Base from U.S. Geological Survey 1954
Limited revision 1964

Manuscript approved for publication September 2, 1992

Compiled in 1992

SCALE 1:250 000

5 0 5 10 15 20 25 MILES

5 0 5 10 15 20 25 30 35 KILOMETERS

DATUM IS MEAN SEA LEVEL

DESCRIPTION OF MAP UNITS

G1 **Elberton Granite (commercial granite 1)**--Hard, fine- to medium-grained, homogeneous light blue-gray true granite. A major present and past producer of monumental granite having high resource potential for dimension stone and crushed stone applications

G2 **Granite and related rocks (commercial granite 2)**--Hard, massive to gneissic, plutonic igneous and metamorphosed igneous rocks ranging in composition from syenite to gabbro tonalite. Predominantly foliated granitoids and granitoid gneisses. Includes present and past producers of crushed stone for all applications, including concrete aggregate, paving, and riprap. Not a present producer of dimension stone, but includes units such as the Coronaca pluton, Granite of Cold Point, Granite gneiss of Gray Court, and Caesars Head Granite (Nelson and others, in press) that have potential for limited dimension stone applications such as curbing and ornamental facing

G3 **Feldspar-rich gneiss (commercial granite 3)**--Hard, layered gneisses containing feldspar and generally quartz. Resource potential is good to moderate for all crushed stone applications, including concrete aggregate, road metal, and riprap

Mf **Mafic and ultramafic rocks**--Very large to small bodies, and thin to thick layers, of hard, very tough, dark rocks

Ms **Mostly hard-layered rock**--Mostly hard to moderately hard gneissic layers of good to fair suitability for construction materials alternating with lesser amounts of softer rock layers less suited for construction materials

Qs **Mixed rock**--Gneisses and schists interlayered in varied proportions. Resource potential is moderate (where schistose layers are sparse) to poor (where soft schistose layers are abundant) for crushed stone applications such as riprap, concrete aggregate, and road metal. Stone containing abundant mica or schistose layers may lack the abrasive hardness needed for use in concrete and asphalt

Mb **Marble**--Moderately hard, light-gray calcitic and dolomitic marble occurring as layers and lenses in the Brevard fault zone; similar to marble presently quarried for crushed stone at Fletcher, N.C. Rock is suitable for crushed stone in concrete aggregate and road metal; thick-bedded deposits of massive rock are also suitable for riprap Resource potential is moderate to poor in most areas because of soft schist interlayers and because of narrow overall widths and thicknesses. Deeply weathered and poorly exposed

S **Poorly suited construction stone**--Predominantly soft, schistose bedrock having little or no value for crushed stone or dimension stone applications. Suitable for confined fill and road dressing

EXPLANATION OF MAP SYMBOLS

⚒ **Quarry**--Most sites are sporadically used

Contact

Thrust fault--Sawteeth on upper plate

Shear zone

INTRODUCTION

This map presents a qualitative regional assessment of the resource potential of bedrock for use as construction stone in the Greenville 1° x 2° quadrangle. Other studies will include metallic minerals (D'Agostino and others, in press a), gold (D'Agostino and others, in press b), and non-metallic commodities (D'Agostino and others, in press c). Construction stone, as used here in the context of bedrock suitability, refers mainly to dimension stone and crushed stone. Abundant supplies of bedrock and alluvial sand and gravel are available from numerous sources in the quadrangle. There is a modern quarry industry with 176 active and inactive quarries situated in the quadrangle--153 in Georgia, 23 in South Carolina, and one in North Carolina. Sixty-five dimension-stone quarries are located in a single granite mass, the Elberton Granite, in Elbert, Madison, and Oglethorpe Counties, Ga. There are numerous undeveloped sources of moderate amounts of stream sand and gravel and major abundant upland residual clay deposits in the quadrangle area.

METHODS

The resource potential of bedrock for dimension stone and crushed stone was evaluated on the basis of three factors. These are: (1) the distribution and character of rock formations shown on the geologic map (Nelson and others, in press), (2) the locations and host formations of quarries which have produced stone, and (3) information on the uses of stone produced in the region. Laboratory tests to determine quantitative physical properties, such as compressive strength (crushing strength) or bearing strength, were not made as part of this study. This map can be used by the stone and construction industries to generally identity the location of potential sources of stone to supply construction needs for growing population centers, highways, and other uses. Site-specific tests may be needed to evaluate individual deposits. Regional planners can combine this information with other considerations to avoid land-use conflicts and environmental problems that might be caused by the need for locating stone supply sources near consumers.

Readers interested in rock bodies smaller than those shown here but locally large enough to quarry, as well as those readers who want more specific and detailed rock-unit descriptions, should consult the geologic map by Nelson and others (in press) and the references therein. A "rock file" of potentially usable and commercial granite specimens, collected and described by Wagener (1977), is available for inspection at the South Carolina Geological Survey in Columbia. A report prepared by D'Agostino and Atelsek (U.S. Geological Survey, 1984, unpub. data) describes the dimension stone industry in the United States and provides a handy guide to the style of stone use in 1984.

GEOLOGIC SETTING

The Greenville 1° x 2° quadrangle is underlain by 11 thrust sheets of crystalline rock that have been transported many kilometers from the southeast (Nelson and others, in press). From northwest to southeast, these are the Great Smoky, Young Harris, Richard Russell, Helen, and Tallulah Falls thrust sheets in the Blue Ridge geologic province; the Chauga-Walhalla thrust complex and the Six Mile, Paris Mountain, and Laurens thrust sheets in the Inner Piedmont belt; and the Charlotte thrust sheet and a possible melange complex in the southeastern part of the map. Each thrust sheet contains a variety of metamorphic and igneous rock types having different mineral assemblages and textures. Granitic gneisses are especially widespread and abundant in thrust sheets of the Inner Piedmont belt and locally extend across tectonic boundaries.

TERMINOLOGY

Differences between the commercial terminology for stone and the scientific usage of geologists are discussed by Currier (1960) and by the American Society of Testing Materials (1991). Users of this map should note that commercial and geological usages of the term granite are different. Geologists classify phaneritic (coarse-grained) igneous rocks, such as granite and gabbro, on the basis of volume percentages of minerals such as quartz, alkali feldspar, and plagioclase (Streckeisen, 1973). The broader commercial use of the term granite, which includes true granite, other igneous rocks of similar texture, and gneisses, is also well established (American Society of Testing Materials, 1952, 1991; Bates, 1969, p. 23-25; Currier, 1960). Commercial granite "includes all feldspathic crystalline rocks of predominantly interlocking texture and with mineral grains visible to the naked eye; these include igneous and metamorphic rocks, including quartz diorites, syenites, quartz porphyries, gabbros, anorthosites, and gneisses" (Taylor, 1989).

DIMENSION STONE

The most suitable construction stone for use as dimension stone has uniform color, texture, and soundness, is available in large volumes, and can be cut or trimmed to size and shape specifications (American Society of Testing Materials, 1991). Finished surfaces range from rough to polished depending on the application (Taylor, 1989). Dimension stone is used for applications such as monuments and memorials, decorative facing, foundation blocks and steps, curbing, and paving blocks (Currier, 1960; Bates, 1969; American Society of Testing Materials, 1991). The most prominent qualities for dimension stone are strength (compressive and transverse), toughness (resistance to impact), hardness (abrasive resistance), and resistance to environmental damage, such as soundness (resistance to disintegration from repeated freezing and thawing) and other weathering characteristics. Nearly all granites exceed normal construction requirements for compressive strength, soundness, low porosity, and low water absorption (Kessler and others, 1940). Mineral segregations and inclusions of country rock are generally avoided, but granite gneisses that have alternating light and dark bands may be used as dimension stone (Bates, 1969, p. 26). Rift and grain (the first and second most prominent splitting directions), as well as joints, are important considerations for quarrying operations. Commercial granite is the only dimension stone likely to be produced in the Greenville quadrangle, although dimension marble is quarried 19 mi west of the quadrangle near Marblehill, Ga.

The Elberton Granite, which straddles the southern border of the Greenville quadrangle, accounts for about a quarter of all the monumental granite produced annually in the United States (U.S. Bureau of Mines, 1988, v. 1, p. 884). Immense quantities are available from the approximately 35 active dimension-stone quarries within a 20-mile radius of Elberton, Ga. Within the quarries, the rock is cut by high pressure, high temperature, jet flame torches into large blocks. In the finishing plants, the blocks are cut by computer operated, 8-foot diameter diamond saw blades on a 24-hour, 7 day-a-week, schedule. The Elberton Granite Association, in its informative pamphlet, reports that more than 1,750,000 ft^3 of select light blue-gray granite is produced annually and shipped throughout the United States and to several foreign countries, that about 90 percent of Elberton's granite production is for cemetery memorials, and that there is a rapidly rising demand for thin-slabbed facing stone for buildings. Estimated production for 1988 was 176,000 tons valued at $11,750,000 (Taylor, 1989). Waste rock from quarries and finishing plants is crushed for aggregate. Because steep slopes are generally lacking in the granitic terrain near Elberton, access to quarry sites is generally easy and developing a quarry site is moderately easy.

Except for the Elberton Granite, homogeneous equigranular granites suitable for monumental stone are uncommon in the Greenville quadrangle. However, many foliated granites and contorted gneisses have potential for curbing and other types of small building stone. These types of granites and gneisses are more widely distributed (Wagener, 1977, p. 34).

CRUSHED STONE

Crushed stone is used in concrete aggregate, road metal, railroad ballast, and as riprap in such structures as breakwaters and spillways (Bates, 1969, p. 25). The most important physical properties for crushed stone are related to (1) toughness (resistance to impact), which affects blasting and crushing characteristics; (2) hardness (resistance to abrasion), which affects wear on crushers and other machinery; and (3) soundness, which is required for general use. Granitic and mafic and ultramafic rocks almost invariably exceed the minimum standards for these properties (Bates, 1969, p. 25, 36), although Wagener (1977, p. 4) reported that some gneisses quarried in the South Carolina Piedmont did not meet the Los Angeles test requirements for resistance to abrasion as applied to the selection of stone for asphalt and concrete. Wagener (1977, p. 44) concluded that crushed granitic gneiss is only likely to approach substandard values for ordinary concrete aggregate and asphalt where the mica content is high enough to render the rock schistose. Variation in properties of rocks that exceed construction standards may have less influence on exploitation than does proximity to markets (Bates, 1969, p. 25).

The total amount of crushed stone produced by all the quarries in the entire state of Georgia in 1988 was 57.4 million tons valued at $251.2 million, and in 1989 it was 50.4 million tons valued at $262.8 million (Tepordei, 1991). The amount of crushed granite produced in 1989 was 32.6 million tons valued at $169.2 million (Tepordei, 1991).

For South Carolina, the total amount of crushed stone produced in 1988 was 23.5 million tons valued at $105.8 million, and for 1989 it was 24.4 million tons valued at $111.6 million (Tepordei, 1991). The amount of crushed granite produced in South Carolina in 1989, probably mostly from quarries outside the Greenville quadrangle area, was 16.8 million tons valued at $86.1 million (Tepordei, 1991).

GRAVEL AND SAND

Limited amounts of gravel and sand are available from the numerous bedrock-bottomed, rapidly flowing streams in the quadrangle. Production of construction sand and gravel from all sources in 1988 for District 1, the northern counties of Georgia, which includes a part of the Greenville quadrangle, was 543,000 tons valued at $670,000 (White and O'Connor, 1990). Most of the production was used as concrete aggregate.

For South Carolina, production of construction sand and gravel from all quarries and stream sources in 1988 for District 1, the western counties of South Carolina, which includes a part of the quadrangle, was 280,000 tons valued at $670,000 (White and Olsen, 1990).

The amount of industrial sand and gravel produced in all of Georgia in 1988 is not available, but in 1989 it was 537,000 tons valued at $7,013,000 (Bolen, 1990). For all of South Carolina in 1988 production was 859,000 tons valued at $15,271,000, and for 1989 it was 842,000 tons valued at $16,635,000 (White and Olsen, 1990).

CLAY

There is a thriving, nearly one billion dollar, clay materials industry in eastern Georgia and eastern South Carolina (Ampian, 1989), but not in the Greenville quadrangle area. There is, however, an abundance of saprolitic clay in many places. According to Grant (1958), a minor amount of clay mining and brick manufacturing occurred in the quadrangle in the early 1900's, about 3 mi east of Hartwell, Hart County, Ga.

DISCUSSION OF MAP UNITS

Bedrock units mapped by Nelson and others (in press) in the Greenville quadrangle are grouped here into eight major categories based on their resource potential for construction stone. These categories are (1) Elberton Granite (commercial granite 1), (2) granite and related rocks (commercial granite 2), (3) feldspar-rich gneiss (commercial granite 3), (4) mafic and ultramafic rock, (5) mostly hard, layered rock, (6) mixed rock, (7) marble, and (8) poorly suited construction stone.

Elberton Granite (commercial granite 1; map unit G1)

The Elberton Granite is a light blue-gray, fine- to medium-grained, homogeneous, true granite. It is composed mainly of alkali feldspar, plagioclase, and quartz in approximately equal proportions and smaller amounts of biotite (4 to 7 percent). Muscovite is rare. Accessory and trace minerals include ilmenite-hematite, magnetite, titanite, allanite, and zircon. The granite is generally massive; a biotite foliation is poorly defined and difficult to discern except near the borders of the pluton, where it is parallel to the contacts (Stormer and others, 1980). The alignment of biotite is interpreted as a flow foliation, and there is no evidence of any superimposed metamorphic fabric (Stormer and others, 1980). The most striking feature of the Elberton Granite is its remarkable homogeneity in mineralogy and major element chemistry, with only slight, gradual variations in grain size and no internal contacts throughout its extent (Stormer and others, 1980). Pegmatites and aplites are locally present as magmatic segregations and dikes. The lack of minerals such as pyrite that could produce weathering stains is a positive attribute. The results of tests on samples of the Elberton Granite (and other granite dimension stones throughout the United States) for important physical properties such as compressive strength, porosity, and absorption are described by Kessler and others (1940).

Granite and related rocks (commercial granite 2; map unit G2)

There are many immense bodies of plutonic igneous rocks and metamorphosed igneous rocks of excellent quality for many uses as construction stone in the Greenville quadrangle. They occur in the southeastern portion, in the central portion trending northeastward, and as isolated bodies in the western and northern parts of the quadrangle. The rock types include granite, quartz diorite, tonalite gneiss, biotite gneiss, granitic gneiss, granodiorite, hornblende diorite, and syenite. Generally, these rocks and the Elberton Granite (Unit G1) yield the best stone available for construction in the quadrangle. This unit is well exposed over large areas and can supply enormous quantities of stone. The igneous bodies are composed of rock that is massive, hard, tough, equigranular, and mostly light-colored. In places the rocks have gneissic texture. The plutonic rocks are excellent as foundation stone, dimension and facing stone, large riprap, and as crushed stone for concrete aggregate and road metal. The granitic topography is generally gently rolling; consequently, numerous sites are easily accessible.

The Coronaca pluton in Greenwood County, S.C., has been described as "the most promising source in South Carolina for pink granitic dimension stone for monumental, ornamental, or building purposes" (Wagener, 1977, p. 35). Fine-grained, homogeneous granite of the Cold Point pluton (in Laurens County, S.C.) and parts of the Gray Court metagranite (also in Laurens County) have potential for use as dimension stone according to Wagener (1977, p. 44). Banded granitic gneiss (of the Caesars Head Granite) near Beverly in Pickens County, S.C., has ornamental stone potential (Sloan, 1908, p. 181; Wagener, 1977, p. 51-52).

Feldspar-rich gneiss (commercial granite 3; map unit G3)

Large areas of the quadrangle are underlain by hard, tough, dark- to light-colored, interlayered gneisses and quartzites good for most construction applications. These areas occur in the eastern and central parts, a large area of the northwest, and smaller areas of the southwest parts of the quadrangle. These rocks are thick to thin bedded, and mostly medium to fine grained. They have good potential as large and small building stones, large riprap, and as crushed rock for concrete aggregate and road metal. In places the hard gneissic layers are gradational or interlayered with thick to thin beds of softer rock types that may be poorly suited for construction uses. The harder varieties include quartzofeldspathic gneiss, dark hornblende gneiss and amphibolite, layered felsic gneiss, porphyroblastic gneiss, and tonalite gneiss. Gneisses with significant biotite content are not as tough, and in some places, strong foliations in gneisses are detrimental to bearing strength. Many excellent quarry sites are associated with these gneisses and quartzites where they crop out on steep hillsides and mountains.

Mafic and ultramafic rock (map unit Mf)

Very large to small bodies of mafic and ultramafic rock can provide stone that is excellent for use as large riprap, and when crushed, for use as concrete aggregate and road metal. This map unit in the Greenville quadrangle include pyroxene gabbro, pyroxenite, hornblende gneiss, and hornblende diorite. These rock types are hard, very tough, and dark, and are located in the southeastern and eastern parts, the central part with bodies trending northeastward, and in the northwestern parts of the quadrangle. These fine- to coarse-grained mafic and ultramafic rocks occur as massive bodies, and also as thick to thin layers interbedded with other rock types. Ultramafic rocks are rarely quarried for stone; most bodies are small, and the rocks may have unsuitable physical properties because of minerals such as talc, or asbestos which can be a source of hazardous dust.

Trending northwestward throughout the quadrangle are vertical dikes of hard, massive diabase (Nelson and others, in press). Although diabase can be excellent as crushed stone for concrete aggregate and road metal, the dikes in this quadrangle are no thicker than a few tens of meters. Diabase dikes are not shown on this map because only minor quantities of stone are easily available.

Mostly hard-layered rock (map unit Ms)

Layered, hard to moderately hard gneissic rock alternating with lesser amounts of moderately soft to soft layered schistose rock are available throughout most of the Greenville 1° x 2° quadrangle, but mostly in the south-central and northwestern parts. The hard varieties of rocks include granite gneiss, biotite gneiss, quartzite, metasandstone, metasiltstone, and minor metaconglomerate of variable thickness, hardness, and color. They have a suitability range of good to fair for use as construction material. The rock types better suited as construction material are massive granite gneiss and thick layers of biotite gneiss; in places their value is reduced where they are thinner and alternate with softer mica-rich rock layers. The hard, massive and thick-bedded rocks are well suited for riprap, large and small building stone, and crushed rock for concrete aggregate and road metal. The thin-bedded hard rocks are suitable for small building stone and crushed rock. Where the alternating layers of rock vary in hardness, they perhaps should be separated for some uses, as the softer rocks may be deleterious in aggregate. Where these predominantly hard, layered rock types occur in hilly to rugged mountainous terrain, excellent quarry sites may be present.

Mixed rock (map unit Qs)

Mostly in the southern and northwestern parts of the Greenville quadrangle, large to small areas are underlain by undivided and interbedded varieties of soft, moderately soft, moderately hard, and hard rock types. The hard rocks include metasandstone, metasiltstone, metagraywacke, quartzite, slate, amphibolite, hornblende gabbro, quartzofeldspathic gneiss, metavolcanic rocks, and mylonite. The hard metasandstone, metasiltstone, metagraywacke, quartzite, and feldspathic gneiss are good for multiple-use construction stone such as riprap, large to small building blocks, and crushed rock for concrete aggregate and road metal. The hard and tough amphibolite, hornblende gabbro, and metavolcanic rocks are excellent for riprap and crushed construction stone, though quarrying from several sources may be necessary for large amounts. The hard, but probably brittle slate, is suitable for small building stone and as fill.

The moderately hard biotite-plagioclase-quartz gneiss and biotite felsic gneiss are suitable for riprap, and if the biotite content is low, good to fair for large building stone, and for crushed aggregate. Mylonitized rocks border some of the many thrust sheets in the quadrangle. Hard recrystallized quartzofeldspathic mylonites are generally suitable as crushed aggregate for construction. Moderately soft rocks, such as friable phyllite and quartz muscovite schist, are suitable for stable fill. Soft rocks, such as mica schist, aluminous schist, biotite schist, and biotite-muscovite schist, are suitable only for confined fill and road dressing. The steep slopes in the hilly terrain could provide numerous good quarry sites.

Marble (map unit Mb)

Limited amounts of excellent construction stone of moderately hard, white to light gray, calcitic and dolomitic marble are available from thin, northeast-trending irregular lenses and layers in the eastern and west central part of the quadrangle. Marble of this type is excellent for large riprap, foundation stone, large and small building blocks, and as crushed aggregate for concrete and road gravel. The marble occurs as long narrow slices along the Brevard fault zone in the Chauga-Walhalla thrust complex. Segments of marble in the central part of the Laurens thrust sheet are not distinguished on the map because they are considered too small for significant stone potential. Surface exposure of marble is no indication of the subsurface extent, however; exposures are sparse because much of this rock is very deeply weathered.

Poorly suited construction stone (map unit S)

Large areas of the Greenville 1° x 2° quadrangle are underlain by soft schistose bedrock, especially in the northeastern, southern, and northwestern parts. The layered, schistose bedrock consists predominantly of soft, thick to thin beds of fine- to coarse-grained, silvery-gray to brown muscovite schist, biotite schist, muscovite-biotite schist, sericite schist, aluminous schist, phyllonitic schist, chlorite schist, talc-chlorite schist, chlorite-tremolite schist, and sillimanite schist. These schists contain minor interlayers of moderately soft to hard gneiss, quartzite, and other units. The soft schists are suitable for road sealant and top dressing, and for fill. Fill with a high mica content is unstable and may need confinement to prevent sliding. Large amounts of mica are detrimental to concrete, though minor quantities are used for ornamental glitter cement. Minor quantities of harder rock layers may be selected from the schist units and used for other construction purposes.

REFERENCES CITED

American Society of Testing Materials, 1952, Book of ASTM Standards, part 3: Philadelphia, Pennsylvania, p. 891-893.

-----1991, Standard terminology relating to dimension stone: Annual book of ASTM Standards, Section 4 Construction, volume 04.08 Soil and Rock; Dimension Stone; Geosynthetics: Philadelphia, Pennsylvania, p. 6-9.

Ampian, S.G., 1989, Clay: Bureau of Mines Minerals Yearbook (1988), Volume I, Metals and minerals, p. 251-258.

Bates, R.L., 1969, Geology of the industrial rocks and minerals: New York, Dover Publications, 459 p.

Bolen, W.P., 1990, Industrial sand and gravel: Bureau of Mines Minerals Yearbook (1988), Volume I, Metals and minerals, p. 833-843.

Currier, L.W., 1960, Geologic appraisal of dimension stone deposits: U.S. Geological Survey Bulletin 1109, 78 p.

D'Agostino, J.P., Abrams, C.E., German, J.M., Zupan, A.J.W., and Maybin, A.H., in press a, Mines, prospects, and occurrences of metallic (excluding gold), pegmatite, and rare-earth minerals in the Greenville 1° x 2° quadrangle, South Carolina, Georgia, and North Carolina: U.S. Geological Survey Miscellaneous Field Studies Map MF-2215-B, scale 1:250,000.

D'Agostino, J.P., Mason, G.T., German, J.M., Abrams, C.E., Zupan, A.J.W., and Maybin, A.H., in press b, Gold occurrences in the Greenville 1° x 2° quadrangle, South Carolina, Georgia, and North Carolina: U.S. Geological Survey Miscellaneous Field Studies Map MF-2215-C, scale 1:250,000.

D'Agostino,J.P.,O'Connor, B.J., Zupan, A.J.W., and Maybin,A.H., in press c, Mines, prospects, and occurrences of non-metallic mineral commodities in the Greenville 1° x 2° quadrangle, South Carolina, Georgia, and North Carolina: U.S. Geological Survey Miscellaneous Field Studies Map MF-2215-D, scale 1:250,000.

Grant, W.H., 1958, The geology of Hart County, Georgia: Georgia State Division of Conservation, Department of Mines, Mining and Geology, p. 71.

Kessler, D.W., Insley, H., and Sligh, W.H., 1940, Physical, mineralogical, and durability studies on the building and monumental granites of the United States: National Bureau of Standards Journal of Research, v. 25, p. 161-206.

Nelson, A.E., Horton, J.W., Jr., and Clarke, J.W., in press, Geologic map of the Greenville 1° x 2° quadrangle, South Carolina, Georgia, and North Carolina: U.S. Geological Survey Miscellaneous Investigations Series Map I-2175, scale 1:250,000.

Nelson, A.E., Horton, J.W., Jr., Lesure, F.G., Bell, Henry, III, and Curtin, G.C., 1990, Thrust sheets and mineral resources in the Greenville 1° x 2° quadrangle, South Carolina, Georgia, and North Carolina, *in* Zupan, A.W., and Maybin, A.H., III, Proceedings, 24th Forum on the Geology of Industrial Minerals, May 2-5, 1988, Greenville, South Carolina: Columbia, South Carolina Geological Survey, p. 83-93.

Sloan, Earle, 1908, Catalogue of the mineral localities of South Carolina: Columbia, South Carolina Geological Survey Bulletin 2, ser.4, 505 p.[Reprinted 1958 by South Carolina Division of Geology.]

Stormer, J.C., Jr., Whitney, J.A., and Hess, J.R., 1980, Petrology and geochemistry of the Elberton Granite, *in* Stormer, J.C., Jr., and Whitney, J.A., eds., Geological, geochemical, and geophysical studies of the Elberton batholith, eastern Georgia, A guidebook to accompany the 15th annual Georgia Geological Society field trip: Georgia Geological Survey Guidebook 19, p. 10-30.

Streckeisen, A.L., 1973, Plutonic rocks, classification and nomenclature recommended by the IUGS Subcommission on the Systematics of Igneous Rocks: Geotimes, v. 18, no. 10, p. 26-30.

Taylor, H.A., Jr., 1989, Dimension stone: Bureau of Mines Minerals Yearbook 1988, Volume I, Metals and minerals, p. 913-922.

Tepordei, Valentin, 1991, Crushed Stone: Bureau of Mines Minerals Yearbook 1989, p. 1-28 (pre-print).

U.S. Bureau of Mines, 1988, Minerals Yearbook: Washington, D.C., U.S. Government Printing Office (annual publication).

Wagener, H.D., 1977, The granitic stone resources of South Carolina: South Carolina Geological Survey Mineral Resources Series 5, 65 p.

White, D.H., Jr., and O'Connor, B.J., 1990, The mineral industry of Georgia: Bureau of Mines Minerals Yearbook (1988), Volume II, Area reports, Domestic, p. 139-150.

White, D.H., Jr., and Olsen, N.K., 1990, The mineral industry of South Carolina: Bureau of Mines Minerals Yearbook (1988), Volume II, Area reports, Domestic, p. 437-446.

SUITABILITY OF BEDROCK FOR CONSTRUCTION STONE IN THE GREENVILLE 1° × 2° QUADRANGLE, SOUTH CAROLINA, GEORGIA, AND NORTH CAROLINA

By

John P. D'Agostino, J. Wright Horton, Jr., Arthur E. Nelson, and James W. Clarke

1993

INTERIOR—GEOLOGICAL SURVEY, RESTON, VA—1993

For sale by U.S. Geological Survey, Map Distribution, Box 25286, Federal Center, Denver, CO 80225