

INTRODUCTION AND PREVIOUS MAPPING

The Louisburg 7.5-minute quadrangle is in central Franklin County, North Carolina. Louisburg, the county seat, lies along the Tar River in the north-central part of the quad. A number of highways converge from all directions at Louisburg: US Highway 401 and NC Highways 39, 56, 581, and 561. In addition to Louisburg, the quad contains the unincorporated communities of Katesville, Royal, and Raynor. The Tar River enters the north-central edge of the quad, flowing SSE through Louisburg and exiting the quadrangle's southeastern corner, draining toward the southeast. Significant creeks in the quad, all tributaries to the Tar River, are Cedar, Fox, Sycamore, Buffalo, Camp, Crooked, and Big Branch Creeks, plus Willow Branch and Jumping Run. Total relief in the quad is just over 200 feet, with elevations above sea level ranging from about 306 feet at Royal to approximately 168 feet where the Tar River leaves the quad at the southeast corner. The Tar River and the lower portions of many of its tributaries, notably Cedar Creek, have broad well-developed floodplains (not mapped).

The Louisburg quadrangle is almost entirely underlain by granitoid rocks belonging to the late Paleozoic (Alleghanian) Roanoke batholith. The granites are intrusive into gneisses and schists of the Raleigh terrane, interpreted as an igneous component of a Neoproterozoic volcanic arc (Hibbard and others, 2002). Just to the northwest of Louisburg, the Mason fault separates the Raleigh terrane from the supracrustal Spring Hope terrane (Fuemmel, 2004; Stoddard and others, 2009). Two Ralston terrane map-units (CZgs and CZms), lying just west of the Mason fault, enter the extreme northeastern corner of the quadrangle, and exhibit features indicating ductile deformation. Other than in the northeastern corner, metamorphic rocks occur in the quad only as xenoliths within granite. In addition, Jurassic dikes of olivine diabase are common in the area, most trending north-southwest, as are linear zones of siliceous breccia, mostly northeast-trending, which are thought to represent brittle faulting of Mesozoic age (cf. Heller and others, 1998).

Prior to this investigation, little geologic mapping had been undertaken in the quadrangle, although it has been included in a number of regional and reconnaissance studies. Parker (1968) defined the structural framework of the region. McDaniel (1980) mapped a multi-county region, including Franklin County, at a scale of 1:100,000, and first identified the siliceous breccia zones in the area. Farrar (1985a, b) mapped the entire eastern Piedmont of North Carolina, defined map units for the region, and proposed a model for the tectonic evolution of the region. As part of a regional radon assessment, Speer (compendium) undertook reconnaissance mapping of the Roanoke batholith. In Speer (1994) also presented a map showing some granitoid plutons of the batholith, and describing some of their constituent facies. Sacks (1996a, b, c) mapped a strip of four 7.5-minute quadrangles along the Virginia-North Carolina border, along strike to the north-northeast.

Adjacent to the field area, 1:24,000-scale mapping has been done for the Justice quadrangle to the east (Stoddard and others, 2009), the Ingleside quadrangle to the north (Stoddard, 2010) and the Franklinton quadrangle to the west (Phillips and others, 2002). To the south, the Roanokeville quadrangle has been mapped at the 1:100,000 scale as part of the Raleigh sheet (Clark and others, 2004).

DESCRIPTION OF MAP UNITS

HYDROTHERMAL UNIT

qrz - quartz rock and quartz breccia: Siliceous accumulations of massive, milky quartz, commonly with vuggy crystals of clear, milky, or smoky quartz ranging from 1 mm to 5 cm. Locally includes brecciated and schistified granitoid rock having networks of thin quartz veins. Likely the result of quartz metasomatism along brittle fracture zones or faults. Probable fault-surface features, including slickensides, observed rarely in field. On the basis of linear arrays of such quartz occurrences, several fault segments are inferred and are depicted on the map as linear quartz breccia zones with trends typically N-S-W. Several good exposures occur near downtown Louisburg. One is along the northeast-trending ridge located just west of US Highway 401, south of its intersection with NC Highway 56, another is in the abandoned excavations just west of several businesses on US 401 South (South Bicket Blvd.), another at several businesses just east of North Bicket Blvd., just north of the Tar River bridge. At one location in the Ingleside quad (Stoddard, 2010), a fault is inferred to pre-date diabase dikes (D1) in length, possibly 50 m in width, crosses US Highway 401 just south of Crooked Creek in the southeastern corner of the quad. A dike with similar trend on the map just north of Cedar Creek just west of SR 1109 (Timberlake Rd.), an ENE-trending dike segment is mapped just east of SR 1109 (Timberlake Rd.) in the same vicinity. On the map, red dots indicate isolated outcrops or small occurrences of qrz.

INTRUSIVE UNITS

jd - diabase: Fine to medium-grained, equigranular to locally plagioclase porphyritic diabase, typically olive-brown. Commonly weathers to black to tan-gray, spheroidal boulders and cobbles. Occurs in vertical to steeply dipping dikes. The traces of the larger dikes correlate with and may be partly inferred on the basis of linear magnetic highs. In the Louisburg quad, nearly all diabase dikes trend N-W to NNW, one large NW-trending dike, possibly 50 m in width, crosses US Highway 401 just south of Crooked Creek in the southeastern corner of the quad. A dike with similar trend on the map just north of Cedar Creek just west of SR 1109 (Timberlake Rd.), an ENE-trending dike segment is mapped just east of SR 1109 (Timberlake Rd.) in the same vicinity. On the map, red dots indicate isolated outcrops or small occurrences of diabase.

Granitoid rocks of the Roanoke batholith

The Roanoke batholith is a large, composite granitoid intrusive complex in the Piedmont of North Carolina. It is elongate parallel to the typical north-northeast regional strike, and generally lies along the axial trace of the Wake-Warren antiform, which passes through the Louisburg quad. Field evidence indicates that the Roanoke plutons intruded during or after the peak of regional metamorphism, and very limited radiometric age-dates indicate that they crystallized and cooled during the Pennsylvanian and Permian periods (Fullagar and Butler, 1979; Horton and Stern, 1994; Schneider and Samson, 2001). Previous studies dealing with the Roanoke batholith in the area covered by this map include those of Parker (1968), Becker and Farrar (1977), Farrar (1985a, b), Speer (1994), Speer and others (1994), and Speer and Hoff (1997). Two related granitoid plutons, the Carolina gneiss, dominate the Justice quadrangle immediately east of the Louisburg quad (Stoddard and others, 2009).

The Roanoke batholith as mapped in the Louisburg quadrangle includes five mapped facies detailed below. The dominant facies, PPgd, underlies over 90% of the map. Leucogranite PPge lies in the northeast. Granitic pegmatite bodies are associated with all of the mapped granitoids.

PPge

PPge - granitoid facies: Fine to medium-grained, non-porphyritic, locally foliated muscovite +/- garnet +/- biotite leucogranite. Cl less than 5. Occurs in the northeastern Louisburg quadrangle and the adjacent Justice quadrangle; it is exposed in a roadcut on NC Highway 56/581 just east of Sycamore Creek in the northeast Louisburg quad (LB694).

PPgd

PPgd - granitoid facies: Fine to coarse-grained, but primarily medium-grained equigranular to moderately porphyritic (very rarely megacrystic), rarely foliated, pink or salmon and white biotite monzonitic. Commonly has an almost isometric fabric with well-formed alkali feldspar and plagioclase grains. Cl 5 - 12. Contains common biotite schlieren and local biotite crystal clogs. Pegmatite dikes and pods are extremely common. Locally, siliceous quartz veins (alkali feldspar 1-4 cm in length) also occur. Unit also contains relatively common xenoliths of Raleigh terrane country rocks. Less commonly contains assemblages of fine-grained orthoclase and/or titanite and may display igneous layering between biotite-rich and biotite-poor phases. Weathered surfaces are commonly highly friable and/or cavernous. Chemical analysis from station 01-LBG-15 from the western corner of the Louisburg quad along SR 1110 (E. F. Cottrell Rd.) has 70.5 wt% SiO₂, normative C1-P of 28.29-43 and normative 20-1% An. Likely equivalent to the Roanoke main phase of Speer (1994) but generally lacks muscovite.

PPgh

PPgh - granitoid facies: White to tan, fine to medium-grained, equigranular to weakly K-feldspar porphyritic, biotite +/- muscovite syenogranite to monzonitic. Locally carries a weak foliation of robust biotite flakes. Occurs in the southeastern Louisburg quad, south of Cedar Creek west of its confluence with the Tar River, and elsewhere as unmapped pods (xenoliths) associated with PPgd. Locally, dikes of PPgd cut rocks similar to PPgh, PPgd, and Ppg. Cl 8 - 18.

PPg

PPg - granitoid facies: Fine to medium-grained, white to pale gray biotite monzonitic to granodioritic. Locally carries a weak biotite foliation. Rare assemblage of subhedral garnet less than 1 mm. May be cut by thin pegmatite dikes having beige to white-colored alkali feldspar. Displays gray to white weathering surfaces, but is distinctively more resistant to weathering when compared to the other granitoid facies. Cl 8 - 14. Occurs in the northeastern Louisburg quad, good examples near Terrell Lane Middle School, located between NC Highway 561 and NC Highway 56.

PPg1

PPg1 - granitoid facies: Fine-grained to medium-grained white, light gray, or tan, equigranular to weakly porphyritic biotite +/- muscovite granite, locally with pink alkali feldspar. Locally contains alkali feldspar xenocrysts up to 8 mm in length, but does not contain schlieren or xenoliths and contains fewer pegmatite dikes than most other granitoid facies. Cl 5 - 12. Extends from north-central Louisburg quad into south-central Ingleside quad.

METAMORPHIC ROCKS OF THE RALEIGH TERRANE

CZms - muscovite-biotite sillimanite schist: Gray to golden or white, fine to coarse-grained, well-foliated schist with abundant sillimanite; may also contain pyrite and/or garnet. Locally strongly and chaotically crumpled and/or rusty or maroon weathering. Contains both prismatic and fibrous varieties of sillimanite, with mats of sillimanite overgrown by coarse muscovite. Occurs in the southwest Louisburg quad along SR 1111 (Cooke Rd.), as an apparent xenolith associated with granite, pegmatite, and leucogranite.

CZgs - biotite gneiss and schist: Medium to dark gray, fine to medium-grained, moderately to well-foliated biotite-quartz-plagioclase/alkali feldspar gneiss and schist. Varies from non-banded biotite granitoid gneiss to variably banded biotite gneiss to schistose biotite gneiss and biotite schist. Rarely includes zones of hornblende-biotite schist, hornblende gneiss, or quartzofeldspathic gneiss with or without biotite and/or muscovite. Locally carries garnet, epidote, or sulfide minerals. Locally associated with dikes and/or sills of pegmatite and/or leucogranite. In the northeastern corner of the Louisburg quad, the unit extends into the neighboring quad; it also occurs as xenoliths within granitoid bodies, as in the excellent exposures on Cedar Creek at the US Highway 401 bridge and along the access road to the Franklin County airport (SR 179 or Airport Dr.). It also occurs as extensive saproplitic exposures at Pruitt Lumber Company just north of US Highway 56/581, east of Louisburg between Fox and Sycamore Creeks. Smaller xenoliths are indicated by point symbols within granitoid rock.

CZms

CZms - muscovite schist: Silvery gray to dark greenish gray, medium-grained, well-foliated schist commonly with well-developed button foliation interpreted as an S-C shear fabric indicating subhorizontal right-lateral shear related to the Mason fault zone. Varies from muscovite schist to chlorite-muscovite schist. Extends into the neighboring Justice quad from a very small area at the extreme eastern edge of the Louisburg quad, just north of the intersection between US Highway 56/581 and SR 1421 (Hickory Rock Rd.).

CZgs

CZgs - hornblende gneiss: Grayish green to greenish black, fine to medium-grained, poorly to moderately foliated hornblende-plagioclase gneiss and amphibolite. May contain biotite or epidote. May be compositionally banded or massive; locally contains hornblende porphyroblasts to one cm. Where biotite content is high may be somewhat schistose. Occurs as xenoliths within granitoid bodies. A single larger body is mapped as a pod along SR 1605 (Julie Pearce Rd.) in the south-central Louisburg quad; white smaller xenoliths are indicated by point symbols within granitoid rock.

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EXPLANATION OF MAP SYMBOLS

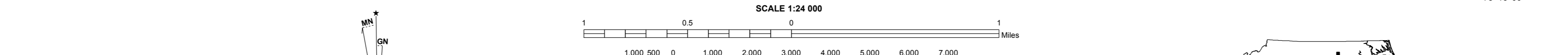
- CONTACTS**
- Lithologic contacts - Distribution and concentration of structural symbols indicates degree of reliability.
- contact - location inferred
 - *** contact - location inferred
 - quartz breccia zone - location inferred
 - diabase dike - location inferred
- LINEAR FEATURE**
- Bearing and plunge of foliolar lineation in granite
 - Bearing and plunge of cretation lineation
- PLANAR FEATURES**
- Observation sites are centered on the strike bar or are at the intersection point of multiple symbols.
- strike and dip of foliation
 - strike and dip of joint
 - vertical foliation
 - strike and dip of foliation of xenolith
 - strike of vertical foliation of xenolith
 - strike of vertical foliation of xenolith
 - biotite gneiss xenolith with granite
 - biotite schist xenolith with granite
 - hornblende gneiss xenolith with granite
 - quartz vein and/or pegmatite dike
 - diabase station location
 - geochronological station location

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This Open-File report is preliminary and has not been reviewed for conformity with the North Carolina Geological Survey editorial standards or with the North American Stratigraphic Code. Further revisions or corrections to this preliminary map may occur prior to its release as a North Carolina Geological Survey map.



Scan with smartphone for link to GeoPDF of map. Third party App required.



Base topographic map is digital raster graphic image of the Louisburg 7.5-minute quadrangle (1978). North Carolina State Plane NAD 83 meters coordinate system, Lambert Conformal Conic projection.

8.12' 10" MILES
1" 20" MILES

SCALE 1:24,000

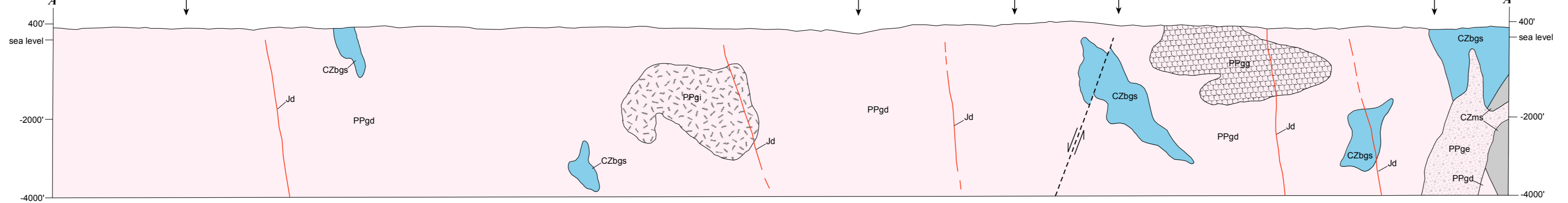
CONTOUR INTERVAL 10 FEET

MAP LOCATION



TERRANE MAP

- Roanoke batholith
- Raleigh terrane



cross section scale 1:24,000
no vertical exaggeration

BEDROCK GEOLOGIC MAP OF THE LOUISBURG 7.5-MINUTE QUADRANGLE, FRANKLIN COUNTY, NORTH CAROLINA

By
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