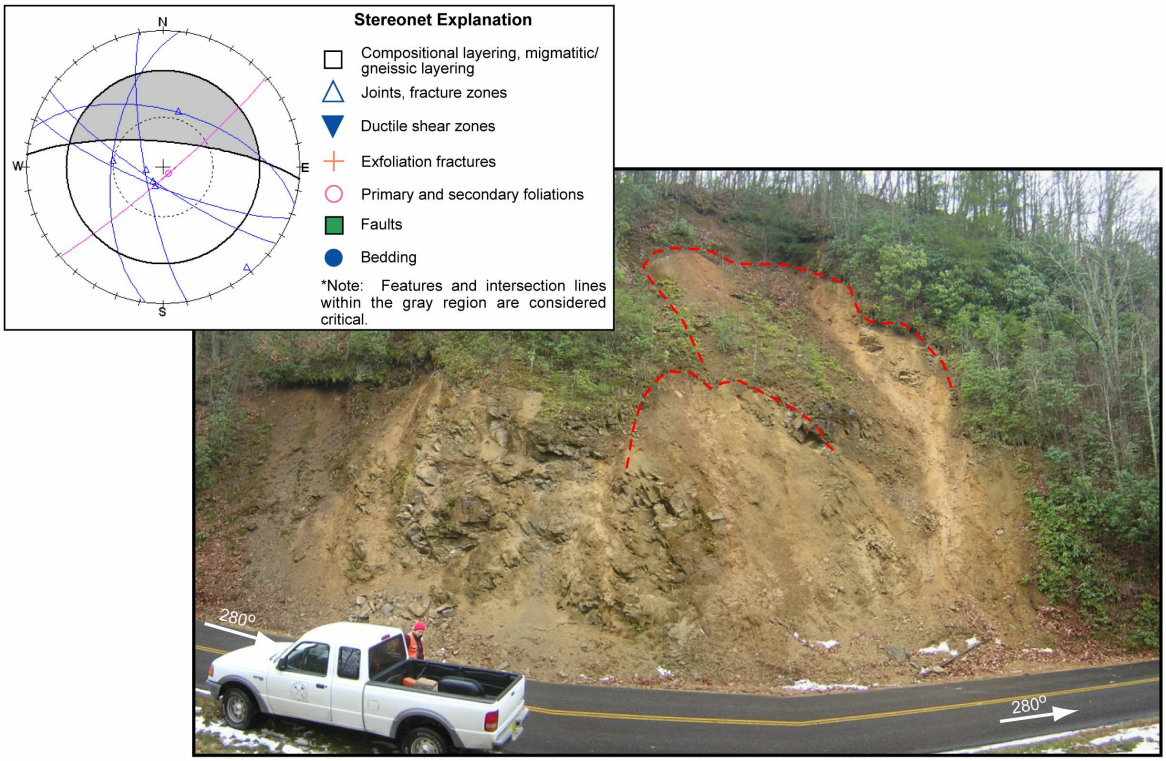


Details for the active weathered rock slide at BBR-003. Rock consists of interlayered metaconglomerate, micaceous metasandstone, and phyllite. All rock types are partially decomposed to stained state. Red dashed lines indicate the two scarps that were observed at this location. **1.** Fracture oriented 335/77. **2.** Foliation oriented 235/70. **3.** Soil at this location is residuum comprised of micaceous sandy silt with minor gravel and cobbles and is less than 2 feet thick.

BRP BBR-003 Image Date: 01/26/05 Collection Date: 01/26/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

BBR-005

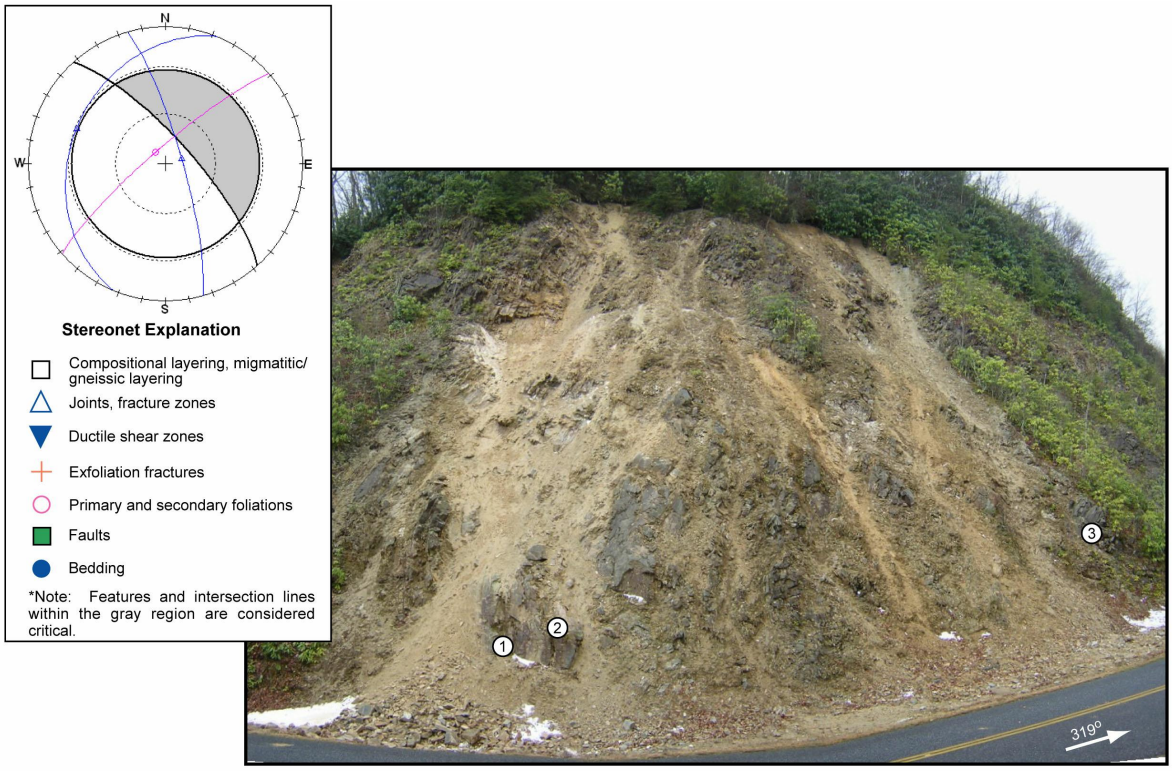


Active debris slide/rock fall at BBR-005 located near milepost 463. Rock fall continued to occur while at the site. Rock type varies at this location from phyllite in the left of the photograph to stained state/partially decomposed metaconglomerate in the central and right portions of the photograph. Soil consists of a poorly graded sand with cobbles and boulders. Fractures measured at this location include the following: 285/55, 173/80, 188/60, 112/78, 50/5, and 127/80. Foliation in the phyllite is 50/85. Red lines indicate locations of scarps.

BRP BBR-005 Image Date: 01/26/05 Collection Date: 01/26/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

BBR-010



Details for rock fall at BBR-010 near mile marker 457. Rock is partially decomposed to stained state, medium to coarse grained metasandstone. 1. Fracture oriented 340/80. 2. Bedding/foliation oriented 228/81. 3. Bedding oriented 202/31.

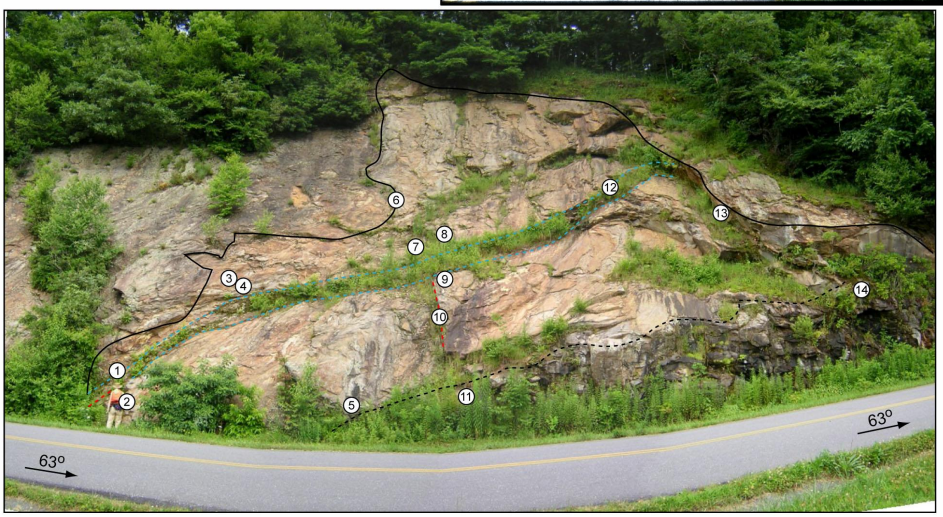
BRP BBR-010 Image Date: 01/26/05 Collection Date: 01/26/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

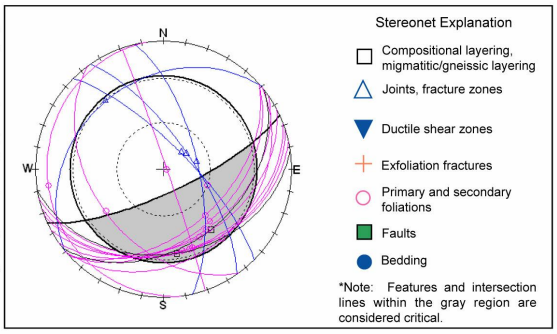
CER-001

Above: Photograph of rock slide debris and 800-1000 short ton rock slab on the roadway. View looking northeast.

Right: Photograph of rocks slide debris looking southwest. Photographs and tonnage estimate courtesy of Alex Glover, Active Minerals International, LLC.



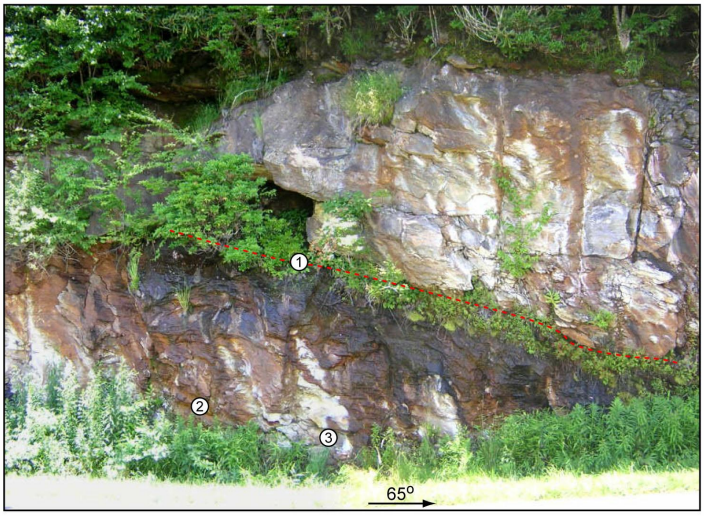
Photograph of the scar from the June 15, 1999 rock slide along the Blue Ridge Parkway (BRP) about 0.2 miles north of Crabtree Meadows. The slide debris that blocked the BRP for several days included an intact boulder that weighed about 800-1000 short tons. Rock is interbedded quartz muscovite schist and metagraywacke of the Alligator Back Formation. 1. Primary foliation/compositional layering in metagraywacke at 144/44. Secondary foliation oriented 172/5-10. Fold at this location with an axial plane at 350/80 and an axis at 0/35. 2. Compositional layering oriented 81/34. Crenulations oriented 249/5. 3. Secondary foliation oriented 20/60. Crenulations on this surface with an axis at 24/3 and axial plane at 5/20. 4. Structural change in bedding orientation. On the southwest side, compositional layering/foliation is oriented 5/88. On the northeast side of this feature, compositional layering/foliation is oriented 50/30. 5. Foliation in schist forming the dip slope is oriented 48/50. 6. Fracture at 345/68. Foliation at 70/35. Slickenlines on foliation are parallel to the slide surface and are oriented 180/40. Movement is normal. 7. Compositional layering at 52/40. Secondary foliation oriented 55/42. 8. Foliation forming slip surface oriented 48/45. Mica lineation on foliation at 180/30. 9. Foliation in stained state graphitic, sulfidic schist oriented 62/40. Foliation at 77/35 has slickenlines on surface oriented 175/40 (bearing and plunge) and indicates normal movement. Seepage at this location. 10. Fracture approximately oriented 315/74. 11. Foliation oriented 72/35. 12. Fracture release surface oriented 230/30 at seepage zone. 13. Approximate orientation of left flank fracture face is 325/72 measured in cut slope. 14. Seepage along foliation surface at top of the cut slope.

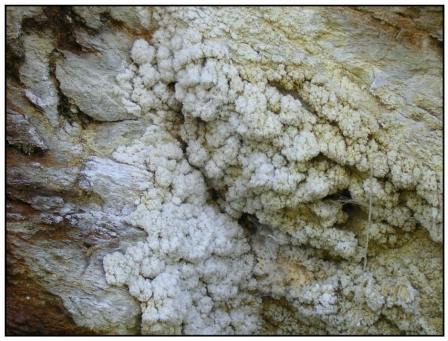


BRP CER-001 Image Date: 07/14/04 Collection Date: 07/14/04

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

CER-002



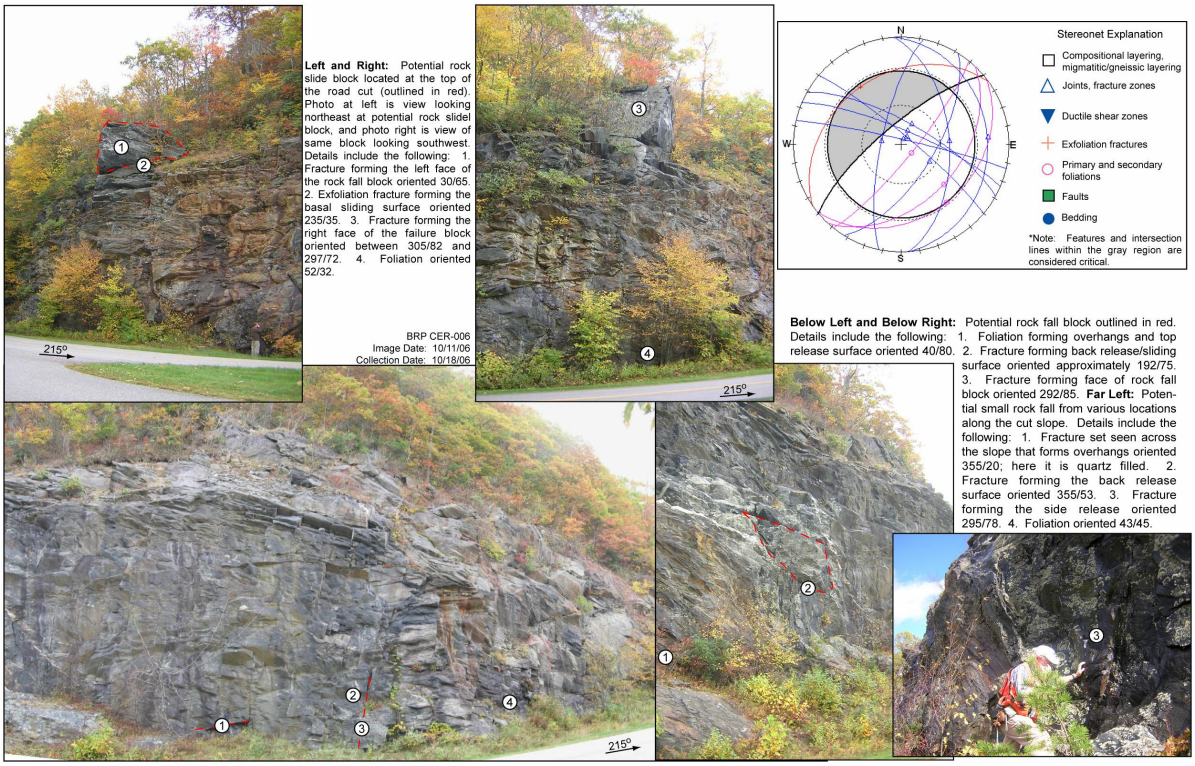


Above: Photograph of potential slide block approximately 75 feet north of the Crabtree Meadows rock slide (CER-001). 1. Foliation/exfoliation in meta-graywacke forms the slip surface for the rock block and is oriented 85/45 (measured at base of slope). 2. Crenulations on the cut slope face have axes oriented 255/3 and an axial plane oriented 60/40. **Top Right and Bottom Right:** Rock at this location is highly sulfidic and has gypsum blooms on the bedrock surface.

BRP CER-002
Image Date: 07/14/04
Collection Date: 07/14/04

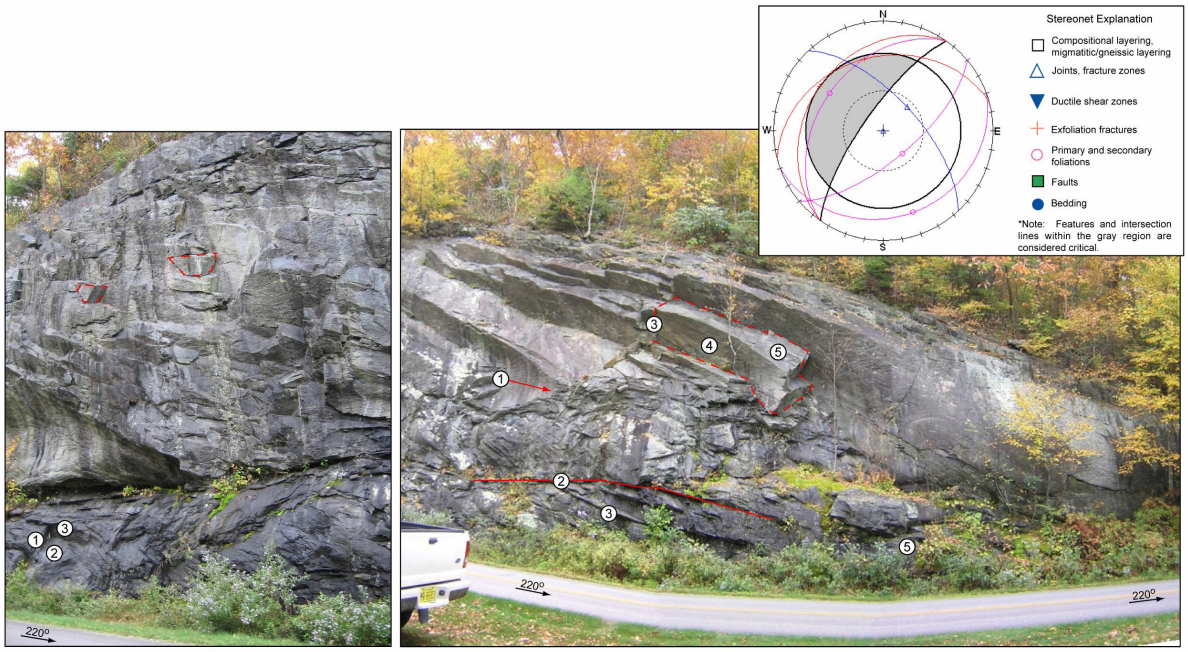
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CER-006



Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CER-007

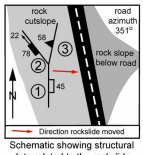


Potential rock slide-fall in cut slope just northeast of the Three Knobs Overlook. Rock here is biotite amphibolite with sulfides. **Left:** Photograph of northeast end of cut. Potential rock slide-fall block are outlined in red. Details include the following: 1. Fracture forming the side release surface oriented 305/90. 2. Foliation on the lower limb of the fold oriented 215/40; this acts as the sliding surface/basal release surface. 3. Foliation on the upper limb of the fold oriented 50/68; this acts as the back release surface for potential rock fall blocks. **Right:** Photograph of southwest end of cut. Potential rock fall block is outlined in red. Significant water seeping out of the slope along fractures at this location. Dent marks were also observed in the asphalt at this location indicating past rock fall at this location. Details include the following: 1. Bearing and plunge of the fold axis oriented 240/20. 2. Exfoliation fracture forming another sliding surface approximately oriented 215/30. 3. Fracture forming side release surface oriented 315/65. 4. Face of potential rock slide-fall block. This approximately corresponds to measurement 3 in photograph at left. 5. Exfoliation fracture forming the sliding surface oriented 255/33.2

BRP CER-007 Image Date: 10/11/06 Collection Date: 10/18/06

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CPR-001



Schematic showing structural data related to the rockslide.

Location Structural Data for Discontinuities

① Strike and dip of exfoliation fracture: 0/30-60E; 0/40-45 at slip surface

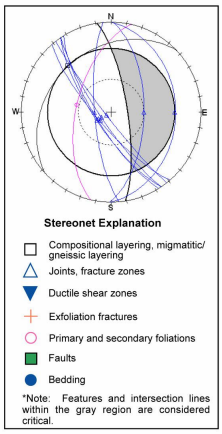
② Strike and dip of fracture - bearing and plunge of slickenlines on fracture:

142/78	352/30
145/85	318-22
178/75	352-30

③ Strike and dip of foliation: 192/58W

April 24, 2003 Rockslide Scar. The rock block failure occured after heavy rains and closed the Parkway for nearly a week at a location about 2000 ft (600 m) south of Potato Field Gap. Weighing about 15 tons the volume of the largest block that slid into the road was about 180 cubic feet (5 cubic meters). Three planar discontinuities cut across the rock mass to delineate the rock block. Discontinuity 1 is an exfoliation joint set that dips from 30° to 60° out of the rock cutslope toward the road, and formed the basal slip surface of the rock block. This joint set intersects the nearly vertical rock cutslope. Discontinuities 2 and 3 bound the sides of the rock block allowing it to detach from the slope. Discontinuity 2 is a joint set with suface markings that indicate the direction of past fault movement along the joint plane (see yellow arrow). The movement was oblique (left-lateral) dip-slip, with displacement that was probably on the scale of inches (cm). Dilation along discontininuity 2 with an aperture of about 1 in (2.5 cm) is visible where the joint cuts across the foliation (discontinuity 3) in the rock. Discontinuity 3 is the oldest surface in the rock, and 1 is the youngest. Rock types present, in increasing order of abundance, include: pegmatite; calc-silicate granolfels; biotite, garnet, muscovite schist; and gneissic, garnet, muscovite, biotite metagraywacke of the Ashe Metamorphic Suite.

Although triggered by heavy rainfall that led to elevated water pressure along the discontinuities, a number of other factors contributed to the slide. Weathering of sulfide minerals, finely disseminated throughout the the rock, resulted in the yellow-brown to dark orange staining on the rock surfaces. Over time this weathering, aided by infiltrating water, decreased the frictional resistance along the discontinuities. Root mats visible on discontinuity 1 along the base of the slide block indicate that root wedging was also a contributing factor. Ice-wedging from repeated freeze-thaw cyles at this elevation (4000 ft or 1220 m) increased the apertures of these discontinuites as well. Known to be an area of past rock slides, the orientations of the discontinuites indicate that future rockslides are likely.



Approximate Image Date: 04/26/04

View looking south located just north of the Potato Field Gap slide. All four features are in the same joint set and have slickenlines on the surface indicating left lateral movement. 1. Fracture approximately oriented 142/78. 2. Fracture face oriented 153/77. Bearing and plunge of slickenlines oriented 333/20 and 333/10. 3. Fracture surface oriented 152/80. Slickenlines oriented 332/36 and 332/8. 4. Fracture face oriented 150/75. Slickenlines oriented 330/15 (bearing and plunge).

Overhang located just north of the Potato Field Gap slide. Material is medium to coarse grained migmatitic, garnet, biotite, quartzo-feldspathic gneiss with localized schistose horizons of garnet, biotite, muscovite quartzo-feldspathic schist. Banding/compositional layering is oriented 227/30.

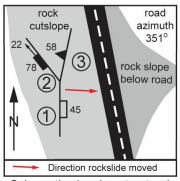
Area of Past and Potential Rock Slides
BRP CPR-001 Image Date: 06/11/04 Collection Date: 06/11/04

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CPR-001a

April 24, 2003 rockslide along the Blue Ridge Parkway. The rock block failure occured after heavy rains and closed the Parkway for nearly a week at a location about 2000 ft (600 m) south of Potato Field Gap. Weighing about 15 tons (13,600 kg) the volume of the largest block that slid into the road was about 180 cubic feet (5 cubic meters) (See below right photo). Three planar discontinuities cut across the rock mass to delineate the rock block. Discontinuity 1 is an exfoliation joint set that dips from 30° to 60° out of the rock cutslope toward the road, and formed the basal slip surface of the rock block. This joint set intersects the nearly vertical rock cutslope. Discontinuities 2 and 3 bound the sides of the rock block allowing it to detach from the slope. Discontinuity 2 is a joint set with suface markings that indicate the direction of past fault movement along the joint plane (see yellow arrow). The movement was oblique (left-lateral) dip-slip, with displacement that was probably on the scale of inches (cm). Dilation along discontininuity 2 with an aperture of about 1 in (2.5 cm) is visible where the joint cuts across the foliation (discontinuity 3) in the rock. Discontinuity 3 is the oldest surface in the rock, and 1 is the youngest. Rock types present, in increasing order of abundance, include: pegmatite; calc-silicate granolfels; biotite, garnet, muscovite schist; and gneissic, garnet, muscovite, biotite metagraywacke of the Ashe Metamorphic Suite.

Although triggered by heavy rainfall that led to elevated water pressure along the discontinuities, a number of other factors contributed to the slide. Weathering of sulfide minerals, finely disseminated throughout the the rock, resulted in the yellow-brown to dark orange staining on the rock surfaces. Over time this weathering, aided by infiltrating water, decreased the frictional resistance along the discontinuities. Root mats visible on discontinuity 1 along the base of the slide block indicate that root wedging was also a contributing factor. Ice-wedging from repeated freeze-thaw cyles at this elevation (4000 ft or 1220 m) increased the apertures of these discontinuites as well. Known to be an area of past rock slides, the orientations of the discontinuites indicate that future rockslides are likely.



Schematic showing structural data related to the rockslide.

Structural Data for Discontinuities

① Strike and dip of sheet joint: 0/30-60E; 0/40-45 at slip surface

② Strike and dip of joint - bearing and plunge of slickenline: 142/78 - 352/30; 145/85 - 318-22; 178/75 - 352-30

③ Strike and dip of foliation: 192/58W

Large boulders in the roadway from the April 24, 2003 rockslide.

BRP CPR-001

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

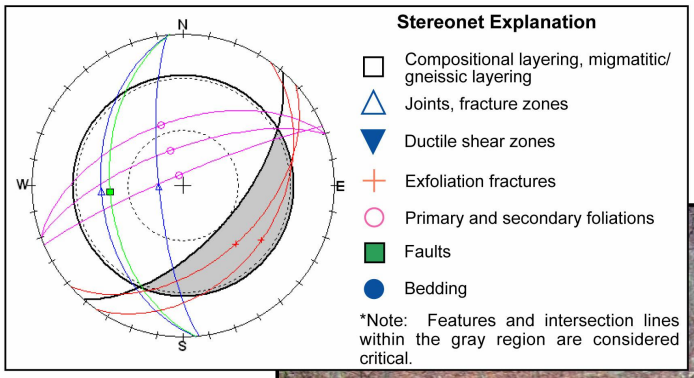
CPR-035

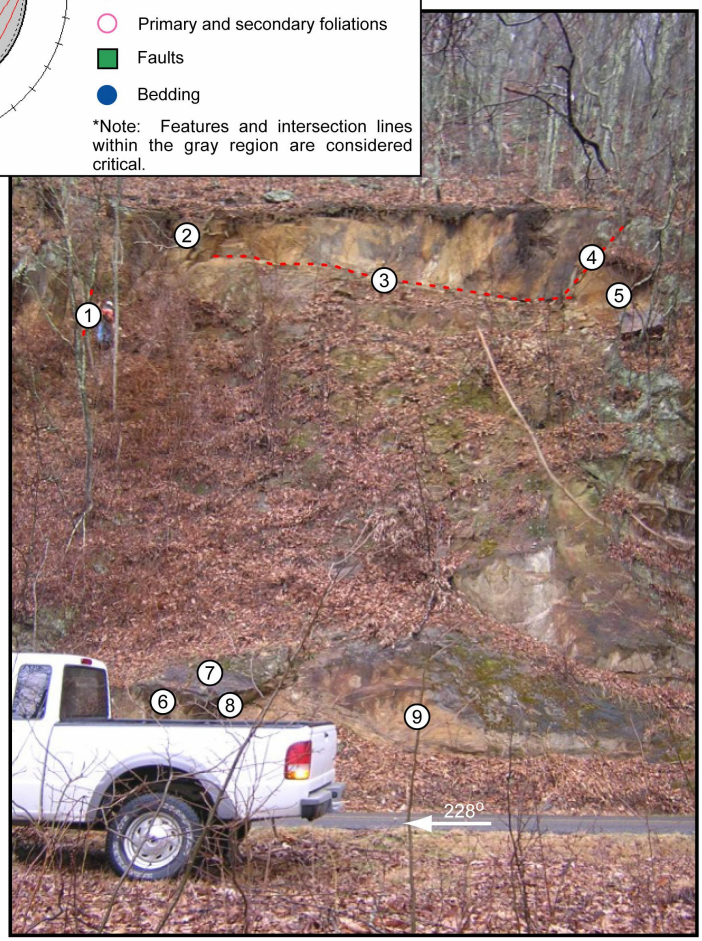
Potential rock fall on north side of outcrop at the west portal of the Craggy Pinnacle Tunnel. Water is seeping out of the slope along an exfoliation fracture. Foliation/compositional layering is 358/16.

BRP CPR-035 Image Date: 01/11/2005 Collection Date: 10/03/03

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CPR-066



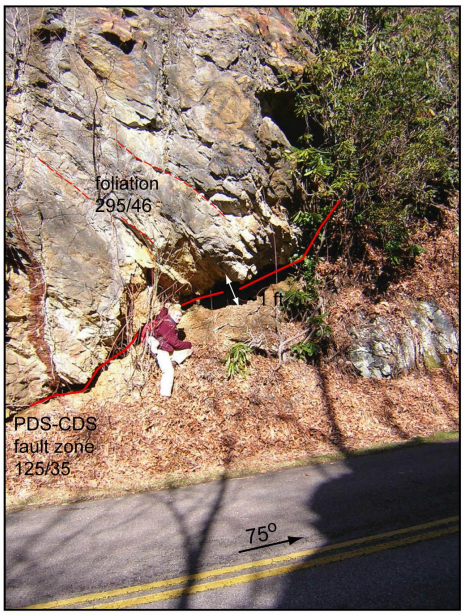


BRP CPR-066
Image Date: 01/13/05
Collection Date: 01/13/05

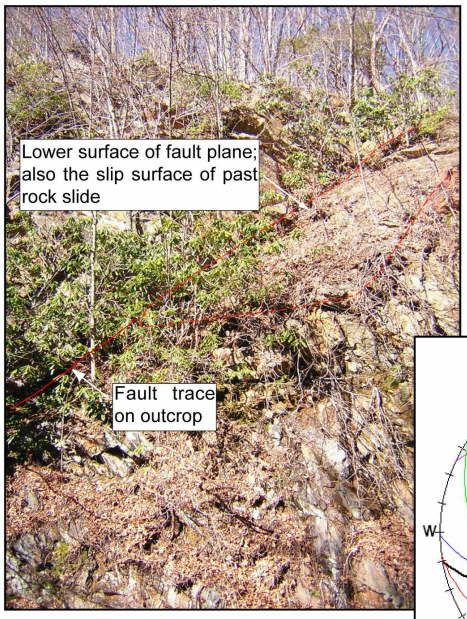
Details for past active/potential rock fall/slide at CPR-066. Bedrock consists of sulfidic mica schist, pegmatite, and metagraywacke. 1. Fracture oriented 178/77 with slickenlines oriented 358/15. 2. Foliation in schist oriented 250/55. 3. Exfoliation fracture that forms the basal slip surface is oriented 48/47. 4. Fracture oriented 175/50 with slickenlines oriented 355/5. Slickenlines indicate left lateral movement. 5. Foliation oriented 250/70. 6. Foliation in schist oriented 250/70. 7. Exfoliation fracture oriented 35/37. 8. Fracture dipping into the slope oriented 176/45. 9. Foliation oriented 247/84.

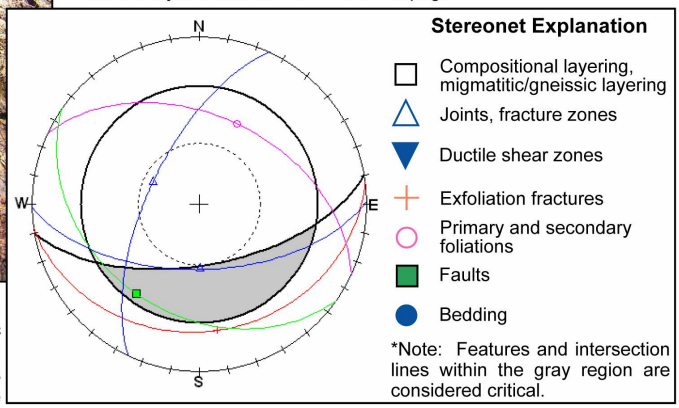
Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

CPR-077



Exfoliation joints oriented 82/25 with seepage



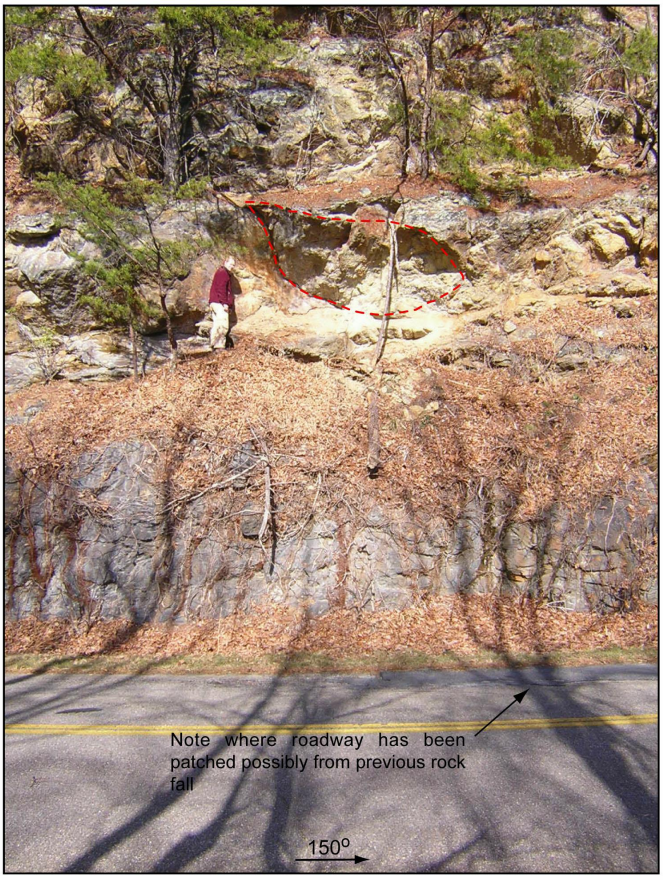


Past Active, Potential Rock Slide Area. Dominant lithology of exposure is migmatitic metagraywacke. Along the fault zone, aligned muscovite is present. Closely spaced fractures subparallel the fault zone. Other fracture measurements in outcrop include: 89/59 and 207/65.

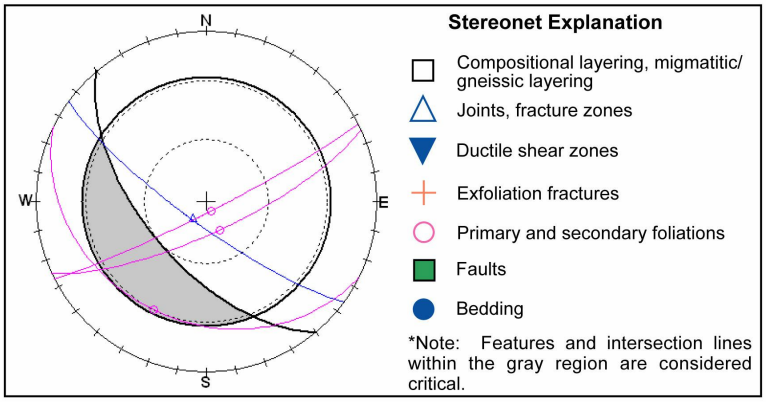
BRP CPR-077 Image Date: 01/16/04 Collection Date: 01/16/04

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

CPR-078



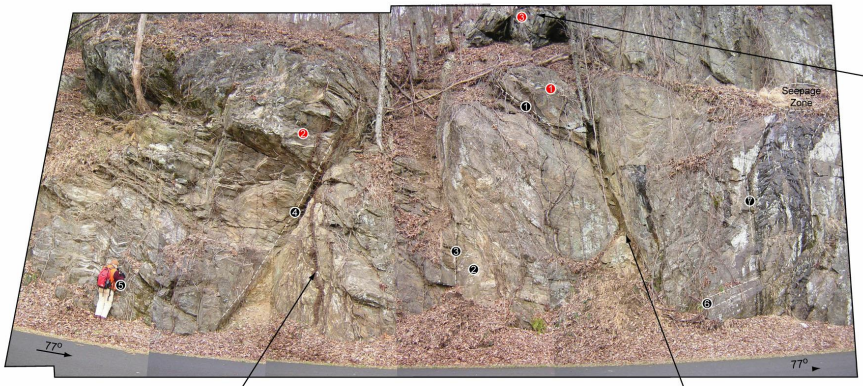
Lithology of this outcrop is sulfidic muscovite biotite garnet schist. Foliation orientations include the following: 116/30, 65/85, 65/75. Area outlined in red is scar where previous rock fall occurred. Fracture measured just off photo measured 130/80.

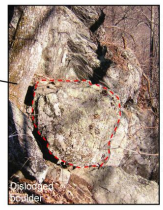


Past Active - Potential Rock Slide Area
BRP CPR-078 Image Date: 01/16/04 Collection Date: 01/16/04

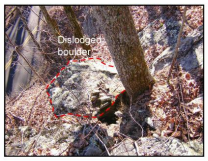
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

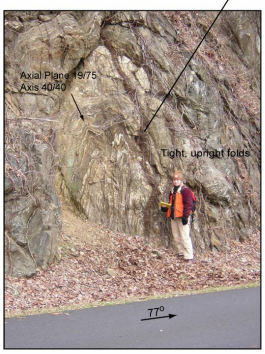
CPR-079





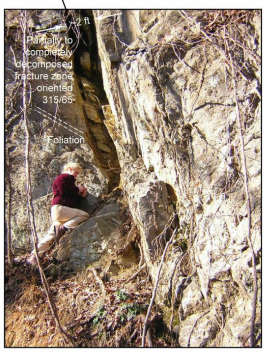
Dislodged boulder (red point 3 in panoramic photo) positioned approximately 37 feet above roadway. Boulder dimensions are approximately 4'x3'x3'. Currently it is supported in approximately 4 points by underlying material. Potential for movement is high.

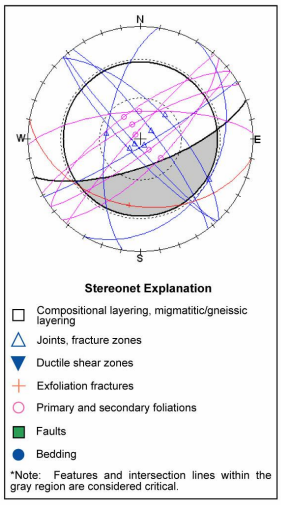




Intense, tight folds are present across the entire slope. Foliation is steep and generally dips into and out of slope depending on fold limb. Lithology is stained state migmatitic metagraywacke with minor amphibolite tendons.

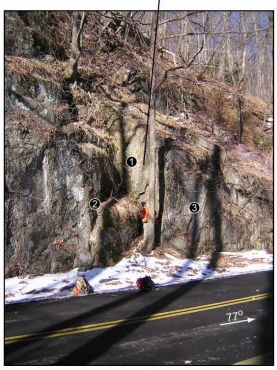
Structural features (indicated by numbered black circles on photo above) include the following: 1. Fracture oriented 30/30. 2. Foliation oriented 52/80. 3. Fracture set oriented 142/85. 4. Partially to completely decomposed fracture zone oriented 190/65. 5. Fold with axial plane oriented 21/65 and axis oriented 10/20. 6. Foliation oriented 240/78. 7. Fracture oriented 142/85. Other slope information (indicated by numbered red circles on photo mosaic) include the following: 1. Potential rock slide block. 2. Potential rock fall from overhang. Note that foliation is oblique to the base of the overhang. Circle marks fold hinge plunging down plane of fracture 4. 3. Dislodged boulder.

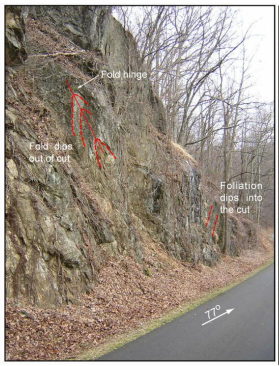


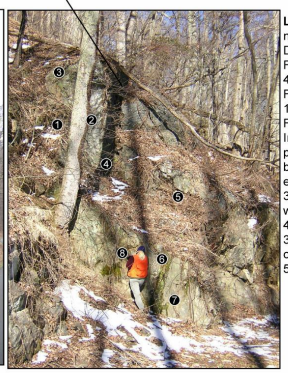


Intense, tight folds are present across the entire slope. Foliation is steep and generally dips into and out of slope depending on fold limb. Lithology is stained state migmatitic metagraywacke with minor amphibolite tendons.

Right: Possible, small past rock slide. Details include the following: 1. Fracture oriented 141/80. 2. Undulating foliation approximately oriented 220/85. 3. Foliation changes to 267/70 to the northeast of Fracture 1.





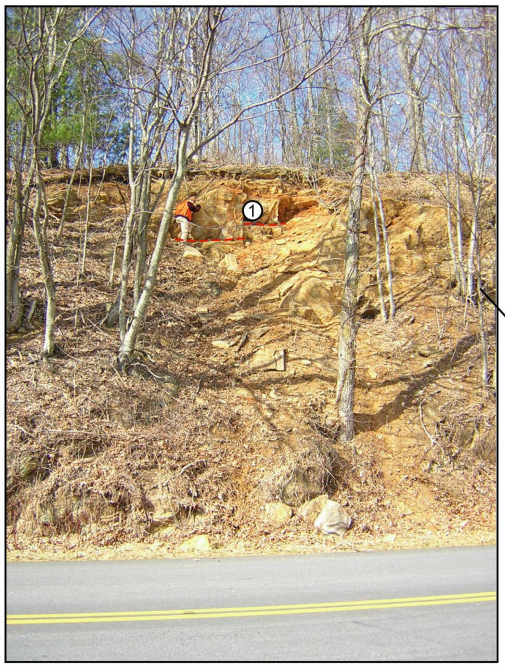


Left: Potential rock slide at the northeast end of the outcrop. Details include the following: 1. Fold with tight axial plane oriented 40/80 and axis oriented 57/15. 2. Fold with axial plane oriented 0-180/40 and axis oriented 48/45. 3. Foliation oriented 233/70. 4. Irregular fracture oriented 55/85 possibly originating as a dilated blasting fracture. 5. Joint (possibly exfoliation joint) oriented 100/40-35. 6. 4-6" wide S-C shear zone with south side down oriented 43/70. 7. Fracture face oriented 320/80. 8. Fold with axial plane oriented 55/80 and axis oriented 55/55.

Potential Rock Slide-Fall Area
BRP CPR-079
Image Date: 01/16/04, 01/21/04
Collection Dates: 01/16/04, 01/21/04

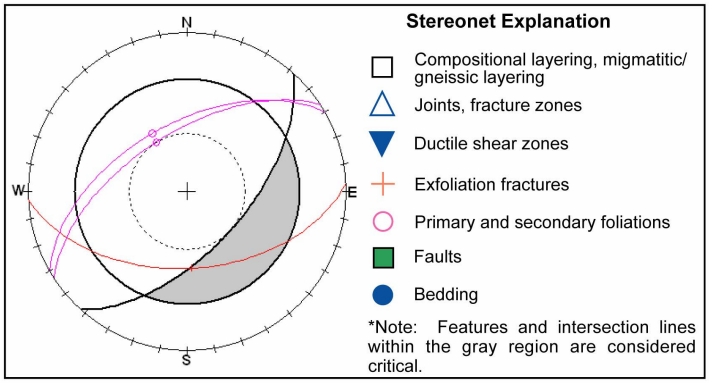
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CPR-082



Past rock slide from scar area near top of road cut. The lithology consists of stained state migmatitic and schistose meta-graywacke. Local, partially decomposed zones form open planes of separation parallel to the foliation allowing blocks to fall. Note boulders at base of slope from possible, recent rock fall. Foliation at point 1 is oriented 239/55 and creates an overhang.

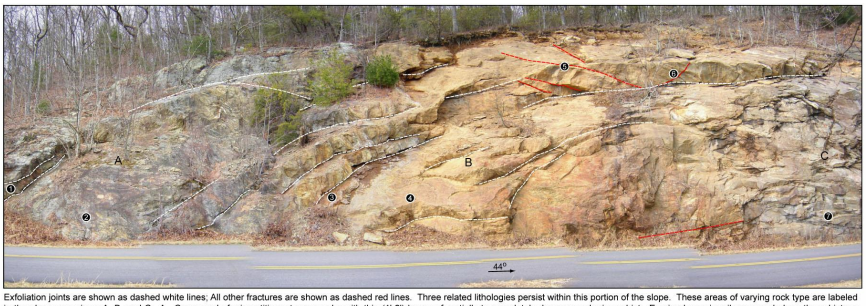
Accumulated boulders supported by tree near top of cut slope. Note hammer for scale.



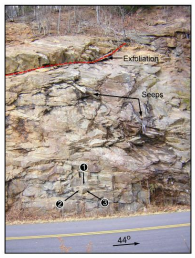
Past Active-Potential Rock Slide Area
BRP CPR-082 Image Date: 01/21/04 Collection Date: 01/21/04

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

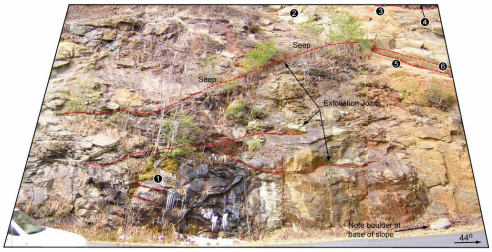
CPR-083



Exfoliation joints are shown as dashed white lines; All other fractures are shown as dashed red lines. Three related lithologies persist within this portion of the slope. These areas of varying rock type are labeled in the above mosaic as A, B, and C. A. Composed of migmatitic metagraywacke with thin (1'-2') layers of partially to completely decomposed mica schist. Erosion has primarily occurred along the schistose layers. B. Sulfidic metagraywacke with garnet. C. Migmatitic metagraywacke, boudins present; small scale folding; local calc-silicate and garnet rich zones present. 1. Exfoliation joint that has developed along partially to completely decomposed mica schist approximately 6 inches wide. Orientation is 103/30. 2. Foliation measured as 272/80. 3. Exfoliation joint developed along completely weathered mica schist leaving a 1 foot open space. Fracture orientation is 116/40. Foliation is 258/60. 4. Exfoliation joint dipping out of slope at 67/50. 5. Fracture approximately oriented 298/20. 6. Fracture oriented approximately 43/50. 7. Area on face where 2 fracture sets intersect with foliation to produce blocky appearance. See photo at right for details.

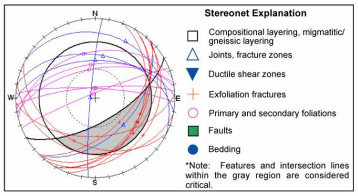


Details for point 7 shown in mosaic at left. 1. Exfoliation fracture oriented 38/25 dipping out of slope. 2. Foliation oriented 242/85 dipping into slope. 3. Fracture oriented 190/85.



Details for above photo: 1. Foliation oriented 262/55. 2. Exfoliation joint 43/35. 3. Foliation oriented 255/42 dips into cut creating an overhang. 4. Boulders (<1 m maximum diameter) positioned at top of slope on exfoliation joint. 5. Exfoliation approximately oriented 30/38 dipping out of cut. 6. Fracture approximately oriented 270/50 into the slope.

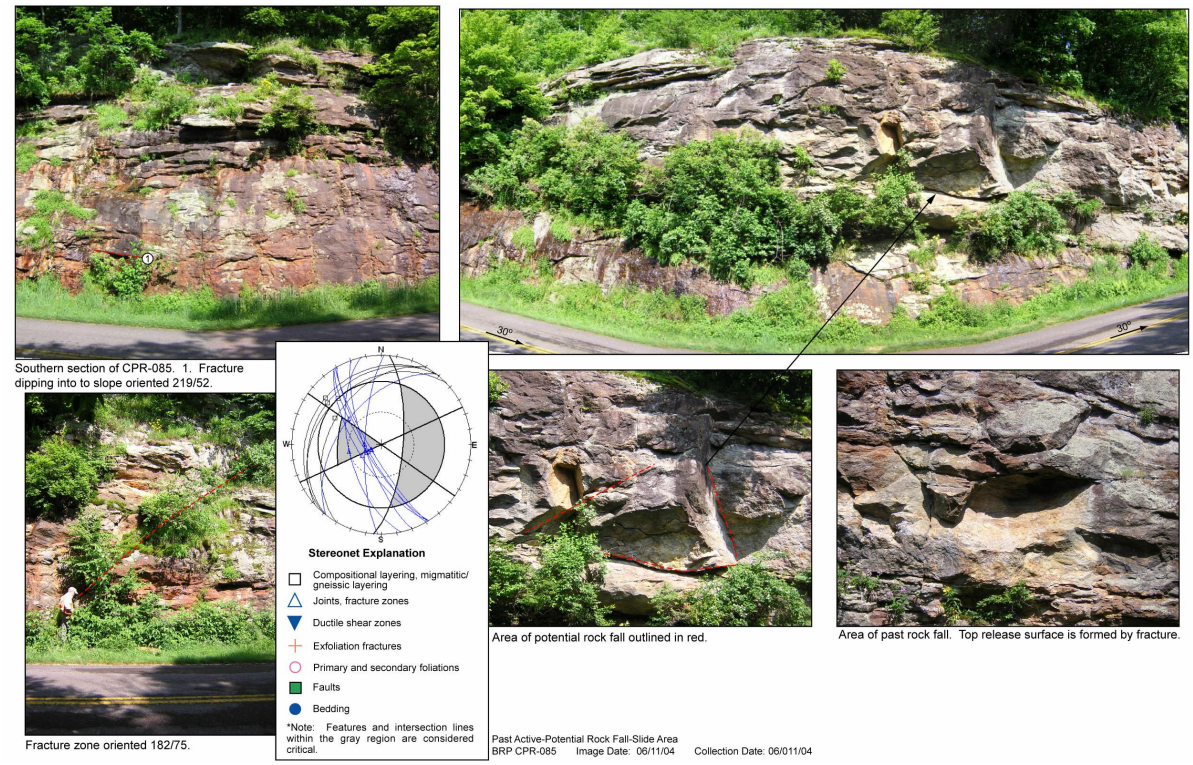
Details for above photo: 1. Crenulations with axial plane oriented 290/15 and axis oriented 80/3. 2. General foliation oriented 264/80. 3. Exfoliation joint oriented 20/40. 4. Potential rock slide block above exfoliation joint. 5. Fracture oriented 280/45. 6. Exfoliation joint plane oriented 45/55 out of the slope. 7. (Not on photo) Exfoliation joint near top of cut approximately 25' NE of pine tree oriented 30/40.



Potential Rock Slide-Fall Area
BRP CPR-083
Image Dates: 01/21/04, 01/29/04
Collection Date: 01/29/04

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

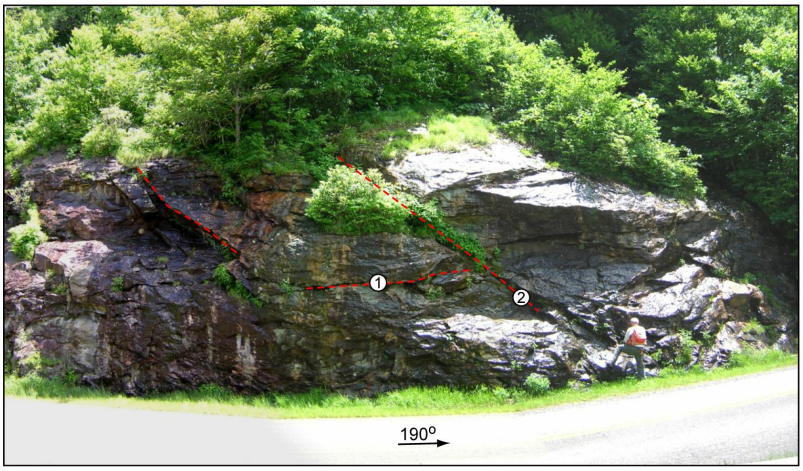
CPR-085

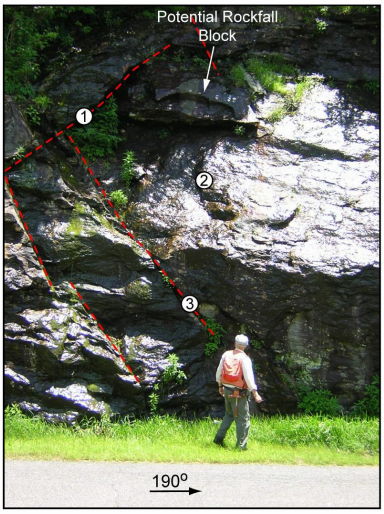


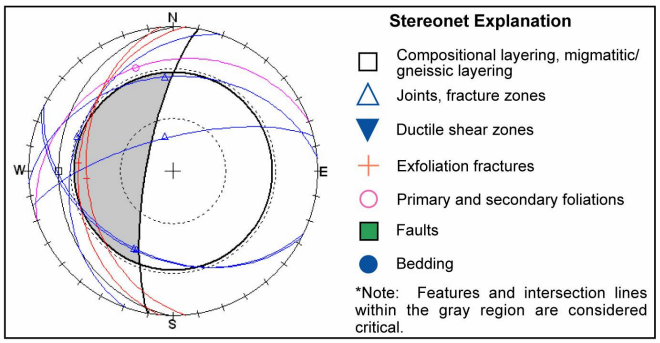
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CPR-087

Below: Potential rockfall block created by the intersection of a fracture with an exfoliation fracture. 1. Exfoliation fracture oriented 185/35. 2. Fracture oriented 117/40. Rock at this location is meta-graywacke to schistose metagraywacke. **Right:** Potential rockfall at the northern end of the outcrop. Rock is metagraywacke with compositional layering oriented 180/22. Considerable water (~5 gpm) is running off the slope at this location. 1. Fracture oriented 265/35 forming the left release surface. 2. Exfoliation fracture forming the base of the slide block oriented 175/40. 3. Fracture oriented 115/40 forms the right release surface.



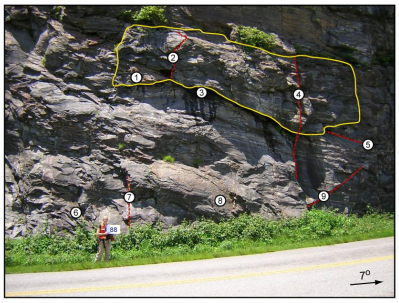


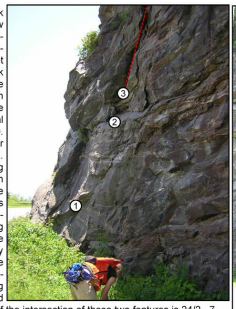


BRP CPR-087 Image Date: 06/11/04 Collection Date: 01/12/05

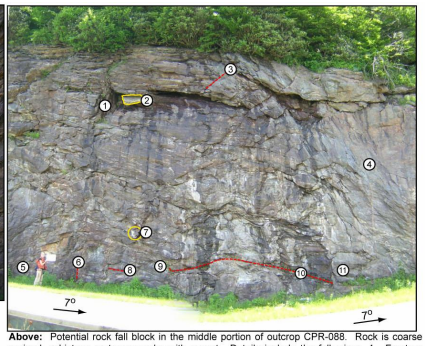
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CPR-088

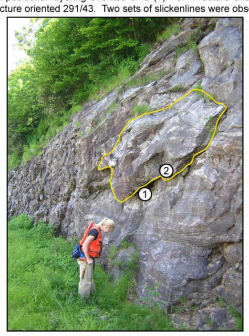


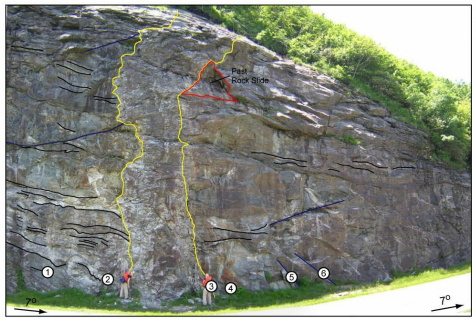


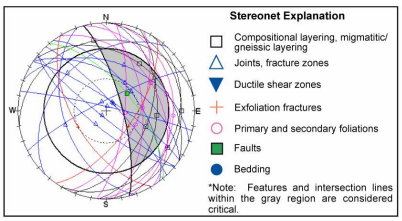
Left: Photo of large rock block overhang, delineated in yellow above, at the south end of CPR-088. Rock block is approximately 35 feet long, 12 feet high, and 4 feet thick. Here rock is predominantly stained state migmatitic metagraywacke with thin garnet chlorite muscovite schist layers. 1. Compositional layering/foliation oriented 22/50. This forms the slip surface for the base of the rock block. 2. Irregular fracture separating side block. 3. Exfoliation fracture forming the slip surface is oriented 34/65. Block has already slipped approximately 9-12 inches. Water seeps along this surface. 4. Fracture oriented 134/85 is already dilated and separates rock slide block from slope. 5. Compositional layering/foliation forming the sliding surface is oriented 15/50. 6. Compositional layering/foliation oriented 345/30. Secondary foliation oriented 5/72. The bearing and plunge of the intersection of these two features is 24/2. 7. Fracture oriented 312/80 with slickenlines oriented 312/5. Movement is left lateral. 8. Compositional layering/foliation oriented 355/56 with slickenlines oriented 355/5. An oriented sample was taken at this location. 9. Fracture/migmatitic vein oriented 162/50 with slickenlines oriented 345/5. **Above Right:** Photo looking south at location in above left photo. 1. Foliation oriented 25/60 with crenulations oriented 20/6. 2. Reference point showing the same location as data point 5 in above left photo. 3. 3-inch dilation on exfoliation fracture bounding block. **Below Left:** Potential rock fall block located just south of pegmatite. Rock is garnet rich migmatitic metagraywacke and schist. Compositional layering/foliation oriented 328/40 and 04/25. 1. Seepage along the base of the rock fall block. 2. Fracture oriented 30/22. **Below Right:** Pegmatite at the north end of CPR-088 (delineated in yellow). 1. Compositional layering oriented 260/20. 2. Fracture along the left edge of the pegmatite oriented 130/75. Slickenlines are on the surface oriented 131/55. 3. Fracture/ fault forming the right contact of the pegmatite is oriented 320/65 to 322/60. Two sets of slickenlines are on this fracture surface: slickenlines on muscovite are oriented 340/25; slickenlines on chlorite are oriented 330/15. Movement was left lateral/oblique normal. 4. Compositional layering oriented 5/42 (?). 5. Fracture oriented 303/58. Slickenlines on chlorite areoriented 341/13 with steps on surface. Movement was normal. 6. Fracture oriented 291/43. Two sets of slickenlines were observed on the chlorite covered surface at the following orientations: 8/39 and 336/22.



Above: Potential rock fall block in the middle portion of outcrop CPR-088. Rock is coarse grained, schistose metagraywacke with garnet. Details include the following: 1. Fracture forming the left side of potential rock fall block is approximately oriented 280/85. This appears to be due to blasting. 2. Wedge of rock that appears to be almost completely disconnected from the slope. Dimensions are approximately 4 feet x 3 feet x 1 foot. 3. Fracture forming the right side of potential rock fall block is approximately oriented 225/38. 4. Face dipping out of the slope is oriented 150/60. 5. Crenulation axes on the rock face oriented 22/17. 6. Fracture oriented 302/80. 7. Small block that could potentially fall. 8. Compositional layering oriented 31/20. 9. Bedding/compositional layering oriented 0/16. This approximately corresponds with the overhang above data point 2; however, at this location, rocks are dipping more steeply. 10. Completely decomposed schist layer predominantly oriented 305/35 N. 11. Irregular fracture face oriented 245/80 with slickenlines oriented 352/26.



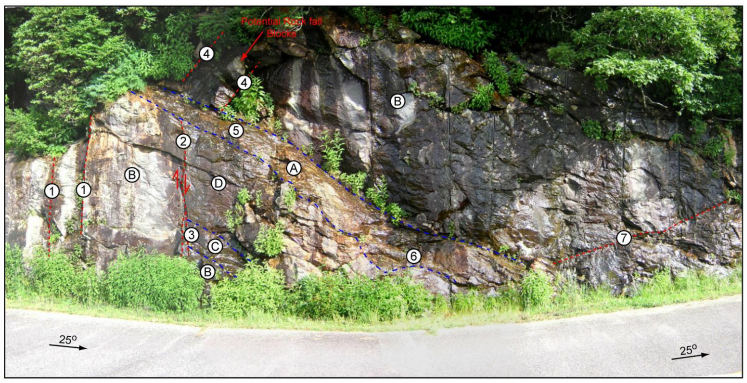




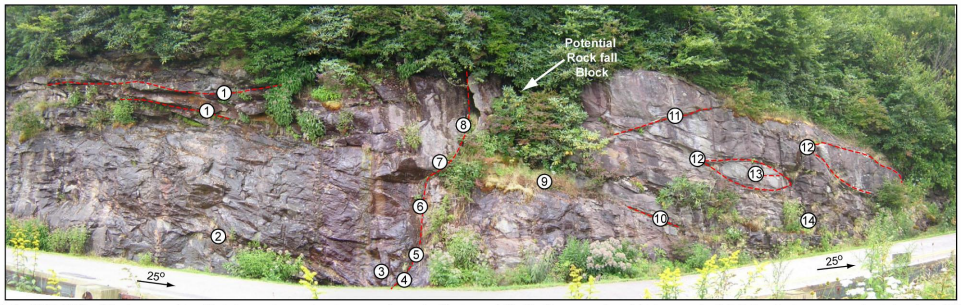
Active Rock Slide Area
BRP CPR-088 Image Date: 06/11/04 Collection Date: 07/09/04

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

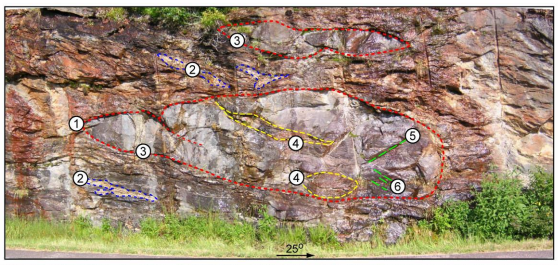
CPR-089



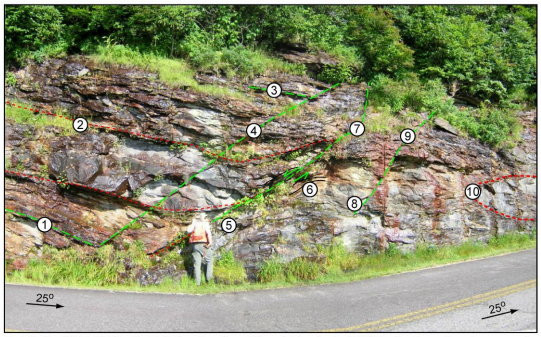
Details for CPR-089A. Lithologies delineated by blue lines and letters, and structural features indicated by red lines and numbers. Seepage was observed at the top of the cut. Lithology at this location includes the following: **A.** Biotite muscovite schist and schistose metagraywacke; **B.** Medium grained muscovite biotite quartzo feldspathic gneiss; locally coarser grained and more felsic than other metagraywackes due to possible migmati-zation; **C.** Muscovite biotite metagraywacke with tin (<3 mm) mica partings; **D.** Garnet metagraywacke. Structural data follows: **1.** Fracture set oriented 315/90. **2.** Possible fault with movement indicated by arrows. **3.** Fracture oriented 310/85. **4.** Fracture approximately oriented 340/45. **5.** Foliation in unit A forming the slip surface at the base of the block is approximately oriented 10/30. **6.** Foliation slip surface measured at the base of the slope is oriented 338/40. **7.** Fracture oriented 320/20.



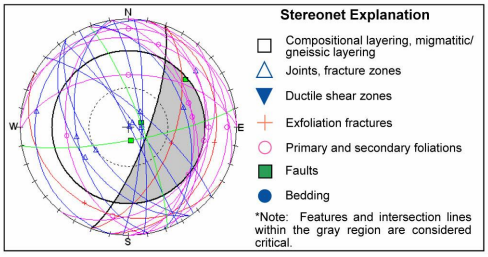
Details for CPR-089B. Lithology consists of interlayered garnet metagraywacke, calc-silicate, and thin biotite muscovite schist layers. **1.** Exfoliation fractures approximately oriented 20/55. **2.** Foliation oriented 0/27. **3.** Compositional layering/foliation oriented 351/40. **4.** Fracture oriented 0/80. This corresponds to a 6-inch thick ductile shear zone subparallel to the fault zone. **5.** Fracture/fault surface oriented 350/80. Bearing and plunge of slickenlines at this location is 355/20 indicative of left lateral movement. **6.** At this location, the fracture/fault surface is oriented 80/80 with slickenlines oriented 80/3. **7.** Fracture that defines one side of the potential rock fall block is oriented 350/80. **8.** Foliation (?) oriented 270/50 that creates overhang surface. **9.** Slide surface for past rock slide oriented 10/20. **10.** Compositional layering/foliation oriented 290/20. **11.** Fracture oriented 190/15. **12.** Metagraywacke boudins outlined in red. **13.** Fracture set that crosses the boudins is oriented 307/75. **14.** Foliation oriented 0/10.



Details for CPR-089C. **1.** Point of reference. This point represents the same location as point 10 in the photo below. **2.** Migmatite boudins (outlined in blue) oblique to the main boudin. **3.** Garnet metagraywacke boudins (outlined in red). The large one in the central portion of the photo is approximately 18 feet wide. **4.** Schistose zones (outlined in yellow) within the large boudin. **5.** Fracture oriented 170/50. **6.** Oblique foliation/mineral lineation in the large boudin.



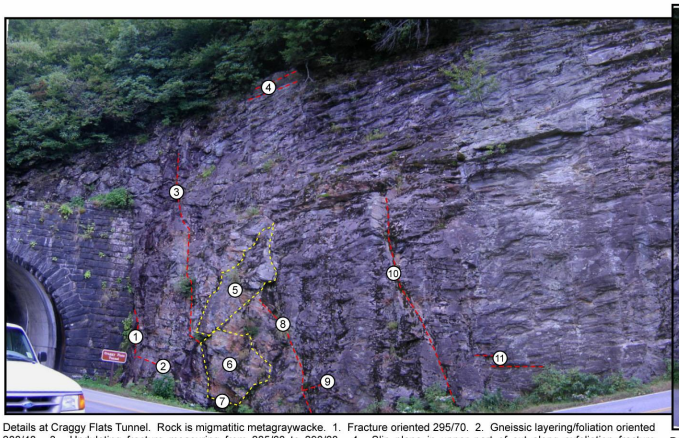
Details for CPR-089D. **1.** Foliation in migmatitic schist oriented 38/30. **2.** Garnet metagraywacke boudin outlined in red. **3.** Undulatory exfoliation fracture oriented 120/20+5. **4.** Fracture oriented 145/50. **5.** Foliation oriented 172/42. **6.** Foliation oriented 100/18. Black lines adjacent to number represent drag folds that indicate reverse movement along the fault zone. **7.** Fault zone oriented 320/32. Arrows indicate apparent direction of movement **8.** Foliation oriented 270/10. **9.** Fracture oriented 145/60. **10.** Point of reference. This point corresponds to point 1 in the photo above.



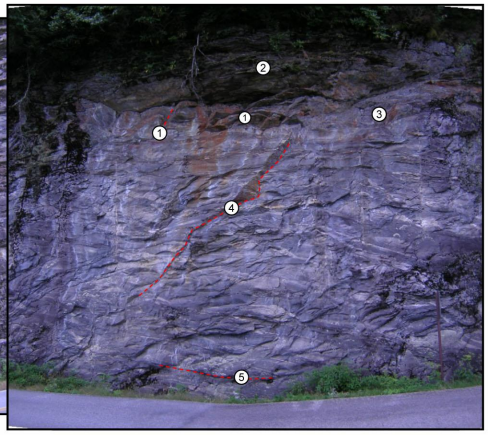
Potential Rock Slide-Fall Area
BRP CPR-089
Image Date: 07/14/04, 08/20/04
Collection Date: 08/20/04

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

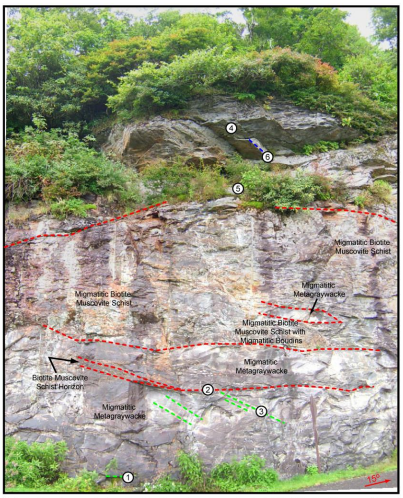
CPR-090



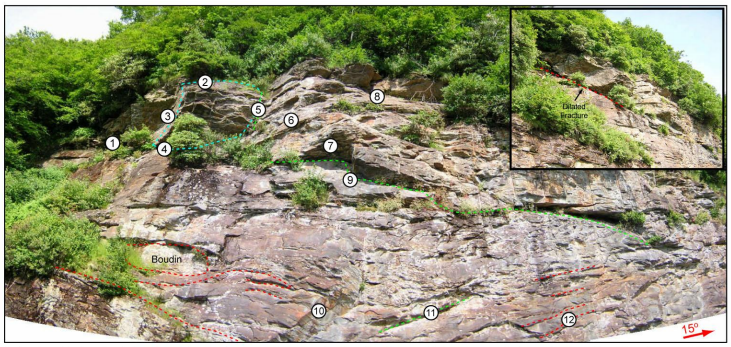
Details at Craggy Flats Tunnel. Rock is migmatitic metagraywacke. 1. Fracture oriented 295/70. 2. Gneissic layering/foliation oriented 200/40. 3. Undulating fracture measuring from 285/60 to 290/60. 4. Slip plane in upper part of cut along exfoliation fracture approximately oriented 355/40. There is also a release surface along a fracture that is parallel to the road and dips into the cut. It is oriented 175/75. 5. Upper potential rock fall block. 6. Lower potential rock fall block. Features at points 3 and 7 define two of the release surfaces. 7. Gneissic layering/foliation oriented 195/4 forms overhang on potential rock fall block. 8. Fracture oriented 310/80. 9. Gneissic layering/foliation oriented 70/15. 10. Fracture oriented 310/72. 11. Gneissic layering/foliation oriented 185/30.



Details for above photo Rock here is migmatitic metagraywacke. 1. Fracture oriented 50/65. 2. Overhang formed by gneissic layering. 3. Undulatory exfoliation fracture oriented 10/50. 4. Fracture slip surface oriented 130/70 with slickenlines oriented 150/30. 5. Gneissic layering/foliation oriented 195/50.

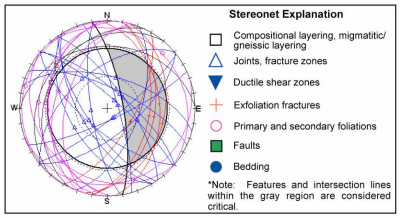


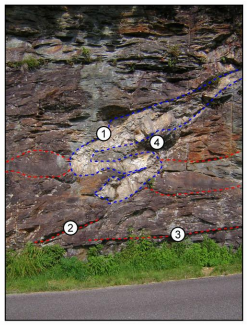
Details for above photo. 1. Gneissic layering oriented 205/30. 2. Compositional layering oriented 220/25. 3. Gneissic layering (shown in green) oriented 270/30. 4. Overhang formed by compositional layering. 5. Fracture oriented 20/60. 6. Fracture oriented 340/80.

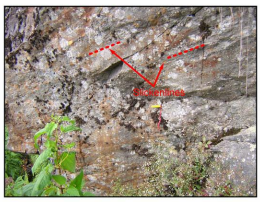


Bedrock at this location is boudinaged stained state metagraywacke (locally with garnet) in stained state layered migmatitic sillimanite garnet biotite muscovite schist. 1. Large block missing from slope indicating probable past rock slide. 2. Potential rock slide block. 3. Fracture approximately oriented 60/80 SE. This forms one side of the potential rock slide block. 4. Dilated exfoliation fracture oriented 15/35. This is the slide surface for the potential rock slide block. 5. Fracture dilated one inch that forms the right release surface for the potential rock slide block. 6. Fracture oriented 50/80. 7. Overhang created by the foliation. 8. Location of past rock fall as indicated by scar on rock face and patched pavement below this location. Slide surface is along exfoliation fracture oriented 10/45. 9. Exfoliation fracture oriented 30/65. 10. Fracture oriented 150/65. 11. Exfoliation fracture. 12. Foliation (shown in red) oriented 315/12. Inset: Up close shot of the potential rock fall block (point 2 in photo at left). Dilated fracture is exfoliation fracture (point 4 in photo at left) oriented 15/35.

Potential/Past Active Rock Slide-Fall Area
BRP CPR-090
Image Date: 07/14/04, 08/23/04
Collection Dates: 08/20/04, 08/23/04



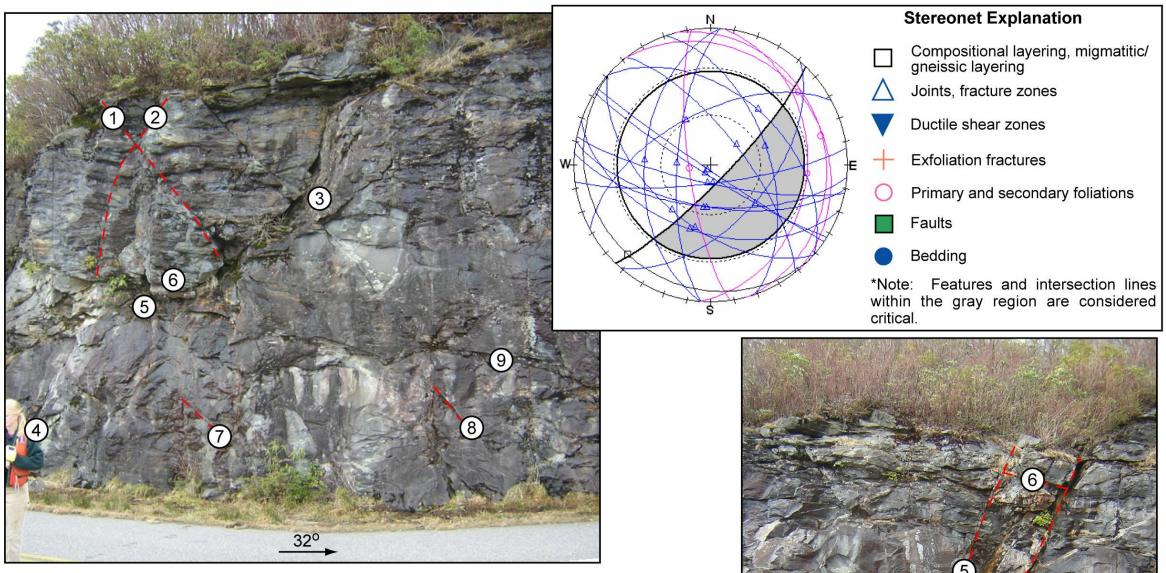


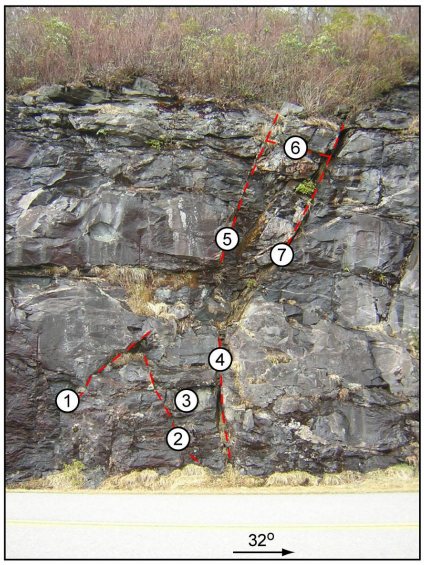


Left: Lithology consists of migmatitic garnet mica schist with metagraywacke layers. Some iron stained, garnet rich layers are present. 1. Folded quartz vein outlined in blue. 2. Foliation/compositional layering oriented 178/32. 3. Foliation/compositional layering oriented 185/22. 4. Fracture oriented 150/55. Above: Slickenlines oriented 150/22 on fracture oriented 148/70. Right: 1. Foliation. 2. Fracture oriented 325/72 with chlorite covered slickenlines oriented 150/10. Movement along the fracture is left lateral. 3. Fracture set oriented 230/53. 4. Foliation oriented 130/22.

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

CPR-092



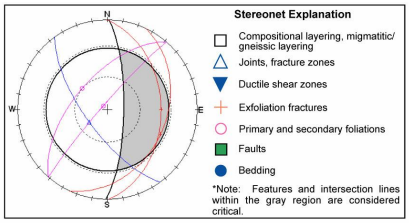


Above: Potential rock slide (wedge failure) at the southeast end of the outcrop. Rock here is migmatitic metagraywacke with minor schist layers. Details (some outlined in red) include the following: 1. Fracture oriented 340/55 forms the right release for rock fall blocks. 2. Fracture oriented 95/65 is conjugate with data point 1 and forms the left release for rock fall blocks. 3. Curviplanar fracture oriented 100/65-80. 4. Fracture oriented 83/80. 5. Fracture oriented 40/55 forms the sliding surface. 6. Foliation/compositional layering oriented 5/30 also forms a sliding surface. 7. Fracture oriented 310/45. 8. Fracture oriented 320/70. 9. Foliation/compositional layering oriented 345/18. Other features measured but not shown on photo include a curvilinear fracture oriented 185/50-70 and foliation/compositional layering oriented 320/18. **Right:** Potential rock slide in the middle of the outcrop at CPR-092. Details include the following: 1. Fracture oriented 104/52. 2. Fracture oriented 131/55. 3. Fracture oriented 242/59; foliation oriented 172/77. 4. Fracture oriented 128/85; water is seeping out of the bedrock along this feature. 5. Fracture oriented 125/87. 6. Compositional layering approximately oriented 133/12. 7. Fracture approximately oriented 108/50.

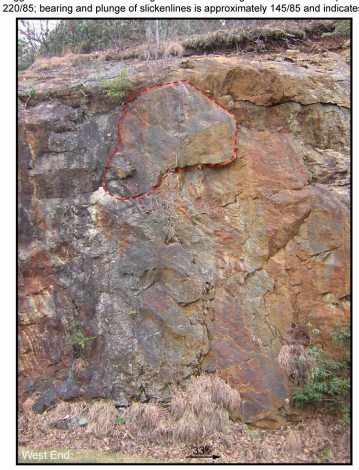
BRP CPR-092 Image Date: 01/11/05 Collection Date: 01/12/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CPR-098



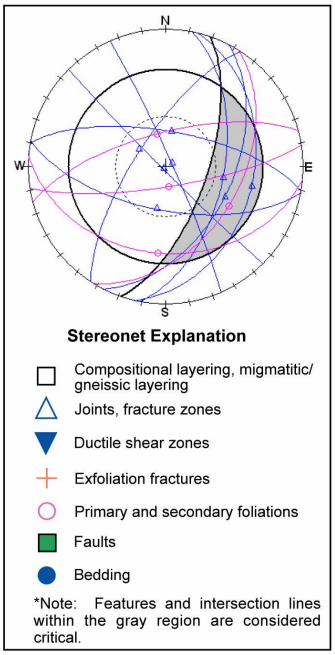
Potential rock slide-fall at a cut on Lane Pinnacle (rock slide-fall blocks are outlined in red). Rock here is primarily metagraywacke with minor schist units and pegmatites. Details include the following: 1. Foliation oriented 220/60. 2. Exfoliation fracture oriented 25/35 that forms a sliding surface. 3. Fracture/slip surface approximately oriented 145/70 forms a back release surface; slickenlines on the surface have a bearing and plunge of 325/25. 4. Exfoliation fracture oriented 0/40. Vegetation growing out of this feature suggests that water travels through the bedrock along this fracture. 5. Slip surface along foliation oriented 220/85; bearing and plunge of slickenlines is approximately 145/85 and indicates reverse movement.



BRP CPR-098
Image Date: 01/12/05
Collection Date: 11/21/06

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CPR-102

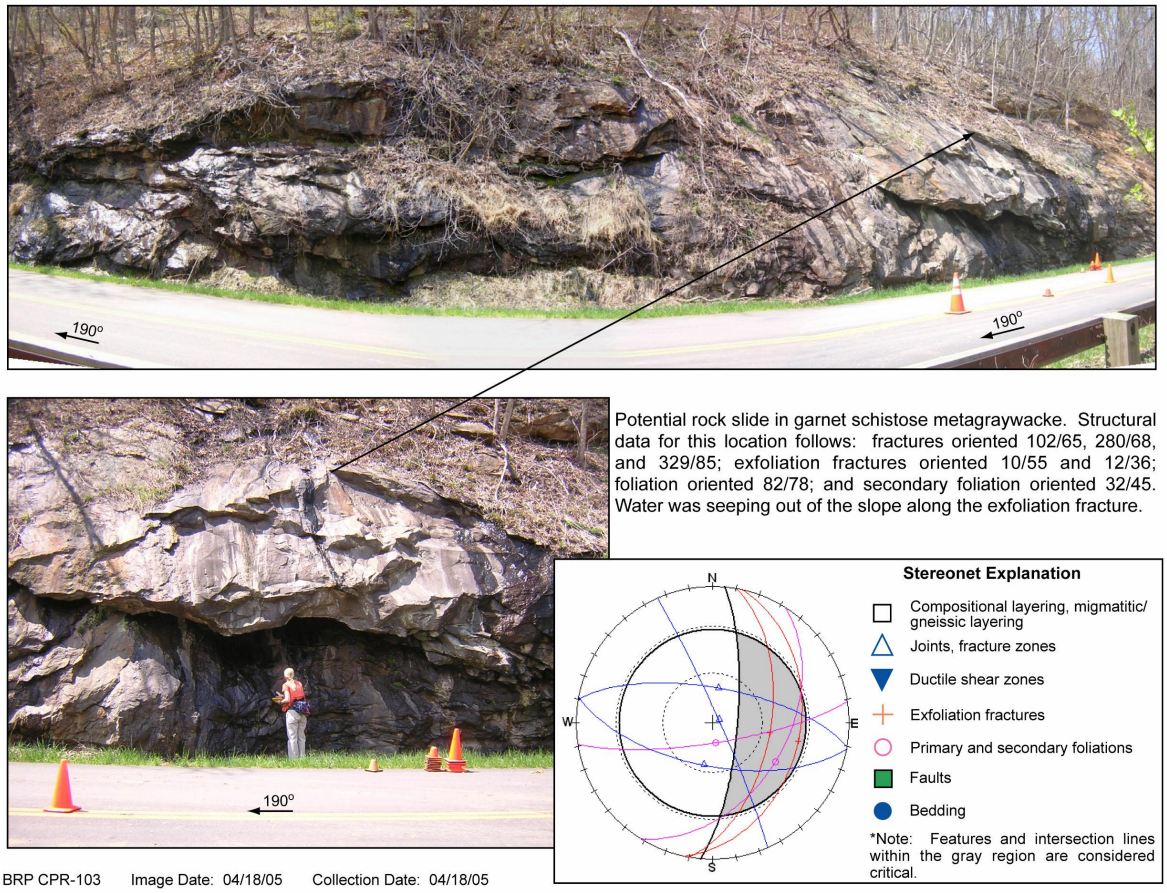


Rock slide that occurred April 14, 2005 near MM 378 and Town Mountain Road. Rock here is mylonitic garnet metagraywacke and garnet, biotite schistose metagraywacke. Measurements include the following: fracures oriented 215/71 and 148/90; exfoliation fracture oriented 26/40; foliation oriented 95/37 and 255/70.

BRP CPR-102 Image Dates: 04/15/05, 04/18/05 Collection Dates: 04/15/05, 04/18/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CPR-103

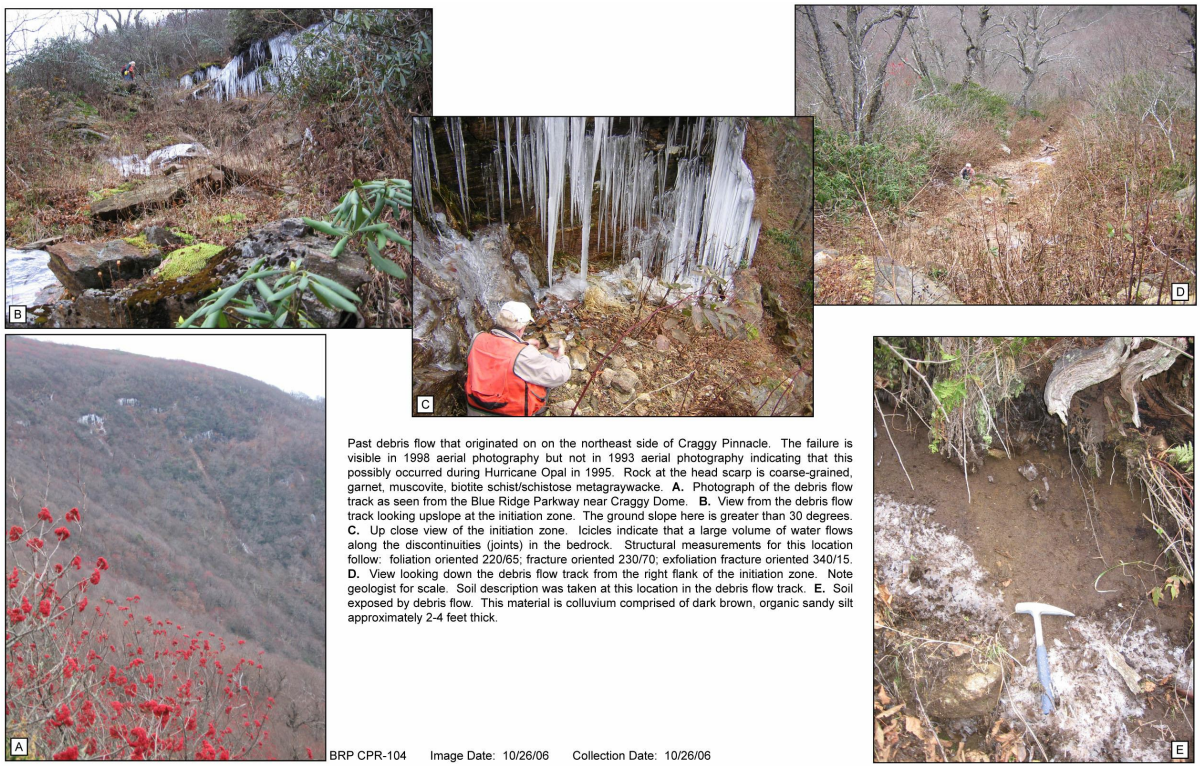


Potential rock slide in garnet schistose metagraywacke. Structural data for this location follows: fractures oriented 102/65, 280/68, and 329/85; exfoliation fractures oriented 10/55 and 12/36; foliation oriented 82/78; and secondary foliation oriented 32/45. Water was seeping out of the slope along the exfoliation fracture.

BRP CPR-103 Image Date: 04/18/05 Collection Date: 04/18/05

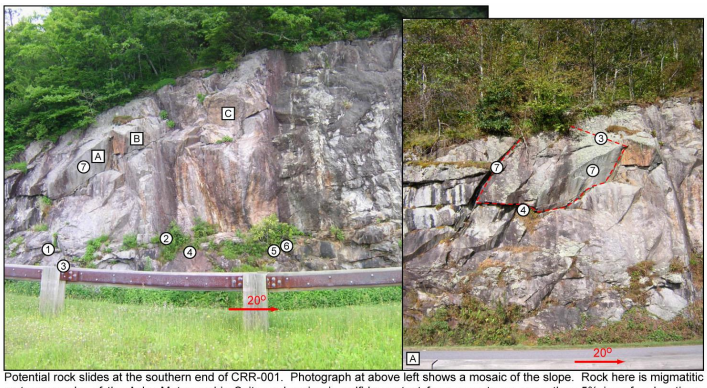
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CPR-104

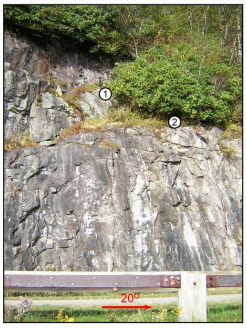


Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CRR-001

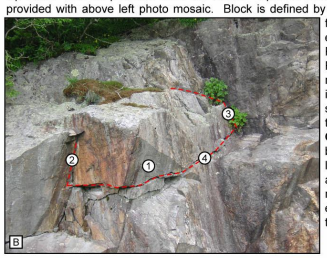


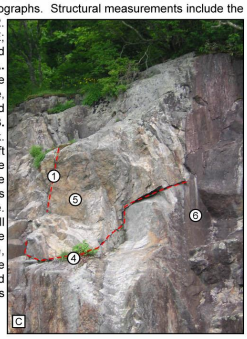
BRP CRR-001
Image Date: 06/10/04
Collection Date: 10/05/05

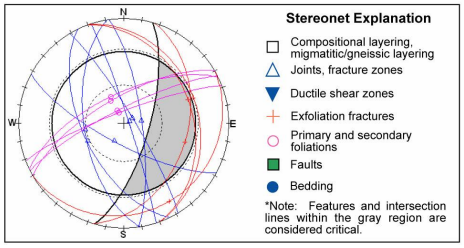


Above Left: Outcrop at the northern end of the road cut. Rock is stained state migmatitic metagraywacke with minor garnet amphibolite and mica schist. Details include the following: 1. Curved, exfoliation fracture exposed in the lower portion of the slope oriented 60/15. 2. Foliation oriented 240/70. 3. Isoclinal fold with an axial plane oriented 245/48 and an axis with a 245/10 bearing and plunge. Garnet amphibolite layers present here. 4. Fracture oriented 120/75. 5. Exfoliation just off the photograph oriented 350/35. **Above Right:** Past rock slide (wedge failure) on the upper portion of the slope where thick rhododendron is presently. 1. Fracture forming the back release surface is 335/85 (measured at the base of the slope). 2. Exfoliation fracture forming the base for sliding is oriented 350/30.

Potential rock slides at the southern end of CRR-001. Photograph at above left shows a mosaic of the slope. Rock here is migmatitic metagraywacke of the Ashe Metamorphic Suite and varies in sulfide content from none to no more than 5% in a few locations. Lettered locations indicate areas of potential rock fall that are shown in the above photographs. Structural measurements include the following: 1. Fracture oriented 155/59 spaced 3-5 feet. 2. Fracture oriented 327/82. 3. Foliation/gneissic layering oriented 244/67. 4. Exfoliation fracture oriented 17/39 E; foliation/gneissic layering oriented 245/81. 5. Foliation/gneissic layering oriented 244/79. 6. Fracture oriented 348/76. 7. Fracture approximately oriented 172/60 W. **A.** Up close view of potential rock fall block. Specific structural measurements are provided with above left photo mosaic. Block is defined by fracture on the right side, foliation on the left, and exfoliation at the base. **B.** Potential rock fall block. Foliation forms the left release surface, a fracture is the right release surface, and exfoliation is the basal sliding surface. **C.** Potential rock fall block. Fracture forms the left release surface, another fracture forms the right release surface, and exfoliation fracture forms the basal sliding surface.







Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CRR-002

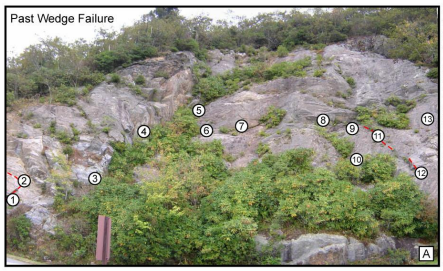


Photo A, at left: Large, past wedge failure at the southern end of the outcrop. Rock at this whole outcrop is migmatitic and porphyroclastic metagraywacke with subordinate thin mica schist layers. Details include the following: 1. Fracture at 150/70. 2. Gneissic layering at 265/55. 3. Fracture face oriented 342/80; gneissic layering 258/60. 4. Fracture face 8/80; gneissic layering 30/35. 5. Exfoliation fracture 75/60. 6. Exfoliation fracture 70/40. 7. Gneissic layering 76/88. 8. Gneissic layering 270/68. 9. Exfoliation fracture 110/55. 10. Exfoliation fracture 110/55. 11. Fracture 153/70. 12. Fracture 150/50. 13. Exfoliation fracture 130/62.

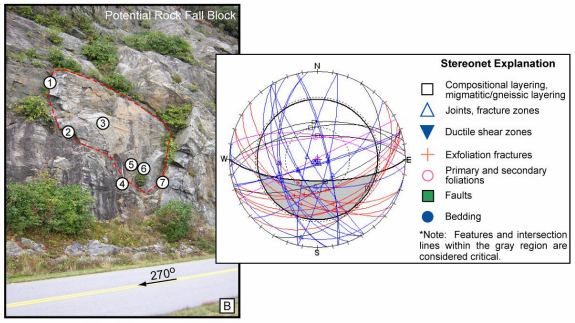
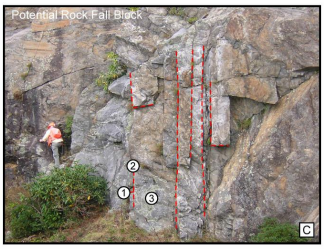


Photo B, at right: Potential rock fall block toward the south end of the outcrop. Details include the following: 1. Fracture forming the right edge of the rock fall block is oriented 195/80. 2. Exfoliation fracture forming the back release surface is oriented 70/60. 3. Exfoliation fracture 110/45. 4. Exfoliation fracture 50/30. 5. Gneissic layering 70/68. 6. Fracture 150/85. 7. Fracture at 175/55 with slickenlines oriented 198/30. Movement is right lateral oblique slip.



Details for Photo C, above: Closely spaced fractures have created the potential for rock fall. Details include the following: 1. Fracture that forms the top and bottom release surface is approximately oriented 102/11. 2. Closely spaced fractures that form the sides of the rock fall blocks is oriented 138/90 and 134/87. The stepped surface indicates former movement with tops (the surface no longer there) moving up. 3. Foliation forms the back release surface is oriented 243/90. This is also the approximate cut face surface.

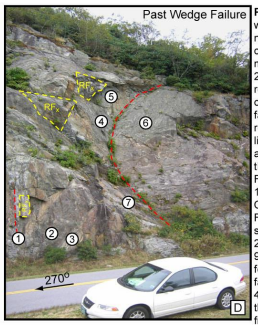


Photo D, at left: Past wedge failure near the northern end of the outcrop. Failure is approximately 75 feet long and 20 feet wide. Curved red line indicates the line of intersection of the two failure planes. Potential rock fall blocks are outlined in yellow. Details at this location include the following: 1. Fracture oriented 138/90. See photograph C at left for details. 2. Fracture at 60/86 with slicken-lines oriented 240/55. 3. Fracture at 94/65. 4. Fracture forming the upper right failure plane is oriented 45/70. This feature is in the same family as the fracture at data point 2. 5. Location of past rock fall. 6. Upper exfoliation/fracture surface that forms the left side of the wedge is approximately oriented 122/50. 7. Exfoliation fracture forming the lower right failure plane is oriented 70/46.

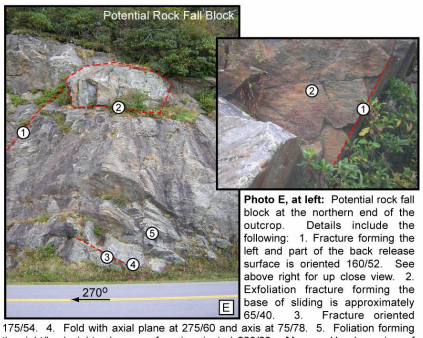
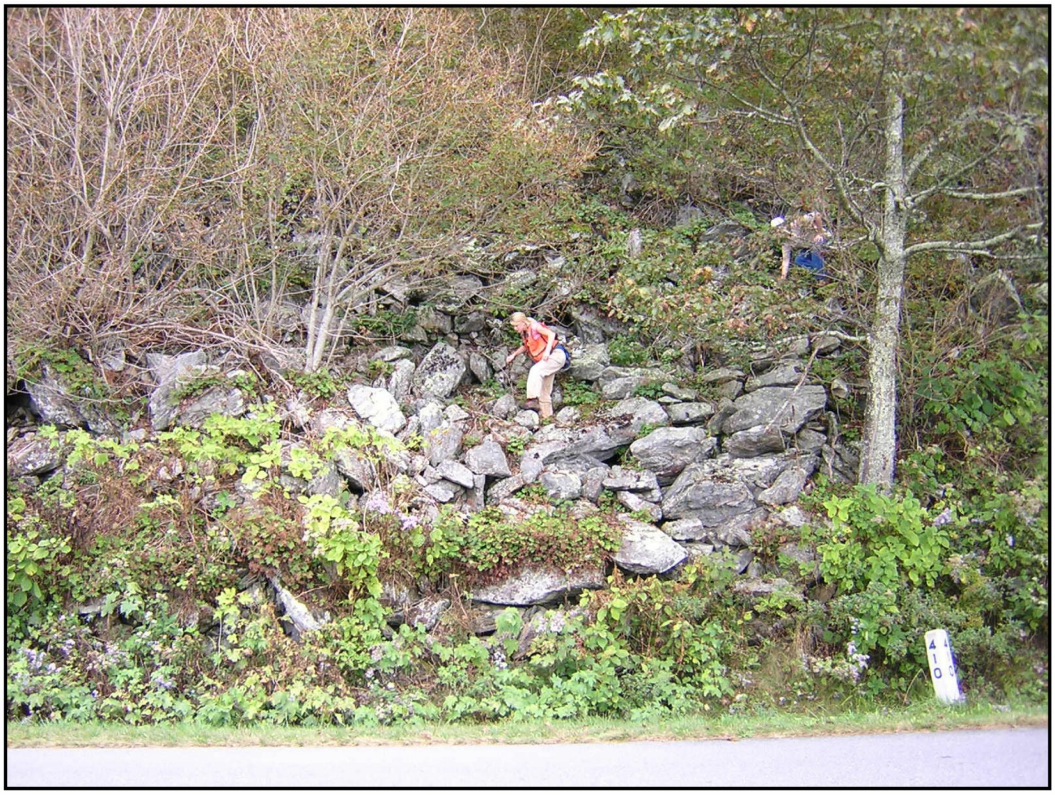


Photo E, at left: Potential rock fall block at the northern end of the outcrop. Details include the following: 1. Fracture forming the left and part of the back release surface is oriented 160/52. See above right for up close view. 2. Exfoliation fracture forming the base of sliding is approximately 65/40. 3. Fracture oriented 175/54. 4. Fold with axial plane at 275/60 and axis at 75/78. 5. Foliation forming the right/back right release surface is oriented 280/68. **Above:** Up close view of fracture 1 at the base of the slope. Again, data point 1 is oriented 160/52. 2. Slickenlines oriented 88/14 on a foliation surface oriented 265/70.

CRR-002 Image Date: 10/05/05 Collection Date: 10/12/05

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

CRR-003

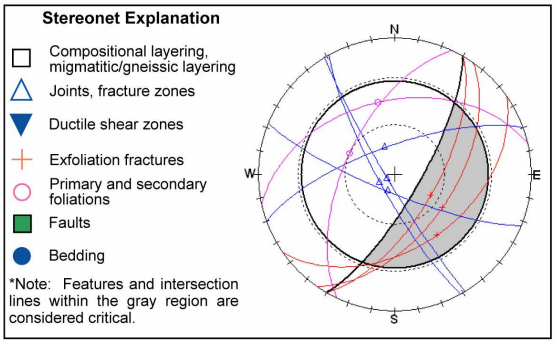


Talus slope at the northeast portal of the Frying Pan Tunnel at mile marker 410. The deposit is approximately 300 feet long and is wider upslope near the source area than it is at the base. Measurements at the source area include the following: foliation 245/72 and fracture 130/85. Some boulders in the deposits are as large as 5 feet wide.

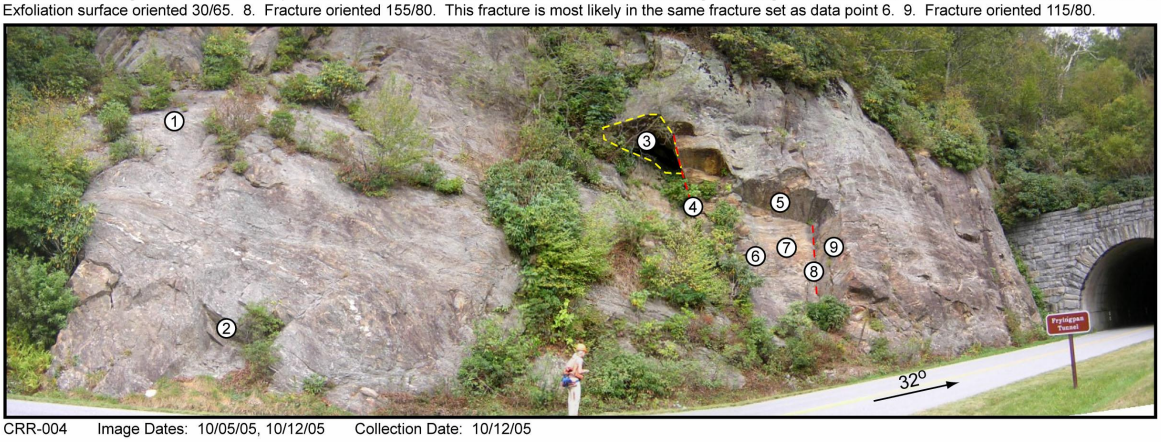
BRP CRR-003 Image Date: 10/05/05 Collection Date: 10/05/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CRR-004



Details for outcrop at the southern portal of Fryingpan Tunnel. Past, active (as indicated by boulders along the road shoulder), and potential rock fall observed here. Rock is massive migmatitic metagraywacke. **Above Right:** Upper half of the slope. Two potential rock slide blocks were observed at this location. Release/sliding surface for both of the these features is the undulating exfoliation surface. At the red dashed line tracing this feature, the exfoliation fracture is approximately oriented 35/55 **Below:** Lower portion of the slope. Details include the following: 1. Exfoliation surface oriented 55/45. 2. Foliation oriented 257/45. 3. Location of past rock fall block (outlined in yellow). Now all that remains is a large cavernous opening. Moss, vegetation, and seepage persist along the right edge of this feature. Potential rock fall area: 4. Fracture forming the left side of the past rock fall block is oriented 250/72. 5. Foliation forming overhang is oriented 205/60. 6. Fracture oriented 160/85. 7. Exfoliation surface oriented 30/65. 8. Fracture oriented 155/80. This fracture is most likely in the same fracture set as data point 6. 9. Fracture oriented 115/80.



CRR-004 Image Dates: 10/05/05, 10/12/05 Collection Date: 10/12/05

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

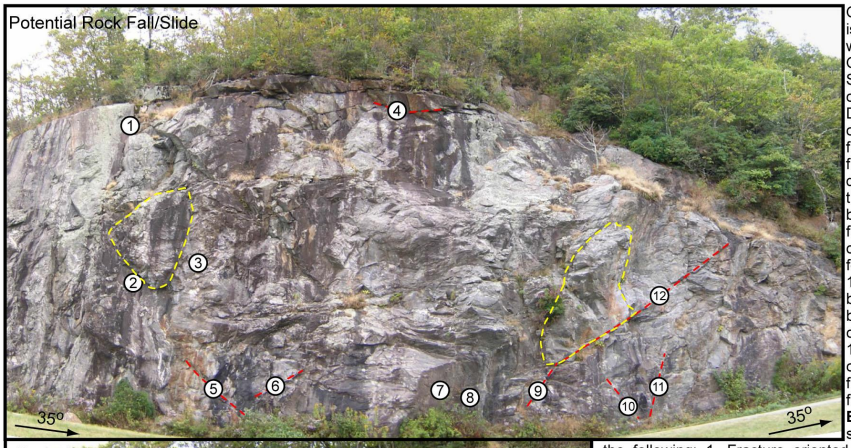
CRR-005

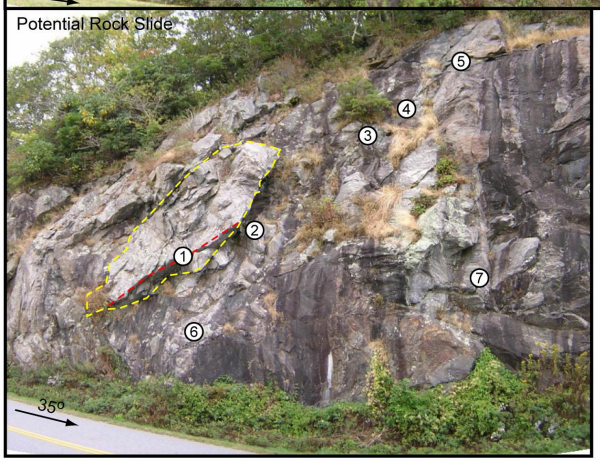
Talus slope approximately 400 feet south of the southwest portal of the Fryingpan Tunnel. Deposit is approximately 50 feet long and 100 feet wide. Outcrop is exposed at the head of the deposit.

BRP CRR-005 Image Date: 10/05/05 Collection Date: 10/05/05

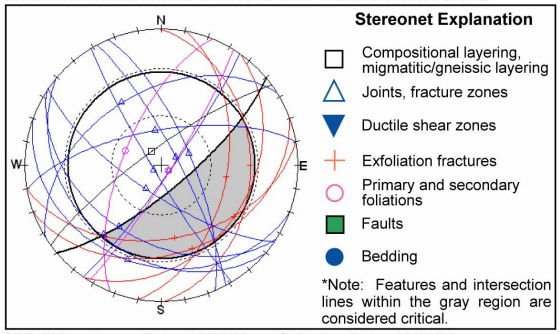
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

CRR-006





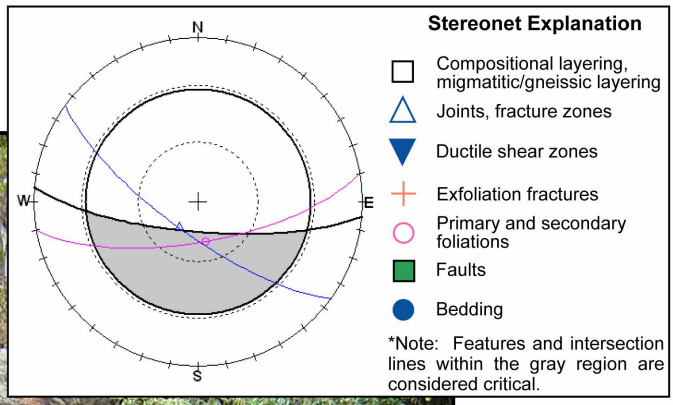
Outcrop at the Pink Beds Overlook. Rock here is stained state, massive, migmatitic metagraywacke with thin mica schist layers. **Top Left:** Outcrop at the northern end of the overlook. Several potential rock fall/slide blocks (yellow outlines) were observed at this location. Details include the following: 1. A fracture oriented 328/80 forms the right release surface for a potential rock fall block. 2. Same fracture as in data point 1 exposed further downslope. 3. Fracture oriented 30/85 forms the left release surface for a potential rock fall block. 4. Exfoliation fracture/sliding surface for rocks along the top of the cut slope is oriented 0/35. 5. Fracture oriented 238/44; foliation oriented 38/85. 6. Fracture oriented 110/28. 7. Fracture oriented 153/85 is the back release surface for a potential rock fall block. 8. Foliation/ compositional layering oriented 202/67. 9. Fracture oriented 125/45. 10. Fracture oriented 260/68. 11. Fracture oriented 125/74. 12. Exfoliation fracture forming the back release and sliding surfaces for potential rock slide block is oriented 10/50. **Bottom Left:** Potential rock slide block at the southern end of the outcrop. Details include the following: 1. Fracture oriented 130/35 is the basal sliding surface for the potential rock fall block. 2. Exfoliation fracture/sliding surface at 70/35 is the back release surface and is dilated 2-4". 3. Exfoliation fracture/sliding surface at 35/35. 4. Location of possible past rock slide. 5. Exfoliation fracture oriented 80/45. 6. Gneissic layering/compositional layering at 235/80 with slickenlines oriented 60/15. Slickenlines indicate left lateral movement. 7. Fracture oriented 335/72.

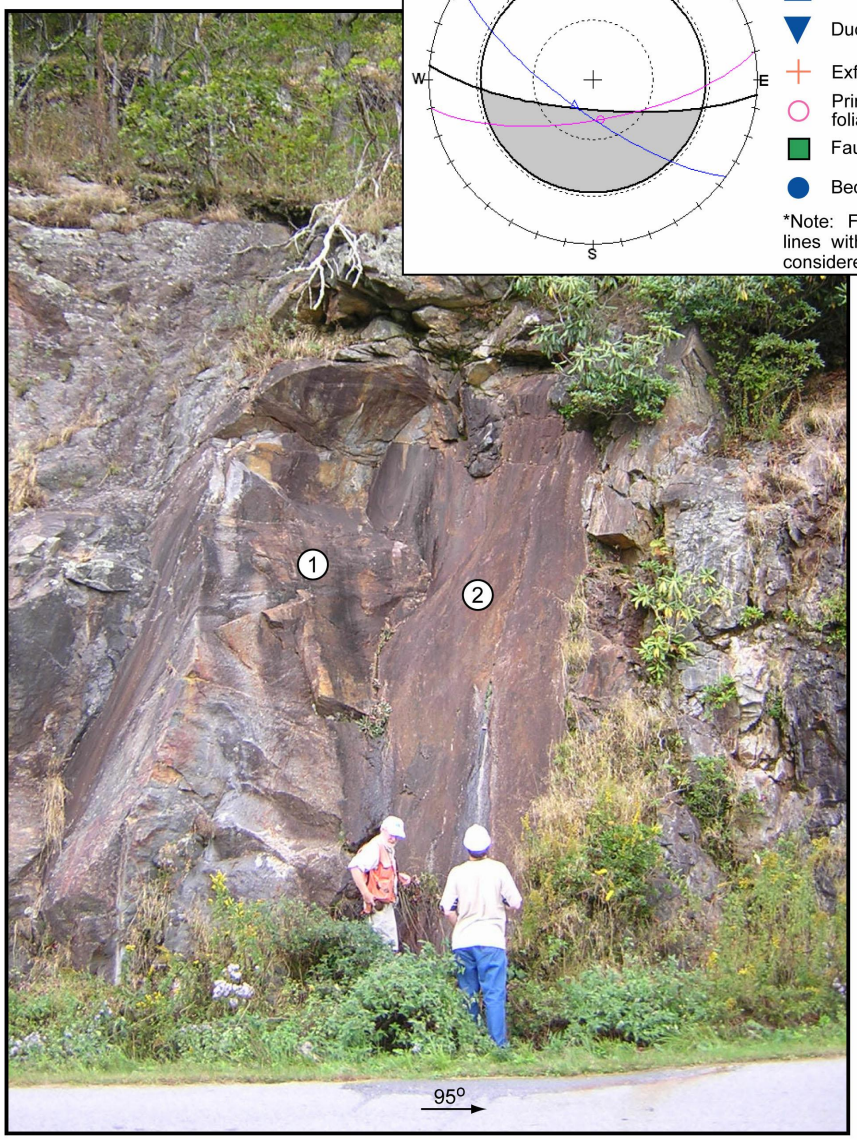


CRR-006 Image Date: 10/05/05 Collection Date: 10/12/05

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

CRR-009



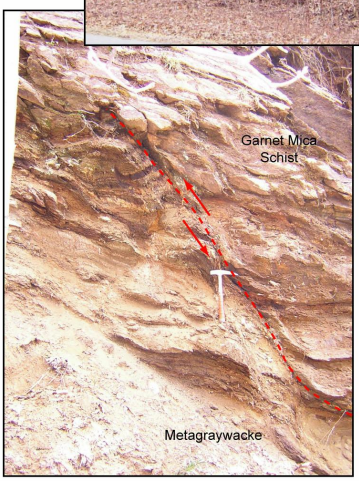


Location of past rock slide and rock fall and active rock fall. The past rock slide was a wedge failure that failed along the following planes: 1. foliation 80/70 and 2. fracture 127/75. Rocks at this location are 2-5% sulfidic.

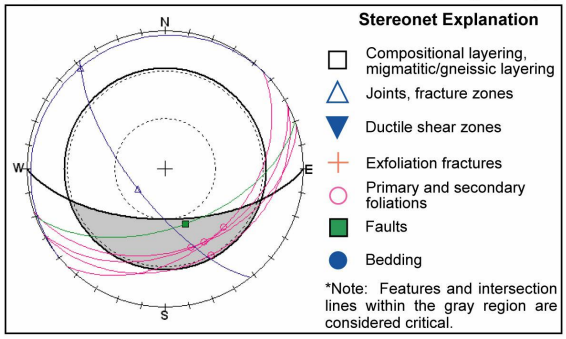
BRP CRR-009 Image Date: 10/05/05 Collection Date: 10/05/05

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

DMR-001



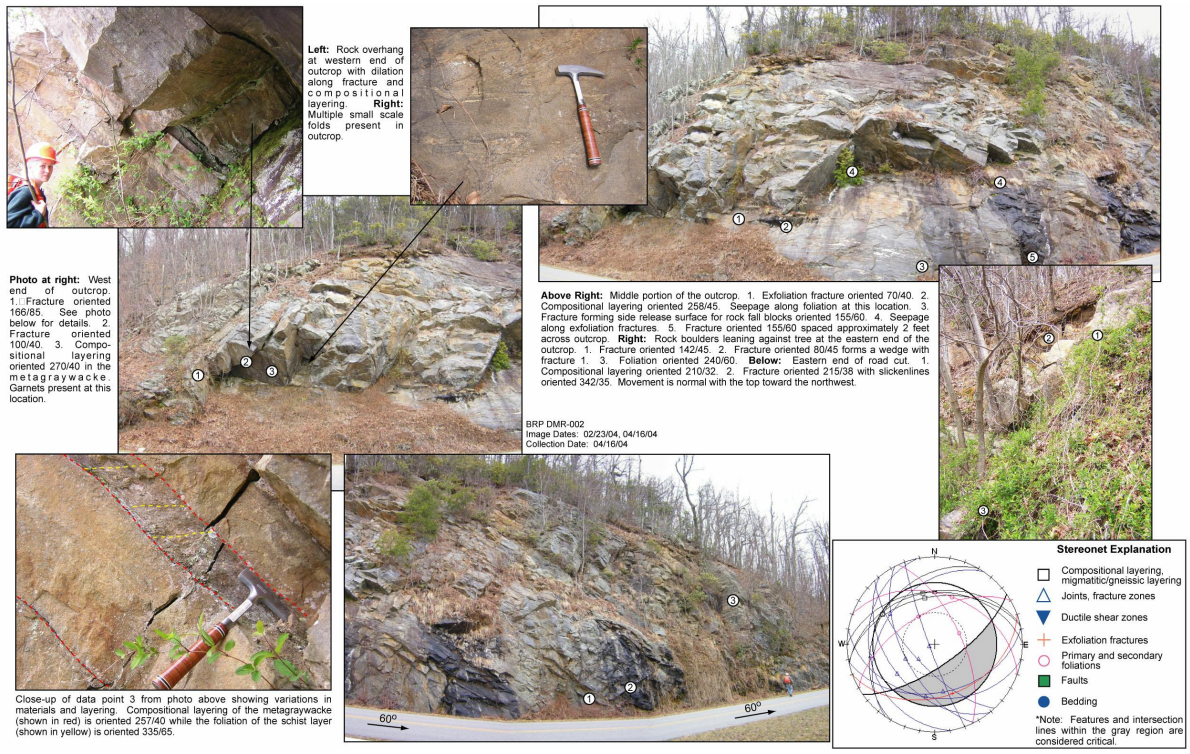
Above: Past active weathered rock slide; vew of left lateral scarp. 1. Foliation in schist oriented 62/40 creates dip slope. 2. Just upslope of the shear band, foliation oriented 45/40 intersecting a fracture oriented 230/5. Other structural data includes the following: Foliation on right lateral scarp oriented 72/40; fracture oriented 143/70 with slickenlines oriented 323/5. **Left:** Shear band/fault on left lateral scarp oriented 70/55. Foliation in schist oriented 62/30 creating dip slope.



BRP DMR-001
Image Date: 02/23/04, 02/24/04
Collection Date: 04/16/04

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

DMR-002



Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

DMR-004

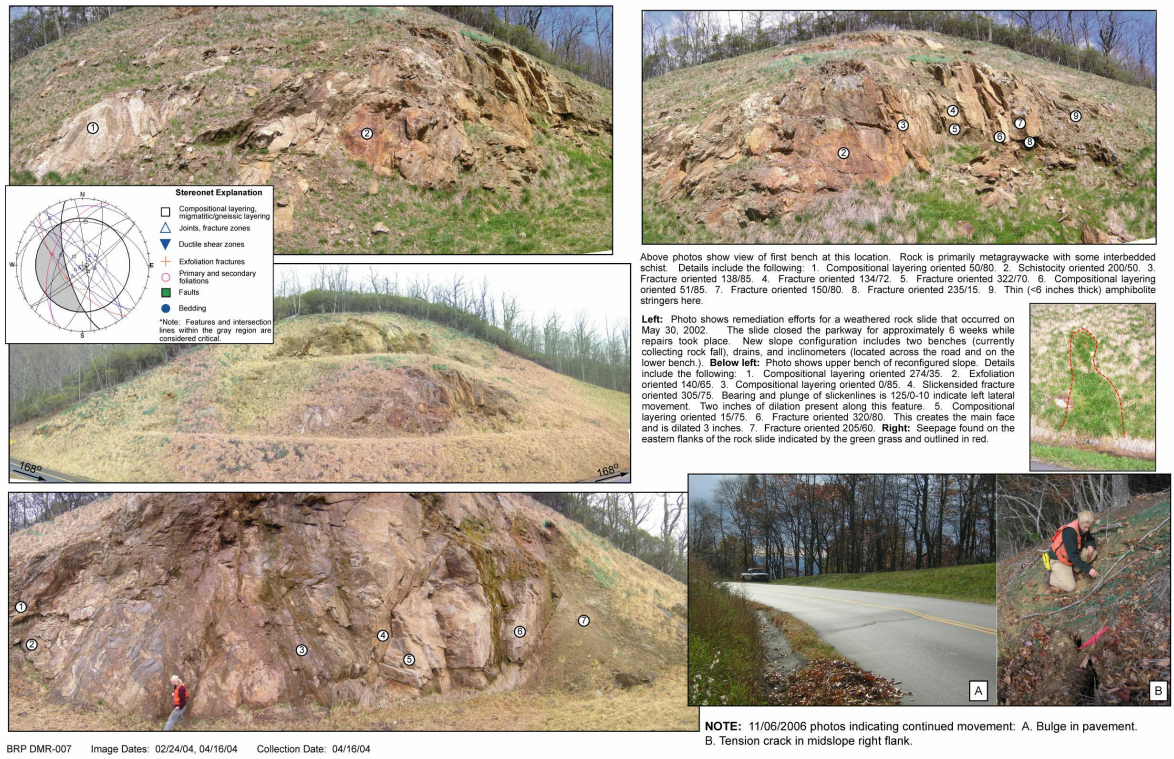
Details for left flank of slide include the following: 1. Compositional layering oriented 38/80, fracture oriented 127/33, and exfoliation oriented 60/65. 2. Compositional layering oriented 54/90.

View of the head scarp of the past acitve rock slide. Rock primarily consists of stained- to completely decomposed metagraywacke with subordinate garnet mica schist. Pegmatite is present at the base of the slide. Broad open folding was observed, but was not measured due to high variability in folding. Slide dimensions are approximately 200 feet wide by 125 feet high.

BRP DMR-004
Image Date: 02/24/04
Collection Date: 02/24/04

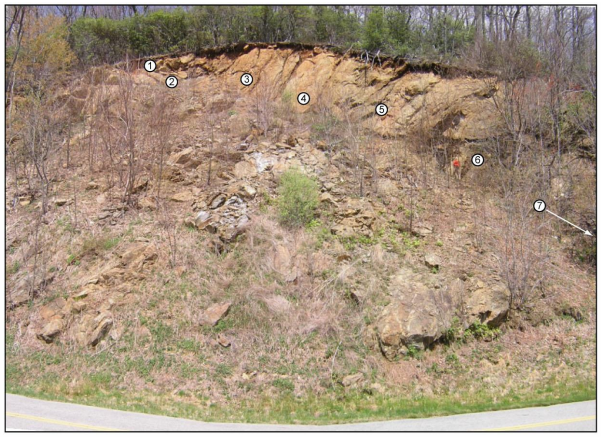
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

DMR-007



Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

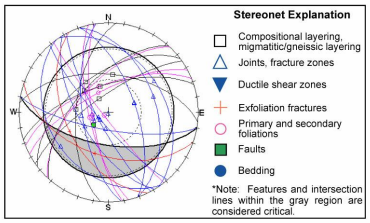
DMR-008



Past active rock slide located on the northeast side of the Parkway. Rock is primarily metagraywacke with minor schist layers. and becomes more sulfidic upslope. Considerable large and small scale folding is present. **1.** See photo below left for details. **2.** See photo below left for details. **3.** Undulating fracture oriented 125/90. Fracture forming face of exposure is oriented 158/75. **4.** Compositional layering oriented 185/60. **5.** Fracture oriented 338/65 forms upper release surface for rock fall. **6.** See photo above right for details. **7.** Exfoliation fracture oriented 154/50.

Details for data point 6 on the left lateral margin of the slide. Rock is migmatitic metagraywacke with biotite-muscovite, gneissic laminae. Fracture forming the face seen in above left photo is oriented 174/65. Compositional layering is oriented 235/75. From this location, a void space approximately 2.5 feet by 3 feet was observed at the base of the outcrop as seen in above right photo.

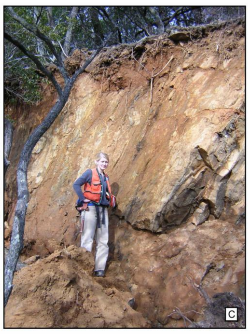
Close-up view of the head scarp area. **1.** Fracture oriented 155/80. **2.** Compositional layering oriented 233/55. Other measurements include the following: Exfoliation fracture oriented 108/50, fold with axial plane oriented 190/60 and axis oriented 292/63, fracture oriented 150/65, and compositional layering oriented 276/55.



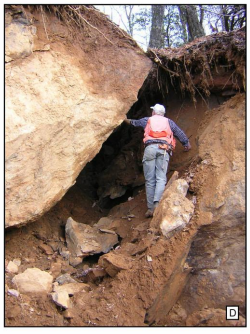
BRP DMR-008
Image Dates: 02/24/04, 04/19/04
Collection Date: 04/19/04

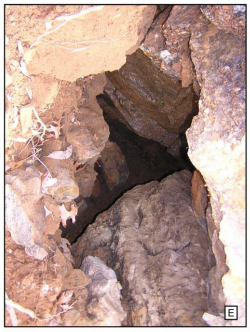
Photo mosaic shown above. The above photograph shows the rock slide on the Blue Ridge Parkway at mile marker 401. Reactivation of this old rock slide began on December 15, 2004. Rock is migmatitic metagraywacke and schist partially to completely decomposed along the scarp and stained state on the large blocks. The following information was collected at the data points shown on the photograph. **1.** Foliation/ compositional layering oriented 222/62 N. The orientation of the scarp ranges from 90/75 S to 140/80 S over a 6-foot span. **2.** Foliation equivalent to the present slip surface behind the main scarp is oriented 170/75 S. Oblique foliation is oriented 145/85 S. There is 1-4 inches of dilation behind this block. **3.** Mesoscopic fold with an axial plane and axis oriented 03/20 E and 162/2 respectively. The fold is broad and open. **4.** Foliation/ present slip surface in the schist is oriented 165/72 S. The compositional layering is oriented 222/60 N. **5.** See Photograph C at right for details. **6.** See Photographs D and E at right for details. **7.** Fracture with 1-6 inches dilation at the base of the main scarp oriented 340/46 E.

Photograph A. Photograph of upper secondary scarp located on left flank of the rock slide. Lower block is approximately 15-20 feet wide and has dropped approximately 1 foot. Measurements in this feature include the following: fracture forming separation surface oriented 175/75 W and foliation oriented 252/65 N. Secondary scarp contacts main scarp as seen in photograph D below. **Photograph B.** Photograph of lower secondary scarp approximately 30 feet downslope from the upper secondary scarp. Block has dropped approximately 0.5-1 foot, and the crack is approximately 1 foot wide. Measurements at this location include the following: fracture forming separation surface is oriented 150/75 SW and a fracture dipping into the slope is oriented 325/38 NE.



Photograph C. Close up view of data point 5 in above left photograph. At this location, the scarp is approximately 12 feet high. Foliation/ compositional layering oriented 248/65 N is oblique to slip surface. Old, manganese-coated slickenlines exposed have a bearing and plunge of 2/62. Fracture (old slip surface) with slickenlines is oriented 130/72 SW. **Photograph D.** Close up view of data point 6 in the above left picture. This is the intersection of the main scarp with the upper secondary scarp (Photo A). Foliation/compositional layering oriented 242/70 N approximates the separation surface that forms the secondary scarp. Fracture in the secondary scarp on the overhang side is oriented 340/65 E. The basal sliding plane is oriented 145/35 S. **Photograph E.** Void space with seepage approximately 15 feet downslope from data point 7. This indicates that the major rock block below the secondary scarp is unstable. Depth of void space is unknown.



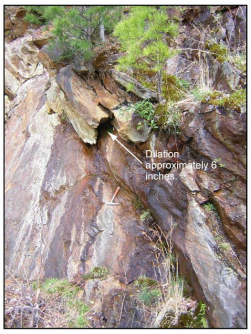


BRP DMR-008 Image Date: 01/05/05 Collection Date: 01/05/05 **NOTE**: Stabilized as of 06/2006 by laying back cut slope and revegetating.

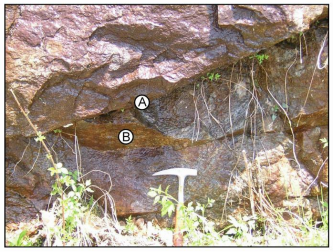
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

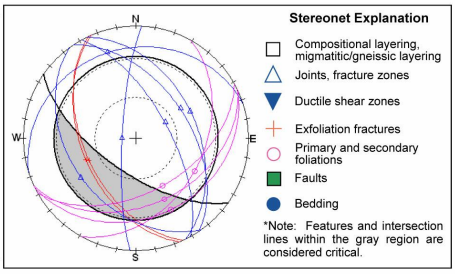
DMR-009

Past active and potential rockslide area. Outcrop on north side of the Parkway just west of Pine Mountain Tunnel. Rock is schistose metagraywacke on the east and west ends of the outcrop grading into sulfidic schist in the middle of the exposure. **1.** Foliation oriented 65/40 creates an overhang. **2.** Fracture face oriented 145/40. Fold axis oriented 63/3 with a fold axial plane oriented 220/58. **3.** Foliation oriented 61/50. **4.** See photo at below left for details. **5.** Foliation oriented 29/40. **6.** Fracture oriented 330/65. **7.** Exfoliation fracture oriented 157/50. **8.** See photo at far right for details. **9.** Seepage of approximately 3 gpm along exfoliation fractures. **10.** Broad, open fold. **11.** Exfoliation fracture oriented 155/52. Foliation oriented 64/30.



Left: Close-up view of data point 4. Fracture forming release of material along the side is oriented 184/80. Fracture forming base of block is oriented 325/50. Several boulders located in catchment ditch next to road. **Right:** Details for data point 7. A. Fracture oriented 252/20 appears to create bottom of overhang. B. Fracture oriented 333/45.

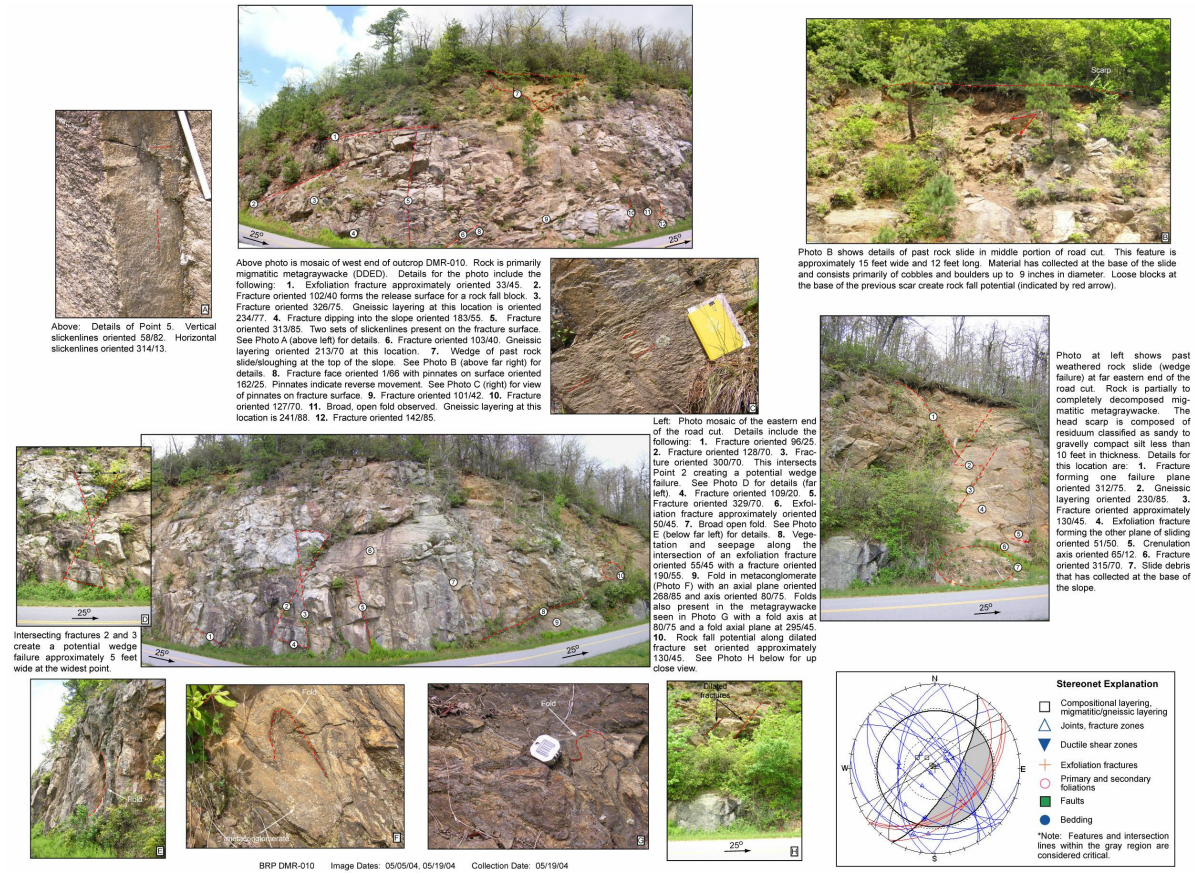




BRP DMR-009 Image Dates: 02/24/04, 04/19/04 Collection Date: 04/19/04

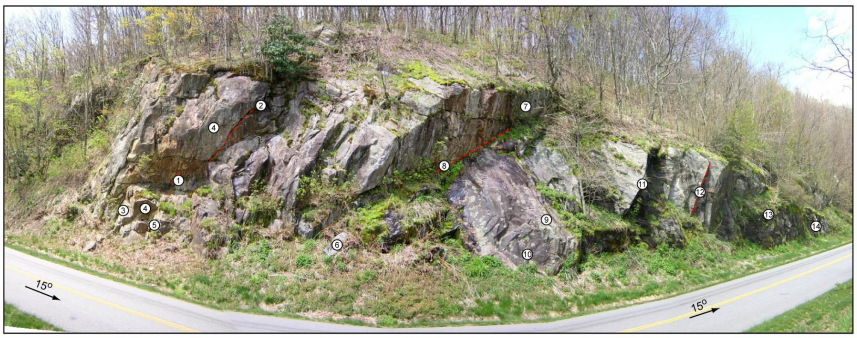
Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

DMR-010

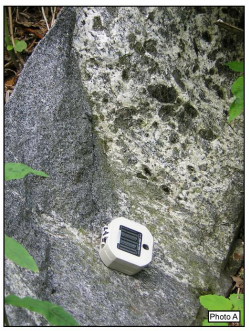


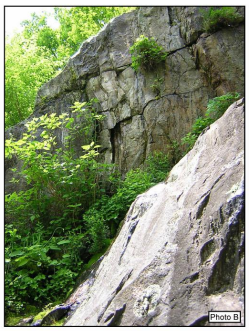
Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

DMR-011

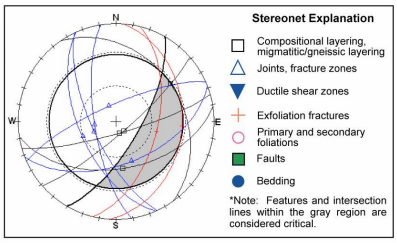


Potential rock fall/slide area. Photo at left is panoramic view of DMR-011 located on the west side of the Parkway approximately 2000 feet north of the Little Pisgah Ridge Tunnel. Rock is stained state metagraywacke and is slightly sulfidic on the southern end of the road cut. Slope aspect is 110 degrees. Details include the following: 1. Seepage at the contact between a sulfidic layer within the metagraywacke and exfoliation. 2. Fracture along gneissic layering oriented 82/50 and dilated approximately 1 inch. 3. Exfoliation fracture oriented 4/33. 4. Fracture oriented 157/70. This fracture also forms the face of the large rock overhang. 5. Gneissic layering oriented 75/80. 6. Large boulder from the slope above consisting of metagraywacke and large clasts of biotite in a quartz matrix. See photo A below for close up view. 7. Fracture forming face of overhang oriented 174/72 . Photo B below provides a head-on view of this fracture face. 8. Seepage of approximately 2-3 gpm along intersection of fracture and exfoliation. 9. Exfoliation fracture approximately oriented 14/55. 10. Gneissic layering oriented 50/80. 11. Fracture forming face of overhang with considerable seepage. Photo C below provides head on view of this face. 12. Fracture oriented 157/60. 13. Seepage zone. 14. Gneissic layering oriented 325/33. Fracture dipping out of the slope oriented 325/33.





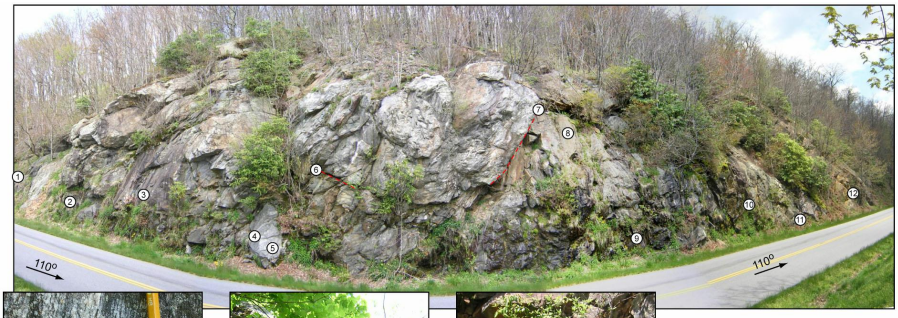
Point 1 is a fracture approximately oriented 246/75. Point 2 is a fracture dilated 2 inches and approximately oriented 68/55.



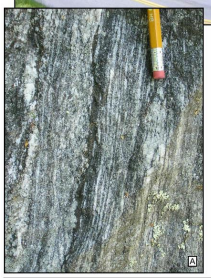
BRP DMR-011
Image Date: 05/05/04, 05/25/04
Collection Date: 05/25/04

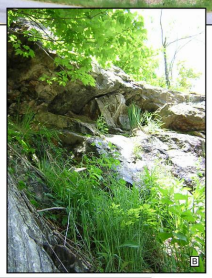
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

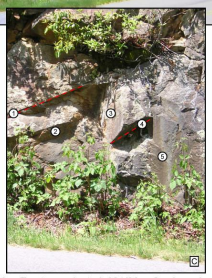
DMR-012



Potential rock slide/fall: DMR-012 is located just south of Candler Knob on the Blue Ridge Parkway approximately 1 mile east of the Little Pisgah Ridge Tunnel. Details include the following: **1.** Mylonitic metagraywacke with gneissic layering oriented 220/60. Some pegmatite also present. Photo A below shows details of rock type. Photo B shows an overhang at the same location. **2.** Fracture oriented 72/82. **3.** Exfoliation fracture oriented 140/60. Staining on rock surface indicates water consistently flows across the surface. **4.** More typical metagraywacke with gneissic layering dipping into the slope at 235/60. Fracture forming the rock face is oriented 132/70. **5.** Fracture forming face oriented 88/62. Crenulations along the surface have axis with a bearing and plunge oriented 243/30. **6.** Fracture forming the base of an overhang oriented 5/20. **7.** Gneissic layering oriented 211/48. **8.** Fracture face oriented 170/62 W. **9.** Gneissic layering oriented 40/83. **10.** Gneissic layering oriented 10/80. **11.** Location of Photo C. Details below. **12.** Location of Photo D. Details below.

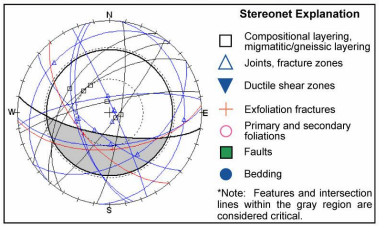






1. Fracture oriented 221/20. **2.** Irregular fracture oriented 265/75. **3.** Fracture oriented 338/85. **4.** Fracture oriented 56/45. **5.** Fracture oriented 329/85. **6.** Exfoliation fracture oriented 85/57.

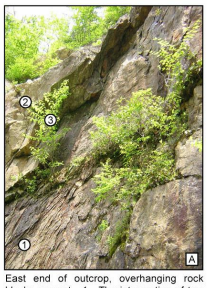
Northeast end of outcrop. Rock here is much more sulfidic than in the rest of the road cut and is more coarse grained and gneissic. **1.** Gneissic layering oriented 258/80. **2.** Fracture oriented 166/59.



BRP DMR-012
Image Dates: 05/05/04, 05/25/04, 05/27/04
Collection Date: 05/25/04

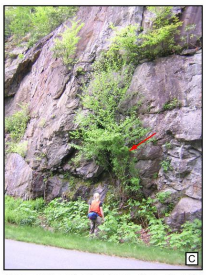
Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

DMR-014

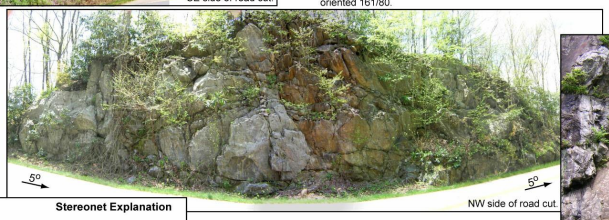


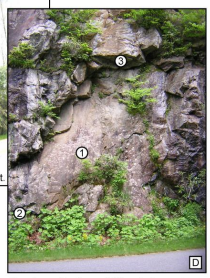
East end of outcrop, overhanging rock blocks present. 1. The intersection of two foliations produces this scaly look. Primary foliation is oriented 194/80. Secondary foliation is oriented 265/70. 2. Exfoliation fracture oriented 204/70. 3. Fracture oriented 161/80.

At east end of outcrop, large block pulling away from the rock face along a fracture oriented 190/80 dilated approximately 1.5 inches. Exfoliation fracture oriented 202/80 forms the cliff face. Arrow points to person for scale.



Near east end of outcrop, through-going fracture with seepage and vegetation oriented 60/70.





Overhang in the middle of the outcrop. Rock is layered quartz feldspathic gneiss and migmatitic biotite gneiss. 1. Exfoliation fracture forms the sliding surface and is oriented 200/76. 2. Foliation oriented 220/83. 3. Fracture forming the base of the overhang is oriented approximately 10/40.

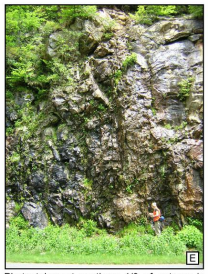
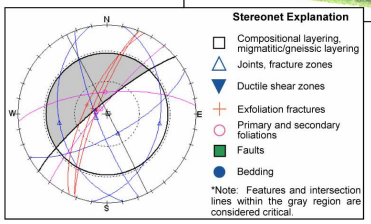


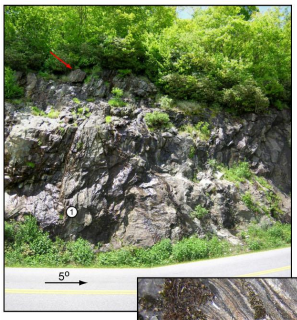
Photo taken at southern 1/3 of outcrop in highly fractured seepage zone. Gneissic layering varies from 75-80/90+ due to intense folding. A fracture set is also present oriented 260/40-50. There is a potential for rock fall at this location due to the small UJB size. Boulders range in size from 9"x18"x12" to 3"x2"x3". Rock is finely layered quartzo-feldspathic gneiss.



Potential rock slide/fall
BRP DMR-014
Image Dates: 05/05/04, 05/19/04
Collection Date: 05/19/04

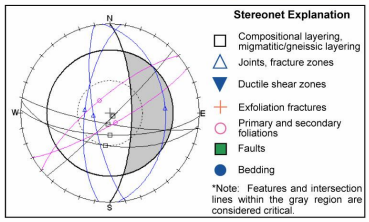
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

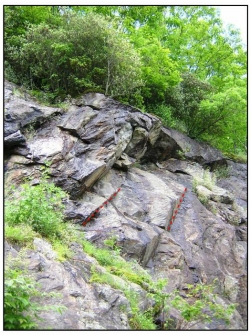
DMR-015



Left: Potential rockfall block above roadway indicated by arrow. Rock type is migmatitic metagraywacke with schistose metagraywacke and schistose layers with seepage zones. At data point 1, compositional layering along the schist-metagraywacke contact is 90/70. An S-C fabric was observed at this location. Orientation of schistocity (S-fabric) is 100/80. C surface is oriented 98/60 with tops to the south. **Below:** Fold at north end of outcrop approximately 200 ft south of DMR-011. Fold axial plane oriented 40/80. Fold axis oriented 230/60. Gneissic layering at this location is oriented 45/86.

Potential rockfall block at DMR-015 indicated by arrow. Details below. Rock is biotite muscovite schistose metagraywacke wtih minor amphibolite observed. At data point 1, the fracture forming the face is oriented 173/75. Schistocity is 60/80, and secondary foliation is oriented 60/55. At data point 2, crenulations oriented 235/20 with an axial plane oriented 145/25. These are possibly associated wtih mesoscopic folding at DMR-016. Schistocity at this location is oriented 230/75.





Left: View of potential rock slide/fall block from the south. Fractures highlighted in red similar to fracture 1 in the above photo. **Above:** View looking south at the potential rockfall block. 1. Fracture forming right face oblique to cut is approximately oriented 188/67. 2. Fracture forming bottom surface dipping out of slope is approximately oriented 355/38.

BRP DMR-015
Image Dates: 05/25/04, 05/27/04
Collection Date: 06/10/04

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

DMR-016

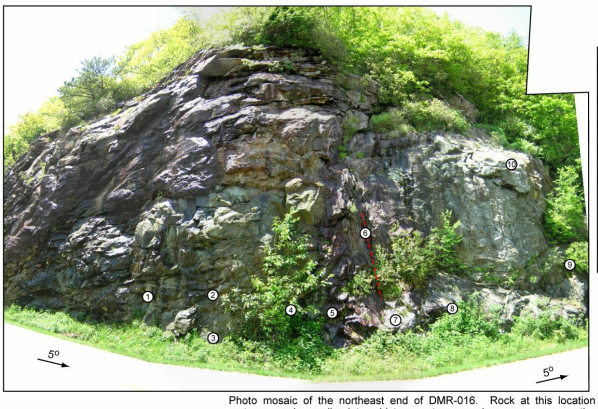
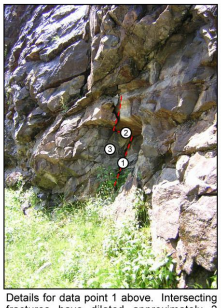
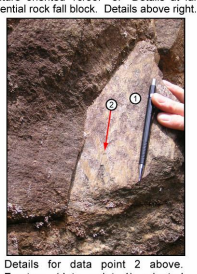


Photo mosaic of the northeast end of DMR-016. Rock at this location is primarily metagraywacke grading into schistose metagraywacke as you move southwest. 1. See details below left. 2. See details below. 3. Fracture forming face oriented 24/65. 4. Details below. 5. Details at right. 6. Schistose zone oriented 230/90. 7. Exfoliation fracture oriented 10/50. 8. Details at far right. 9. Foliation oriented 230/85. 10. Potential rock fall block. Details above right.

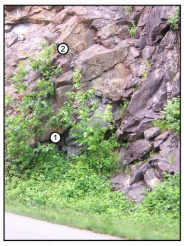
Details for data point 10 in photo mosaic at far left. **Left:** Large rock fall block (approximately 6ft x 4ft x 3ft). Dilated fracture is approximately oriented 292/90. Bottom sliding surface is an exfoliation fracture. Fracture forming right face is approximately oriented 15/37. **Above:** Photo of same rock fall block directly below it from the shoulder of the road.



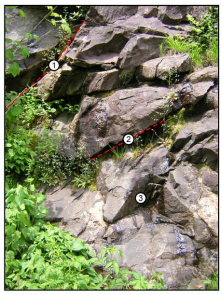
Details for data point 1 above. Intersecting fractures have dilated approximately 2 inches. 1. Fracture oriented 24/65. 2. Foliation oriented 200/30. 3. Fracture forming the face oriented 305/90.



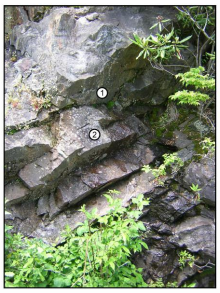
Details for data point 2 above. Fracture (data point 1) oriented 43/75 with slickenlines on surface oriented 170/60 (data point 2; Bearing and plunge indicated by arrow.).



Details for data point 4 above. Broad open fold. 1. Foliation on lower limb oriented 60/15. 2. Foliation on upper limb oriented 140/50.



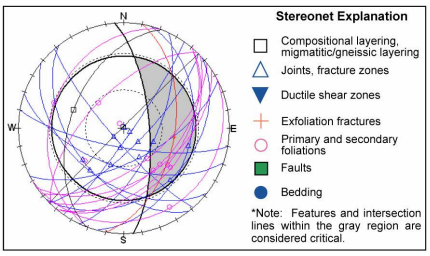
Details for data point 5 in photo mosaic. 1. Six inch wide fracture zone oriented 61/65. 2. Fracture with seepage oriented 48/35. 3. Fracture oriented 129/48.



Details for data point 8 in photo mosaic. Closely spaced fractures produce a stair-step appearance at the base of the slope. Fracture 1 is oriented 143/50. Fracture 2 is oriented 15/37.

Above: Photo mosaic of the southwestern end of DMR-016. Rock at this location is primarily schistose metagraywacke. 1. Fracture oriented 25/85. Primary foliation oriented 225/62. Secondary foliation oriented 40/42. Intersection lineation of the foliations is oriented 225/35. 2. Potential rock slide. See photo at right for details. 3. Secondary foliation oriented 52/60. Slickenlines on the surface of this feature are oriented 50/55. 4. Slickenlined fracture surface. See photo below left for details. 5. Compositional layering oriented 200/48. Secondary foliation oriented 40/45 with slickenlines oriented 150/33. Fracture cleavage oriented 100/75.

Close up of data point 4 from photo mosaic above. 1. Foliation surface oriented 45/50. 2. Slickenlines on the surface of the fracture face oriented 110/60.



Close up of data point 2 in photo mosaic at left. 1. Fracture approximately oriented 142/80. 2. Foliation dipping out of the slope approximately oriented 55/50.

BRP DMR-016
Image Dates: 05/25/04, 06/10/04
Collection Date: 06/10/04

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

DPR-001

Two, small, relatively recent debris slides in gullied channel just east of Grassy Gap Fire Road near the eastern boundary of the park. Structural measurements taken in the channel follow: fracture oriented 318/70; foliation/compositional layering 72/55. Debris slide on north side of channel (above left) is roughly 20 feet wide, 20 feet long, and 2 feet thick. Debris slide on south side of channel (above right) is roughly 30 feet wide, 20 feet long, and 3 feet thick. Residual soil is metagraywacke that has completely decomposed to tan silty sand interlayered with partially decomposed schist. Above this is a layer of colluvium roughly two feet thick on the south side and 8 feet thick on the north side. Colluvium is matrix supported, silty sand with subangular, gravel to cobble sized schist clasts.

BRP DPR-001
Image Date: 03/13/08
Collection Date: 03/13/08

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

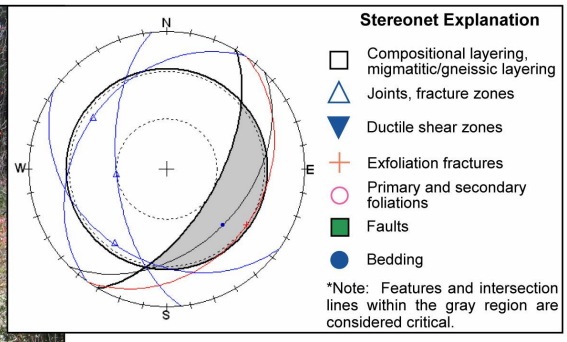
DPR-004

Phototraph of past active and potential rock slide area on the Grassy Gap Fire Road in Doughton Park. Structural details follow. 1. Foliation and compositional layering that forms sliding surface 50/40. 2. Back release fracture surface: 270/38. Other back release fracture surface not shown in photo: 212/77. 3. Lateral release fracture surfaces: 143/72, 335/88. Rock is stained state, schistose metagraywacke of the Alligator Back

BRP DPR-004 (Whitehead 7/5' quad. FN 200808130005)
Image Date: 08/13/08
Collection Date: 08/13/08

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

GFMR-001



Potential rock slide just southeast of Rough Ridge Overlook. Rock type is metasandstone of the Grandfather Mountain Formation. **Left:** View from the Parkway. Note large boulder perched at the top of the cut. Boulder is approximately 20 feet long. **Bottom Left:** View of upslope end of large boulder. Note the void space under in the rock indicating its instability. Measurements at this location follow: Exfoliation fracture oriented 35/30; bedding oriented 45/42 dips out of the slope. **Bottom Right:** View of other detached, potential rock fall boulders below and behind the main rock slide block. Measurements in this area follow: Fracture oriented 215/35; fracture oriented 175/60; fracture oriented 125/35.

BRP GFMR-001
Image Date: 10/25/06
Collection Date: 10/25/06

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

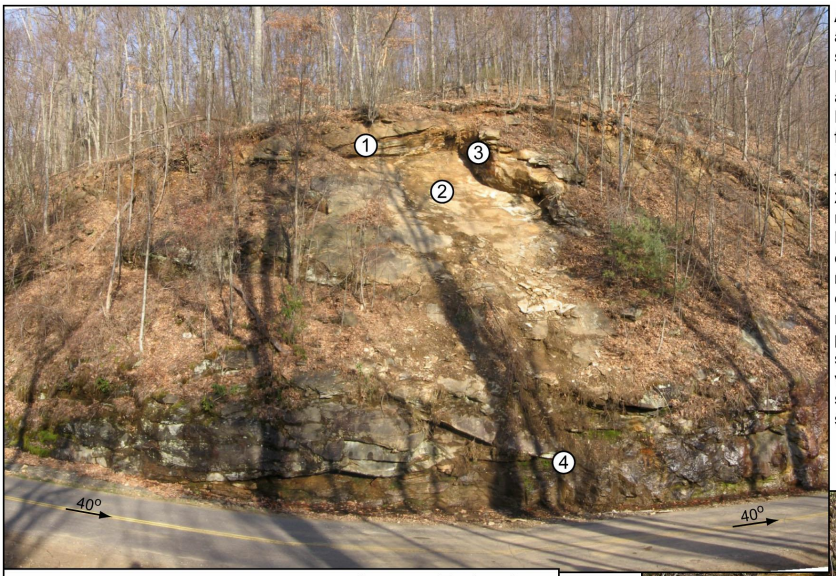
GFMR-003

Past Active - Potential rock fall area. Rock type is arkosic metasandstone of the Grandfather Mountain Formation. Foliation dipping into the cut slope creates overhang area susceptible to rock fall. Fifteen foot long boulder is present at this location from past rock fall activity.

GFMR-003 Image Date: 10/25/06

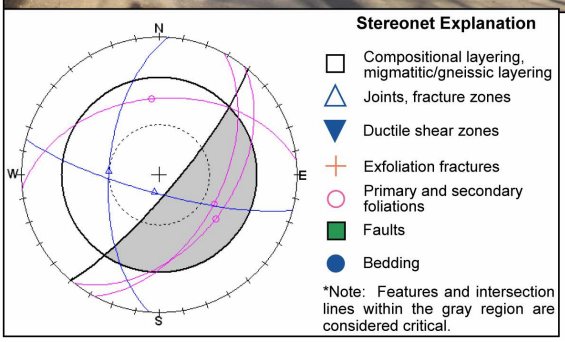
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

GSR-002



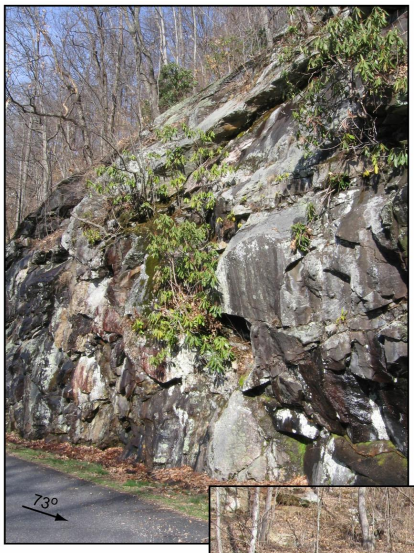
Above: Recent, active rock slide. Divots and scrape marks in road and apparent rock slide material pushed over embankment. Rock is a combination of granitoid, amphibolite, and schistose metagraywacke. Details include the following: 1. Fracture forming back release surface is oriented 185/60. 2. Foliation/compositional layering forms the sliding surface and is oriented 28/53. 3. Fracture forming the left lateral release surface is oriented 105/80. 4. Foliation dipping obliquely into the slope is oriented 264/44. Foliation in schistose metagraywacke oriented 38/47 is not shown on photo. **Right:** Outcrop adjacent to recent rock slide with yellow gypsum blooms possibly indicative of the presence of sulfides. However, primary sulfides not visible in schistose metagraywacke hand samples. There is slight potential for rock slide at this location.

BRP GSR-002
Image Date and Collection Date: 03/13/08



Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

GSR-003



Above left and above right: Potential rock slides along exfoliation fractures. Seepage observed along apparent exfoliation fracture(s). Right: Above: Red dashed line outlines potential rock slide block with seepage along exfoliation fracture at base . Potential debris slide in colluvial deposit between outcrops. Colluvium is roughly 3-5 feet thick and is principally comprised of silty gravel with boulders

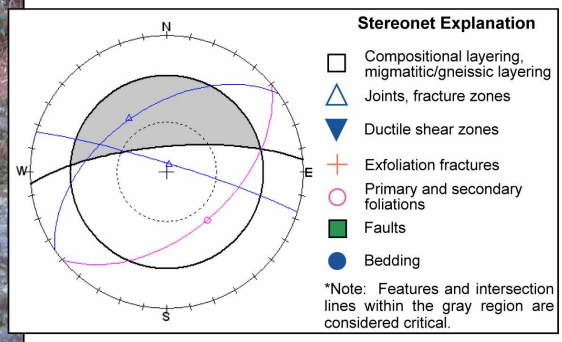
BRP GSR-003 Image Date: 03/13/08 Collection Date: 03/13/08

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

GVR-001

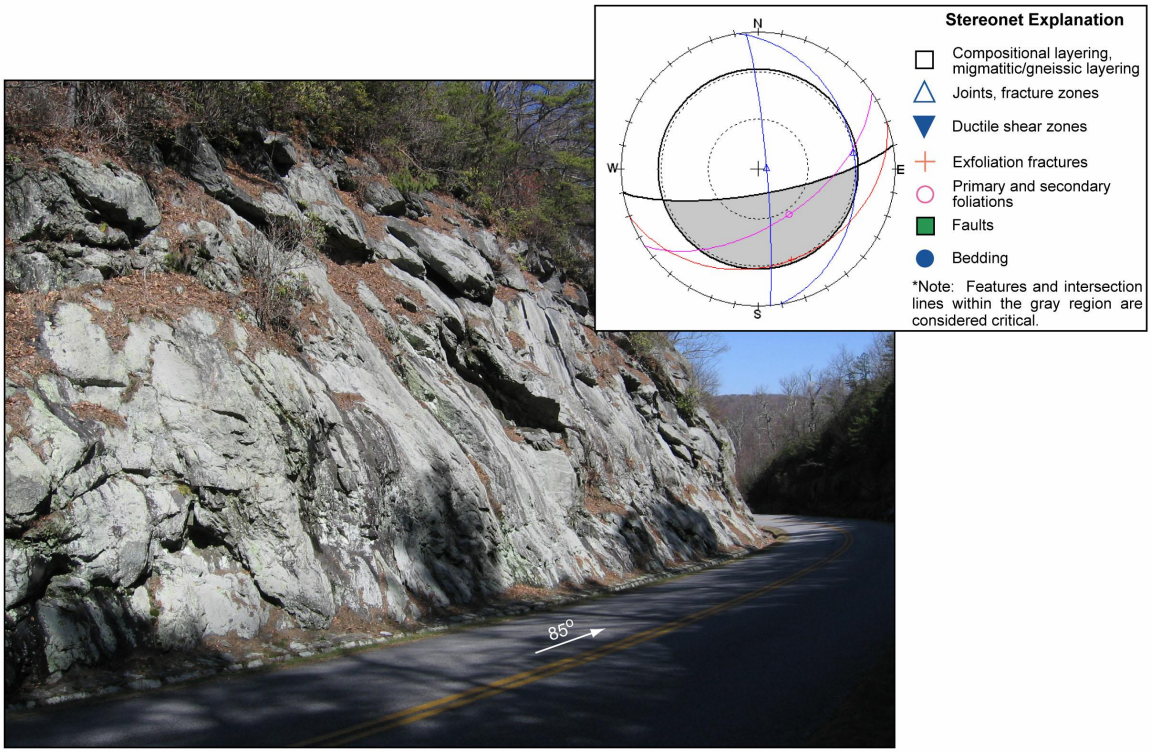
Right: Potential rock fall block near milepost 228. Rock is finely layered, biotite metagraywacke with thin layers of biotite, muscovite schist. Details include the following: 1. Foliation/ compositional layering that dips into the slope oriented 50/52. 2. Fracture forming the right release surface is oriented 235/50. 3. Fracture forming the left release surface is oriented 285/85. An intersection lineation was also measured with a bearing and plunge of 202/35. **Below:** Possible past wedge failure (rock slide) in the middle of the outcrop. Rock here is the same as that described above.

BRP GVR-001 Image Date: 03/12/08 Collection Date: 03/12/08



Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

GVR-005



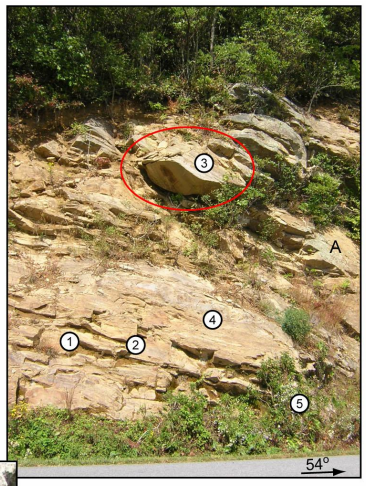
Potential rock slide in through cut. Rock is finely layered, biotite, muscovite, schistose metagraywacke (metagraywacke with fine schist laminae). The foliation/compositional layering is oriented 56/57 and dips out of the cut. A fracture oriented 350/85 forms the side release surface for rock slide slabs. An exfoliation fracture oriented 70/30 forms the potential sliding surface. A fracture oriented 350/30 was also measured. There is some rock fall potential on the south side of the through cut.

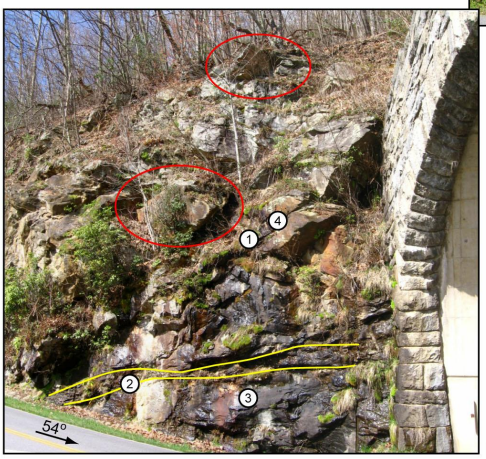
BRP GVR-005 Image Date: 03/12/08 Collection Date: 03/12/08

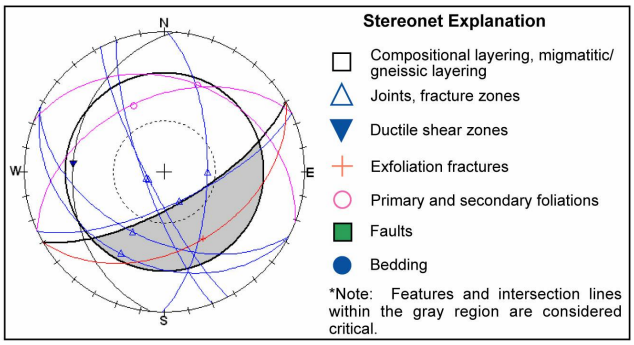
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

HZR-004

Long outcrop at the southeast portal of tunnel with several areas of potential rock fall. Rock is primarily migmatitic metagraywacke with mica schist (+ garnet) and calc-silicate. **Right and Far Right:** Pan of the slope at the southern end of the outcrop with potential rock fall blocks outlined in red (The letter "A" indicates the same location in each photo). Details follow: 1. Foliation oriented 291/34 forms overhangs and is the top release surface. 2. Fracture oriented 161/79. 3. Fracture (measured on right photo) oriented 63/71 approximates the front face of the potential rock fall block in photo at left. 4. Exfoliation fracture oriented 60/44 forms the back release surface. 5. Fracture oriented 157/80. **Below:** Potential rock fall blocks (outlined in red) at the southeast tunnel portal. Details follow: 1. Foliation/compositional layering oriented 245/47. 2. Shear zone (outlined in yellow) oriented 185/35. 3. Fracture oriented 0/65. 4. Fracture oriented 118/35-50.



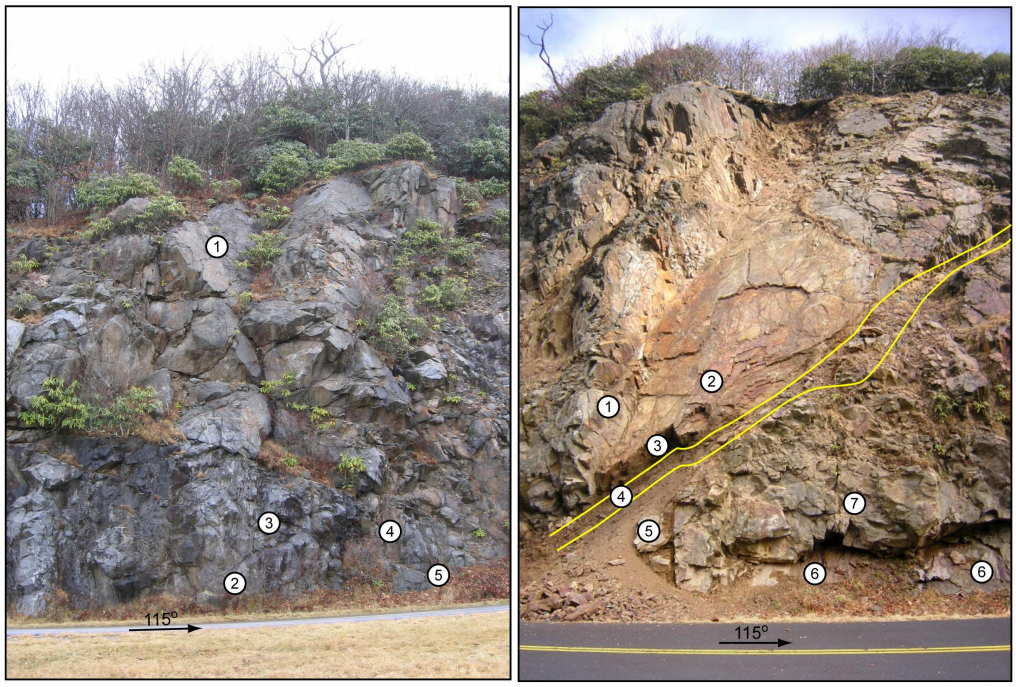




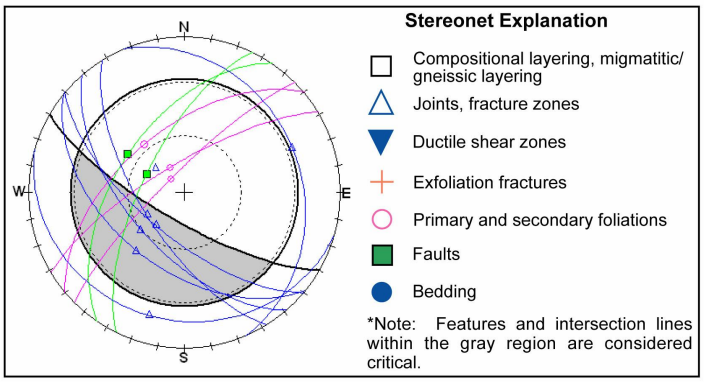
BRP HZR-004 Image Date: 09/27/05 Collection Date: 04/03/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

HZR-006



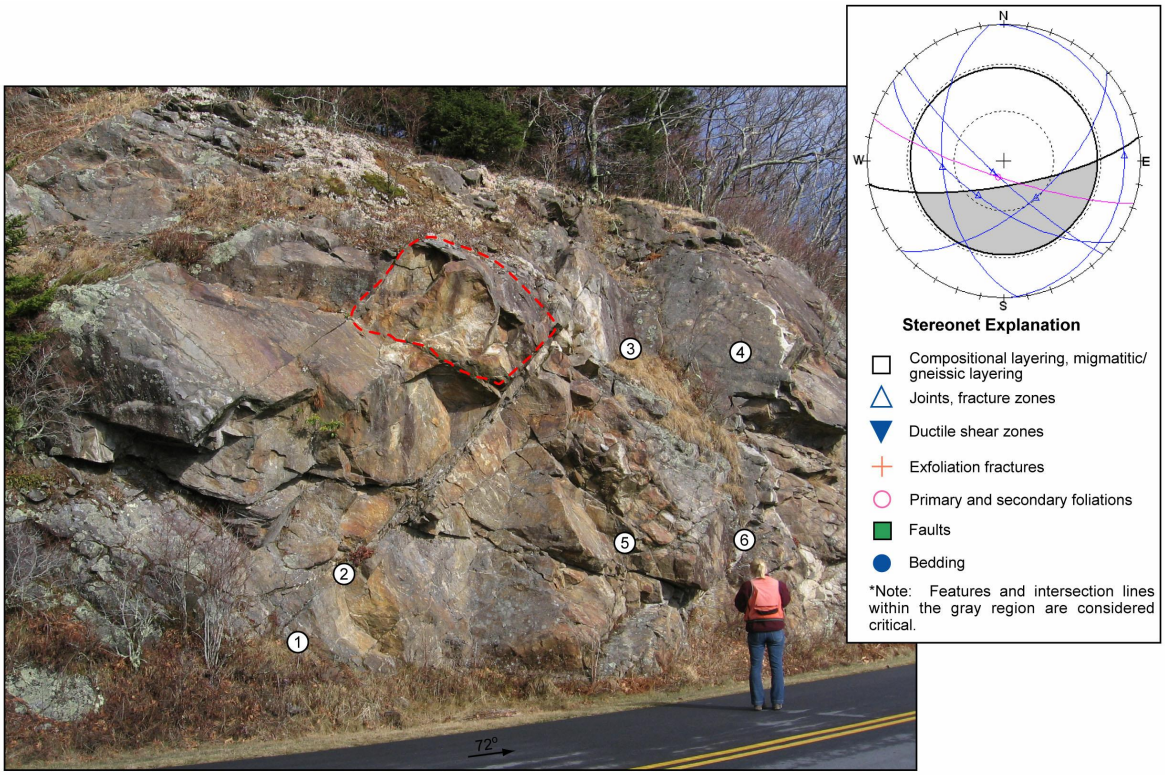
Left: Potential rock fall blocks at the northern end of the outcrop at HZR-006. Rock here is migmatitic biotite metagraywacke. Details follow: 1. Fracture approximately oriented 150/68 forms the side/back release surface. 2. Chlorite covered slip surface oriented 214/54; slickenlines bearing and plunge is 300/55. 3. Faint foliation oriented 240/75. 4. Tectonic slip surface oriented 206/68; slickenlines bearing and plunge is 305/65 and movement is normal. 5. Fracture dipping out of the slope is oriented 106/20; fracture dipping into the slope is oriented 337/26. **Right:** Active/Past active rock slide at the southern end of the outcrop. Details follow: 1. Foliation oriented 225/80. 2. Fracture oriented 132/68 forms the sliding surface. 3. Foliation/compositional layering oriented 230/57. 4. Completely decomposed zone of migmatitic, fine-grained, mica schist that conforms roughly to the orientation of foliation/compositional layering. 5. Fracture oriented 140/60. 6. Fracture oriented 130/50 forms the sliding surface; water flows out of the slope along this feature. 7. Fracture/slip surface oriented 222/70; bearing and plunge of slickenlines is 315/77.



BRP HZR-006 Image Date: 12/13/06 Collection Date: 04/03/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

HZR-008

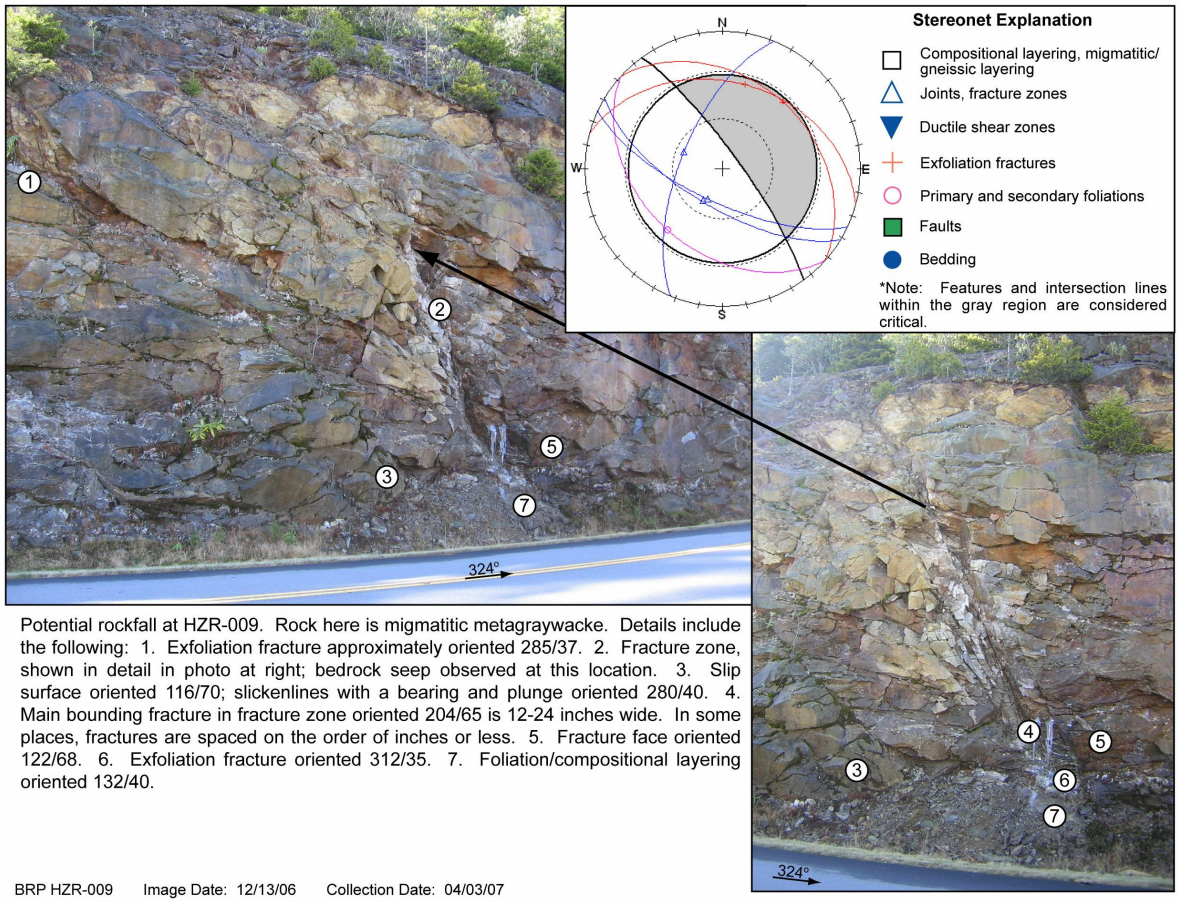


Potential rock fall (block outlined in red) in layered garnet, biotite, quartzo-feldspathic gneiss (possibly with silliminite). Details include the following: 1. Undulating foliation oriented 110/80 at this location. 2. Fracture zone oriented 175/53. 3. Fracture oriented 48/61 forms the right side of a possible, past wedge failure. 4. Fracture oriented 134/81 forms the left side of a possible, past wedge failure. 5. Fracture zone oriented 127/65. 6. Fracture oriented 357/13 is dilated approximately 2 inches.

BRP HZR-008 Image Date: 12/13/06 Collection Date: 12/13/06

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

HZR-009



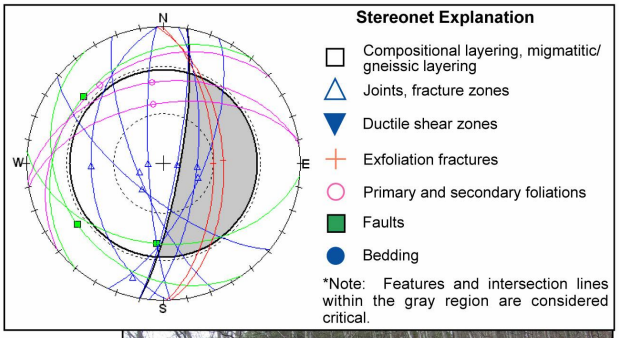
Potential rockfall at HZR-009. Rock here is migmatitic metagraywacke. Details include the following: 1. Exfoliation fracture approximately oriented 285/37. 2. Fracture zone, shown in detail in photo at right; bedrock seep observed at this location. 3. Slip surface oriented 116/70; slickenlines with a bearing and plunge oriented 280/40. 4. Main bounding fracture in fracture zone oriented 204/65 is 12-24 inches wide. In some places, fractures are spaced on the order of inches or less. 5. Fracture face oriented 122/68. 6. Exfoliation fracture oriented 312/35. 7. Foliation/compositional layering oriented 132/40.

BRP HZR-009 Image Date: 12/13/06 Collection Date: 04/03/07

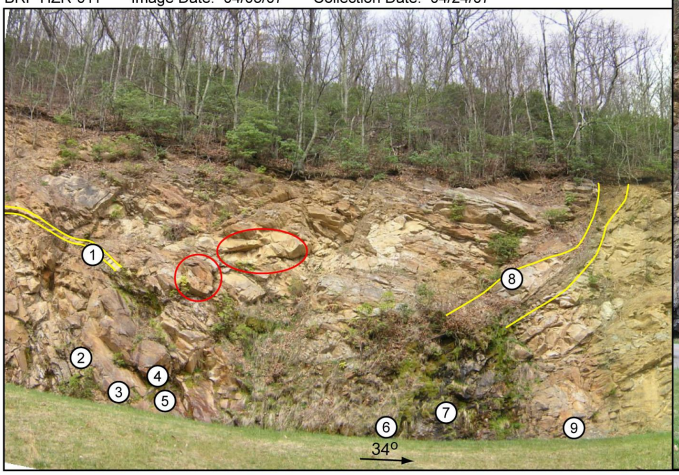
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

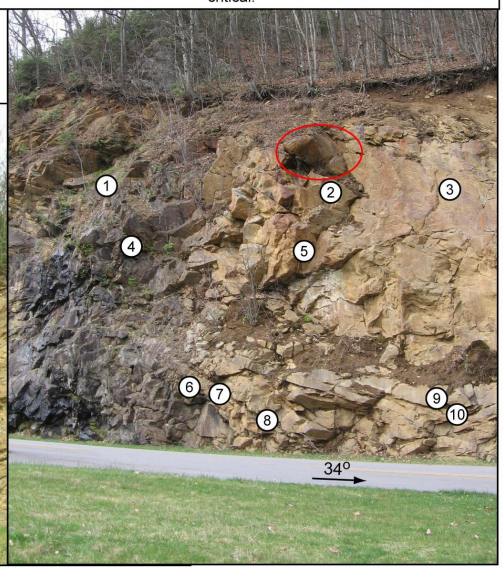
HZR-011

Below Right: Potential rock fall (block circled in red) at the southern end of the outcrop opposite of the Cove Field Ridge Overlook. Rock is primarily migmatitic, muscovite, biotite metagraywacke. Details follow: 1. Exfoliation fracture approximately oriented 0/60. 2. Fracture oriented 160/75. 3. Fracture oriented 5/70. 4. Seepage along foliation at this location. 5. Fracture oriented 130/70. 6. Foliation/compositional layering oriented 262/40. 7. Fracture oriented 22/68. 8. Biotite muscovite schist layer approximately 4-6 inches thick exposed here. 9. Fracture oriented 5/82. 10. Fracture oriented 105/15. **Below Left:** Potential rock fall (blocks circled in red) at the northern end of the outcrop opposite the Cove Field Ridge Overlook. Rock here is also migmatitic metagraywacke. Details follow: 1. Fault contact (outlined in yellow) oriented 220/25. 2. Foliation/compositional layering oriented 260/54 forms overhangs. 3. Fracture oriented 178/46 forms the side/top release for rock fall blocks. 4. Irregular fracture oriented 160/75 forms top release. 5. Exfoliation fracture oriented 357/54. 6. Fault contact oriented 145/24 with seepage. 7. Fracture oriented 180/81. 8. Fault contact (outlined in yellow) in metagraywacke oriented 95/41. 9. Foliation/compositional layering oriented 231/27.



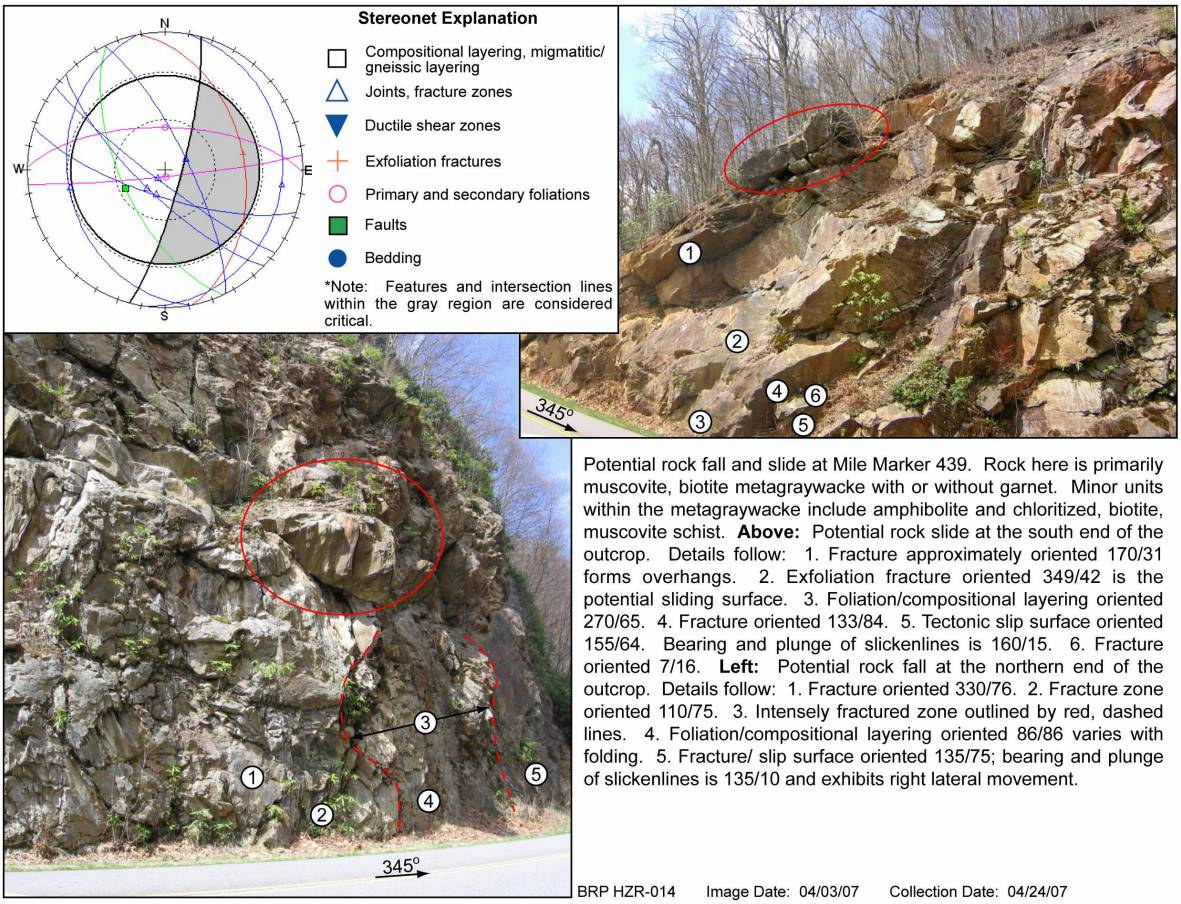
BRP HZR-011 Image Date: 04/03/07 Collection Date: 04/24/07





Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

HZR-014

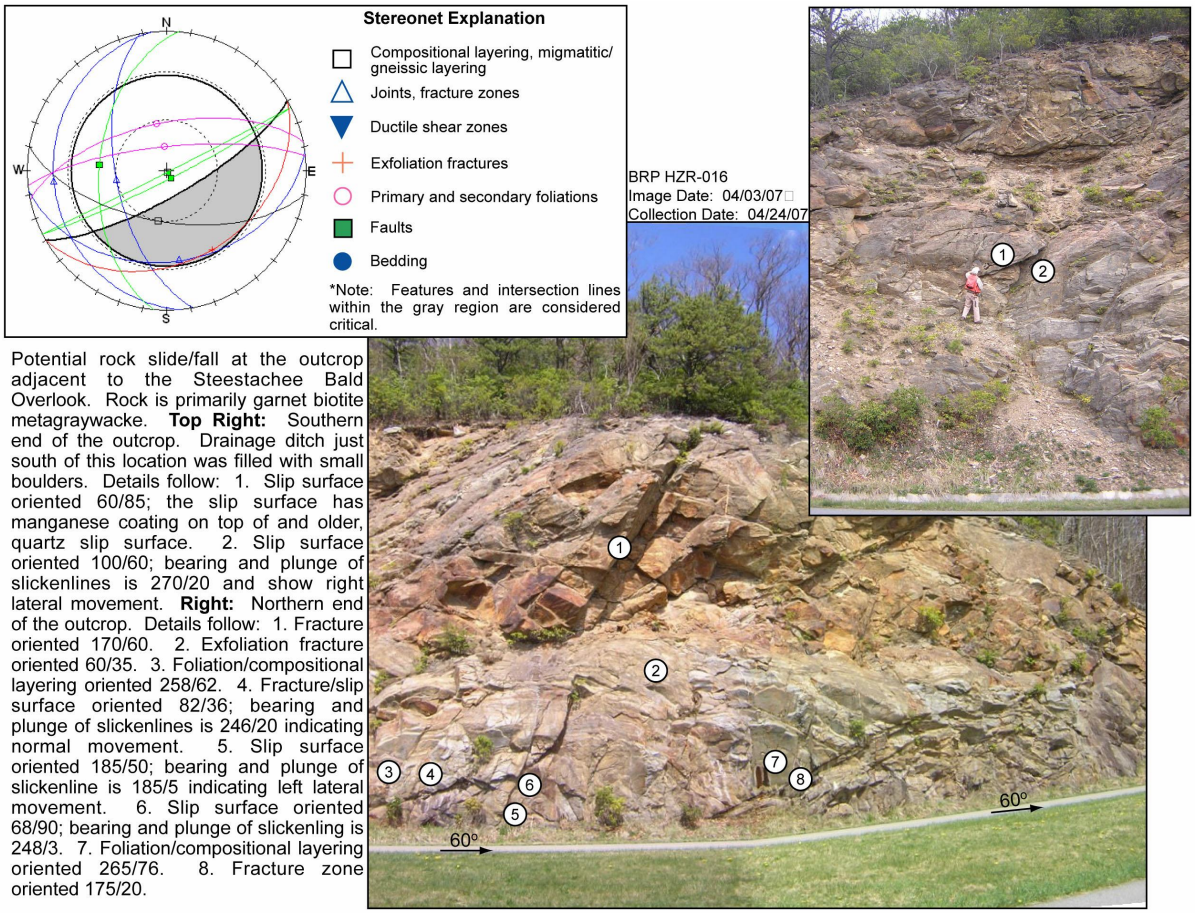


Potential rock fall and slide at Mile Marker 439. Rock here is primarily muscovite, biotite metagraywacke with or without garnet. Minor units within the metagraywacke include amphibolite and chloritized, biotite, muscovite schist. **Above:** Potential rock slide at the south end of the outcrop. Details follow: 1. Fracture approximately oriented 170/31 forms overhangs. 2. Exfoliation fracture oriented 349/42 is the potential sliding surface. 3. Foliation/compositional layering oriented 270/65. 4. Fracture oriented 133/84. 5. Tectonic slip surface oriented 155/64. Bearing and plunge of slickenlines is 160/15. 6. Fracture oriented 7/16. **Left:** Potential rock fall at the northern end of the outcrop. Details follow: 1. Fracture oriented 330/76. 2. Fracture zone oriented 110/75. 3. Intensely fractured zone outlined by red, dashed lines. 4. Foliation/compositional layering oriented 86/86 varies with folding. 5. Fracture/ slip surface oriented 135/75; bearing and plunge of slickenlines is 135/10 and exhibits right lateral movement.

BRP HZR-014 Image Date: 04/03/07 Collection Date: 04/24/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

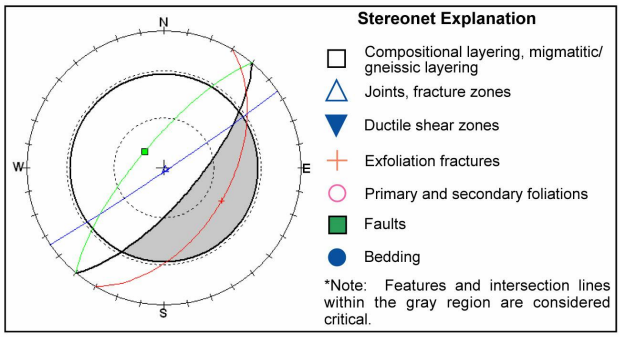
HZR-016



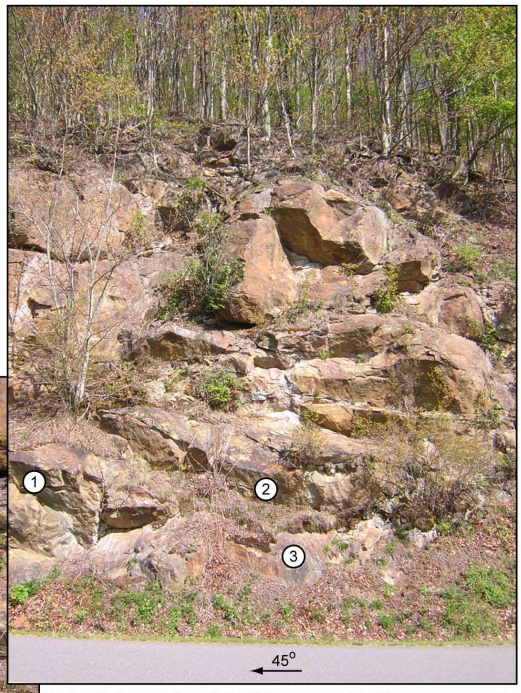
Potential rock slide/fall at the outcrop adjacent to the Steestachee Bald Overlook. Rock is primarily garnet biotite metagraywacke. **Top Right:** Southern end of the outcrop. Drainage ditch just south of this location was filled with small boulders. Details follow: 1. Slip surface oriented 60/85; the slip surface has manganese coating on top of and older, quartz slip surface. 2. Slip surface oriented 100/60; bearing and plunge of slickenlines is 270/20 and show right lateral movement. **Right:** Northern end of the outcrop. Details follow: 1. Fracture oriented 170/60. 2. Exfoliation fracture oriented 60/35. 3. Foliation/compositional layering oriented 258/62. 4. Fracture/slip surface oriented 82/36; bearing and plunge of slickenlines is 246/20 indicating normal movement. 5. Slip surface oriented 185/50; bearing and plunge of slickenline is 185/5 indicating left lateral movement. 6. Slip surface oriented 68/90; bearing and plunge of slickenling is 248/3. 7. Foliation/compositional layering oriented 265/76. 8. Fracture zone oriented 175/20.

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

HZR-025



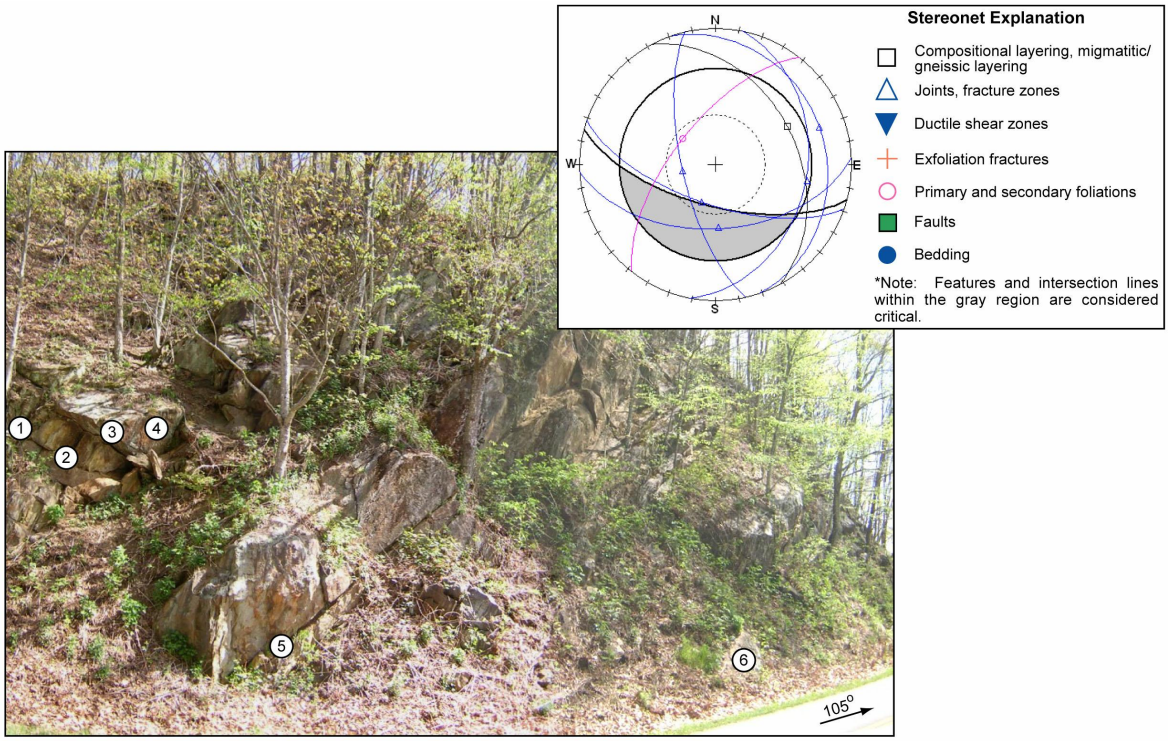
BRP HZR-025 Image Date: 05/10/07 Collection Date: 05/10/07



Potential rock fall/slide in biotite, muscovite metagraywacke interlayered with muscovite schist. Details include the following: Compositional layering oriented 250/60. 1. Fracture oriented 18/90 forms the back release surface. 2. Slip surface oriented 220/75; bearing and plunge of slickenlines is 32/42. 3. Exfoliation fracture oriented 30/50 forms the potential sliding surface; water is seeping out of the slope along this feature.

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

HZR-026

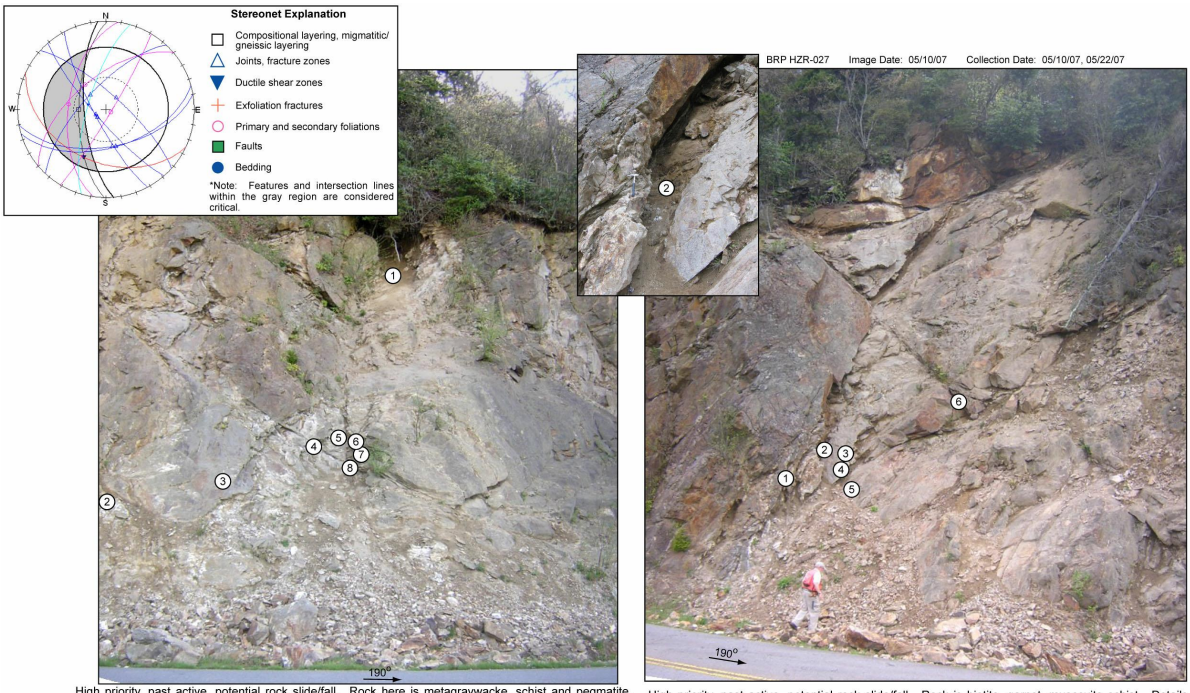


Potential rock fall in hairpin turn. Rock here is porphyroclastic, garnet, biotite, muscovite schist slightly sulfidic in places. Details include the following: 1. Fracture oriented 10/32 forms a potential sliding surface. 2. Fracture oriented 170/70. 3. Fracture oriented 340/20 forms an overhang. 4. Foliation/compositional layering oriented 218/65. 5. Completely decomposed zone oriented 332/40. 6. Fracture oriented 87/52. Fracture not on photograph is oriented 110/66 and dips into the road.

BRP HZR-026
Image Date: 05/10/07
Collection Date: 05/22/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

HZR-027

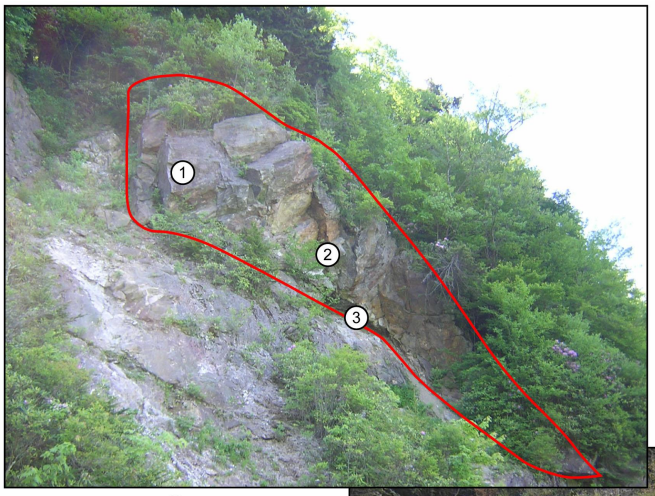


High priority, past active, potential rock slide/fall. Rock here is metagraywacke, schist and pegmatite. Details follow: 1. Fracture oriented 225/70 forms the left side of past active wedge failure. 2. Pegmatite contact oriented 170/85. 3. Foliation oriented 188/55. 4. Bearing and plunge of fold axis is oriented 200/28. 5. Fracture zone oriented 140/80. 6. Foliation/compositional layering oriented 25/85. 7. Fracture oriented 310/75. 8. Shear zone oriented 115/40 is 4 inches wide and shows normal, ductile movement.

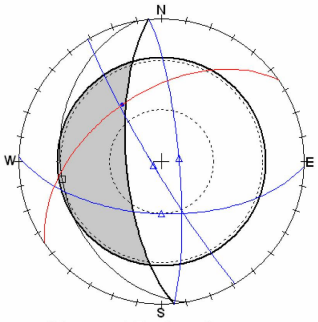
High priority, past active, potential rock slide/fall. Rock is biotite, garnet, muscovite schist. Details follow: 1. Bedding oriented 195/73. 2. One- to four-foot thick completely decomposed zone oriented 180/65; see inset photo at top of page. 3. Fracture set oriented 155/80. 4. Fracture oriented 80/56. 5. Foliation in schist oriented 230/60. 6. Fracture oriented 75/55.

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

HZR-028



Very large, potential rock slide block near Fork Ridge Overlook. Rock is migmatitic, schistose metagraywacke. Top photo is an oblique view of the rock slide block, and photo at right is view of rock slide block from across the road. Details include the following: 1. Fracture approximately oriented 350/80. 2. Fracture oriented 90/60. 3. Completely decomposed zone at the base of the rock slide block is approximately oriented 170/30. 4. Fracture oriented 155/85 forms the face of the rock slide block. Bedding, measured to the right of the photograph, is oriented 235/50.



Stereonet Explanation

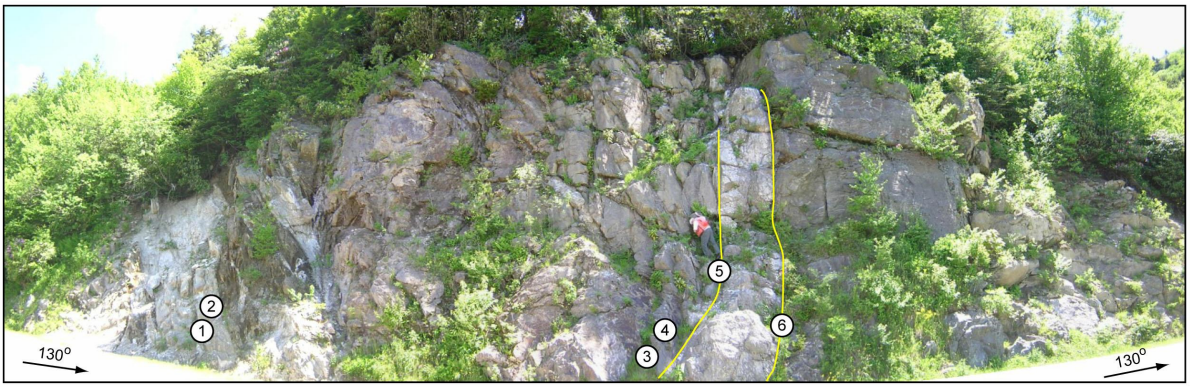
- Compositional layering, migmatitic/ gneissic layering
- Joints, fracture zones
- Ductile shear zones
- Exfoliation fractures
- Primary and secondary foliations
- Faults
- Bedding

*Note: Features and intersection lines within the gray region are considered critical.

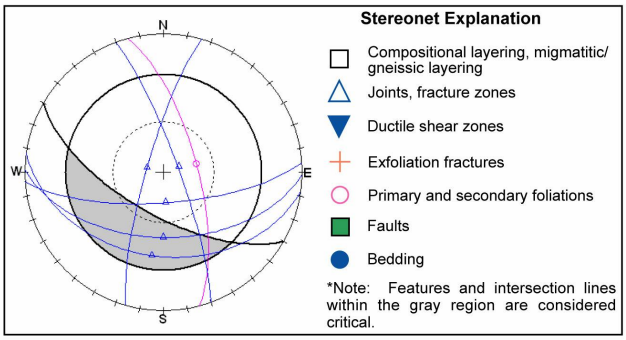
BRP HZR-028
Image Date: 06/17/05, 05/10/07
Collection Date: 05/10/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

HZR-029



Low priority, potential rock slide at the Fork Ridge Overlook. Rock is garnet, biotite muscovite schist and partially to completely decomposed pegmatite. Details include the following: 1. Foliation in pegmatite oriented 345/70. 2. Fracture oriented 98/40. 3. Fracture set oriented 337/80. 4. Fracture set oriented 86/73. 5. Pegmatite contact oriented 200/80. 6. Pegmatite contact oriented 180/52.



BRP HZR-029
Image Date: 06/17/05
Collection Date: 05/10/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

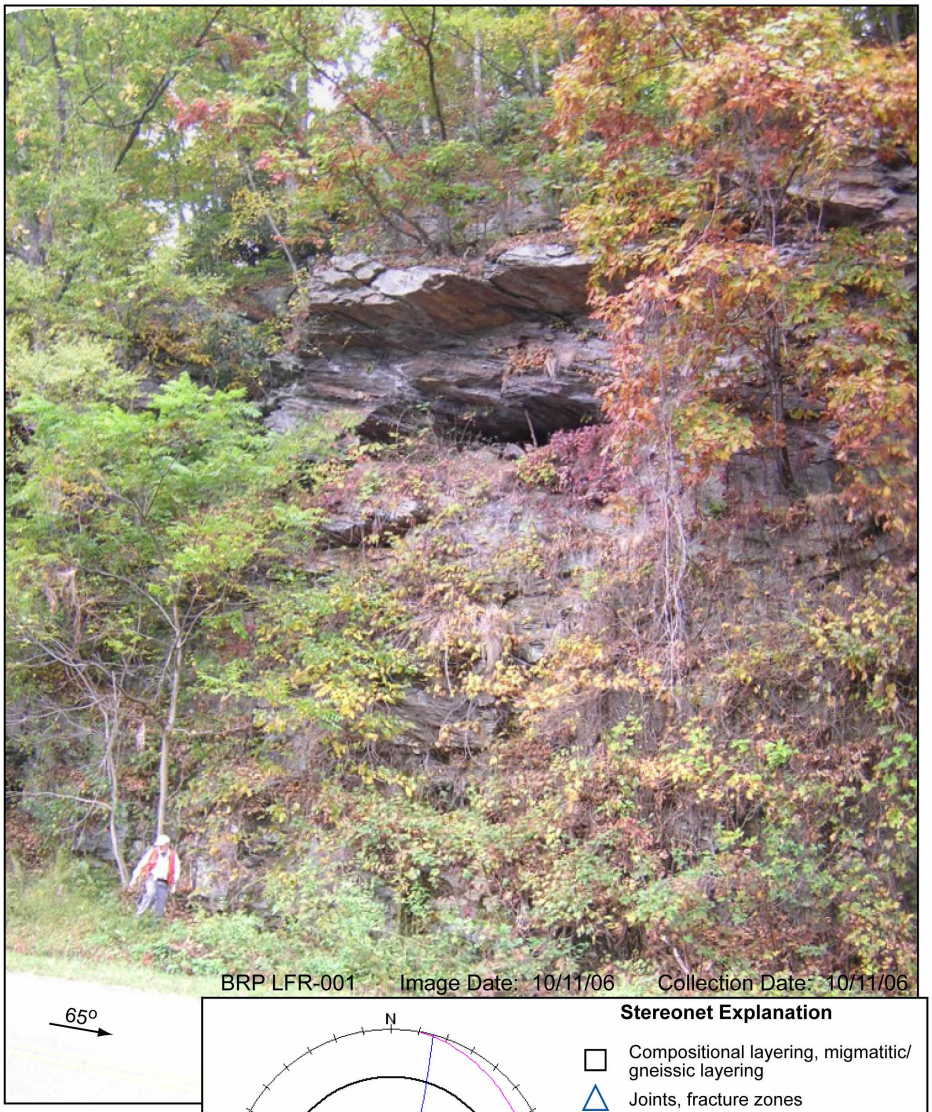
HZR-030

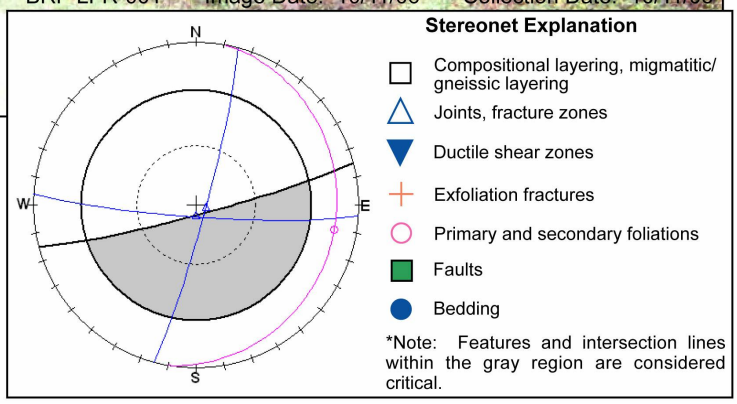
Rock Slide/Fall Potential along exfoliation joints dipping toward road.

BRP HZR-030 Image Date: 05/10/07 Collection Date: 05/10/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

LFR-001

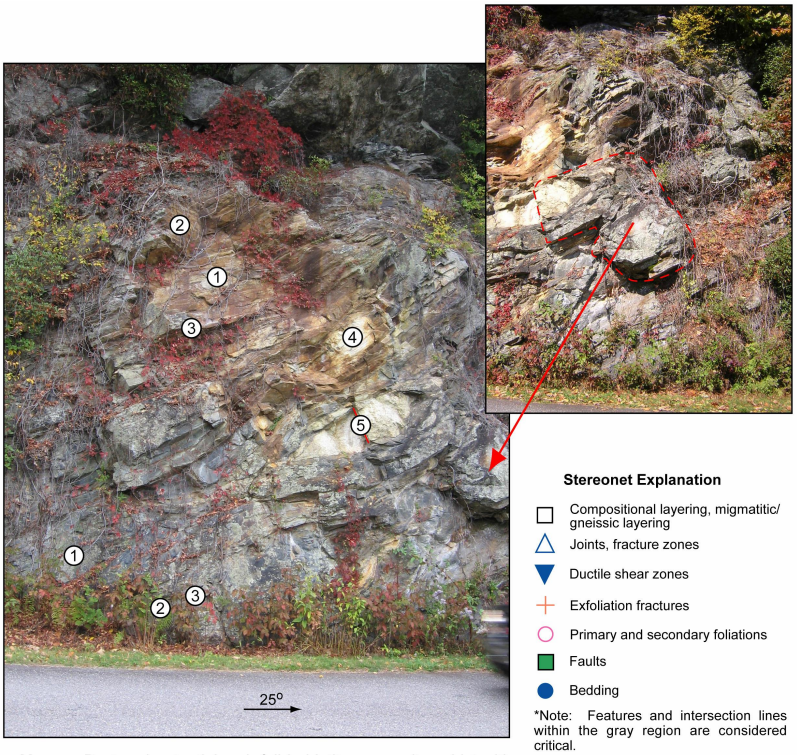




Potential rock fall in stained-state mylonitic muscovite schist and metagraywacke. Pertinent structural information follows: fracture oriented 10/85; foliation oriented 10/15; and fracture oriented approximately 90/85 (subparallel to the road).

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

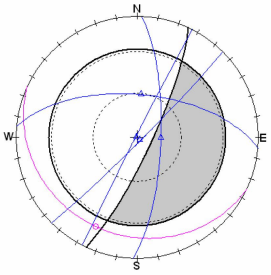
LFR-002



Stereonet Explanation

- Compositional layering, migmatitic/ gneissic layering
- Joints, fracture zones
- Ductile shear zones
- Exfoliation fractures
- Primary and secondary foliations
- Faults
- Bedding

*Note: Features and intersection lines within the gray region are considered critical.

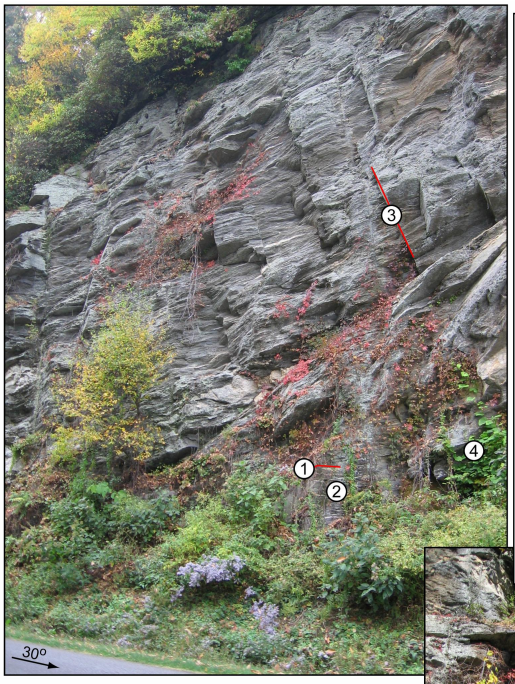


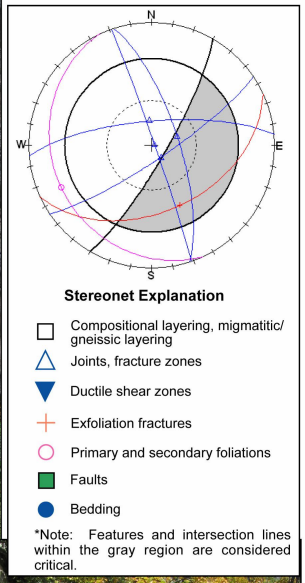
Above: Past and potential rock fall in biotite muscovite schist with minor metagraywacke. Details include the following: 1. Fracture roughly parallel to the cut face forming one of the back release surfaces oriented 26/88. 2. Fracture forming future right flank release surface oriented 359/74. 3. Foliation oriented 115/20 forms overhang/top release surface. 4. Fracture forming left flank release surface approximately oriented 245/90; it terminates at the boudin just below it. 5. Fracture cutting through boudin approximately oriented 275/60; this could be a release surface for future failure. **Right:** Up-close view of potential rock fall block (outlined in red).

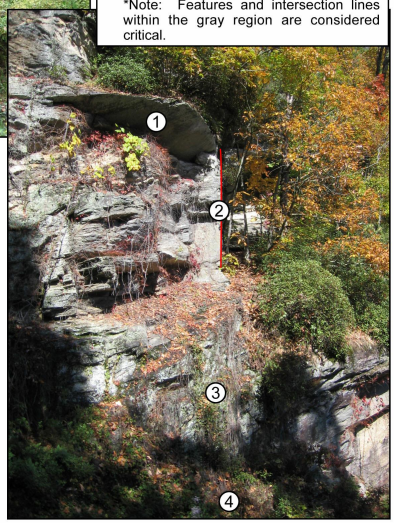
BRP LFR-002 Image Date: 10/11/06 Collection Date: 10/18/06

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

LFR-003







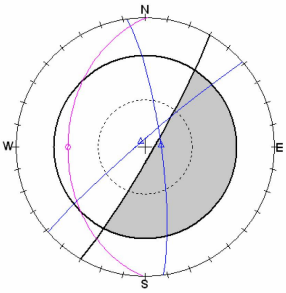
Above left: Potential rock fall in biotite muscovite schist with minor, locally migmatitic and pegmatitic metagraywacke and epidote, hornblende biotite schist. Details include the following: 1. Foliation oriented 155/20 forms overhangs. 2. Fracture oriented 340/72 forms the face. 3. Fracture forming right and left release surfaces oriented 265/73. 4. Detached rock block. See above right photograph. **Right:** Northeast end of outcrop with potential rock fall. Details include the following: 1. Foliation forms an overhang. 2. Fracture oriented 340/88. 3. Fracture face oriented 50/80. 4. Exfoliation fracture oriented 65/45.

BRP LFR-003
Image Dates: 10/11/06, 10/18/06
Collection Date: 10/18/06

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

LFR-004

Potential and past rock slide in biotite muscovite schist. Details include the following: 1. Fracture forming the right side of the wedge failure oriented 350/80. 2. Fracture forming the left side of the wedge failure oriented 235/85. 3. Foliation forming overhangs with rock fall potential oriented 180/40.



Stereonet Explanation

- Compositional layering, migmatitic/ gneissic layering
- Joints, fracture zones
- Ductile shear zones
- Exfoliation fractures
- Primary and secondary foliations
- Faults
- Bedding

*Note: Features and intersection lines within the gray region are considered critical.

BRP LFR-004
Image Date: 10/11/06
Collection Date: 10/18/06

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

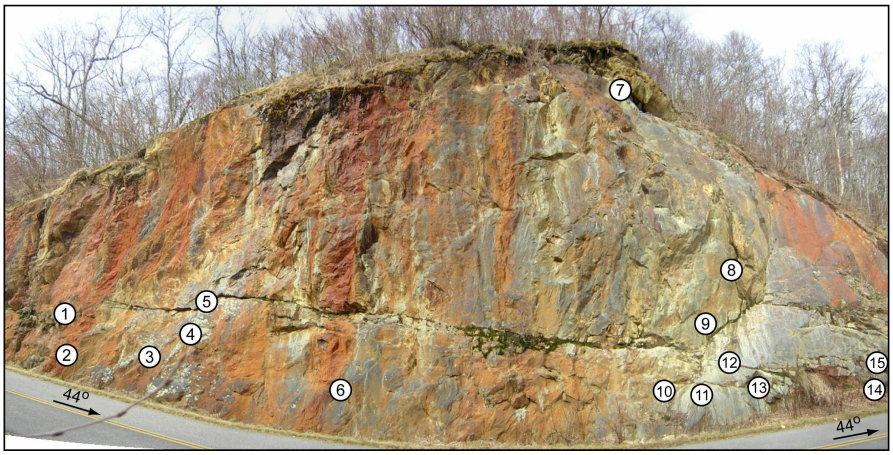
LFR-005

Details for embankment failure/debris flow at mile marker 322 (LFR-005) triggered by Hurricane Frances. Rock type downslope from the head scarp is protomylonitic micaceous metasandstone with medium grained biotite muscovite schist. Structural data at this location includes the following: foliation 42/13, mineral lineation on this foliation 135/13, fracture 330/88, and fracture 50/85. Downslope the rock is coarse to medium grained biotite muscovite schist that is more schistose, sulfidic, and weathered than rock upslope. Measurements include the following: compositional layering/foliation 196/12, fracture 335/80, and fracture 238/85. **A.** View looking downslope from the initiation point of the debris flow. Asphalt from the Parkway is seen in the lower right corner of the photograph. **B.** Imbricated older debris flow deposits exposed along the track downslope from the initiation zone. **C.** View looking down the debris flow track from the confluence with the main channel. **D.** View looking upslope from the same location shown in photograph C. Arrow points to guardrail that used to be located along the roadway. White circle is around person for scale. **E.** Large boulder (outlined in red) deposited by the debris flow weighing at least 80 tons. **F.** View of the debris flow track from Highway 221 in the North Cove area.

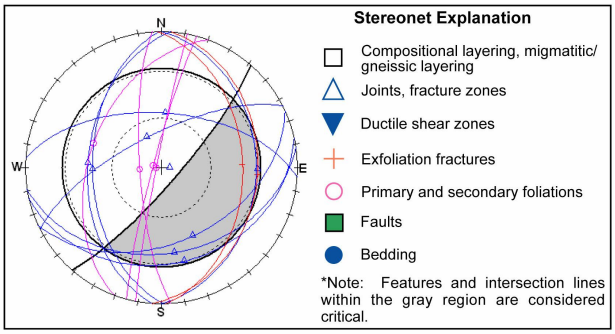
BRP LFR-005
Image Dates: 11/17/04, 01/06/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

MRR-001



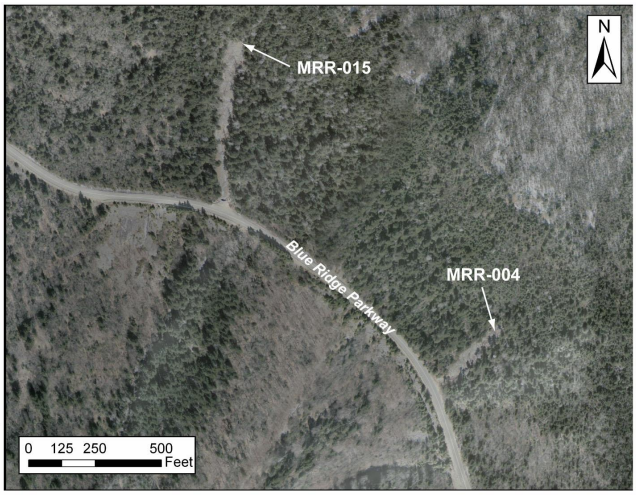
Potential rock slide-fall just northeast of the Glassmine Overlook. Rock here is sulfidic garnet biotite muscovite schist with sulfidic garnet schistose metagraywacke. Details include the following: 1. Fracture oriented 76/31. 2. Foliation oriented 180/87. 3. Fracture oriented 81/38. 4. Fracture oriented 245/69. 5. Fracture oriented 180/48. 6. Foliation oriented 176/77; Fracture oriented 274/56. 7. Fracture oriented 0/30 forms the sliding surface for a potential rock slide block. 8. Undulating, dilated fracture approximately oriented 350/85. 9. Foliation/ compositional layering oriented 195/85. 10. Fold with an axial plane oriented at 172/5 and an axis with a bearing and plunge of 08/5. 11. Fracture/slip surface oriented 65/45; bearing and plunge of slickenlines is 170/43; movement is normal. 12. Exfoliation fracture oriented 358/40. 13. Fracture oriented 185/45. 14. Secondary foliation oriented 200/46. 15. Exfoliation fracture oriented 4/30.



BRP MRR-001 Image Date: 01/11/05 Collection Date: 01/12/05

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

MRR-004



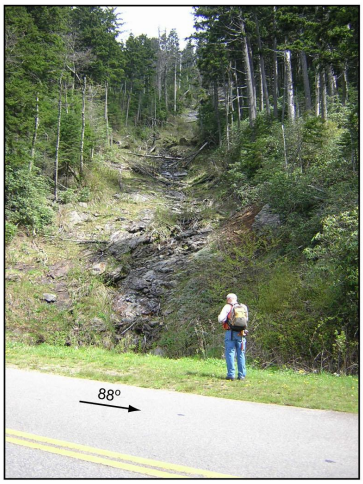
Above: View of initiation zone of debris flow at MRR-004 from the left flank of the debris flow track. Note exposed bedrock just below leaning trees. Thin soil layer (<1' thick) and trees appear to have been scoured from bedrock during rain events with the head scarp progressively moving upslope. Note person in circle for scale. **Right:** 2006 aerial photograph of MRR-004 debris flow track.

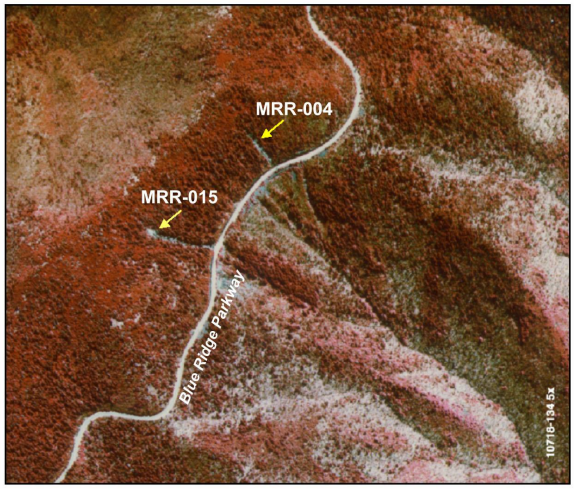
Left: View of left flank of debris flow track. Note large tree leaning along the margin. **Right:** Rock type is silliminite muscovite biotite schistose metagraywacke interstratified with metagraywacke. Note boudinage and folding.

BRP MRR-004 Image Date: 05/12/04 Collection Date: 05/12/04

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

MRR-015





Above Left: View from the Blue Ridge Parkway looking up the debris flow track of MRR-015 possibly triggered by Hurricane Opal in 1995.
Above Right: 1998 color infrared aerial photograph of the debris flow tracks.

Left: Bedrock at initiation zone consists of sillimanite, biotite, muscovite, schistose metagraywacke and gneissic meta-graywacke. Seeps are present along soil bedrock interface. Soil is organic, low plasticity silt less than 1.5 feet thick. **Right:** Along the right flank, material appears to be sloughing downslope most likely during rainfall events. Note tree tilted upslope indicative of soil creep.

BRP MRR-015
Image Date: 05/12/04
Collection Date: 05/12/04

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

MRR-021A/B

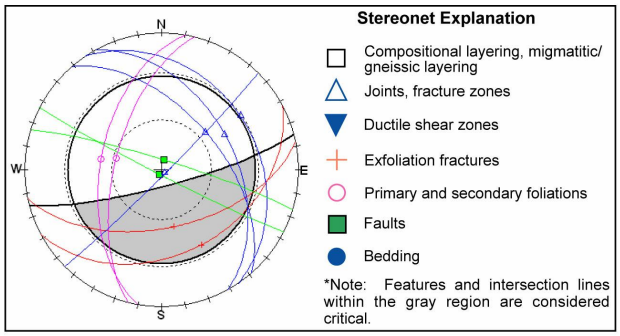
Details for past active/potential debris slide in colluvium above the road at MRR-021A. Material consists of colluvium/talus in a sandy silt matrix. Several boulders (indicated in the photograph above) on the slope are loose and could fall in the future.

Details for past debris flow/slide at MRR-021B. Bedrock is interlayered garnet schistose metagraywacke and metagraywacke overlain by talus and colluvium. Foliation is oriented 72/48. A seepage zone was observed at the head scarp in dark brown organic silty sand with cobbles and boulders.

BRP MRR-021 Image Date: 01/10/05 Collection Date: 01/10/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

MRR-023

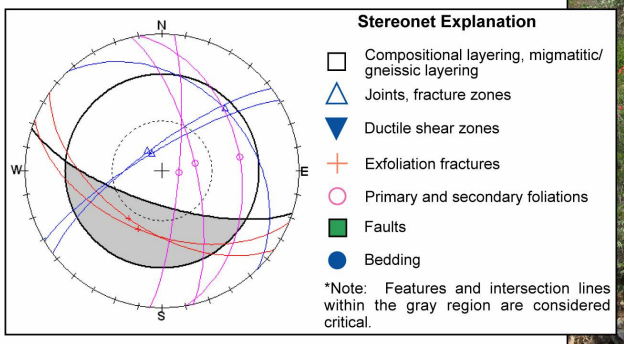


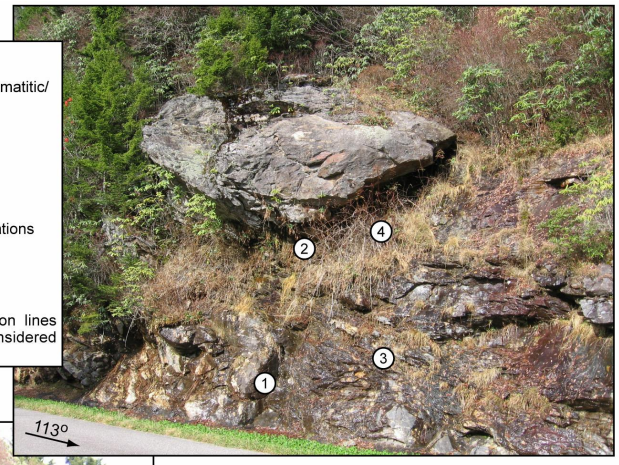
Potential rock fall (blocks outlined in red) at mile marker 357. Rock here is predominantly metagraywacke with subordinate amounts of calc-silicate, schistose meta-graywacke, and pegmatite. Details include the following: 1. Foliation just off the photograph oriented 190/53 forms the right release surface. 2. Slip surface oriented 283/84 with slickenlines oriented 270/40. Movement is normal. 3. Exfoliation fracture oriented 78/55 is the sliding surface. Water is flowing out of the slope along this feature. Dilation along the feature at base of rock fall block is approximately 7 inches. 4. Slip surface oriented 115/87 with slickenlines oriented 286/61; movement is normal. 5. Fracture oriented 319/55 forms top/left release surface. 6. Fracture approximately oriented 330/46 forms sliding surface. 7. Fracture oriented 325/30. 8. Exfoliation fracture oriented 62/38 creates overhangs. 9. Foliation oriented 194/62 also forms overhangs. 10. Fracture oriented 35/88.

BRP MRR-023 Image Date: 01/10/05 Collection Date: 11/01/06

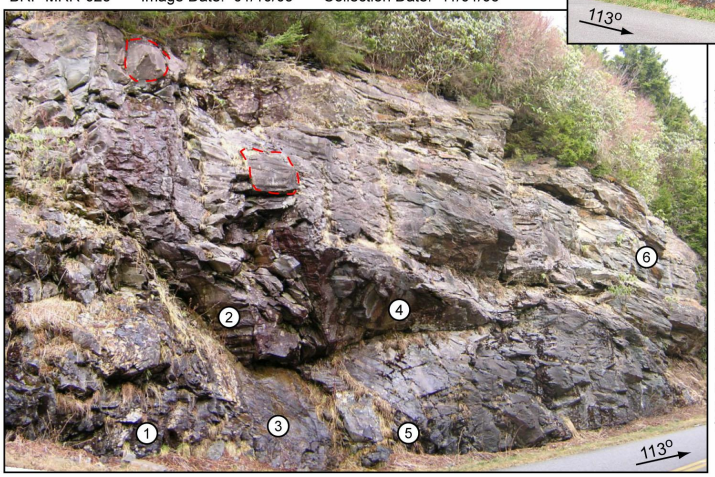
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

MRR-025





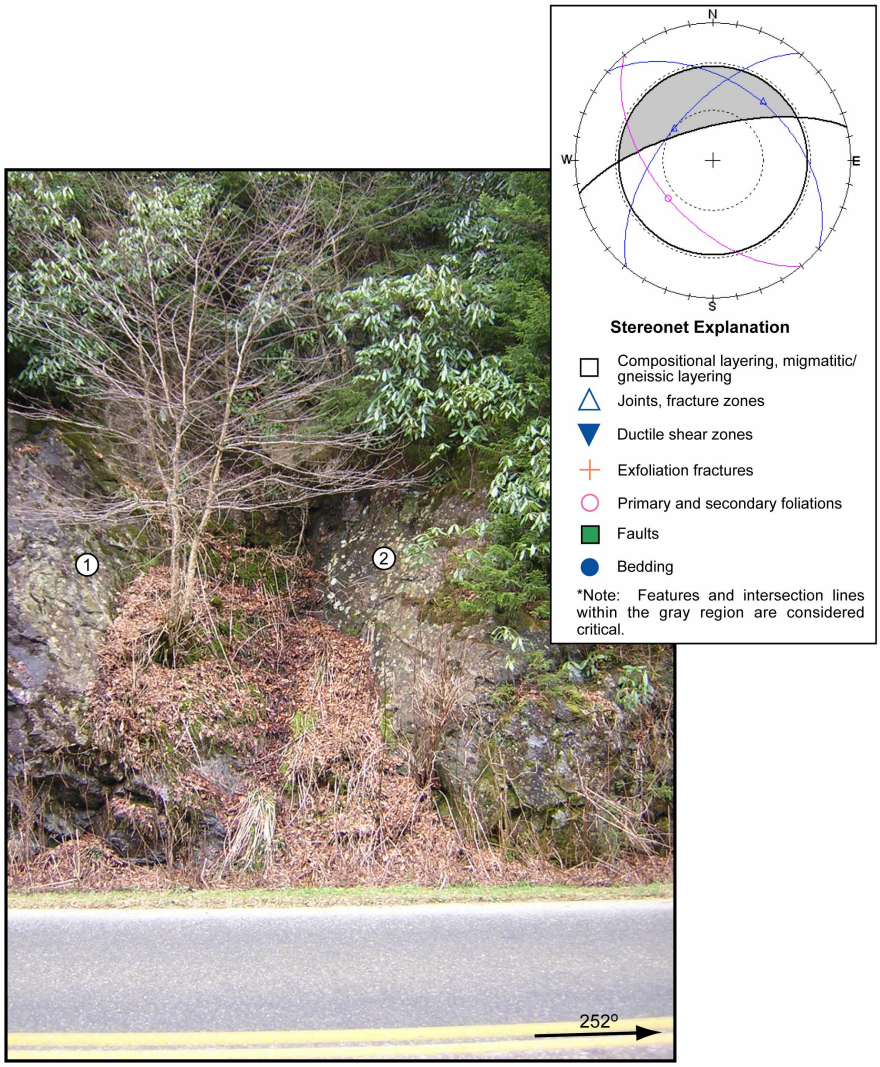
BRP MRR-025 Image Date: 01/10/05 Collection Date: 11/01/06



Above: Potential rock slide block at the northeast end of the outcrop. Rock here is predominantly muscovite, biotite metagraywacke. Details include the following: 1. Fracture face oriented 235/75. 2. Seepage through a partially decomposed weathered rock zone. 3. Foliation/ compositional layering is oriented 350/42 and is variable; this forms the overhang. 4. Exfoliation fracture approximately oriented 125/55 forms the sliding surface for the potential rock slide block. **Left:** Potential rock fall blocks (small blocks outlined in red) and large overhang (potential rock slide) in slightly migmatitic schistose metagraywacke. Details include the following: 1. Fold axial plane oriented 20/25; bearing and plunge of axis is oriented 340/22. 2. Foliation oriented 347/70 acts as a release surface. 3. Undulating exfoliation fracture oriented 112/52 forms the sliding surface. 4. Fracture possibly due to blasting oriented 315/35 forms overhang. 5. Folded and undulating foliation oriented 6/80. 6. Fracture oriented 240/78.

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

MRR-030

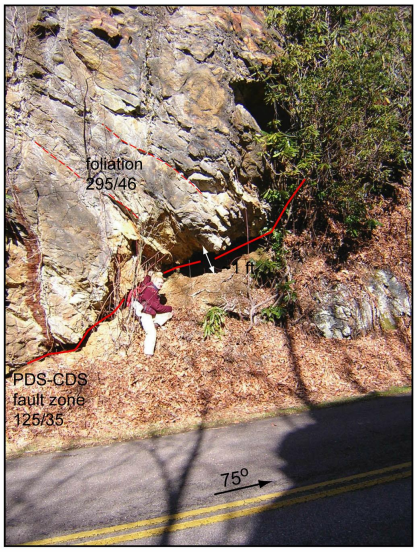


Details for past active/potential rock slide at MRR-030. Bedrock is biotite gneiss/metagraywacke with a foliation of 140/55. 1. Fracture forming the right side of the wedge failure is oriented 220/60. 2. Fracture forming the left side of the wedge failure is oriented 310/43.

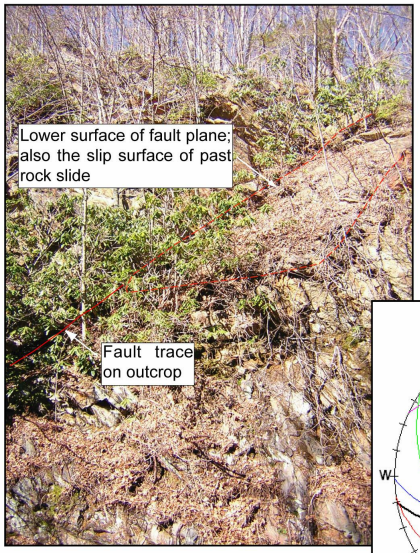
BRP MRR-030 Image Date: 01/11/05 Collection Date: 01/11/05

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

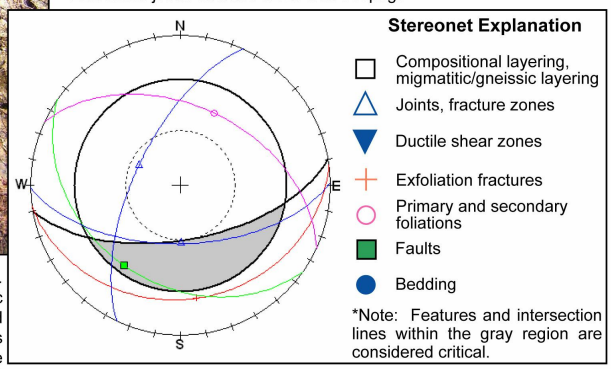
MRR-041



Exfoliation joints oriented 82/25 with seepage



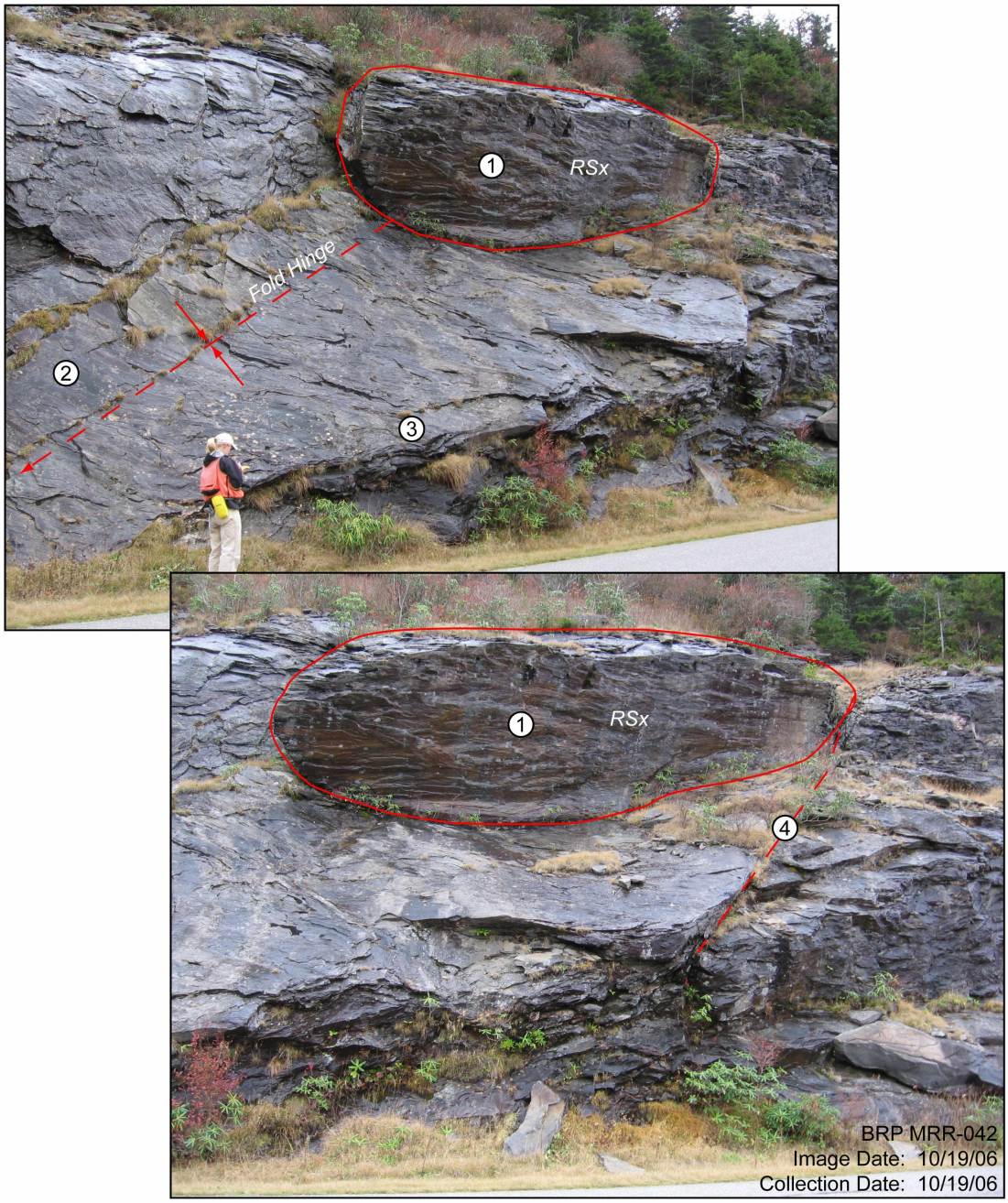
Past Active, Potential Rock Slide Area. Dominant lithology of exposure is migmatitic metagraywacke. Along the fault zone, aligned muscovite is present. Closely spaced fractures subparallel the fault zone. Other fracture measurements in outcrop include: 89/59 and 207/65.



BRP CPR-077 Image Date: 01/16/04 Collection Date: 01/16/04

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

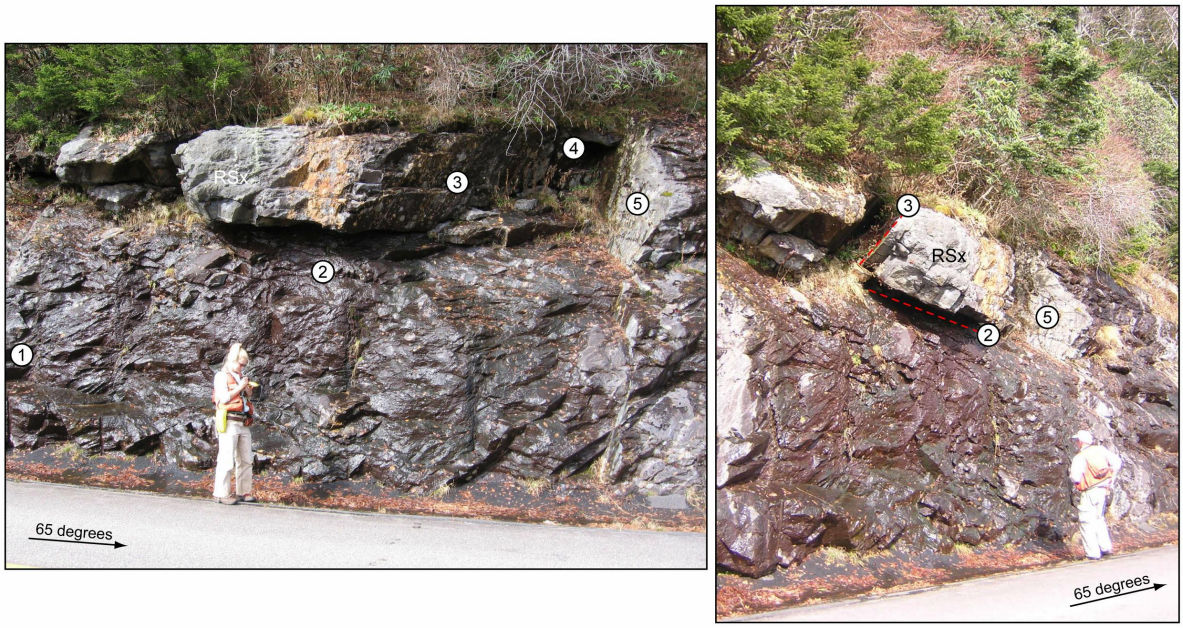
MRR-042



Large potential rock slide (block outlined in red) in slightly migmatitic metagraywacke and schistose metagraywacke. Details include the following: 1. Front face of rock slide block approximately oriented at 349/61. 2. Foliation on upper limb of fold at 156/60 forms back release surface. 3. Foliation on lower limb of fold at 175/37 forms sliding surface. 4. Fracture forming side release surface oriented 278/90.

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

MRR-043

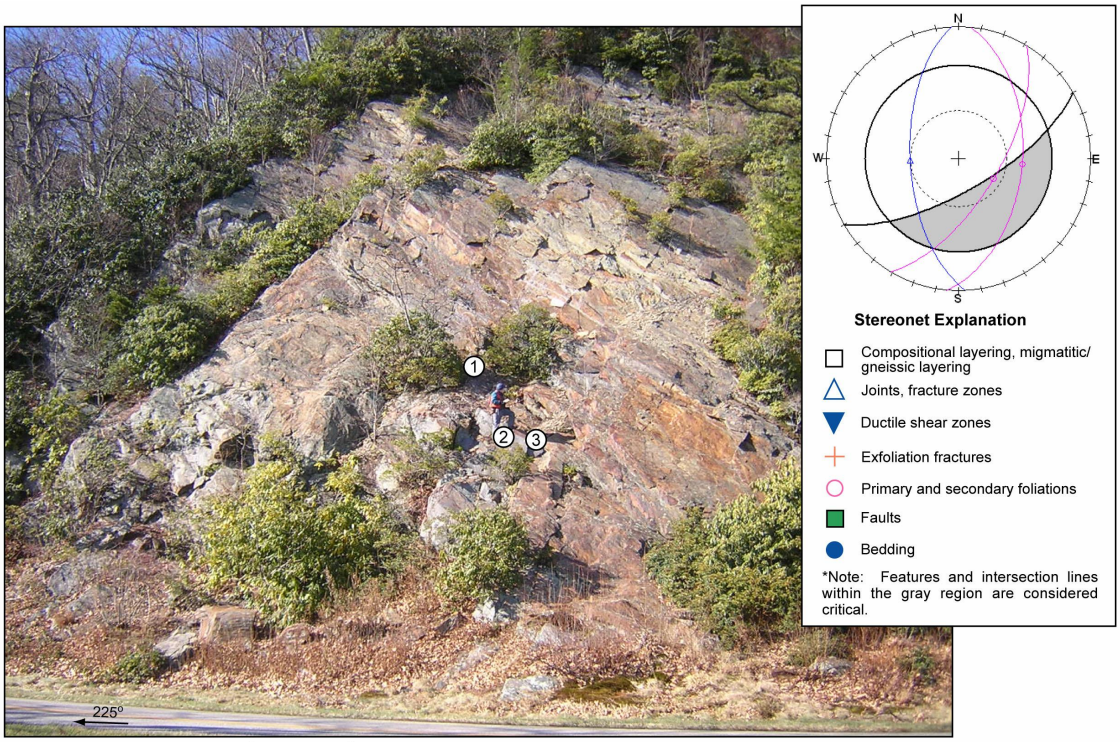


Two different views of a potential rock slide block (labeled RSx) just east of MRR-023. Photo at left shows a head on view of the potential failure block; photo at right shows an oblique view of the same block taken from the west end of the outcrop. Rock here is predominantly metagraywacke with subordinate amounts of calc-silicate, schistose metagraywacke, and pegmatite. Details include the following (selected features are outlined in red): 1. Fracture/slip surface oriented 132/62; slickenlines on surface have a bearing and plunge of 218/60. 2. Exfoliation fracture oriented 60/28 forms the sliding surface; water is seeping out of the slope along this fracture. 3. Foliation oriented 36/45 forms the side release surfaces. In photo at top right, the highlighted foliation is dilated approximately 18 inches. 4. Dilated fracture behind potential rock slide block is oriented 116/82. 5. Fracture oriented 315/72. The outcrop extends approximately 300 feet to the northeast from this location, and there is the potential for small rock fall to occur along the entire length of the outcrop.

BRP MRR-043
Image Date: 11/01/06
Collection Date: 11/01/06

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

OFR-003

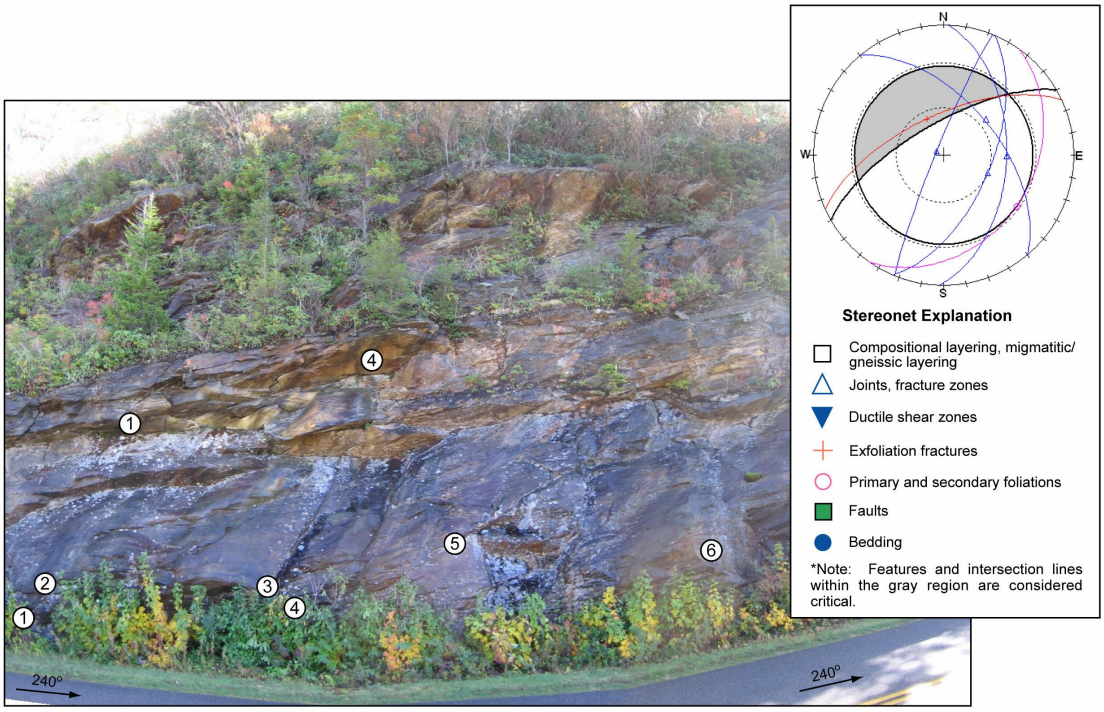


Potential rock slide in cut at Greenknob Overlook. Rock here is medium-grained metagraywacke interlayered with sulfidic muscovite biotite schist. Details include the following: 1. Secondary foliation oriented 30/65 is the potential sliding surface. 2. Fracture oriented 178/60 is the top release surface for rock slide blocks. 3. Primary foliation oriented 5/50 is the secondary sliding surface.

BRP OFR-003 Image Date: 11/21/06 Collection Date: 11/21/06

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

OFR-004

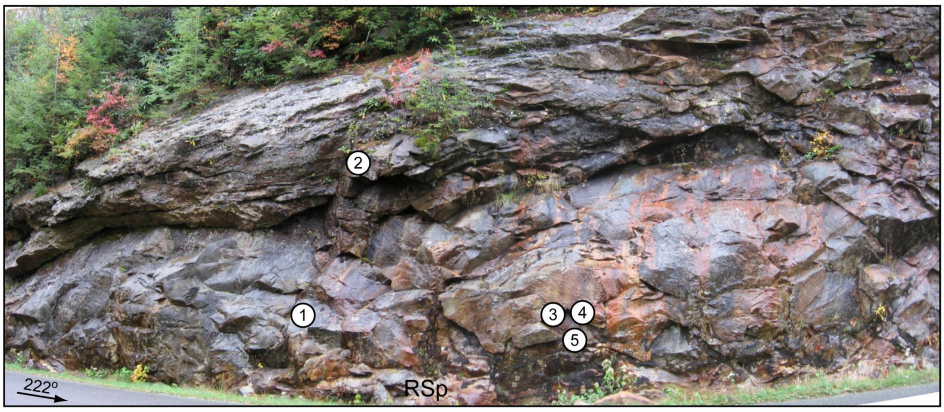


Potential rock slide-fall in finely laminated metasandstone with biotite muscovite layers. Details include the following: 1. Fracture oriented 22/60 forms the side release for potential rock fall blocks. 2. Exfoliation fracture oriented 245/65 is the potential sliding surface. 3. Fracture oriented 320/55. 4. Foliation oriented 35/32 forms the top release surface and the base of overhanging rock blocks. 5. Fracture oriented 1/50. 6. Fracture oriented 210/85.

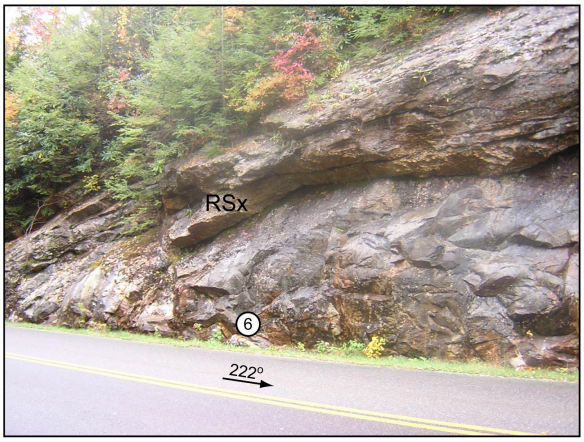
BRP OFR-004 Image Date: 10/18/2006 Collection Date: 10/26/2006

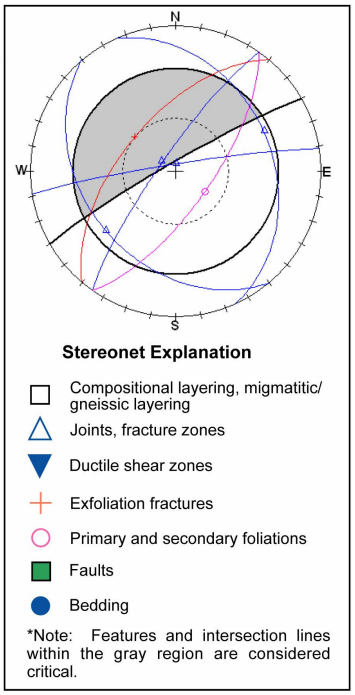
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

OFR-005



Potential (indicated by RSx) and past active (indicated by RSp) rock slide in garnet metagraywacke and pegmatite. Rock transitions into schistose metagraywacke and then to schist toward the east (off the left edge of the bottom photograph). Details include the following: 1. Exfoliation fracture oriented 220/60 is the sliding surface; this fracture is dilated as much as 3-4 inches. 2. Fracture oriented 285/85 is a side release surface. 3. Fracture oriented 335/33. 4. Fracture oriented 140/38; this fracture is conjugate with the fracture at data point 3. 5. Fracture oriented 220/80. 6. Foliation oriented 35/70 forms overhang.

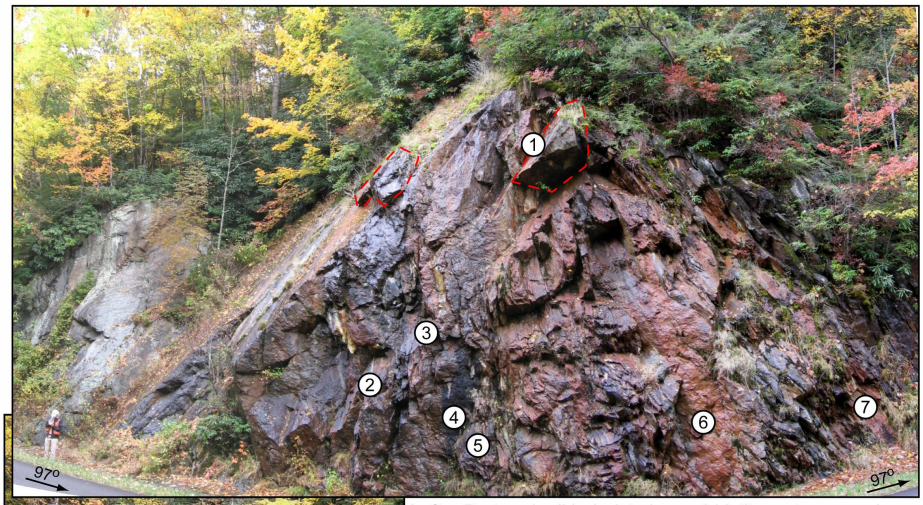


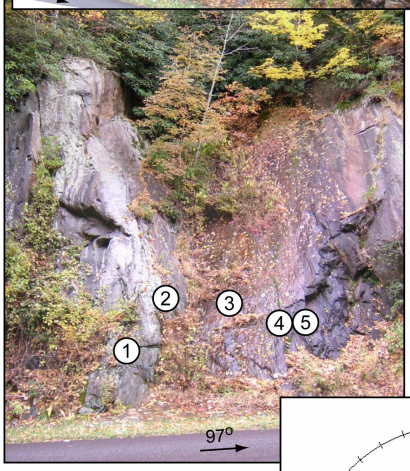


BRP OFR-005 Image Date: 10/19/06 Collection Date: 11/21/06

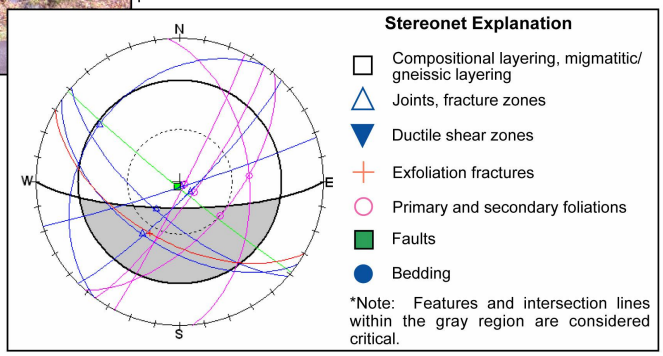
Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

OFR-006





Left: Past rock slide in interlayered biotite metagraywacke and biotite muscovite schist. Details include the following: 1. Fracture oriented 216/32 forms overhangs. 2. Undulating foliation approximately oriented 27/87 forms the right side of the past wedge failure. 3. Fracture oriented 126/54 forms the left side of the past wedge failure. Water was observed flowing along this fracture. 4. Foliation oriented 35/80. 5. Fracture slightly oblique to foliation is oriented 40/82. **Above:** Potential rock slide and rock fall blocks in schist dominated interlayered biotite muscovite schist and biotite metagraywacke. Details include the following: 1. Fracture oriented 126/54 forms the sliding surface for potential rock slide blocks. 2. Fracture oriented 132/70. 3. Exfoliation fracture oriented 120/56 acts as a potential sliding surface. 4. Fracture oriented 60/88. 5. Foliation oriented 40/60. 6. Slip surface oriented 120/87 with slickenlines oriented 300/22. Movement is left lateral. 7. Foliation in graphitic muscovite schist is oriented 355/50. Gypsum crystals were observed indicating the presence of sulfides.



BRP OFR-006
Image Date: 10/19/06
Collection Date: 10/26/06

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

OFR-007

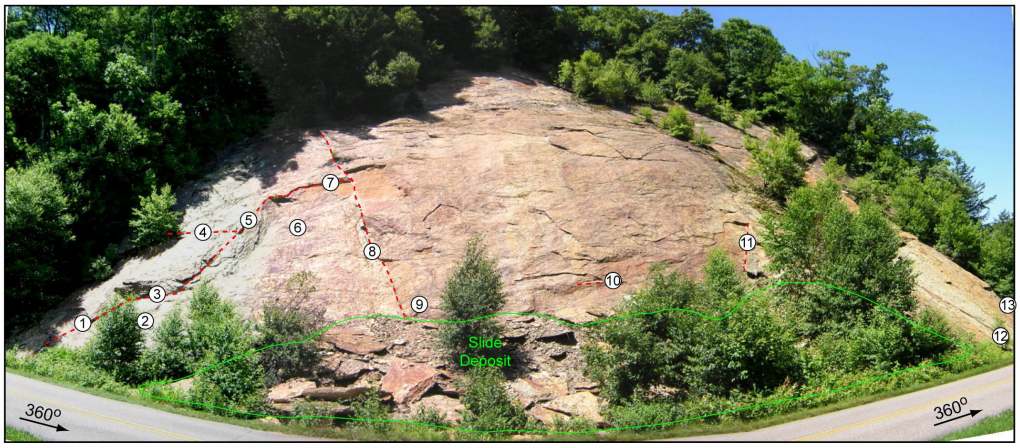
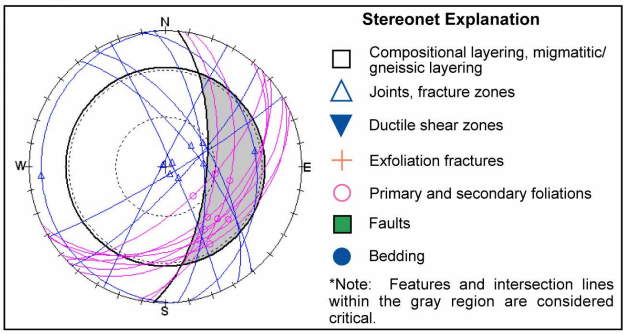


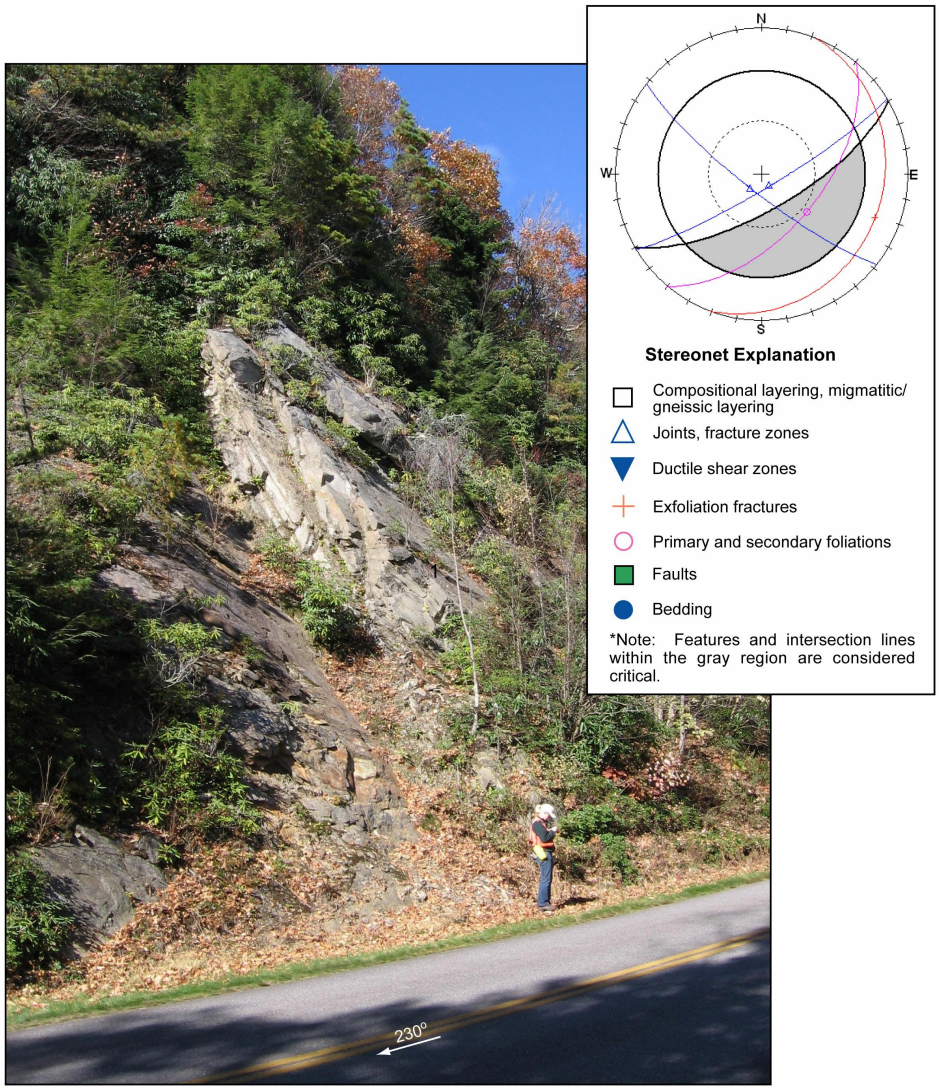
Photo mosaic of dip slope failure at OFR-007. Rock is garnet biotite muscovite "button" schist that is moderately sulfidic. Slide deposit is outlined in green. 1. Secondary foliation oriented 12/50 forms the right flank of the smaller wedge that has failed. 2. Primary foliation forming the dip slope and slip surface is oriented 60/35. 3. Fracture oriented 40/80 forms the back release surface for rock slide blocks. Slickenlines on the surface are oriented 178/32. 4. Fracture oriented 222/88. 5. Secondary foliation oriented 8/60 forms the right flank of the larger missing wedge. 6. Primary foliation forming the slip surface is oriented 65/40 with slickenlines oriented 185/42. 7. Fracture forming the back release surface is oriented 55/85. 8. Fracture oriented 320/70. 9. Foliation forming the slip surface is oriented 45/45. 10. Secondary foliation forming the back release surface for rock slide blocks is oriented 47/66. 11. Fracture forming the right release for rock slide block is oriented 176/10. 12. Weathered fracture zone oriented 350/34. 13. Foliation oriented 40/40. Fracture oriented 354/67 with crenulations oriented 190/25. Fracture with trees in it measures 325/85 and 327/63. Other data collected not indicated on photo includes the following: foliation oriented 58/45; crenulation axis oriented 195/25; foliation oriented 50/50; bearing and plunge of slickenlines oriented 178/32.



BRP OFR-007
Image Date: 07/14/04
Collection Date: 07/14/04

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

OFR-009

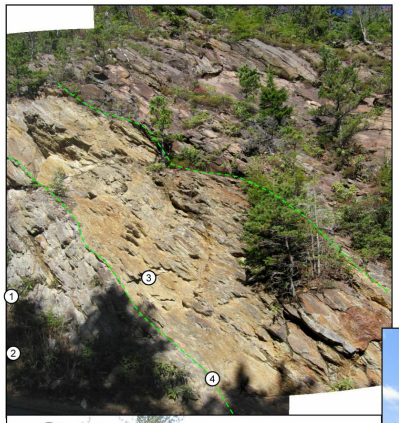


Potential rock slide location north east of the Greenknob overlook. Rock is predominantly muscovite biotite metagraywacke with schistose metagraywacke at the southwest end of the cut. Details include the following: Foliation oriented 40/57 which forms the sliding surface; main fracture face oriented 130/80 which forms the side release surface; minor fracture oriented 55/83; exfoliation fracture oriented 21/18.

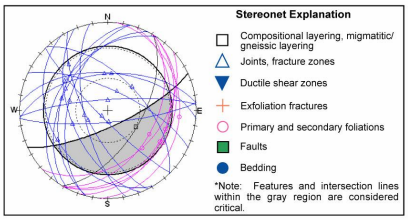
OFR-009 Image Date: 10/26/06 Collection Date: 10/26/06

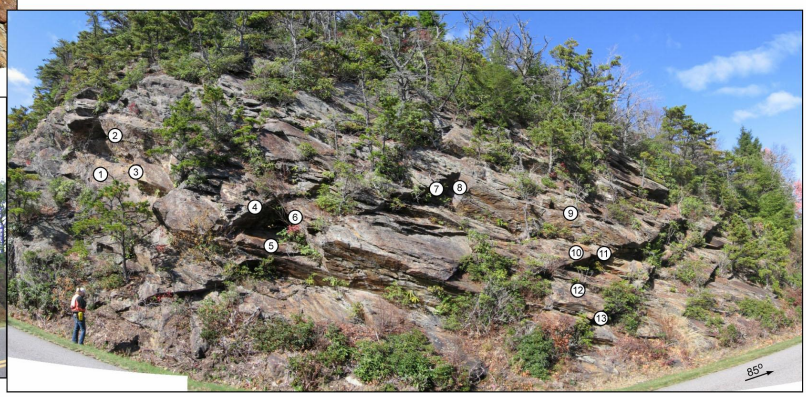
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

OFR-010



Top Left: Potential rock slide at the western end of cut slope at OFR-010. A roughly 10-foot thick bed of partially to completely decomposed biotite schist lies within a stained state biotite metagraywacke unit (boundaries are outlined in green). Details include the following: 1. Fracture oriented 170/68. 2. Irregular fracture oriented 155/70. 3. Irregular fracture oriented 150/35 forms the top release surface for rock slide blocks. 4. Compositional layering oriented 30/60; schistocity oriented 30/45. A fracture just west of the photograph is oriented 85/80. Fracture just off photograph perpendicular to foliation is oriented 195/53. Gypsum blooms were observed at this location. **Bottom Left:** Potential rock slide on the south side of the through cut. Details include the following: 1. Foliation oriented 5/20 forms the top and bottom release surface. 2. Fracture oriented 295/70 forms the side release surface. 3. Fracture oriented 265/55 forms the sliding surface. **Bottom Right:** Potential rock slide at the eastern end of the outcrop and the northern side of the through cut. Details include the following: 1. Foliation oriented 48/42. 2. Fracture oriented 270/80 forms a back release surface. 3. Fracture approximately oriented 160/55 forms a side release surface. 4. Fracture oriented 195/45 forms a top release surface. 5. Foliation oriented 18/32. 6. Fracture oriented 315/58 forms another top release surface. 7. Fracture oriented 208/45 is a top release surface. 8. Fracture oriented 140/83. 9. Fracture oriented 275/55; rock here is garnet biotite muscovite schist. 10. Foliation oriented 30/28. 11. Fracture oriented 230/32 forms a top release surface; rock here is garnet bearing schistose metagraywacke. 12. Foliation oriented 31/32. 13. Fracture oriented 215/40.



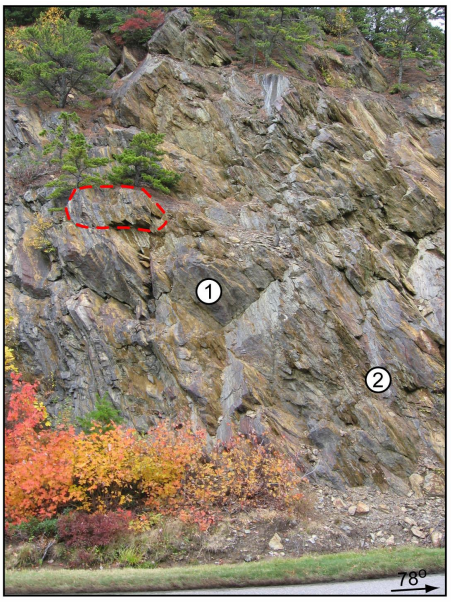


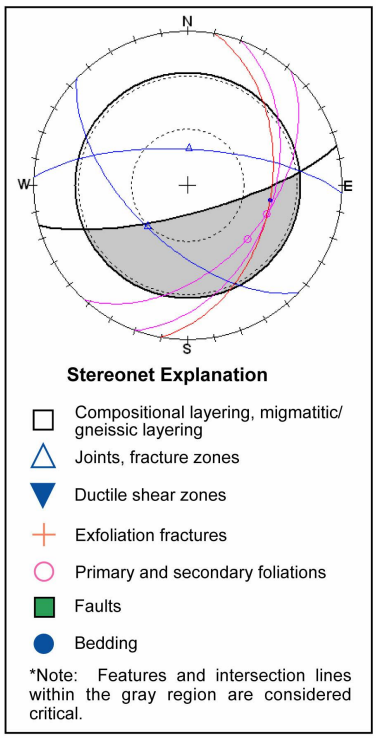
OFR-010
Image Date: 10/26/06
Collection Date: 10/28/06

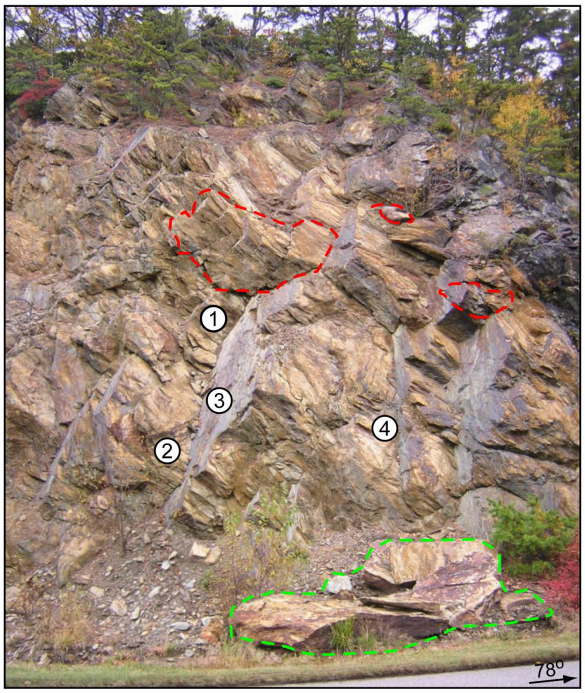
Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

OFRR-001

Top Right: West end of outcrop. Potential rock fall blocks outlined in red. Details follow: 1. Fracture oriented 272/70 and bedding oriented 10/45. 2. Crenulation axial plane oriented 15/35. **Bottom Right**: Past and potential rock fall-slide at OFRR-001. Rock at this location is graphitic, sulfidic, muscovite schist with a few beds of metagraywacke. Potential rock fall (outlined in red) and past rock fall (outlined in green) adjacent to the road at the base of the slope. Details include the following: 1. Crenulation axis with a bearing and plunge of 195/15. 2. Primary foliation oriented 20/45. 3. Fracture oriented 135/60. 4. Primary foliation oriented 42/47.







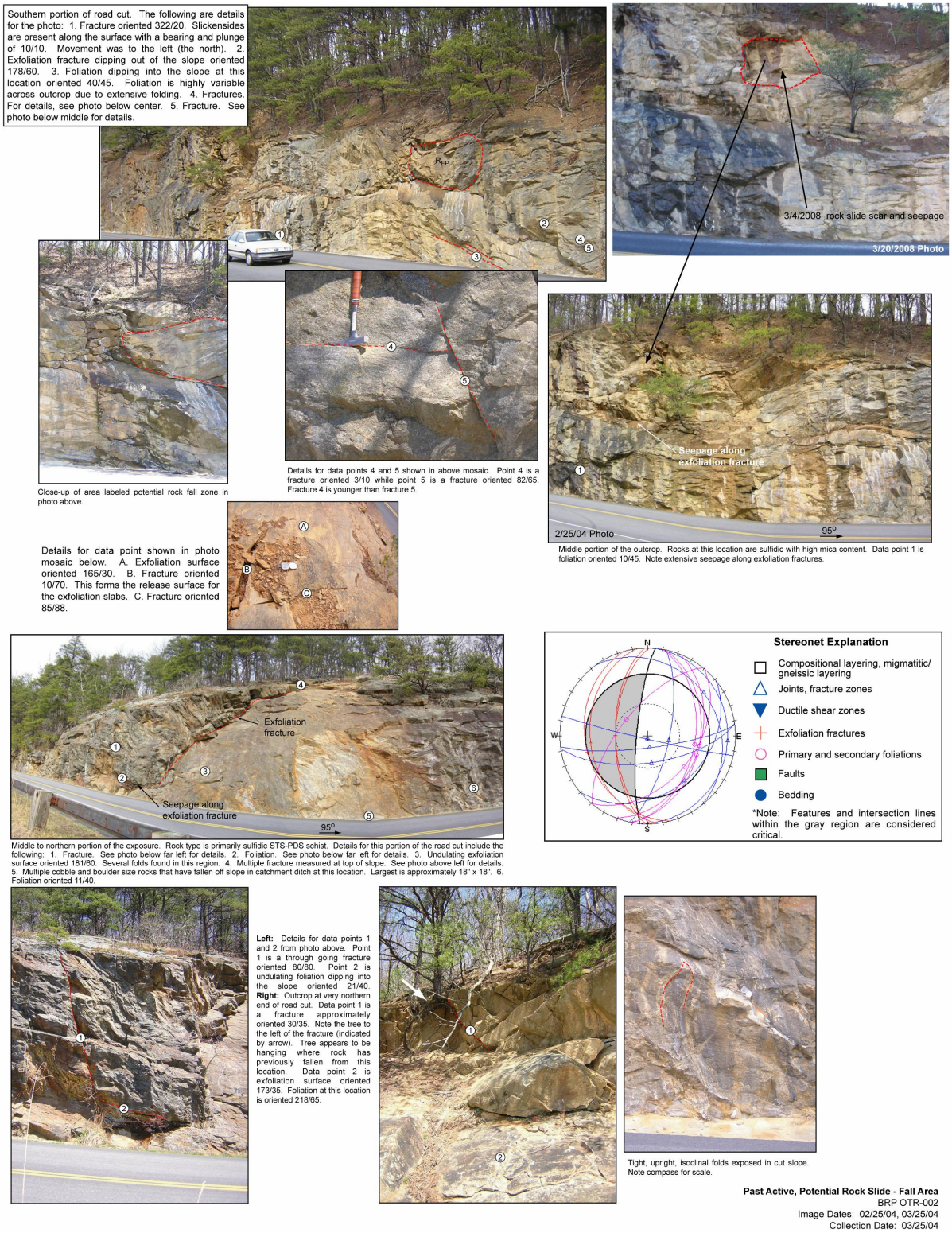
BRP OFRR-001
Image Date: 10/19/06
Collection Date: 10/26/06

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

OTR-001

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

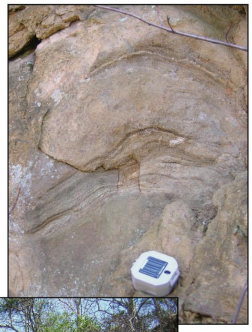
OTR-002

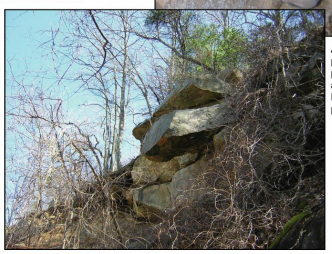


Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

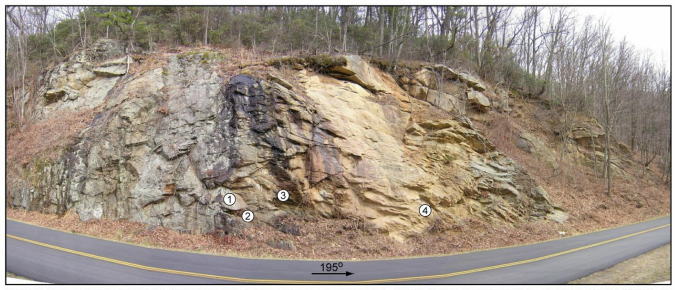
OTR-003

Southern end of outcrop. Rock type is primarily stained state metagraywacke with very thinly foliated, partially decomposed schistose zones present. Quartz, garnet boudins are also present. Details include the following: 1. Compositional layering oriented 62/30. 2. Fracture oriented 129/85. 3. Scar of past rock slide/rock fall. Dimensions are approximately 50 feet high and 20 feet wide with a slope angle of approximately 60 degrees. 4. Exfoliation ranging from 202/35 to 202/60. 5. Broad, open, upright, fold. For details, see photo at right. 6. Compositional layering/foliation in metagraywacke oriented 56/65 dipping obliquely into the slope.

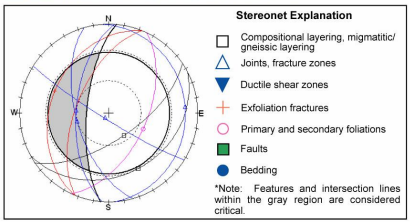




Above: Data point 5 in photo at left. Fold axial plane oriented 90/60 and axis oriented 100/20. **Left:** Rock overhanging scar of past rock fall/rock slide.



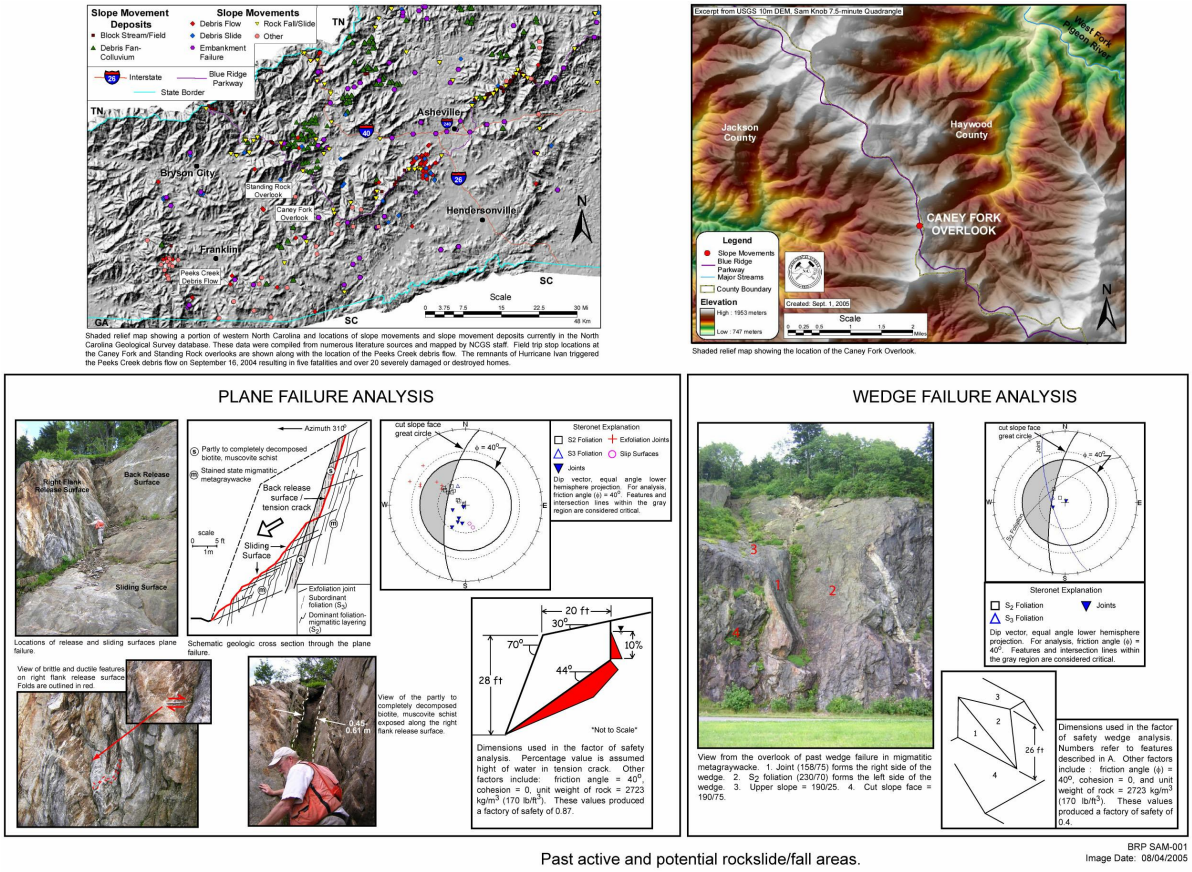
Northern end of outcrop. Rock type grades into garnet mica schist moving northward. Details include the following: 1. Fracture oriented 166/60. 2. Fracture oriented 355/15. 3. Foliation oriented 25/55. 4. Fracture oriented 185/60. Crenulation axes oriented 35/40.



Past Active, Potential Rock Slide/Fall Area
BRP OTR-003
Image Dates: 02/25/04, 03/26/04
Collection Date: 03/26/04

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

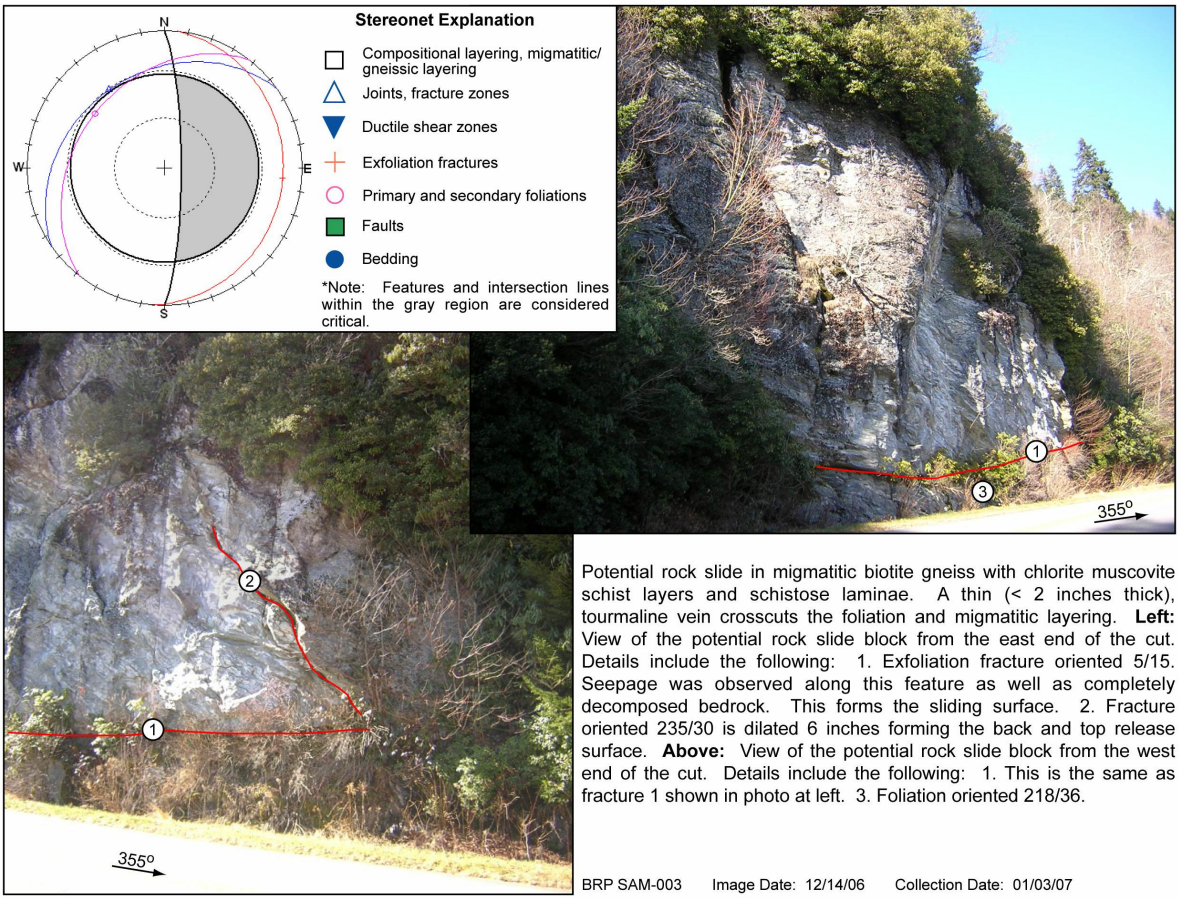
SAM-001



Past active and potential rockslide/fall areas.

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SAM-003

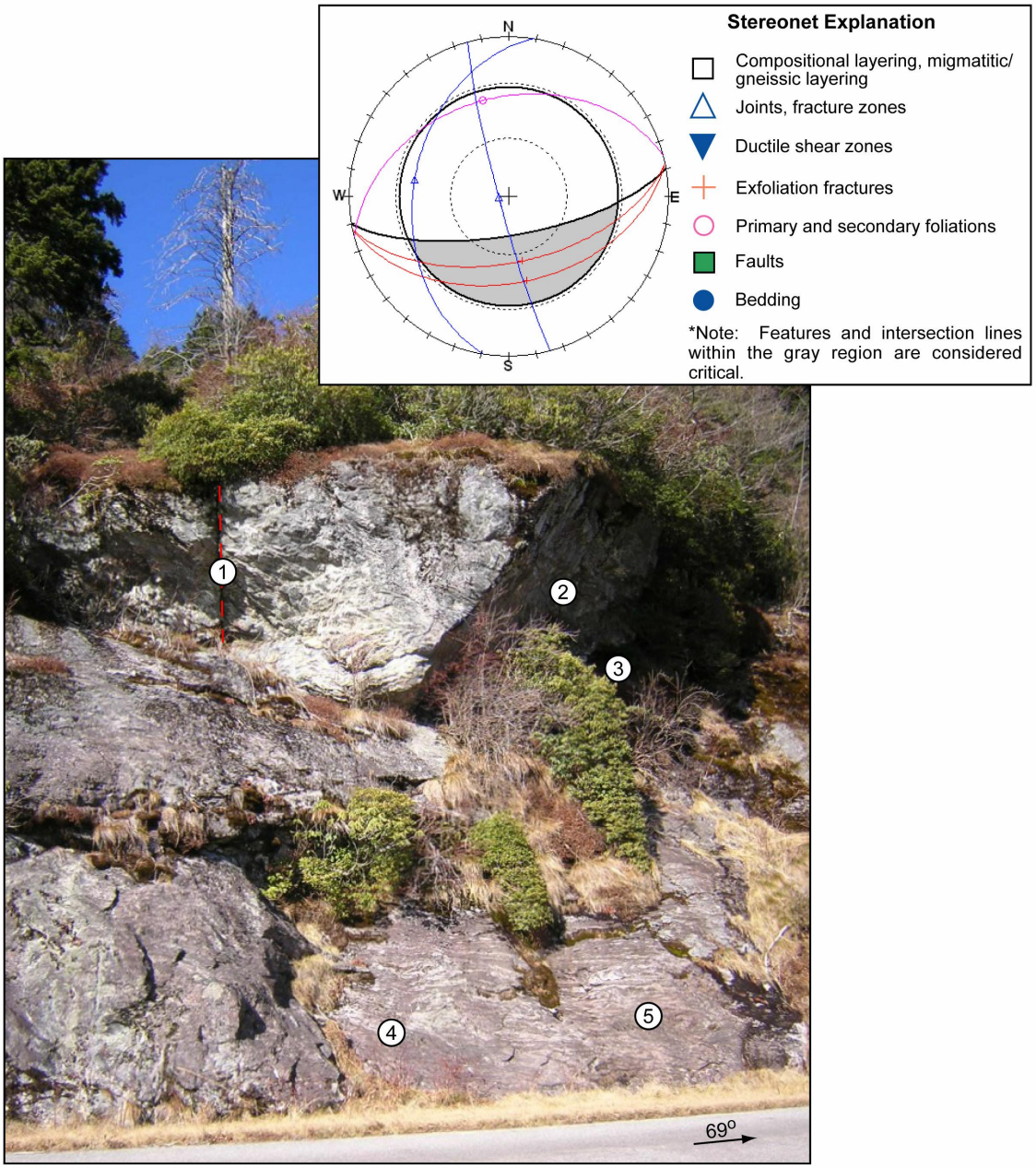


Potential rock slide in migmatitic biotite gneiss with chlorite muscovite schist layers and schistose laminae. A thin (< 2 inches thick), tourmaline vein crosscuts the foliation and migmatitic layering. **Left:** View of the potential rock slide block from the east end of the cut. Details include the following: 1. Exfoliation fracture oriented 5/15. Seepage was observed along this feature as well as completely decomposed bedrock. This forms the sliding surface. 2. Fracture oriented 235/30 is dilated 6 inches forming the back and top release surface. **Above:** View of the potential rock slide block from the west end of the cut. Details include the following: 1. This is the same as fracture 1 shown in photo at left. 3. Foliation oriented 218/36.

BRP SAM-003 Image Date: 12/14/06 Collection Date: 01/03/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SAM-005

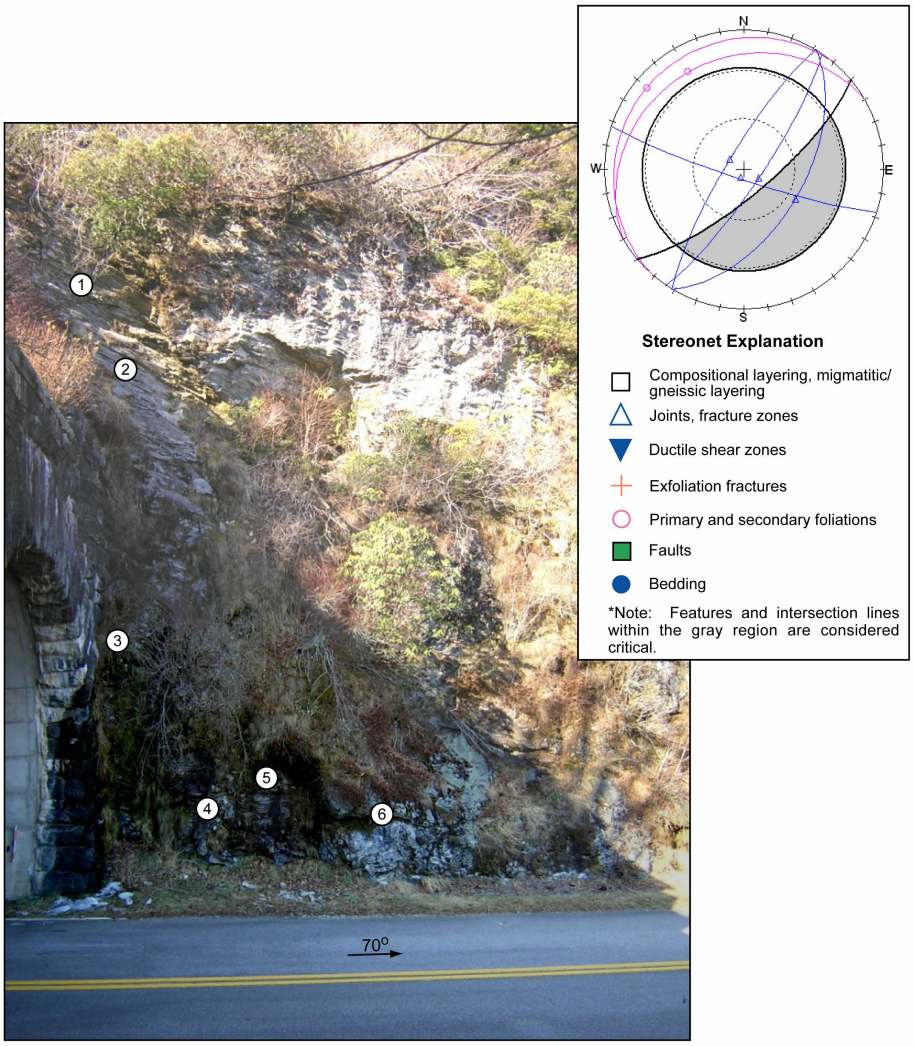


Potential rock slide in muscovite gneiss(?). Details include the following: 1. Fracture possibly created by blasting during road construction is oriented 175/85. 2. Irregular fracture oriented 190/40. 3. Exfoliation fracture approximately oriented 78/45 forms the sliding surface. 4. Foliation oriented 255/38 is highly variable. 5. Exfoliation fracture oriented 78/56; water seeps out of the slope along this feature. Embankment subsidence here - out of photo.

BRP SAM-005 Image Date: 12/14/06 Collection Date: 01/03/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SAM-007

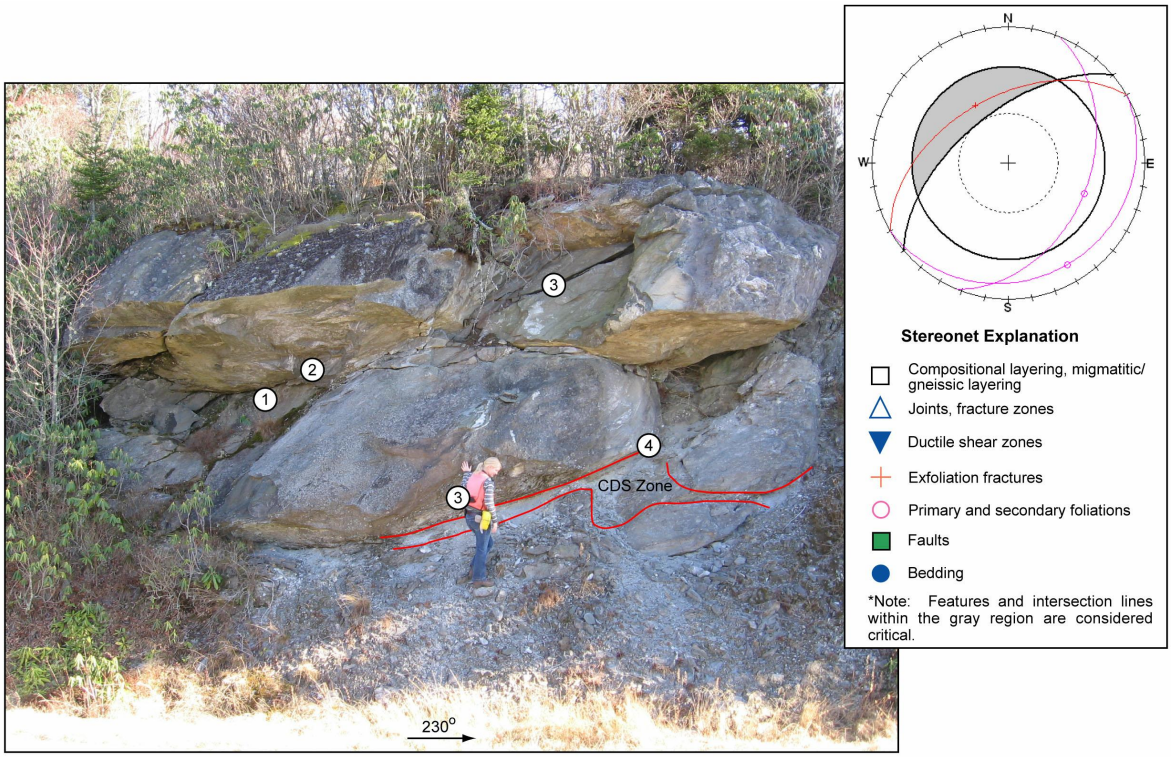


Potential rock slide at tunnel portal. Rock here includes chlorite, muscovite schist. Details follow: 1. Fracture oriented 30/80 forms the back release surface. 2. Fracture oriented 30/55 forms the sliding surface. 3. Seepage exiting the slope along the tunnel portal. 4. Fracture oriented 110/85. 5. Fracture oriented 215/80; variable foliation/compositional layering oriented 220/10. 6. Foliation/compositional layering oriented 240/20.

BRP SAM-007 Image Date: 12/14/06 Collection Date: 04/27/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SAM-008

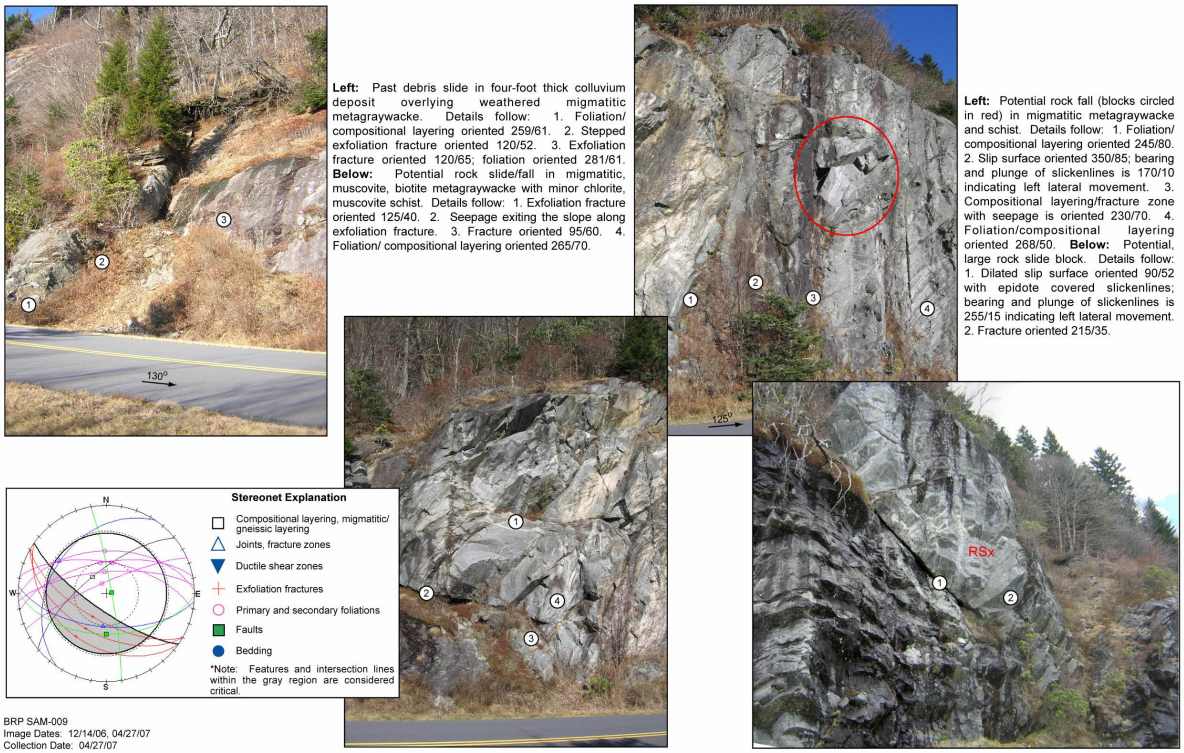


Potential rock fall just west of Devil's Courthouse. Rock is primarily biotite metagraywacke with minor chlorite, muscovite schist. Details follow: 1. Exfoliation fracture oriented 240/50 is the base release surface. 2. Foliation/ compositional layering oriented 60/15 is folded and variable. 3. Foliation/compositional layering oriented 22/40. 4. Foliation/compositional layering forms the top release surface and is dilated 2-5 inches. 5. Zone where rock has completely decomposed to micaceous silt.

BRP SAM-008 Image Date: 12/14/06 Collection Date: 04/27/07

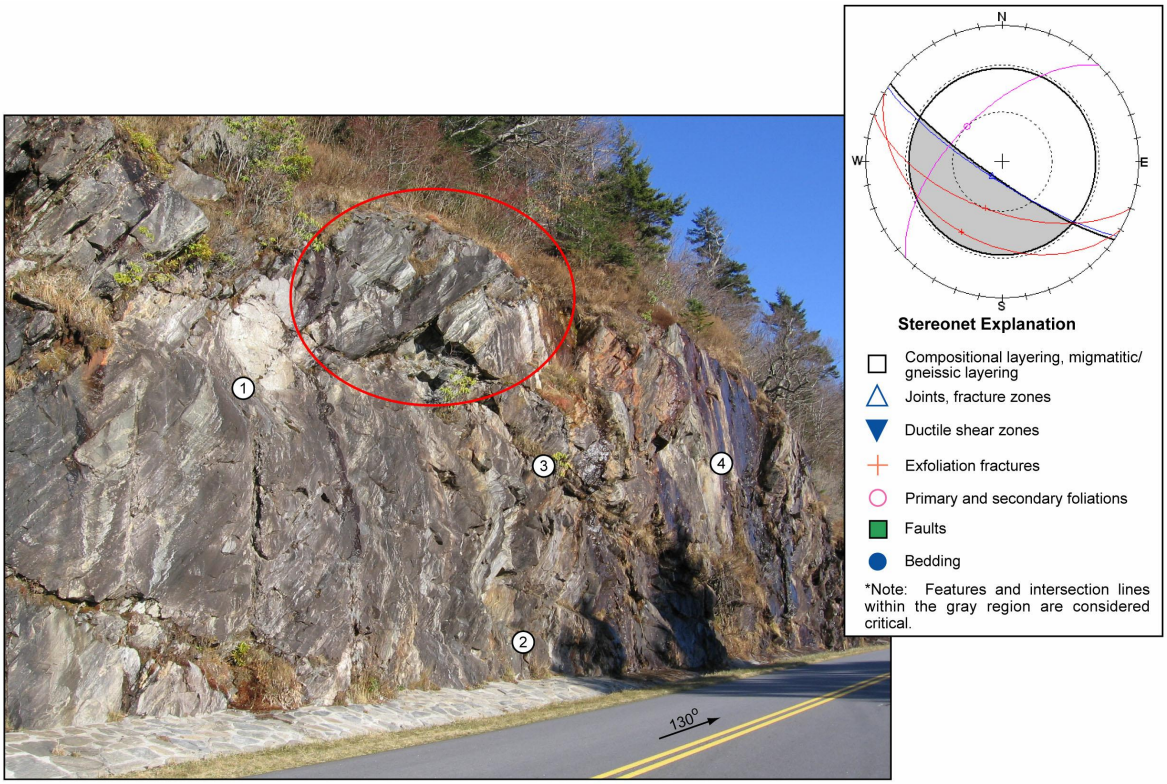
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-009



Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-010

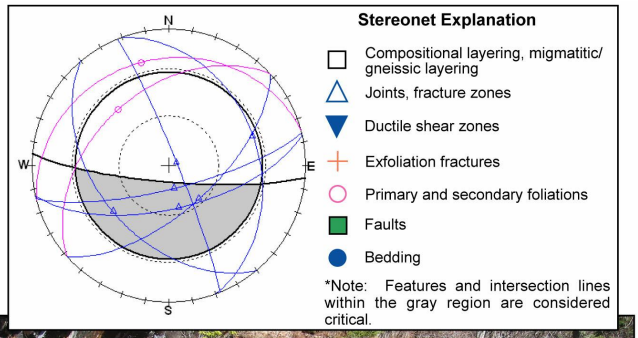


Potential rock slide block in road cut. Details include the following: 1. Exfoliation fracture oriented 120/40. 2. Foliation oriented 225/60. 3. Exfoliation fracture oriented 110/60. 4. Fracture face oriented 125/80.

BRP SAM-010 Image Date: 12/14/06 Collection Date: 04/27/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-011



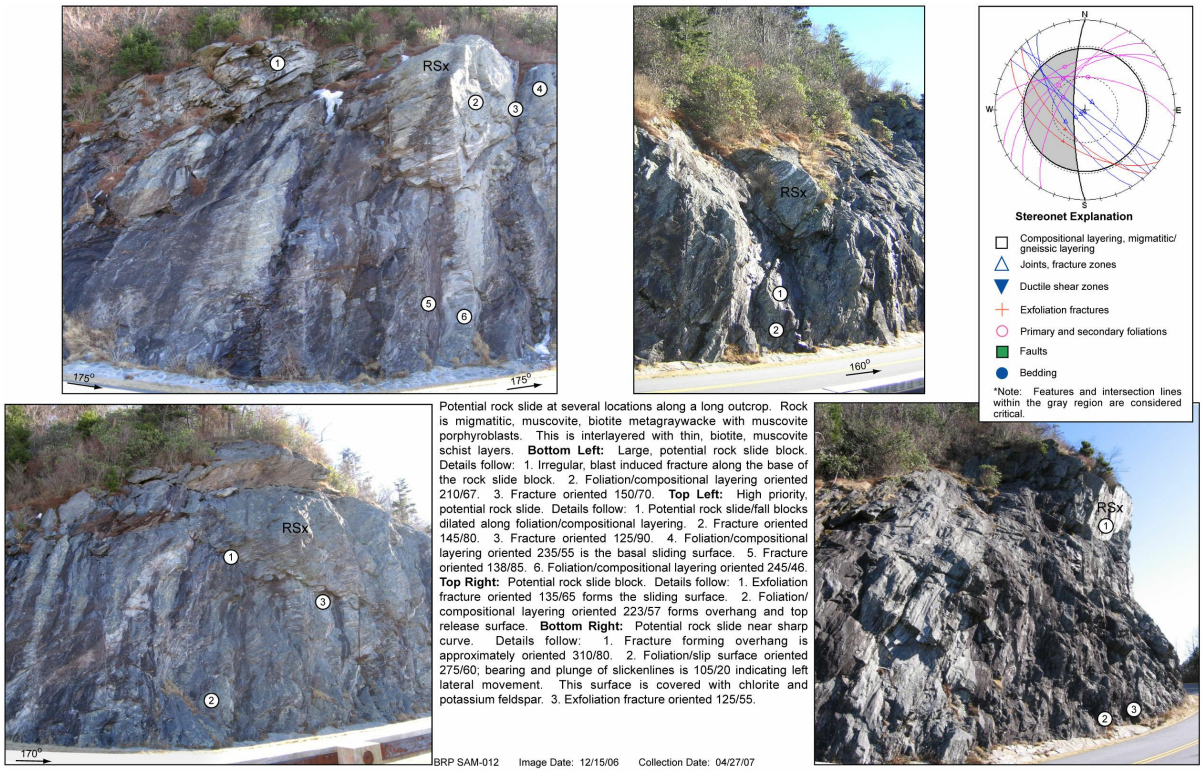
Potential rock slide block (outlined in red) in a road cut. Rock is migmatitic garnet (+/-), biotite, muscovite metagraywacke. Details follow: 1. Fracture oriented 340/35. 2. Fracture oriented 330/85. 3. Foliation/compositional layering oriented 255/23. 4. Fracture oriented 76/65 is the potential rock slide surface.

Potential rock fall block (outlined in red) in a road cut. Rock is migmatitic, biotite, muscovite metagraywacke. Details follow: 1. Fracture oriented 47/64. 2. Foliation/ compositional layering oriented 228/44. 3. Fracture oriented 141/47 forms the side release for the rock fall block; this plane is covered with biotite. 4. Irregular fracture oriented 75/77 forms the back release surface.

BRP SAM-011 Image Date: 12/14/06 Collection Date: 04/27/07

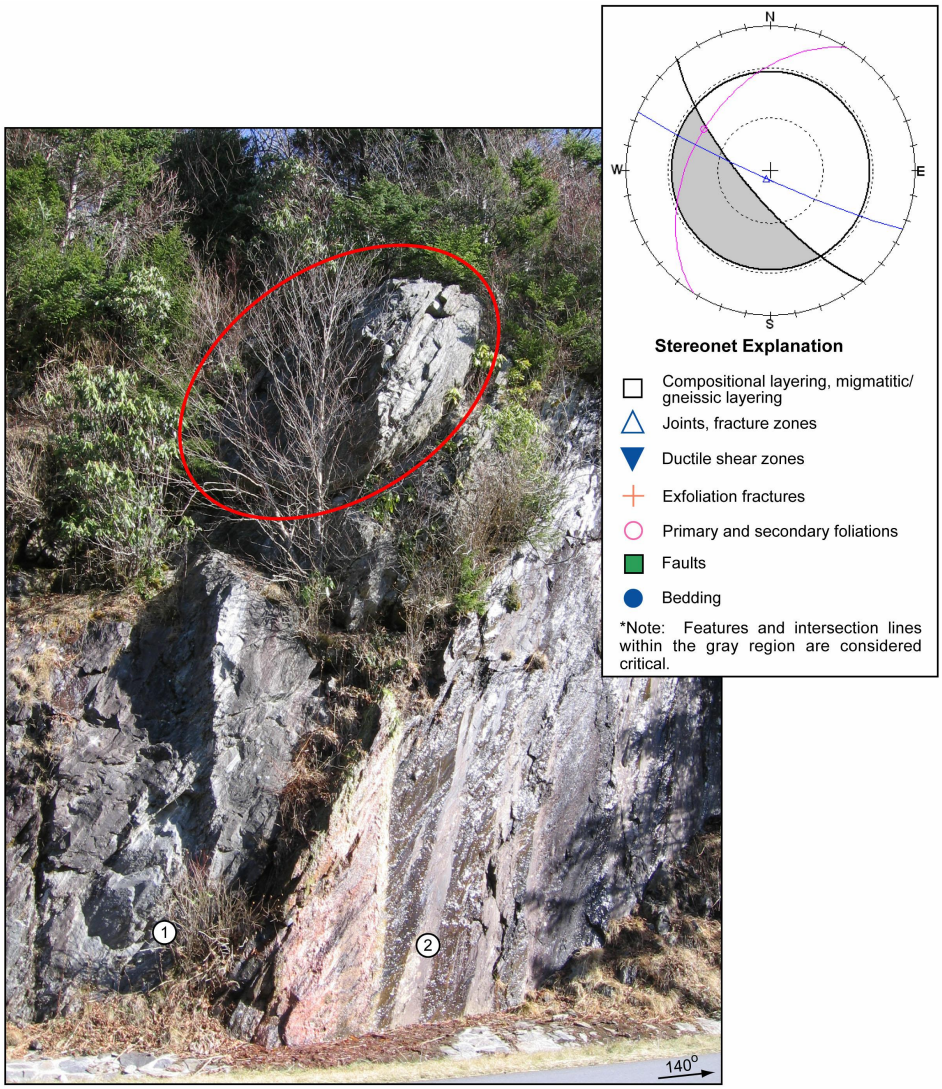
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-012



Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-013



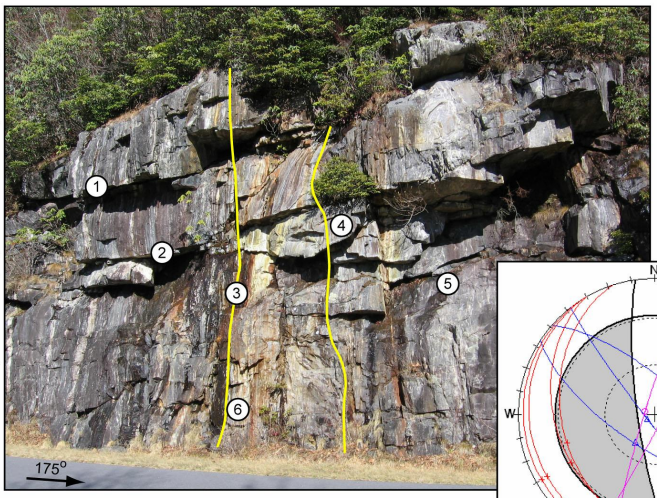
Potential rock slide block (circled in red) in biotite, muscovite schist and metagraywacke that is locally migmatitic. Details follow: 1. Foliation/compositional layering oriented 212/45; water is seeping out of the slope along this feature. 2. Fracture oriented 115/85.

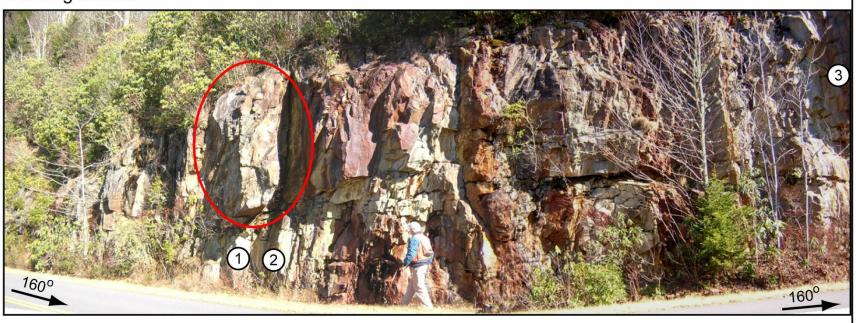
BRP SAM-013 Image Date: 12/15/06 Collection Date: 05/09/07

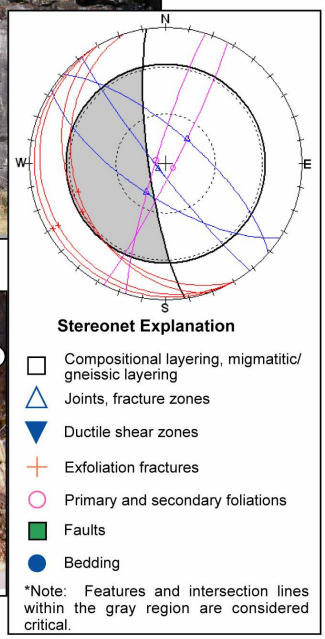
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-014

Potential rock fall blocks (circled in red) in outcrop of migmatitic, biotite, muscovite metagraywacke with minor layers of biotite, muscovite schist. **Right:** 1. Sub-horizontal exfoliation fracture oriented 150/10 forms overhang. 2. Another subhorizontal exfoliation fracture oriented 150/5 also forms an overhang. 3. Biotite, quartzite zone with minor sulfides outlined in yellow. 4. Fracture oriented 150/85 forms front face. 5. Exfoliation fracture oriented 150/30; water is seeping out of the slope along this feature. 6. Foliation/ compositional layering oriented 30/85 forms side release for rock fall blocks. **Below:** 1. Fracture oriented 125/70 forms the right release surface. 2. Foliation/ compositional layering oriented 196/84 forms back release surface; water is seeping out of the slope along this feature. 3. Fracture approximately oriented 310/70 forms overhang. To the right of the photo, exfoliation fracture oriented 162/33 forms a sliding surface.



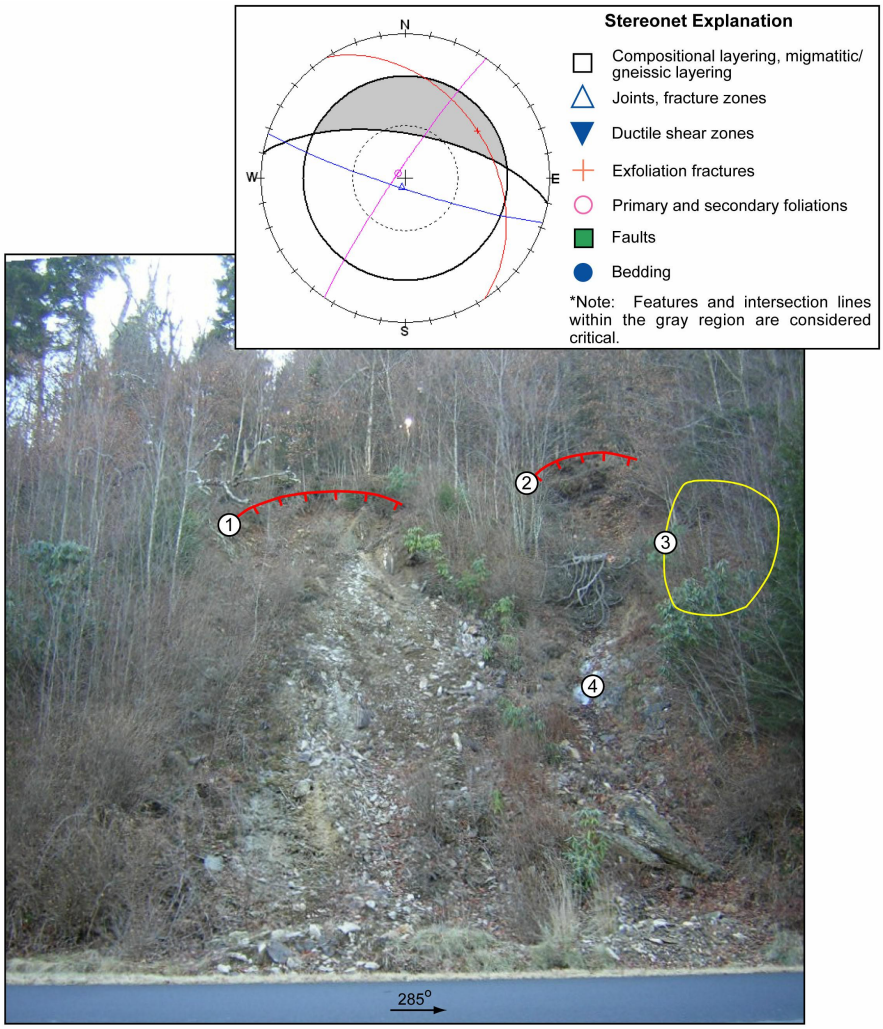




BRP SAM-014 Image Date: 12/15/06 Collection Date: 05/09/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-015

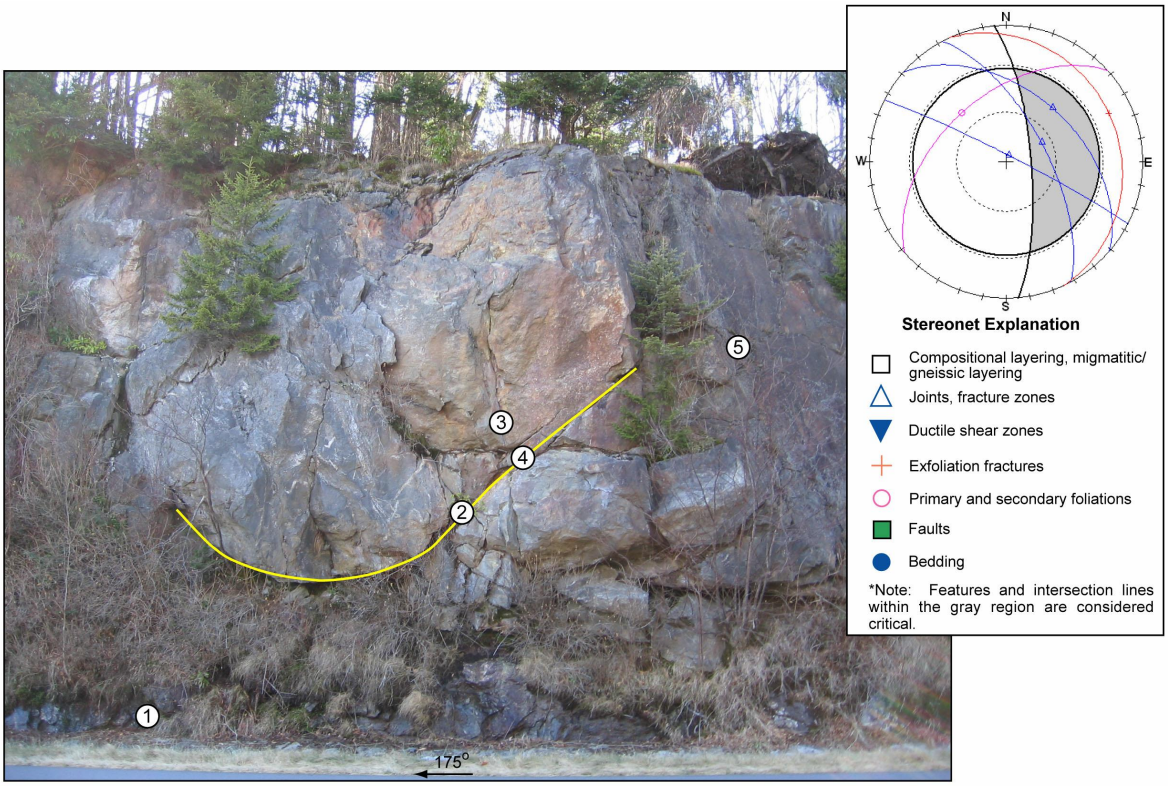


Past debris slide with two initiation zones (outlined in red). 1. Headscarp 1 is in matrix supported, yellow brown, silty gravel colluvium. Maximum thickness of this unit is 6 feet. The track here is subparallel to the foliation/compositional layering in metagraywacke oriented 215/85. A fracture measured here is oriented 110/85. 2. Headscarp 2 is in matrix supported, yellow brown, organic sandy silt colluvium. Maximum thickness of this unit is 2 feet, and a completely decomposed pegmatite is below the soil. 3. Potential slide mass outlined in yellow. Tension cracks and developing scarps were observed during site visit. 4. Exfoliation fracture oriented 327/40 forms the sliding surface.

BRP SAM-015 Image Date: 12/15/06 Collection Date: 05/09/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SAM-016

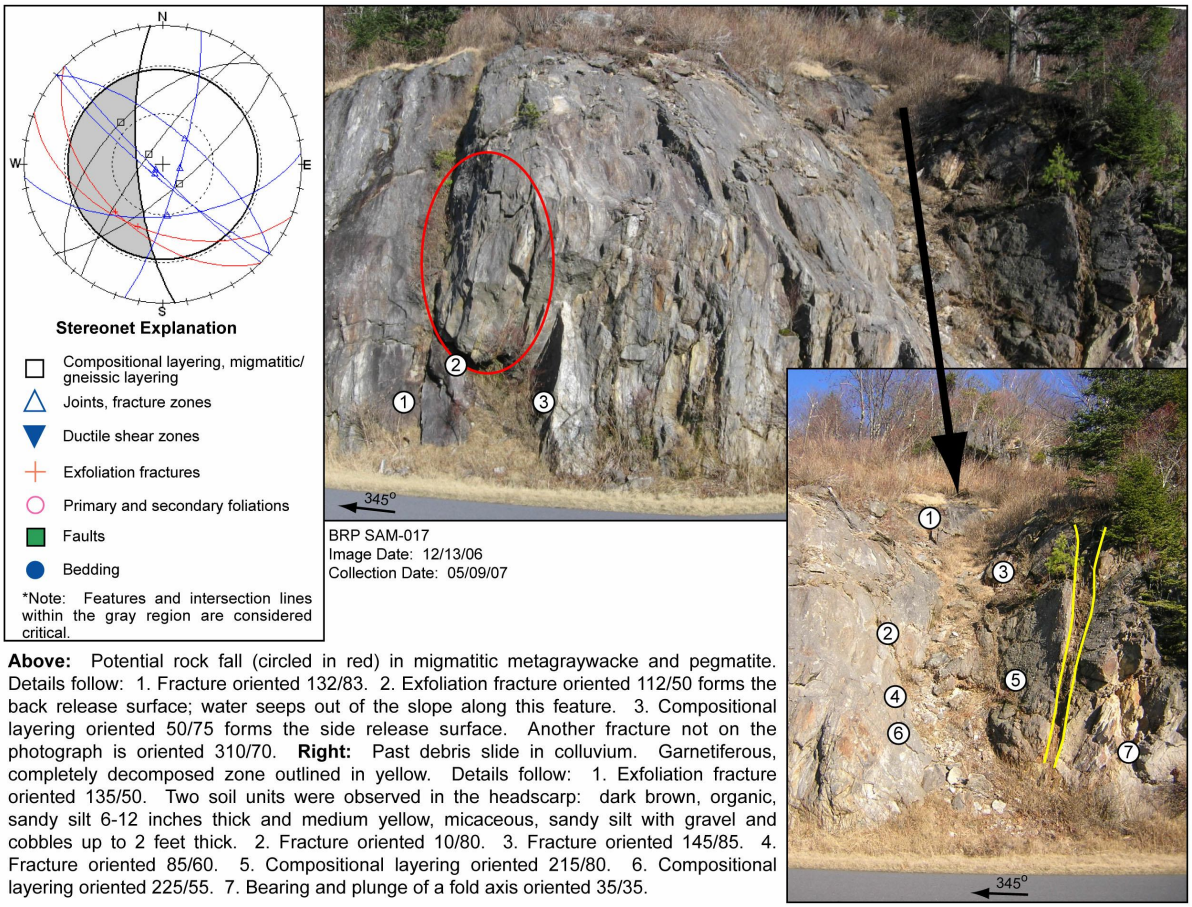


Potential rock fall in migmatitic metagraywacke and pegmatite. Completely decomposed, coarse-grained migmatite and pegmatite is outlined in yellow. Water seeps out of the slope at this location. Details follow: 1. Foliation/compositional layering oriented 228/50. 2. Exfoliation fracture oriented 335/18. 3. Fracture oriented 290/85. 4. Fracture oriented 310/46. 5. Fracture face oriented 330/65.

BRP SAM-016 Image Date: 12/15/06 Collection Date: 05/09/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

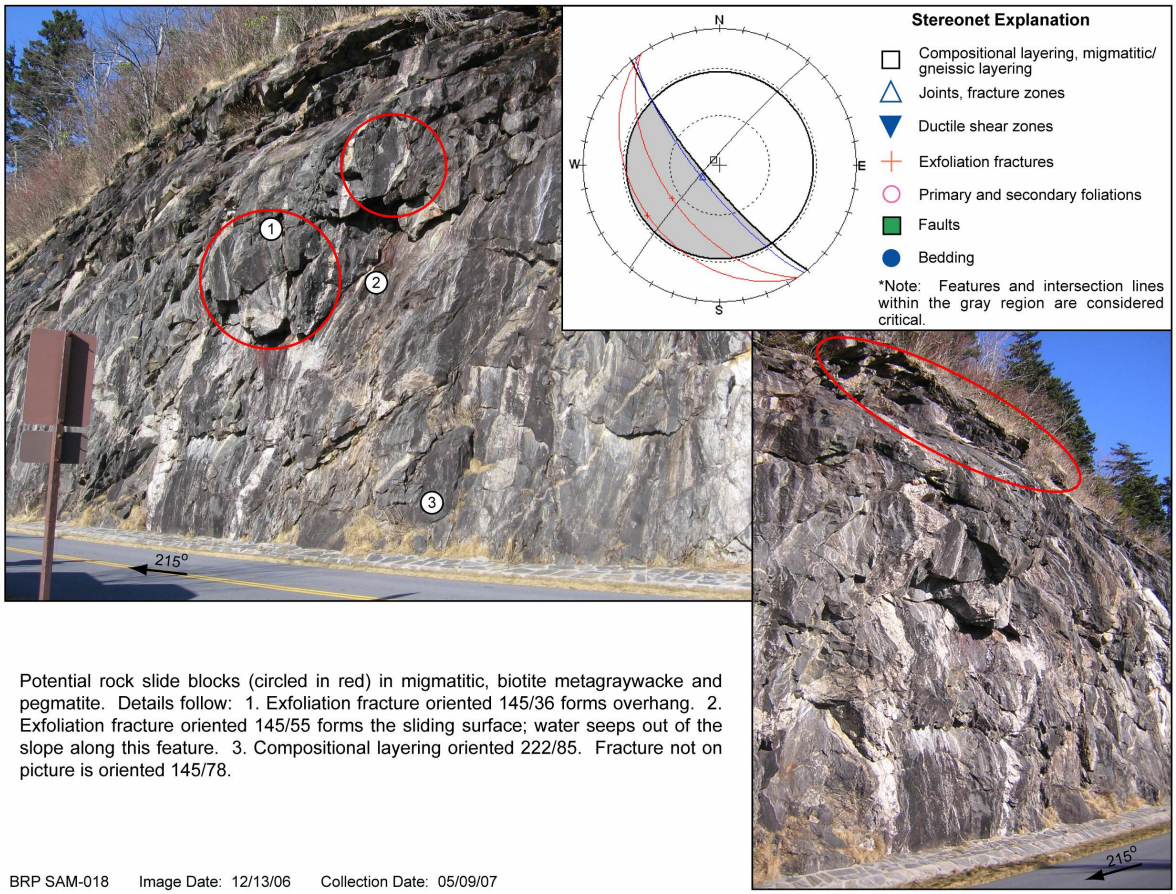
SAM-017



Above: Potential rock fall (circled in red) in migmatitic metagraywacke and pegmatite. Details follow: 1. Fracture oriented 132/83. 2. Exfoliation fracture oriented 112/50 forms the back release surface; water seeps out of the slope along this feature. 3. Compositional layering oriented 50/75 forms the side release surface. Another fracture not on the photograph is oriented 310/70. **Right:** Past debris slide in colluvium. Garnetiferous, completely decomposed zone outlined in yellow. Details follow: 1. Exfoliation fracture oriented 135/50. Two soil units were observed in the headscarp: dark brown, organic, sandy silt 6-12 inches thick and medium yellow, micaceous, sandy silt with gravel and cobbles up to 2 feet thick. 2. Fracture oriented 10/80. 3. Fracture oriented 145/85. 4. Fracture oriented 85/60. 5. Compositional layering oriented 215/80. 6. Compositional layering oriented 225/55. 7. Bearing and plunge of a fold axis oriented 35/35.

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-018

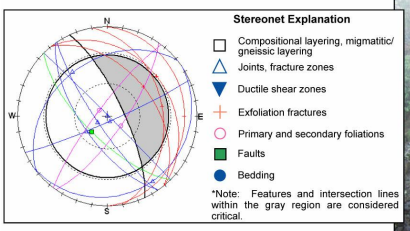


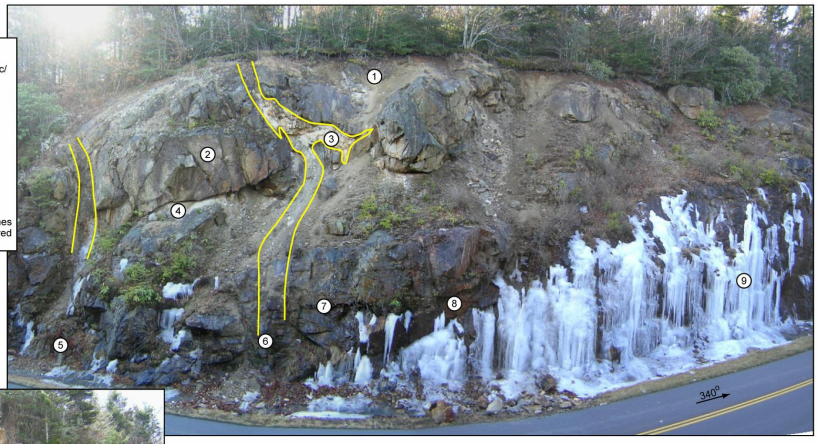
Potential rock slide blocks (circled in red) in migmatitic, biotite metagraywacke and pegmatite. Details follow: 1. Exfoliation fracture oriented 145/36 forms overhang. 2. Exfoliation fracture oriented 145/55 forms the sliding surface; water seeps out of the slope along this feature. 3. Compositional layering oriented 222/85. Fracture not on picture is oriented 145/78.

BRP SAM-018 Image Date: 12/13/06 Collection Date: 05/09/07

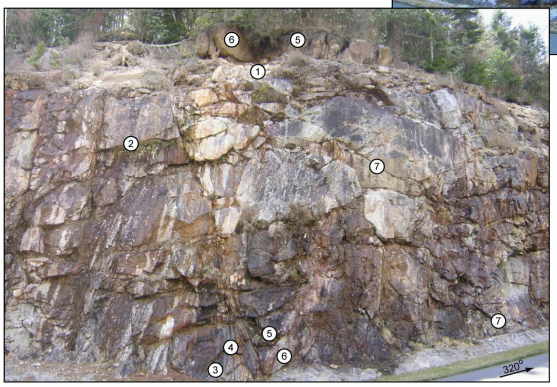
Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SAM-019





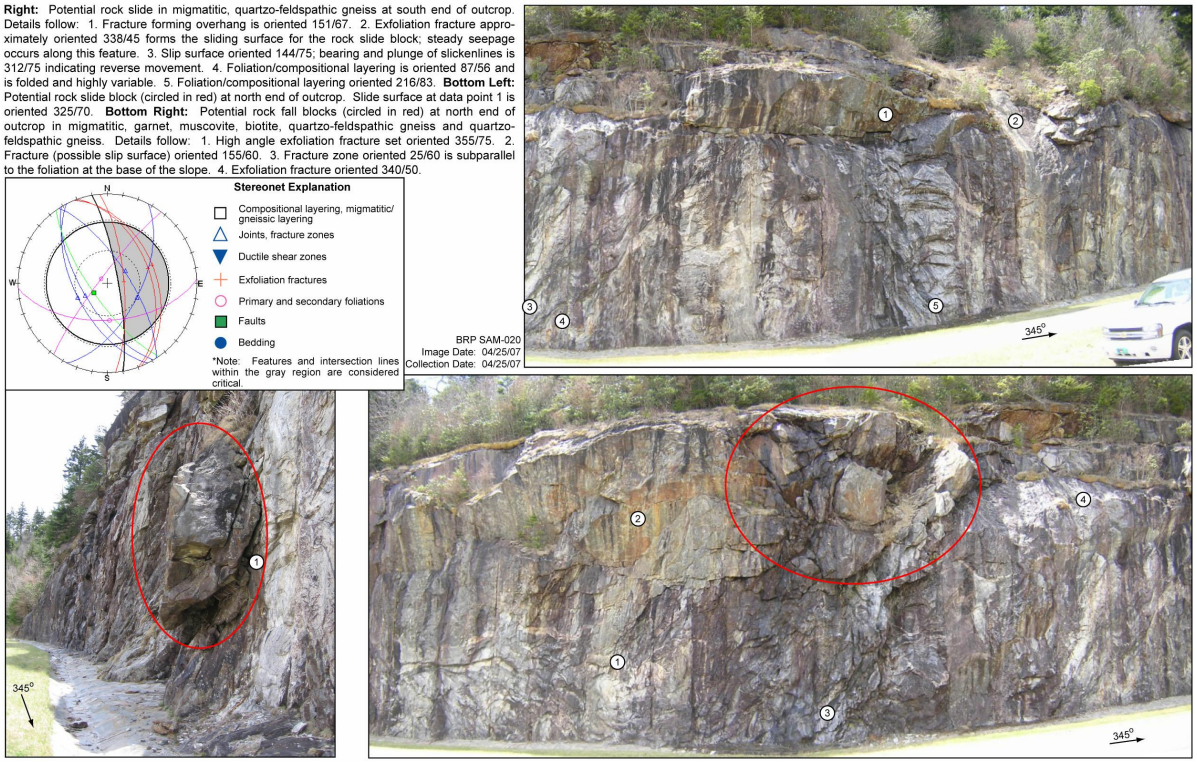
BRP SAM-019
Image Date: 12/13/06
Collection Date: 04/25/07



Above: Past active rock slide in porphyroclastic, migmatitic, muscovite, biotite, quartzo-feldspathic gneiss and pegmatite. Details follow: 1. One- to three-foot thick sandy silt residuum at top of cut. This material appears to be what is failing. 2. Fracture oriented 150/80. 3. Stained state to completely decomposed pegmatite (outlined in yellow). 4. Exfoliation fracture approximately oriented 350/38. 5. Foliation/compositional layering oriented 35/75. This is also the trend of the one- to four-inch partially to completely decomposed zone along which seepage occurs. 6. Fracture set in pegmatite oriented 60/85. 7. Exfoliation fracture oriented 0/15. Water seeps out of the slope along this feature. 8. Fracture oriented 138/70. 9. Slip surface oriented 135/70; bearing and plunge of slickenlines is 240/70 indicating reverse movement. **Left:** Past active and potential rock fall in the same lithology described above. There are large divots in the road at this location, and the drainage ditch has numerous rocks in it. Details include the following: 1. Exfoliation fracture approximately oriented 321/30 forms the slide surface. 2. Fracture approximately oriented 55/13 forms overhang. 3. Exfoliation fracture oriented 321/47. 4. Foliation/compositional layering in pegmatite is oriented 217/81 forms the side release surface. 5. Fracture oriented 144/67. 6. Fracture oriented 270/90. 7. Fracture oriented 232/37.

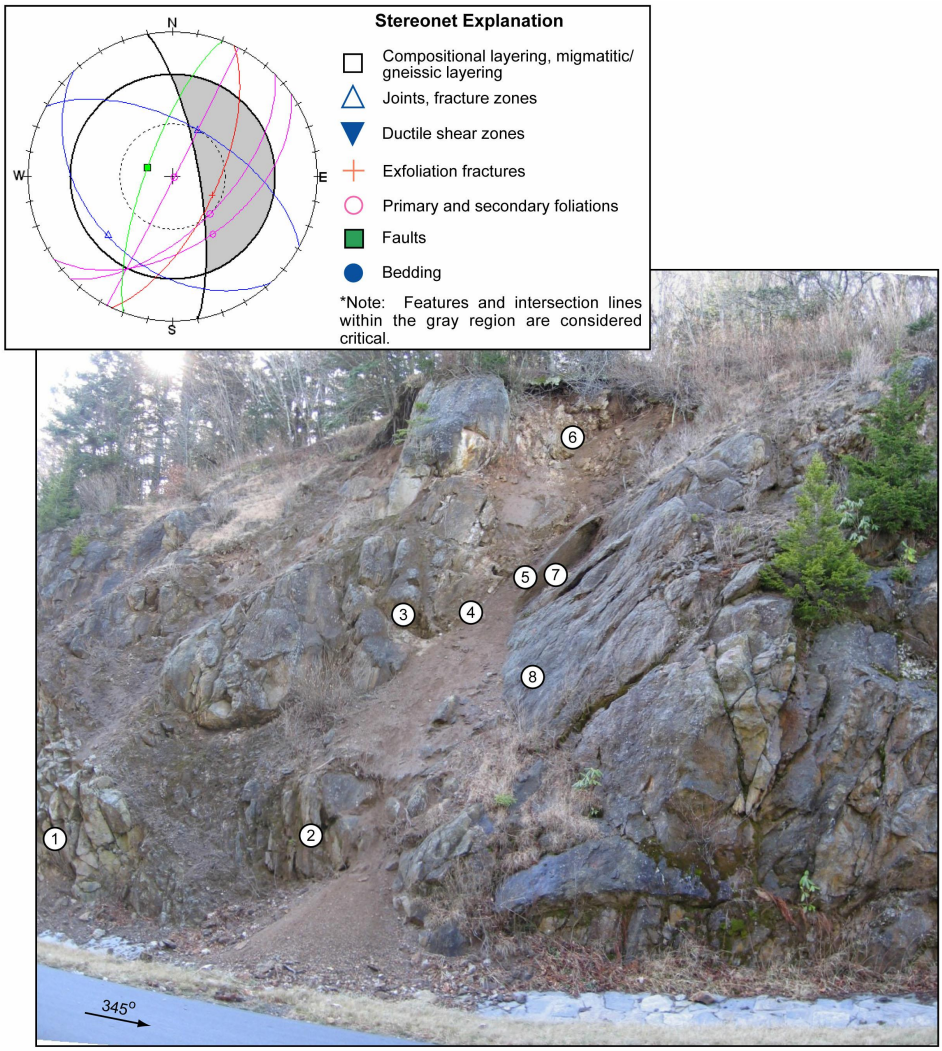
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-020



Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-021

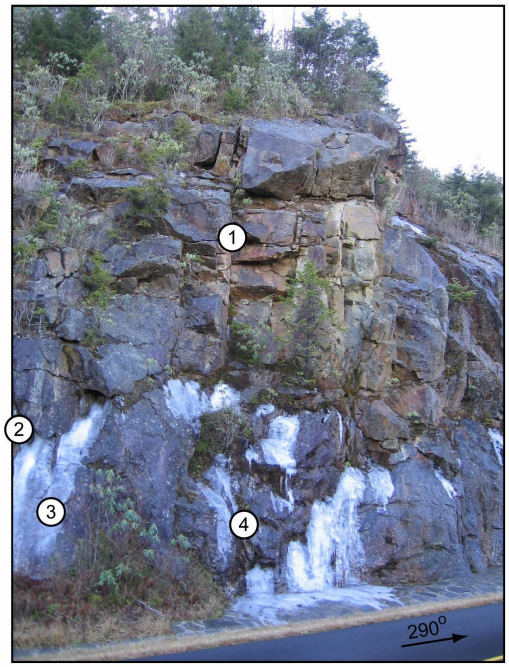


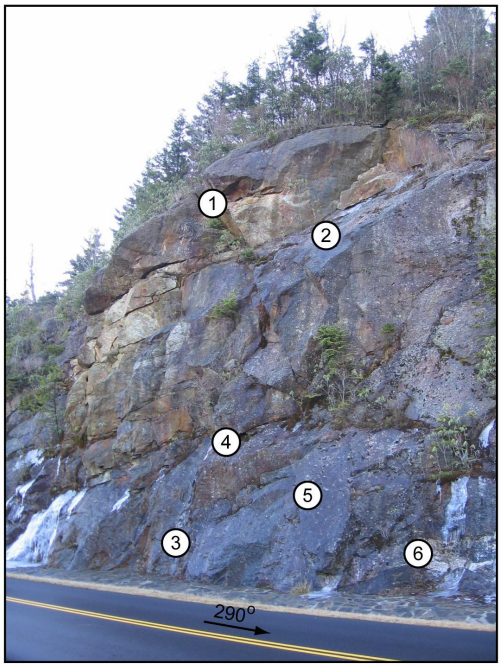
Past active and active weathered rock slide. Rock is migmatitic, garnet, muscovite, biotite schist and migmatitic schistose metagraywacke with minor pegmatite intrusions. Details include the following: 1. Slip surface oriented 200/75; bearing and plunge of slickenlines oriented 310/75 indicate normal movement. 2. Foliation/compositional layering oriented 25/90. 3. Fracture oriented 138/40. 4. Foliation in pegmatite is oriented 55/50. 5. Foliation in the schist is 45/60. 6. Stained state to completely decomposed pegmatite in the headscarp. 7. Fracture oriented 298/60. 8. Exfoliation fracture oriented 25/65.

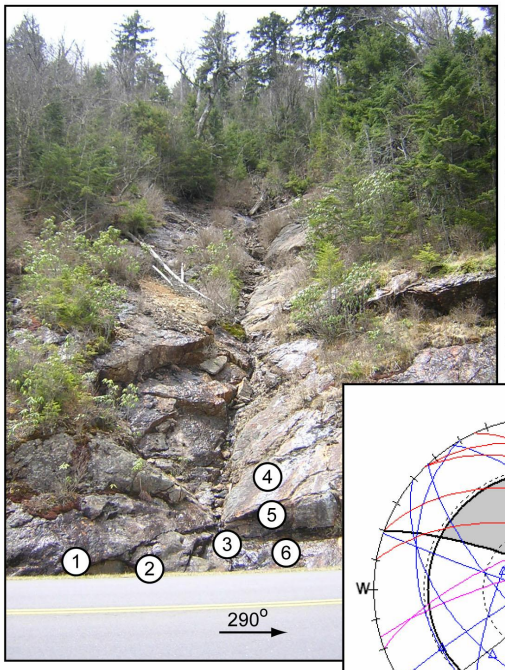
BRP SAM-021 Image Date: 12/13/06 Collection Date: 04/25/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

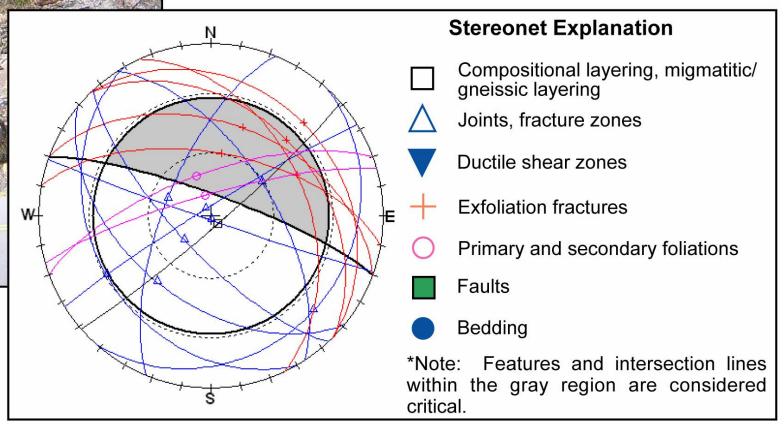
SAM-022







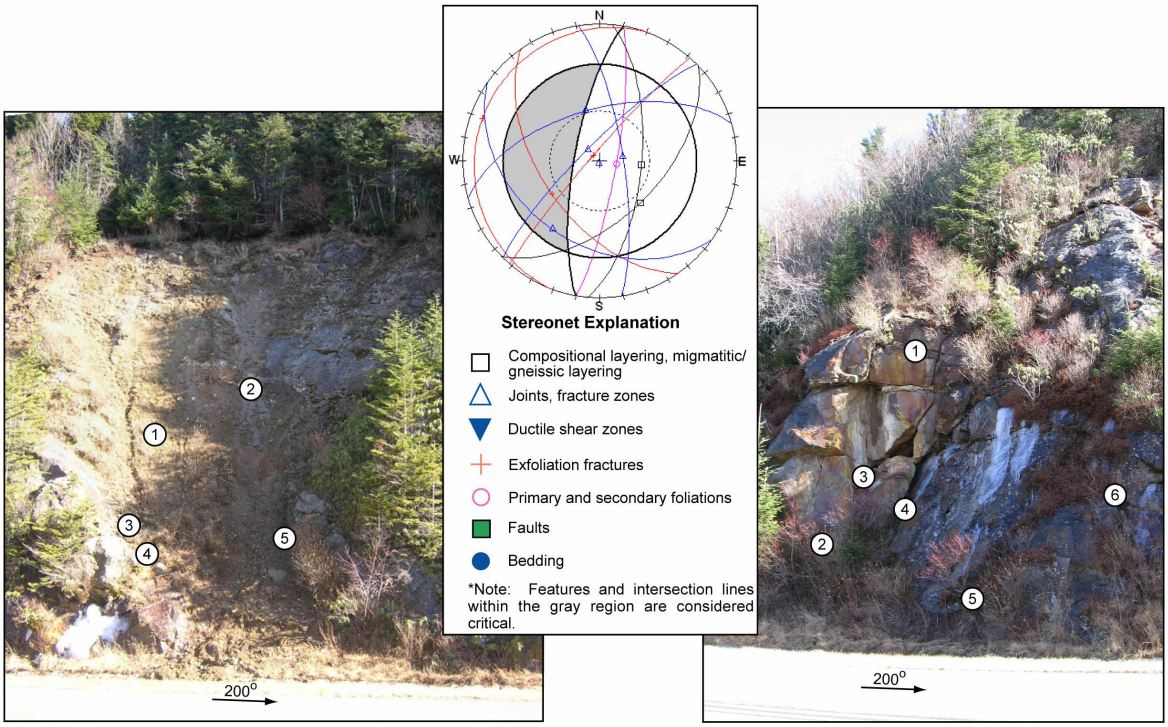
Above Left: Potential rock fall in migmatitic, garnet, muscovite, biotite, quartzo-feldspathic gneiss and pegmatite. Details follow: 1. Fracture set oriented 60/90. 2. Fracture oriented 240/85; foliation/compositional layering oriented 255/80 is subparallel with the fracture at this location. 3. Fracture oriented 325/60. 4. Foliation/compositional layering oriented 250/70. **Above Right:** Potential rock slide in lithology described above. Details follow: 1. Fracture oriented 130/50 forms overhang. 2. Exfoliation fracture oriented 290/45 forms the sliding surface. 3. Pegmatite contact oriented 50/85. 4. Zone of closely spaced exfoliation fractures oriented 315/25. 5. Exfoliation fracture oriented 280/60. 6. Pegmatite cross-cutting the gneiss. **Left:** Past active debris and/or rock slide in garnet biotite quartzo-feldspathic gneiss and pegmatite. Details follow: 1. Fracture oriented 42/21. 2. Fracture oriented 151/32. 3. Fracture oriented 205/68 controls the flow direction of the creek. 4. Exfoliation fracture oriented 335/44. 5. Fracture oriented 140/74. 6. Exfoliation fracture oriented 315/38.



BRP SAM-022
Image Date: 12/13/06
Collection Date: 04/25/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SAM-023



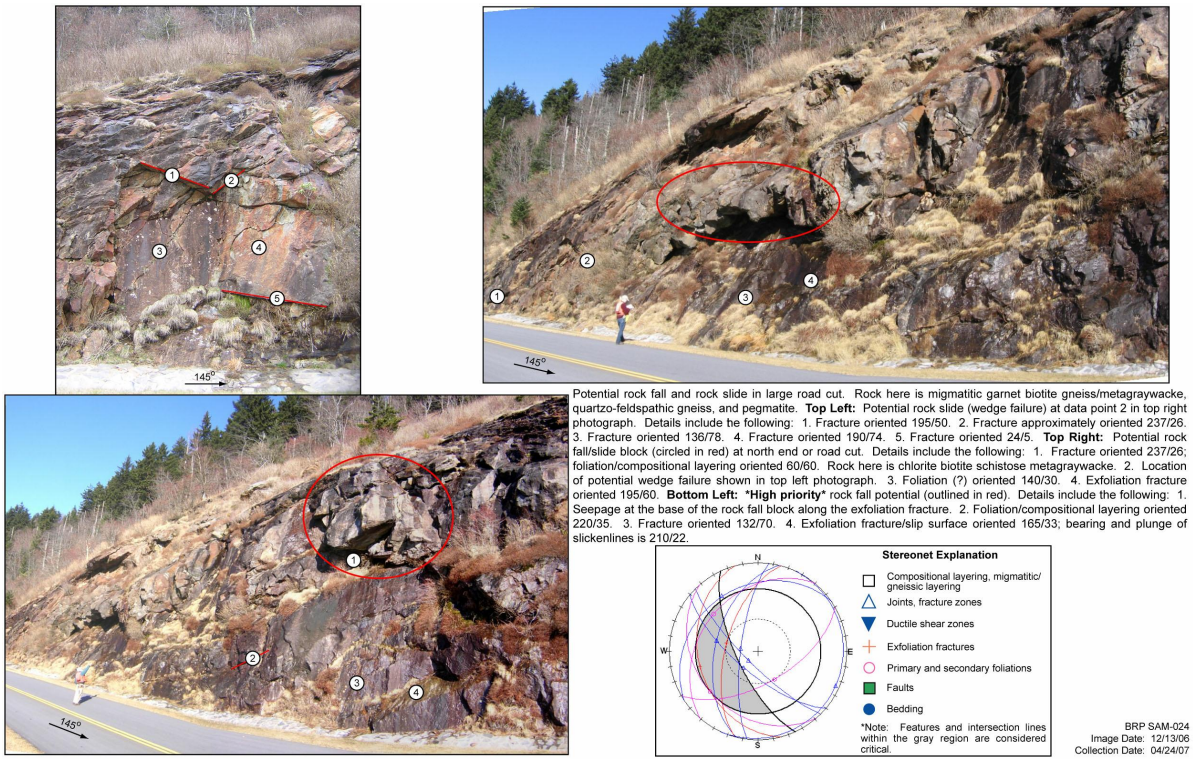
Past weathered rock/debris slide. Rock here is biotite, quartzo-feldspathic gneiss and garnet, biotite, hornblende gneiss with pegmatite and garnet amphibolite pods. Details follow: 1. Area of completely decomposed pegmatite and amphibolite that has weathered to silty gravel (GM) with cobbles. 2. Undulating exfoliation surface oriented 222/85 forms the left side of the wedge; compositional layering oriented 46/55. 3. Compositional layering oriented 5/65. 4. Undulating exfoliation surface oriented 145/55 forms the right side of the wedge. 5. Fracture oriented 228/80.

Potential rock fall in road cut. Rock is garnet, biotite schist and migmatitic metagraywacke. Details follow: 1. Exfoliation fracture approximately oriented 200/10. 2. Foliation oriented 10/80. 3. Fracture oriented 110/90. 4. Fracture oriented 255/58. 5. Fracture oriented 346/76. 6. Fracture oriented 125/40.

BRP SAM-023 Image Date: 12/13/06 Collection Date: 04/24/07

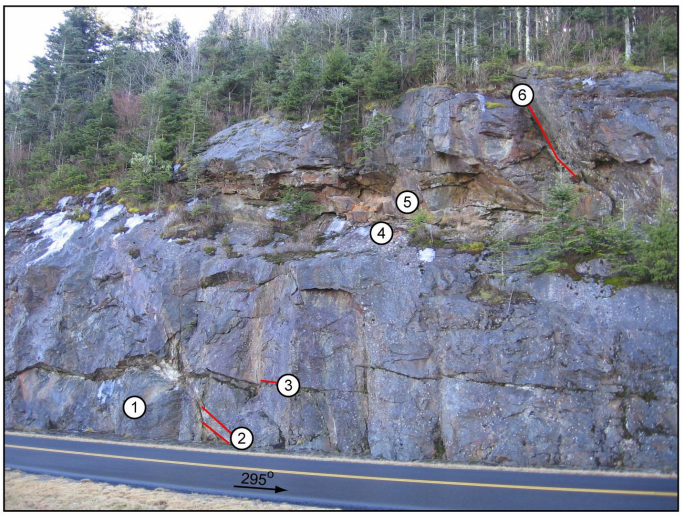
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

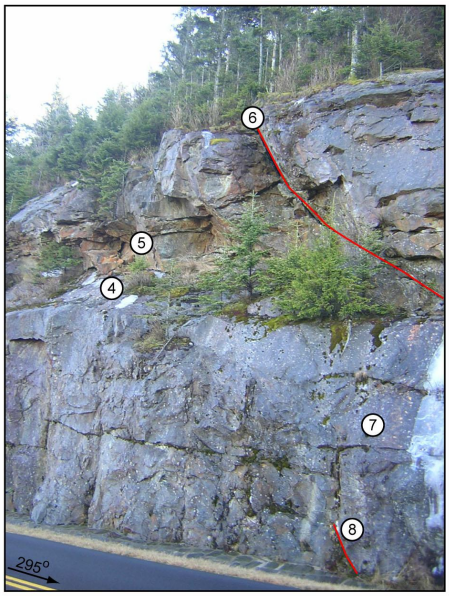
SAM-024

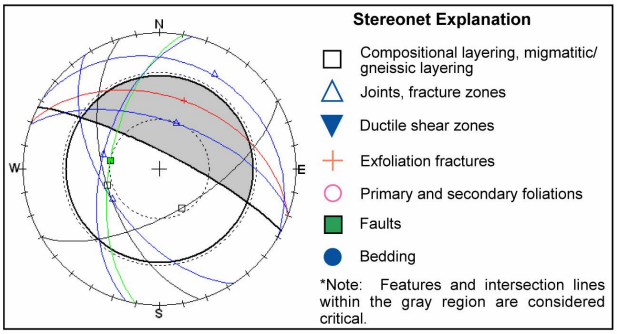


Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SAM-025





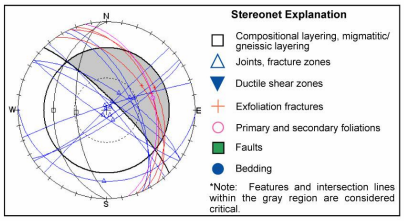


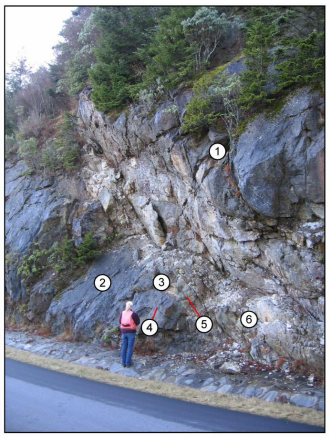
Potential rock slide in road cut. Primary rock type is migmatitic garnet biotite quartzo-feldspathic gneiss. Photo at right is an oblique view of above photograph. Details for both images follow: 1. Compositional layering oriented 60/63. 2. Contact between pegmatite and surrounding rock oriented 163/57. 3. Fracture/slip surface oriented 300/20. 4. Exfoliation fracture approximately oriented 290/46 forms the sliding surface. 5. Fracture approximately oriented 148/57. 6. Curvilinear fracture approximately oriented 195/55. 7. Fracture oriented 290/60. 8. Slip surface oriented 190/60; slickenlines have a bearing and plunge of 355/25 and show right lateral displacement.

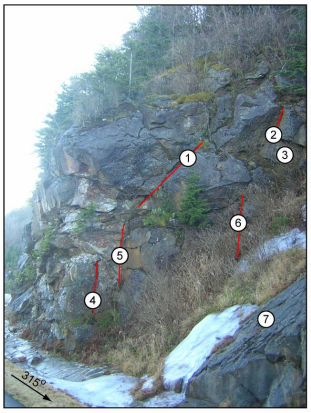
BRP SAM-025 Image Date: 12/13/06 Collection Date: 04/25/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

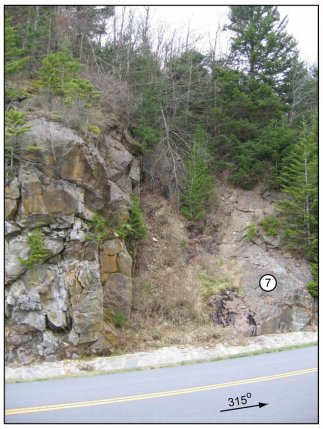
SAM-026







Above Left: Southeast side of potential rock fall in migmatitic garnet muscovite biotite quartzo-feldspathic gneiss with minor garnet chlorite muscovite schist. Details follow: 1. Fracture oriented 300/80. 2. Fracture set oriented 130/85. 3. Fracture zone oriented 255/85. **Left:** Northwest side of the outcrop shown in top left photo. Lithology is the same. Details follow: 1. Exfoliation fracture oriented 325/50. 2. Fracture oriented 330/65. 3. Fracture oriented 250/88 forms the right lateral scarp for past rock slide in bottom left photo. 4. Fracture oriented 305/70. 5. Fracture oriented 315/85. 6. Fracture oriented 335/62. 7. Exfoliation fracture oriented 340/45 forms the sliding surface for past rock slide; foliation oriented 355/45. **Right:** View of past rock slide. Data point 7 is the same feature described in bottom far left photo.



Above: Potential and active rock fall in a completely decomposed pegmatite. Details follow: 1. Fracture approximately oriented 92/22. 2. Exfoliation/bottom release surface oriented 335/40. 3. Fracture oriented 50/85. 4. Fracture oriented 53/80 forms side release. 5. Contact between pegmatite and gneiss oriented 180/40. 6. Contact on the other side of the pegmatite is oriented 176/62. Closely spaced fractures with this orientation are spaced from 2 inches to 1 foot.

BRP SAM-026 Image Date: 12/13/06 Collection Date: 04/25/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

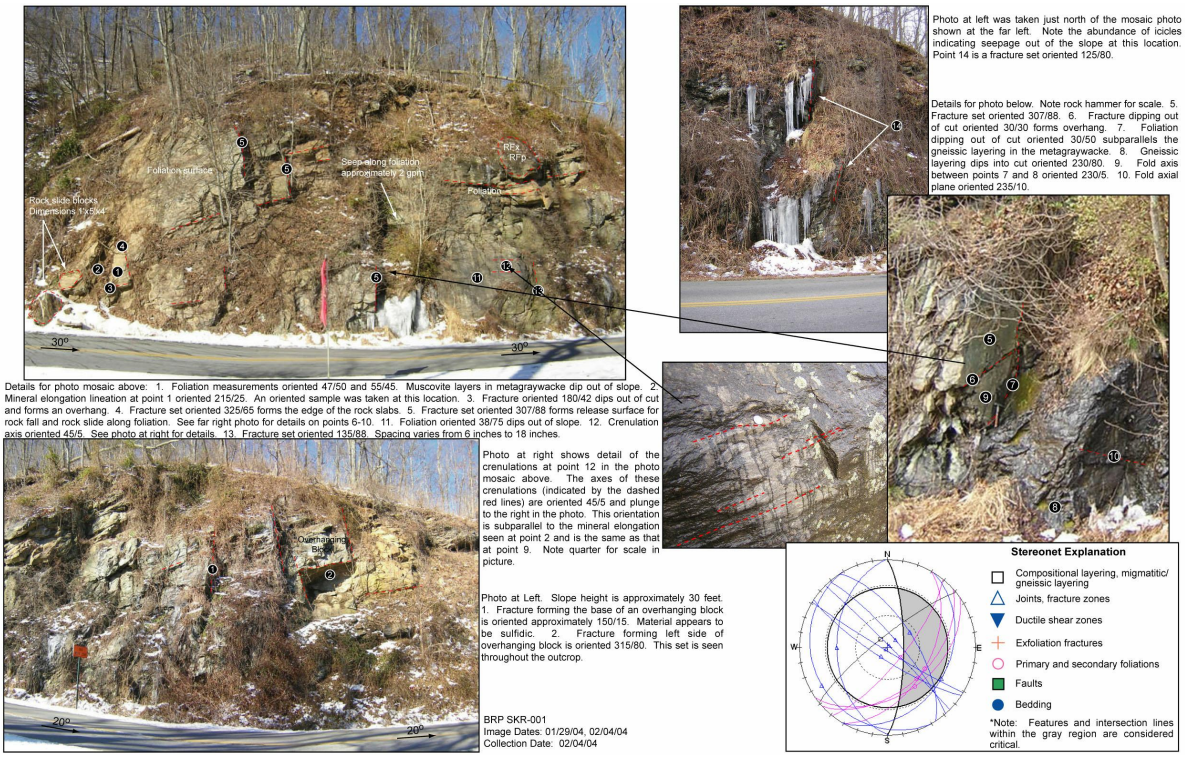
SAM-028

BRP SAM-028
Image Date: 12/14/06
Collection Date: 01/03/07

Past and potential debris slide at MM 321. **Top:** View of the center scarp (outlined in red) from the road. The slide is approximately 125 ft wide, 100 ft long, and 12 ft thick. **Bottom Left:** The headscarp along the left flank (not visible in top photo) cuts through colluvium down into completely decomposed (CDS) laminated muscovite biotite felsic metagraywacke. **Bottom Right:** A remnant of colluvium between the middle and left headscarps has a large crack (outlined in red) that extends almost to the ground surface. This material could potentially fail along this fracture.

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SKR-001



Details for photo mosaic above: 1. Foliation measurements oriented 47/50 and 55/45. Muscovite layers in metagraywacke dip out of slope. 2. Mineral elongation lineation at point 1 oriented 215/25. An oriented sample was taken at this location. 3. Fracture oriented 180/42 dips out of cut and forms an overhang. 4. Fracture set oriented 325/65 forms the edge of the rock slabs. 5. Fracture set oriented 307/88 forms release surface for rock fall and rock slide along foliation. See far right photo for details on points 6-10. 11. Foliation oriented 38/75 dips out of slope. 12. Crenulation axis oriented 45/5. See photo at right for details. 13. Fracture set oriented 135/88. Spacing varies from 6 inches to 18 inches.

Photo at left was taken just north of the mosaic photo shown at the far left. Note the abundance of icicles indicating seepage out of the slope at this location. Point 14 is a fracture set oriented 125/80.

Details for photo below. Note rock hammer for scale. 5. Fracture set oriented 307/88. 6. Fracture dipping out of cut oriented 30/30 forms overhang. 7. Foliation dipping out of cut oriented 30/50 subparallels the gneissic layering in the metagraywacke. 8. Gneissic layering dips into cut oriented 230/80. 9. Fold axis between points 7 and 8 oriented 230/5. 10. Fold axial plane oriented 235/10.

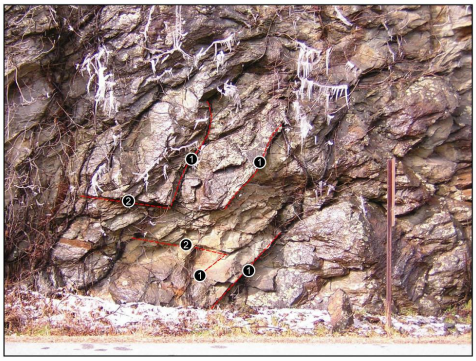
Photo at right shows detail of the crenulations at point 12 in the photo mosaic above. The axes of these crenulations (indicated by the dashed red lines) are oriented 45/5 and plunge to the right in the photo. This orientation is subparallel to the mineral elongation seen at point 2 and is the same as that at point 9. Note quarter for scale in picture.

Photo at Left. Slope height is approximately 30 feet. 1. Fracture forming the base of an overhanging block is oriented approximately 150/15. Material appears to be sulfidic. 2. Fracture forming left side of overhanging block is oriented 315/80. This set is seen throughout the outcrop.

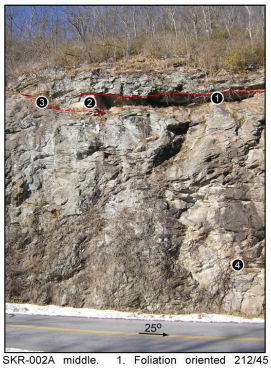
BRP SKR-001
Image Dates: 01/29/04, 02/04/04
Collection Date: 02/04/04

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

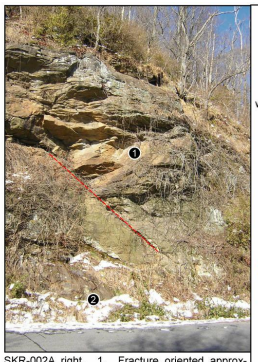
SKR-002



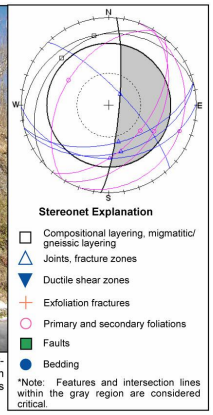
SKR-002A left. Primary rock type is stained state to partially decomposed garnet mica schistose metagraywacke with some localized sulfidic weathering. 1. Fracture set oriented 89/40. 2. Foliation oriented 39/52. Other important features include a lineation/mica alignment/ secondary schistocity oriented 30/40, primary schistocity oriented 20/15, and gneissic layering oriented 258/20.

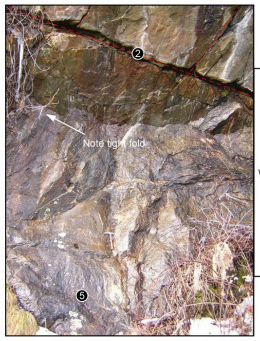


SKR-002A middle. 1. Foliation oriented 212/45 measured at the base of the slope. 2. Fracture forming the side of a wedge of rock approximately oriented 314/75 dipping out of the slope. 3. Exfoliation joint similar to the one in above right photo. 4. Gneissic layering oriented 225/25.

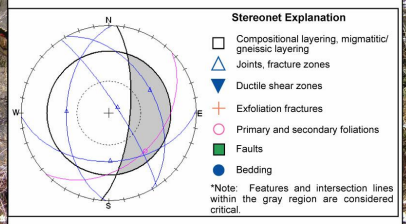


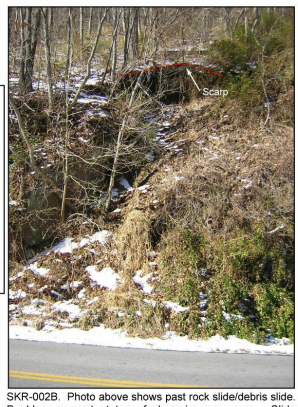
SKR-002A right. 1. Fracture oriented approximately 75/55 similar in orientation to fracture 1 in photo at left. 2. Intersection lineation/crenulations oriented 46/10.





Data for SKR-002C shown in photo at above left and right. Note hammer for scale in bottom left photo and top right photo. 1. Fracture (possibly exfoliation surface) oriented 324/80. 2. Closely spaced fractures with completely decomposed schist in 4"-6" spaced opening oriented approximately 330/45. Seepage occurs at this location. 3. Fracture set approximately oriented 88/45. 4. Fracture dipping into the slope oriented approximately 183/50. 5. Schistosity oriented 46/40.





SKR-002B. Photo above shows past rock slide/debris slide. Boulders present at top of slope in scarp area. Slide approximately 25 feet high and 10 feet wide.

Details for SKR-002D shown above: 1. Fracture oriented 225/85. 2. Fracture set oriented 325/80. 3. Fold. See photo to left for more details on fold orientation. 4. Gneissic layering with some protomylonite at the base of the cut. Orientation is 225/25. 5. Fracture set oriented 335/85. This corresponds to the fracture at point 2. 6. Secondary foliation dipping into the cut oriented 235/55. This corresponds to point A in the close up photo of point 3 shown at left. 7. Overhanging block showing rock fall potential. 8. Potential rock slide blocks formed from the intersection of exfoliation surface and two fractures. See photo at right for details.

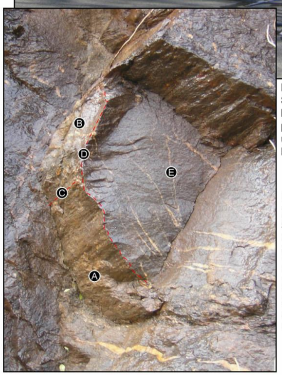
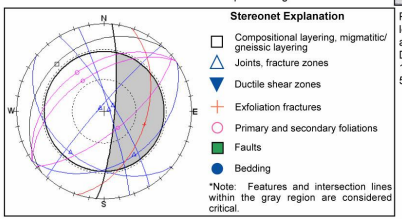


Photo at left is a close-up of point 3. Details are as follows: A. Secondary foliation oriented 235/45. B. Upper surface oriented 55/40. C. Intersection lineation on lower limb of open fold oriented 235/5. D. Open fold with upper limb dipping out of slope and lower limb dipping into slope. E. Tight upright folds.



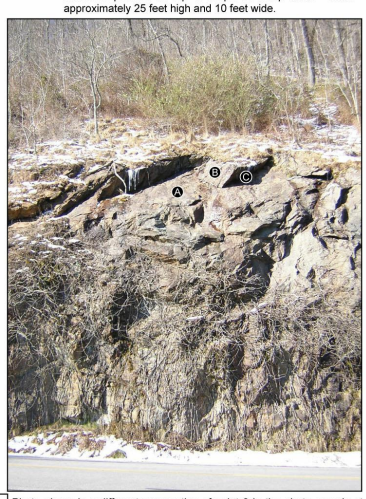


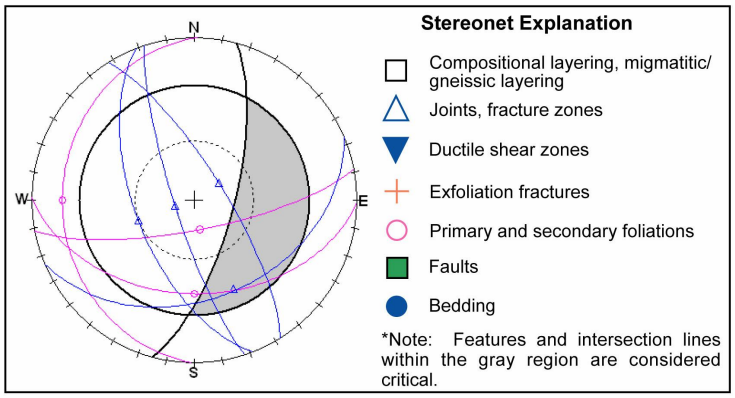
Photo above is a different perspective of point 8 in the photo mosaic at left. The intersection of 3 features has created the "zig-zag" appearance at the top of the slope where rocks have potentially fallen in the past. Details are as follows: A. Exfoliation surface oriented approximately 18/50. B. Foliation dipping out of the slope oriented approximately 50/70. C. Fracture dipping into the slope oriented approximately 130/40.

Past Active - Potential Rock Slide-Fall Area
BRP SKR-002
Image Dates: 01/29/04, 02/04/04

Extracted from: (*GRI Source Map ID 4160)* ([Blue Ridge Parkway Bedrock South](#)).

SKR-003

Past rock slide with a possible debris slide component. Slides dimensions are approximately 60' by 60' with a slope angle of 42 degrees. The slope is oriented at 105 degrees. Details include the following: 1. Fracture face (not seen in photo) oriented 160/60 in pegmititic/migmatitic metagraywacke. 2. Outcrop on south flank of slide with foliation oriented 90/42 and a fracture face subparallel to the scarp oriented 325/75. 3. Medium brown silty sand is around the outcrop at the apex. Outcrop is migmatitic muscovite schist with foliation oriented 80/75. Fracture face oriented 165/80 matches the fracture at 1. 4. Fracture face subparallel to left flank scarp oriented 66/40. Foliation is oriented 180/20.

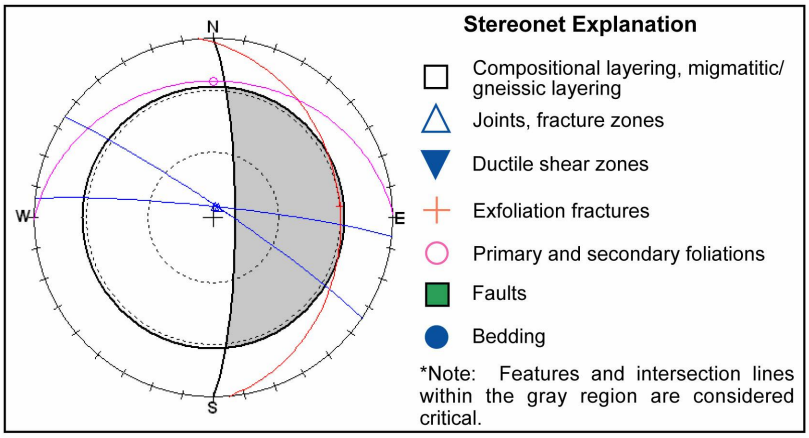


BRP SKR-003 Image Date: 02/04/04 Collection Date: 02/04/04

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SKR-005

Rock wedge showing rock fall potential. The following features are labeled in the photo: 1. Fracture dilated approximately 3 inches oriented 295/85. 2. Foliation oriented 270/25. 3. Exfoliation fracture oriented 355/30. 4. Fracture oriented 278/85.

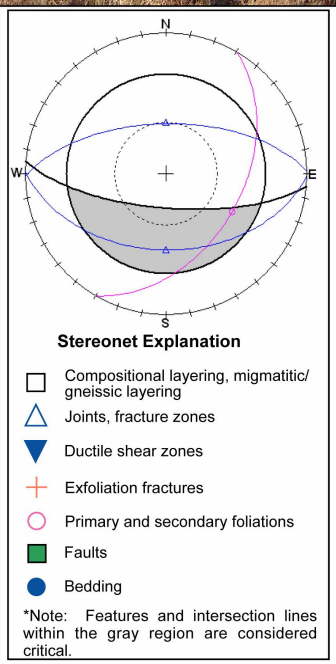


BRP SKR-005 Image Date: 02/04/04 Collcetion Date: 02/04/04

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SKR-006

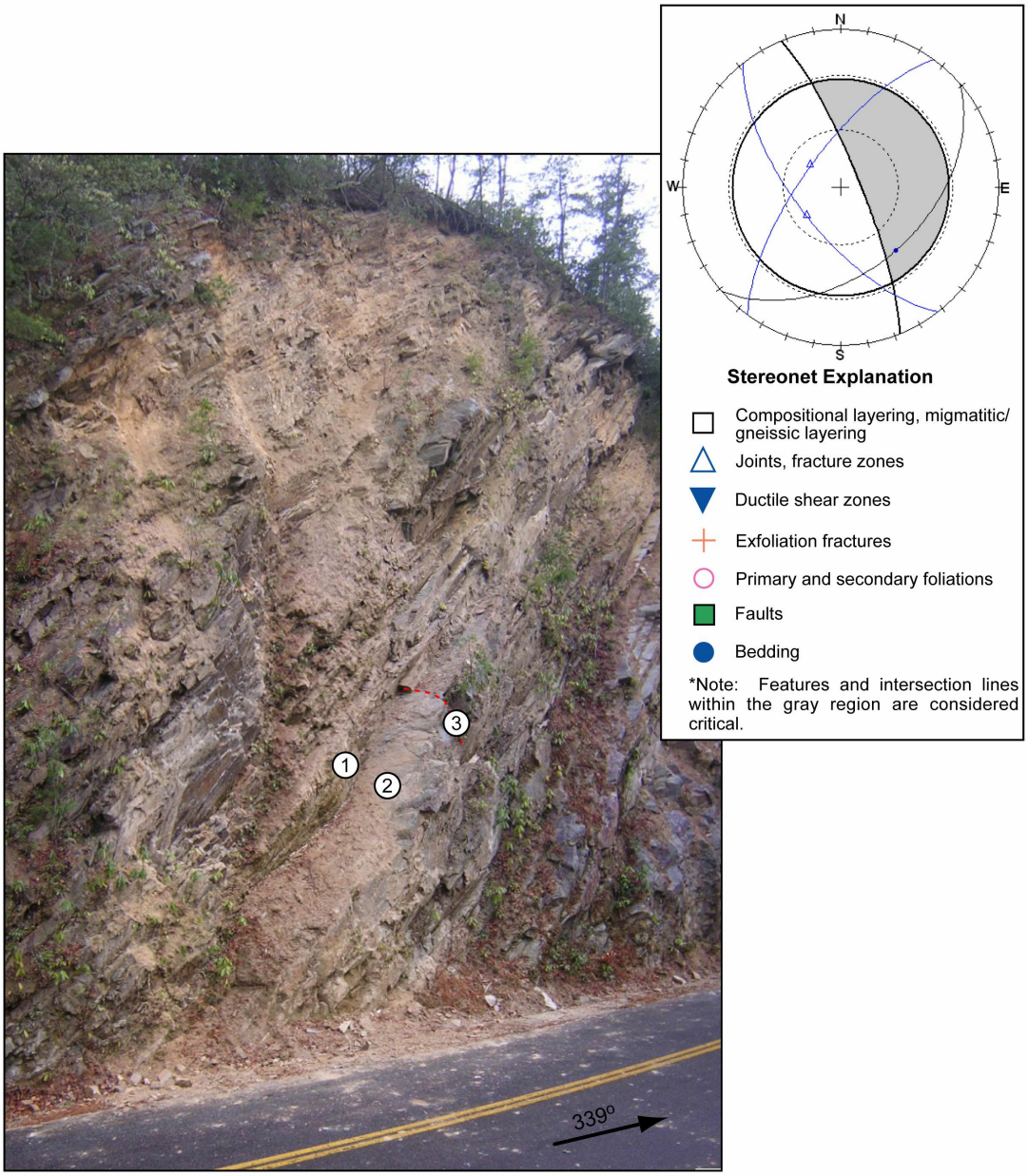
Debris flow at the west end of the Green Knob Tunnel that occurred around December 25, 2006. Material from the debris flow landed in the road, but no injuries or damage was reported. Failure occurred in thin (< 5 feet thick) colluvium above stained state metagraywacke and chlorite muscovite schist. The sliding surface is approximately 90/45. Foliation in bedrock is 30/45, and another fracture was measured at 270/60. There is seepage along the soil-bedrock contact, and numerous curved and leaning trees were observed upslope of the headscarp which indicates that the soil is creeping downhill.



Past Active - Potential Debris Flow - Rock slide
BRP SKR-006
Image Date: 01/03/07
Collection Date: 01/03/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SMR-001

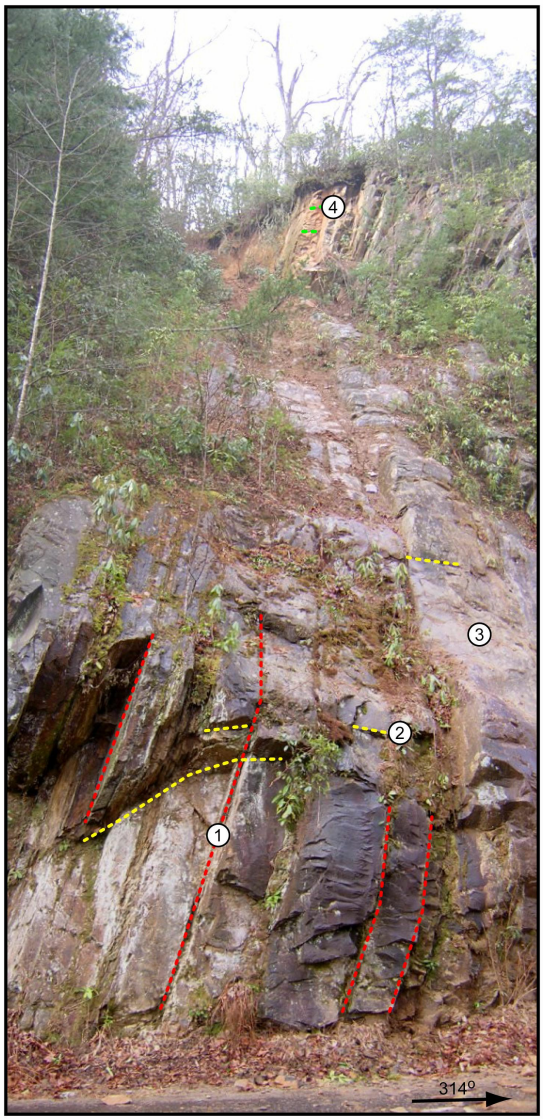


Photograph of SMR-001 located approximately 600 feet north of the Ballhoot Scar Overlook where early January 2005 rock slide occurred. Rock primarily consists of muscovite metasandstone and is locally crossbedded. Rock was continuing to fall at time of investigation. 1. Fracture oriented 142/68. 2. Bedding/foliation oriented 49/46. 3. Fracture oriented 218/70.

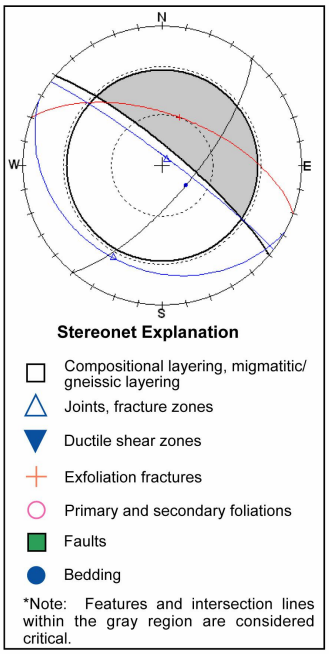
BRP SMR-001 Image Date: 01/26/05 Collection Date: 01/26/05

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SMR-003



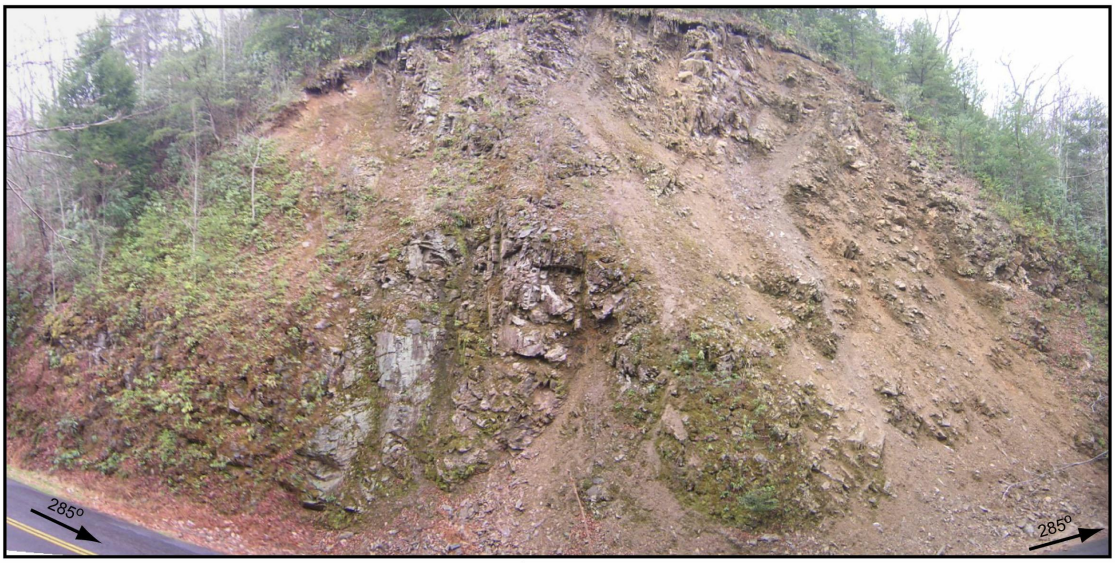
Details for past active/active rock fall at SMR-003. Rock here is stained state to partially decomposed grey-brown pebbly arkosic micaceous metasandstone with mica. 1. Bedding (highlighted in red) oriented 40/72. 2. Fracture forming an overhang oriented 118/27. 3. Exfoliation fracture dipping towards the road is oriented 290/60. 4. Fracture forming the release surface for rock fall is oriented 305/85.



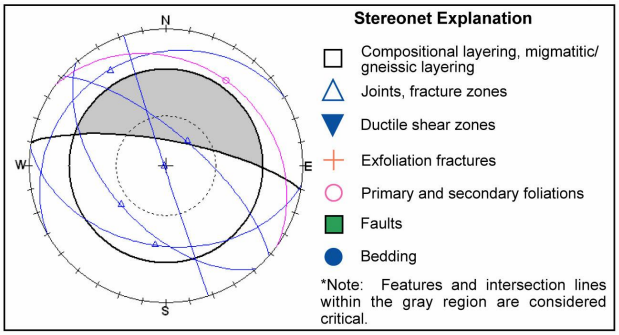
BRP SMR-003
Image Date: 01/26/05
Collection Date: 01/26/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SMR-008



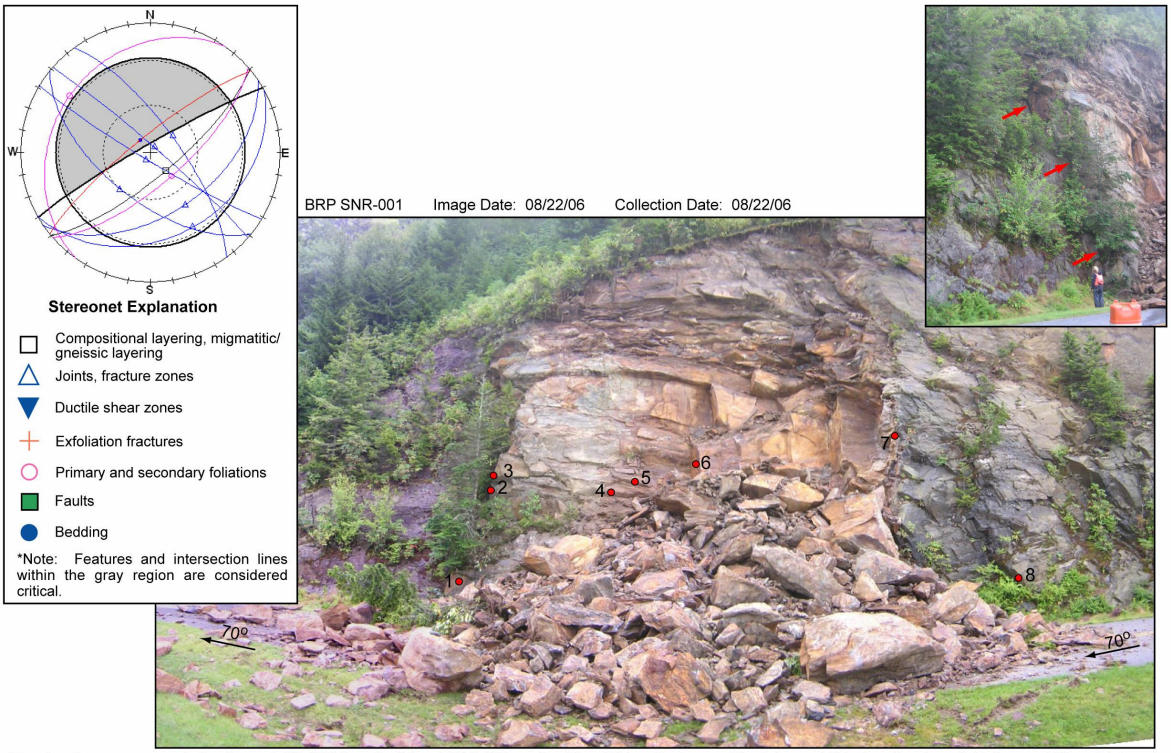
Active rock fall at SMR-008. Rock type includes micaceous, gray to brown, medium-grained metasandstone, meta-conglomerate with quartz and feldspar clasts, and minor layers of metasiltstone. All three rock types are stained state in lower portion of the cut and are stained state to partially decomposed in the upper portion of the road cut. Soil is yellow-brown, poorly graded, gravelly, cobbly, bouldery sand with sandy silt matrix. Fracture measurements here include the following: 140/55, 310/70, 220/90, 98/42, 240/20. Foliation is oriented 305/25.



BRP SMR-008 Image Date: 01/26/05 Collection Date: 01/26/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

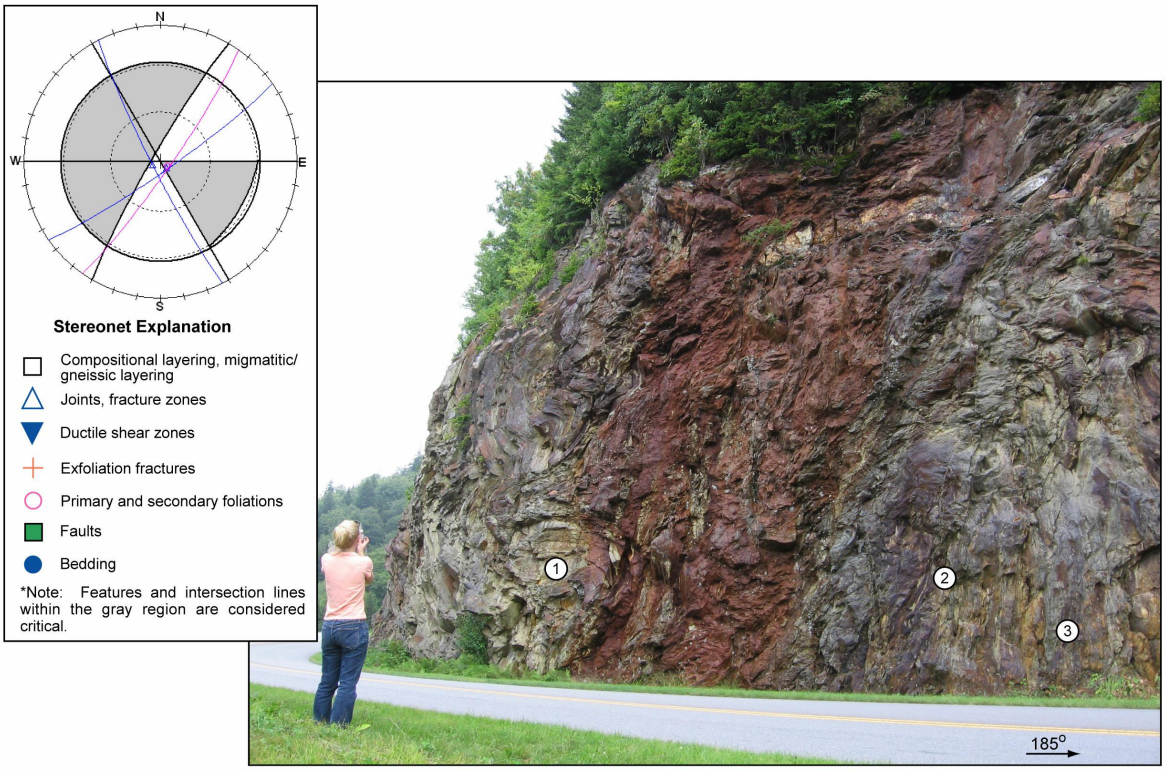
SNR-001



Structural measurements for August 18, 2006 rock slide at MM 452 on the Blue Ridge Parkway. Rock type at this location is sulphidic graphitic schist and metagraywacke of the Great Smoky Group. Details include the following: 1. Bedding/primary foliation forming back release surface oriented 232/80. 2. Fracture/slip surface oriented 322/72 with slickenlines oriented 40/65. 3. Fracture (possible cleavage associated with the fold axial plane) oriented 60/35. 4. Fold with axial plane oriented 55/45 and fold hinge oriented 220/5. Foliation on the top limb oriented 215/25; foliation on bottom limb oriented 48/70. 5. Fracture/quartz vein forming the top release surface set oriented 56/50. 6. Fracture/slip surface oriented 302/90+5 with slickenlines oriented 40/82. 7. Pegmatite contact oriented 50/75. This forms the left flank of the slide. 8. Fracture oriented 130/60. **Inset:** Oblique photograph showing fracture at data points 2 and 3. Arrows point to potential sliding surface.

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SNR-003

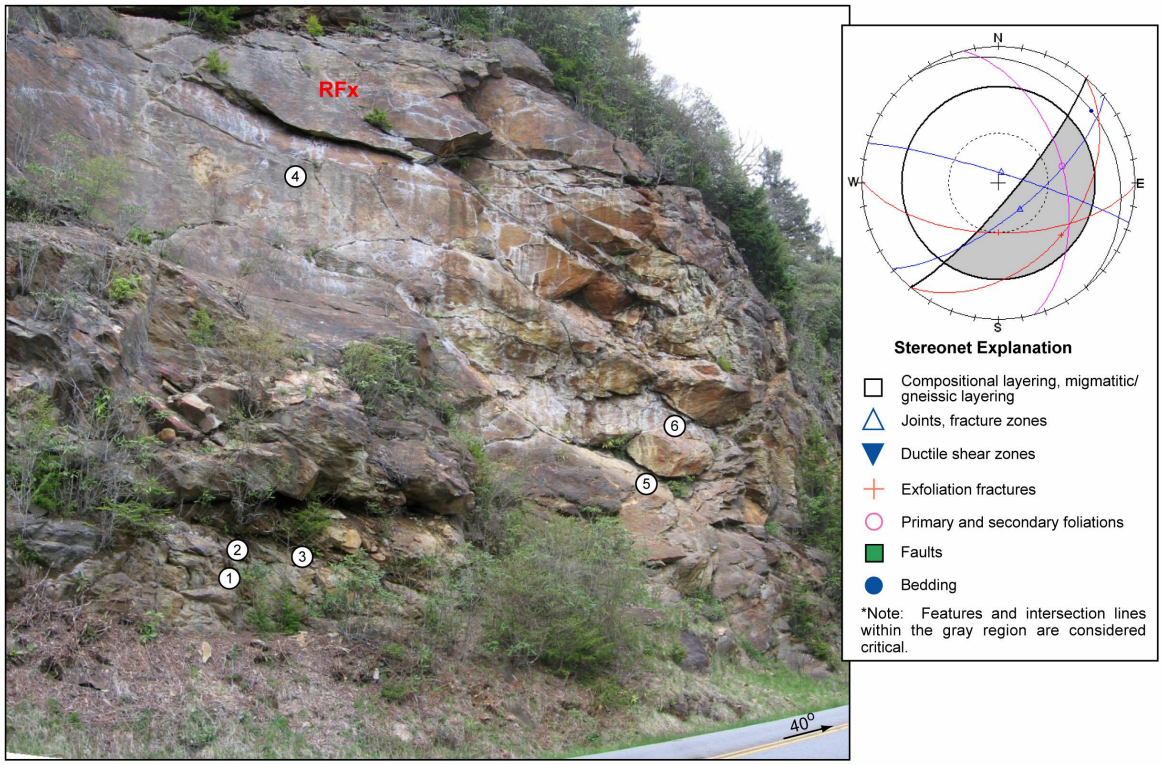


Potential rock slide/fall in sulfidic bedrock. Details follow: 1. Variable fracture face oriented 160/85. 2. Slip surface oriented 45/85; bearing and plunge of slickenlines oriented 45/20. 3. Foliation in schist oriented 32/85.

BRP SNR-003 Image Date: 08/22/06 Collection Date: 05/10/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SNR-004

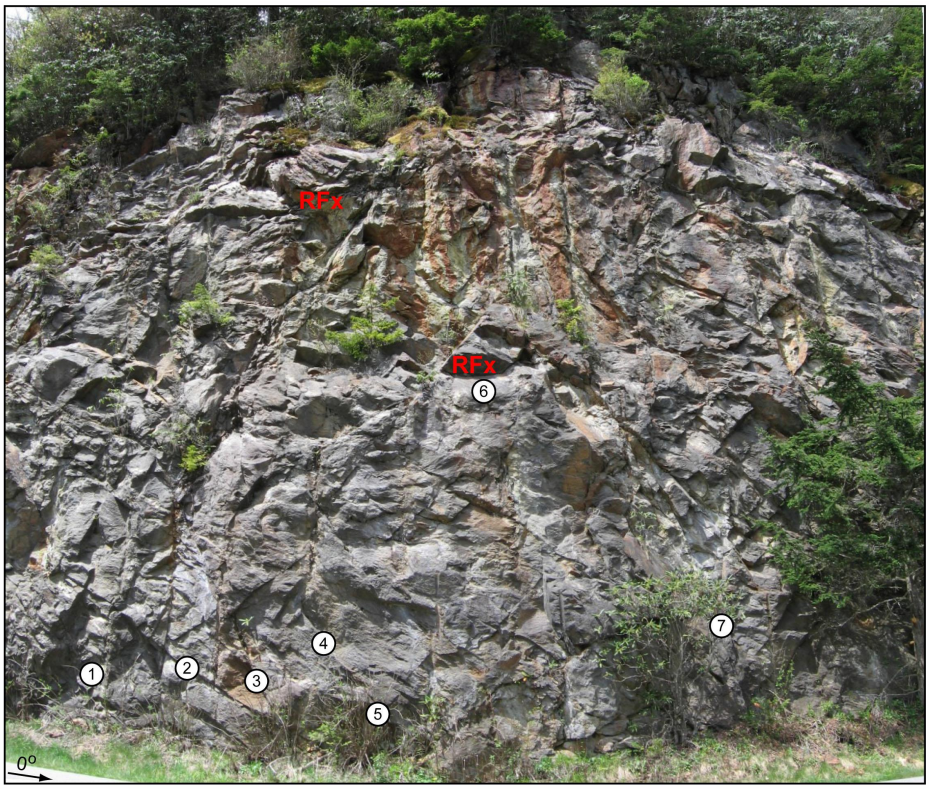


High priority, potential rock fall in garnet, muscovite, biotite meta-graywacke and schist with local graphite and sulfides. Details follow: 1. Fracture set oriented 285/83. 2. Foliation oriented 345/50. 3. Bedding oriented 322/15. 4. Fracture approximately oriented 50/70. 5. Exfoliation fracture oriented 40/40. 6. Exfoliation fracture oriented 90/60.

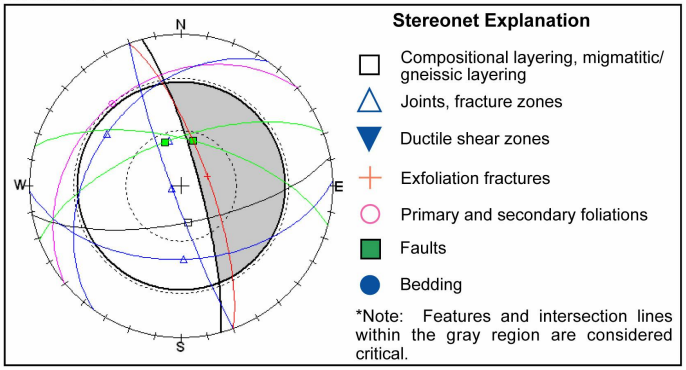
BRP SNR-004
Image Date: 05/10/07
Collection Date: 05/22/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SNR-005



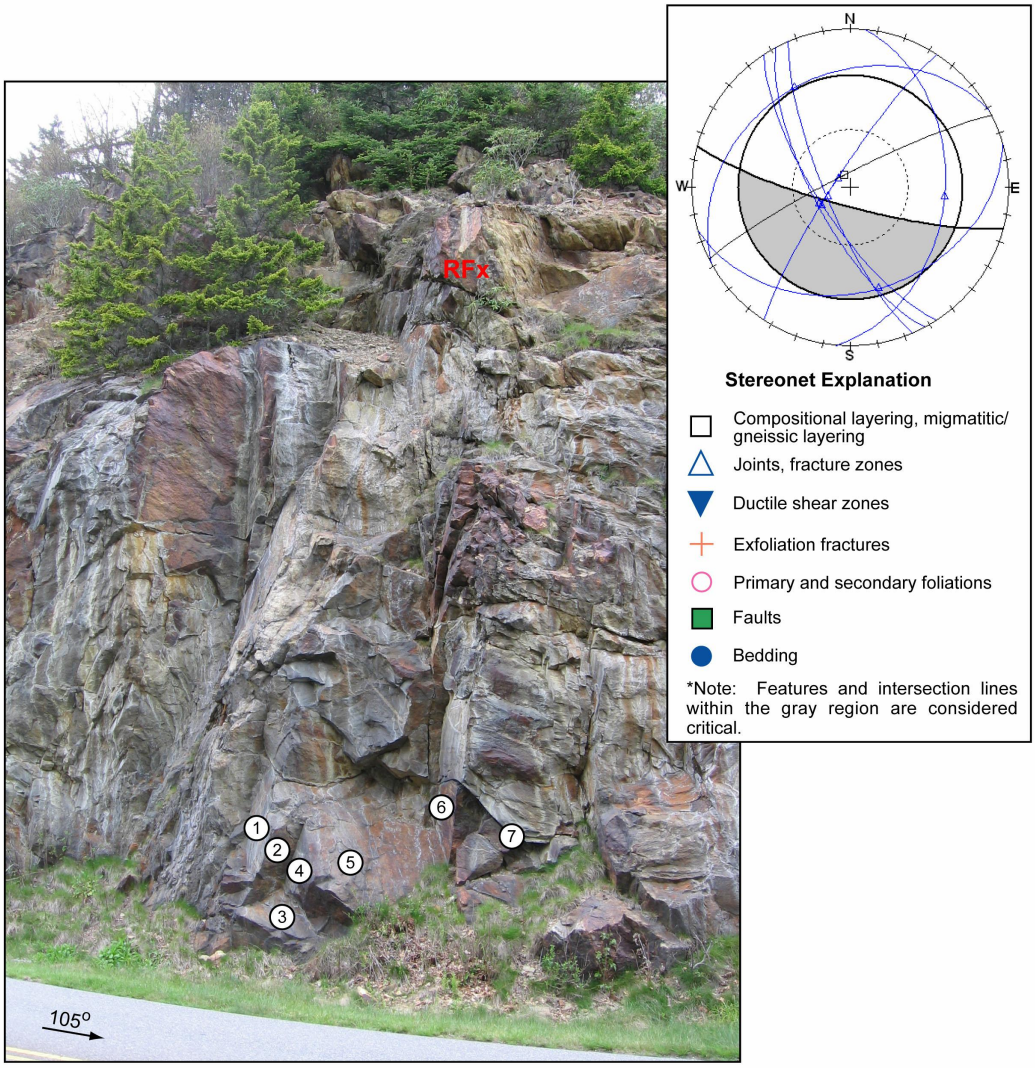
Potential rock fall in through cut. Details include the following: Pegmatite intrusive contact not on photo is oriented 80/70. Fracture not shown on photo is oriented 165/85. 1. Foliation/compositional layering oriented 230/30. 2. Fracture oriented 215/40. 3. Fracture oriented 255/65. 4. Reverse fault oriented 250/65 with 6-8 inches of offset. 5. Fracture oriented 88/50. 6. Exfoliation fracture approximately oriented 340/75. 7. Fault oriented 285/65.



BRP SNR-005 Image Date: 05/10/07 Collection Date: 05/22/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SNR-006

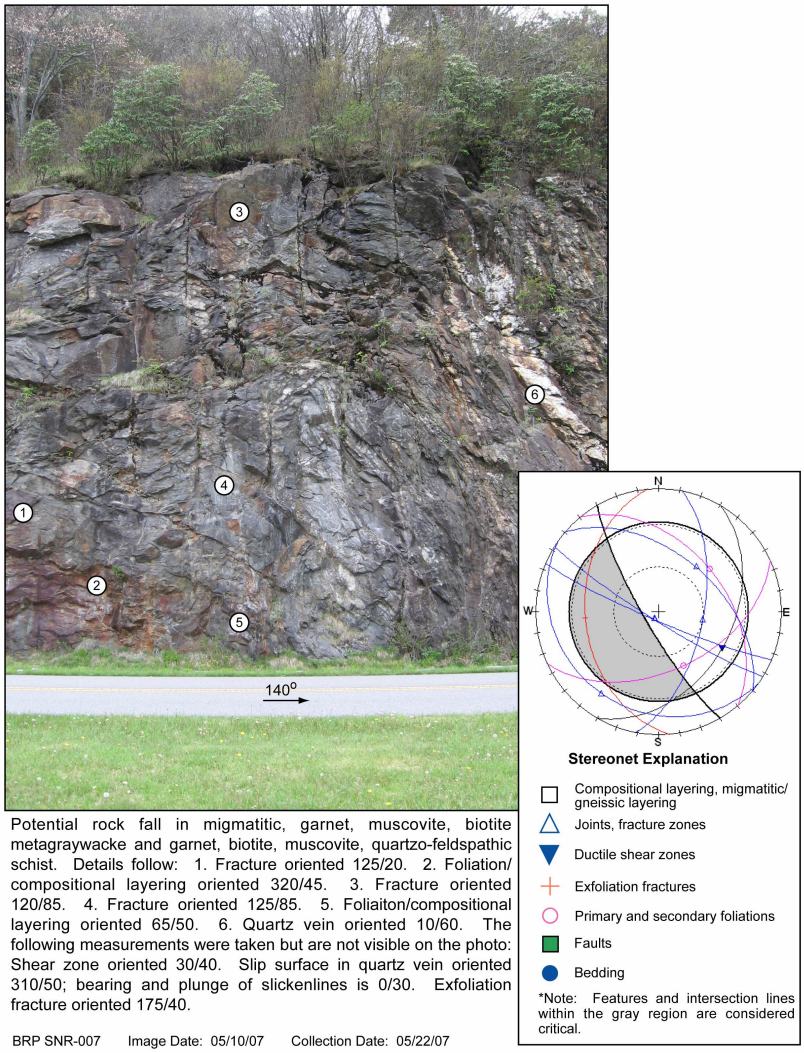


Potential rock fall in biotite metagraywacke with minor biotite muscovite schist layers. Details include the following: 1. Fracture oriented 150/73. 2. Fracture oriented 220/82. 3. Fracture oriented 241/28. 4. Fracture oriented 154/72. 5. Fracture oriented 74/35 forms a potential sliding surface. 6. Fracture oriented 161/78 forms a side release surface. 7. Fracture oriented 5/40. Compositional layering measured to the left of the photo is oriented 243/83.

BRP SNR-006
Image Date: 05/10/07
Collection Date: 05/22/07

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SNR-007

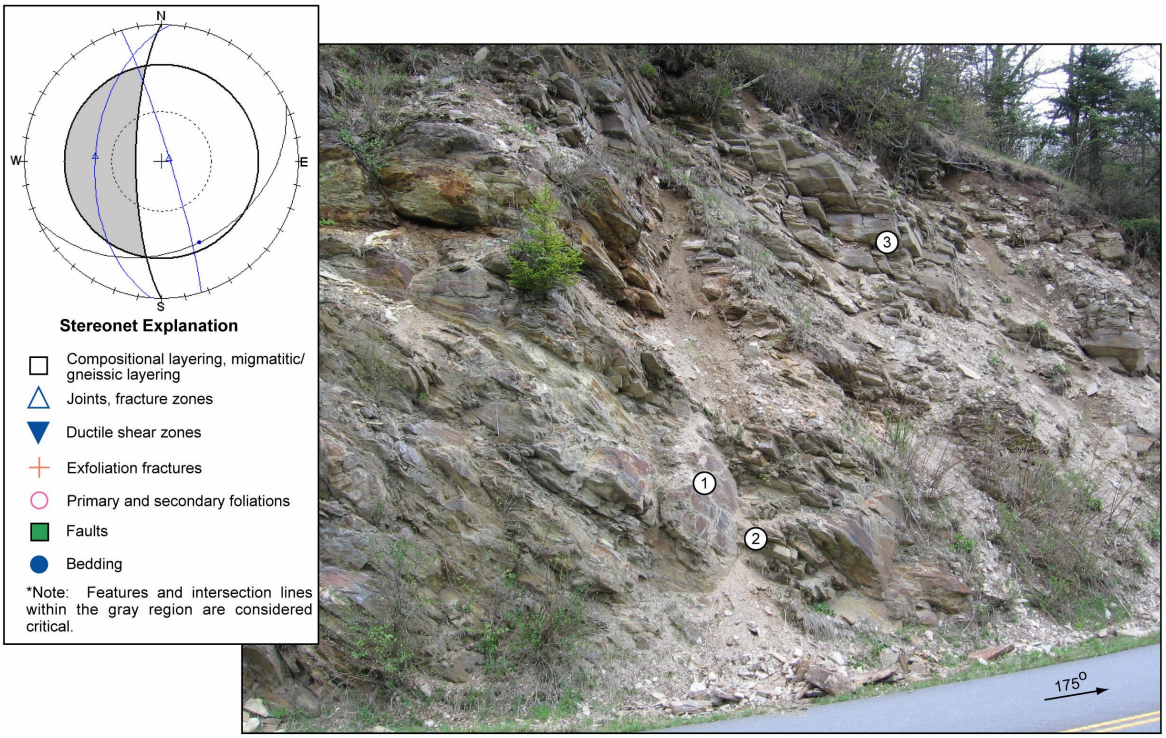


Potential rock fall in migmatitic, garnet, muscovite, biotite metagraywacke and garnet, biotite, muscovite, quartzo-feldspathic schist. Details follow: 1. Fracture oriented 125/20. 2. Foliation/ compositional layering oriented 320/45. 3. Fracture oriented 120/85. 4. Fracture oriented 125/85. 5. Foliaiton/compositional layering oriented 65/50. 6. Quartz vein oriented 10/60. The following measurements were taken but are not visible on the photo: Shear zone oriented 30/40. Slip surface in quartz vein oriented 310/50; bearing and plunge of slickenlines is 0/30. Exfoliation fracture oriented 175/40.

BRP SNR-007 Image Date: 05/10/07 Collection Date: 05/22/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SNR-011

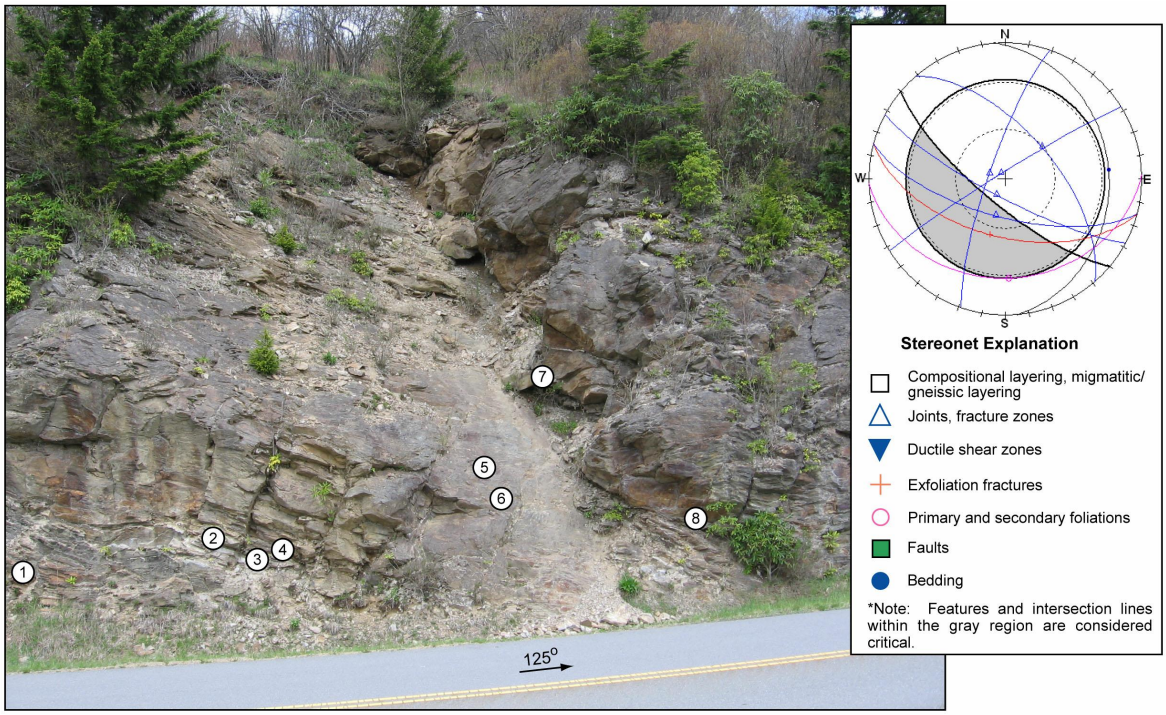


Active rock slide in metasandstone and schist. Details follow; locations of measurements are approximate: 1. Fracture forming right side of wedge failure is oriented 334/85. 2. Fracture forming left side of wedge failure is oriented 185/50. 3. Bedding in metasandstone/schist is oriented 65/35.

BRP SNR-011 Image Date: 05/10/07 Collection Date: 05/10/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SNR-012



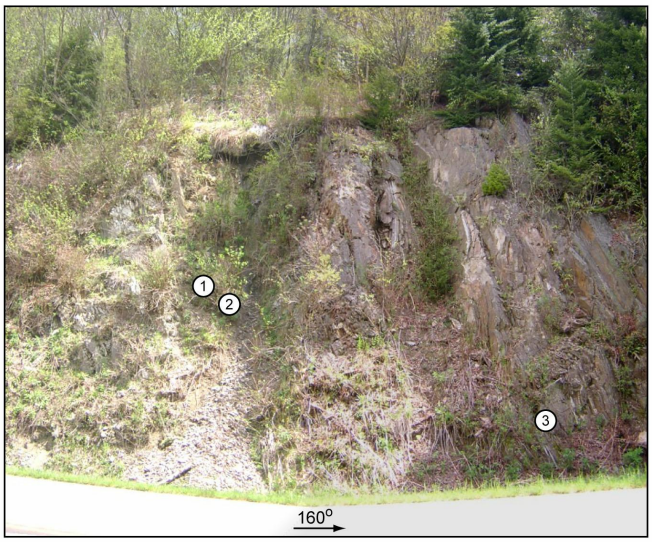
Past active/potential rock slide in biotite, muscovite schist and metagraywacke with minor calc-silicate pods. Details include the following: 1. Fracture oriented 318/60. 2. Fracture oriented 105/68. 3. Bedding oriented 355/25. 4. Foliation oriented 88/28. 5. Exfoliation fracture oriented 105/55. 6. Fracture set oriented 120/80. 7. Fracture oriented 240/85. 8. Fracture oriented 205/80.

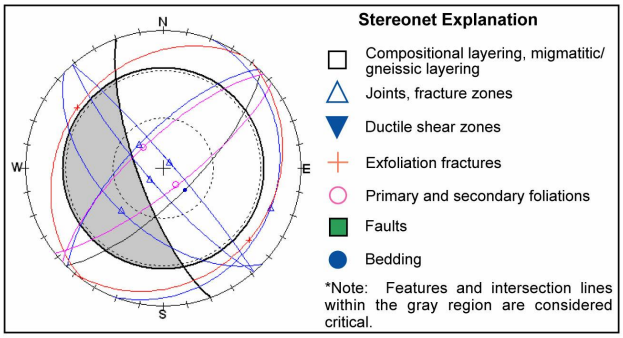
BRP SNR-012 Image Date: 05/10/07 Collection Date: 05/22/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SNR-013

Below: Potential rock slide in biotite, muscovite metagraywacke with graphitic, sulfidic, quartzo-feldspathic, muscovite schist and muscovite, biotite, quartz metasandstone. Details follow: 1. Fracture oriented 315/85. 2. Fracture oriented 135/55 forms the potential sliding surface. 3. Foliation/bedding oriented 226/73. 4. Slip surface oriented 225/70; bearing and plunge of slickenlines is 225/3 indicating right lateral movement. 5. Fracture oriented 140/80. 6. Exfoliation fracture oriented 215/25. 7. Exfoliation fracture oriented 40/20. **Right:** Weathered rock slide. Details follow: 1. Foliation in partially to completely decomposed pegmatite oriented 53/78. 2. Intrusive contact oriented 20/18. 3. Bedding oriented 45/72.

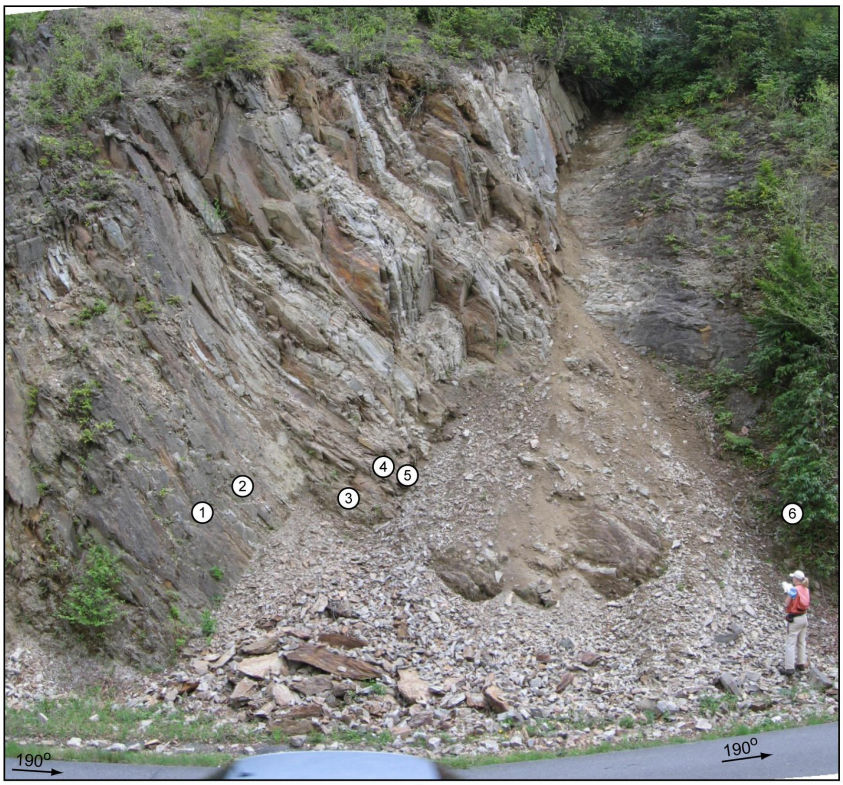


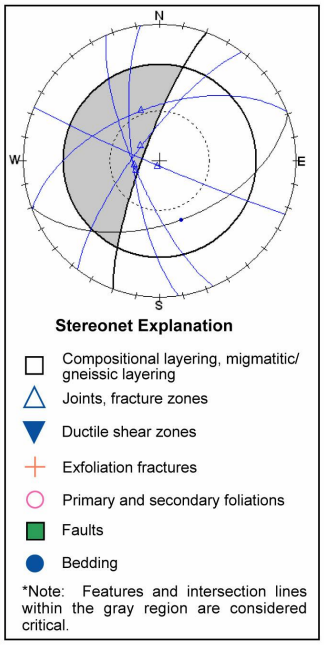


BRP SNR-013 Image Date: 05/11/07 Collection Date: 05/22/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SNR-014





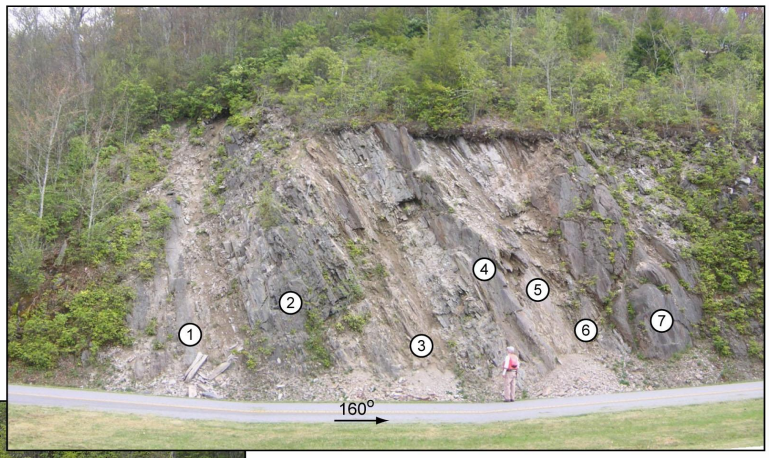
Active rock slide in biotite, muscovite, quartzo-feldspathic metagraywacke with minor amounts of pegmatite and coarse-grained, garnet, biotite, muscovite schist. Details follow: 1. Bedding oriented 70/52 forms overhangs. 2. Fracture oriented 173/75 forms side release surface. 3. Fracture oriented 220/75. 4. Fracture oriented 118/87. 5. Fracture oriented 160/75. 6. Fracture oriented 250/57 forms left release surface.

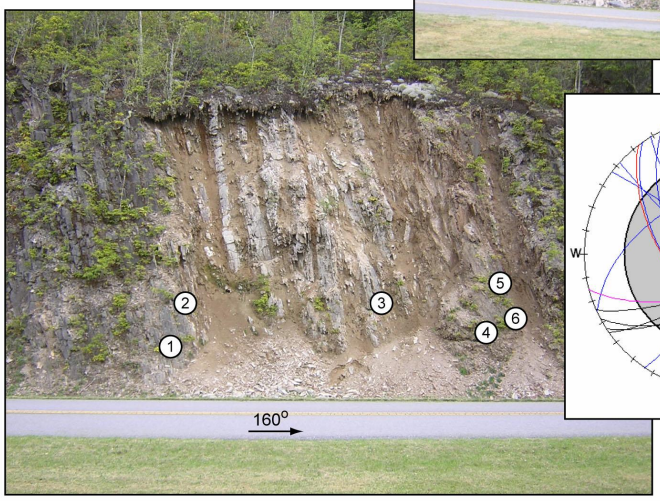
BRP SNR-014
Image Date: 05/11/07
Collection Date: 05/22/07

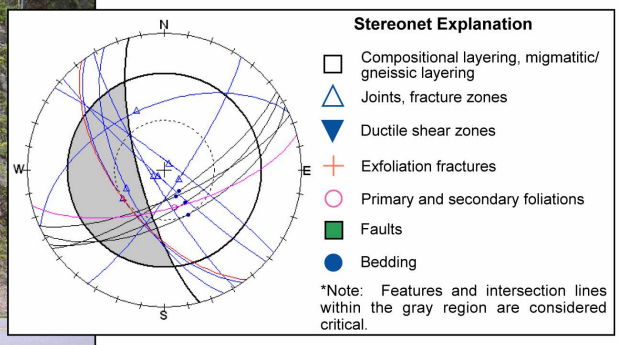
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SNR-015

Rock slide at the Hornbuckle Valley Overlook in biotite, muscovite, feldspathic metagraywacke and muscovite schist. The schist is completely decomposed in several locations particularly at the southeast exposure. **Right:** Northwest portion of the outcrop. 1. Fracture oriented 146/60. 2. Fracture oriented 305/85. 3. Foliation/bedding oriented 62/60. 4. Fracture oriented 30/80. 5. Fracture oriented 155/65. 6. Fracture oriented 245/50. 7. Fracture oriented 140/85. **Below:** Southeast portion of the outcrop. 1. Fracture oriented 154/83. 2. Bedding oriented 57/67. 3. Bedding oriented 55/75. 4. Exfoliation fracture oriented 143/60. 5. Foliation in schist oriented 75/67. 6. Bedding oriented 67/73.



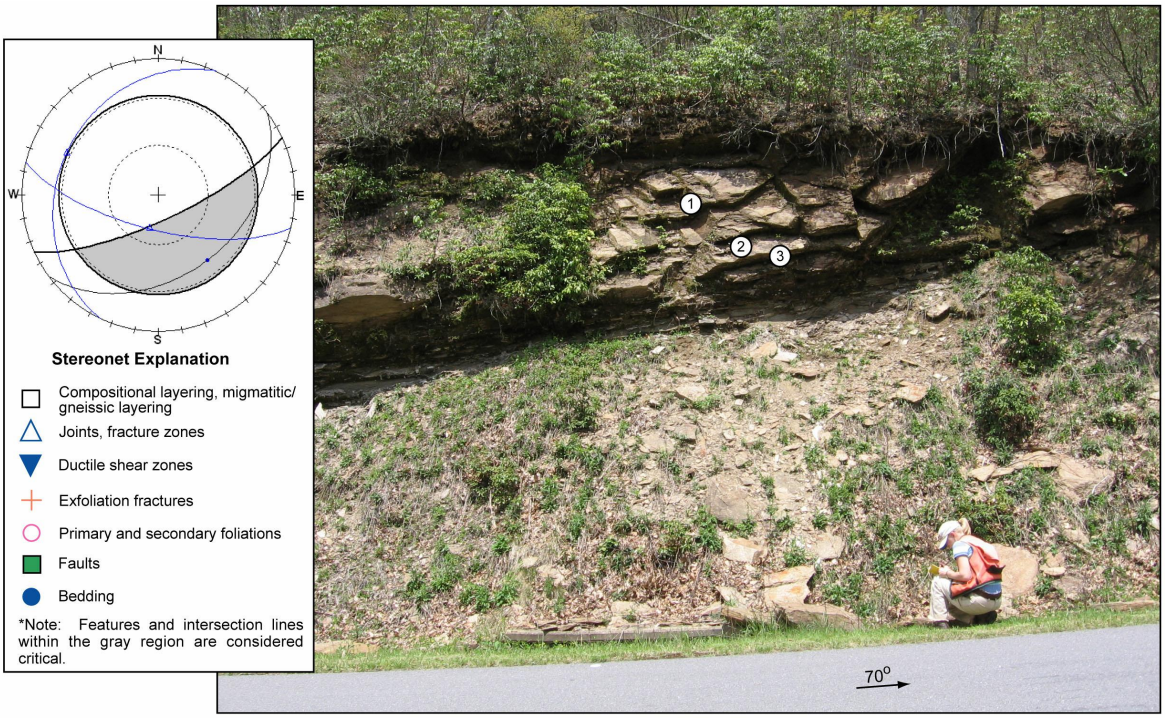




BRP SNR-015
Image Date: 05/11/07
Collection Date: 05/22/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SNR-016

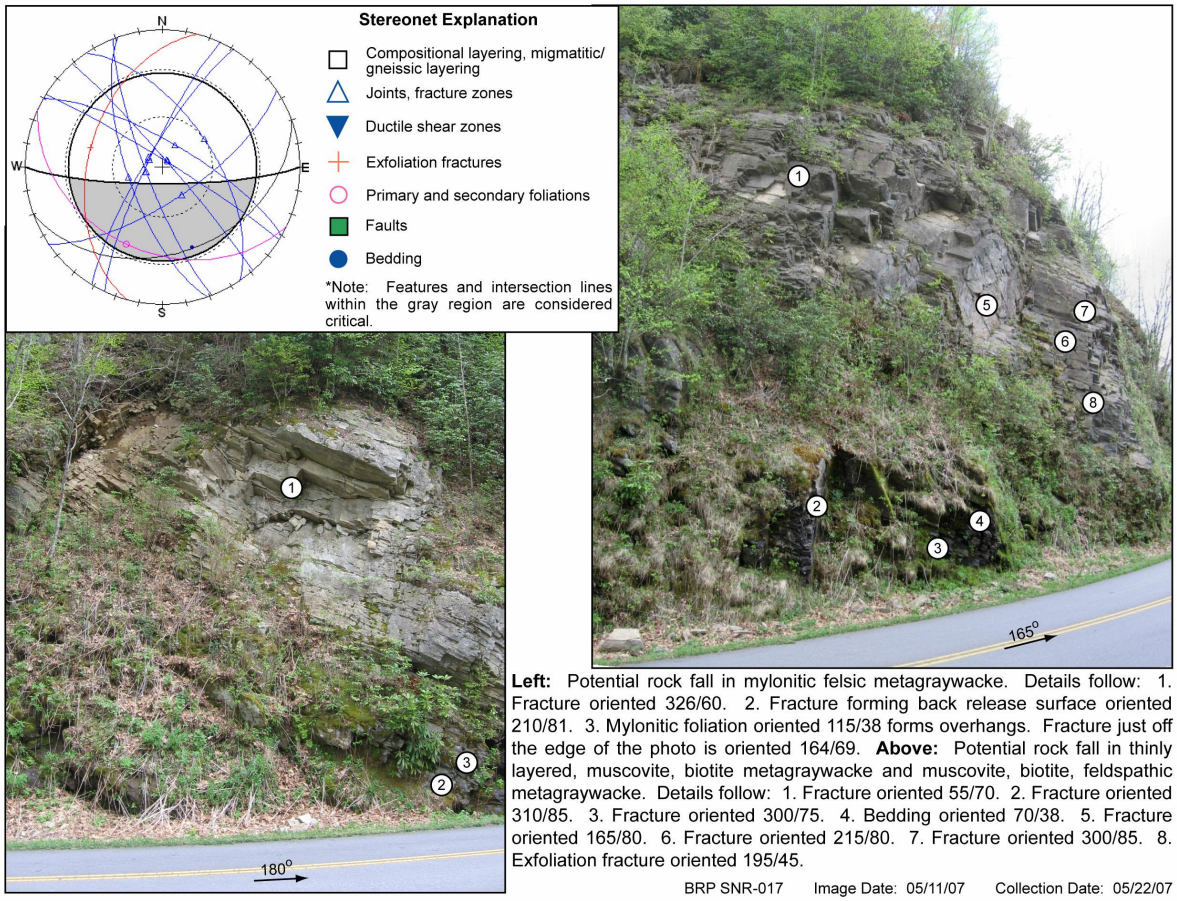


Past active and potential rock slide in thinly layered, biotite, muscovite schist and metagraywacke. Rocks from past rock slide are up to 3 feet in diameter and are in the ditch at the base of the slope. Details follow: 1. Fracture oriented 105/70 forms the side release surface. 2. Bedding oriented 53/40 forms the sliding surface. 3. Fracture oriented 205/27 forms the top release surface.

BRP SNR-016 Image Date: 05/11/07 Collection Date: 05/11/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SNR-017

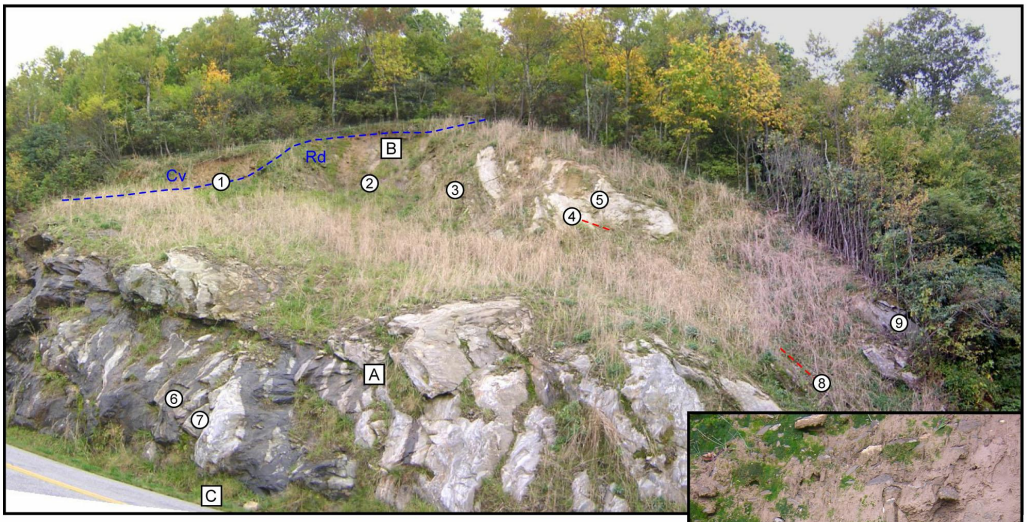


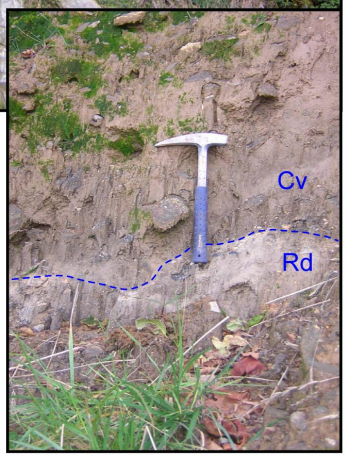
Left: Potential rock fall in mylonitic felsic metagraywacke. Details follow: 1. Fracture oriented 326/60. 2. Fracture forming back release surface oriented 210/81. 3. Mylonitic foliation oriented 115/38 forms overhangs. Fracture just off the edge of the photo is oriented 164/69. **Above:** Potential rock fall in thinly layered, muscovite, biotite metagraywacke and muscovite, biotite, feldspathic metagraywacke. Details follow: 1. Fracture oriented 55/70. 2. Fracture oriented 310/85. 3. Fracture oriented 300/75. 4. Bedding oriented 70/38. 5. Fracture oriented 165/80. 6. Fracture oriented 215/80. 7. Fracture oriented 300/85. 8. Exfoliation fracture oriented 195/45.

BRP SNR-017 Image Date: 05/11/07 Collection Date: 05/22/07

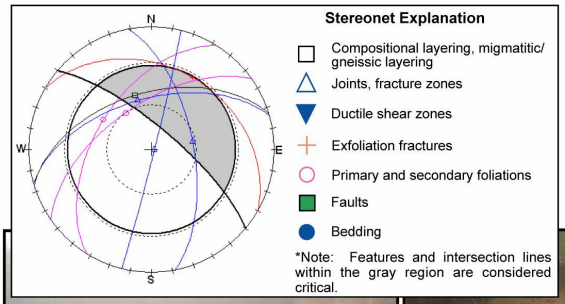
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SRR-003

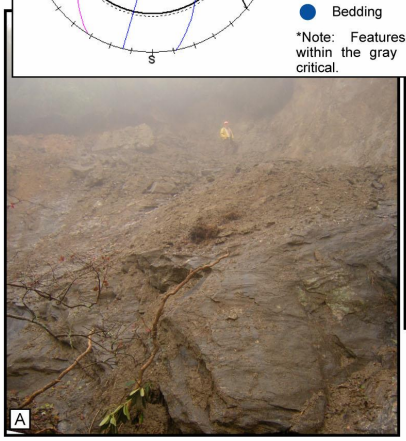




Past debris slide at mile marker 413.1. The slope failed between September 6-8, 2004 during heavy rainfall from the remnants of Hurricane Frances. **Above:** Lettered data points correspond to images below taken shortly after failure occurred. Photograph was taken on October 5, 2005. Details for this image include the following: 1. Contact, shown by blue dashed line, between colluvium (Cv) and completely decomposed bedrock (residuum, Rd). Photo at right provides an up close view of the contact. 2. Foliation/ compositional layering oriented 212/52. 3. Piping exposed in the scarp. 4. Compositional layering/gneissic layering in partially decomposed migmatitic metagraywacke is 253/52. 5. Fracture oriented 348/62. 6. Exfoliation fracture/slip surface oriented 300/33. 7. Foliation/compositional layering oriented 235/60; mica alignment with bearing and plunge of 60/10. 8. Fracture oriented 255/55. 9. Fracture oriented 351/88. **Right:** Dashed line indicates the contact between colluvium (Cv) and completely decomposed bedrock (Rd). The colluvium contains many boulders suspended in a silty sand matrix. The completely decomposed rock is also a silty sand except but does not contain boulders.



BRP SRR-003
Image Dates: 09/16/04, 10/05/05
Collection Dates: 09/16/04, 10/05/05



Photographs of the debris slide at mile marker 413.1 taken on September 16, 2004. **A.** View of the head scarp and initiation point taken from the toe. **B.** Up close view of a colluvial/residual wedge where failure occurred. Arrow points to piping at this location. Gullying and surface water runoff were observed at the time of the photograph. **C.** Deposit of soil, rocks and trees at the toe of the slope. This deposit blocked the Blue Ridge Parkway for several days and cost over $100,000 to repair.

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SRR-004

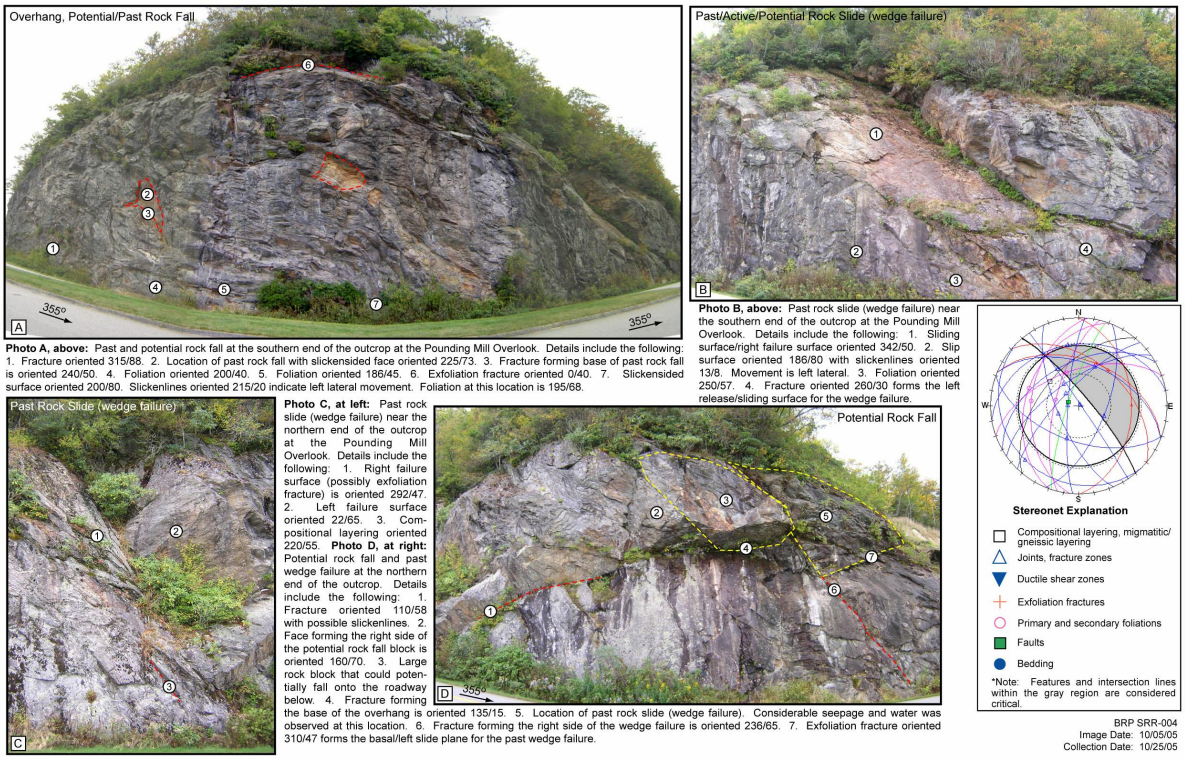


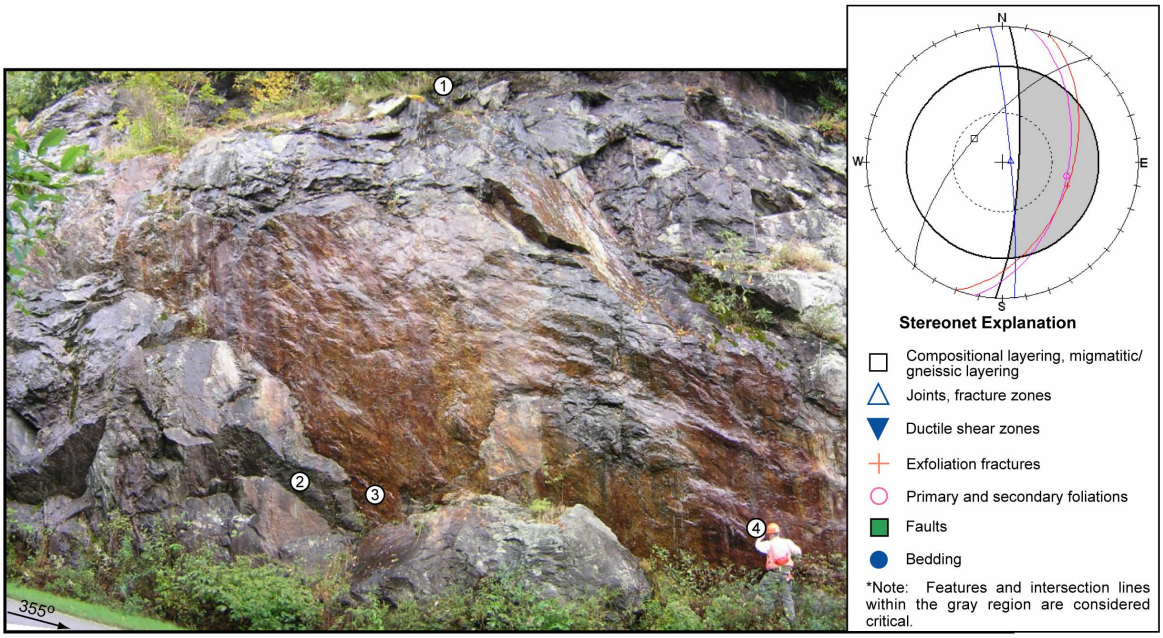
Photo A, above: Past and potential rock fall at the southern end of the outcrop at the Pounding Mill Overlook. Details include the following: 1. Fracture oriented 315/88. 2. Location of past rock fall with slickensided face oriented 225/73. 3. Fracture forming base of past rock fall is oriented 240/50. 4. Foliation oriented 200/40. 5. Foliation oriented 186/45. 6. Exfoliation fracture oriented 0/40. 7. Slickensided surface oriented 200/80. Slickenlines oriented 215/20 indicate left lateral movement. Foliation at this location is 195/68.

Photo B, above: Past rock slide (wedge failure) near the southern end of the outcrop at the Pounding Mill Overlook. Details include the following: 1. Sliding surface/right failure surface oriented 342/50. 2. Slip surface oriented 186/80 with slickenlines oriented 13/8. Movement is left lateral. 3. Foliation oriented 250/57. 4. Fracture oriented 260/30 forms the left release/sliding surface for the wedge failure.

Photo C, at left: Past rock slide (wedge failure) near the northern end of the outcrop at the Pounding Mill Overlook. Details include the following: 1. Right failure surface (possibly exfoliation fracture) is oriented 292/47. 2. Left failure surface oriented 22/65. 3. Compositional layering oriented 220/55. **Photo D, at right:** Potential rock fall and past wedge failure at the northern end of the outcrop. Details include the following: 1. Fracture oriented 110/58 with possible slickenlines. 2. Face forming the right side of the potential rock fall block is oriented 160/70. 3. Large rock block that could potentially fall onto the roadway below. 4. Fracture forming the base of the overhang is oriented 135/15. 5. Location of past rock slide (wedge failure). Considerable seepage and water was observed at this location. 6. Fracture forming the right side of the wedge failure is oriented 236/65. 7. Exfoliation fracture oriented 310/47 forms the basal/left slide plane for the past wedge failure.

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SRR-005

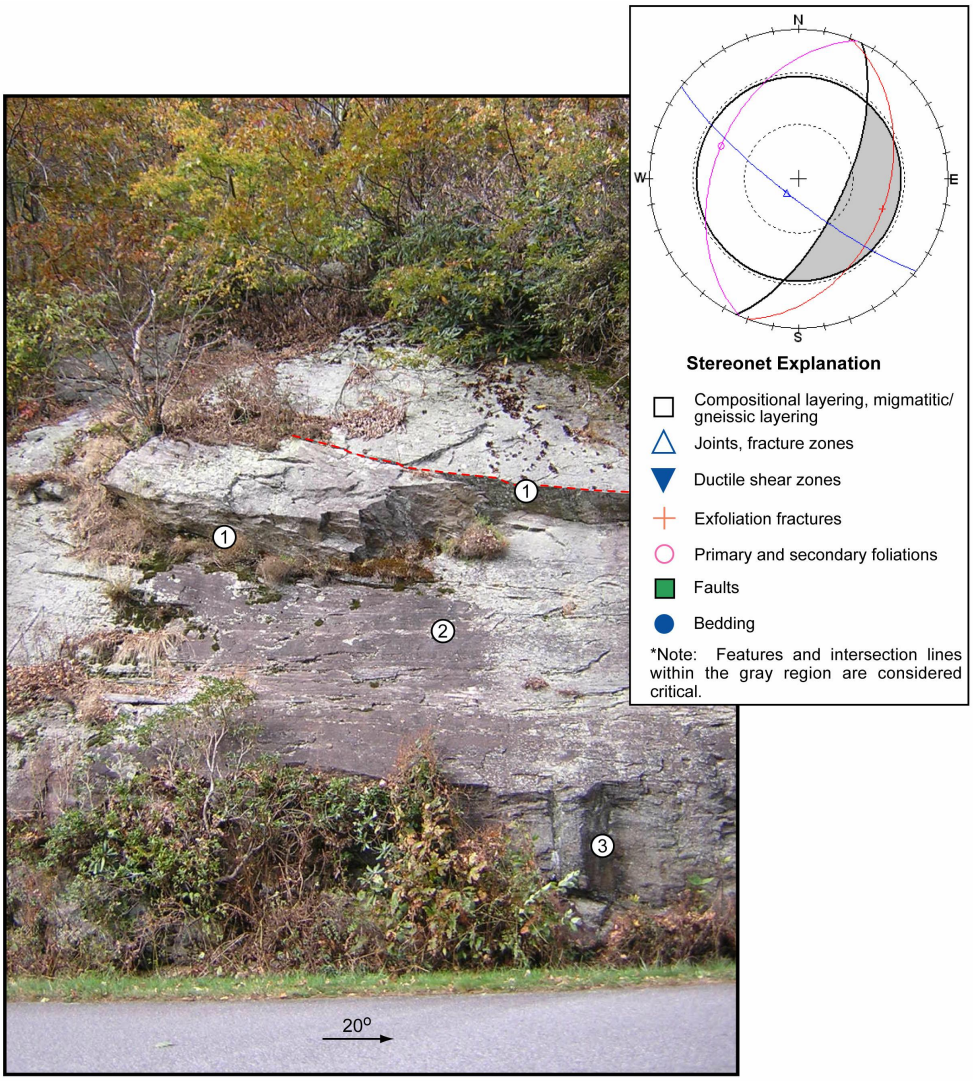


Details for through cut with rock fall potential just south of Wagon Road Gap. Rock here is metagraywacke with minor schist layers. Details follow, and data point locations are approximate. 1. Exfoliation fracture at the top of the slope that forms the basal sliding plane for potential rock fall/slide blocks. This feature is oriented 20/48. 2. Gneissic layering/foliation in metagraywacke is oriented 220/68. 3. Foliation surface dipping out of slope is oriented 12/50. Crenulations on this surface have a bearing and plunge of 20/12. 4. Very wet slip surface oriented 345/85. The bearing and plunge of slickenlines is 2/47. Movement is left lateral oblique slip.

SRR-005 Image date: 10/12/05 Collection Date: 10/25/05

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SRR-009

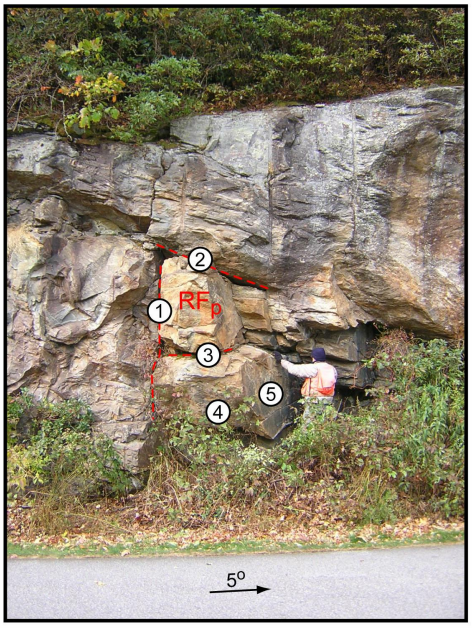


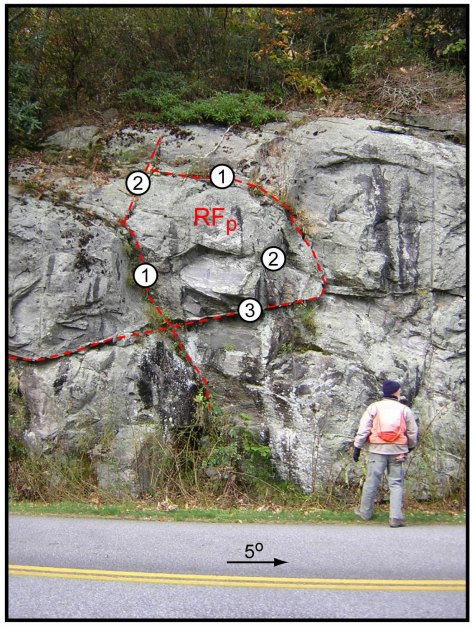
Potential rock fall block at SRR-009 in stained state migmatitic metagraywacke. Details include the following: 1. Foliation forming the front face and the back release surface (indicated by red line) is oriented 203/43. 2. Exfoliation fracture forming the sliding surface is oriented 20/40. 3. Fracture measured at the bottom of the slope possibly forming the side release surfaces where located upslope is oriented 130/80.

SRR-009 Image Date: 10/25/05 Collection Date: 10/25/05

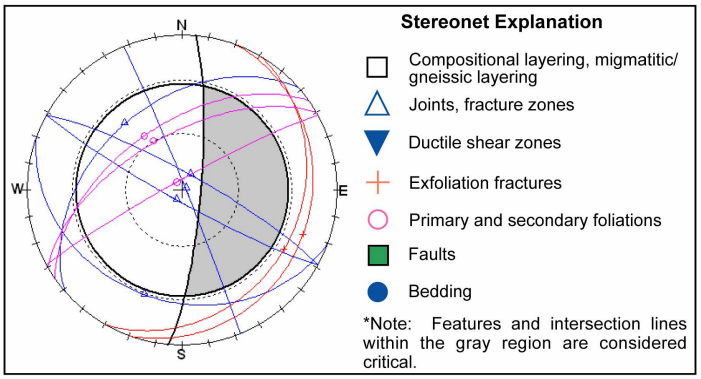
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SRR-011





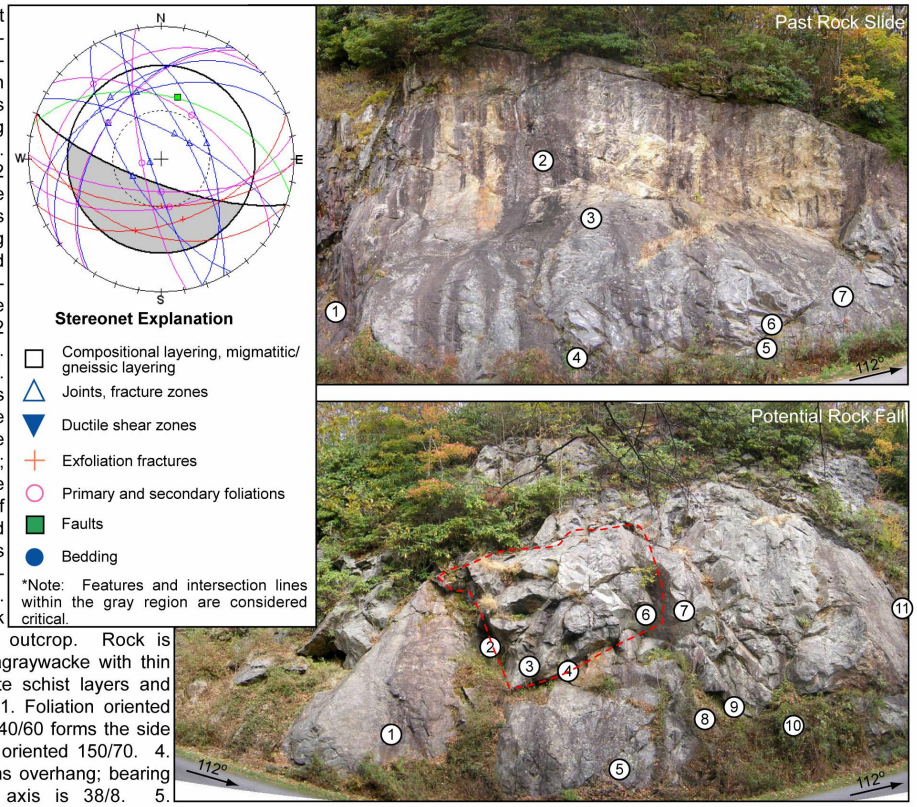
Details for two potential rock fall blocks at SRR-011. Rock type at this location is stained state migmatitic metagraywacke. **Above Left:** Details for first potential rock fall block. 1. Fracture forming right release surface is oriented 122/85 and is dilated approximately 3 inches. 2. Fracture forming the back release surface is oriented 230/42. 3. Exfoliation fracture oriented 30/25 and 20/18 forms the sliding surface for the rock fall block. 4. Foliation measured 235/55 is variable. 5. Fracture forming the left release surface is oriented 320/87. **Above Right:** Details for second potential rock fall block at SRR-011. Photo right is an oblique view of the same location shown in photo left. Details are the same for each photo and include the following: 1. Foliation forming the front and back release surfaces is 235/85. This is the bottom limb of a broad open fold. Foliation on the top limb is 240/60. The fold axis has a bearing and plunge of 50/5. 2. Fracture forming the right and left release surfaces for the rock fall block is oriented 296/80. 3. Bottom slip surface occurs along the contact between the metagraywacke and a cross cutting pegmatite oriented 110/30.



SRR-011 Image Date: 10/25/05 Collection Date: 10/25/05

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SRR-012

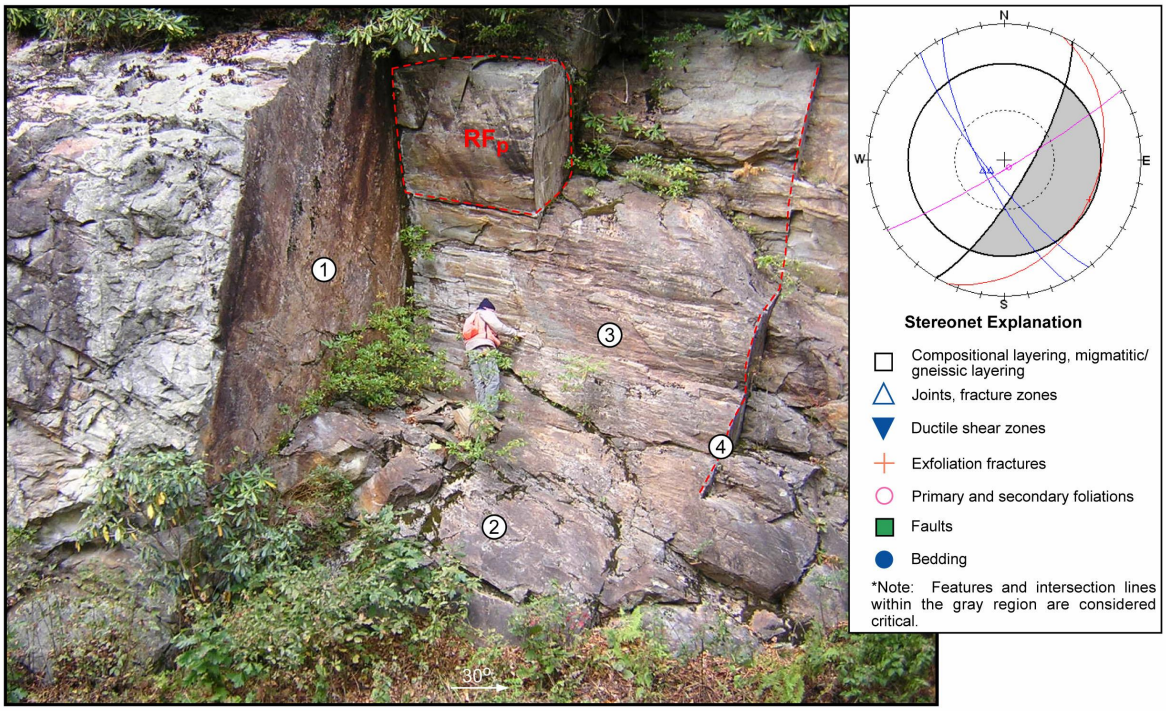


Top Right: Details for past rock slide in migmatitic metagraywacke. Structural information follows: 1. Foliation oriented 170/78; there is considerable seepage coming down the slope at this location. 2. Fracture oriented 287/72 forms the back release surface of the slide block; slickenlines on the surface have a bearing and plunge of 110/20 and indicate right lateral movement. 3. Exfoliation fracture approximately oriented 110/42 forms the sliding surface. 4. Fracture oriented 215/50. 5. Fracture oriented 231/39 forms the side release surface for the past failure and the top release for potential future failure; slickenlines on the surface have a bearing and plunge of 230/8. 6. Foliation oriented 305/57 forms small overhangs and is highly variable. 7. Exfoliation fracture oriented 90/61. **Bottom Right:** Potential rock fall at the east end of the outcrop. Rock is migmatitic garnet biotite metagraywacke with thin minor garnet biotite muscovite schist layers and calcsilicate. Details follow: 1. Foliation oriented 80/60. 2. Fracture oriented 340/60 forms the side release surface. 3. Fracture oriented 150/70. 4. Foliation oriented 228/25 forms overhang; bearing and plunge of crenulation axis is 38/8. 5. Foliation/shear zone oriented 215/50. 6. Fracture approximately oriented 250/45. 7. Fracture oriented 330/70 forms overhang. 8. Fracture oriented 170/83. 9. Exfoliation fracture oriented 70/50. 10. Slip surface oriented 285/50; bearing and plunge of slickenlines is 60/35. 11. Secondary foliation oriented 90/70.

BRP SRR-012 Image Date: 10/25/05 Collection Date: 12/14/06

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SRR-013

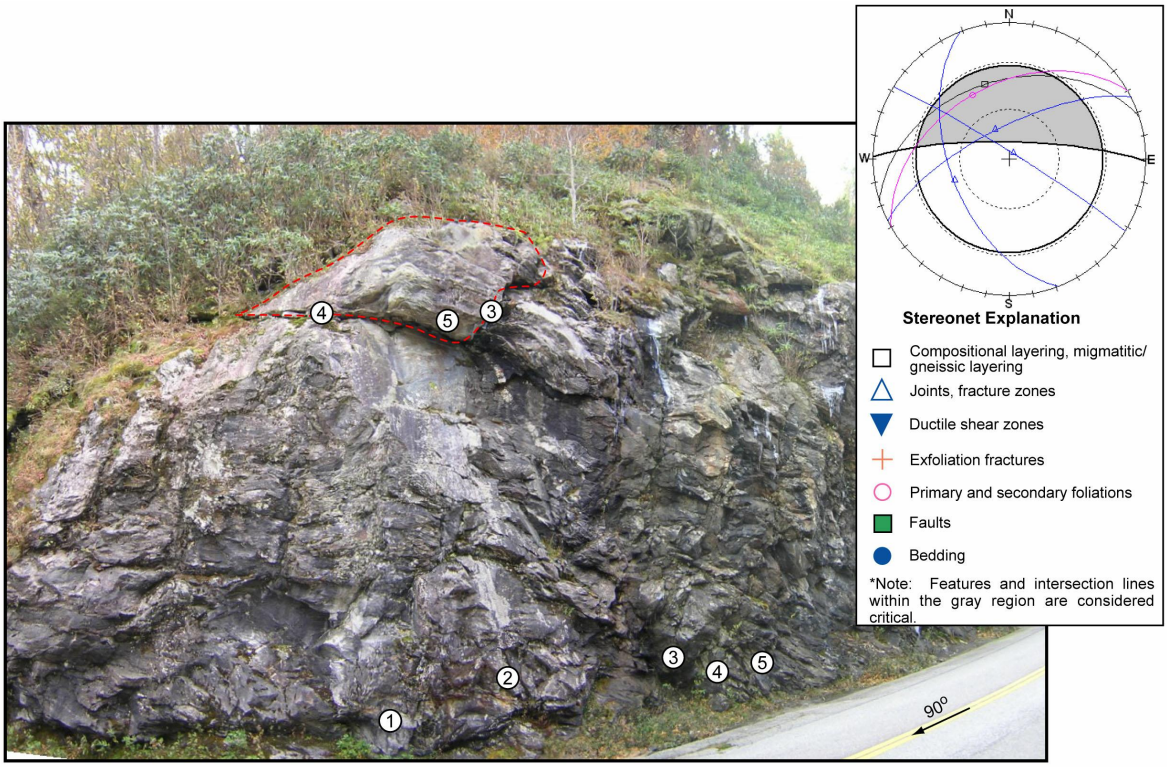


Past rock slide and potential rock fall (labeled RFp) at SRR-013. Rock here is stained state migmatitic metagraywacke and schistose metagraywacke. Details include the following: 1. Right release surface for past rock slide is oriented 145/80. This also forms the right release surface for the potential rock fall block. 2. Exfoliation fracture oriented 25/32 is the sliding surface for the past rock slide and the potential rock fall. 3. Undulating and folded foliation approximately oriented 60/85 forms the left release surface for the past rock slide and the back release surface for the potential rock fall. 4. Fracture oriented 155/76. A fold at this location has an axis oriented (bearing and plunge) 65/15.

SRR-013 Image Date: 10/25/05 Collection Date: 10/25/05

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

SRR-015

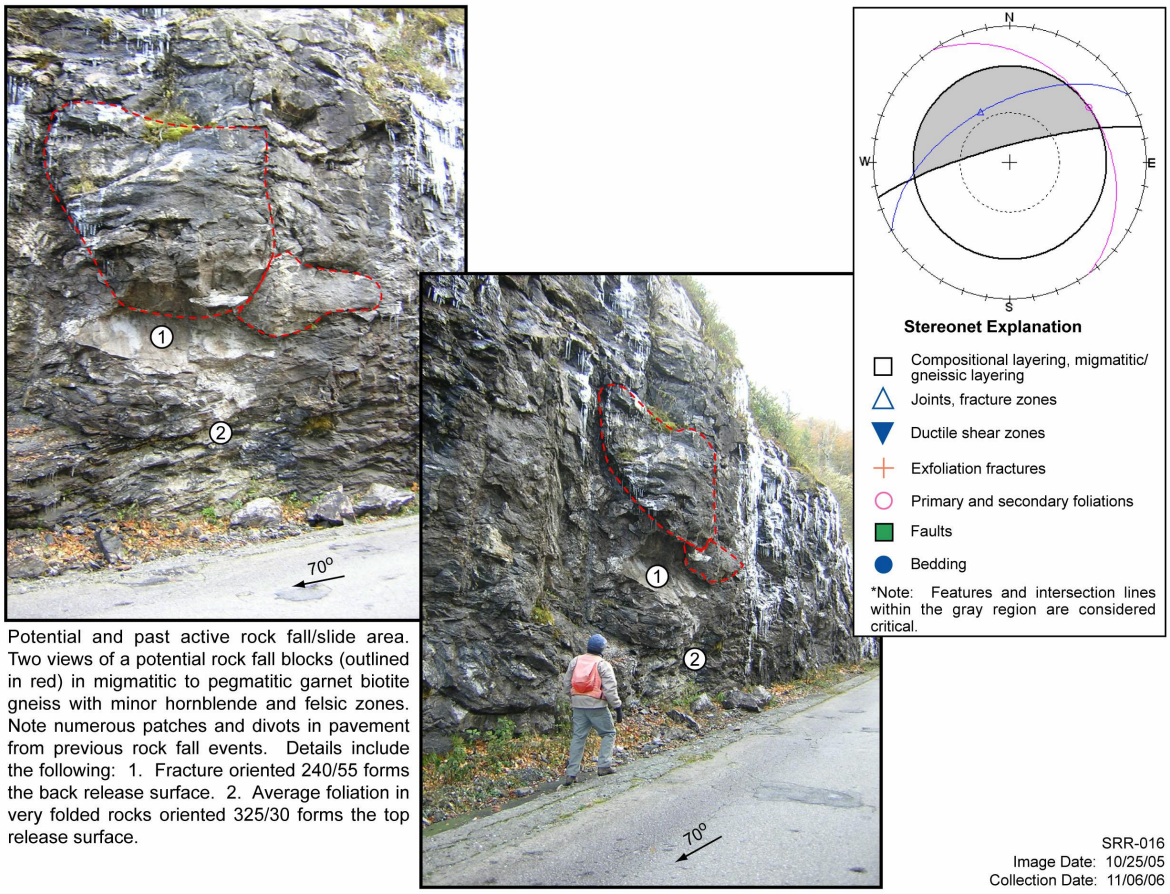


Potential rock fall block (outlined in red above) in interlayered migmatitic metagraywacke, migmatite, and amphibolite. Details include the following: 1. Compositional layering oriented 252/42. 2. Fracture oriented 245/70. 3. Fracture oriented 160/55; this corresponds to the left release surface of the potential rock fall block. 4. Foliation/compositional layering that creates the overhang is oriented 240/45. 5. Fracture oriented 300/85.

SRR-015 Image Date: 10/25/05 Collection Date: 11/06/06

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SRR-016

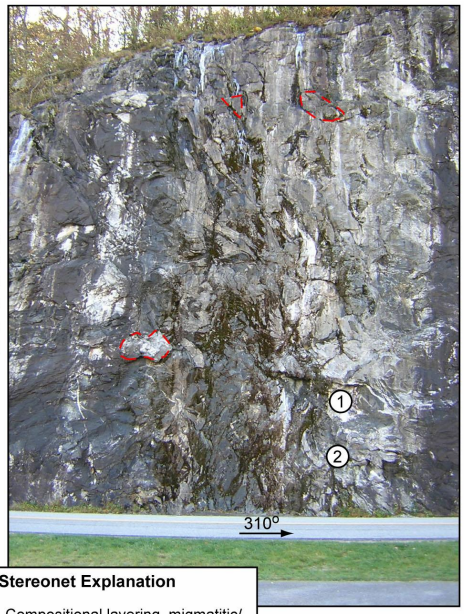


Potential and past active rock fall/slide area. Two views of a potential rock fall blocks (outlined in red) in migmatitic to pegmatitic garnet biotite gneiss with minor hornblende and felsic zones. Note numerous patches and divots in pavement from previous rock fall events. Details include the following: 1. Fracture oriented 240/55 forms the back release surface. 2. Average foliation in very folded rocks oriented 325/30 forms the top release surface.

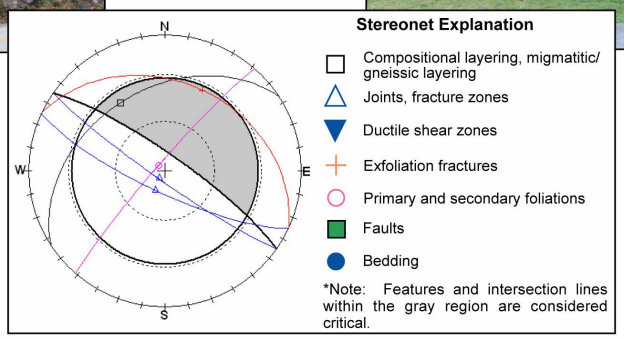
Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

SRR-017

Right: Past and potential rock fall and rock slide (outlined in red) in cut slope at the East Fork Overlook in layered migmatitic metagray-wacke, amphi-bolite and migmatite. Details for above photograph include the following: 1. Fracture oriented 132/85 acts as the back release surface for rock fall blocks. 2. Compositional layering oriented 237/40.



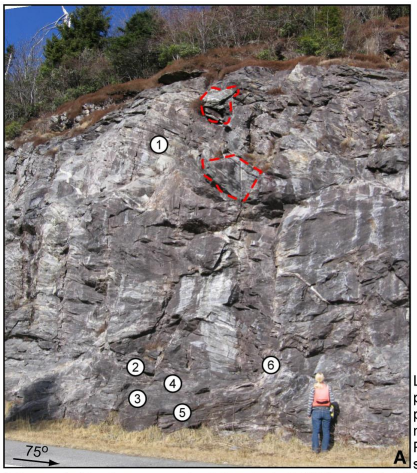
Above: Potential rock slide just west of the East Fork Overlook. Details include the following: 1. Highly folded and variable Foliation/compositional layering oriented 220/85 forms the side release surface. 2. Exfoliation fracture oriented 295/35 forms the sliding surface. 3. Fracture/slip surface oriented 116/78 forms the back release surface; bearing and plunge of slickenlines on this surface is 120/76.

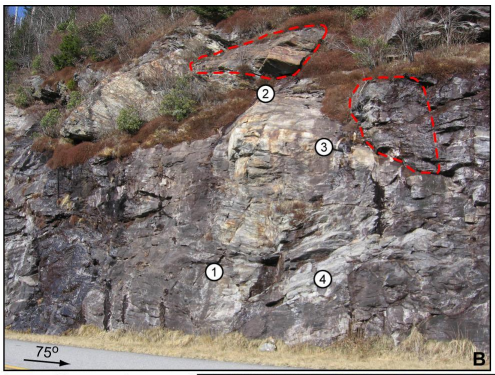


BRP SRR-017
Image Date: 10/25/05
Collection Date: 11/06/06

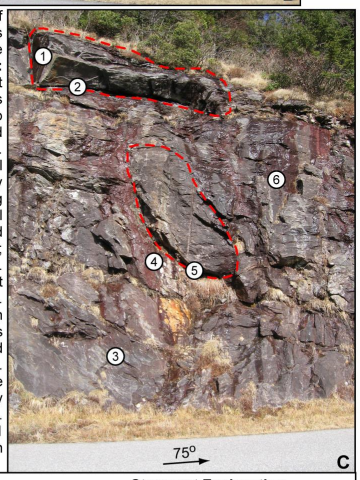
Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

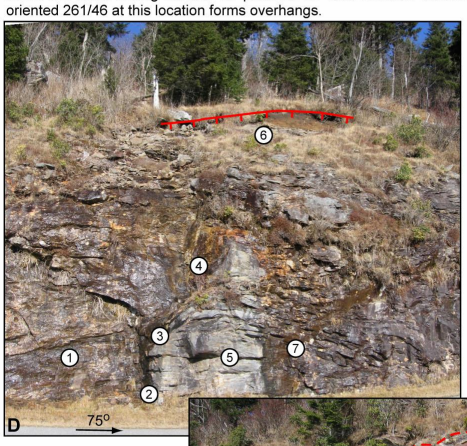
SRR-018

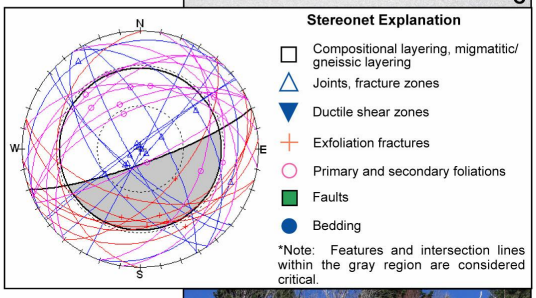




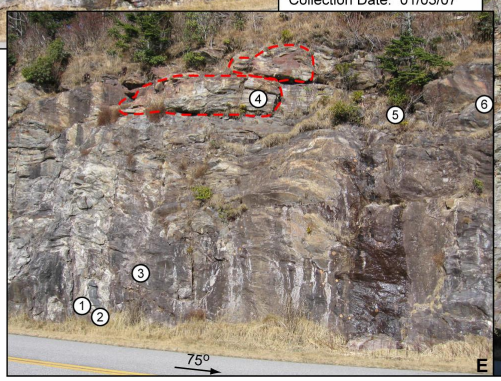
Long outcrop with several areas of potential problems. Lithology is primarily migmatitic muscovite biotite metagraywacke and pegmatite. **A:** Potential rock falls (outlined in red) at southwest end of outcrop. Details follow: 1. Fracture approximately oriented 35/85. 2. Foliation oriented 325/25. 3. Fracture/slip surface oriented 145/60; bearing and plunge of slickenlines is 265/55. 4. Exfoliation fracture oriented 70/35. 5. Foliation oriented 225/35. 6. Fold hinge. **B:** Potential rock slide blocks (outlined in red). Details follow: 1. Fracture oriented 325/42. 2. Exfoliation fracture oriented 105/55 forms a potential sliding surface; seepage was observed along this feature. 3. Exfoliation fracture approximately oriented 40/58. 4. Foliation oriented 220/45. An additional exfoliation fracture was measured along the slope at 105/40. This is a potential sliding surface along which seepage occurs. **C:** Potential rock slide blocks (outlined in red) in middle portion of outcrop. Details follow: 1. Fracture oriented 320/90 forms side release surface. 2. Exfoliation fracture oriented 85/35 forms sliding surface; seepage along this feature. 3. Foliation oriented 9/30. 4. Secondary foliation oriented 64/80. 5. Foliation oriented 20/45. 6. Fracture oriented 240/85. **D:** Headscarp (indicated by red) of likely past debris slide. Details follow: 1. Foliation oriented 245/56. 2. Irregular fracture oriented 152/82. 3. Fracture oriented 133/77. 4. Fracture approximately oriented 135/75. 5. Highly variable foliation oriented here at 246/31. 6. Exfoliation fracture that was the sliding surface for the past failure is approximately oriented 180/30. 7. Foliation oriented 245/63. **E:** Potential rock slide blocks (outlined in red) near the northeast end of the outcrop. Details follow: 1. Fracture oriented 235/10. 2. Exfoliation fracture oriented 60/25. 3. Foliation oriented 279/45. 4. Fracture forming the face of the slide blocks oriented 250/87. 5. Bedrock seep. 6. Fracture just off the photograph approximately oriented 20/20. **F:** potential rock fall/slide blocks (outlined in red) at the northeast end of outcrop. Details follow: 1. Fracture approximately oriented 330/73. 2. Exfoliation fracture oriented 74/41 forms the basal sliding surface for potential for rock slide/fall blocks. 3. Highly variable foliation oriented 261/46 at this location forms overhangs.

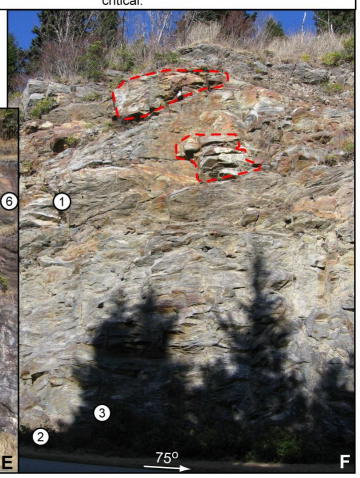






BRP SRR-018
Image Date: 12/14/06
Collection Date: 01/03/07

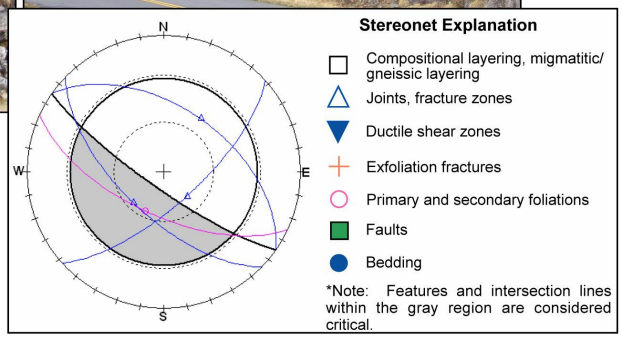




Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

TUCK-001

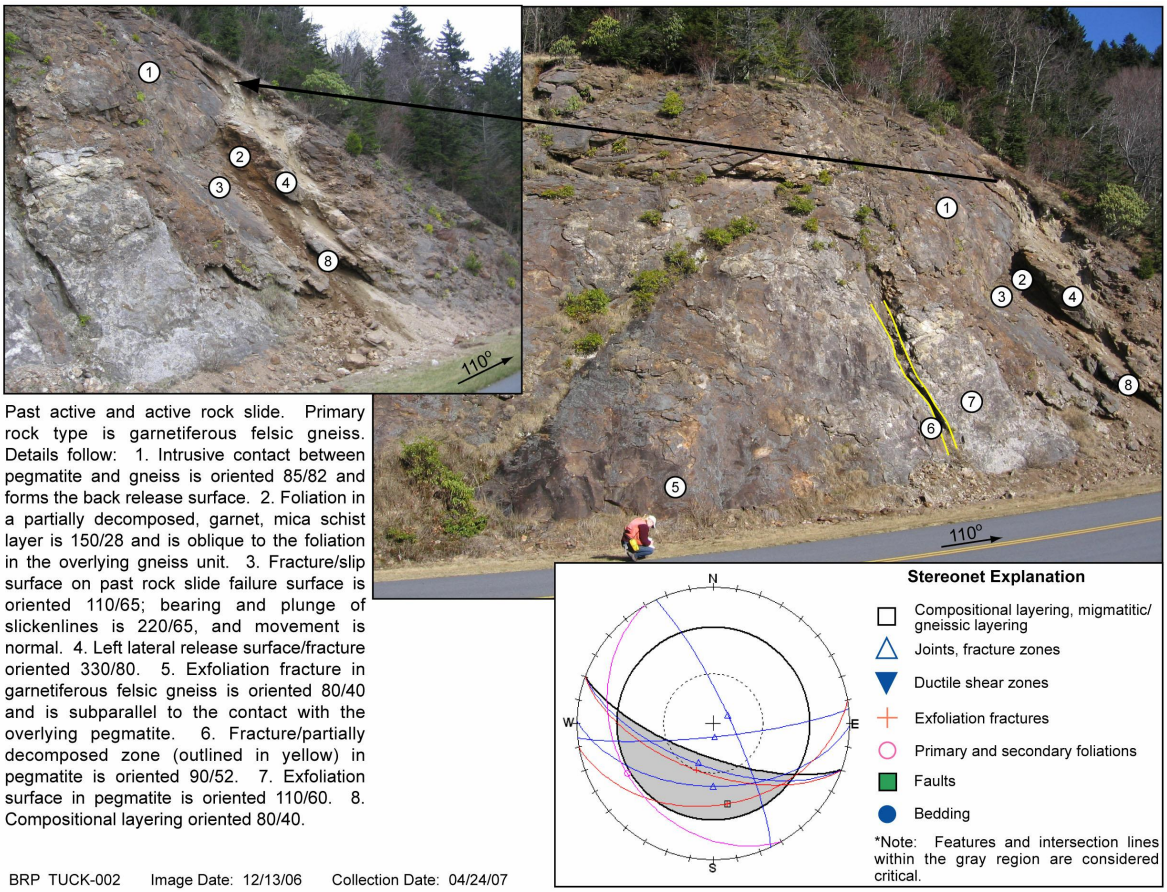
Potential rock fall and rock slide at multiple locations (circled in red) along a long outcrop. Rock is primarily migmatitic metagraywacke. Representative measurements along the outcrop include the following: 1. Foliation oriented 115/64 dips out of the slope. 2. Fracture set oriented 45/70. 3. Fracture oriented 305/50 dips into the slope. 4. Fracture oriented 135/65.



BRP TUCK-001 Image Date: 12/13/06 Collection Date: 04/24/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

TUCK-002

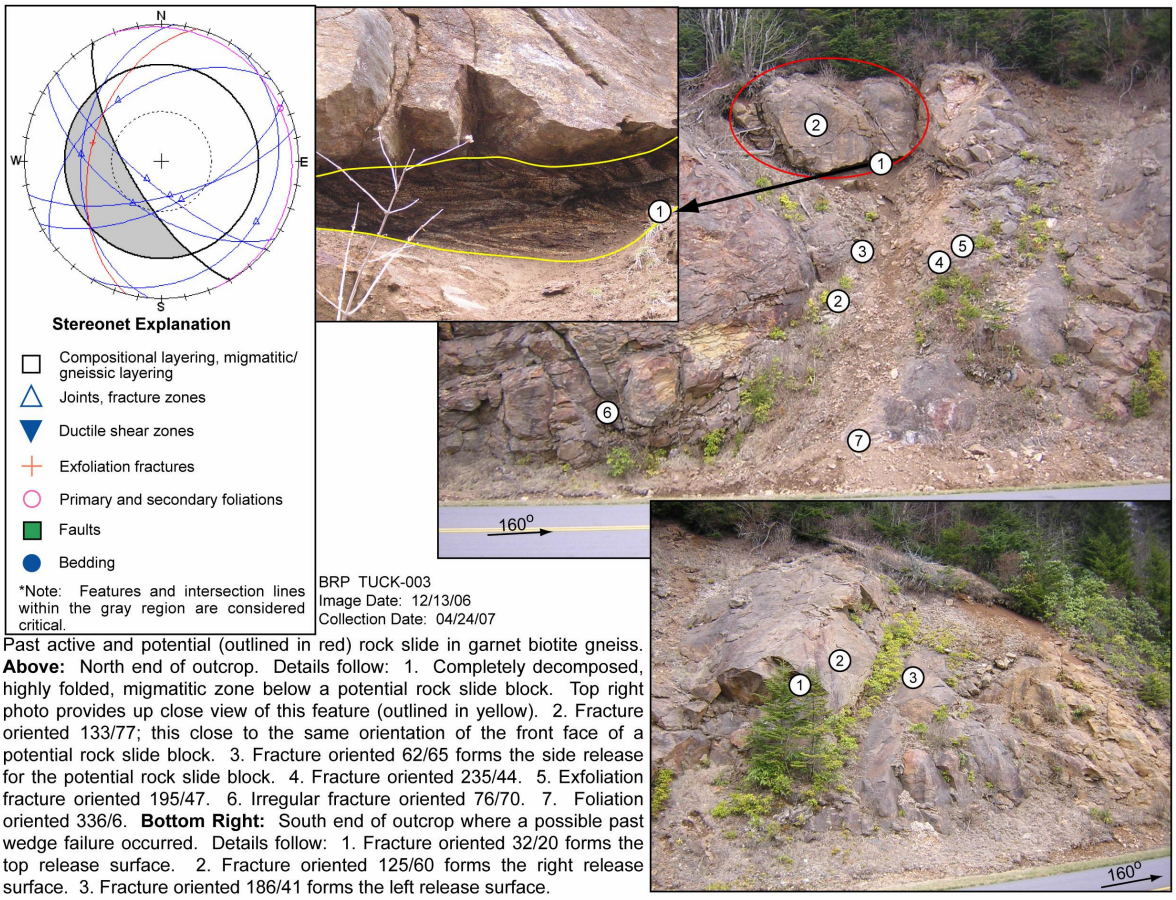


Past active and active rock slide. Primary rock type is garnetiferous felsic gneiss. Details follow: 1. Intrusive contact between pegmatite and gneiss is oriented 85/82 and forms the back release surface. 2. Foliation in a partially decomposed, garnet, mica schist layer is 150/28 and is oblique to the foliation in the overlying gneiss unit. 3. Fracture/slip surface on past rock slide failure surface is oriented 110/65; bearing and plunge of slickenlines is 220/65, and movement is normal. 4. Left lateral release surface/fracture oriented 330/80. 5. Exfoliation fracture in garnetiferous felsic gneiss is oriented 80/40 and is subparallel to the contact with the overlying pegmatite. 6. Fracture/partially decomposed zone (outlined in yellow) in pegmatite is oriented 90/52. 7. Exfoliation surface in pegmatite is oriented 110/60. 8. Compositional layering oriented 80/40.

BRP TUCK-002 Image Date: 12/13/06 Collection Date: 04/24/07

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

TUCK-003



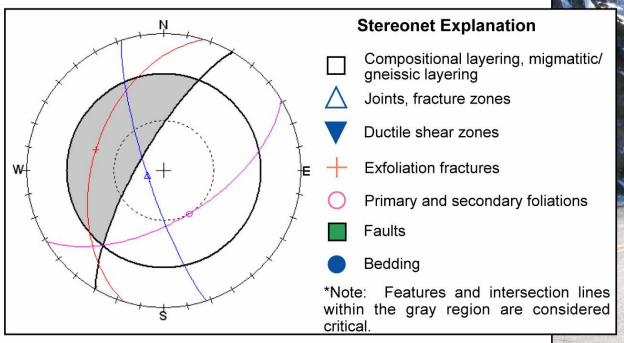
BRP TUCK-003
Image Date: 12/13/06
Collection Date: 04/24/07

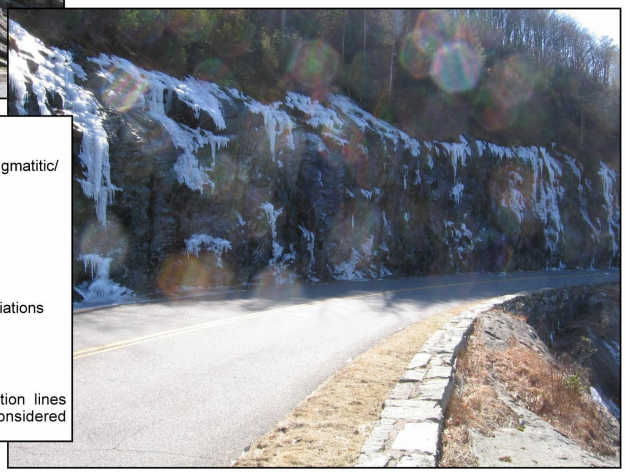
Past active and potential (outlined in red) rock slide in garnet biotite gneiss. **Above:** North end of outcrop. Details follow: 1. Completely decomposed, highly folded, migmatitic zone below a potential rock slide block. Top right photo provides up close view of this feature (outlined in yellow). 2. Fracture oriented 133/77; this close to the same orientation of the front face of a potential rock slide block. 3. Fracture oriented 62/65 forms the side release for the potential rock slide block. 4. Fracture oriented 235/44. 5. Exfoliation fracture oriented 195/47. 6. Irregular fracture oriented 76/70. 7. Foliation oriented 336/6. **Bottom Right:** South end of outcrop where a possible past wedge failure occurred. Details follow: 1. Fracture oriented 32/20 forms the top release surface. 2. Fracture oriented 125/60 forms the right release surface. 3. Fracture oriented 186/41 forms the left release surface.

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

WHR-002

Photo at left shows potential rock slide block along the northeast end of the outcrop. Rock here is finely layered, biotite, muscovite, schistose metagraywacke with minor garnet. Details include the following: 1. Exfoliation fracture that creates the potential sliding surface is oriented 197/47. Water seeps out of the slope along this discontinuity. 2. Foliation forming the potential left release surface is oriented 60/60. 3. Fracture forming the potential right release surface is oriented 165/80. Photo below shows area of potential rock fall along the southwest end of the cut. The foliation of the bedrock creates overhangs that could potentially produce rock fall blocks.

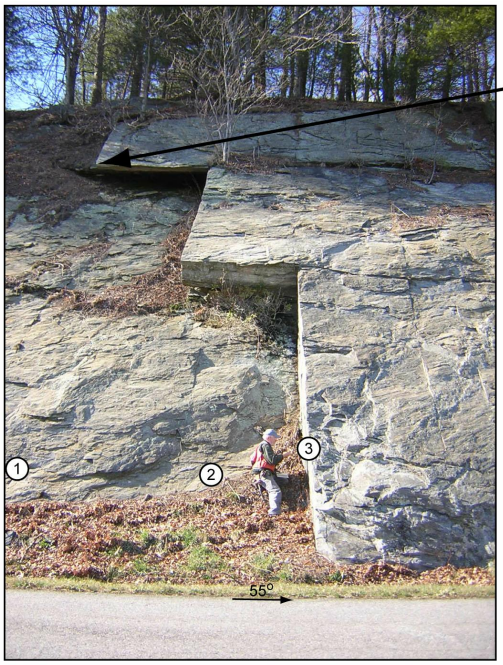




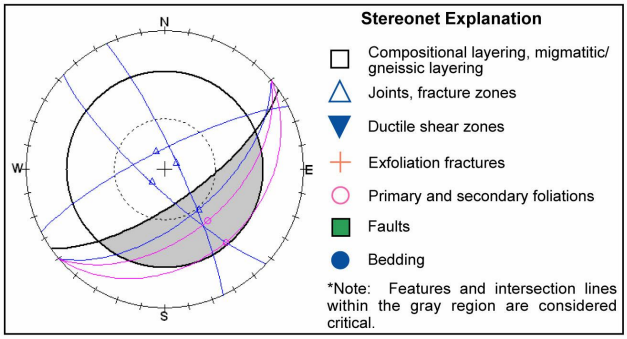
BRP WHR-002 Image Date: 03/12/08 Collection Date: 03/12/08

Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

WHR-005



Potential rock slide in finely layered, biotite, muscovite, schistose metagraywacke with garnet. Above right photo is oblique view of above left photo. Details include the following: 1. Slip surface oriented 49/59; bearing and plunge of slickenlines is 205/35. 2. Foliation/compositional layering oriented 50/50 creates the sliding surface. 3. Fracture oriented 330/82; bearing and plunge of slickenlines is 150/40. Details for photo at right: foliation/ compositional layering oriented 50/32; fracture forming back release surface 245/78; fracture forming right release surface 138/80.



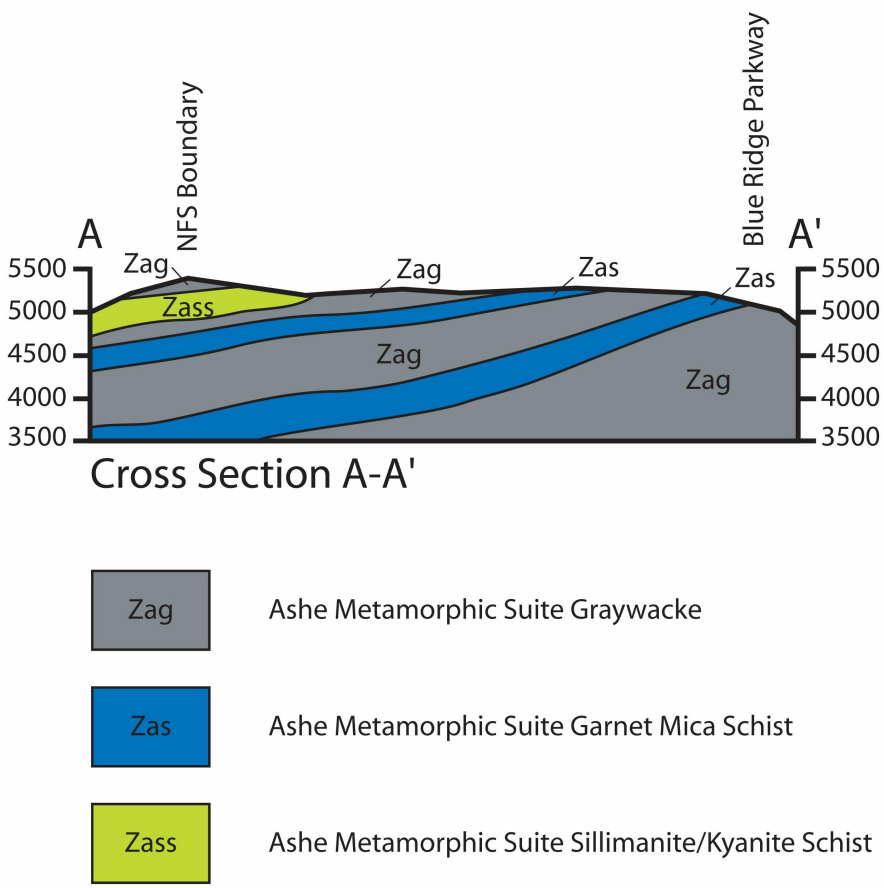
BRP WHR-005 Image Date: 03/12/08 Collection Date: 03/12/08

Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

Geologic Cross Sections

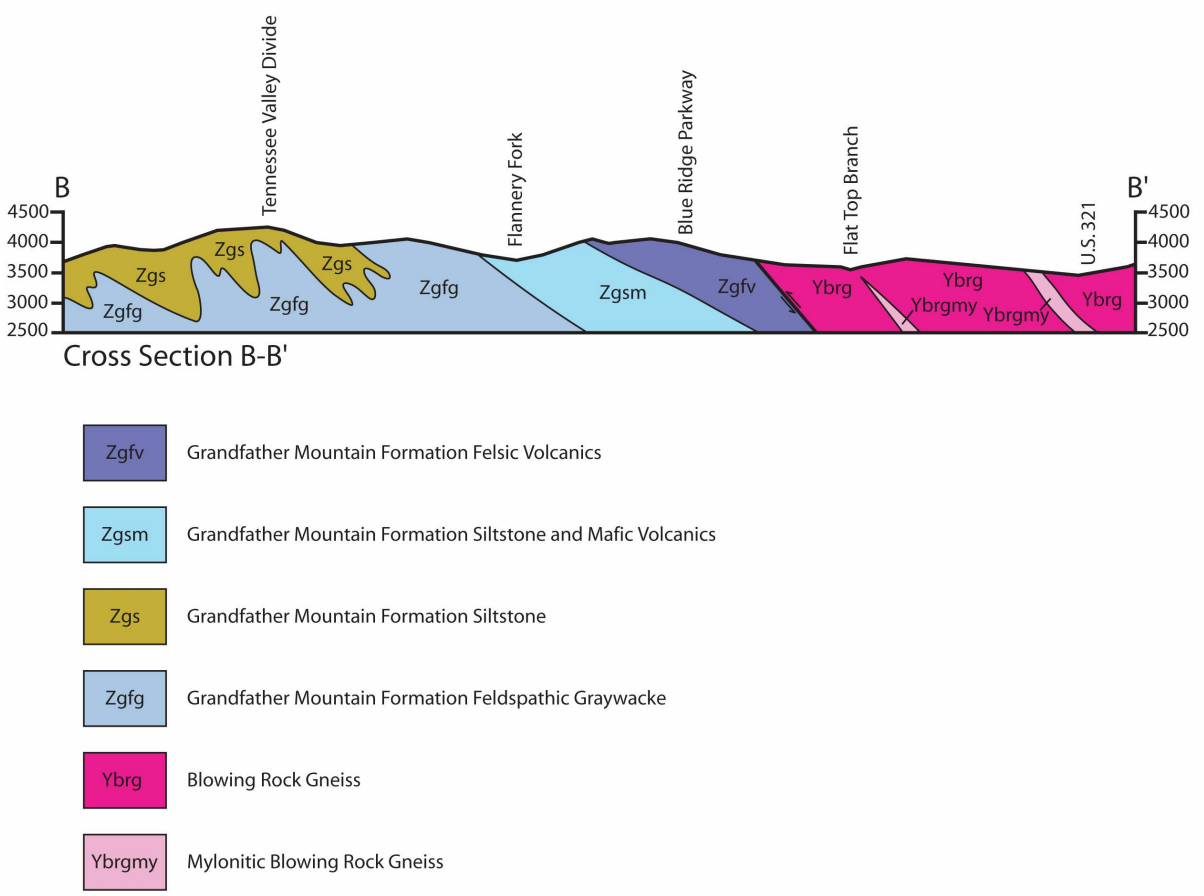
The geologic cross sections present in the GRI digital geologic-GIS data produced for the southern portion of Blue Ridge Parkway, North Carolina and Virginia (BLRI) are presented below. Cross section graphics were scanned at a high resolution and can be viewed in more detail by zooming in (if viewing the digital format of this document). Some unit symbols and/or unit names present on these cross sections have been changed in the GRI digital geologic-GIS data, and in this document (see the Map Unit List and Map Unit Descriptions sections of this document as to why some unit symbols and/or names were changed by the GRI.

Cross Section A-A'



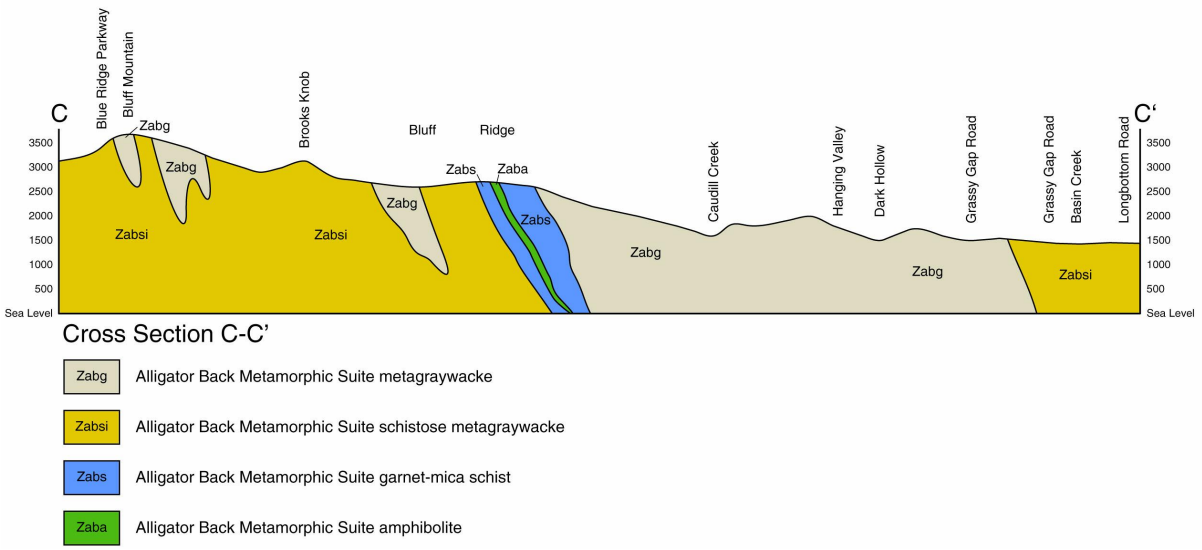
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Cross Section B-B'



Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Cross Section C-C'



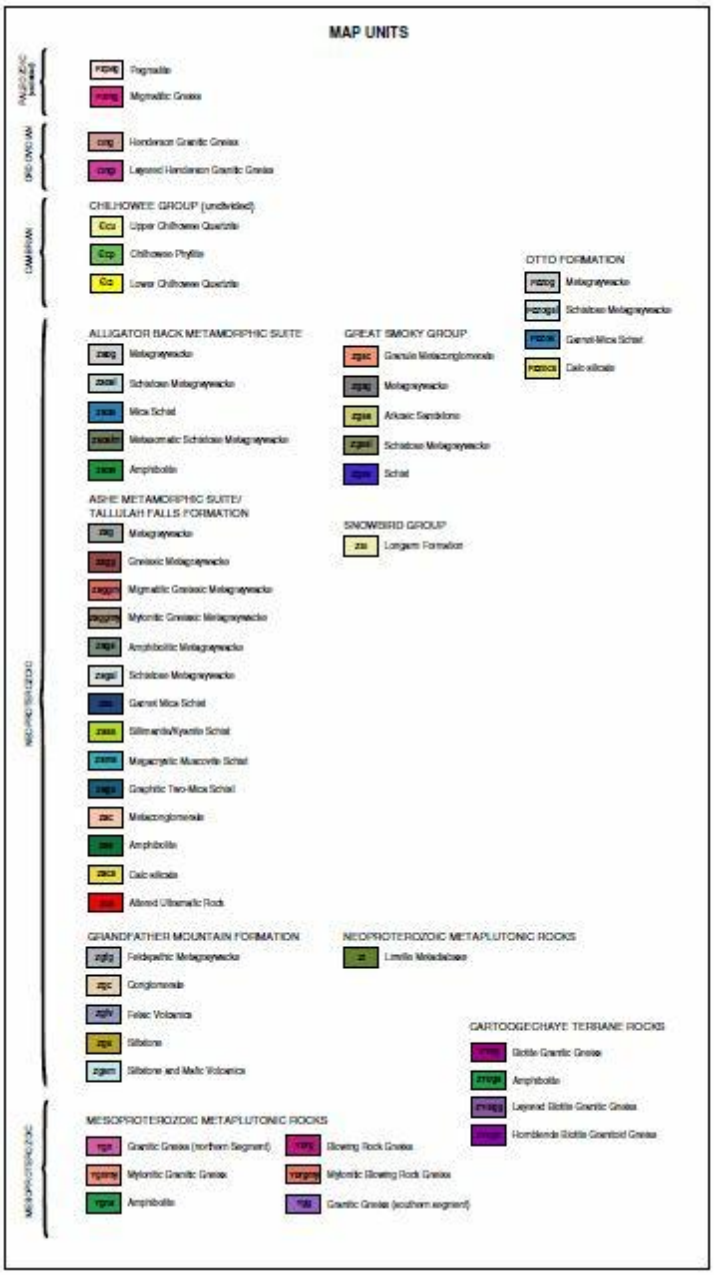
Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

GRI Source Ancillary Map Information

Blue Ridge Parkway Bedrock South

Merschat, Carl, Carter, Mark, Wooten, Rick, 2008, Geologic Map of Blue Ridge Parkway, North Carolina portion (unpublished): North Carolina Geological Survey, scale 1:24,000. (*GRI Source Map ID 4160*).

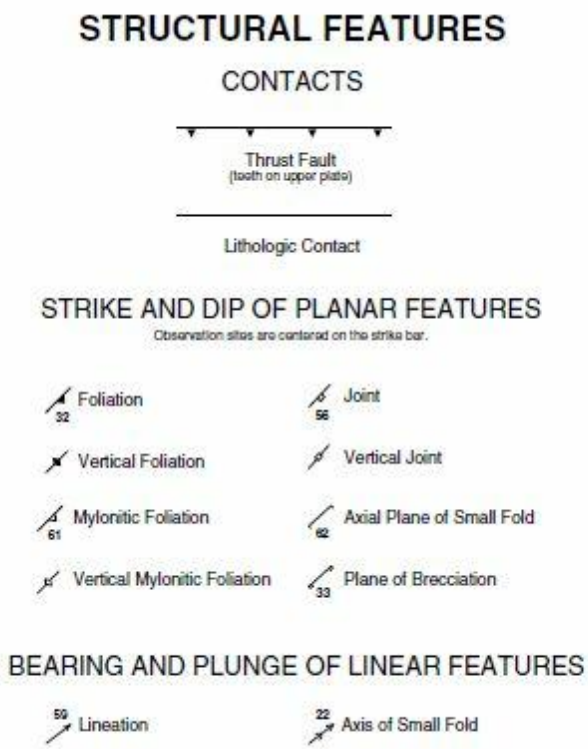
Correlation of Map Units



Extracted from: (*GRI Source Map ID 4160*) (Blue Ridge Parkway Bedrock South).

Note that several unit symbols were changed in the GRI digital geologic-GIS data and in this document. See the Map Unit List section of this document as to why some unit symbols were changed by the GRI.

Structural Features Legend



Extracted from: (*GRI Source Map ID 4160)* (Blue Ridge Parkway Bedrock South).

Blue Ridge Parkway Geohazards South

Merschat, Carl, Carter, Mark, Wooten, Rick, 2008, Geologic Hazards of Blue Ridge Parkway, North Carolina portion (unpublished): North Carolina Geological Survey, scale 1:24,000. (*GRI Source Map ID 76004*).

Geohazards Readme/Report document

Included with the geohazards digital data and ancillary files provided by the North Carolina Geological Survey was a readme/report document. This document provides a summary of the geohazards data for the parkway, as well as for nearby Carl Sandburg Home National Historic Site.

Summary of Geohazards Data and Data Layers for The Blue Ridge Parkway in North Carolina, and the Carl Sandburg Home National Historic Site

GRI Digital Data Credits

This document was developed and completed by James Winter and Stephanie O'Meara (Colorado State University) for the NPS Geologic Resources Division (GRD) Geologic Resources Inventory(GRI) Program. Quality control of this document by Stephanie O'Meara.

The information in this document was compiled from GRI source maps and is intended to accompany the digital geologic-GIS maps and other digital data for the southern portion of Blue Ridge Parkway, North Carolina and Virginia (BLRI) developed by Stephanie O'Meara, Derek Witt and Georgia Hybels (see the GRI Digital Maps and Source Map Citations section of this document for all sources used by the GRI in the completion of this document and related GRI digital geologic-GIS maps).

GRI finalization by Stephanie O'Meara.

GRI program coordination and scoping provided by Bruce Heise and Tim Connors (NPS GRD, Lakewood, Colorado).