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GEOLOGY OF THE STONE MOUNTAIN-LITHONIA DISTRICT, GEORGIA

By

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THE STONE INDUSTRY

HISTORY

The rock types of the district suitable for building and monumental stone attracted attention early in the history of the region because of their hard, unweathered surfaces. The natural ledges caused by sheeting* simplified quarrying but their partially weathered sap surfaces (Watson, 1902, p. 326) made the rocks unsuitable for purposes other than foundation stones, chimneys stones, and steps. The desire for hard, unaltered stone, unobtainable from the natural ledges, led to the method of raising ledges of any desired thickness by artificial means (see Quarrying Methods). The ability to raise ledges has been one of the major factors in the early and continued success of the stone industry.

Few records of quarrying in the region date back very far, but Watson (1902, p. 111) noted that tombstones were made about 1845 or 1850 and that some stone was quarried from Stone Mountain prior to the Civil War. The Stone Mountain Granite and Railway Company and their successors, the Venable Brothers, who operated quarries on Stone Mountain beginning in 1869, were the first to produce stone on a large scale. During their peak production the Venable Brothers quarried 20,000 carloads of stone from two large quarries on the south side of Stone Mountain. The output was transported from the quarries to the Georgia Railway on a spur which ran around the west side of the mountain.

Prior to 1900 the Venable Brothers also owned a large portion of the exposed rock (Lithonia gneiss) in the vicinity of Lithonia. Their major holdings were Little Stone Mountain (Pine Mountain) and most of Arabia Mountain. Pine Mountain was first worked in 1883 according to Watson (1902, p. 142) and by 1900 was supplying a large quantity of Belgian blocks, curb stone, road ballast, and dimension stone.

At the beginning of the 20th Century there were no major stone producers in the area other than the Venable Brothers. The Southern Granite Company owned a five acre quarry at the present site of the Davidson Granite Company's Big Ledge

*Sheeting is the term used to describe the nearly horizontal joints of granites and similar rocks.

Quarry and also owned the Collinsville Mountain Quarries. The Georgia Railroad owned a quarry on the exposure southwest of Little Stone Mountain and, in addition, owned a quarry in conjunction with Mrs. Mary Reagin located near the DeKalb-Rockdale County line, just north of the railroad tracks.

Quarrying of the Stone Mountain granite declined after 1900 due to lessened demand for this type of stone. The decline was not due to lack of beauty but rather to the inability of the stone to stand up under prolonged weathering. Weathering causes the surface of building blocks to change color from a sparkling white to a dull gray, and causes the surface of polished monumental stone to lose much of its luster. On the other hand, the demand for Lithonia gneiss increased because of its hardness and color retaining quality, and the abundance of easily accessible stone in the Lithonia area.

The Venable Granite Company was succeeded in Lithonia by the Davidson Granite Company, started in 1895 by J. K. Davidson, Sr. Mr. Davidson immigrated from Scotland and began work as a quarry laborer, but in a few years he was in business for himself. During the first year of operation he produced a relatively small number of paving blocks from quarries leased at Collinsville Mountain; but from these meager beginnings he built the business into a large enterprise which now produces all of the dimension stone of the district and much of the rubble, curb stone, crushed stone, and jetty stone. He also pioneered in the manufacture of poultry grit which, according to experiments of the Quaker Oats Company, aids in the assimilation of feed by grinding it more thoroughly. A large plant at the site of the Big Ledge Quarry is used solely for the production of poultry grit and crushed stone. The old plant burned down in the late spring of 1950 and was replaced by a new, modern plant. The company is now owned by Mr. Davidson's sons.

In 1950, the company owned approximately 1500 acres of exposed gneiss in the vicinity of Lithonia. Their main property is the Big Ledge Quarry, previously owned by the Southern Granite Company, to which has been added the adjoining Abrams and Braswell properties. The Davidson Granite Company succeeded the Venable Brothers as owners of the

Pine Mountain and Arabia Mountain Quarries. From the Big Ledge and Pine Mountain Quarries comes the total dimension stone, curb stone, and jetty stone production of the company.

In 1900 there were small crushing plants at the Georgia Railroad and Pine Mountain quarries to convert the quarry waste into road metal and ballast, but the small demand for crushed stone at that time did not warrant the operation of a separate quarry for this purpose. With the advent of the automobile more and better roads were needed. To supply this need the Consolidated Quarry Corporation opened a quarry at Rock Chapel Mountain in April, 1929, which produced 150,000 tons of stone the first year. Production from this plant increased to over 1,000,000 tons of crushed stone in 1949 under the direction of Nelson Severinghaus, vice-president and general manager.

The Davidson Granite Company crushing plant at the Big Ledge quarry was opened prior to the Consolidated plant, but its output is mostly in the form of poultry grit with only a small amount used as ballast and concrete aggregate.

During the 1930's the Works Progress Administration leased the DeKalb County quarry north of Little Stone Mountain and the Flat Rock quarry north of Stone Mountain. Small crushing plants were built to produce crushed stone for road ballast and concrete aggregate used in the administration's building programs.

At the present time the Davidson Granite Company and the Consolidated Quarry Corporation are the only major producers of the district, but there are several smaller producers who add considerably to the total output. The Kellogg Granite Company, operated by A. B. Kellogg, produces a combined total of 25,000 tons of rubble and 100,000 lineal feet of rough curb stone per year from quarries on the north side of Rock Chapel Mountain and the east side of Stone Mountain. The entire production from these quarries is sold by the Consolidated Quarry Corporation.

The Coffey Granite Company, owned by G. A. Coffey, had an estimated output of 25,000 to 30,000 tons of rubble and 75,000 to 100,000 lineal feet of rough curb stone in 1950 from quarries on the south side of Mile Rock, west of Arabia

Mountain. Other smaller quarries produce a proportionately lesser amount of stone.

The total stone production of the district in 1949 was more than 1,400,000 tons, valued at well over $3,000,000. By comparison, the most productive year noted in Watson's report was 1891 when the value of all the granite and gneiss produced in Georgia was $790,000. The increase in value and production, which has occurred at the same time that market areas have diminished due to greater shipping costs, can be directly related to the development of new markets supplied by the greater plant facilities of the two major producers.

TYPES OF STONE

Stone Mountain Granite (Quartz-Monzonite)

The Stone Mountain granite (quartz-monzonite) is a fine- to medium-grained, almost pure white stone with a faint planar structure or foliation produced by parallel orientation of mica flakes. It is relatively hard, but easily quarried because of its pronounced rift and grain.

The rock has a rather constant composition throughout its areal distribution except for the more biotitic phases in the vicinity of Lithonia. It has an average composition of approximately 30% quartz, 31% oligoclase, 28% microcline, 10% muscovite, 1½% biotite, and traces of other minerals including epidote, garnet, apatite, zircon, pyrite, rutile, sericite, and calcite. In the vicinity of Stone Mountain the rock has slightly more oligoclase than microcline, but near Centerville and Redan the proportions are reversed. A rock of this composition falls into the quartz-monzonite category of most igneous rock classifications. For this reason it is reclassified as a quartz-monzonite in this report although the name granite is retained in its broad meaning as a light colored, medium-grained igneous rock.

Viewed from a distance the stone appears homogenous, but close inspection reveals a quite noticeable foliation due to a small amount of biotite mixed with muscovite. The foliation is made more pronounced in some parts of the exposure by the presence of mica patches or autoliths flattened in the plane of foliation (Fig. 33). Small tourmaline clusters in the

rock on the east and south sides of Stone Mountain give it a spotted appearance locally (Fig. 37).

Lithonia Gneiss

The Lithonia gneiss is a very hard gray-white stone with a pronounced highly deformed and sheared banding. The individual bands are composed of white quartz and feldspar layers alternating with thin biotite-rich layers. The gneiss is well suited for general building purposes and street curbing because of its ease of quarrying and ability to withstand weathering. Locally the stone contains an objectionable amount of pyrite which readily changes to limonite, staining the rock with brown streaks.

The composition of the gneiss is quite variable because of the numerous biotite-rich, garnet-epidote, and quartz-rich layers in many exposures. In addition, many quartz and aplite veins and granite and pegmatite dikes intimately intrude the gneiss. Typical mineral compositions of several of the rock types are given in Table 1.

Texturally the rock is xenoblastic (grains are without crystal shape) and slightly inequigranular. Grain boundaries are irregular and frequently serrate or "saw-toothed" and replacement textures are common.

The structures of the gneiss most commonly referred to in the section on description of quarries are banding, contortions or flow folds, shear zones, biotite orientation or lineation, rift and grain. The banding has been described above, but perhaps the other terms need some explanation. The contortions or flow folds are small flexures of the banding which have a small amplitude, usually no more than one foot in height. These flexures are frequently accompanied by shear zones which occur as small healed breaks across the banding, commonly filled with white aplite veins. In the quarries, the majority of the shear zones trend in a north northeast direction and a minority trend in a northwesterly direction. The biotite lineation is a stretching of individual biotite flakes in a northwest-southeast direction and can best be seen in stone which has been split parallel to the banding. The rift of the stone is the easiest direction of splitting and is parallel to the surface. Natural rift planes are known as

sheeting planes. The grain of the stone is the second easiest direction of splitting and is always perpendicular to the rift, but it trends in a different direction in every quarry.

Panola Granite

The Panola granite is a mass of igneous rock of limited areal extent located near the southeastern corner of DeKalb County. It forms a small prominence south of Panola known as Hog Mountain. The rock is unlike the Stone Mountain granite or the Lithonia gneiss in structure, texture and composition. It shows no visible structure but has a pronounced porphyritic texture formed by small phenocrysts (crystals) of microcline. A sample of the rock taken from the Bowers quarry at Panola showed a large number of thin epidote veins filling the fractures. Under the microscope the individual minerals are almost equigranular except for occasional large microcline phenocrysts. The mineral composition of the rock, in order of abundance, is microcline, quartz, oligoclase (plagioclase), and biotite with accessory amounts of muscovite, epidote, apatite, magnetite, rutile, and chlorite. The quartz is strained and the microcline is highly altered to muscovite and sericite. The biotite is slightly altered to chlorite.

Because so little of this stone has been quarried, its qualities as a building stone are not known. The stone at the Bowers quarry is contaminated by many epidote veins but surface examination of the larger mass at Hog Mountain indicates that they are scarce or absent there. As far as the writer knows, no physical tests have been made on the stone to determine its durability.

PHYSICAL CHARACTERISTICS OF GRANITE AND GNEISS

General Statement

The physical characteristics of granite and gneiss include hardness, crushing strength, structure, texture, mineral composition and color. The combination of these characteristics determines the desirability and the economic value of the stone. Although they were described thoroughly by Watson (1902), some additional information will be given here.

Hardness

The hardness of a rock is a measure of its ability to withstand abrasion and is dependent on its internal constitution. The hardness of a mineral is determined by the atomic structure and type of atoms or molecules making up the structure, whereas the hardness of a rock is determined by the type and arrangement of the constituent minerals.

Most granites and gneisses are very hard because the two main constituents, quartz and feldspar, are hard. The hardness of these rocks is further increased by the tightly interlocking texture of the mineral grains.

The hardness decreases with the age of the stone because of the weathering agencies of oxidation, carbonation, and hydration. The minerals most susceptible to weathering are the feldspars, orthoclase (or microcline) and plagioclase, which alter to clay. This alteration loosens the interlocking texture and causes the stone to crumble in the most advanced stages of decay.

Crushing Strength

Crushing strength tests made on Lithonia gneiss and Stone Mountain granite at the Washington Navy Yard in 1887 (Watson, 1902, p. 54) showed that the former rock type had a range in strength from approximately 13,000 to over 21,000 pounds per square inch, and Stone Mountain granite had a range from approximately 12,000 to over 21,000 pounds per square inch. These values are well above the maximum strength required of stone used for structural purposes.

Structure

Each of the three building stones of the district has a different structure. The Lithonia gneiss has a pronounced banding which is strongly contorted and sheared. The Stone Mountain granite has a weak to strong foliation or flow structure, and the Panola granite is essentially devoid of any structure. These structures have no apparent effect on the durability of the stone since none of the rocks will break parallel to the structures more readily than across them, nor do they weather (decompose) more easily in one direction than another.

The structure of the rock, especially the Lithonia gneiss,

does effect the economic value of the stone. The numerous pegmatite dikes and veins, the quartz veins, and the pink garnetiferous layers all effect the quarrying operations because these portions of the rock cannot be used. In addition, the stone does not break properly across these features. The pegmatite dikes in the Stone Mountain granite have the same effect, although they are not so objectionable since they are not so numerous.

Texture

The textures of the building stones of the district are similar, in that the mineral grains composing the stones are tightly interlocked, forming very compact and strong bonds. It is this texture which helps give the rocks a high crushing strength and hence makes them very suitable for structural purposes.

Mineral Composition

The minerals composing the several rock types are essentially the same. Each type contains quartz, oligoclase, microcline, biotite, muscovite and accessory amounts of garnet, epidote, magnetite, zircon, etc., but in slightly different proportions.

Color

The color of the building stones of the district depends on the mineral composition mentioned above. If it were not for the minor constituents, the rocks would all be white because quartz, oligoclase, and microcline are white or colorless. However, in the case of the Lithonia gneiss the chief accessory, biotite, forms about 3 percent by volume of the rock, and this is concentrated in thin bands giving the rock a gray-white appearance. The Panola granite also contains about 3 percent of biotite, but it is scattered throughout the rock, giving it a gray color. The Stone Mountain granite, on the other hand, has about 9 percent muscovite and only about 1 percent biotite, giving the rock a very faint gray color.

An important color consideration, although not directly related to the original color of the rock, is the presence of minor amounts of easily oxidized iron bearing minerals. The chief of these is pyrite, an iron sulfide, which tends to de-

compose readily to limonite, an iron oxide. If this mineral occurs in sufficient amounts, as it does in portions of the Lithonia gneiss, it renders the stone useless or of lesser economic value. This feature can be seen in some of the quarries where large areas of the surface are badly iron-stained.

QUARRYING METHODS

Building Stone

The demand for any particular type of building stone depends upon its beauty, durability, and price. Inasmuch as the building stones of this district fulfill the requirements of beauty and durability, the price, which depends on quarrying and shipping costs, becomes the most important factor.

Rough building stone can be produced and sold in the vicinity of Atlanta at a cost comparable to the cost of brick because of the ease of quarrying. Quarrying is inexpensive because layers of desired thickness can be "raised". This property depends on the natural ability of the rock to split along rift planes parallel to the surface.

The method of raising ledges was discovered early in the history of the district. The process is begun by drilling a hole in the rock to a depth equal to the thickness of the desired ledge. A small charge of blasting powder is placed in the bottom of the hole; and, after filling the hole with clay, the charge is set off. Successively larger charges are set off in the hole over a period of six months, and finally the hole is cleared out in preparation for forcing compressed air into the opening. The last step in the process is usually withheld until a very hot day when the pressure of the air plus the differential expansion of the rock cause the rock to rift over a large surface area.

Quarrying is started at the place where the rift plane intersects the surface, or "runs out" as the quarryman puts it. The quarry face becomes progressively higher as quarrying proceeds because of the slightly wedge-shaped cross section of the raised ledge.

Before quarrying can begin, the direction of easiest breaking of the rock, the grain or run, must be determined. This direction may be known if the exposure has already been

quarried; or, in the case of a new exposure, the direction can be determined by trial and error or by noting the most prominent jointing direction.

Rough stone such as rubble and curbing, which requires a minimum of plant and equipment, is produced by many small operators who hire only a few men to work the stone with jack hammers, plug drills, mallets and wedges. Larger blocks such as jetty and dimension stone are produced only by the large companies because they require much heavier equipment such as large air compressors, trucks, hoists, and a plant to finish the stone.

Crushed Stone

The production of crushed stone requires a much larger plant, and in general, a larger exposure of rock than building stone because a small margin of profit makes necessary a large volume of output. Although there are only two commercial crushed stone producers in the district, the total value of their output in 1949 was over $2,000,000. This is compared with the total value of the stone of the district which slightly exceeded $3,000,000.

The Davidson Granite Company quarries stone from the Big Ledge quarry for the production of poultry grit and concrete aggregate. The operation begins with the drilling of large holes about ten feet back from the face of the opening with two wagon drills. The holes are drilled as deep as the face is high and then filled with dynamite. After the face is blasted down, the smaller fragments of rock are loaded into Euclid trucks and taken to the initial jaw crusher. The larger blocks of stone are broken into smaller pieces by means of steel balls dropped from derricks.

The Consolidated Quarry Corporation's number one quarry has a 120 foot northern face which is drilled by three 6½ inch churn drills. The face is blasted down and the smaller fragments hauled to the initial jaw crusher by six 12 yard side-dump trucks pulled by Mack chain drive cabs. The larger blocks are broken by placing a small explosive charge in holes drilled by jack hammers.

USES OF STONE

In the early history of the district, prior to and even after

1900, the stone was used mainly for curbing, Belgian blocks, and rubble, and a minor amount was used for monumental and dimension stone purposes. The Belgian blocks and curb stones were transported great distances by rail to be used in St. Louis, Missouri, Baltimore, Maryland, and other large cities. As labor and transportation costs increased, the stone was shipped shorter distances; and with the advent of the automobile and Macadam and asphalt paved highways, the use of Belgian blocks declined and finally ceased. The Stone Mountain granite was found after a time to be poorly suited for monumental stone and its production finally ceased.

Other uses were found to take the place of those that diminished. Crushed stone became an important product, and production of dimensional stock increased as the Davidson Granite Company's Pine Mountain plant increased in size. Most of the crushed stone was used for road ballast and concrete aggregate at first, but poultry grit soon became a major outlet. Later, the building of jetties in some southern cities such as Jacksonville, Florida, and New Orleans, Louisiana, opened a new market for the stone. At the present time the Davidson Granite Company produces a combined total of 15,000 tons of rubble and jetty stone, and the Consolidated Quarry Corporation produces 50,000 tons of jetty stone.

New uses for the stone are continually being investigated by the large stone producers. The Consolidated Quarry Corporation is investigating such uses as washed sand for concrete bricks and feldspar for glass, pottery and enamels. Eventually the potash and rare elements may be utilized as fertilizer supplements.

DESCRIPTION OF QUARRIES

GENERAL STATEMENT

The locations of the quarries described below are shown on the quarry map of the district (Plate 8, in pocket) for quick reference. The distances given in the text are only approximate and can be more accurately measured from the map.

The names of many of the quarries do not conform to those of the Watson report (1902) because of change in ownership.

In some instances the former name is given in the quarry description.

STONE MOUNTAIN GRANITE (QUARTZ-MONZONITE)

DeKalb County

Block Quarry—Two rather small quarries in Stone Mountain granite, located about three and a half miles southeast of the village of Stone Mountain, are owned by Mr. Bates Block of Atlanta. The larger of the two quarries is only a few hundred feet east of the Wade residence. The smaller one is in a flat-rock exposure about five acres in area, several hundred yards south of the large quarry near the headwaters of Crooked Creek.

The rock is gray-white granite remarkably free from blemishes or inclusions. It contains about twice as much muscovite as brownish biotite. Structures are not pronounced in the rock, but a faint flowage foliation trends N5°W and dips 40°E. A strong set of joints strikes N35°W and dips vertically.

Britt Quarry—Mr. Mark Britt of Stone Mountain owns a large quarry two hundred and fifty feet square and up to forty feet deep, located one and one-half miles east of Stone Mountain. It was formerly owned and worked by G. Weiblen and Sons from 1935 to 1946. It was known as the Nash and McCurdy quarry in the Watson report (1902). At present the opening is filled with water.

The rock is typical muscovite-rich granite with a small amount of brown biotite and small pink garnets. On the northwest side of the quarry there are numerous muscovite-rich bands and pegmatites within the granite. A large pegmatite at the north end of the pond has an irregular shape with many projecting tongues or fingers. The rock is highly fractured here and many of the horizontal joints contain yellow uranophane.

A pronounced flowage foliation strikes about N60°W and dips either north or south on the northwest side of the quarry, and strikes about N50°W and dips 35°NE on the east side of the quarry. Locally the foliation is erratic. Joints are not common but a small fault trending N40°W limits the north end of the quarry.

The rock is of good quality for general purposes except for the numerous pegmatite and highly micaceous areas. Further work would be hampered, however, by the large amount of water in the opening.

Coffey Quarries—Mr. G. Coffey owns about five acres of exposed rock about two and one-half miles north northwest of Lithonia. Three quarry openings have been made, the largest of which has a worked face one hundred feet long and three feet high.

The rock is a strongly foliated biotite-rich granite of the Stone Mountain type. It is uniform in texture and composition except for thin muscovite-rich lenses with scattered garnets similar to those found at Stone Mountain. Several coarse-grained pegmatites composed of microcline, quartz, muscovite and biotite have intruded the rock.

The flowage foliation varies in strike from N10°W to N25°W and dips from 15° to 25°W. Joints are very rare. The grain of the rock trends N-S.

Edwards Quarry—A very small quarry on the south slope of Swift Creek, three miles north of Lithonia, is owned by Mrs. I. G. Edwards.

The rock is a medium-grained and evenly textured biotite-rich muscovite granite. Scattered, small, biotite-rich, ellipsoidal inclusions are found throughout the exposure. A pronounced flowage foliation strikes N40°W and dips 10°NE. A set of joints strikes N35°E and dips vertically.

The rock shows pronounced signs of decay, mainly in the kaolinization of the feldspars.

Ethel Quarry—The Ethel quarry is located on a ten acre pavement of granite three miles east of the village of Stone Mountain. The quarry face is two hundred feet long in a northeasterly direction.

Small, disseminated pink garnets are found throughout the rock which is distinctly foliated biotite-bearing muscovite granite. Small, zoned aplite dikes have medium-grained muscovite borders and fine-grained white aplite centers. Irregular pegmatite pods contain small black tourmaline rosettes. Light green damourite occurs on several small slickensided faults.

Flat Rock Quarry—The Flat Rock Quarry is owned by Mr. W. H. Venable of Stone Mountain. It is located approximately one-half mile north of the carving on Stone Mountain.

There are two quarries on the property, a large one on the north (Fig. 40), and a smaller one on the south. The rock in both openings is a medium-grained muscovite granite with small pink garnets scattered throughout. A faint flowage foliation trends approximately N45°W and varies in dip from 10° to 40°NE. Several steeply dipping faults on the northwest side of the opening are coated with light green damourite.

In the vicinity of the faults tourmaline clusters are abundant, and on the southwest side of the quarry numerous garnet-bearing muscovite inclusions are common. A yellow-green coating of uranophane is found on many of the horizontal sheeting planes.

The quarry and a small crushing plant now in disuse were

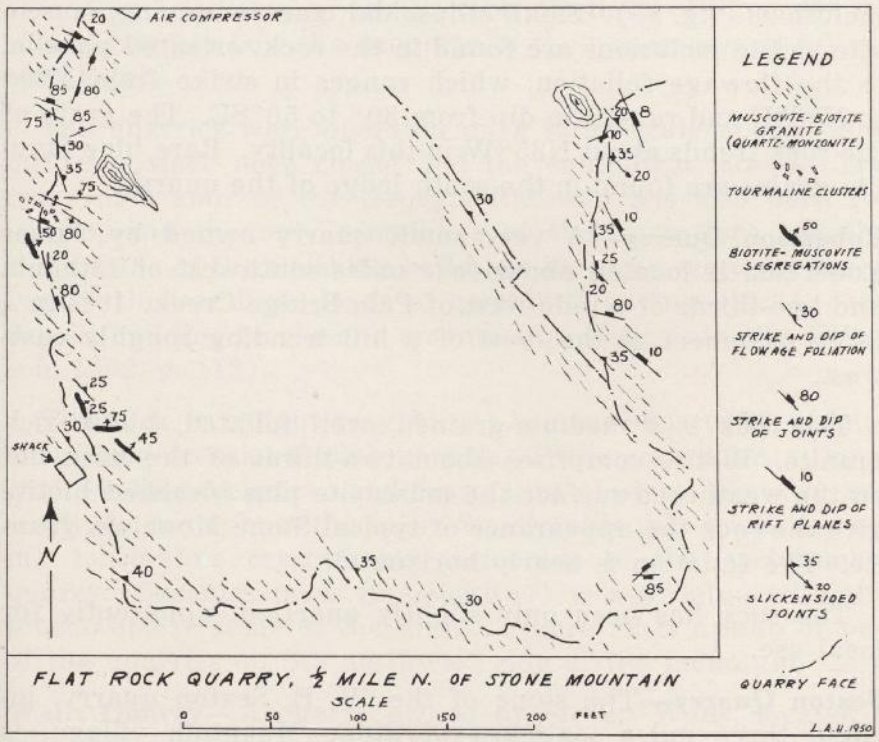


Fig. 40

operated during the period from 1935 to 1940 by the Works Progress Administration for crushed stone. It is now operated by Mr. Venable for rubble.

Kellogg Quarry—A large quarry on the east side of Stone Mountain is leased by Arthur Kellogg from the Venable Brothers estate and operated by Otis King. The quarry has been in continuous operation since 1947. It was previously operated by the Stone Mountain Granite Corporation (Weiblen and Sons) from 1916 to 1934, and by the Works Progress Administration from 1935 to 1940.

In 1950 the quarry production was 1200 tons of stone per week, divided into 700 tons of rough curb stone and 500 tons of rubble. Due to the high cost of shipping, the stone is used almost exclusively in the greater Atlanta area.

The stone is good quality biotite-bearing muscovite granite. The mineral composition is given in Table 5, sample number S68. The only flaws in the rock are numerous small tourmaline clusters, and occasional pegmatite dikes and biotite gneiss inclusions (fig. 35). Small ellipsoidal, garnet-bearing, muscovite-biotite inclusions are found in the rock, oriented parallel to the flowage foliation, which ranges in strike from N20° to N50°E and ranges in dip from 30° to 50°SE. The grain of the rock trends about N35°W in this locality. Rare blue lazulite grains are found in the south ledge of the quarry.

Robertson Quarry—A very small quarry owned by James Robertson is located about four miles southwest of Lithonia and two-thirds of a mile west of Pole Bridge Creek. It is in a large pavement at the crest of a hill trending roughly east-west.

The rock is a medium-grained, well foliated, biotite-rich granite. Biotite comprises about two-thirds of the mica but on the weathered surface the muscovite plus bleached biotite give the rock the appearance of typical Stone Mountain granite. The foliation is nearly horizontal.

The rock has been only slightly quarried, apparently for local use.

Sexton Quarry—The stone of the W. E. Sexton quarry, located three miles southeast of Stone Mountain village, is quite variable in character. The rock is muscovite-rich gran-

ite with many micaceous inclusions, tourmaline clusters and small irregular stringers of pegmatite.

The rock is not of acceptable grade for any purpose other than crushed stone. The owner worked it for this purpose for a short time but has since discontinued the operation.

Smith Quarry—A small quarry on the Smith property one-half mile north of Redan is owned by the Venable Estate of Stone Mountain. The rock is coarse-grained, non-foliated Stone Mountain granite composed of quartz, oligoclase, microcline, muscovite, biotite and small pink garnets. Many small biotite-rich inclusions are found in the rock.

Only a small amount of stone was quarried from this location. The small size of the exposure and the poor quality of the stone make it undesirable for future quarrying.

Venable Estate Quarries—Two large quarries on the south side of Stone Mountain and several smaller quarries on the west and northwest sides of the mountain were formerly owned and operated by the Venable Brothers of Stone Mountain. They are now the property of their successor, the Venable Estate.

The quarries were operated on a large scale about 1900, but have since been closed and the equipment moved. The track of a spur of the Georgia Railroad has also been removed, and the only remainder of the operations are the stone walls of the finishing buildings in which were produced twenty thousand car loads of combined paving blocks, curb stones, building blocks and monumental stone annually (Watson, 1902, p. 113).

The rock is a light-gray biotite-bearing muscovite granite containing occasional pink garnets. Many garnetiferous muscovite-biotite inclusions and tourmaline clusters (Fig. 37) are scattered throughout the rock. Small aplite dikes with radiating tourmaline crystals are numerous in the easternmost quarry. Greenish mica (mariposite?) is associated with the tourmaline in some of the dikes. Figure 32 is a map of one of the quarries on the northwest side of the mountain.

Wells Quarry—A quarry owned by Steven Wells, located a mile and a quarter north of Redan, is situated in fine-grained, evenly textured Stone Mountain granite. It is a light gray

rock composed of microcline, quartz, oligoclase, muscovite, biotite, and minor amounts of epidote, zircon, and garnet (Table 5, no. L58).

A faint foliation in the rock is barely discernible. Small quartz veins cut the granite in various directions in the quarry. The rock is very good quality, hard, and free from blemishes. It was originally quarried to build the DeKalb County Court House in Decatur.

Gwinnett County

Campbell Property—A ledge has been raised but no quarrying has been done on a several acre pavement of Stone Mountain granite located approximately three quarters of a mile east of Centerville. The property is owned by Mr. C. M. Campbell.

The rock is good quality biotite-bearing muscovite granite similar to that at Stone Mountain except that it contains a slightly greater proportion of microcline than oligoclase. A faint flowage foliation strikes N55°W and dips 20°NE. Jointing is not pronounced. Close inspection of the outcrop revealed no blemishes other than a few mica-rich areas. In spite of its good quality the prospects for successful quarrying are unfavorable because of its distance from paved highways and its small areal extent.

PANOLA GRANITE

DeKalb County

Bowers Quarry—A small quarry located on the east side of Georgia Route 155 and south of Yellow River at Panola is owned by Mr. Lincoln Bowers.

The stone is a coarse-grained, porphyritic biotite granite with microcline and biotite phenocrysts up to one-eighth of an inch in diameter. A small amount of magnetite is scattered throughout the rock. The stone is poor quality for quarrying because of the many fractures filled with epidote and chlorite.

Rockdale County

Hog Mountain Property—Hog Mountain is a large dome-

shaped prominence of Panola granite similar to that at the Bowers quarry. The property, owned by Mr. John Yarborough of Atlanta, consists of about 600 acres. A small summer resort has been developed around a dammed lake on the southwest side of the mountain.

LITHONIA GNEISS

DeKalb County

Brand Quarries—The J. T. Brand quarries include about eight openings on a 20 acre exposure of Lithonia gneiss located between Little Stone Mountain and Collinsville Mountain. A large amount of stone was removed from these quarries in the late nineteenth and early twentieth centuries mostly for Belgian blocks and curb stone.

The rock is typical highly contorted Lithonia gneiss with numerous garnet and magnetite crystals disseminated throughout. Shear zones, flow folds, and garnet-rich epidote-bearing layers are common in this exposure.

Chapman Quarry—The Archie Chapman quarry is located about one and one-half miles north of Lithonia, approximately 600 yards east of the Stone Mountain-Lithonia Highway. It contains two openings, the larger of which is 150 feet long, 100 feet wide and up to 15 feet deep.

The rock in the large quarry is a faintly banded, medium-grained, light gray biotite gneiss with numerous porphyroblasts of microcline and magnetite. The banding has a uniform strike of N15°E and ranges in dip from 15°-30°E.

The banding becomes progressively more deformed to the east, until it reaches the stage of typical highly sheared and contorted Lithonia gneiss in the eastern quarry. The trend of the banding in this quarry is very erratic, and the rock contains many randomly oriented pegmatite veins and dikes.

The rock has not been quarried for several years although that of the large quarry is a good quality, hard stone. Its extent is limited, however, by the increased number of pegmatite dikes to the east which make quarrying difficult.

Clack Quarries—A small dome-shaped mass of exposed Lithonia gneiss, known as McDaniel Mountain, is located ap-

proximately one mile east of Arabia Mountain and just west of the DeKalb County-Rockdale County line. It is owned by Mrs. Golden Clack.

The stone is typical highly contorted Lithonia gneiss with numerous veins and dikes of pegmatite and aplite. The exposure contains several small abandoned quarries on the western side and a small opening on the eastern side which had been quarried as recently as 1950.

Coffey Quarries—Mr. George A. Coffey of Lithonia owns approximately 50 acres of exposed rock on the south end of Mile Rock, just southwest of Arabia Mountain. He also owns 19 acres south of Bradley Mountain. At the time of the writer's visit in 1950, Mr. Coffey was operating six ledges on the south and southwest sides of Mile Rock and leasing part of his property on a royalty basis to the Reagin Granite Company. Twenty men operating three air compressors, twenty plug drills and two jack hammers produced an estimated 25,000 to 30,000 tons of rubble and 75,000 to 100,000 lineal feet of rough curb stone that year.

The rock is typical Lithonia contorted biotite gneiss with numerous garnet and magnetite crystals. Small, dislocated bands of quartz-rich epidote- and garnet-bearing gneiss with a pronounced pink color are common in an abandoned quarry on the west-central portion of the exposure (Figure 20). Locally the rock contains pyrite which weathers to form a limonitic coating on the surface.

The rock is generally extremely contorted with small aplite and pegmatite dikes and veins filling numerous shear zones which trend approximately N20°E.

The rock is a good quality, hard stone suitable for general building purposes. The extensive raised ledges on the property insure an almost unlimited supply of stone for the future.

Consolidated Quarry Corporation—The Consolidated Quarry Corporation owns and operates the largest quarry in the region, located on Rock Chapel Mountain. The quarry covers an area of fifty acres and has a northern face which is 120 feet high. The company also operates a smaller quarry to the south which is 400 feet long, 150 feet wide, and 45 feet high. In addition to the two quarries, the company owns

over 200 acres of exposed rock east of Rock Chapel Mountain.

According to Mr. Nelson Severinghaus, general manager and vice-president of the corporation, 1,000,000 tons of crushed stone, 80,000 tons of washed sand and 50,000 tons of jetty stone were produced in 1949. The jetty stone ranges in size from rip rap (25 to 150 pounds) to large ten ton blocks. Additional stone, produced from quarries on the north side of Rock Chapel Mountain, amounted to 25,000 tons of rubble and 100,000 lineal feet of rough curbing in 1949. These latter quarries are leased and operated by the Kellogg Granite Company and the entire output is sold by the Consolidated Granite Corporation.

A pilot plant was set up in 1950 to produce poultry grit at a price of $0.40 per 80 pound sack. The prices of other products (F. O. B. quarry) in 1950 were as follows:

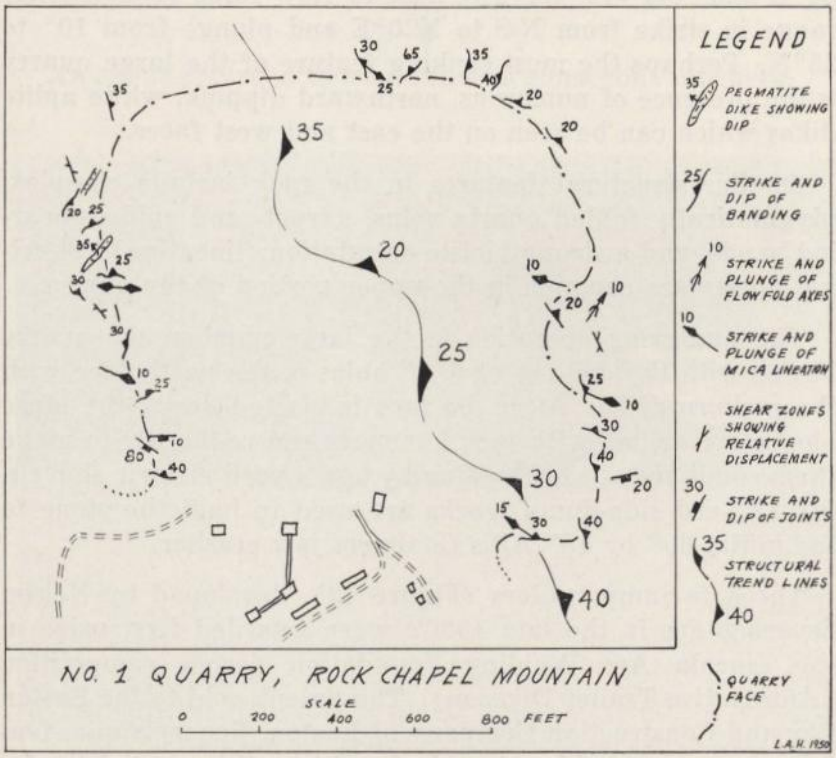


Fig. 41

Rubble	$1.90 per ton
Rough curbing	$0.30 per lineal foot
Crushed stone	$0.60 for undersize fines
	$1.50 for 1/8" to 3/8" aggregate

Research is also being undertaken to find other by-product uses for the washed sand which is too fine for concrete aggregate. Among the uses which are being investigated (Severinghaus, 1950, pp. 82-84) are washed sand for concrete bricks, and feldspar for glass, pottery and enamels. The presence of approximately 4.5% potassium oxide (K_2O) and other rare elements may also serve as a supplement to fertilizer in agriculture. The latter use will depend on the solubility of gneiss in the very finely crushed state.

The rock is typical Lithonia gneiss with numerous disseminated garnet and magnetite crystals. The banding is widely variable in attitude (Fig. 41) due to its sheared and contorted nature. Two major sets of shear zones strike N10°-30°E and N50°-70°W. The axes of flow folds (contortions) range in strike from N-S to N20°E and plunge from 10° to 25°N. Perhaps the most striking feature of the large quarry is the presence of numerous, northward dipping, white aplite dikes which can be seen on the east and west faces.

Smaller structural features in the rock include complex, ptygmatically folded quartz veins, garnet- and epidote-bearing bands, and a strong biotite orientation (lineation). Sheeting planes are common in the upper portion of the quarry.

The quarrying operation in the large number one quarry begins with the drilling of 6½" holes in the north face with three churn drills. After the face is blasted down, the large blocks are drilled with jack hammers and re-blasted to make them small enough for loading by two 4 yard electric shovels. Six 12 yard side-dump trucks are used to haul the stone to the initial 60" by 48" Allis Chalmers jaw crusher.

The side-dump trailers (Figure 42), developed by Nelson Severinghaus in the late 1930's were awarded first prize in the Lincoln Arc Welding Foundation design competition (Automotive Trailer Division). The patent, sold to the Easton Car and Construction Company of Easton, Pennsylvania, features an open-sided box-type body which utilizes a hoist independent of the chasis at the dumping point. This independent

hoisting increases the life of the trailer by absorbing the total weight of the load.

The flow sheet of the number one quarry and main plant after leaving the initial jaw crusher is as follows:

42″ 270 foot belt to storage

↓

Jeffery Traylor feeder

↓

42″ 150 foot belt

↓

Two 20″ Allis Chalmers gyratory crushers

↓

36″ belt to revolving and vibrating screens

↓

Oversize returned to two 4 foot Symons cone crushers.

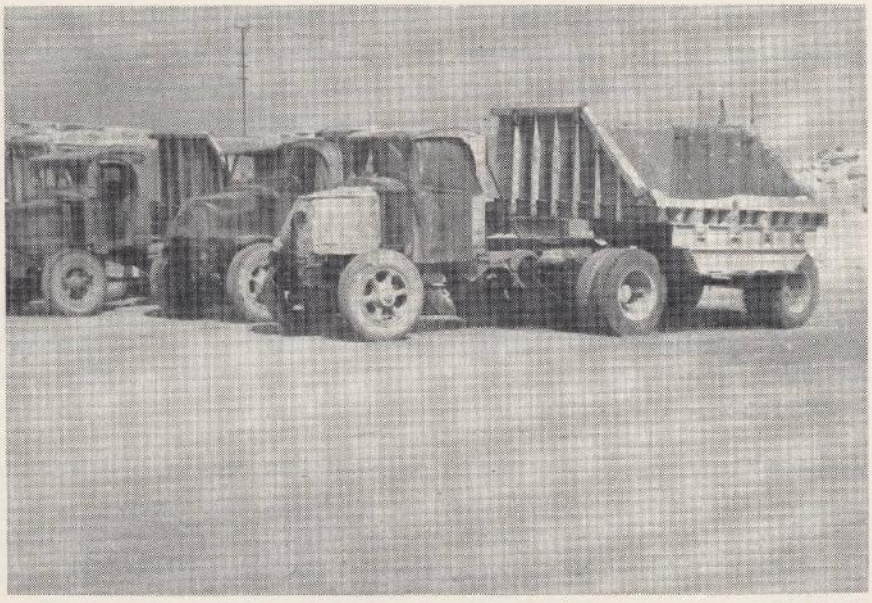


Fig. 42. Side dump trucks used by the Consolidated Quarry Corporation.

The screens separate the stone into seven sizes ranging from one-eighth inch to 2 inches which are stored separately or blended. Part of the one-eighth inch size is sent to a hydraulic and screw classifier sand washing plant for the production of fine aggregate.

The flow sheet of the small number two quarry and plant begins with two wagon drills, three jack hammers, and a two yard P and H diesel shovel. From there it is as follows:

Two Euclid 10 yard trucks

↓

42″ x 10′ pan feeder

↓

30″ x 42″ Pioneer jaw crusher

↓

30″ belt

↓

4′ x 8′ double deck vibrating screen.

Three sizes are screened in the number two plant: oversize, intermediate, and undersize. The oversize goes to a three-foot Traylor T. Y. gyratory crusher and the intermediate size goes to a three foot Symons cone crusher. All three products are mixed and taken to a storage pile by a 24 inch belt. A belt beneath the storage pile feeds the product to the 36 inch belt in the number one plant.

The capacity of the number one plant is 300 tons per hour and that of the number two plant is 100 tons per hour. The size of the operation has increased from an annual production of 150,000 tons in the initial year of 1929 to well over 1,000,000 tons in 1950.

Cooper Quarry—Five acres of exposed Lithonia gneiss located east of the Lon Plunkett quarry and two and one-half miles south of Lithonia are owned by Mr. W. C. Cooper of Lithonia. A small quarry on the property was last worked in 1942 for rubble.

Davidson Granite Company—The Davidson Granite Company

of Lithonia owns and operates the Big Ledge and Pine Mountain (Little Stone Mountain) quarries, two of the largest in the area, and owns or leases a large portion of the exposed Lithonia gneiss in the vicinity of Lithonia. This includes the North Georgia quarries (70 acres), the north portion of Mile Rock and a portion of Collinsville Mountain.

The company is owned by N. A., J. K. Jr., and Charles Davidson of Lithonia and operates under the following corporate names:

The Stone Mountain Grit Company

The Davidson Brothers

The Davidson Granite Company

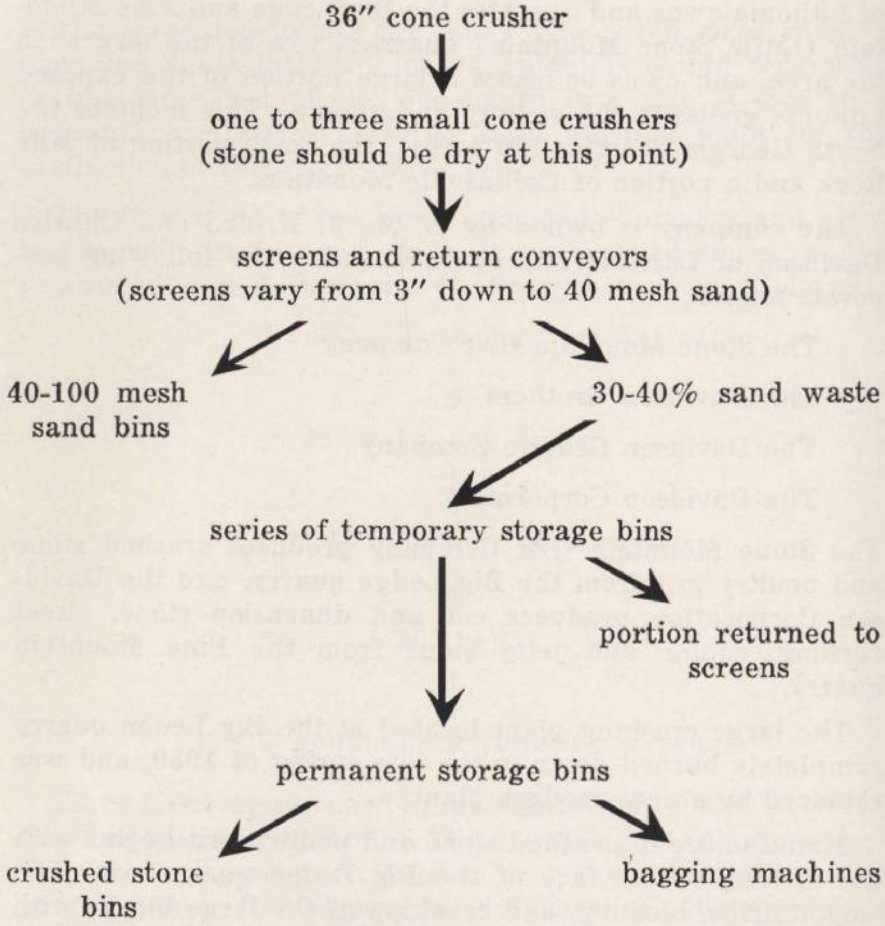
The Davidson Corporation

The Stone Mountain Grit Company produces crushed stone and poultry grit from the Big Ledge quarry, and the Davidson Corporation produces cut and dimension stone, street curbing, rubble and jetty stone from the Pine Mountain quarry.

The large crushing plant located at the Big Ledge quarry completely burned down in the late spring of 1950, and was replaced by a new, modern plant.

Manufacture of crushed stone and poultry grit begins with the drilling of the face of the Big Ledge quarry with two wagon drills, blasting, and breaking of the large blocks with steel balls dropped from derricks. The stone is loaded into Euclid trucks and taken to the initial 42 inch jaw crusher. From this point the stone follows the flow sheet shown below.

Compressed air to operate the pneumatic drills for the Pine Mountain quarry and to operate the pneumatic tools in the large 400-foot finishing shed is provided by compressors in a separate building located on the northwest side of the quarry. The finishing shed houses gang saws, diamond saws, pneumatic surfacers and finishers. A large overhead crane moves blocks of stone from one part of the building to another for surfacing, finishing or sawing. Some of the products of this plant include base courses, bulkheads, steps, copings, straight or circular curb stone and ashlar facings. Rip rap, curbing, jetty stone, rubble, paving blocks and monumental blocks are also manufactured from this quarry.



The crushed stone used for poultry grit ranges from one-fourth inch (turkey size) to 40 mesh (canary size).

Production from the Big Ledge quarry (Stone Mountain Grit Company) in 1949 was 150,000 tons of crushed stone of which 100,000 tons was sold as poultry grit and the remaining 50,000 tons was sold as concrete aggregate. Ten thousand tons of cut or dimension stone, 25,000 tons of street curbing and 15,000 tons of combined rubble and jetty stone were produced from the Pine Mountain quarry.

The stone from both major quarries is a good quality, highly contorted Lithonia biotite gneiss. Numerous shear zones and aplite veins as well as larger discordant pegmatite dikes cut the banding. Garnet-rich, epidote-bearing bands

are numerous locally, especially in the Pine Mountain quarry. Black magnetite crystals are found throughout the gneiss.

The description of the individual quarries of the company, including detailed structural features, are given below.

Big Ledge Quarry—The Big Ledge quarry, occupying 135 acres, is located about one mile north of Lithonia. The property, which also includes the old Abram and Braswell properties, was formerly owned by the Southern Granite Company. The northern end of the quarry is presently being worked for granite grit, concrete aggregate, road ballast and jetty stone. The south end is being held in reserve for future use as building stone (Figure 43).

The rock is good quality gray-white Lithonia gneiss composed of quartz, microcline, oligoclase, biotite, and minor amounts of muscovite, epidote, magnetite, zircon and apatite. The banding is highly sheared, flow-folded and intruded by irregular biotite granite dikes, pegmatite dikes and aplite veins. The shear zones and flow fold axes trend approxi-

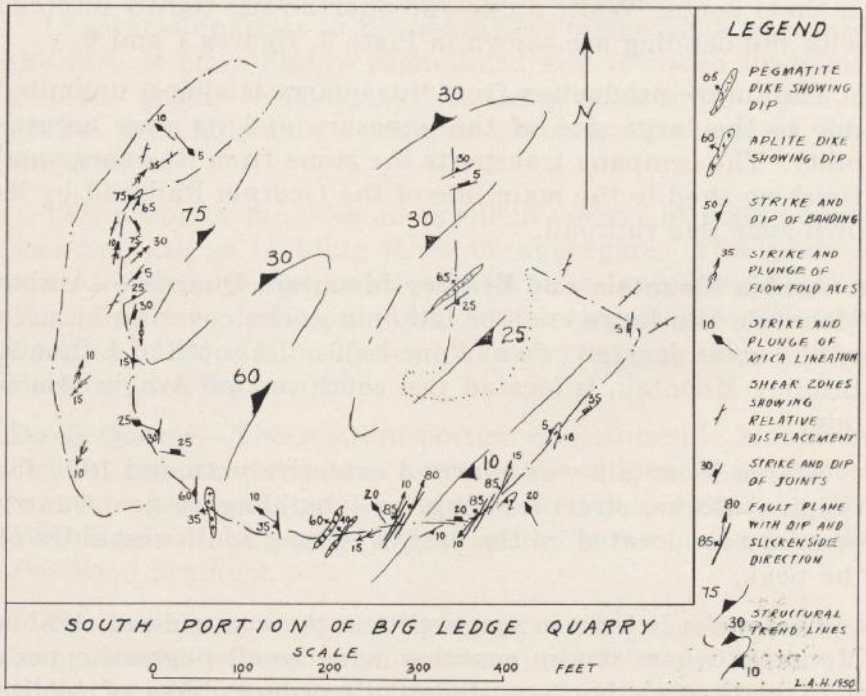


Fig. 43

mately N30°E. Pink garnetiferous layers are occasionally seen.

Pine Mountain Quarry—The Pine Mountain quarry occupies the upper portion of Little Stone Mountain consisting of 380 acres of exposed Lithonia gneiss (Plate 4). Two levels of ledges were being quarried at the time of the writer's visit in 1950; a lower level on the east, southwest and north slopes, and an upper level near the top of the mountain.

The rock is highly contorted, medium-grained Lithonia biotite gneiss. It is very hard, gray-white stone suitable for general building and monumental purposes. The banding is highly variable throughout, but shear zones and mica lineation are regular in trend. A major set of shear zones strike about N20°E and a minor set trends northwesterly (Plate 4). The mica lineation plunges northwest or southeast.

Slightly pink, garnet-rich, epidote-bearing layers parallel to the banding are common in the north and central portions of the quarry (Plate 5, figures 3, 4, 5 and 7). They are often intruded by pegmatite dikes and offset by small faults or shear zones. White aplite and quartz veins tightly infolded with the banding are shown in Plate 5, figures 1 and 6.

The future production from this quarry is almost unlimited due to the large size of the exposure and its easy accessibility. The company transports the stone from its quarry and finishing shed to the main line of the Georgia Railroad by its own spur line railroad.

Arabia Mountain and Bradley Mountain Quarries—Arabia Mountain is a large knob of Lithonia gneiss covering an area of 205 acres, located two and one-half miles south of Lithonia. Bradley Mountain is located just southwest of Arabia Mountain.

Arabia Mountain was quarried extensively around 1900 for Belgian blocks, street curbing, and building stone. Quarry openings are located on the east, west and southwest sides of the peak.

The gneiss is high in magnetite on the east side of Arabia Mountain where it also contains many small pegmatite pods with biotite-rich borders. Small discordant dikes of biotite granite cutting across the banding can be seen in several

quarry faces. The banding is highly deformed and sheared on the east side of the mountain. Two sets of shear zones trend N35°E and N85°E, respectively. Many of the shear zones are filled with aplite or pegmatite veins. Garnet- and epidote-bearing bands are found in several parts of the quarry.

None of the former production facilities for the operation remain except the old road bed for a spur line of the Georgia Railroad. However, quarrying could easily be resumed because of the many raised ledges on both mountains.

North Georgia Quarries—The North Georgia quarries are located about one mile west of Rock Chapel Mountain on the west side of Swift Creek. At least five separate quarry openings are located on the exposure covering an area of approximately seventy acres.

The rock is typical, highly contorted and sheared Lithonia biotite gneiss. The banding shows no regularity, but biotite flakes are strongly oriented in a northwest-southeast direction. Garnet and magnetite crystals are common.

In several quarries to the southwest of the main exposure, the rock is more highly pegmatized and intruded by homogeneous granite and aplite. In many places the banding grades gradually into a medium-grained, structureless, biotite granite.

This property provides an excellent reserve of good quality rock for use as building stone or aggregate. The quarries were formerly owned by Messrs. Watson and Brantley, and Mrs. Bowe of Lithonia. Under their ownership (Watson, 1902, p. 130) 150 carloads of rock were produced from February to August, 1898.

Davis Quarry—The western portion of Collinsville Mountain, located about two-thirds of a mile south of Little Stone Mountain and just north of Georgia Route 12, is owned by Mr. Will Davis of Lithonia. The property is now leased to the Davidson Brothers.

The rock is strongly contorted gray-white Lithonia gneiss composed of microcline, oligoclase, quartz and biotite with accessory amounts of magnetite, garnet, epidote, and zircon. Numerous shear zones range in strike from N5°-25°E and

biotite flakes are stretched in northwest-southeast direction. Axes of small flow folds (contortions) range in strike from N25°-50°E and plunge from 10°-25°N.

Several small garnet-rich layers like those in the Pine Mountain quarry can be seen in the surface of the exposure. Biotite-rich patches parallel to the banding are common. Scolecite, a radiating, fibrous, white zeolite occurs in joint surfaces in this quarry.

DeKalb County Quarry—The DeKalb County quarry is a moderately large opening in Lithonia gneiss located about two-thirds of a mile north of Little Stone Mountain and directly south of an unpaved county road. The property was formerly owned by Mr. J. W. Johnston but is now owned by the county. In 1950 it was leased to Mr. W. F. Beauford who supplied curb stone to the county.

The rock is typical Lithonia gneiss which is highly contorted and sheared. It is similar to that of Little Stone Mountain in the large number of garnet-rich bands parallel to the banding. Rather abundant aplite and pegmatite veins and dikes cut across the banding in a northeasterly direction. Figure 22 is a small map of the quarry showing the general structures of the rock and Plate 6 shows the structures in detail.

Elliot Quarries—A small quarry two and one-half miles northeast of Lithonia is owned by Mr. Coy Elliot. Several small openings are located in a pavement which covers an area of approximately five acres.

The rock is highly contorted Lithonia gneiss with random orientation of banding and abundant shear zones trending N30°-40°E. Magnetite crystals, white aplite veins and areas of homogeneous biotite granite are common features of the quarry. A small fault forming one face of the quarry is coated with greenish damourite, muscovite, black tourmaline and a brownish stain.

Gaines Quarry—The Gaines quarry, owned by Mr. M. A. Gaines of Gaines Lake, is located about one-half mile north of Georgia Route 12 on the west side of a dirt road running approximately along the DeKalb County-Rockdale County line. The largest of several openings is about three feet

high. The quarry has not been worked for at least twenty years.

The rock is highly contorted Lithonia gneiss with common magnetite crystals and rare pink garnets. Many small shear zones trend N25°E. The rock is medium-grained and evenly banded with quartz-feldspar bands about one-fourth inch wide.

Hammock Quarry—A small quarry owned by Mr. Harvey Hammock is located approximately one mile north of Little Stone Mountain and 400 yards north of the DeKalb County quarry. It was last quarried about 1943.

The opening is in medium- to coarse-grained, highly contorted Lithonia gneiss. Where consistent in trend, the banding ranges in strike from N35°-60°W and dips from 10°N to vertical. Numerous shear zones in the quarry range in strike from N30°-50°E. Several garnet-epidote layers parallel to the banding are only a few inches wide. Black tourmaline occurs on the surfaces of small faults as tiny matted crystals.

Hayden Quarry—A small quarry in moderately contorted Lithonia gneiss located just north of Forest Lake is owned by the Hayden Estate and leased to Jeff Aycock for the production of rubble and cut stone. Locally, the rock is called Polecat stone.

The gneiss is gray-white, evenly banded and strongly sheared. The banding strikes approximately N10°E and dips 20°-35°W. The axes of numerous small flow folds trend N5°-35°E and plunge 5°-15°N. Shear zones filled with white aplite strike N10°E.

The composition of the rock in the quarry based on one sample is that of a quartz-monzonite (Table 1, no. L6) containing local concentrations of pyrite and red garnet and a moderate amount of magnetite. Aside from the pyrite and garnet areas the rock is of good quality suitable for general building purposes.

Haygood Quarry—A small quarry located about one-half mile northwest of Arabia Lake was formerly owned by Mr. W. O. Smith and is now owned by Mr. M. J. Haygood.

The rock is medium- to coarse-grained, highly contorted

Lithonia gneiss. Numerous small white aplite veins parallel to the banding are twisted into random orientations. Shear zones are abundant with a majority striking N30°E and others striking in various directions between N-S and E-W. The quarry was last worked in 1939 for rubble.

Hutchens Quarry—The H. H. Hutchens property is located about 500 yards northeast of the Hayden quarry. It is a small opening in Lithonia gneiss now covered with black stain and lichens. It has been inactive since about 1900.

Johnson Quarry—A small abandoned quarry located about one mile northwest of Forest Lake is owned by J. C. Johnson of Lithonia. It was last operated around 1900 for stone for a building in Lithonia.

The rock is highly sheared Lithonia gneiss with many small aplite and pegmatite dikes in random orientation. The quarry is now covered with mosses and lichens, and the worked portion is stained gray or brown due to weathering.

Johnston Quarry—A large quarry located one-quarter of a mile northwest of Little Stone Mountain (Plate 4) is owned by Mr. Snell Johnston. The quarry was operated sporadically for curb stone and rubble during 1950.

The rock is gray, medium-grained and highly contorted Lithonia gneiss. In several parts of the exposure the stone contains numerous white, fine-grained aplite veins and coarse-grained pegmatite dikes. Thin quartz veins parallel to the banding are often intricately folded. Numerous shear zones trend in general about N20°E. The axes of small flow folds are usually parallel to the strike of the shear zones, and a pronounced mica lineation trends in a northwest-southeast direction.

In the north central part of the quarry a garnet-rich epidote-bearing layer has been faulted and the fault filled with pegmatite (Plate 5, fig. 2). A large slickensided joint forms the southeast face of the opening.

The gneiss is good quality stone for general building purposes, and the exposure is large enough to be of continuing economic value. The upper surface has been worked to a depth of ten to twenty feet, and the central portion is being worked to still lower levels. In addition to the present quarry,

there is an almost unlimited supply of exposed stone to the southeast.

McClendon Quarries—A series of small quarries, just west of Georgia Route 124 and three-quarters of a mile northwest of Rock Chapel Mountain, are owned by H. O. McClendon of Rock Chapel. The exposure covers an area of several acres on the south side of a small stream. The surface of the outcrop contains many large weathering pits like those described under the section on weathering in Part I.

The banding of the gneiss is highly variable in trend in the south portion of the exposure but becomes more consistent in strike as it approaches the contact with mica schist, located several hundred yards to the north. Near the contact, the banding strikes N70°W and dips 30°N. The gneiss contains many shear zones filled with white aplite.

McMayer Quarry—The McMayer quarry consists of several abandoned surface openings in highly contorted Lithonia gneiss located about 500 yards southwest of Collinsville Mountain. The rock was quarried to provide stone for the Broad Street Bridge in Atlanta.

Park Quarry—A small quarry owned by Mrs. Addie Park of Decatur is located approximately four and one-half miles southwest of Lithonia. The rock is faintly banded but well foliated gneiss similar to the Lithonia type. The foliation strikes generally N85°E and dips 30°N. Although not typical contorted Lithonia gneiss, it is slightly sheared and deformed. The shear zones trend N5°W and the axes of small crenulations strike N20°E and plunge 20°N. Many dikes of Stone Mountain muscovite-rich granite and pegmatite cut across the rock, somewhat impairing its value as a building stone.

Plunkett Quarries—A large pavement exposure of Lithonia gneiss, located one-half mile southwest of Forest Lake, is owned by Mr. Lon Plunkett of Lithonia. Several small and large openings have been made in the rock, one of which was quarried as recently as 1950 for rubble.

The rock is contorted Lithonia biotite gneiss with many disseminated garnet and magnetite crystals. It is medium- to coarse-grained and locally has the appearance of porphyritic granite due to the presence of large feldspar crystals

within thin pegmatite veins. Abundant shear zones trend approximately N30°E, and biotite lineation ranges in strike from N30°-50°W and plunges 10°-15°NW or SE. Several small faults located in the southwest corner of the largest quarry are filled with green damourite and radiating tourmaline crystals.

Powell Quarries—A 25 acre, slightly dome-shaped mass of Lithonia gneiss located south of Bradley and Arabia Mountain is owned by M. D. Powell of Klondike. One large and five small openings have been worked on various parts of the property. The present working is about 300 feet wide in an east-west direction and three to five feet high.

The rock is highly contorted Lithonia gneiss with many dikes and veins of white aplite filling northerly trending shear zones. In places where the banding is consistent, mainly on the south side of the exposure near the contact with mica schist, the banding strikes about N70°W and ranges in dip from 60°S to 60°N. The number of shear zones and the amount of deformation of the banding also decrease rapidly as the contact is approached.

Garnet-rich, epidote-bearing bands are common in this exposure and are often faulted along the northeasterly trending shear zones. Large, black tourmaline crystals up to six inches long and more than one inch thick are found in some pegmatite dikes. Locally the tourmaline forms radiating clusters within the gneiss.

In 1950 the stone was quarried for rough curbing and rubble. Most of the curbing was used as coping in cemetery lots.

Reagin Quarries—Mr. Grover Reagin of Lithonia owns a large exposure of gneiss southwest of Little Stone Mountain and south of Tom George Creek. The property contains about twelve large quarry openings of which only one was being operated in 1950. Mr. Reagin also owns and periodically operates several small quarries on the south side of Collinsville Mountain, just north of Georgia Route 12. The production is almost entirely rubble.

The rock in both localities is typical contorted Lithonia gneiss containing disseminated garnet and magnetite crystals.

Northeasterly trending shears are often filled with white aplite veins. Numerous joints are coated with colorless radiating scolecite.

Scales Quarries—Mrs. Lula Scales of Lithonia owns a portion of the exposure southwest of Little Stone Mountain on which the Reagin quarries are located. The rock is the same as that of the Reagin property. No quarrying has been done for many years.

Smith Quarries—Several quarry openings located three- quarters of a mile north of Arabia Lake and near the Haygood quarry are owned by Mr. W. C. Smith of Lithonia. Most of the production from the quarries was used locally for chimney stones, foundation stones and steps.

The rock is highly contorted Lithonia biotite gneiss with many flow folds and shear zones. Folded, lens-shaped, biotite-rich inclusions are common in this locality.

Near the northern contact with mica schist, located a few hundred yards north of the quarries, the banding of the gneiss becomes more consistent in attitude, ranging in strike from N40°-70°W and ranging in dip from 15°-35°N. The quarry was last worked in 1940 by Mr. Smith for rubble.

Turner Quarry—A large amount of stone has been removed from the Henry Turner quarry, located two miles east southeast of Lithonia and immediately north of the Georgia Railroad tracks. The quarry was previously owned jointly by Mrs. Mary Reagin and the Georgia Railroad.

The rock is typical contorted Lithonia gneiss, the same as that of Collinsville Mountain just to the west.

Wilson Quarry—The Archie Wilson quarry is a small opening on the west side of the Lithonia-Stone Mountain Highway, one mile north of Lithonia. It is 250 feet long, 150 feet wide and 20 feet deep.

The rock is highly contorted Lithonia gneiss with numerous small pegmatite dikes and veins rich in muscovite. Magnetite is sparsely scattered throughout the gneiss but is concentrated in small aplite veins. These aplite veins commonly fill northeasterly trending shear zones. The banding of the gneiss is highly variable due to the shearing.

Part of the eastern wall of the quarry is bounded by a fault which trends N10°E and dips 75°W. Slickensides on the fault surface strike N20°W and plunge 30°N.

Gwinnett County

Britt Quarry—A small quarry opening, located one and one-half miles south of Snellville and a short distance east of Georgia Route 124, is owned by Mr. W. C. Britt.

The rock is slightly contorted Lithonia biotite gneiss intruded by numerous dikes of Stone Mountain granite and garnetiferous pegmatites. Small garnet and magnetite crystals are common. A pronounced banding ranges in strike from N30° to 70°E and dips steeply to the west. A faint additional foliation consists of an orientation of biotite flakes at an angle to the banding. This secondary structure dips gently to the west.

The rock was quarried only to a small extent because of the restricted area of exposure and the abundance of cross-cutting dikes of pegmatite and granite.

Byrd Quarry—A small quarry owned by Mr. G. T. Byrd is located two and one-half miles north of Loganville on a branch of Bay Creek. The rock is strongly banded, non-contorted Lithonia biotite gneiss with small disseminated magnetite crystals. The stone was used to build the Loganville Methodist Church.

Gwinnett County Quarry—The Gwinnett County quarry is located approximately three miles east of Snellville on the south side of U. S. Highway 78. The opening is about 250 feet long in a north-south direction and 50 feet high.

The rock is light gray, well-banded Lithonia gneiss. Numerous small pink garnets are disseminated throughout the rock but are slightly more concentrated in biotite bands. The banding is consistent in trend varying in strike from N-S to N20°W and ranging in dip from 10° to 20°E. Locally, the banding is tightly deformed into zig-zag recumbent isoclinal folds. Small pegmatite and quartz veins parallel the banding, but larger biotite granite sills grade almost imperceptibly into the gneiss.

The rock was formerly quarried for road ballast and ag-

gregate but the quarry has not been in operation for several years.

Hayes Quarry—The J. W. Hayes quarry, located about three and one-half miles southeast of Lawrenceville, was formerly known as the Turner quarry. About two acres of exposed pavement contain several small workings which were being quarried for rubble at the time of the writer's visit in 1950.

The pavement is composed of strongly foliated gneiss which resembles the Lithonia type except for a high content of muscovite. The rock apparently weathers rapidly inasmuch as the sap cover is two feet thick in places. It is relatively brittle and breaks easily with several blows of the hammer.

Johnson Property—Several small openings have been made in a large pavement on the E. A. Johnson property located east of Georgia Route 124, about one and one-half miles south-southwest of Snellville.

The rock is essentially non-contorted, strongly banded Lithonia gneiss. It has a higher percentage of muscovite than the typical Lithonia gneiss and is much less contorted and sheared. Small magnetite and garnet crystals are scattered throughout, and light green epidote grains occur locally. Numerous Stone Mountain granite dikes cut the gneiss.

The banding has a consistent strike of N25°E and a vertical dip. Clusters of biotite form a pronounced lineation parallel to the strike of the banding.

The stone is good quality for building purposes except for those areas with a high percentage of granite intrusions. The rock was formerly used for local construction.

Johnston Quarries—A large dome-shaped mass of Lithonia gneiss covering an area of more than 10 acres is owned by Snell Johnston. It is located on the east slope of No Business Creek one and three-quarters of a mile south of Snellville.

The banding of the gneiss is generally highly contorted but is locally non-deformed. Hand specimens of the rock show that it is typical Lithonia gneiss with scattered garnet and magnetite crystals. Locally the muscovite content is increased where large dikes of Stone Mountain granite cut the rock.

About six or seven small openings have been worked on

the property, but the largest has a face only about four feet high. The large size of the outcrop and the good quality of the stone make the rock suitable for many purposes. However, the quarries in this vicinity are at a disadvantage because of their greater distance from the market than the quarries of Stone Mountain and Lithonia.

Jones Quarry—The C. V. Jones quarry is located one mile west of the center of Lawrenceville just south of Georgia Route 120. Formerly it was owned by Gwinnett County and prior to that it was known as the Lawrenceville quarry. It is several hundred feet wide and about 50 feet high. It is now filled with water.

The stone is non-contorted but strongly lineated Lithonia-type biotite gneiss. Biotite and a small amount of muscovite are streaked into a pronounced lineation which strikes S40°E and plunges 10°S.

The quarry has not been worked since about 1925 when crushed stone and road ballast were produced.

Kelley Quarry—Mr. Hoke O. Kelley of Atlanta owns a small quarry in a pavement exposure on the west side of Bay Creek, three miles north of Loganville. It was formerly known as the McElvany Shoals quarry. The rock was used to build a stone house and stone wall near the quarry.

The rock is strongly banded, non-contorted Lithonia biotite gneiss. The banding strikes N10°E and dips 15°E. Small biotite-bearing pegmatites strike N45°W and locally deform the banding.

McCart Quarry—The McCart quarry is a very small opening in Lithonia gneiss located on the west side of Georgia Route 124, one and one-half miles north northeast of Centerville.

A pronounced banding in the rock has a fairly consistent trend which ranges in strike from N-S to N30°E and dips 20°E. A lineation formed by orientation of biotite clusters plunges gently to the north. Several pegmatite and granite dikes cut across the banding.

McConnell Quarry—A small quarry located one-half mile northwest of the center of Grayson on the west side of Georgia Route 20 is owned by Mr. J. N. McConnell of Grayson.

It was owned and operated prior to 1900 by G. W. Cates who quarried the rock for a railroad trestle.

The rock is an augen gneiss with quartz and feldspar bands drawn into lenticles. The banding strikes N40°E and dips about 15°W. It is a non-contorted phase of the Lithonia gneiss. A portion of the exposure consists of a biotite granite intrusion which contains garnet and epidote.

Moon Quarries—Several small quarry openings on the Raymond Moon property are located south of U. S. Route 78, a mile and three-quarters east of Snellville.

The rock is Lithonia gneiss with a strong, slightly undulatory banding. It is medium-grained and contains small magnetite crystals and rare garnet crystals. Several small granite and pegmatite dikes trend N50°W.

The quarry was last worked many years ago for building stone for the Snellville school. The surface is now covered with mosses and lichens.

Sawyer Quarry—The J. C. Sawyer quarry is located about three-quarters of a mile northwest of the center of Snellville. The small opening is in medium-grained, strongly banded Lithonia biotite gneiss composed of oligoclase, microcline, quartz, biotite, muscovite and small pink garnets. The banding is slightly deformed with small flow folds whose axes strike N10°E and plunge 10°N. Numerous pegmatite veins cut the gneiss.

Woodruff Quarry—Mr. Hoke Woodruff owns a small quarry in a flat rock exposure of Lithonia gneiss, located about one-quarter of a mile north of U. S. Route 78, approximately three miles northwest of Loganville. The property was formerly owned by Mr. T. Langley.

The rock is highly contorted with many flow folds and shear zones. The rock contains scattered grains of magnetite, pink garnets and green epidote.

Yancy Quarry—A small quarry opening with a ledge about one foot high is located one mile northeast of Grayson on the G. J. Yancy property. The stone is slightly sheared and crenulated Lithonia gneiss containing numerous disseminated magnetite crystals.

Rockdale County

Almond Quarry—The Almond quarry is a small opening just west of Tan Yard Branch at the southwest edge of Conyers. It is owned by Mr. Thomas Parker.

The rock is typical contorted and sheared Lithonia gneiss with a badly iron-stained surface. Pink garnets and magnetite crystals are common in the gneiss, and large tourmaline clusters are found in quartz veins. The grain of the rock, shown by a six foot quarry face, trends approximately N-S.

Beadie Property—Several small openings have been made in a pavement of Lithonia gneiss which crops out on both sides of a county road three miles west northwest of Conyers. The property is now owned by Mr. B. Owens of Conyers. The rock is highly contorted Lithonia gneiss with many disseminated magnetite crystals.

Brooks Quarries—The Brooks quarry consists of several openings in a three acre pavement of Lithonia gneiss about two and one-half miles north northwest of Conyers on the south bank of Yellow River. Prior to 1900, it was known as the Pierce quarry but is now owned by Mr. Cotton of Conyers. The stone was last worked about 1895. The rock is similar to that of the Beadie quarry above.

Calloway Quarry—A small quarry on the northwest side of Milstead is owned by the Calloway Mills Company. It is located on the south side of Yellow River, several hundred yards east of the river bridge.

The rock is a slightly contorted phase of the Lithonia gneiss with only occasional flow folds and shear zones. Its structure is hard to detect because of the dark gray or brown weathered surface, but the banding seems to strike N40°W and dip 40°E. Several small pegmatite dikes about six inches wide range in strike from N50° to 80°E.

Farmer Quarry—The Edward Farmer quarry is located six miles north of Conyers, just south of a highway near the county line. The rock is mildly contorted Lithonia gneiss, containing many small white aplite veins which trend N25°E and dip 25°E. Small magnetite grains are disseminated in the gneiss and larger magnetite crystals are found in the aplite veins. Small irregular pegmatite dikes are common.

Johnston Quarry—The Will Johnston quarry, leased by the Haygood Brothers of Lithonia, is located about one mile northwest of Zingara. The pavement exposure contains about ten acres of good quality contorted Lithonia gneiss. The rock is medium-grained but contains occasional microcline porphyroblasts up to two inches in diameter. The biotite is somewhat altered to chlorite. Small pink garnets and magnetite crystals are scattered throughout the rock.

The stone was being quarried for curbing and rubble at the time of the writer's visit in 1950.

Mahoney Quarry—The C. M. Mahoney quarry, located one mile northeast of Milstead, contains about ten acres of exposed Lithonia gneiss. The quarry consists of two small ledges.

The rock is highly contorted and sheared and contains large feldspar crystals which have been elongated into augen. Small aplite and pegmatite dikes commonly cut across the erratic banding. Small oxidized magnetite crystals have stained the surface a yellow-brown.

The quarry was last worked for curb stone about 1900 by Lee Brantley.

Norton Quarry—A large quarry located one mile northwest of Milstead on the west side of Georgia Route 20 is presently owned by Mr. J. E. Norton. During the period between 1900 and 1915, it was operated by Lee Brantley for Belgian blocks and for curb stone used in St. Louis, Missouri. It has been idle since that time.

The rock is highly folded Lithonia gneiss containing scattered magnetite crystals. A strong banding is cut by numerous shear zones which trend N40°W. The grain of the stone trends N70°W.

Pirkle Quarry—The Pirkle quarry is a small opening on the west side of a large pavement of Lithonia gneiss located about one-half mile south of the village of Zingara. The property is owned by Emma Chandler.

The gneiss is medium-grained and well banded with quartz-feldspar layers up to one-quarter of an inch wide. The banding is non-contorted and consistent in strike. Scat-

tered magnetite crystals and epidote grains are common. Occasional shear zones trend N30°E. One small dike of Stone Mountain muscovite granite was seen in the exposure.

Reagin Quarry—A small quarry owned by W. B. Reagin is located one mile north of Milstead. It was worked about 1900 for rubble, chimney stone and foundation stone. The quarried portion is now covered by mosses and lichens.

The rock is a highly contorted Lithonia gneiss with small magnetite grains scattered throughout. Two pronounced sets of shear zones trend N60°W and N80°W, respectively.

Rockdale County Quarry—The Rockdale County quarry is a large opening in Lithonia gneiss located on the east side of Georgia Route 20, one mile north of Milstead. The quarry was operated on a large scale about 1900 by Lee Brantley of Lithonia. The production at that time was primarily curb stone and Belgian blocks for street paving. Presently the quarry is operated by Rockdale County to supply crushed stone for road ballast and concrete aggregate.

The rock is highly sheared and contorted Lithonia gneiss with many small aplite and pegmatite dike intrusions. Locally the surface is badly iron-stained by decomposition of pyrite contained in the rock.

Shaw Quarry—Mr. Park Shaw of Stone Mountain owns a rather large quarry located two miles north of Conyers. The quarry, with a face about fifteen feet high, was extensively worked about 1900, but has been idle since that time. A small building and a broken dam are the only remains of the former operation.

The rock is highly contorted Lithonia gneiss with random banding.

Sims Quarry—A small quarry located two and one-half miles northwest of Conyers is owned by Carl Sims and operated by E. C. Reagin. The present operation started about May, 1950, but was previously operated about 1900. Mr. Reagin employed two men and used an air compressor to quarry building stone at the time of the writer's visit in 1950.

The rock is typical light gray Lithonia gneiss which is highly contorted and sheared. The banding is erratic.

Whittaker Quarry—Mr. Robert Williams owns a small quarry, formerly known as the Whittaker quarry, in a one acre pavement, located one-half mile south of Conyers on the west side of Georgia Route 138. The quarry has been idle long enough to permit a growth of mosses and lichens on the surface. A yellow-stained sap cover extends about four inches down to the fresh rock.

The stone is highly sheared and contorted Lithonia gneiss with small disseminated magnetite crystals. A prominent set of joints with slickensided surfaces trends N50°E and dips 65°NW.

Walton County

Carter Quarry—A small quarry owned by Lee Carter and formerly owned by Steven Brand is located on Flat Rock Creek in Loganville. The exposure is composed of well banded, medium-grained Lithonia gneiss. The opening is now covered with lichens and stain.

Cown Quarry—The Horace Cown quarry is located on the east side of Loganville, just south of U. S. Route 78. The stone is locally contorted Lithonia gneiss with a slight augen structure. It is medium- to coarse-grained and contains numerous magnetite octahedra. The rock was used to build a structure on the property which is now abandoned.

Forrester Quarry—A small surface opening has been made in a large pavement of Lithonia gneiss just south of the junction of two county roads, approximately six miles southwest of Loganville. The opening is one-half mile west of Sandy Rock Creek.

The rock is highly contorted Lithonia augen gneiss with several percent magnetite. Quarrying was done to provide local building stone.

Guthrie Quarry—A small quarry located a short distance west of Little Haynes Creek, and five miles south of Loganville, is owned by Mr. T. L. Guthrie. The rock, highly contorted Lithonia gneiss, was quarried for local use about forty years ago.

McCuller Quarry—Mr. Ewell McCuller owns a small quarry located four and one-half miles south of Loganville. The stone

is highly contorted Lithonia gneiss which has been intimately intruded by coarse-grained homogeneous muscovite-biotite granite (Stone Mountain type). Magnetite crystals are rare and no garnets were observed. The biotite is partly chloritized.

The exposure in which the quarry is located is small and the rock is not of good quality. The stone has not been worked for many years.

Rockmore Quarry—The M. L. Rockmore quarry is located just south of U. S. Route 78 in the village of Loganville. The flat rock exposure covers an area of approximately five acres. The stone was quarried to build the Methodist Church of Loganville, plus several other local structures.

The rock is locally contorted, well-banded Lithonia gneiss with a pronounced augen structure in the coarse-grained portions. Small cross-cutting pegmatite dikes are common in this quarry.

Windsor Bridge Quarry—A small quarry located on the west bank of Alcovy River, five miles northeast of Loganville, is owned by Mr. Dennis Still. The rock is non-contorted Lithonia gneiss with a pronounced augen structure. The stone taken from the opening was used to build the bridge across the Alcovy River.

Yancy Quarry—A small quarry near the northwest limits of Loganville, just north of Georgia Route 20, is owned by Mr. T. D. Yancy. The rock is evenly banded, medium-grained Lithonia-type gneiss. The banding strikes N15°W and dips 25°E. A pronounced mica lineation strikes N10°W and plunges several degrees north.

The rock was quarried many years ago to build a dam across a small stream which runs across the north side of the exposure. The property was formerly known as the Braswell quarry.