

Location and Description

It's never been a passage way for the weak of heart. It's up and down, with hairpin turns and dramatic overlooks.

Half of America's population can arrive here in a few hours by car. It's a morning's drive from our nation's capital. Yet, while it is so near to everything, its rugged and demanding appearance makes it feel far away and different.

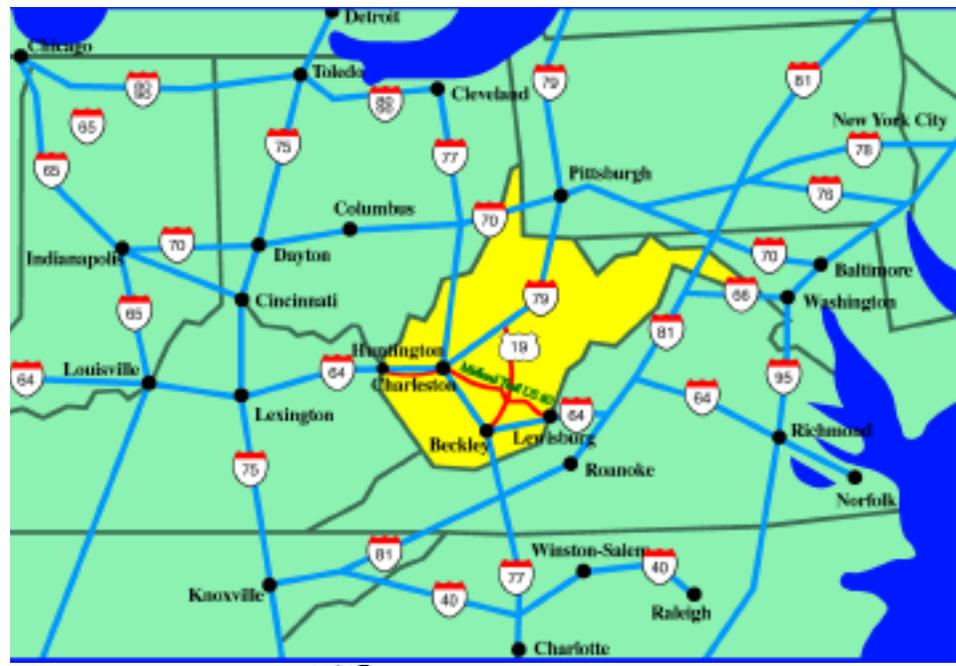
It's up to us to preserve that individual look which characterizes the Midland Trail ...



One of the country's oldest routes, the Midland Trail follows US Route 60 across America from the Atlantic Ocean near Hampton, Virginia to the Pacific Ocean near Los Angeles, California.

In West Virginia Midland Trail/ US Route 60 extends border to border across the state's midsection from the Virginia border near White Sulphur Springs passed the State Capitol at Charleston and on to the Kentucky & Ohio border near Huntington and Kenova.

In all, the Midland Trail encompasses 180 miles of multi-faceted visitor experience.

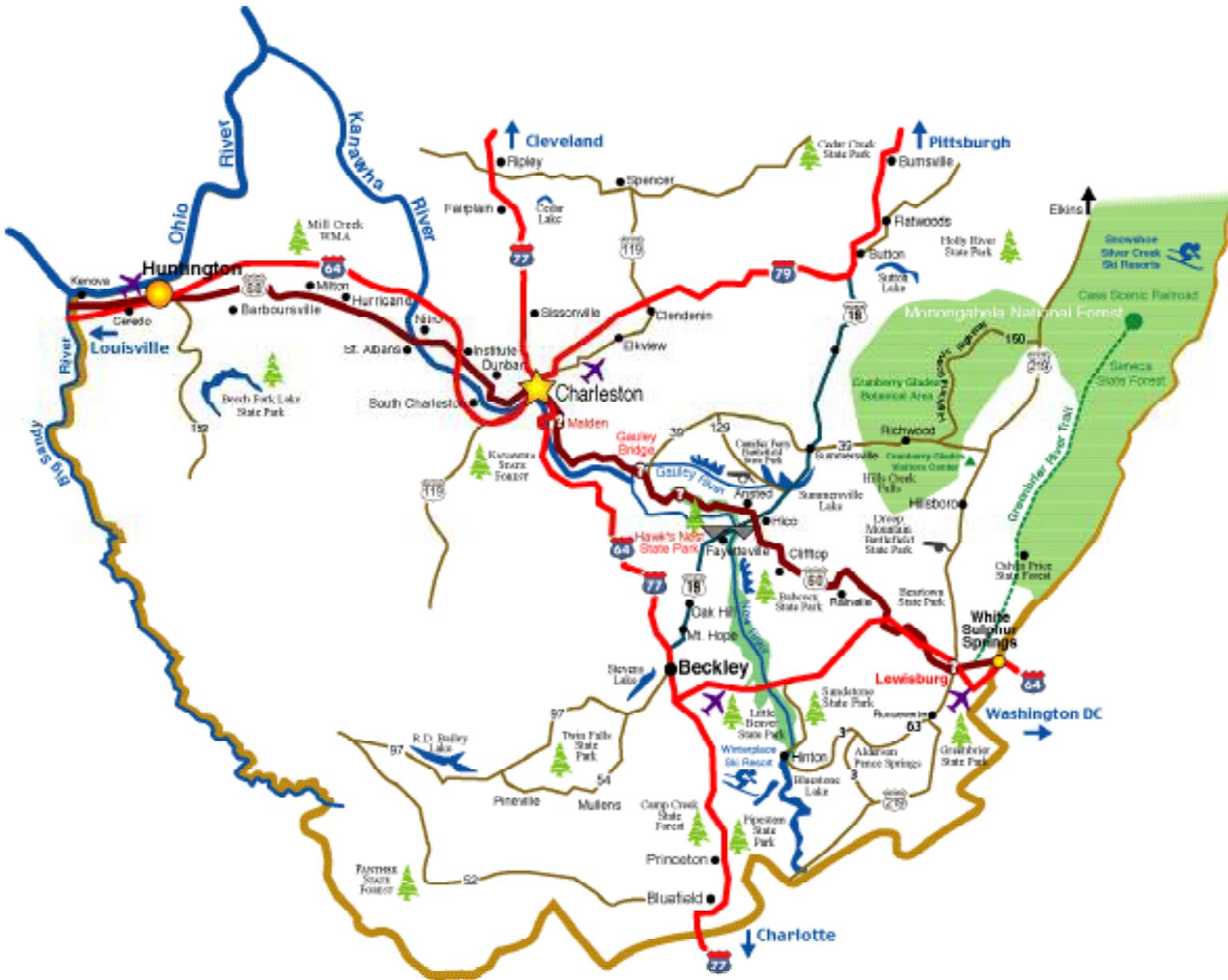


Midland Trail Scenic Byway/US Route 60

Pathway to West Virginia's rich historic, recreational and scenic offerings

2.3

Location in West Virginia



The Midland Trail stretches border to border across from Kenova to White Sulphur Springs via U.S. 60.

The course of the Midland Trail runs through the six WV counties of Wayne, Cabell, Putnam, Kanawha, Fayette, and Greenbrier, each with distinctive terrains, each with its different viewshed and land uses. This description moves eastward.

The Trail's western segment begins at the juncture of the Big Sandy and Ohio Rivers at the western most point in West Virginia, Virginia Point Park. From there it follows through the towns of Kenova and Ceredo, the later historically significant for its abolitionist role. As the Byway leaves Wayne and enters Cabell County (mile 5) it passes Camden Park, a 100+ year old amusement park with a wooden roller coaster. In Cabell it enters WV's second largest city Huntington and follows the south side of the Ohio River through town. At the east end of Huntington, Rt. 60 turns at 29th Street and follows the Guyandotte River to Barboursville. Milton is the last town in Cabell County.

While the area to this point is very commercial, as the Byway leaves Milton and enters Putnam County and Teays Valley it is a pleasant non-mountainous country road drive with some on-grade development.

At St. Albans, the first town in Kanawha County, the byway meets the Great Kanawha River on land surveyed by George Washington. It follows the south side of the Kanawha through South Charleston until it crosses the River at Patrick Street and follows the north side of the Kanawha River. At the State Capitol on the banks of the Kanawha River approximately 61 miles east of Kenova the state-designated section meets the Midland Trail National Scenic Byway.

MT National Scenic Byway continues to follow the Kanawha River for another 38 miles (MM 99) to its origin at the confluence of the New and Gauley Rivers at Gauley Bridge. From Charleston it runs through the bottom of the Kanawha Valley, surrounded by wooded mountains on both sides the entire way. The Valley's width in these areas generally runs one-half mile to one mile. Beginning about 34 miles east of Charleston and continuing for for

10+ miles the north side of the Byway is marked with beautiful dramatic outcropping of dramatic rock formations. Along the first five miles of this section (MM95-100) there are a dozen seasonal waterfalls visible along north side of the Byway, plus the phenomenal Kanawha Falls on the south side.

Between Gauley Bridge (Fayette County) and Rainelle (Greenbrier County) is a series of mountains: Gauley Mountain, Big Sewell, Little Sewell. The Trail runs along the sides of the mountains in this area and on Gauley Mountain overlooks the New River Gorge.

Here the viewshed stretches out to the horizon both at the Gorge and the plateau at the south foot of Big Sewell Mountain. Throughout most of the course in this segment, the Trail winds and curves, some places with tortuous, hairpin turns.

From Rainelle to the Virginia border, the Trail runs through flat, farm pasture land and gently rolling hills and knolls; again, the viewshed stretches for miles through broad verdant valleys. The topography here is limestone karst, with its characteristic sinkholes.

The Trail is two-directional. Visitors can begin at designated entries (Kenova, Charleston or White Sulphur Springs) or enter at a mid-point at such towns as Lewisburg, Hico, Milton, Barboursville, Hurricane, South Charleston or St. Albans. For consistency throughout the Plan, however, the Trail is described from its western terminus (Kenova, West Virginia) traveling east to its eastern terminus (White Sulphur Springs, West Virginia).

In addition to travelling the Trail proper, tourists enter the Trail from I-77 and I-64, and Routes 19, (Hico), 35 (St. Albans), and 34 (Hurricane). through what we term Trail Gateways. Route 19, which intersects the Trail at Hico, delivers tourists from I79 to the North and from I77 Beckley area from the south. North of the Trail, Rt. 19 runs past the town of Summersville, whose land uses are residential, commercial, recreational (Summersville Lake), and heritage (Carnifex Ferry Battlefield). To the south, 19 links the Trail with Beckley and I77 and the tourists who visit this area for rafting and sightseeing at the

New River Gorge Bridge. This vicinity would provide the link between the Coal Heritage and Midland Trails.

Corridor boundaries are generally defined by the "viewshed" from the road. A viewshed is the distance that is visible from a point on the roadway to the top of the steep mountains that line most of the Trail. In some instances the corridor boundaries widen to include important intrinsic qualities (i.e. scenic or historical sites). When this occurs, the boundary then follows the access routes leading to and from the historical or scenic sites and includes their viewsheds. For instance, just east of Charleston the Old Stone House, Hale House/Cabin Creek Quilts and Historic Malden are visible from the viewshed of the Route 60 four-lane, but to access it travelers must use "old Route 60". Also, a Byway spur would follow W.V. 35 and include its viewshed Nitro, Dunbar and Institute.

The viewshed's contribution to the context of the Midland Trail is the main reason for including it within the corridor boundaries. Since the physical setting is defined and views are limited by high ridges and narrow valleys, it provides a manageable size for maintaining a complementary context. The context of the historical areas should be preserved because it helps to interpret the sites effectively. Challenging visitors to envision the site in the era of historical significance is impossible if there are modern and unsympathetic buildings or signs that compete for the visitors' attention.

Huntington is a designed city with broad one-way avenues. Huntington is in the process of rerouting traffic on the Midland Trail. Historically Rt. 60 westbound traffic followed 3rd Ave. and 5th Ave was one-way eastbound. In the downtown area where 3rd Ave goes through the new riverfront development of Pullman Square and Harris Riverfront Park, 3rd Ave. will soon be 2-way traffic, eliminating the need for travelers to use the once one-way 3rd Ave to go west bound and 5th Ave for east bound.

For exact route of extension see Extension Memo in Appendix

Land use along the Trail is diverse. The western 75+ miles from Huntington/Kenova thru Charleston and on to Montgomery has highest degree of development on the Trail. Along the remaining 100+ miles of Fayette and Greenbrier counties the intensity and degree of development tends to be low.

Land use is divided into eight categories: commercial, residential, industrial, governmental, agricultural, educational, recreational, and heritage preservation. Context /Town Pages in Chapter 5 provide a close look at land uses. For a big picture view we divide the Byway in to three sections, west to east.

**Our Industrial West
Advantage Valley &
The State Capitol**

The western bookend of the Midland Trail is the Ohio River which creates the western border of WV at Kenova and Huntington. Continuing eastward through WV's fastest growing area, Putnam County and Charleston, our capital city, this 70+ mile section of the Trail is becoming known as Advantage Valley.

Along the way Route 60 passes through the Great Kanawha River Valley, where the nation's industrial past and present are celebrated in coal tipples, old salt works, chemical plants, locks and dams, mines and company towns, electrical power plants, roads, bridges and the passage to the Ohio River.



**The Recreation Center
Fayette County & Area**

In the center, the Midland Trail passes over West Virginia's most beautiful and rugged mountain terrain. Fayette County, the Trail's recreational center, provides physical activities from the mild to the wild—fishing, whitewater rafting, horseback riding, and rock-climbing—draws visitors from around the world. This region's pristine vistas and breathtaking natural beauty are worth a Trail-hop alone. At Hico, U.S. 19 intersects the Trail, providing access to even more adventure.



**The Refined Pastoral East
Greenbrier County & Area**

To the east, mountains melt into the Greenbrier Valley's broad, verdant fields and karst (limestone) topography. The Trail's rural east, Greenbrier County, presents the pastoral picture of piedmont farmland; unhurried life; Civil War sites; and quaint towns, such as Lewisburg, where historical preservation, amid genteel country living, is a way of life. The Virginia state border provides the eastern bookend of the Byway.



Corridor Routing & Mileage

ROUTE REMARKS	COUNTY	BEG. MP	END MP	SEGMENT MILEAGE
U.S. 60	Wayne	0.00	5.6	5.6
WAYNE COUNTY TOTAL				5.6
U.S. 60	Cabell	0.00	26.79	26.79
CABELL COUNTY TOTAL				26.79
U.S. 60	Putnam	0.00	9.01	9.01
PUTNAM COUNTY TOTAL				9.01
U.S. 60 County line to State Capitol	Kanawha	0.00	19.0	19.0
KANAWHA Co. TOTAL (WV Designated Section) *				19.0

WV Designated Section Byway Total 60.4

* NSB begins at State Capitol 19 miles into Kanawha Co.
Total Kanawha Co. mileage approx: 45.94

**AWAITING Detailed Segment INFO
FROM WV DOH FOR
WESTERN EXTENSION**

ROUTE REMARKS	COUNTY	BEG. MP	END MP	SEGMENT MILEAGE
U.S. 60 @ State Capitol; joins I-77	Kanawha	19.00	20.83	1.83
I-77 follows I-77	Kanawha	95.34	97.13	1.79
U.S. 60 CR 60/12 (Old Midland Trail')	Kanawha	21.97	23.19	1.22
CR 60/12 Midland Trail;WB from US 60 to CR 60/18	Kanawha	0.00	5.96	5.96
CR 60/18 Midland Trail;WB from CR 60/18 to CR 60/20	Kanawha	0.19	0.45	0.26
CR 60/20 Midland Trail;WB from CR 60/20 to US 60	Kanawha	0.00	0.51	0.51
CR 70 US 60 to CR 60/21	Kanawha	0.00	0.08	0.08
CR 60/21 CR 70 to CR 60/18	Kanawha	0.00	0.41	0.41
CR 60/18 CR 60/21 to "Old Midland Trail"	Kanawha	0.00	0.19	0.19
.S .60 to Charleston Urbanized Boundary	Kanawha	29.86	37.34	7.48
	Kanawha	37.34	44.55	7.21
KANAWHA COUNTY TOTAL (NSB Segment)				26.94
U.S. 60 County line to Greenbrier County line	Fayette	0.00	46.06	46.06
FAYETTE COUNTY TOTAL				46.06
U.S. 60 County line to I-64 @ Sam Black Church	Greenbrier	0.00	15.18	15.18
	Greenbrier	15.18	35.19	20.01
WV 63 @ Caldwell	Greenbrier	35.19	43.80	8.61
to I-64 @ White Sulphur Springs				
GREENBRIER COUNTY TOTAL				43.80
NSB BYWAY TOTAL				116.80

Geology Report

Geology is the foundation of the Midland Trail. Because of the ancient history en route, coal, oil, gas, salt, limestone, sandstone, shale, water, sand and gravel are present and accessible to maintain life throughout the Trail. They have been instrumental in attracting people and industry to the area and profoundly influencing the culture, history and economy of the heart of the state. The Trail's exquisite scenery also lies on the backbone of its geology. The story of how geology has set the stage for life on the Midland Trail can only add to the travelers' enjoyment of this Scenic Byway.

While our Town Pages Chapter 5 place the Intrinsic qualities in their specific surroundings, we have found geologist Claudette Simard's review of the Midland Trail's geology so helpful that we asked her to update it to include the western extension for this 2005 Revised CMP.

Claudette Simard,
Rock Renditions - Stories of the Earth
376 Wildwood Lake Road,
Morgantown, WV 26508
304-291-8117

OVERVIEW OF THE MIDLAND TRAIL'S GEOLOGY Intrinsic Qualities

The Midland Trail is a prime example of the tremendous effect mineral resources and geology have had on West Virginia. The Trail is richly endowed with coal, oil, gas, limestone, sandstone, shale, salt, sand and gravel because of its 380 million year old history. The conditions were perfect for depositing the minerals then later exposing them for easy access. As these minerals were discovered and extracted, they attracted people and industry to this area having a profound impact on the culture and history of the heart of West Virginia - the Midland Trail. An increasingly important aspect of the state, its scenic beauty, is directly related to the underlying rocks and the processes that shaped them over time.

In this report, the Midland Trail has been divided into four parts based on changes in geology expressed in the landscape. Each section includes recommendations for pull off areas and signs to explain the essential role geology plays in the available mineral resources, history, and scenic beauty of the area. Attached is a page describing photos needed for the recommended stops, as Mr. Thibeault suggested.

Section 1 Charleston to Huntington (east to west, new mile 61, Chas. to new mile 0, Kenova)

West of the Capitol, the Midland Trail follows the Kanawha River until it makes a left at Amandaville. At that point, it follows the pleasant valleys created by Tackett and Hurricane Creeks. Hurricane Creek (and the Trail) flow into the Teays Valley which was created and abandoned long

ago by the Teays River. More than two million years ago, before the last Ice Age, what is now the Kanawha River did not flow north to Point Pleasant but made a westward bend at Scary and flowed through the Teays Valley to the Ohio River at Huntington. During the last Ice Age, glaciers extending into southern Ohio blocked the flow of the Ohio River thereby creating a dam. As a result, the Ohio River and the rivers flowing into it, including the Teays, were backed up forming a large lake similar to those formed by modern dams. In these quiet lake waters, more than 100 feet of mud and clay settled onto the bottom of the lake (Fridley, 1950). The glacier eventually melted and allowed the Ohio River and its feeding streams to flow once more. The water of the Teays could not break through the thick mud at Scary but found an easier path by joining the Pocatalico River at Poca and flowing north

(Fridley, 1950). I recommend a sign where the Trail enters Hurricane or in Milton to describe this ancient, relatively unknown history of the Teays Valley, see photo 6.

Besides providing a wide valley for building roads and communities, the Ice Age left a valuable legacy of clay behind in the glacial lake. In scattered places throughout the Valley, especially near active building excavations, these clay layers can be seen. The clay has historically been an important resource for the manufacturing of "good quality brick, tile, hollow blocks, pottery and similar products" produced near Huntington, Barboursville, Culloden and other places in the vicinity (Cross and Schemel, 1956).

Brick and tile had also been produced until 1977 from the Pennsylvanian-aged red shales at Barboursville and Huntington. The Barboursville Brick Manufacturing Company, one of the state's leading brick producers from 1902 to 1977, produced 10 million bricks a year, (70,000 bricks a day) during peak production years of the "baby boom" 1950's (Kessler, 1998). West Virginia Brick in Charleston, owned by the same company, also used local shales to produce their brick.

The Teays and Ohio Valleys are home to a thriving hand blown glass industry. Since the early 1900s, glass producers have been drawn to the area, (and the state), by the abundant, cheap natural gas. As late as 1975, West Virginia was one of the leading glass manufacturing states (Eggleston, 1975). Blenko Glass Company and Gibson Glass at Milton, and the smaller independent glass artists like Hammond Glass at Teays all produce glass sought after by tourists and West Virginians alike. Their products, ranging from window glass to fine crystal are sold worldwide. All of these companies give free tours of this fascinating process and have showrooms with items for sale. The small brown glass factory signs on Route 60 do not do justice to these attractions. They need to be enhanced or at least enlarged.

The Teays Valley area has several productive oil and gas fields. The Midland Trail's petroleum resources have been one of the key features attracting industries to the Kanawha and Ohio River Valleys. A depleted gas field in the Hurricane area has been converted to a gas storage field where gas from other areas is stored in the summer when demand is low, and withdrawn in the winter when demand is high.

Last, but by no means least, is the Ohio River Valley at Huntington/Ceredo/Kenova. The Ohio River dominates these areas by its sheer size and influence. Its numerous sand and gravel terraces were deposited by glacial meltwater draining through the river during the last Ice Age. Rounded gravels of granites and other nonnative rock from as far north as Canada are relicts of glaciers that never reached West Virginia. These flat easily excavated deposits provide excellent building sites for homes, industry, roads and railroads as well as the important sand and gravel needed to build them. Throughout time, the river has always been a vital transportation link for its inhabitants and commerce to the rest of West Virginia and states along the Ohio and Mississippi Rivers. Of particular interest is the flood wall that the U.S. Army Corps of Engineers built around the towns after the greatest flood of record in 1937. Pullman Square related development at the end of 11th Street in Huntington is a great place to tell the story of the Ohio River and its flood wall, see photo 7.

In Kenova the Big Sandy River dumps into the Ohio River at Virginia Point Park, the western most point of West Virginia.

Section 2 Charleston to Gauley Bridge (mile 61 to 99; old mile 0 to 38)

The Kanawha River Valley's ancient history is the foundation for its cultural history. Charleston and the other communities built along the Kanawha owe their existence to the area's 300 million year

old history. At that time, known as the Pennsylvanian Geologic Period, North America was near the equator, ferns were as big as trees and dragonflies had three foot wing spans. The sandstones that dominate the Trail's road cuts and cliffs are the remains of sandy streams meandering across a low-lying coastal area next to an inland sea. Plant fossils give proof that these were stream rather than beach sands. In places, the streams were separated by flood plains where mud accumulated and was later compressed into thinly layered shales. In other places, swamps were teaming with luxuriant tropical-like plants that thrived in this hot equatorial climate. The plants died and piled up into layers that formed peat and were eventually compressed over time into coal. Limey mud would settle in large lakes or a shallow arm of the ocean would cover the area and deposit thin layers of what is now limestone. Over time, the inland sea drained and these rock layers were uplifted then worn down to their present heights above the Kanawha River. These rocks are typical of the sedimentary rocks (made of particles or sediments) found in 99 percent of West Virginia.

The sandstones have been quarried over the years for decorative building stone and crushed stone for making roads (Haught, 1968). From the early 1800s to about 1980, some of the shales have been used to produce the tile, building brick and road brick so common in the area (Haught, 1968).

At Malden, the sandstones are a source of oil, gas and brine that have, in places, filled the tiny pore spaces between the sand grains. The brine, or ancient sea water, was instrumental in attracting Indians and later settlers, industry and workers to the area. Over the last 300 million years, the brine has migrated to these sandstones known as the

"Salt Sands" (Ludlum, 1951). The oil and gas, formed from decomposed marine plants and animals mixed in with sea floor sediments, has also slowly migrated to these rocks. At Burning Spring Creek, gas bubbling through the spring was believed to have been recognized by Native Americans and perhaps used for fuel (Eggleston, 1975). Technology developed by the Ruffner brothers to drill brine wells in 1806 was essential equipment for drilling for oil and gas later in that century (Eggleston, 1975). Oil and gas, which were considered a nuisance by the salt well drillers, were wasted to the extent that the Kanawha River was long known as "Old Greasy" by boatmen (Eggleston, 1975). In 1841, the value of gas was first realized commercially when it was used to evaporate brine in the Dickinson area (Ludlum, 1951). Not until 1826 was oil used for lamps in workshops and factories (Eggleston, 1975). The Kelley Creek Oil Field near Chelyan (mile 14) and the Cabin Creek Oil Field near Cedar Grove (mile 18) are important gas producers for the area (Gulley et al, 1937). Today, Kanawha County is one of the state's larger producers of gas and lesser amounts of oil.

Coal, West Virginia's most valuable mineral worth more than \$4.5 billion annually, was first used commercially in 1817 when it replaced charcoal as fuel at the Kanawha River salt furnaces (Eggleston, 1975). By 1840, 200,000 of the 300,000 tons of coal produced that year were used at the Kanawha salt furnaces (Eggleston, 1975). In 1997, 13 million tons of coal were produced in Kanawha County, ranking it 5th among 28 coal producing counties, a distinction it has held for at least the past 30 years (Ludlum, 1951; WV Department of Mines, 1997). West Virginia competes with Kentucky every year for the position of second leading coal producing state.

West Virginia's southern coal fields formed under ideal conditions to make them the best low sulfur coals in the world (Workman, 1998). As a result of their high quality, the Kanawha Formation coals

have been extensively mined east of Charleston to the Gauley Bridge area. At Shrewsbury, mile 15, these coals are being mined and the tippie is still active. I recommend this site as an ideal pull off area for signs to describe how coal formed and its impact on the economy, see photo 1. The Kanawha Formation also contains some relatively rare cannel coals used for extracting lamp fuel oil. By the mid 1800s, petroleum had replaced them as lamp fuel (Workman, 1998). Today, the majority of these and other West Virginia coals are burned in power plants like the Glasgow Power Plant (mile 20) to supply electricity for homes and industry. West Virginia is the nations leading exporter of electricity.

The Kanawha River's wide flood plains provided some of the rare flat land for building trails, then later roads, communities and industry. The River has always been a vital transportation link to the Ohio River for people and commerce. It has been and still is an important water source for local communities and industry. The Marmet Lock and Dam (mile 8) and the London Lock and Dam Number 3 (mile 24) maintain a constant river level for barge transportation of products such as coal on the Kanawha. Flood control and navigation dams at Bluestone, Summersville and Sutton hold back flooding water that would normally inundate communities on the Kanawha flood plain. I recommend signs at the dams to explain the role the river plays in the lives of its inhabitants, see photo 2.

The Kanawha Falls park is an excellent place to showcase the scenic beauty in view of Kanawha Falls and to describe the vital role geology plays in the development of the Falls, the New River Gorge, and the most valuable coals of the state, the New River coals. I also recommend a geologic/scenic sign for Kanawha Falls park at the Glen Ferris Power Plant, mile 36, see photo 3.

Section 3 Gauley Bridge to Rainelle (mile 99 to 134; old mile 38 to 73)

In this section, the Midland Trail leaves the Kanawha and New River Valleys to traverse the ridge tops. The Trail climbs a large arch in the rock that has lifted the New River Formation's Nutall sandstones from 700 feet under the surface at Dickinson to a 1270 foot elevation at Hawks Nest (Ludlum, 1951). This tough sandstone is the same one that produces gas in this area and brine and gas at Dickinson (Ludlum, 1951). Numerous small cascades grace this section of the Trail as they flow over the edge of the resistant sandstones. The Trail clings precipitously to the New River Gorge's edge as it winds its way to the top of Gauley Mountain. En route, it passes through 30 of the 100 coal zones in the state, 20 of which are worked commercially somewhere in West Virginia (Ludlum, 1951). The New River Formation coals of the area "furnish some of the purest coal and cokes of the state" according to I. C. White (1903). The low sulfur "smokeless" coals were premium steam coals sought after for steam ship and locomotive fuel in the late 1800s and early 1900s (White, 1903).

I recommend a geology/scenic sign at Hawks Nest State Park or one of the scenic pull-offs before the park. From any of them, West Virginia's name, the "Mountain State," will be strikingly obvious from the scenery, rugged topography, and geology typical of the greater part of central West Virginia. The spectacular view of the New River 510 feet below (Ludlum, 1951) will be a perfect backdrop to explain the rock's effect on the river, the history of the river and how Union Carbide harnessed its energy to produce hydroelectric power, see photo 4.

In the past, beehive coke ovens at Ansted, Boomer (Gulley, et al., 1937), and many other parts of the state burned coal to concentrate the fuel. The result is a clean burning fuel used in smelting iron and steel and for domestic heat (Ludlum, 1951). The Sewell seam of the New River Formation coals, which is commercially mined almost exclusively in Fayette County, was mined for coking as well as other uses (Ludlum, 1951). Fayette County produced close to four million tons of coal in 1997, ranking it 15th of 28 coal producing counties (WV Department of Mines, 1997).

Lookout, at mile 58, is at the center of the arch in the rocks that lifted the New River Formation's sandstones and coals to the surface. This uplift and subsequent erosion created the area's spectacular scenery and made the valuable New River Formation coals accessible. The arch was folded when the continents collided about 200 million years ago. During this collision, rocks in eastern West Virginia were folded into northeast-southwest trending ridges. Rock layers closer to the collision point (those in eastern West Virginia) were more severely folded than those farther away (western part of the state). As a result, the Midland Trail will pass through more and more severely folded rock layers as it traverses eastward.

Babcock State Park, about 3 miles from the Midland Trail on Route 41, is another recommended geologic/scenic stop. Glades and Manns Creeks have carved a 1000 foot gorge on their journey to the New River. The gorge slices through the Pennsylvanian-aged New River and Pocahontas Formations to expose the Mississippian-aged rock (approximately 340 million years old) below.

The distinctive rust color of the rock along the Trail from mile 60 to mile 94 is from iron in the rock that rusted when exposed to air. The color occurs in some of the Pennsylvanian rocks but is

even more pronounced in the older Mississippian-aged Mauch Chunk Group of rocks from Rainelle to just beyond Clintonville. One of the Mauch Chunk sandstones that is slightly iron stained into a beautiful pink and yellow color is quarried and cut into building stone near Alderson.

Scenic view areas near mile 69 would be ideal places to explain the role the area's ancient history plays in creating the terrain, especially since the highest elevation on the Midland Trail is nearby.

Section 4 Rainelle to White Sulphur Springs (mile 134 to 181 old mile 73 to 120)

At the Fayette/Greenbrier County line, mile 73, the rivers and streams have cut through the younger Pennsylvanian age New River and Pocahontas Formation layers to expose Mississippian-aged rocks below. In 1997, 500,000 tons of New River and Pocahontas coals in western Greenbrier County's hills were produced, ranking it 24th out of 28 coal producing counties (WV Department of Mines, 1997). At one time, all of the coal mined in this county passed through Rainelle (Heck, 1939) making it a booming town as shown by the historic King Coal Hotel at mile 75. According to Heck (1939), more than 1.5 million tons of coal traveled through Rainelle annually during the 1930's. This is the last coal seen on the Trail driving east because the rest of the Trail is in older Mississippian-aged rocks which do not have any mineable coal.

The communities from Rainelle to Sam Black Church are on the wide flood plain of the Meadow River and its tributaries. These streams have worn through Mississippian rock that is much easier to erode than the tough New River sandstones downstream. As a result, the streams have used their erosive energy to cut unusually wide valleys through this area. The Meadow

River and its tributaries meander lazily across it and pond into numerous wetlands. I recommend a geologic/scenic sign at Rainelle to explain this interesting feature, see photo 5.

The dividing line between the rock layers that are horizontal and the layers that are folded is at Clintonville, mile 91. From Charleston to a few miles west of this point, the rock layers appear to be flat. From this point east, they are inclined or dipping at an angle from the folding that occurred during continental collision about 200 million years ago. The ridges on the rest of the journey, like Brushy Ridge at Alta (mile 95), have a definite northeast-southwest orientation from the folding. The folding has also raised the rock layers higher and cracked them, enabling erosive forces of water and wind to wear the younger Pennsylvanian rock layers away completely. This left the older, once buried, Mississippian layers at the surface for the rest of the route.

At mile 94 is the Boxley Greenbrier Limestone Quarry that produces crushed stone mainly for use in building roads. Boxley quarries the Greenbrier Limestone, the limestone that yields 60% of the state's production. Greenbrier County, West Virginia's leading limestone producing county, quarries almost three million of the state's 15 million ton annual total. West Virginia's limestone is mainly used in the state's roads although some is sold to other states.

The Greenbrier Limestone continues westward to underlie the younger Pennsylvanian rock. Along the Trail, it ranges in thickness from 600 feet in this county to 200 feet at the Ohio River (McCue et al, 1939). The Greenbrier's thickness and marine shell fossils are proof that West Virginia was under the ocean for an extended period of time about 340 million years ago. The Greenbrier

Limestone below the surface has been one of the state's leading gas producers and a less significant oil producer (Avary, 1998).

From Richland, at mile 99, to Lewisburg, the Midland Trail traverses prime examples of land features unique to limestone. Because limestone slowly dissolves from rainwater which is naturally slightly acidic, it often contains caves, sinking creeks, sinkholes (depressions on the land) and springs. Numerous fine examples of these land forms can be seen on either side of the Trail toward Lewisburg. More spectacular examples include the very large sinkhole that Lewisburg is built in and Lost World Caverns, located about three miles north of town. Because limestone is slowly dissolved over time, it forms wide fertile valleys that are prime agricultural land, a bonus for this county. I recommend a scenic/geologic pull off with signs near Richland or Lewisburg to explain these interesting features.

At the eastern edge of Lewisburg, close to mile 167/106, the Midland Trail travels on Greenbrier Mountain formed from the resistant sandstones of the Mississippian Maccrady and Pocono Groups. At mile 108, the Trail crosses the Greenbrier River, which drains the eastern half of the county and flows into the New River at Hinton. From Caldwell to the Greenbrier Resort in White Sulphur Springs, the Trail is built on Howard Creek's flood plain that was carved through the oldest rock en route, the 380 million year old Devonian shales. The world famous White Sulphur Springs emerge from these shales (Ludlum, 1954). The medicinal waters of the springs and the mild summer temperatures have attracted tourists to White Sulphur Springs since the mid 1700s (McColloch, 1985).

In summary, geology is the foundation of the Midland Trail. Because of the ancient history en route, coal, oil, gas, salt, limestone, sandstone, shale, water, sand and gravel are present and accessible to maintain life throughout the Trail

and West Virginia. They have been instrumental in attracting people and industry to the area and profoundly influencing the culture, history and economy of the heart of the state. The Trail's exquisite scenery also lies on the backbone of its geology. The story of how geology has set the stage for life on the Midland Trail can only add to the travelers' enjoyment of this Scenic Byway.

REFERENCES CITED

Avary, K., 1998, Personal communication, West Virginia Geological Survey, Morgantown, WV.

Cross, A. T. and Schemel, M. P., 1956, Part II, Economic resources in Geology and economic resources of the Ohio River Valley in West Virginia: West Virginia Geological Survey Vol. 22, 129 p.

Eggleston, J. R., 1975, A bicentennial story: history of West Virginia's mineral industry: West Virginia Geological Survey December Newsletter, pp. 23-33.

Fridley, H. M., 1950, The geomorphic history of the New-Kanawha River System: West Virginia Geological Survey Report of Investigation No. 7, 12 p.

Gulley, G. M., Sherrill, R. E., and Price, P. H., 1937, Log of pre-convention field trip, American Association of Petroleum Geologists mid-year meeting: West Virginia Geological Survey, 19 p.

Haight, O. L., 1968, Geology of the Charleston area: West Virginia Geological Survey, Bulletin 34, 38 p.

Heck, E. T., 1939, Log for West Virginia 1939 trip, field conference of Pennsylvania Geologists:

West Virginia Geological Survey, 11 p.

Kessler, F., 1998, Personal communication, Barbourville Brick Manufacturing Company, Barbourville, WV.

Ludlum, J. C., 1951, The geology of Hawks Nest State Park, West Virginia: West Virginia Geological Survey State Park Bulletin, SPB No. 1, 25 p.

Ludlum, J. C., 1954, Description of the area and log of field trip for Anthony Gap and return, American Petroleum Institute, Eastern District Spring Meeting, White Sulphur Springs, 1954: West Virginia Geological Survey, 6p.

McColloch, J. S., 1985, Springs of West Virginia: West Virginia Geological Survey V-6A, 494 p.

McCue, J. B., Lucke, J. B., and Woodward, H. P., 1939, Limestones of West Virginia: West Virginia Geological Survey V-12, 560 p

West Virginia Department of (Mines) Miners' Health Safety and Training, 1997, 1997 annual report, 200 p.

White, I. C., 1903, Levels above tide true meridians report on coal: West Virginia Geological Survey Vol. 2, 725 p.

Workman, M., 1998, Personal communication: West Virginia University Institute for the History of Technology and Industrial Archaeology, Morgantown, WV.