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DEPARTMENT OF MINES

BUILDING STONES OF ONTARIO

PART V

GRANITE AND GNEISS

By

D. F. HEWITT

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BUILDING STONES OF ONTARIO

will be issued in five parts:

Part I	Introduction
II	Limestone
III	Marble
IV	Sandstone
V	Granite & Gneiss

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BUILDING STONES OF ONTARIO

PART V - GRANITE AND GNEISS

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The writer wishes to thank the quarry owners who provided access for the examination of their properties.

BUILDING STONES OF ONTARIO

PART V: GRANITE AND GNEISS

By D. F. Hewitt[1]

Granite and gneiss occur widely throughout the whole of the Ontario portion of the Canadian Shield. Many deposits have been opened from time to time but no substantial granite production has resulted. Competition from established granite producers outside the province has hampered development of Ontario granite deposits. Granite deposits of great variety are available in Ontario and prospecting possibilities are good.

In the following section active and inactive granite deposits which have been worked are described.

SOUTHERN ONTARIO

In the Kingston-Brockville area granite-quarrying was formerly carried on at Kingston, Gananoque, Lyndhurst, Escott, Ivy Lea and Brockville. At the present time no mill blocks are produced but there is production of some ashlar for fireplaces, chimneys, house fronts, etc. from quarries at Lyndhurst and Gananoque.

Kingston

Red granite was formerly quarried at Deadman's Bay just east of Kingston where an inlier of red Precambrian granite of the Frontenac type[2] occurs. The property was operated by the

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[1]Senior Geologist, Industrial Minerals, Ontario Department of Mines.

[2]Following H.R. Wynne-Edward's classification, personal communication.

Canadian Granite Company, Alexander McLean, president.

The property is described by Parks (1912, p. 296) as follows:

"To the north of the granite area occurs a belt of greyish gneiss, banded with red and cut by stringers from the granite mass. The gneissoid formation strikes 30°W. of S. The granite forms a hill rising slightly above the level of the gneiss. In the side of this elevation the quarry has been opened to a depth of 50 feet. The excavation is about 200 feet long by 100 feet wide.

"The jointing is very marked and has doubtless contributed one reason for the cessation of operations. A strong series of joints strike southeast with a dip of 70° to the southwest; these partings are clear cut and, in some places, they are not more than one foot apart. A second series runs 50°E. of N., or approximately at right angles to the first set with a vertical dip. A third set of joints, which is however much less in evidence, runs at 60°S. of E. with a dip of 75° or 80° to the northeast. Another set of partings, which probably represents the sheeting planes of the granite mass, strikes 30°W. of N. and dips at a low angle (about 30°) to the northeast. Horizontal cracks of an irregular character, and evidently of later origin, are also to be seen." The abundant close jointing made it difficult to obtain large mill blocks from this quarry.

The properties of the stone are described by Parks (1912, p. 297) as follows:

"This stone presents a general bright red aspect with

light bluish dots. It consists of red feldspar (orthoclase), blue quartz, and a small amount of black mica which is in places replaced by hornblende. Under the microscope it is seen that decay has begun in the orthoclase and to some extent in the mica, but nevertheless the rock is compartively fresh. A small amount of pyrite, as well as other accessory minerals, is present. The polished surface has a unique appearance due to the bluish cast of the quartz. The physical properties are as follows:

Specific gravity	2.68
Weight per cubic foot, lbs.	166.72
Pore space, percent	0.319
Ratio of absorption, percent	0.119
Coefficient of saturation	.7
Crushing strength, lbs. per square inch	30421.
Transverse strength, lbs. per square inch	3382.

A large amount of stone is available but there has been no production for many years."

The quarry is now located on a portion of Barriefield military camp.

Betz Green Granite

In 1962 a small quarry was opened by Kingston Quarries Limited on the northeast side of No. 15 highway two miles north of Kingston Mills on lot 5, concession IV, Pittsburgh township, Frontenac county. The rock is a well-foliated green diopside amphibole gneiss which strikes N.60°E. and dips 70 to 80°S.E. The stone splits into 2 to 5 inch slabs suitable for

granite veneer. It has been used in granite wall veneer in several Toronto area buildings including the Constellation Hotel at Malton.

Gananoque

Several small granite quarries have been opened a few miles northwest of Gananoque in the Gananoque syenite. This is a coarse-grained reddish brown rock carrying up to 15 percent quartz in some places. Grey to brown phenocrysts of feldspar are sometimes prominent. These quarries have operated intermittently from 1900 to the present time; there is a small annual production of granite ashlar for fireplaces, chimneys and veneer.

In the early days quarrying was done on several small islands in the Admiralty group from one to three miles south of Gananoque in the St. Lawrence river. There were quarries on Forsythe, Leek, Juniper and Granite islands in fine to coarse, pink to red granite.

Findley Station Quarry

Lot 32, Concession IV, Pittsburgh Township

The quarry near Findley station is a quarter mile south of the railway line on lot 32, concession IV, Pittsburgh township. It was operated from 1921 to 1925 by Campbell and Lattimore. The stone is a coarse-grained red-brown porphyritic syenite. The quarry is located on the top of a 60-foot, south-facing hill. A 30-foot face has been developed in a north-south direction for a distance of 300 feet, and a 50-foot face has been opened up 300 feet to the south of the main opening. A prominent set of

joints strikes N.85°W. and dips 80°N. These are spaced 4 to 10 feet apart. A vertical set of joints strikes N.5°E. Horizontal jointing is not prominent. The joint pattern is not regular and led to quarrying difficulties. There is a slight mineral lineation striking at N.80°E. The stone is mainly syenite with large grey feldspar phenocrysts. There is minor granite facies and rare schlieren of country rock gneiss. The stone weathers brown.

Physical properties of the syenite are as follows:

Compressive strength, p.s.i.,	maximum:	24750
	minimum:	17500
	average:	22080

Absorption, 0.12 percent;

Bulk specific gravity, 2.69;

Weight per cubic foot, 168 pounds;

Abrasive hardness, 85.0.

Lot 3, Concession I, Leeds Township

A small granite quarry was opened half a mile south of the railway on lot 3, concession I, Leeds township. The quarry opening measuring 50 by 70 feet by 6 feet deep is on the east side of a granite ridge. The stone is brownish red, coarse-grained porphyritic quartz syenite. Vertical sets of joints strike at N.45°E. and N.40°W. There is a horizontal joint at 6 feet. The syenite is cut by two or three small faults which strike at N.20°E. and dip 80°E. Six to ten inches of mylonite is developed along the faults.

Lloyd Road Quarries

Lots 5, 6, 7, Concession II, Leeds Township

Several small granite quarries were opened on the north side of Lloyd road and were particularly active in the 1920's. Paving blocks constituted a large percentage of the production. The stone is a dark red to brownish quartz syenite with dark grey feldspar phenocrysts. There is some accessory hornblende.

The syenite area has a limited relief of about twenty feet and quarry faces range from 6 to 15 feet in height. Vertical joints strike N.65°E. and N.20°W. Horizontal joints are spaced at 3 to 5 feet. There is a mineral lineation striking at N.55°E. The syenite contains brownish-red coarse porphyritic granite facies and stringers of red tourmaline pegmatite. There are rare inclusions of black amphibolite. Many of the joints show rusty weathering. The rock itself weathers brown.

The stone from one of these quarries operated by D.J. Gordon and Son is described as follows by Parks (1912, p.299): "This rock presents a dark greenish grey appearance in the rough. When polished it is a very handsome stone. The chief mineral constituent is a brownish tinted orthoclase which occurs in crystals of a half inch or more in diameter. A small amount of plagioclase is present as well as intergrown feldspars of different kinds. Next in importance are crystals of dark greenish hornblende with which is associated a considerable amount of magnetite. Small amounts of augite also occur, but the crystals of this mineral are in a poor state of preservation. Quartz is also present in very small amount. The rock should

not properly be called a granite but a syenite. Owing to the presence of some augite, which mineral is more abundant in other parts of the area, the rock would be classified as an augite syenite. To this class belong many of the beautiful stones imported from Norway and with which, therefore, the present example is comparable..... The physical properties of the present speciment are indicated below:

Specific gravity	2.746
Weight per cubic foot, lbs.	168.82
Pore space, percent	0.33
Ratio of absorption	0.124
Coefficient of saturation	0.73
Crushing strength, lbs. per square inch	23152.
Crushing strength, after freezing	20536.
Transverse strength, lbs. per sq. in.	2791."

Abrasive hardness, 79.0.

Lot 8, Concession II, Leeds Township

There is a small quarry on the south side of the Marble Lake road at its junction with highway No. 32. A six-foot quarry face exposes medium-grained, brownish-red, hornblende-quartz syenodiorite, in part porphyritic. There is poorly developed jointing. Mineral lineation strikes at N.40°E.

Gordon Quarry

Lot 10, Concession III, Leeds Township

One of the larger quarries in the area is the Gordon quarry on lot 10, concession III. Carr (1955, p. 134) describes the quarry as follows: "The quarry is opened on the

north side of a low-lying bluff with a relief of not more than 30 feet above the surrounding country. The sheeting is massive and horizontal, running up to 10 feet in thickness, and joint planes are well defined and spaced wide apart. The rift is horizontal, paralleling the sheets, and the grain is vertical, paralleling the main joint planes. Large blocks may be obtained but extreme care must be taken to obtain blocks free from the black knots prevalent in this quarry."

"The stone may be described as a coarse to medium-grained augite syenite of fair mixture. Its colour is a dark brown with a decided reddish tinge, and it was known to the trade as "Excelsior Brown." It is composed essentially of orthoclase, plagioclase, hornblende and augite, with smaller amounts of quartz and magnetite. The chief mineral constituent is dark brown orthoclase which occurs in crystals up to half an inch and larger in diameter. The stone polishes well and takes a high lustre, and when polished in large slabs has a very pleasing appearance."

Physical properties of the syenite are as follows:

Compressive strength, p.s.i.,	maximum:	25875
	minimum:	23250
	average:	24562

Absorption, 0.11 percent;

Bulk specific gravity, 2.69;

Weight per cubic foot, 168 pounds;

Abrasive hardness, 76.0.

Admiralty Islands

Early quarrying in the Gananoque area was carried out on the islands in the St. Lawrence River, and red granite was obtained from Leek, Juniper, Granite, Forsythe and Yorke islands. The principal quarries were located on the U.S. side at Grindstone Island. These quarries had largely ceased operation when Parks made his survey of building stones prior to 1912. On Juniper and Leek islands the granite rises only 20 feet above the water and a limited amount of material is available. Parks (1912, p. 298) describes the Juniper Island locality as follows: "On this island the rock rises about 20 feet above the water and an excavation of 300 feet by 200 feet has been opened to a maximum depth of 10 feet. The rift is horizontal and the grain vertical in an east and west direction. The jointing is similar to that seen on Grindstone Island; the upper sheet is fully 8 feet thick. Despite the considerable amount of checking, some dimension stone has been obtained."

"It would appear that, although the shipping facilities are excellent and although much of the stone presents a handsome appearance when polished, the difficulty of obtaining large pieces without undue waste has militated against a continuous production."

Forsythe Island Quarry

Two small quarries were visited on Forsythe Island. One quarry north of the house measures 40 by 40 feet with a 20-foot face. The stone is medium-grained red granite.

Vertical joints strike N.20°W. and N.80°E.

A second small quarry opening is at the east end of the island. The quarry is 20 by 60 feet long and 6 feet deep. Vertical joints strike N.60°E.

The red coarse-grained granite from Forsythe Island quarry was examined by the writer. Its compressive strength was 15875 p.s.i.; absorption, 0.230 percent; bulk specific gravity 2.64 and weight per cubic foot, 165 pounds.

Bostwick (Yorke) Island

A red coarse-grained granite from Bostwick (Yorke) Island had the following physical properties: Compressive strength, 21375 p.s.i.; absorption 0.141 percent; bulk specific gravity, 2.62; weight per cubic foot, 163 pounds.

Lyndhurst

The Lyndhurst granite occupies an oval area of approximately eight square miles extending from Whitefish Lake on the Rideau to the village of Lyndhurst. Four small granite quarries are located in this red granite body one-half mile west of highway No. 15 on lots 9 and 10, concession IX, Rear of Leeds and Landsdowne township, Leeds county. These quarries were operated in the 1920's by A.C. Brown and Robert Brown. In 1953 and 1954 the A. C. Brown quarry, which is the most easterly of the four quarries, was reopened by Dominion Granite and Marble Company.

A. C. Brown Quarry

The A. C. Brown quarry is located several hundred feet south of the tenth concession road, on the east face of a fifty-foot ridge of red granite. The quarry has a length of 150 feet, a width of 50 feet and a face up to 35 feet in height. Jointing in the granite is irregular with joints observed striking N.20°W. with dip 45°W.; strike N.75°W., dip vertical, and strike N.30°E., dip 70°W. The horizontal sheeting is also irregular. Due to the irregular jointing it has proven difficult to quarry rectangular mill blocks without considerable waste. Many of the joints show rusty-weathering.

The stone is a coarse-grained biotite-hornblende granite of excellent red colour. The principal mineral constituents are red orthoclase, white to smoky quartz, black biotite and hornblende. The granite takes an excellent polish and is known to the trade as "Lyndhurst Rose". There are occasional quartzite inclusions in the granite.

W. E. Brown Quarry

Two small granite quarries located one-quarter mile to the west of the A. C. Brown quarry are operated by W. E. Brown. One quarry opening is located on the south side of a 60-foot granite hill. The quarry face is 25 feet high and 50 feet long. Joints were observed with strike N.30°W., dip 70°E.; and strike N.70°E.; dip 70°N. There is horizontal sheeting at 5-foot intervals. The stone is an excellent coarse-grained red granite similar to that already described. It is

called "Rideau Rose".

A second small quarry has been opened 200 feet to the south on the north face of a low granite ridge.

Physical properties of the red granite are as follows:

Compressive strength, p.s.i.,	maximum:	12500
	minimum:	7750
	average:	10125

Absorption, 0.16 percent;

Bulk specific gravity, 2.68;

Weight per cubic foot, 167 pounds;

Abrasive hardness, 81.0.

Escott

The granite quarries near Escott have not been operated for many years. The area is described as follows by Carr (1955, p. 135): "The granite just north of highway No. 2 on lots 10 and 15, concession II, Escott township, has been extensively quarried for paving blocks in the past. Cole reported the presence of fifteen to twenty small openings on lot 15 at the time of his visit in 1934, at which time several hundred thousand blocks were cut and piled ready for shipment."

"The stone is a fine-grained reddish brown granite with numerous feldspathic stringers and pegmatite dikes of a light pink colour through it; in addition, black knots may be present. These make the stone unsuitable in most cases for building or monumental use, but on account of the remarkable ease with which it breaks on the rift, grain and hardway, it is ideal for paving blocksor curbing. The jointing is well developed so

that large stone can readily be obtained. When free from imperfections, this granite, as Parks (1912, p. 301) stated, "presents a uniform grain and a very pleasing colour; it should make a desirable material either for decorative or rock face work." However there is little contrast between the polished and hammered surfaces." Parks (1912, p. 301) states that "the horizontal rift and east and west grain are exceptionally well developed, and, even on the head, the stone breaks with a smooth fracture. It is stated that this material is 10 percent easier to cut into paving blocks than the product of any other opening yet made in the district."

"The main joints strike 15°S. of W. with a dip of 18° to the south. The other set strikes 40°W. of N. The first series is widely spaced, as much as 30 feet intervening between partings. The joints of the second series occur at intervals of from 2 to 10 feet. The jointing is unquestionably good, so that large stone can be obtained with facility."

This granite would probably be desirable for ashlar.

Ivy Lea

A small granite quarry was opened on the north side of highway No. 401 a quarter mile east of Ivy Lea. The quarry is located on the east face of a 40-foot granite ridge. The quarry has a 25-foot face and has been opened for 50 feet. Jointing is irregular and two prominent joint sets were observed; one set strikes N.55°E. and dips 75°N.W., the second set strikes N.45°W. and dips vertically. Irregular horizontal sheeting is an objectionable feature in this quarry making it

difficult to obtain rectangular blocks.

The stone is a medium- to fine-grained pink leucogranite.

Brockville

Wright (1923, p. 25) describes the Brockville granite as follows: "The name Brockville granite is given to the granite outcropping in the town of Brockville and west on the islands of the Brock group and at intervals along the St. Lawrence to a short distance west of Jones Creek..... The Brockville granite varies from red to pink, with a few outcrops weathering greyish. It is mostly rather coarse-grained, and the size of the grains and the proportion of dark minerals show little variation from place to place. However, in some cases the biotite is segregated in bunches and the outcrop has a spotted appearance..... The granite is massive and well jointed.

"In thin sections the Brockville granite is seen to be composed chiefly of quartz, microcline, orthoclase, microperthite, oligoclase-albite, and biotite, with accessory muscovite, hornblende, tourmaline, apatite, zircon, magnetite, rutile needles, and secondary calcite, epidote, leucoxene, kaolin, and sericite. The texture is hypidiomorphic granular, and cataclastic..... The average diameter of the minerals of this granite is about 3mm....."

"The following is the average of the mineral composition of nine sections of the Brockville granite:

Quartz	22.7
Potash feldspar	39.2
Plagioclase feldspar	21.1
Microperthite	0.4
Biotite	13.4
Hornblende	0.9
Accessories	2.6
	100.0 "

Parks (1912, p. 303) gives the physical properties of the Brockville granite as follows:

Specific gravity	2.658
Weight per cubic foot, lbs.	166.647
Pore space, percent	0.201
Ratio of absorption, percent	0.075
Coefficient of saturation	0.67
Crushing strength, lbs. per sq. inch	26209.
" " after freezing	24634.
Transverse strength, lbs. per square inch	2480.

There are no granite quarries now active in the Brockville area, but the stone may be seen in the Waterworks building and in the electric station at Brockville.

Tweed

Courneya Quarry

Lot 24, Concession IX, Hungerford Township

A small granite gneiss quarry was formerly operated

in Hastings county near Tweed. It is described by Osborne (1930, p. 49) as follows: "A granite gneiss has been quarried for local use on the farm of Felix Courneya, lot 24, concession IX. The stone is closely jointed and the foliation makes it break into small blocks. The stone is of a pinkish-brown colour and is cut by many stringers of pegmatite, which in no way detract from the appearance of the stone. The stone has been used for the Church of St. Edmunds and its presbytery at Stoco Lake. In the buildings the rock gives a rich brown tone that is very pleasing. The church, which is in the course of construction, has Crookston limestone for the trim and plinth courses. According to masons engaged on the building, the stone works readily."

Coe Hill

Granite has been quarried at several places in the Coe Hill area, Wollaston township, Hastings county. The main production came from Ebonridge Quarries, in lot 24, concession V, and Upper Canada Granite Quarries, in lot 27, concession III; these quarries are in the Coe Hill granite pluton, Hewitt (1962). A pink granite body located in lot 17, concession VII, was tested by C. E. Muffit of Bancroft. A few test blocks were taken in lot 17, just south of the road to Wollaston Lake, but there was no commercial production. The Bachelor granite quarry, located on the north slope of the hill near the Ebonridge quarries, was worked to a limited extent.

Upper Canada Granite Quarries

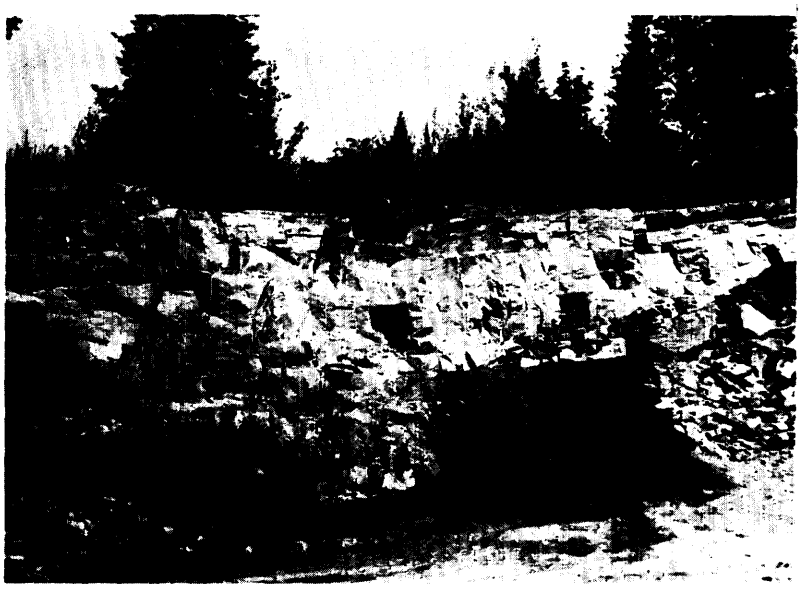
In 1940 and 1941 Upper Canada Granite Quarries operated a small red granite quarry in lot 27, near the lot 26 line, in concession III, Wollaston township, Hastings county. The quarry is located on the northeast side of a small granite knoll, about half a mile south of the Coe Hill-Lasswade road, and may be reached by wagon road.

The quarry face is about 12 feet high, and the quarry has been worked to the southwest into the side of the hill. The face trends northwest and has a length of about 80 feet. The width of the present quarry floor is about 30 feet.

The stone is a medium-grained pink to red biotite granite. Irregular horizontal sheeting makes quarrying difficult. One vertical set of joints strike N.30°-50°W. A second set of joints strikes N.60°E. and dips 80°SE. Quartz stringers up to one-half inch in width are occasionally found cutting the granite. Narrow dikelets of granite pegmatite up to 6 inches in width, and dikelets of pink, fine-grained leucogranite cut the pink biotite granite.

The granite forms part of the Coe Hill granite, an irregular composite granite stock much contaminated by inclusions of diorite and amphibolite. A few chains south of the quarry the granite contains many diorite inclusions. To the west of the quarry the granite contains

Upper Canada Granite Quarry,
Wollaston Township,
near Coe Hill.



Boothby Quarry, Huntsville; showing
bedded paragneiss quarried
for building stone.

large inclusions of diorite containing pink feldspar porphyroblasts. The ground north of the quarry is low and swampy.

The stone has a pleasing red colour and makes a satisfactory building and monumental stone.

Ebonridge Quarries Limited

Ebonridge Quarries Limited was opened in 1921 by the Morrison brothers and operated until 1930. There are two small quarries in lot 24, concession V, Wollaston township, Hastings county, about 500 feet west of the Coe Hill-Lasswade road. One quarry is in pinkish-grey biotite granite, the other is in black, medium- to fine-grained diorite.

The pinkish-grey granite, called "Heather granite" for the trade, is medium-grained and consists of grey and pink microcline and albite, grey quartz and biotite. Mafic minerals make up 10 to 15 percent of the rock, giving it a rather dark colour. Apatite, titanite, magnetite and carbonate are minor accessories.

The granite is massive to slightly gneissic. The heather granite quarry is located on the east face of a low granite knoll a few hundred feet west of the road. The quarry opening measures about 80 by 30 feet, with a face about 8 feet high. Flat horizontal sheeting in the granite parallels the rock surface. These horizontal joints are spaced 2 to 3 feet apart. A prominent set of

vertical joints strikes N.30°W.; a second set of joints strikes N.85°E. and dips 80°N. Inclusions of porphyritic biotite granite gneiss occur in the massive granite. Patches of pink leucocratic granite, and minor granite permatite stringers, were also noted. This "Heather Granite" may be seen in the steps of the East Block of the Ontario Parliament Buildings in Toronto.

To the northwest a small body of black dioritic rock is intruded and caught up within the granite. A small quarry has been opened in this "black granite" about 500 feet north of the heather granite quarry. The quarry opening is 30 by 30 feet and about 6 feet deep. The rock is a medium-grained, black massive biotite diorite composed of plagioclase, hornblende and biotite. It is cut by pink biotite granite. Irregular jointing makes it difficult to quarry rectangular mill blocks of this stone, the stone frequently breaking into wedge-shaped blocks. Some pyrite in the stone causes rusty discolouration on weathered surfaces.

Gooderham

Two small granite quarries were opened near Gooderham in Monmouth and Glamorgan townships. Both are now abandoned.

Hadley Quarry

Lot 7, Concession VIII, Monmouth Township

The Hadley quarry is described by Satterly (1943, p. 87) as follows: "Allan Hadley reopened in 1935 a small quarry, which was first operated in 1912, in a fine-grained, pink

granite in lot 7, concession VIII, Monmouth township, Haliburton county, adjacent to the south side of the Gooderham-Tory Hill road. (This is the old road, now disused: the quarry now lies north of the present highway 500, D.F.H.). The quarry is 40 feet by 50 to 75 feet and from 15 to 20 feet deep. Jointing occurs at intervals from 2 to 6 feet apart trending N.20°E. and dipping 80°W. Joints were also observed trending N.50°E. and N.65°W. The rock is cut by irregular stringers of pegmatite and black seams of quartz and biotite. Some pyrite was observed. Owing to the uneven splitting and the presence of stringers, much of the rock quarried was waste. F. W. Chubb reports that selected material was shipped to monument-makers in Toronto, and a shipment was made for granite paving stones. Total shipments were about 150 tons. Tombstones of this material may be seen in St. John's cemetery, Toronto, and in the cemetery at Gooderham."

Physical properties of the Hadley granite are as follows: Compressive strength, 20875 p.s.i.; absorption, .216 percent; bulk specific gravity, 2.61; weight per cubic foot, 163 pounds.

Glamorgan Township

Lot 23, Concession IV

"In 1941 a small quarry for test shipments was opened up by the Ritchie Cut Stone Company Limited in a black massive gabbro on lot 23, concession IV, Glamorgan township, Haliburton county. The quarry operations show that the rock breaks with a very irregular fracture. A well-defined jointing is absent.

A mill block lying in the quarry, despite the fact that it was drilled at closely spaced intervals, had broken irregularly. The deposit would not appear to have commercial possibilities. The company reports that the rock took a very good polish and was very black, and would make a good monumental stone if it could be quarried in suitable sizes." (Satterly 1943, p. 86).

Catchacoma

In 1962 there was exploration and testing of an attractive fine-grained red granite which occurs on the Catchacoma road in Cavendish township, Peterborough county. Mr. William Blott of St. Catharines has staked lots 7 and 8, concession I, Cavendish township and has taken out test samples of granite for polishing. The stone takes a good polish.

The Rutter Granite Company quarried a few test blocks of the red Catchacoma granite on the east side of highway No. 507 on lots 14 and 15, concession III, Cavendish township in 1963. This medium-grained red biotite granite has the following physical properties: Average compressive strength, 14687 p.s.i.; absorption, .215 percent; bulk specific gravity, 2.63; weight per cubic foot, 164 pounds.

Stony Lake

Two small granite quarries were opened by Stoney Lake Granite Quarries Limited of Lakefield on the Nephton road at the eastern end of Stony Lake in the east half of lot 32, concession XIII, Dummer township, Peterborough county. The stone is a coarse-grained porphyritic biotite granite of pink

colour, composed of phenocrysts of microcline up to $\frac{1}{2}$ inch in size, plagioclase, quartz and biotite. The biotite makes up as much as 20 percent of the stone giving it a rather dark colour. Vertical joints strike N.70°E. and N.15°W. There is a well-developed horizontal sheeting which allows the removal of mill blocks up to 3 or 4 feet thick. In 1940 it is reported that about 3,000 cubic feet of mill blocks were sold to Ritchie Cut Stone company of Toronto. The stone was used for monuments and building stone. The quarry has been inactive since 1942. The quarry was owned by Frank Coyle and R. G. Kilbon.

Physical properties of the Stony Lake granite are as follows: Compressive strength, 25000 p.s.i.; absorption, 0.19 percent; bulk specific gravity, 2.73; weight per cubic foot, 170 pounds; abrasive hardness, 50.5.

A small red granite quarry was operated at one time on Quarry Island in the east end of the Stony Lake, south of Burleigh township.

Belmont

In 1964 C. R. Young did some development work on a granite property on lot 31, concession X, Belmont township. The property is adjacent to the road and close to the C. P. Railway line to Nephton. Pink medium-grained biotite granite forms an extensive bare rocky ridge on this lot. The granite is uniform and massive with few joints. The location is ideal for a quarry site with relief of at least 100 feet. The granite polishes well and is a pleasing colour. No mafic schlieren or other detrimental features were observed at the

quarry site.

Minden

Granite gneiss suitable for random flagstone, dry wall and veneer has been quarried in the Minden area. In 1962 two small quarries were operating.

Armstrong Quarry

The Armstrong quarry is located at Mountain Lake on the west side of No. 35 highway, four miles north of Minden, in Minden township. The stone is a pink and black veined granite gneiss which strikes north and dips 30°E. There is northeast and southeast vertical jointing. The northeast joints are spaced at 3 to 5 feet. There is a marked southeast lineation. Stratiform foliation in the gneiss is pronounced and it readily splits into thin flagstones or veneer. Quarrying is carried out by drilling, blasting and wedging the rock. The stone is split with wedges and sledge hammers.

The stone is used for granite facing, veneer, dry walls, and flagstone.

Physical properties of the granite gneiss are as follows: Maximum compressive strength, 20500 p.s.i.; minimum compressive strength, 14810 p.s.i.; average compressive strength, 18103 p.s.i.; absorption, 0.297 percent; bulk specific gravity, 2.63; weight per cubic foot, 164 pounds; abrasive hardness, 60.9.

Highland Granite Quarry

On the east side of highway No. 35 near the Armstrong quarry a small granite gneiss quarry has been operated by John Fleming. Pink granite gneiss with black amphibolite and paragneiss bands strikes north-south and dips 5 to 8°E. An opening 30 feet long has a 4-foot face. Random flagstone and veneer stone has been produced.

Carnarvon

McKay Quarry

A small granite gneiss quarry is operated by Archie McKay a mile north of Carnarvon on highway No. 35. The quarry is 500 feet west of the road. The quarry opening measures approximately 30 by 100 feet with a 4 to 5-foot face.

Pink and grey banded granite gneiss strikes N.20°W. and dips 15°E. One set of joints strike N.20°E. and dip 70°E.; a second set of vertical joints strike N.50°W.

Miner's Bay

Saikonnen Quarry

A small granite gneiss quarry was operated in 1963 by Kalle Saikonnen on lot 26, concession VII, Lutterworth township, Haliburton county. The quarry is on the south side of the Black Lake road, a mile west of highway No. 35 not far from the village of Miner's Bay.

Pink granite gneiss strikes N.70°E. and dips 25°N.W. Foliation is rather poor, but there is some lineation. Rubble

and veneer are produced.

Huntsville

Two small quarries producing pink granitized paragneiss for building stone were in production in 1962 in Franklin and Sinclair townships on highway No. 60 east of Huntsville, near Hillside.

Fred Boothby Quarry

The quarry operated by Fred Boothby is located on the north side of highway No. 60 about a mile east of Hillside on lot 18, concession XIV, Franklin township, District of Muskoka. The stone is a grey granitized paragneiss containing minor amounts of garnet. It is well-foliated and shows a mineral lineation on foliation surfaces. The gneiss strikes northeast and dips 10°N.W. A 20-foot face on the south side of a low hill has been opened up. Blocks are removed by drilling and blasting and the blocks are split by wedge and sledge hammer into thicknesses of 3,6 and 9 inches. Veneer stone, dry wall stone and ashlar is produced. The stone does not split as readily as some of the other gneisses worked in Ontario.

Physical properties of the gneiss are as follows: Maximum compressive strength normal to foliation, 27000 p.s.i.; minimum compressive strength, 23750 p.s.i.; average compressive strength, 25375 p.s.i.; absorption, 0.32 percent, bulk specific gravity, 2.65; weight per cubic foot, 165 pounds; abrasive hardness, 35.6.

J. Read Quarry

The quarry operated by J. Read of Sutton is located one quarter mile northeast of Boothby's quarry on the same ridge of paragneiss. The quarry is 200 feet west of the barn on the Emberson farm, Sinclair township. The quarry face along the south face of the hill is 6 to 10 feet high and 60 feet long. Grey flat-lying biotite paragneiss cut by pink granitic stringers dips 10°N.W. Vertical jointing strikes at N.30°W. and N.50°E. Bedding seams are 8 to 24 inches apart and the stone is quarried in massive blocks which are split by wedge and sledge hammer. The stone is rather massive and does not readily split. Veneer, dry wall stone and ashlar are produced.

Parry Sound

Gneiss is quarried at two locations near Parry Sound. The Mill Lake stone quarry has operated since 1925.

Mill Lake Quarry

The Mill Lake stone quarry operated by W. R. Hall is located on the shore of Mill Lake, in lots 24 and 25, concession III, McDougall township, District of Parry Sound. The rock is flat-lying, well jointed grey to pinkish feldspathic biotite paragneiss. It is fine-grained and finely banded with good stratiform foliation and lineation. The quarry face is 35 feet in height and 250 feet long along the north side of a 60-foot hill. The upper few feet of black amphibolite gneiss is wasted. Six-foot holes are drilled using jackhammers. The resulting blocks are split with wedges and sledge hammers. Veneer, flagstone and dry wall stone are produced.

Physical properties of the gneiss are as follows: Maximum compressive strength normal to foliation, 28500 p.s.i.; minimum compressive strength, 25062 p.s.i.; average compressive strength, 27021 p.s.i.; absorption, 0.210 percent; bulk specific gravity, 2.65; weight per cubic foot, 165 pounds; abrasive hardness, 69.3.

Parton Quarry

The Parton quarry is located on the shore of Georgian Bay on lots 16 and 17, concession A, McDougall township. The stone is flat-lying, well bedded, granitized amphibolite gneiss.

Mill Lake Quarry,
Parry Sound.

Nipissing black granite
at the River Valley
Quarry.

NORTHEASTERN ONTARIO

River Valley

Nipissing Black Granite Company

The property formerly operated by Nipissing Black Granite Company is now operated by Industrial Garnet Company Limited. Nipissing Black Granite Company held a group of five claims in Gibbons and Crerar townships, District of Nipissing. Two of the claims were patented and the quarry workings are located on claim S.21853, N.W.$\frac{1}{4}$, N.$\frac{1}{2}$, lot 12, concession VI, Gibbons township. The quarry is 52 miles northwest of North Bay, 3 miles from the village of River Valley, and can be reached by motor road. The quarry is two miles northeast of the Canadian National Railway line where a siding is available for loading mill blocks.

The deposit was discovered by J. Theriault of River Valley several years ago and samples were taken for testing. A polished slab may be seen in the Royal Ontario Museum. The present quarry was opened in 1948 by Mr. Theriault.

The deposit is a large boss of coarse-grained black anorthosite, with facies of fine-grained diorite and pyroxene gabbro, intruding granite gneiss country rock. The quarry workings are located on the east face of a 60-foot ridge trending N.15°E. The basic intrusive is exposed for over 1,500 feet along the east face of the ridge and a short reconnaissance traverse indicated that the rock extends north and westward for at least one-quarter mile. At the quarry the rock is a coarse-grained anorthosite composed of labradorite (80 to 90 percent),

hypersthene (5 to 10 percent), hornblende, minor quartz and magnetite. Grain size ranges from $\frac{1}{4}$ to $\frac{3}{4}$ inches. The rock is massive, with no rift or grain. The texture and colour of the stone is quite variable along the face, ranging from a pyroxene-feldspar pegmatite with crystals up to six inches in size to a fine-grained massive diorite with an even granitoid texture and 1 to 2 mm. grain size. The pyroxene pegmatite facies intrudes the anorthosite. The fine-grained diorite is in sharp contact with the coarse-grained anorthosite and the boss appears to be a multiple intrusion with several distinct textural facies. To the east near the mill building there are outcrops of metagabbro consisting of grey plagioclase, scapolite and green hornblende.

At the quarry the coarse-grained anorthosite has a uniform texture for about 200 feet along the face. The rock weathers dark grey. Megascopic examination indicates that the rock consists primarily of labradorite feldspar with dark green or black pyroxene and minor magnetite. No sulphides were noted and no iron staining appears on weathered surfaces. The stone makes a good durable building or monumental stone. Close to the joint planes the feldspar is frequently brownish-mauve in colour. In some places more leucocratic facies of the anorthosite weather white with the pyroxene standing out as green knots.

There is a pronounced set of joints striking from N.45°W. to N.70°W. and dipping 75°S.W. Weak vertical jointing was noted at N.60°E. in a few places. The rock tends to exfoliate

in thick slabs parallel to the present contours of the erosion surface on the hillside and this presents difficulties in quarrying.

The initial quarry was opened on the east face of the anorthosite ridge and has a 30-foot face, a 50-foot length and 25-foot width. It is bounded on the south by a joint plane. When mill blocks were being quarried at this opening there were 5 narrow benches with lifts of 30 to 54 inches. Blocks are removed by drilling and broaching. This quarry is now used for granite chips.

A second small quarry was opened 300 feet to the northeast in fine-grained black gabbro. In 1961 Stanstead Granite Quarries Company Limited opened a quarry several hundred feet to the northeast and several mill blocks were removed. Most of the production is now granite chips for precast concrete facings. Coarse-grained black (Star Black), fine-grained black (Velvet Black) and grey (Eminence Grey) are produced.

The Nipissing Black granite may be seen in the Workmen's Compensation Building, Harbour Street, Toronto.

Physical properties of the black granite are as follows: Maximum compressive strength, 29412 p.s.i.; minimum compressive strength, 19975 p.s.i.; average compressive strength, 23759 p.s.i.; absorption, 0.15 percent; bulk specific gravity, 3.01; weight per cubic foot, 187 pounds; abrasive hardness, 87.4.

Matachewan

Rickaby Porphyry

An attractive porphyry was discovered by H. C. Rickaby in the Bannockburn Gold area near Matachewan (Rickaby 1932, pp. 8-9). A quarry permit covering claims M.R. 27569 to 72 in Bannockburn township, is held by C.E. Cook of Paymaster Consolidated Mines, South Porcupine. The occurrence is described by G.R. Guillet as follows: "The porphyry crosses the road $\frac{1}{2}$ mile northeast of the mill of the Ed Wilson Lumber Company on Rahn Lake in the northwest quarter of Bannockburn township, District of Timiskaming. From Matachewan it is reached via highway No. 566 for about 15 miles, thence south on the Wilson Lumber road for a distance of 2 miles."

"The ridge of feldspar porphyry trends north-south and contacts green volcanic rock on the west side. From an outcrop of grey porphyry on the Rahn Lake road the rock can be traced for 700 feet until the ridge falls off into swamp. A small quarry has been opened 500 feet north of the road on the east side of the ridge. The main cut is in grey porphyry and measures 30 feet long and 15 feet high. A second cut is above and 20 feet south of the main cut. Several other small openings extend the workings over a total length of 80 feet. Several diamond drillholes have been put down on a westerly bearing in the vicinity of the workings. The small amount of quarrying done has employed both channeling and plug and feather methods. The porphyry body is at least 120 feet wide in an east-west

direction through the quarry area."

"The porphyry is composed of creamy-white feldspar phenocrysts in a fine-grained dark grey matrix which grades to reddish brown on the borders of the mass. It weathers to a buff-grey or pink grey. The phenocrysts vary in size from 1/8 inch to 1 inch. They are usually zoned, and in the vicinity of fractures the centres are aften altered to pink which grades outwards to a creamy-white border. A greenish hue, which pervades both matrix and phenocrysts, is occasionally developed in a 3- or 4-inch zone along healed fractures"

"The rock is massive and texturally uniform, but is occasionally seen to include fragments of dark green diabase to 18 inches. Jointing and sheeting are very irregular and rather closely spaced. The most common planes are N.35°E., dipping from vertical to 30°W., and N.20°W., with a dip of 80°E. Spacing varies from inches to several feet. Sheeting from 2 to 6 feet thick has an east-west strike and dips 25°S."

In 1959 Paymaster Consolidated Mines Limited investigated the deposit with seven diamond drillholes, and made a transit survey to tie-in the few scattered outcrops. Their work indicates the porphyry may underlie an area 800 feet by 900 feet. The drill cores show considerable local variation in the colour of the matrix in shades of grey, green, brown, and red.

Physical properties of the porphyry are as follows: maximum compressive strength, 19750 p.s.i.; minimum compressive strength, 17650 p.s.i.; average compressive strength, 18700 p.s.i.; absorption, 0.14 percent; bulk specific gravity, 2.65; weight per cubic foot, 165 pounds; abrasive hardness, 137.6.

NORTHWESTERN ONTARIO

Marathon

From 1928 to 1932 considerable quarrying of black and red granite was carried on between Marathon (then Peninsula) and Port Coldwell. The area is located on the Canadian Pacific Railway line adjacent to water shipping facilities. With the new highway now completed through the area it is expected that there will be renewed interest in building stone in the area which offers good prospecting possibilities.

Black granite was first quarried at Marathon (Peninsula) about 1880 by the Canadian Pacific Railway for construction of bridges over the Pic and Little Pic rivers (Thomson 1931, p.35).

Peninsula Granite Quarries Limited

The Peninsula Granite Quarries are described by Thomson (1931, p.35) as follows: "The property consists of a group of 17 claims extending from Peninsula station for $2\frac{1}{2}$ miles north along both sides of the Canadian Pacific Railway. To the west the claims border the shore of Peninsula harbour. Quarrying operations have been carried on at two different locations for the purpose of simultaneously developing red and black granite.

"During fourteen months of operation in 1929 and 1930, 24 carloads of black and 2 carloads of red granite have been shipped from Peninsula. The location of the property is such that shipments may be made by rail or boat at slight expense. The granite is sold at $2.50 per cubic foot, f.o.b. Peninsula."

"Peninsula black granite has been used in the construction of several buildings in Canada and the United States. In Toronto it can be seen in the new building of the T. Eaton Company (College Street), McConkey's restaurant, the Creed building, and the Woolnough building. Numerous buildings in Chicago, Detroit and other midwestern cities of the United States contain this granite."

Black Granite

"Commercial black granite outcrops along the lakeshore near the southwest corner of claim T.B. 7204 and is exposed continuously for 30 chains north along the waterfront. Beyond this point it merges into a complex of red-brown-black granite. From the shore the limit of commercial material runs eastward to the railway. To the east and south the rock disappears beneath an extensive sand plain. Sixty acres of the property are estimated to be covered with a good grade of black granite."

"The black granite quarry is located 30 feet from the shore of Peninsula harbour [near the middle of lot 21, concession X, Pic township, District of Thunder Bay] and about 1,800 feet west of Peninsula station. The working face runs at right angles to the shoreline; it is 70 feet in length and has at present a maximum height of 14 feet."

"Two sets of joints are seen in the quarry. The most prominent strikes almost due north and varies in dip from vertical to 70°W. The cross-jointing strikes east-west and is nearly vertical. At the quarry the north-south joints are 70 feet apart and run parallel for at least 500 feet.

Rectangular blocks of a size limited only by the plant capacity can be quarried. The sheets lie horizontally and exhibit an even and well-defined floor. The first sheet quarried had a maximum thickness of 14 feet. Drilling in the next sheet below to a depth of 10 feet did not reach another sheeting plane. The rift is roughly parallel to the sheeting planes."

"The granite, as a whole, is a dense, medium-textured rock uniform throughout the quarry. Surface weathering has penetrated the massive rock to a depth of one to two inches. The colour, when closely observed, is dark greenish-brown but at a short distance is black. A striking feature is the development of plate-like or lath-shaped feldspars, which exhibit shining cleavage planes on freshly broken surfaces. The feldspars attain a length of one-quarter to one-half inch and are the predominant mineral constituent. They generally exhibit well developed Carlsbad twins. The chief ferromagnesian mineral is black augite. Finely crystalline magnetite is disseminated uniformly throughout the rock; traces of pyrite may be seen. At the quarry the granite shows a marked uniformity of colour. Segregations and hair lines are absent. Pegmatite dikes a few inches in width occur at wide intervals."

"Examination of a dressed and polished specimen of the black granite shows that it is suitable for fine types of finished work. Owing to the large size of individual crystals, the rock breaks with a somewhat uneven surface. The colour of the hammered face is bluish-grey with a dark green mottling.

The polished surface is of pleasing appearance, the colour being much livelier than that of the rock face. Much of the charm of the rock is due to the light-blue iridescence of the feldspars. In this respect it bears a resemblance to the beautiful monumental laurvikite of Norway. A detailed examination of the surface shows a pronounced greenish-brown shade speckled throughout by irregularly shaped shining black minerals. The surface is also dotted with small grains of magnetite made noticeable by their metallic lustre. The polished rock, viewed at the distance of a few feet, exhibits a bright lustrous black colour enhanced by the delicate sheen of the feldspars. The beauty of this unique type of black granite should assure it a ready market as an ornamental stone."

"The rock may be technically termed an augite syenite. Both in chemical and mineralogical composition it is similar to a Norwegian variety of augite syenite which Brogger has named laurvikite. In thin section the rock shows a holocrystalline, coarsely granitic texture. The chief mineral constituents are augite and a feldspar that has been described as a "microperthitic intergrowth of albite and orthoclase " (Kerr 1910, p.214). Subordinate amounts of hornblende, olivine, biotite, apatite and magnetite may be seen. The rock shows very little alteration. A detailed petrological description is given by Kerr (1910, p. 214)."

Chemical analyses are given by Thomson (1931, p.37).

Cold Spring Granite Company

In 1931 the black granite claims of Peninsula Granite Quarries Limited were taken over by the Cold Spring Granite Company of Cold Spring, Minnesota. The company opened a new quarry immediately east of the Canadian Pacific Railway right of way three-quarters of a mile north of Peninsula station on claim T.B. 7227 in the south half of lot 20, concession XI, Pic township. Thomson (1932, p. 44) states that "During the summer of 1931 twenty carloads of black granite were shipped to Cold Spring..... In the general vicinity of the quarry the rock is a complex of brown-black-red "granite" (syenite). Black augite syenite (laurvikite) of commercial grade is found in local areas. In places pegmatitic dikes of red hornblende syenite intersect the augite syenite, producing a hybrid variety of brownish-coloured syenite in the vicinity of the intrusion."

"When visited the quarry had been opened to a depth of 14 feet. Blocks of a coarsely grained, black granite (syenite), of uniform texture and free from segregations and hairlines, were being removed. On the north face of the pit, areas of the above mentioned brownish-coloured syenite were being encountered. The presence of this "off-coloured" variety has been of some concern to the quarrymen and has necessitated selective quarrying of the better-grade material."

"Two sets of joints are seen in the quarry. The most prominent joint strikes W.25°N. and dips 50°S. Another well defined joint strikes N.5°E. and is nearly vertical. The sheets vary in thickness from $1\frac{1}{2}$ to 8 feet and dip 8°-10°W."

Peninsula Granite Quarries - Red Granite

Thomson (1931, p.37) states that "a red granite of commercial grade is located on the northern claims of the (Peninsula Granite) group and is estimated to cover an area of 150 acres, which extends from the lakeshore across the railway and about half way up the side of the ridge to the east. Beyond this limit the red granite merges into a complex of black and red types."

"A red granite quarry is to be opened near the south-east corner of claim T. B. 9270 about 200 feet east of the railway on the side of a ridge, which at its summit reaches an elevation of 700 feet above Lake Superior".....

"The most prominent joints strike east and north of east; the other system strikes S.20°-30°E. Joints are so widely spaced that the largest blocks in commercial demand can be obtained. The sheets slope at an angle of 5°S.W. The rock quarries quite readily into rectangular blocks."

"The granite is a medium-textured rock of dull old-rose colour variegated with considerable amount of black material. Lath-shaped crystals of reddish orthoclase up to one-third of an inch in length are prominently exhibited. As observed at the quarry, the rock is of uniform colour and segregations are rarely of consequence. Hair lines and weathering stains were not noticed."

"The sawn surface of the red granite exhibits a light-pink matrix mottled with fine, irregular anhedra of blue-green

hornblende. The rock takes a good polish and exhibits a uniform granular pattern. Orthoclase, hornblende and scattered grains of magnetite are the most prominent minerals."

"Microscopic examination shows the rock to be an alkali syenite. Kerr (1910, p. 210-213) has named it "red syenite" and gives a complete petrological description." Thomson (1931, p. 38) gives a chemical analysis. In 1932 he describes a small test quarry developed on claim T. B. 9270. A few of the surface blocks exhibit an undesirable brownish shade.

Thomson (1932, p. 46-7) describes a block of claims staked for black granite by Wm. Morrison just east of Middleton station on the Canadian Pacific Railway.

Ignace - Butler Area

by

G. R. Guillet

A white granite has been worked at two quarries near Ignace and at several places in the vicinity of Butler 9 miles to the west. The Ignace quarries are located just north of the Canadian Pacific Railway and highway No. 17, less than 2 miles northwest of Ignace station and 3/4 mile due north of Agimac Lake in north central Ignace township, District of Kenora. The Butler quarries lie between highway No. 17 and the Canadian Pacific Railway just southeast of the Butler siding in south central Bradshaw township, District of Kenora. Relief is very low in both areas and the quarries are opened in low outcroppings of the granite where it protrudes through a predominantly sandy terrain.

Typically the rock is a uniform medium-grained biotite granite with granitic texture. It is structurally massive and white in colour, but near Ignace it inclines to a gneissic pale grey or pink. It weathers light grey. The rock is composed of white feldspar, pale yellow to amber quartz, rarely red-stained, and black biotite. Vertical jointing is developed in two directions almost at right angles and sheeting is horizontal. The rock breaks well in all three directions, and hairline fractures, stains, and segregations are practically absent.

Canadian Pacific Railway Company Quarry - Ignace

The quarry lies 100 yards north of the Canadian Pacific Railway line, 1.6 miles northwest of Ignace station. It was worked by the Canadian Pacific Railway Company for bridge foundations during construction of the railroad. The face is 200 feet long with a maximum height of 16 feet. It is cut into the east side of a low granite outcrop. The rock is a faintly gneissic, medium-grained pale pink and grey biotite granite striking N.70°E. and dipping 45°S. Both colour and texture are locally variable and streaks of a dark rock are sometimes included. Six sheets from 18 inches to 8 feet thick are present in the face. The sheeting dips 10°N. Jointing is well developed at N.70°W. at intervals of 6 inches to 20 feet, commonly 4 to 6 feet. Jointing at N.40°E. is widely spaced. Quarrying of the large blocks appears to have been accomplished with black powder in widely spaced drill holes the full depth of the sheet.

Physical properties of the Ignace grey granite are as follows: maximum compressive strength, 26375 p.s.i.; minimum compressive strength, 15375 p.s.i.; average compressive strength, 20875 p.s.i.; absorption, 0.20 percent; bulk specific gravity, 2.62; weight per cubic foot, 163 pounds; abrasive hardness, 66.8.

Quarry No. 2 - Ignace

The quarry is about 200 yards north of the railway, 1.8 miles northwest of Ignace station. It was served by a railway spur of which only the bed remains. A great many paving blocks and curb stones were apparently produced in addition to larger blocks. A number of shallow cuts have been made over an area of several acres in a low outcrop of the white granite. The rock is massive and medium-grained with rare diffuse patches of coarser texture up to several feet in diameter. The sheeting is massive and horizontal at the east end of the workings and large blocks were taken from an 8-foot working face. At the west end, sheets 6 to 24 inches thick are common. Scattered workings in this area were largely for paving and curb stones. Jointing is widely spaced in the same two directions, N.70°W. and N.30°E. Plug and feather quarrying was used.

Butler Quarries

The Butler quarries are located in a block of five patented mining claims, K.561-2-3, and K.599, 600, largely contained by highway No. 17 on the south and the Canadian Pacific Railway on the north, in south central Bradshaw

township. Four quarries were observed on a low wooded ridge over a distance of $\frac{1}{2}$ mile, all between 100 and 300 yards south of the railway. The most westerly quarry lies 200 yards north of the highway and can be seen from the road across a shallow sand pit. The quarry measures 60 feet by 150 feet and has a maximum depth of 4 feet. The rock is white, massive and medium-grained. Rare small patch pegmatites were noticed beyond the quarry area. Sheeting is horizontal, somewhat tapering, and thin. Thicknesses of the two sheets being worked varies from 15 to 40 inches. Jointing at N.40°E. is spaced at 4 to 8 feet. Jointing at N.70°W. is widely spaced. The planes are commonly marked by a mottled brown and white alteration. Two small timber derricks and a number of freshly cut blocks attest to quarrying activity within the last 10 years. Older quarries to the east worked sheets from 1 to 4 feet thick to depths of 8 to 12 feet. Blocks were shipped by rail from the nearby Butler siding.

Physical properties of the Butler grey granite are as follows: compressive strength, 26125 p.s.i.; absorption, 0.28 percent; bulk specific gravity, 2.61; weight per cubic foot, 163 pounds; abrasive hardness, 58.0.

Vermilion Bay

by

G. R. Guillet

Scotstown Granite Company Limited

The Scotstown Granite Company works a quarry near Vermilion Bay formerly operated by the Vermilion Pink Granite Company

Limited. The stone is dressed at the company's finishing plant at Cap St. Martin, Quebec. The property consists of two patented claims, K. 11804 and K. 11805, on the south shore of Aaron Lake in Docker township, District of Kenora. The quarry is located several hundred yards north of highway No. 17, about 6 miles west of Vermilion Bay on the Canadian Pacific Railway line. Recent improvements to the highway have relocated its route a few hundred feet south of the old road, but access to the property has been maintained via the old road from a point $\frac{1}{2}$-mile east of the quarry. The 100-foot mast of a steel derrick is clearly visible above the trees for some distance along the highway.

The quarry is opened on the crest of a low east-west ridge and is being worked in steps down the gentle northern slope. The workings are spread over an area 200 feet square and the inclined sheets have an aggregate thickness of 39 feet. A large motor-driven derrick is located on the southeastern edge of the opening. In June 1962 a number of recently-cut blocks were stocked on the quarry edge awaiting truck transport. Two small openings on the south side of the ridge just above the route of the natural gas pipeline were apparently the site of earlier operations.

The rock is a uniform moderate orange-pink, medium-grained, biotite granite. It is typically granitic in texture and is composed of orange-pink feldspar and white to colourless quartz speckled with black mica. A faint gneissosity is apparent in the quarry face but is not readily seen in the hand specimen. It is due to slight relative enrichments of the three minerals

in diffuse alternating bands an inch or so thick striking east-west and dipping about 12°N. Sheeting in the granite is parallel to the gneissosity and is frequently marked by a pegmatitic layer, 1 to 2 inches thick, of quartz and feldspar. Small pegmatitic patches within the mass of the rock are not sufficiently frequent to be deleterious. Staining was not observed on any of the rock surfaces and quartz segregations are absent.

The thickness of sheets in the quarry area measured from top to bottom are 2, 2, 3,4, 2, 12,10 and 4 feet. The two thick sheets form the major producing zone. Outcropping parts of the thin upper sheets are present as erosional remnants on the northern slope of the ridge and hence their thicknesses are not constant. Jointing is poorly developed in one direction - N.45°E., and the interval is wide. The jointing is usually tight,almost healed, and is often marked by a $\frac{1}{4}$-inch bleached zone. The rock breaks well in directions parallel to the jointing and sheeting, and "plug and feather", and black-powder blasting techniques, are used in these directions. The third direction is difficult and requires channelling methods to insure a square cut.

The granite is well-exposed in outcrops along highway No. 17 for more than half a mile. Commonly its structure is massive and sparsely jointed as in the quarry area, but towards the eastern limits two joint systems are developed. One is in a direction N.50°W. at intervals of 8 inches to 6 feet; the other is north-south at 2 to 20 feet. Westward the granite contains blocks of amphibolite and it grades finally into a contored lit-par-lit gneiss by injection between the bands of

the flanking dark paragneiss.

Physical properties of the Vermilion pink granite are as follows: compressive strength, 26600 p.s.i.; absorption, 0.22 percent; bulk specific gravity, 2.60; weight per cubic foot, 162 pounds; abrasive hardness, 80.8.

Farlane District

Granite quarrying near Farlane is described by Carr (1955, p. 147) as follows: "A number of years ago quarrying operations were carried on adjacent to the Canadian National Railway a mile west of Farlane, a station ten miles east of Redditt and 139 miles by rail east of Winnipeg. The stone, a red granite of Archean (early Precambrian) age, was produced by the Ontario Granite Company Limited."

"The bluff in which the opening was made rises about 55 to 60 feet above the level of the railway; the stone was taken out in benches. The sheeting is fairly massive, but varies in places, and has a general dip of 10 degrees to the west. The rift follows the sheeting and the grain is vertical, paralleling the main joints which strike N.13°W. Medium-sized blocks can be obtained."

"The stone is a fine-grained, even textured, light pink biotite granite with only a faint gneissoid structure. The colour of the stone is due to the red feldspars, but with the large proportion of quartz, and the biotite present only sparingly, the general colour of the stone is quite light. The rock takes a beautiful polish but there is not much contrast between the different finishes. It was used for monumental dies and should be suitable for building stone."

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