

Geology of



A walking guide to the geology of Carroll County

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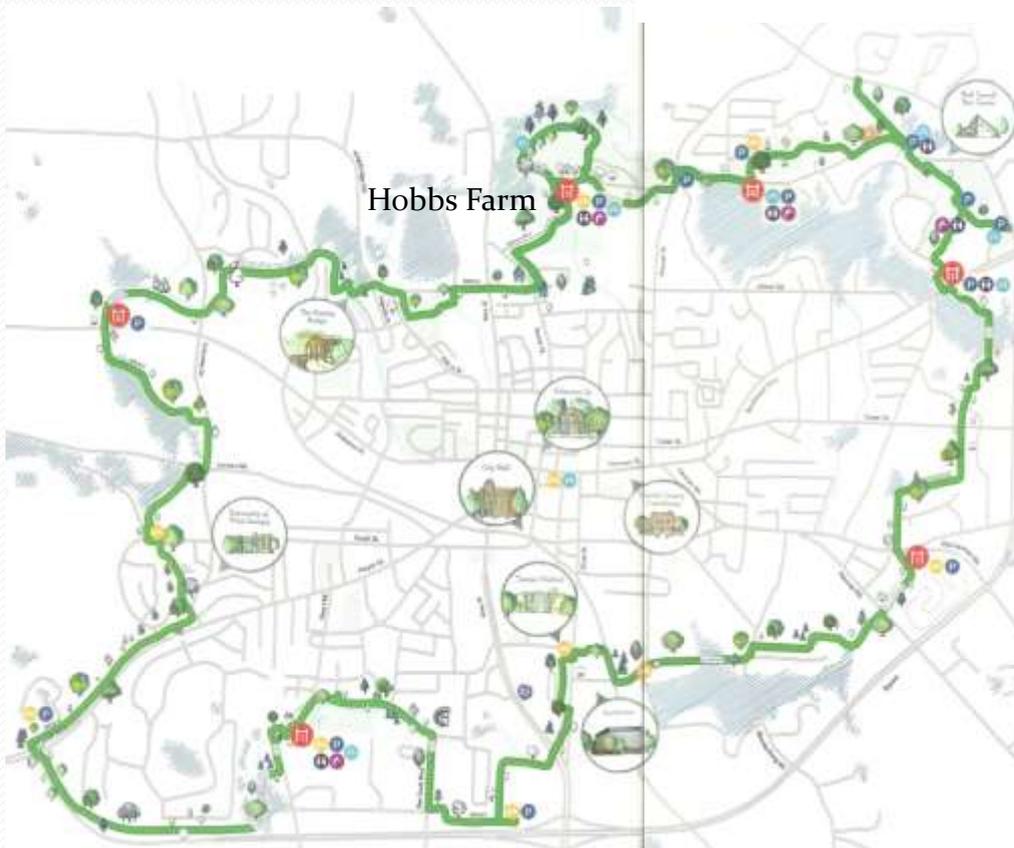
Sedimentary, Igneous & Metamorphic Rocks

- Geologists recognize three rock families:
- 1. Igneous rocks formed by the crystallization of magma either at the surface (volcanic like basalt) or deep underground (plutonic like granite).
- 2. Sedimentary rocks (like sandstone, mudstone and limestone) formed from the weathered remains of older rocks.
- 3. Metamorphic rocks formed by the recrystallization (alteration) of older igneous and sedimentary rocks due to heat and pressure, especially, during mountain building.

Rock types in Carroll County

- Carrollton is located in the Piedmont province in the heart of the Appalachian mountain chain.
- Because of great heat and pressure during the building of the Appalachian mountains any original sedimentary rocks, and the fossils they contained, were converted to metamorphic rock.
- In places temperatures were high enough to cause melting and the intrusion of masses of granite magma (e.g. Stone Mountain).
- However, most of the Piedmont consists of metamorphic rocks formed below the temperatures and pressures needed to melt rock.

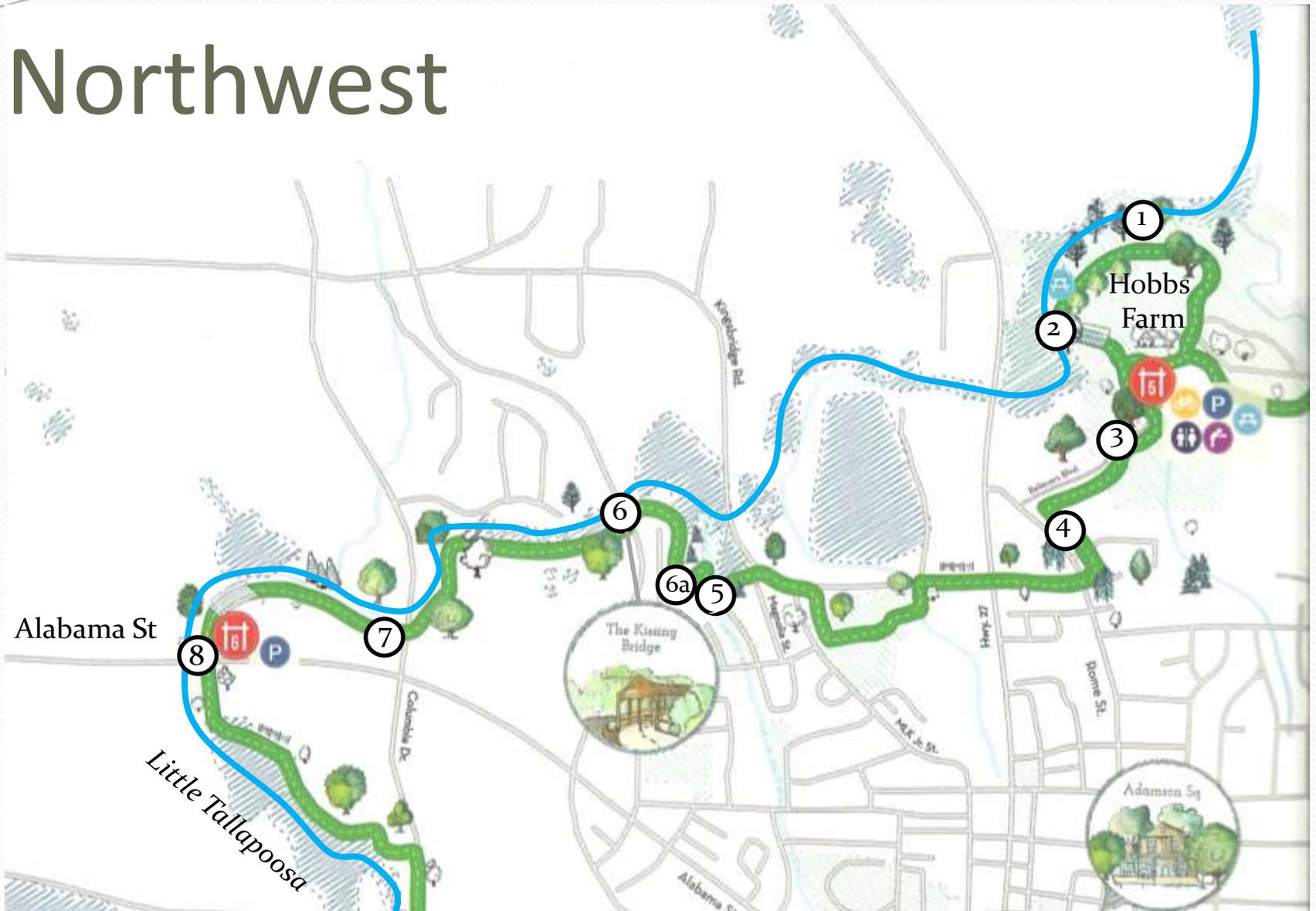
Exploring the GreenBelt



We will begin our exploration at Hobbs Farm and proceed counter clockwise, but you can start from any access point.

Localities are numbered consecutively to aid location.

Northwest



1 Little Tallapoosa at Hobbs Farm



View of Little Tallapoosa from tee 13 on the disc golf course

1a Beaver ponds and swamps

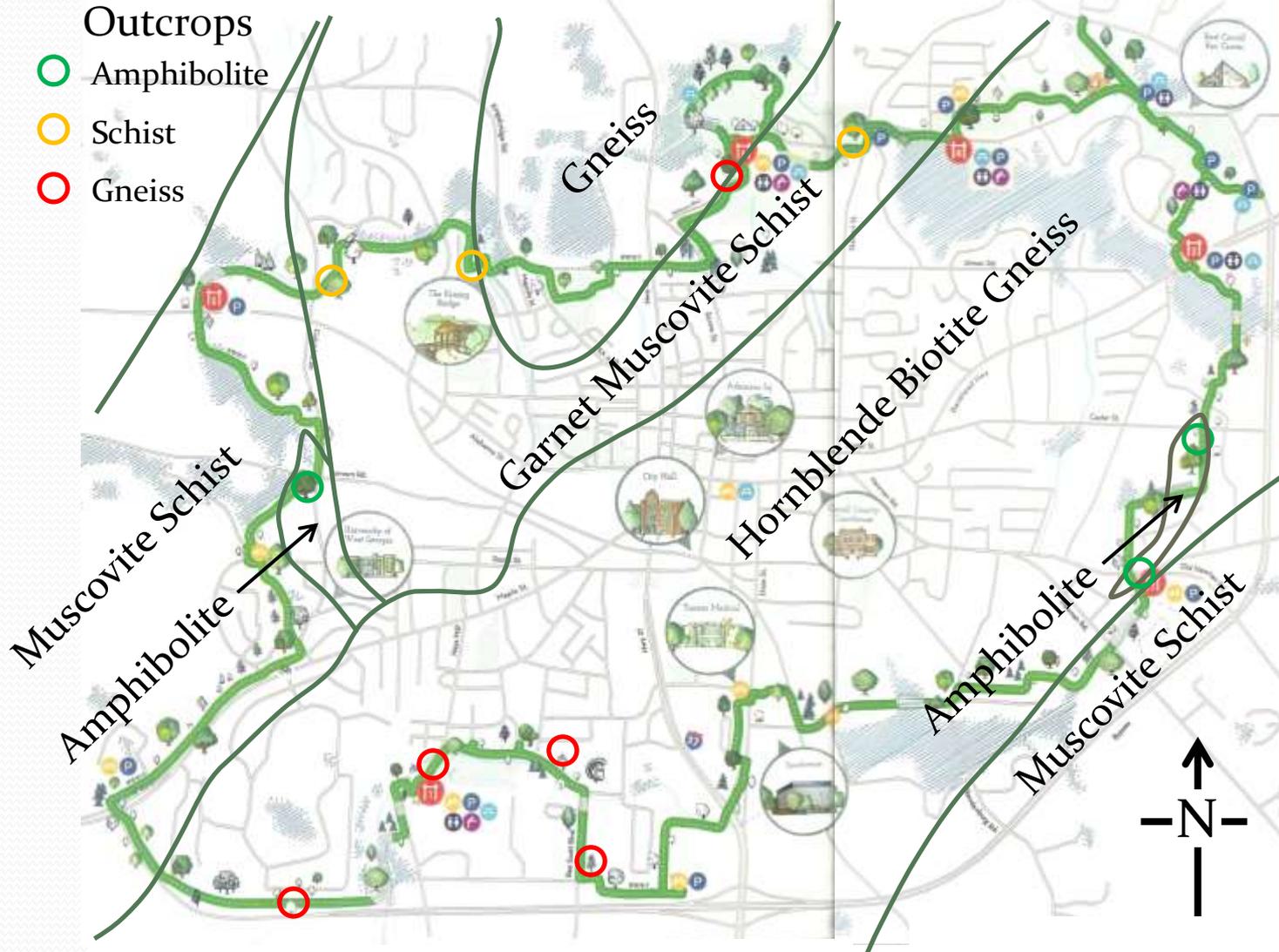


- Notice the tree stumps attacked by beavers. The swamps around Hobbs Farm are the result of damming of the Little Tallapoosa by beavers.

2 Observation platform on Little Tallapoosa



Simplified Geologic Map



TRAILHEADS AND AMENITIES

	LAURA'S PARK, 400 WAYS MILL ROAD West of the North of Jags AM Center
	• Bike Repair Station • Bike Share Station
	OLD NEWMAN ROAD, 610 OLD NEWMAN ROAD Approach from the DMV office
	• Buffalo Creek Nature Trails
	LOU CABIN, 182 NORTH LAKESHORE DRIVE Off Southwood Hwy, near the Lou Cabins
	LAKEHURST PARK, 600 NORTH LAKEHURST DRIVE West of the park from the baseball field to the south
	• Boat Dock/Ramp • Canoe/Fishing • Bike Share Station
	WOODS TRAIL PARK, 600 BELLEVER'S BUCKLEBANK At the end of Bellever's Blvd, off Route 20
	• Observation Deck • Canoe/Fishing • Kayak Launch Dock • 16-Pool Hammock Nest • Disc-Golf Course • Nature Trails • Bike Repair Station • Bike Share Station
	ALABAMA STREET TRAILHEAD, 1170 ALABAMA STREET At the Lake, near the Feller

Carrilton GreenBelt

map legend:

	GREENBELT
	ROAD
	PARK LAND
	WATERWAY
	SCULPTURE TRAIL
	Trail Head
	Parking
	Bike Share
	Hammock
	Fishing
	Ramp



Based on geologic mapping by Thomas Crawford and Randal Kath (UWG)

Rock Structure

- Notice how the bands of rock on the geologic map run NE-SW across our area. This is because of the rock structure of the Appalachian chain.
- During the continental collision, which caused mountain building, rocks were folded and faulted due to compression.
- Folding shows up in the tilting of rock outcrops. Notice the bend in the outcrops of garnet mica schist on the north west part of the map. This is the result of folding.
- The abrupt termination of garnet mica schist, amphibolite and mica schist against hornblende biotite gneiss to the southeast indicates a major fault line.

2a View from observation platform



- The northwest part of the GreenBelt follows the meandering course of the Little Tallapoosa.
- Notice that the river flows SW parallel to the Appalachian trend.
- Locally the valley takes advantage of a belt of mica schist that is more easily eroded than neighboring gneisses.
- Downtown Carrollton is located on a hilltop of harder gneiss.

3 Gneiss, a common metamorphic rock



- Slab of gneiss beside Believers Blvd. Outcrops may be traced to the NW along the small ridge on the disc golf course.
- This is the type of rock that caps the hill top at Hobbs farm.
- At first glance this looks like granite but its streaky texture shows it has never melted. See stops 20 and 23 for more explanation.

4 Oak Lawn Farms, Rome Street



- Before US 27 was constructed this was the main road leading north out of Carrollton.
- If you continue straight (south) at the intersection with Williams Street you will end up on the Square (see side excursion to Downtown, stop 41).
- There are plenty of good restaurants!

5 Right of Way



The many manholes along the GreenBelt remind us that the trail often shares the right of way with the sewer lines. This is helpful since it allows ready access in case a lid is popped after heavy rains

6 Kissing Bridge below railroad



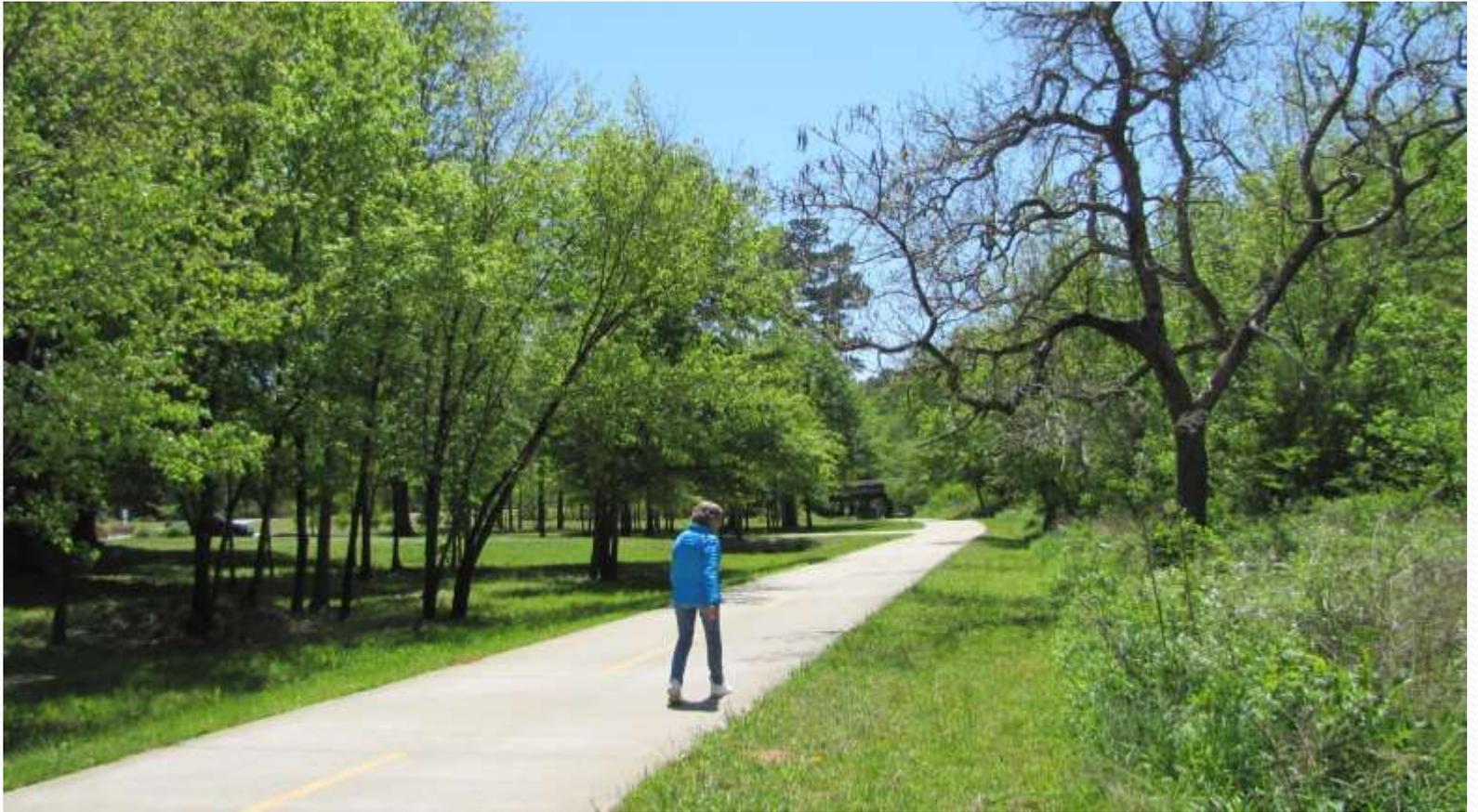
The retaining wall (on right in this picture) is made of blocks of local garnet, mica schist. Outcrops are visible at the sharp bend just before reaching the bridge (stop 6a).

7 Outcrops of schist

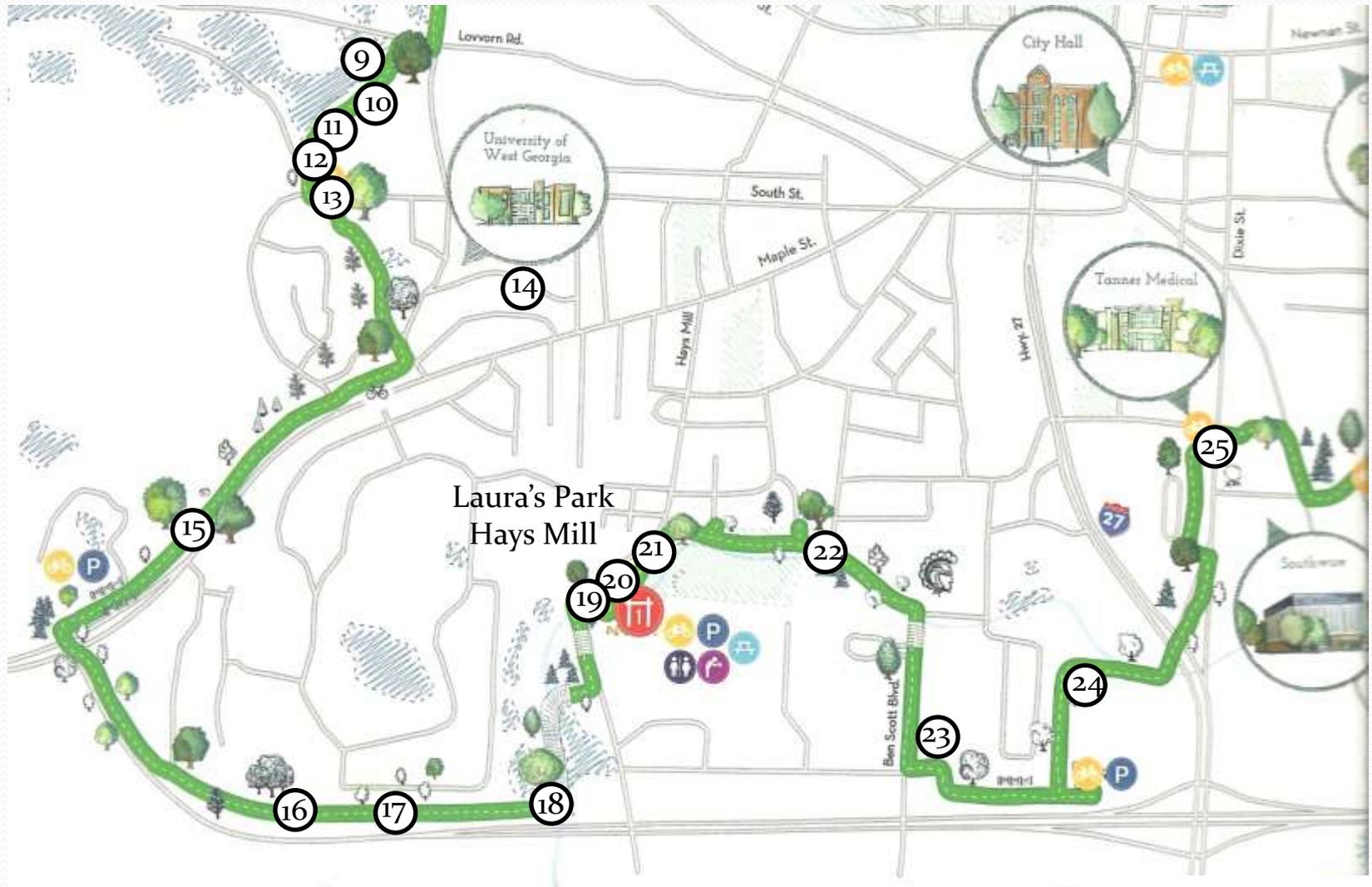


- Schist is a metamorphic rock formed by the alteration of shale or mudstone.
- Heat and pressure during mountain building have caused quartz and mica to grow at the expense of the original minerals in the mud.
- The original mud was deposited on an ancient sea floor before the collision that built the Appalachians.
- Notice that the layers of schist are tilted about 35° SE as a consequence of folding during mountain building.

8 Trailhead at Alabama Street



Southwest



9 Abandoned Meander



There are several places where the Little Tallapoosa has changed its course and left abandoned channels that are now shallow ponds like this one on the south side of Lovvorn Rd.

10 Cliffs of Amphibolite



- These outcrops were exposed due to erosion by the Little Tallapoosa.
- The rocks are tilted to the ENE at an angle of 40° indicating that they have been folded.
- The greenish color of the fresh rock is typical of the metamorphic rock known as amphibolite which forms by the metamorphism of basalt lava.

11 Lowest elevation



The lowest elevation on the trail is given as 975'. This is close to the Little Tallapoosa northwest of the University.

12 Groundwater monitoring



As you walk along the trail near mile post 13.02 watch out for short white pipes like the one near the bridge. These are water monitoring wells used for measuring groundwater levels around Campus creek.

13 Campus creek



- The drainage area of the small creek west of the trail lies almost completely on the campus of UWG.
- It is an ideal area to study hydrogeology.
- From measurements of local rainfall, evaporation, stream discharge and infiltration (using monitoring wells) it is possible to model the water budget for one small tributary of the Little Tallapoosa.

14 Callaway Science Building



- The Callaway Building houses the Geology program in the College of Math, Science & Technology at the University



- There are many showcases in the halls illustrating rocks, minerals and fossils.
- Come visit us if you want to know more about the geology of Carroll County or other areas.

Minerals



Fossils

15 Highest Point



- The highest elevation of 1100' is located on Maple Street between markers at 1090' & 1092'.
- This is only 1 mile from the lowest point on the Little Tallapoosa at 975'.
- If you are cycling southwest this is the most difficult (steepest) part of the trail.

Relief (Difference in elevation)

- The difference in elevation between the highest (1100') and lowest (975') points on the GreenBelt is only 125'
- This is surprising in view of the complicated geology, which rivals the geology of the Alps or Himalayas.
- The Alps, Himalayas and Appalachians were all formed by the collision of continents and the rock structures are similar.
- The difference is in their ages. The Appalachians once resembled these younger mountain ranges but have been planed down by 250 million years of erosion.

16 Hornblende-gneiss



- This metamorphic rock has layers of dark (hornblende & biotite) and light (feldspar) colored minerals.
- It is a loose block beside the bridge but similar to nearby outcrops where dip & strike was measured.

17 Measuring rock structure



- The geologist is measuring the dip and strike (trend) of the rock structure with a compass and clinometer.
- At this locality near the bypass the rocks trend WNW and dip 14° NNE.
- This is unusual for the Appalachians which generally trend NE and are inclined either NW or SE depending on folding.

18 Buffalo Creek



- The GreenBelt crosses Buffalo Creek several times between the Country Club and Old Newnan Rd.
- The creek drains Richards Lake and provides the right of way for much of the southern part of the trail.
- It flows west to join the Little Tallapoosa in Alabama.



19 Fish watching

- The pool just before the underpass at Hays Mill Rd is a good place to watch for fish, especially bluegill and redbreast sunfish.
- The water is well oxygenated after passing over the falls at Hays Mill.



Take time to read about bats on the ceramic signs under the bridge.

20 Erosion on Buffalo Creek



Notice the remains of the old mill.

- Along much of its valley Buffalo Creek is flat and swampy.
- However, harder rocks around Hays Mill have increased the gradient and velocity, leading to erosional down-cutting.
- This is the reason that bare rock is visible in the stream bed.

20a Hays Mill



This is a great locality to visit the local geology.

The waterfall which provided the water power for the old mill is made of a relatively resistant metamorphic rock called gneiss.

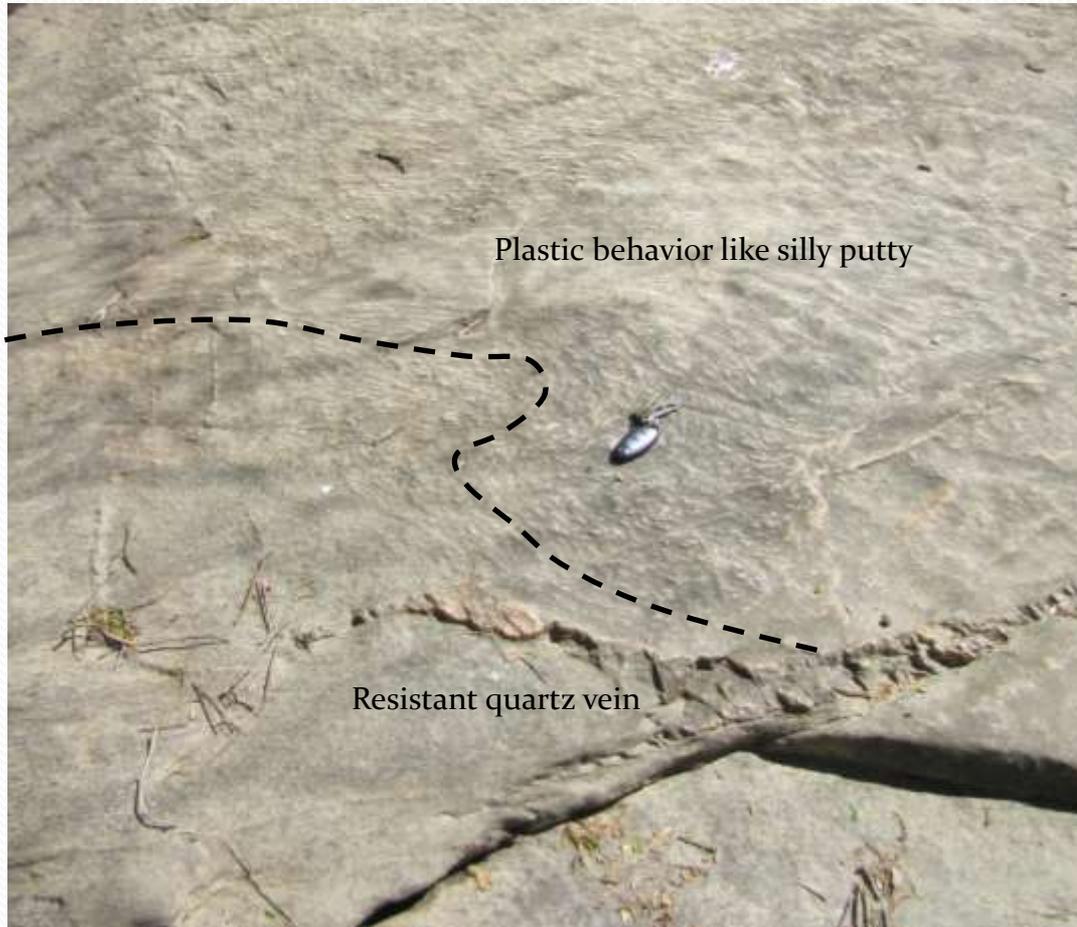
Metamorphic rocks are formed by recrystallization from earlier rocks by heat and pressure during mountain building.

20b Metamorphic Rock

- Examine the streaky texture of this metamorphic rock.
- You can see the way it has been squeezed like silly putty.
- This tells us that the rock has been metamorphosed by heat and pressure but never melted.
- Melting produces a more uniform crystalline texture like that in granite.
- There are a few quartz veins cutting the outcrop.



20c Quartz veins



- This metamorphic gneiss is made up of several different minerals, mainly quartz, feldspar, hornblende and biotite mica.
- Quartz is quite hard and resistant to erosion. It is the reason the rock forms a waterfall.
- Quartz also has a relatively low melting point which makes it the first mineral to begin melting when heated.
- The quartz veins in this rock are the first signs of melting.

21 Foundation of old quarry workshop



- At first these blocks look like granite but their streaky texture shows they are made of gneiss.
- Temperatures remained below the melting point of granite but were high enough to cause recrystallization (metamorphism).
- All the blocks are similar and were quarried locally, across the road where the apartment complex is located (near the swimming pool).
- Notice the drill holes used to split the blocks and probably drilled by hand.

22 Buffalo Creek Restoration Project



- Watch out for signs describing the stream, plants and animals along this part of the trail.

22a Sand with ripple marks



Ripple marks

- A sign explains the relationship between particle size and stream velocity.
- It is usually possible to see ripple marks formed by current action on the sandy bottom along this part of the stream.

22b Footbridge near Scott Blvd



- The Buffalo Creek restoration project is sponsored by the Carrollton City Schools.

23 Loose blocks of Gneiss



- Gneiss is a metamorphic rock with a composition similar to granite.
- However the streaky texture tells us that unlike granite it has never melted. Rather the crystals grew within the solid rock due to heat and pressure but below their melting point.
- These blocks were probably blasted during construction of the bypass.

23a Gneiss not Granite



- This is the main rock type around Carrollton.
- In the mistaken belief that this kind of rock is granite, people often infer a connection with Stone Mountain, but this is not so.
- Some blocks include veins with crystals of brown mica (biotite), along with light colored quartz and feldspar.

Silicate Minerals

- In order, the most abundant elements in the Earth's crust are: oxygen (surprisingly), silicon, aluminum, and iron.
- In combination, these are the main elements that make up the rock-forming silicate minerals.
- Silicon & aluminum combined with oxygen give light colored silicate minerals; quartz, feldspar, white mica (muscovite). Quartz is the main ingredient in glass.
- The addition of iron produces darker green, brown and black colors; brown mica (biotite), hornblende (amphibole), garnet.

24 Detention Pond



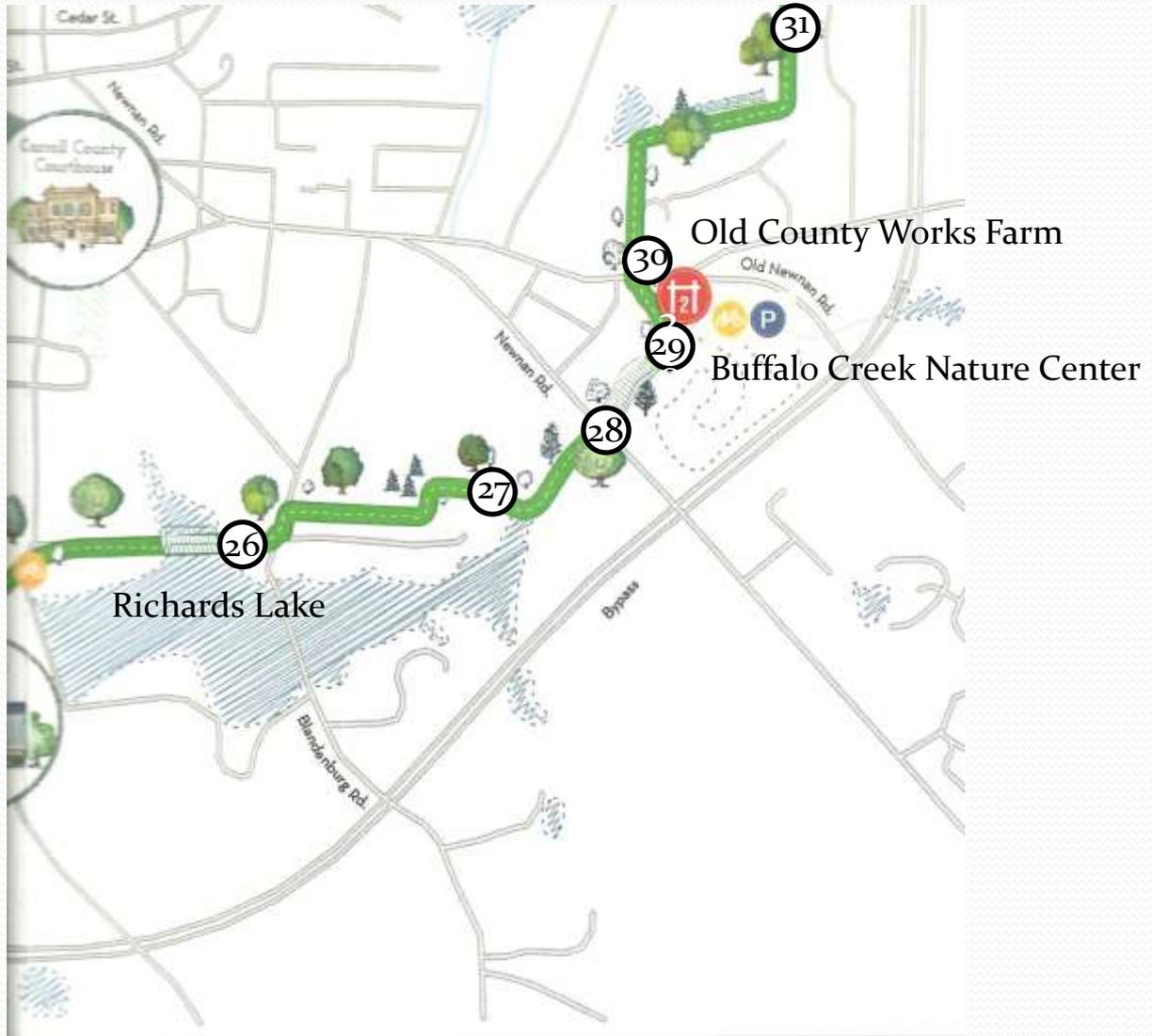
- This small dry pond is designed to collect runoff from the parking lot after heavy rains.
- This slows drainage and helps to prevent flooding along the creek.
- Plant growth also helps to trap and break down pollutants like oil.

25 Tanner Health Pavilion



- The decorative stone facing the building and around the pool is the sedimentary rock sandstone.
- There are no local sedimentary rocks and this stone was most likely quarried north of Chattanooga.

Southeast



26 Richards Lake & Blandenburg Rd



27 Ayers Dairy Farm



- View looking toward Newnan Road.
- Notice the contour ploughing on the slope to the left of the trail. Contour ploughing was encouraged to prevent erosion when these were cotton fields.

28 Buffalo Creek at Newnan Road



29 Buffalo Creek Nature Preserve



- A short side trip will take you across Buffalo Creek into the Nature Preserve.
- You will find wild flower trails with identification signs for trees and plants.
- Also a demonstration garden at the top of the hill near the offices of the UGA Extension Service.

30 County Works on Old Newnan Rd



- The modern DMV occupies the old County Works Farm.
- At an elevation of 1095' this is a high point on the GreenBelt.

Before Hwy 16 was built this was the main road to Newnan. The original roads around Carrollton often followed ridge lines to avoid the swampy river lands.

Northeast



31 Blocks of vein quartz



- Although the local bedrock is amphibolite it apparently includes veins of quartz as in these three blocks.
- The quartz was deposited deep underground from hot water circulating through cracks in the amphibolite.

32 Amphibolite



Structures in the rock tell us that the original lava was erupted on an ancient sea floor before the collision that formed the Appalachians. Although these blocks have been moved during construction they are close to their original position.

- Amphibolite is a metamorphic rock formed by the recrystallization of basalt lava.
- Metamorphism occurred as a result of heat and pressure during the building of the Appalachian mountains.
- Although metamorphism has altered the appearance of the lava the chemistry of these rocks is still identical to basalt.

33 Curtis Creek



- Curtis Creek flows NW through Lake Carroll to join the Little Tallapoosa near Hobbs Farm.

Carrollton was built on the drainage divide between the Little Tallapoosa, Curtis Creek and Buffalo Creek.

33a Swamps on Curtis Creek



- The work of erosion along a creek is mainly controlled by discharge and gradient
- Curtis Creek is only a tiny creek with small discharge.
- Gradient is controlled by the dam on Lake Carroll (1004'). At the bypass the elevation of the creek is only 1010' and the gradient is, therefore, very low.
- As a result Curtis Creek has little energy and its course is swampy and sluggish.

34 Lake Carroll from Bankhead Hwy



34a Log Cabin



- Chimneys of old log cabins provide a window into local geology.
- Can you identify the rock types?

As you pass the cabin check out the bird identification guide.

35 Barry Memorial Field



- Can you identify the rock used in the memorial?
- Is it igneous, sedimentary, or metamorphic?
- What is the evidence?

36 Old Airport



- East Carrollton Park occupies the location of the old Carrollton airfield. Can you identify the old runways?
- The main runway ran NW-SE between Castle playground and the fire station.
- A shorter runway ran NE-SW perpendicular to the first.

37 Castle Playground - Soil types



Check the soils along the dirt bike trails near Castle playground. Do they match the rock type shown on the geology map?

- Even when there is no rock exposed it is often possible to identify the rock type by observing the soil. The redder the color the more rusty iron.
- Amphibolite; red clay soil.
- Gneiss; orange clay soil with rock fragments.
- Schist; orange soil with mica flakes.
- River lands; light colored sandy or pebbly soil.

38 Lakeshore Park

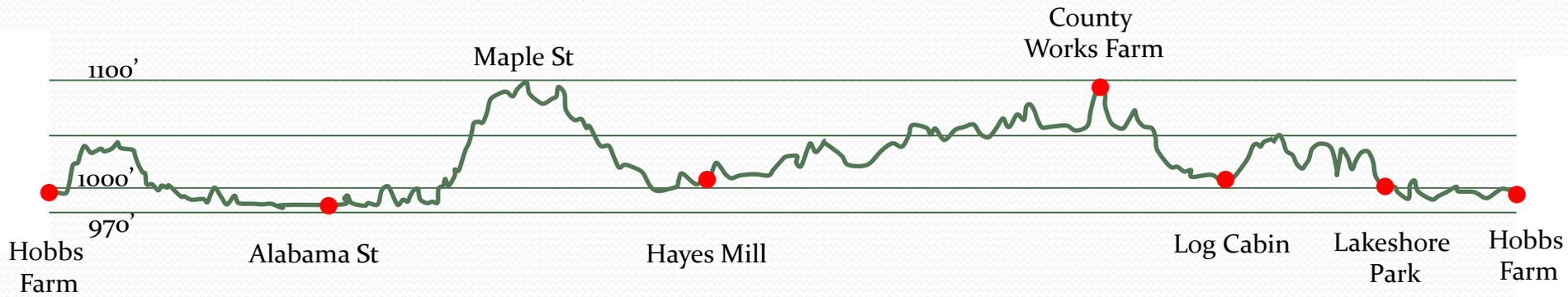
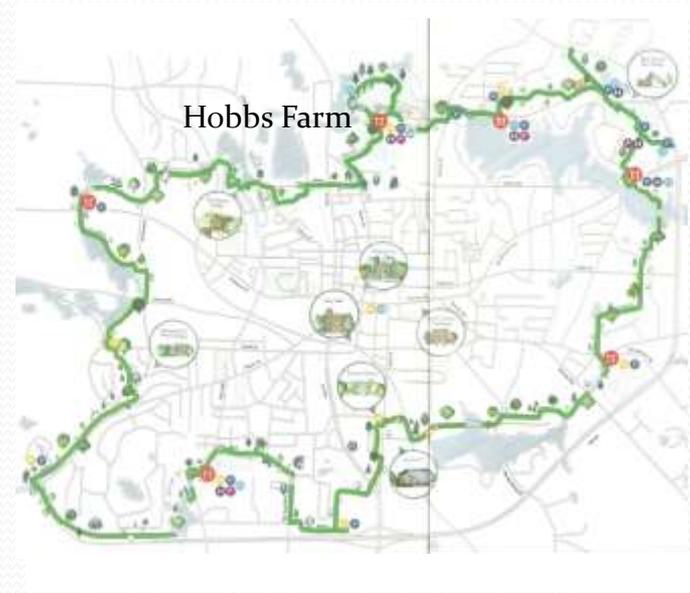


39 Stewart Street

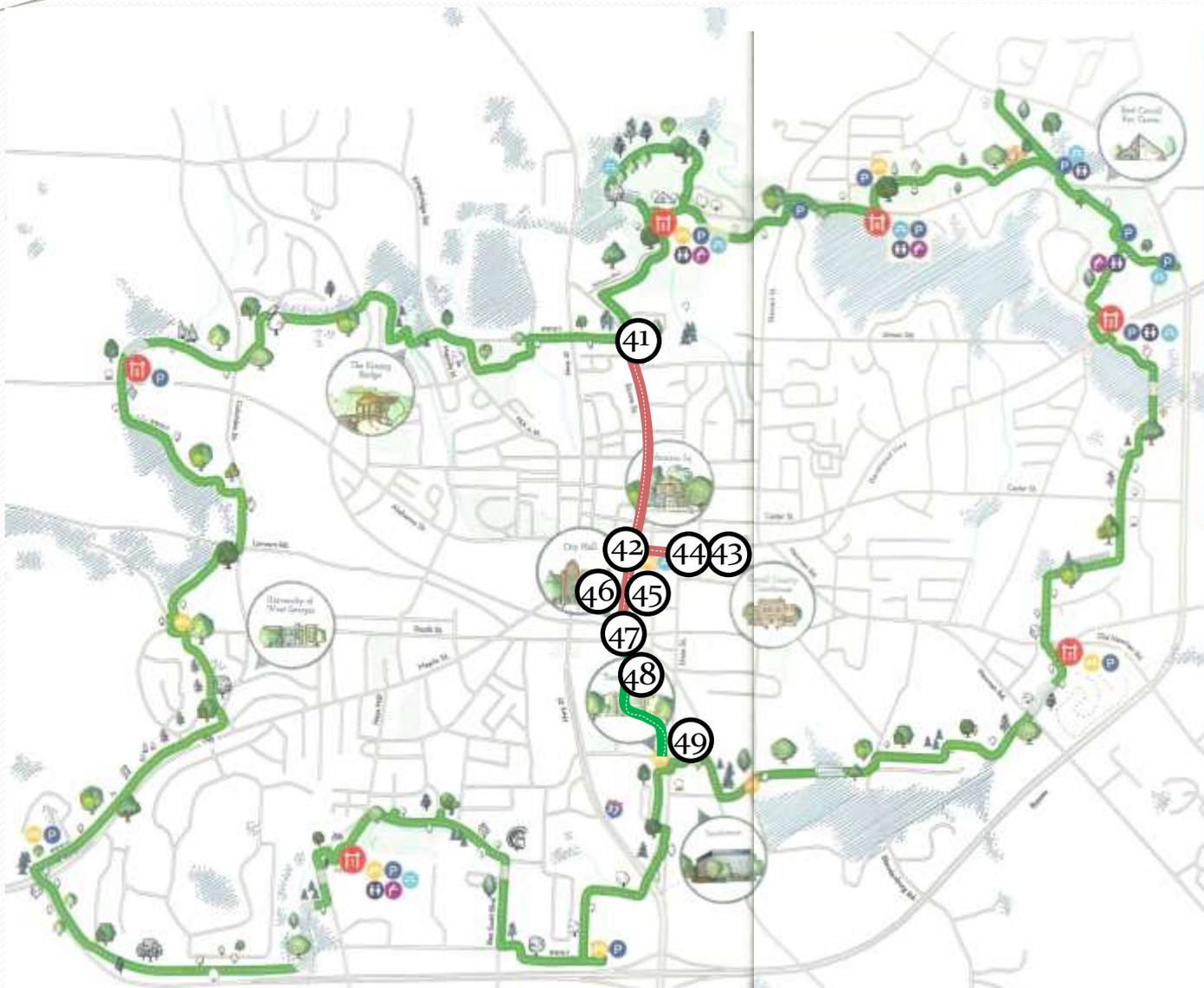


- This old dry stone wall is built of local rock.
- Can you see the flakes of mica twinkling in the sun?
- What is the rock type?

40 Hobbs Farm



Adapted with permission from alltrails.com



- ### TRAILHEADS AND AMENITIES
- LAURA'S PARK, 400 HAYS MILL ROAD
West of North of Lake AM Church
 - Bike Repair Station
 - Bike Share Station
 - OLD NEWMAN ROAD, 610 OLD NEWMAN ROAD
Approach from the DMV office
 - Buffalo Creek Nature Trails
 - LEO CABIN, 182 NORTH LAKESHORE DRIVE
Off South Road Hwy, overlooking Lake Central
 - LAKESHORE PARK, 600 NORTH LAKESHORE DRIVE
Bike Share across from baseball field & tennis courts
 - Boat Dock/Ramp
 - Canoe/Fishing
 - Bike Share Station
 - HORSE TEAM PARK, 600 BELLEVER'S BUCKLEWALK
At the end of Bellever's Dec. of Home St
 - Observation Deck
 - Canoe/Fishing
 - Kayak Launch Dock
 - 16-Pool Hammock Nest
 - Disc-Golf Course
 - Nature Trails
 - Bike Repair Station
 - Bike Share Station
 - ALABAMA STREET TRAILHEAD, 1174 ALABAMA STREET
At the Lake, overlooking Hill



map legend:

	GREENBELT
	ROAD
	WATER
	PARK LAND
	BOUNDARY
	SCULPTURE TRAIL
	Trail Head
	Parking
	Bike Share
	Bike Repair
	Bike Share
	Bike Repair

41 Excursion to Downtown



A $\frac{3}{4}$ mile walk south along Rome St. will take you to Adamson Square, the center of Carrollton.

42 Adamson Square



This charming old square dates to the turn of the 20th century. In the NW corner you will find a 1912 photograph of the old square etched in slabs of igneous rock set into the sidewalk.

42a Bradley Street



Another ½ mile along Bradley St will bring you to the Depot and railroad crossing where the sidewalk reconnects with a spur of the GreenBelt on the south side of town

43 Historic Court House 1929



- A side trip to the old court house is a must if you are enthusiastic about rocks. Turn left (east) at the square.
- The outside of the building is clad in oolitic limestone from north Alabama.
- Inside are more kinds of fossiliferous limestone.

43a Hot rocks



- The tiles in the entry halls consist of pink gneiss veined with granite.
- This mixture of igneous and metamorphic textures shows that the rock was partly magma, partly solid and very close to the melting point.

43b Lobby & Main staircase



- The polished pink and gray stone around the lobby and main stairway is still quarried near Knoxville and called Tennessee 'marble'.
- It is not a true metamorphic marble but a limestone full of stem plates of 'sea lilies' (pink stone) and microbial structures (gray stone).

43c Main Courtroom



- The walls of the old courtroom and lobby are faced with an unusual limestone full of fossil oyster shells and other mollusks. Holes are left by their solution.
- The rock was quarried from the Clayton Limestone near Cuthbert in Randolph Co, GA.

43d Fossils in Limestone



The remains of oysters (white calcite shells) and clam shells that have dissolved to leave molds.



The rounded swirly masses in this gray limestone wainscoting are microbial structures formed by fossil bacteria.

44 Confederate War Memorial



- On your way back to the square pause at courthouse park.
- The memorial resembles those in many southern towns.
- It is made of true marble, formed by the metamorphic alteration of limestone.
- Note that marble is much softer than granite or gneiss and more easily scratched.

44a The Cotton Farmer



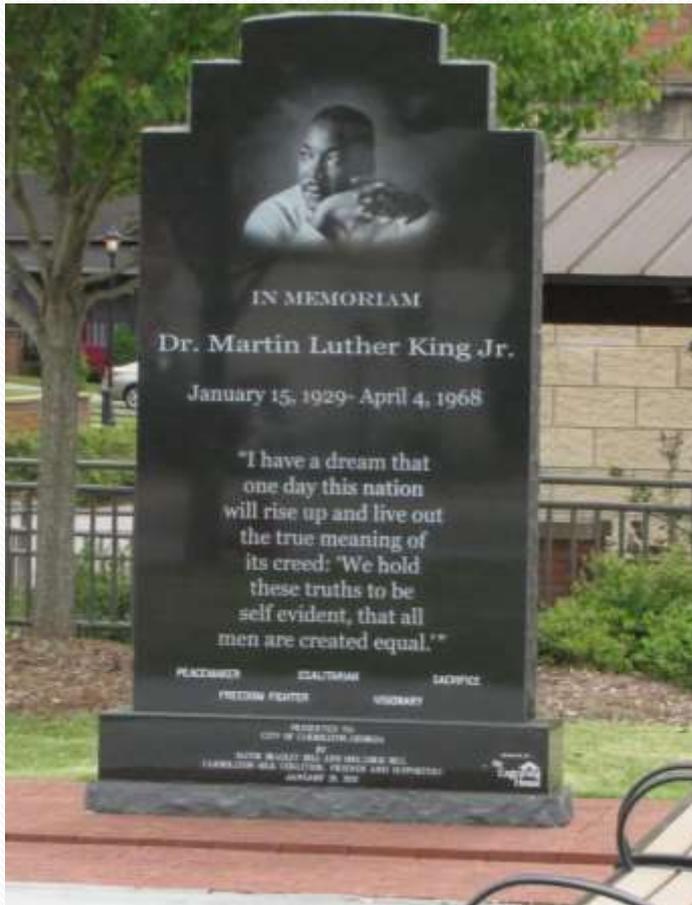
- The Cotton Farmer, who sits in the small park beside the courthouse, was sculpted by Henry Setter and is based on an old photograph taken on the square in 1912.
- The cotton bale is carved from a block of limestone, a sedimentary rock, from the old Ledbetter quarry in Rome, GA.
- The sculpture is cast in bronze.

44b Granite Mill Wheel



- The old mill wheel next to the Cotton Farmer is made of the coarse grained igneous rock granite.
- Note the large rectangular crystals of feldspar that formed by the slow cooling of magma deep in the earth's crust.

44c Martin Luther King Memorial



- This fine grained, hard, dark colored igneous rock is called dolerite.
- It has the same composition as basalt but was intruded beneath the surface.
- The small sized crystals indicate rapid cooling of magma.

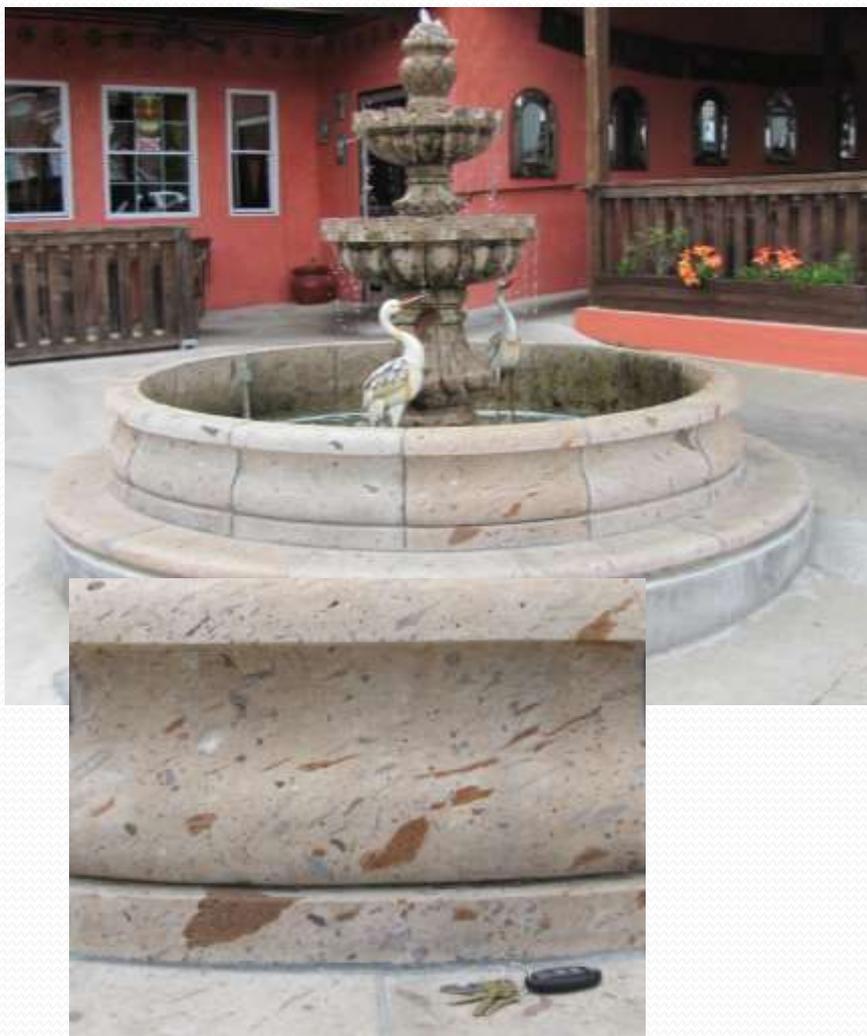
45 The Carrollton Amp



Return to the square and turn left (south) on Bradley St. The buildings to the left and right after passing the Amp are old mills.

Watch out for the Southeastern Quilt and Textile Museum on the left. On the right is City Hall.

46 A most unusual, deadly volcanic rock



- This fountain, across the road from the Amp, is made of welded volcanic ash; the kind of ash deposited by the most dangerous, explosive volcanoes.
- This is like the 'glowing avalanche' which buried Pompeii in 79 AD.
- It consists of pieces of pumice and other rock fragments ripped from the throat of a volcano and mixed with shreds of glass and fine grained ash.
- Because the mixture of ash and burning gas is so hot it welds into solid rock on settling.

47 Train Depot



- The Train Depot dates to 1888 and was donated to the City by Norfolk-Southern in 2010.
- It features elegant brickwork and a rare slate roof.
- Slate is a metamorphic rock hardened by the alteration of much weaker shale or mudstone.

48 Tanner Hospital Park



- A new spur trail connects downtown with the GreenBelt on Dixie St. via Tanner Hospital Park.
- Enjoy a shady walk beside the creek and meet the geese.

49 Tanner Health Pavilion



- The decorative stone facing the building and around the pool is the sedimentary rock sandstone.
- There are no local sedimentary rocks and this stone was most likely quarried north of Chattanooga.



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 (West side, across from baseball field, in stone court)
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ALABAMA STREET TRAILHEAD, 1170 ALABAMA STREET
 At the Lake, near pool area



map legend:

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	SCULPTURE TRAIL
 	Trail Head Parking
 	Public Toilet Restrooms
 	Bike Share Bike Fixation