ONTARIO
DEPARTMENT OF MINES

THE LIMESTONE INDUSTRIES OF ONTARIO 1958-1963

by

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Map 2059 - Ontario Limestone Quarries, 1963.
Scale 1 inch to 16 miles.

THE LIMESTONE INDUSTRIES OF ONTARIO
1958 - 1963

The three principal limestone industries in Ontario are the crushed stone, portland cement and lime industries. In 1962 the value of production from these industries was $70,149,206 surpassing any other industrial mineral in value.

This report presents the results of a survey of Ontario limestone quarries made in the summer of 1963. The results of a previous survey made in 1958 were published in 1960 (Hewitt 1960). In 1958 seventy-four limestone quarries were producing, while in 1963 the number had increased to one hundred and five. Since 1958 thirteen quarries have closed and forty-four new quarries opened. Production of limestone has increased from 19,968,361 tons in 1958 to 22,542,664 tons in 1962.

The principal limestone production comes from the Black River and Trenton limestones of Ordovician age, the Guelph-Lockport-Amabel dolomite of Silurian age and the Detroit River - Delaware limestones of Devonian age. Several new quarries have been opened in the Napanee - Kingston area, mainly to supply aggregate for highway No. 401. A number of small quarries without permanent plants have been opened in the Beekmantown dolomite formation between Smiths Falls and Brockville. Three new quarries have been opened near Cornwall, and four new quarries near Ottawa. Two large quarries have been opened at Milton and Acton to supply aggregate for the Toronto market. A small quarry has been opened in the Amabel formation southwest of Collingwood. Considerable exploration work has been carried out on the Amabel and Guelph high purity dolomites of the Bruce peninsula, but to date there has been no production. A new quarry has been opened near Port Dover in the Delaware limestone. The first limestone production from the Hamilton formation comes from a new quarry north of Thedford in Lambton county. In 1963 four new marble quarries were opened in Eastern Ontario to produce building stone from Grenville marbles. Building stone production from the Lockport dolomite has also increased.

Portland cement production has not notably increased since 1958. There are six cement plants in Ontario and one new kiln has been installed since 1958, at St. Mary's Cement Company.

Production of lime has increased slightly in 1962, but only two additional kilns have been installed in Ontario lime plants since 1958.

PRODUCTION AND USE OF LIMESTONE IN ONTARIO

The production and value of limestone produced in Ontario from 1958 to 1962 are given in (1). The figures do not include limestone used for the manufacture of portland cement and lime.

(1) PRODUCTION OF LIMESTONE IN ONTARIO, 1958-1962

Year	Tonnage	Value
1958	15,144,361	$18,542,922
1959	16,322,071	19,363,443
1960	16,118,571	18,782,073
1961	16,654,878	19,242,067
1962	17,279,797	$19,892,022

The production and use of limestone in Ontario for the years 1958 to 1961 are given in (2). As indicated in this table, the four main uses of limestone, namely crushed stone, flux stone, lime and portland cement, consume 95 to 97 percent of the limestone quarried. Annual consumption of crushed stone, principally for road construction, concrete aggregate and railway ballast, ranged from 13,000,000 to 15,000,000 tons during the 1958 to 1961 period. Consumption of flux stone ranged from 1,000,000 to 1,200,000 tons or 5 to 6 percent of total limestone production. From 2.5 to 3.3 million tons of limestone were used annually by the portland cement industry and from 1.5 to 1.8 million tons by the lime industry.

The average price for crushed stone in 1961 was $1.07 per ton. The average price for flux stone in 1961 was $1.10 per ton and for agricultural limestone, $3.58 per ton.

In 1957 there were 32 limestone quarries in Ontario producing over 100,000 tons per year; in 1962 there were 36 in this category. In 1962 there were five quarries each producing in excess of 1,000,000 tons per year. A list of limestone quarries operating in Ontario in 1962 is given in (3). A list of quarries opened in 1963, and contractor's quarries not individually reported is given in (4).

(2) PRODUCTION AND USE OF LIMESTONE IN ONTARIO, 1958 - 1962

USE	1958 Tonnage	1958 Value $	1958 Percent	1959 Tonnage	1959 Value $	1959 Percent
Crushed stone	13,010,520	14,917,650	65.2	14,657,068	16,098,266	69.5
Flux stone	1,047,729	1,168,111	5.3	1,001,145	1,065,480	4.7
Building stone	58,912	818,578		60,028	751,490	
Riprap and armour stone	526,330	743,427		388,551	663,664	
Agricultural limestone	102,958	268,078		83,445	281,517	
Pulverized stone	44,042	242,756	5.3	88,838	346,924	3.2
Pulp and paper	23,226	64,527		7,748	26,822	
Glass	14,606	47,984		35,248	129,280	
Sugar	20,362	24,435				
Other chemical uses	295,076	247,376				
Total	15,144,361	18,542,922		16,322,071	19,363,443	
Cement industry	3,266,000		16.4	2,950,000		14.0
Lime industry	1,558,000		7.8	1,800,000		8.6
Grand Total	19,968,361		100.0	21,072,071		100.0

	1960 Tonnage	1960 Value $	1960 Percent	1961 Tonnage	1961 Value $	1961 Percent
Crushed stone	13,988,047	15,486,135	69.1	14,955,613	16,051,652	71.5
Flux stone	1,016,350	1,135,104	5.0	1,224,604	1,343,227	5.8
Building stone	38,914	492,640		57,234	960,232	
Riprap and armour stone	447,901	558,304	5.5	81,572	115,938	
Agriculture limestone	58,909	147,464		67,583	241,384	
Pulverized stone	66,877	379,392		217,096	356,344	2.2
Pulp and paper	8,693	29,927		7,288	25,191	
Glass	36,341	136,889		39,116	135,857	
Sugar				2,255	9,018	
Other chemical uses	456,539	416,218		2,516	3,224	
Total	16,118,571	18,782,073		16,654,878	19,242,067	
Cement industry	2,451,300		12.1	2,715,620		12.9
Lime industry	1,681,723		8.3	1,590,600		7.6
Grand Total	20,251,594		100.0	20,961,098		100.0

(2) PRODUCTION AND USE OF LIMESTONE IN ONTARIO, 1958-1962 (Cont.)

1962

USE	Tonnage	Value $	Percent
Crushed stone	15,619,816	17,074,833	70.0
Flux stone	533,355	654,589	2.4
Building stone	115,591	538,918	
Riprap and armour stone	156,047	209,881	
Agricultural limestone	67,786	238,226	5.1
Pulverized stone	531,942	701,290	
Pulp and paper	29,919	64,199	
Glass	58,156	202,540	
Sugar	161,445	201,806	
Other chemical uses	5,740	5,704	
Total	17,279,797	19,892,022	
Cement industry	3,345,124		14.9
Lime industry	1,706,449		7.6
Grand Total	22,331,370		100.0

(3) LIMESTONE PRODUCERS IN ONTARIO, 1962

Order of Production	Name	Location
	Group 1: over 1,000,000 tons per year	
1.	Nelson Crushed Stone	Nelson
2.	Canada Crushed & Cut Stone Ltd.	Dundas
3.	St. Lawrence Cement Co. Ltd.	Ogden Point
4.	Cyanamid of Canada Ltd.	Beachville
5.	R.E. Law Crushed Stone Ltd.	Port Colborne
	Group 2: 500,000 to 1,000,000 tons per year	
6.	Lake Ontario Portland Cement Co. Ltd.	Picton
7.	Limestone Quarries Ltd.	Uhthoff
8.	Brunner Mond Canada Limited	Amherstburg
9.	Milton Quarries Limited	Milton
10.	Domtar Chemicals Limited	Beachville
11.	Halton Crushed Stone Limited	Milton
12.	St. Mary's Cement Co. Ltd.	St. Marys
13.	Queenston Quarries Limited	Queenston
14.	Cayuga Quarries Limited	Cayuga
15.	Canada Cement Company Ltd.	Belleville
	Group 3: 100,000 to 500,000 tons per year	
16.	Canada Cement Company Ltd.	Woodstock
17.	Hagersville Quarries Limited	Hagersville
18.	Associated Quarries & Const. Ltd.	Milton
19.	Walker Brothers Quarries	Thorold
20.	Geo. C. Campbell Company Ltd.	Ridgemount
21.	Ottawa Valley Crushed Stone Ltd.	Ottawa
22.	Chemical Lime Limited	Ingersoll
23.	Frazer Duntile Limited	Ottawa
24.	A. Cope & Sons Limited	Stoney Creek
25.	Armstrong Bros. Co. Ltd.	Ottawa
26.	Amherst Quarries Limited	Amherstburg
27.	St. Catherines Crushed Stone Ltd.	St. Catherines
28.	Vineland Quarries & Crushed Stone Ltd.	Vineland
29.	Haldimand Quarries & Const. Ltd.	Hagersville
30.	Dibblee Const. Company Ltd.	Ottawa
31.	Armstrong Bros. Co. Ltd.	Georgetown
32.	Ridgemount Quarries Limited	Ridgemount
33.	Armstrong Bros. Co. Ltd.	Vinemount
34.	Domtar Chemicals Ltd.	Glen Christie
35.	Dominion Magnesium Limited	Haleys
36.	Canadian Gypsum Company Ltd.	Guelph

(3) LIMESTONE PRODUCERS IN ONTARIO, 1962 - continued

Not in Order of Production	Name	Location
	Group 4: Less than 100,000 tons per year	
	Armstrong Bros. Co. Ltd.	Clappison Corners
	Armstrong Bros. Co. Ltd.	Marmora
	Bertrand & Frere Const. Co. Ltd.	L'Orignal
	Black River Limestone Products	Nogies Creek
	Bonnechere Lime Co. Ltd.	Eganville
	Bruce Peninsula Quarries	Wiarton
	Canada Cement Co. Ltd.	Port Colborne
	Canada Crushed & Cut Stone Ltd.	Hagersville
	A.G. Cook	Thedford
	J.S. Cook	Wiarton
	Dunnville Rock Products Ltd.	Dunnville
	Ebel Quarries	Wiarton
	Frontenac Quarries Ltd.	Kingston
	J.L. Fulton	Haileybury
	Jas. D. Gray & Son	Carlisle
	Indusmin Ltd.	Coboconk
	Kirkfield Crushed Stone Ltd.	Kirkfield
	McGinnis & O'Connor Ltd.	Westbrook
	Norfolk Quarry Co.	Port Dover
	Owen Sound Ledgerock Ltd.	Owen Sound
	Permanent Transit Mix Concrete Ltd.	Brockville
	Port Colborne Quarries Ltd.	Port Colborne
	Rieger Brothers	Pelee Island
	Roblindale Quarries Ltd.	Roblin
	Rockwood Lime Company	Rockwood
	Storey Construction Ltd.	Napanee
	Wiarton Ledgerock	Wiarton
	PRODUCERS OF PRECAMBRIAN MARBLE:	
	Angelstone Limited	Sharbot Lake
	Angelstone Limited	Tatlock
	Bolenders Limited	Eagle Lake
	W.F. Bonter Co. Ltd.	Malone
	Canada Talc Industries Ltd.	Madoc
	Canadian Dolomite Co. Ltd.	Haleys
	Carleton Lime Products Co. Ltd.	Carleton Place
	Dominion Magnesium Ltd.	Haleys
	Grenville Marble Company	Cashel
	Hastings Marble Products Limited	Madoc
	Jamieson Lime Company	Renfrew
	Madoc Marble Company	Madoc
	Omega Marble Tile & Terrazzo Ltd.	Tatlock
	Rideau Aggregates Ltd.	Mountain Grove
	Stoklosar Marble Quarries Ltd.	Madoc

(4) LIMESTONE PRODUCERS IN ONTARIO, 1962 - continued

Name	Location
QUARRIES OPENED IN 1963, AND CONTRACTOR'S QUARRIES AND OTHERS NOT INCLUDED IN (3):	
Acton Limestone Quarries Ltd.	Acton
Blair Construction Co. Ltd.	St. Albert Station
Brundige Construction Co. Ltd.	Athens
" " "	Ferguson Corners
" " "	Harlem
" " "	Jasper
Collingwood Sand and Gravel	Duntroon
Dibblee Const. Co. Ltd.	Cornwall
" " "	Smiths Falls
Frazer Duntile Ltd.	Orleans
H.J. McFarland Const. Co. Ltd.	Marysville
" " "	Napanee
" " "	Switzerville
W.J. McKendry	Kingston
Municipal Sand and Gravel	Collins Bay
Peninsula Limestone Ltd.	Thorold
Roads Resurfacing Ltd.	Apple Hill
Smith Const. Co. Ltd.	Braeside

THE CEMENT INDUSTRY IN ONTARIO

Production of portland cement in Ontario for the period 1958 - 1962 is given in (5).

(5) PRODUCTION OF PORTLAND CEMENT IN ONTARIO, 1958 - 1962

Year	Tonnage	Value
1958	2,400,158	$35,195,552
1959	2,386,334	31,731,767
1960	2,007,044	30,699,800
1961	2,226,923	35,671,569
1962	2,418,119	37,998,948

There were six portland cement plants in operation in Ontario in 1963, as listed in (6).

(6) PORTLAND CEMENT PRODUCERS IN ONTARIO, 1963

Company	Location	No. of Kilns	Approximate Annual Capacity in Tons
Canada Cement Company Ltd.	Belleville	3	700,000
Canada Cement Company Ltd.	Port Colborne	1	210,000
Canada Cement Company Ltd.	Woodstock	2	560,000
Lake Ontario Portland Cement Co.	Picton	2	350,000
St. Lawrence Cement Company Ltd.	Clarkson	2	700,000
St. Mary's Cement Company Ltd.	St. Marys	5	750,000
Total Annual Capacity			3,270,000 tons

During the period from 1958 to 1962 production of portland cement has not shown the marked expansion of the previous five year period. No new cement plants have been built in Ontario since 1958 when the Picton plant of Lake Ontario Portland Cement Company came into production. One new kiln was installed in 1963 by St. Mary's Cement Company to increase the capacity of the plant by 28 percent. The total annual rated capacity of the portland cement industry in Ontario is approximately 3,270,000 tons. In 1962 portland cement production was running at 74 percent of rated capacity.

Consumption of raw materials used in the manufacture of portland cement is given in (7).

(7) CONSUMPTION OF RAW MATERIALS USED IN PORTLAND CEMENT IN ONTARIO IN 1962

	Tons
Limestone	3,293,850
Gypsum	128,369
Clay and shale	669,932
Iron oxide	3,184
Sand	56,006

Limestone furnishes the lime necessary for portland cement. Shale, clay or sand furnish the alumina and silica required. Some limestones are shaly or argillaceous and do not require addition of much clay or shale; the limestone from the Ogden Point quarry of St. Lawrence Cement Company is of this type. Iron oxide or pyrite is added to produce certain types of cement. Gypsum is added during grinding of the cement clinker in the finish grinding process to act as a retarder in the cement in the proportion of about 3½ to 4 percent.

THE LIME INDUSTRY IN ONTARIO

Production of lime in Ontario for the period 1958 - 1962 is given in (8).

(8) PRODUCTION OF LIME IN ONTARIO, 1958 - 1962

Year	Tonnage	Value $
1958	1,009,916	12,644,925
1959	1,130,055	14,006,532
1960	990,088	12,278,630
1961	865,130	11,548,132
1962	900,213	10,355,285

Ontario production and use of lime by industry in 1961 is given in (9). Nearly half the Ontario lime production is used in the chemical industries. The iron and steel industry used 18.8 percent, and the uranium industry, 13.6 percent. The building trades used 9.4 percent of the lime production, principally in the form of hydrated dolomitic lime.

In 1962 there were 13 lime producers in Ontario as listed in (10).

(10) ONTARIO LIME PRODUCERS, 1962

Company	Locality	Type of lime	No. and type of kiln	Plant capacity tons per 24 hrs.
Bonnechere Lime Co.	Eganville	Calcium	3 stack	36
Brunner Mond Canada Ltd.	Amherstburg	Calcium	5 stack	Not available
Canada & Dominion Sugar Co.	Chatham	Calcium	2 stack	90
Canadian Gypsum Co.	Guelph	Dolomitic	15 stack	170
Carleton Lime Products Ltd.	Carleton Place	Calcium	1 stack	8
Chemical Lime Limited	Ingersoll	Calcium	3 stack	300
Cyanamid of Canada Ltd.	Beachville	Calcium	1 rotary	325
Cyanamid of Canada Ltd.	Niagara Falls	Calcium	7 rotary	700
Dominion Magnesium Ltd.	Haley	Dolomitic	2 rotary	150
Domtar Chemicals Ltd.	Beachville	Calcium	(6 stack) (2 rotary)	1075
Domtar Chemicals Ltd.	Hespeler	Dolomitic	11 stack	220
Indusmin Ltd.	Coboconk	Calcium	1 rotary	100
Rockwood Lime Company	Rockwood	Dolomitic	2 stack	35

(9) PRODUCTION AND USE OF LIME IN ONTARIO, 1961

Use	Quicklime tons	Quicklime $	Hydrated Lime tons	Hydrated Lime $	Total Lime tons	Total Lime $	Percent
Chemical Industries	396,340	5,184,348	25,052	361,583	421,392	5,545,931	48.7
Iron and steel	161,451	1,838,595	1,178	17,560	162,629	1,856,155	18.8
Uranium milling	117,612	1,491,661	138	1,915	117,750	1,493,576	13.6
Building trades	15,532	251,211	65,580	1,416,176	81,112	1,667,387	9.4
Pulp and paper	22,023	241,404	1,656	23,228	23,679	264,632	2.7
Glass	18,365	246,912			18,365	246,912	2.1
Smelters	13,654	158,415	3,020	44,872	16,674	203,287	0.9
Gold milling	6,477	79,427	1,277	18,947	7,754	98,374	
Sugar	6,639	47,600	540	4,347	7,179	51,947	
Tanneries	764	8,938	3,751	53,315	4,515	62,253	3.8
Fertilizer & insecticides	997	11,492	747	13,320	1,744	24,812	
Agriculture	64	750	1,039	14,800	1,103	15,550	
Other uses	867	11,976	367	5,340	1,234	17,316	
Total	760,785	9,572,729	104,345	1,975,403	865,130	11,548,132	100.0

Four geological formations are quarried to produce limestone or dolomite for the lime industry. The most important source of high purity calcium limestone in Ontario is the Detroit River limestone of Devonian age quarried at Beachville and Amherstburg. Detroit River limestone is used by Brunner Mond, Canada and Dominion Sugar, Chemical Lime, Cyanamid of Canada and the Beachville plant of Domtar Chemicals Limited. These plants accounted for 84.7 percent of Ontario lime production in 1962. The high purity calcium lime produced at Amherstburg and Beachville is the raw material for the large chemical plants of Brunner Mond Canada Limited at Amherstburg and Cyanamid of Canada Limited at Niagara Falls.

Calcium lime is also produced from Black River limestone of Ordovician age quarried at Coboconk and Eganville. These plants produce 1.4 percent of Ontario production.

Dolomitic lime which is used principally in the building trade is produced mainly from the Guelph - Amabel dolomite of Silurian age by three companies located at Hespeler, Guelph and Rockwood. The Guelph - Amabel dolomite furnishes 8.8 percent of Ontario lime production. Precambrian limestone of the Grenville series is quarried near Carleton Place for lime. Precambrian dolomitic marble is quarried by Dominion Magnesium Limited at Haley for the manufacture of magnesium metal.

SPECIFICATIONS AND USES OF LIMESTONE AND DOLOMITE

Specifications and use of limestone and dolomite are given in Hewitt (1960, pp.8-16).

ONTARIO LIMESTONE QUARRIES

The principal limestone and dolomite formations being quarried commercially in Ontario are the following:

1. Precambrian Grenville Marble.
2. Beekmantown Dolomite.
3. Trenton and Black River Limestones.
4. Guelph, Lockport and Amabel Dolomites.
5. Bois Blanc Limestone and Bertie-Akron Dolomite.
6. Detroit River and Delaware Limestones.
7. Hamilton Limestone.

Numbers 3, 4, 5 and 6 are the most important commercially. Ontario limestone quarries are herein described under the general heading of the geological formation to which they belong. The distribution of these geological formations in Ontario is indicated on map 2059 which accompanies this report. The geological column for southern Ontario is given on the map.

1. PRECAMBRIAN LIMESTONE AND DOLOMITE

Precambrian limestone and dolomite deposits are of widespread occurrence in eastern Ontario. These limestones and dolomites are recrystallized into marble which belongs to the Grenville series of the Grenville geological province. The marbles range in grain size from fine to coarse, depending on their degree of metamorphism. Colour is extremely varied; white and grey is common, but pink, green, yellow, buff, red, blue and black are also quarried. Some of the Grenville marbles are of high purity; others contain mica, lime silicates, garnet, serpentine, pyrite, magnetite and other impurities.

Companies quarrying Grenville marble in Ontario in 1963 are listed in (11).

(11) GRENVILLE MARBLE QUARRIES

	Company or Individual	Location	Type
1.	L.P. Legendre	Rutherglen	dolomite
2.	Bolenders Limited	Eagle Lake	dolomite
3.	W.F. Bonter & Co. Ltd.	Malone	limestone
4.	Stoklosar Marble Quarries Ltd.	Madoc	limestone & dolomite
5.	Hastings Marble Products Ltd.	Madoc	limestone & dolomite
6.	Madoc Marble Quarries Company	Madoc	limestone & dolomite
7.	Canada Talc Industries Ltd.	Madoc	dolomite
8.	Grenville Marble Company	Cashel Twp.	limestone
9.	Rideau Aggregates Ltd.	Mountain Grove	dolomite
10.	Angelstone Ltd.	Sharbot Lake	limestone
11.	Angelstone Ltd.	Tatlock	limestone
12.	Omega Marble Tile and Terrazzo Ltd.	Tatlock	limestone
13.	Carleton Lime Products Co.	Carleton Place	limestone
14.	Jamieson Lime Company	Renfrew	limestone
15.	Canadian Dolomite Company	Haleys	dolomite
16.	Dominion Magnesium Ltd.	Haleys	dolomite

Quarries

L.P. LEGENDRE

Rutherglen

In 1962 and 1963 brucitic dolomite was quarried by L.P. Legendre from claim T.48166, concession A, Olrig township, on the north side of the Mattawa river, near the village of

Rutherglen. A sample of medium crystalline white brucitic dolomite taken from the quarry by the author in 1962 analyzed 26.88 percent magnesia, equivalent to about 10 percent brucite in dolomite. This brucitic dolomite is used in pulp and paper mills.

BOLENDERS LIMITED
Eagle Lake

Bolenders Limited have for many years operated quarries in a deposit of coarsely crystalline white Grenville dolomitic marble on lots 24 and 25, concession IV, Guilford township, Haliburton county, a quarter mile west of the village of Eagle Lake.

A small crushing and screening plant produces various sizes of chips which are used principally for stucco base, stucco dash, poultry grit, artificial stone and driveways.

Insoluble grit is produced from another small quarry on the property. The material quarried is quartzite and interbanded white diopside.

A chemical analysis of crushed dolomitic marble from the quarry is given by Satterly (1943, p.87) as follows: silica, 11.60 percent; iron oxide and alumina, 0.20 percent; calcium carbonate, 50.28 percent; magnesium carbonate, 37.82 percent.

W.F. BONTER & COMPANY LIMITED
Malone

Six white calcitic marble quarries have been operated on lots 16 and 17, concession XI, Marmora township, Hastings county by W.F. Bonter & Company Limited. The quarries are located southeast of the village of Malone.

Production is mainly man-sized blocks for the pulp and paper industry. Poultry grit, dust for feeds, terrazzo chips and stone for driveways are also produced.

STOKLOSAR MARBLE QUARRIES LIMITED
Madoc

Stoklosar Marble Quarries Limited operate a mill for the production of marble terrazzo chips on No. 62 highway, a mile north of Madoc. The marble is crushed in a jaw crusher and hammermill. Seven sizes are produced by screening. These sizes are as follows:

No. 0,	minus 1/8 inch,	plus 12 mesh;	
1,	minus 1/4 inch,	plus 1/8 inch;	
2,	minus 3/8 inch,	plus 1/4 inch;	
3,	minus 1/2 inch,	plus 3/8 inch;	
5,	minus 3/4 inch,	plus 1/2 inch;	
7,	minus 1 inch,	plus 7/8 inch;	
	and dust.		

The company operates six small quarries within a few miles of Madoc for the production of black, green, buff, white, chocolate brown and pink chips. Fine-grained black calcitic marble is quarried on lot 4, concession VI, Madoc township, on the east side of No. 62 highway, half a mile north of Madoc village. Fine-grained light green calcitic marble is quarried on lot 1, concession XIV, Huntingdon township, on the north side of the old Marmora road. Fine-grained buff to yellow dolomitic marble is quarried on lot 19, concession VI, Madoc township, northeast of Eldorado village. White chips are also obtained from Canada Talc Industries Conley mine at Madoc. Pink, medium-crystalline calcitic marble is quarried on lot 22, concession VI, Madoc township. Chocolate brown, microcrystalline, lower Black River limestone of Ordovician age is quarried on lot 11, concession I, Madoc township.

HASTINGS MARBLE PRODUCTS LIMITED
Madoc

Hastings Marble Products Limited operate a crushing and screening plant for the production of marble terrazzo chips on the north side of No. 7 highway on the western outskirts of Madoc village. Crushing is done by jaw crusher and hammermill. A full line of chip sizes are produced.

The company operates several small quarries in the Madoc area for the production of black, green, buff, white, pink and chocolate brown terrazzo chips. Fine-grained black calcitic marble is quarried on lot 4, concession V, Madoc township, on the west side of No. 62 highway, half a mile north of Madoc village. Fine-grained, siliceous green calcitic marble is quarried on lot 17, concession X, Marmora township, near the village of Malone. Fine-grained buff dolomitic marble is quarried on lot 19, concession VI, Madoc township. A new quarry was opened in 1963 on lot 2, concession IX, Madoc township in fine-grained white dolomitic marble. Another quarry was opened in 1963 on lot 2, concession VIII, Madoc township, in pink, fine-grained dolomitic marble. Chocolate brown, aphanitic to microcrystalline lower Black River limestone is quarried on lot 9, concession IV, Madoc township. A greyish pink marble was formerly quarried on lot 7, concession I, Elzevir township, and white marble was formerly quarried on lot 1, concession IX, Madoc township. A fine-grained yellow dolomitic marble is quarried on lot 22, concession V, Madoc township.

MADOC MARBLE QUARRIES COMPANY
Madoc

Madoc Marble Quarries Company operates a crushing and screening plant for the production of marble terrazzo chips in Madoc village. A full line of chip sizes are produced.

The company quarries black, green, buff, white and pink Grenville marble, and chocolate brown limestone for the production of terrazzo chips. Fine-grained black calcitic marble is quarried just north of Madoc village on the west side of highway No. 62 on lot 3, concession V, Madoc township. Green fine-grained calcitic marble is quarried north of the old Marmora road on lot 1, concession XIV, Rawdon township. Fine-grained buff dolomitic marble is quarried on lot 15, concession VIII, Madoc township, north of Hazzards Corners. White, medium- to coarsely-crystalline dolomitic marble is quarried on the south side of No. 7 highway, east of Actinolite, on lots 2 and 3, concession VI, Elzevir township. Pink, medium-crystalline marble is quarried on lot 20, concession VI, Madoc township. Chocolate brown aphanitic to microcrystalline lower Black River limestone is quarried on lot 10, concession IV, Madoc township.

CANADA TALC INDUSTRIES LIMITED
Madoc

White fine-grained dolomitic marble is mined by Canada Talc Industries Limited at the Conley mine, on lot 15, concession XIV, Huntingdon township, Hastings county. This dolomitic marble is crushed and screened to produce terrazzo chips.

GRENVILLE MARBLE COMPANY
Cashel Township

A deposit of black fine-grained calcitic marble has been opened by the Grenville Marble Company in Cashel township, Hastings county. The company holds a quarry permit on lot 19, concession VII, Cashel township. The black marble is veined with white.

Chemical analysis of a sample of this marble is as follows: silica and silicates, 6.50 percent; iron oxides (Fe_2O_3), 0.87 percent; alumina (Al_2O_3), 0.61 percent; lime (CaO), 47.40 percent; magnesia (MgO), 3.55 percent; carbon dioxide (CO_2), 40.80 percent.

Several mill blocks were shipped from this quarry in 1963 for dimension stone.

RIDEAU AGGREGATES LIMITED
Mountain Grove

A small quarry has been opened on the south side of No. 7 highway near Mountain Grove in Olden township, Frontenac county by Rideau Aggregates Limited. White coarsely crystalline dolomitic marble is quarried for production of chips for facing precast concrete panels.

ANGELSTONE LIMITED
Sharbot Lake

In 1962 and 1963 Angelstone Limited quarried some blocks of white and grey medium crystalline calcitic marble from lot 21, concession IV, Oso township, Frontenac county.

ANGELSTONE LIMITED
Tatlock

In 1962 Angelstone Limited quarried some test blocks of white medium crystalline calcitic marble on lot 3, concession IV, Darling township, Lanark county. In 1963 the company opened a small quarry in white medium crystalline calcitic marble on lot 5, concession IV, Darling township. This white marble is known as "Temple White", and is used as dimension stone.

Chemical analysis of a sample of this marble from lot 5 taken by the author was as follows: silica, 7.22 percent; ferric oxide, 0.01 percent; alumina, 3.56 percent; lime, 48.33 percent; magnesia, 0.98 percent; carbon dioxide, 39.00 percent.

OMEGA MARBLE TILE & TERRAZZO LIMITED
Tatlock

In 1962 a marble quarry was opened north of the Tatlock road on lot 6, concession V, Darling township, Lanark county, by Omega Marble Tile and Terrazzo Limited. White and azure blue medium crystalline calcitic marble is quarried for dimension stone. A wire saw is used to quarry the marble.

Chemical analysis of the white marble is as follows: insoluble silica and silicates, 8.93 percent; ferric oxide, 0.02 percent; alumina, 0.08 percent; lime, 50.77 percent; magnesia, 0.11 percent; carbon dioxide, 39.2 percent.

CARLETON LIME PRODUCTS COMPANY
Carleton Place

Carleton Lime Products Company operate a small quarry in white Grenville calcitic marble on lot 8, concession VI, Ramsay township, Lanark county. Lump stone from the quarry is used for the manufacture of lime in a wood fired stack kiln. Goudge (1938, p.119) gives the following analysis of the Grenville Marble: silica, 1.04 percent; ferric oxide, 0.16 percent; alumina, 0.12 percent; calcium phosphate, 0.02 percent; calcium carbonate, 92.53 percent; magnesium carbonate, 5.63 percent.

JAMIESON LIME COMPANY
Renfrew

Jamieson Lime Company operate a quarry in white medium crystalline dolomitic marble on lot 21, concession I, Horton township, Renfrew county, on the east side of No. 17 highway about 4 miles north of Renfrew. Man-sized blocks of dolomite are shipped to pulp and paper mills.

A chemical analysis of dolomite from this quarry is given by Goudge (1938, p.170) as follows: silica, 1.72 percent; iron oxide, 0.71 percent; alumina, 0.36 percent; calcium phosphate, 0.02 percent; calcium carbonate, 53.19 percent; magnesium carbonate, 43.22 percent.

CANADIAN DOLOMITE COMPANY
Haley

Canadian Dolomite Company operate a quarry in coarsely crystalline dolomitic Grenville marble on lot 24, concession IV, Ross township, Renfrew county, two miles east of Haley Station. The dolomitic marble is shipped for crushing and screening to a plant at Portage du Fort, Quebec. Stucco dash, stucco plaster filler, and chips for artificial stone are the principal products.

DOMINION MAGNESIUM LIMITED
Haley

Dominion Magnesium Limited quarry white coarsely crystalline Grenville dolomitic marble of high purity on lot 20, concession V, Ross township, Renfrew county, two and a half miles northeast of Haley Station. The dolomitic marble is calcined in rotary kilns to produce dolomitic lime which is the raw material for the production of magnesium metal by the Pidgeon process. The

average composition of the dolomitic marble is given by Satterly (1944, p.66) as follows: lime, 30.85 to 31.95 percent; magnesia, 20.48 to 21.55 percent; insolubles, 0.25 to 0.65 percent; R_2O_3, 0.25 to 0.60 percent; ignition loss, 46.8 to 47.1 percent.

2. BEEKMANTOWN DOLOMITE

The main area of Beekmantown dolomite in Ontario of commercial interest is on the west flank of the Ottawa - St. Lawrence basin and extends from Ottawa to Brockville, underlying parts of Carleton, Dundas, Grenville, Leeds and Lanark counties.

The Beekmantown dolomite of the Ottawa - St. Lawrence basin is divided into a lower March formation, consisting of interbedded grey dolomite, sandy dolomite and sandstone, and an upper Oxford formation, consisting of thick-bedded dolomite and dolomitic limestone. The March formation constitutes transition beds from the underlying Nepean sandstone to the overlying Oxford dolomite and attains a maximum thickness of about 30 feet (Wilson 1946, pp.12-14). The Beekmantown dolomite (Oxford plus March formations) has a thickness of 240-350 feet. The Beekmantown dolomite is overlain by the Rockcliffe formation, consisting of shale and sandstone of Chazyan age.

Quarries

BECKWITH CONSTRUCTION COMPANY
Carleton Place

A quarry was opened in 1963 in sandy Beekmantown dolomite on lots 2 and 3, concession VIII, Ramsay township, near Carleton Place, by Beckwith Construction Company.

DIBBLEE CONSTRUCTION COMPANY LIMITED
Smiths Falls

The Smiths Falls quarry of Dibblee Construction Company is located on the northern outskirts of Smiths Falls on lot 28, concession V, Montague township, Lanark county.

The quarry is in Beekmantown dolomite. A fifteen-foot face of mottled buff to brown, medium-bedded, fine- to medium-crystalline dolomite is exposed. Some of the dolomite beds are quite sandy, a lithology typical of the March formation of the Beekmantown group.

A chemical analysis of the upper 8 feet of the quarry section is given in (13).

(13) CHEMICAL ANALYSIS - SMITHS FALLS QUARRY
DIBBLEE CONSTRUCTION COMPANY

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
16.10	4.26	0.28	14.90	25.46	36.64	0.14	97.78

There is no permanent crushing plant at the quarry.

BRUNDIGE CONSTRUCTION COMPANY LIMITED
Jasper

The Jasper quarry of Brundige construction Company is on lot 29, concession I, Wolford township, Grenville county, half a mile north of Jasper.

The quarry is in Beekmantown dolomite, (Oxford formation). A 20-foot section is exposed in two 10-foot lifts. The upper 10-foot lift is medium brownish grey, brown to buff-weathering, thin-bedded, fine crystalline to aphanitic dolomite with abundant white gypsum streaks. The upper 3 feet of the upper lift is rusty weathering due to weathering of sulphides which occur with patches of white calcite in the rock. Green glauconitic sand occurs in the dolomite in the upper three feet. Rare white chert was observed in the upper lift.

The lower 10-foot lift is medium grey to brownish, thin-bedded, aphanitic dolomite.

Chemical analyses of the stone are given in (14).

(14) CHEMICAL ANALYSES - JASPER QUARRY

	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
Upper 10'	11.04	2.25	0.19	15.68	29.21	40.32	0.11	98.80
Lower 10'	10.20	1.60	0.14	17.06	27.35	40.84	0.09	97.28

A portable crushing plant is employed to produce crushed stone mainly for road construction.

BRUNDIGE CONSTRUCTION COMPANY
Harlem Quarry

The Harlem quarry of Brundige Construction Company is on lot 15, concession VI, Bastard township, Leeds county, one-half mile south of Harlem.

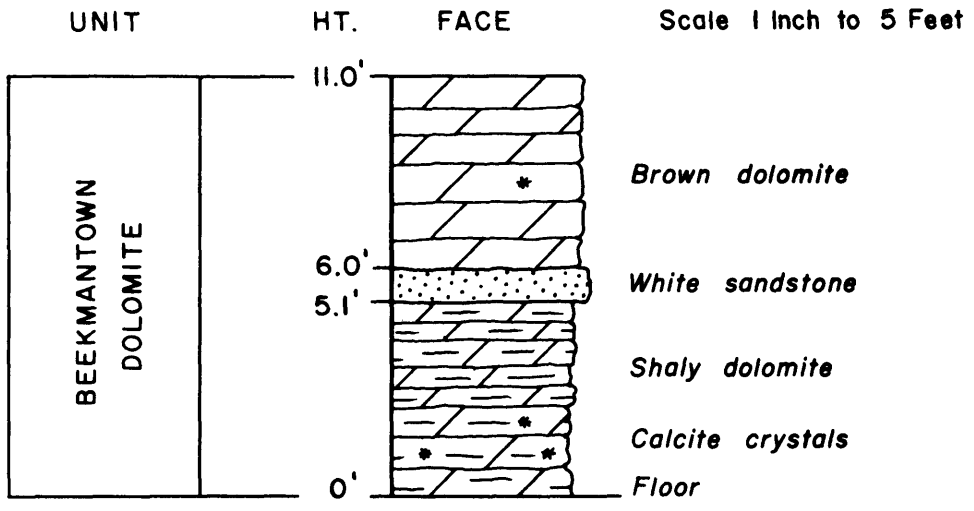
The quarry is in Beekmantown dolomite, (March formation). The quarry face is 11 feet in height. The upper 5 feet is light buff to medium brown, aphanitic to fine crystalline, thin- to medium-bedded dolomite with calcite crystals. The next 0.9 feet is white, medium-grained sandstone. Below this is 5.1 feet of brownish grey to buff, aphanitic to fine crystalline, thin-bedded dolomite with abundant shaly partings and white calcite crystals. The geological section is illustrated in figure 1.

A chemical analysis of a chip sample from the quarry face is given in (15).

(15) CHEMICAL ANALYSIS - BRUNDIGE CONSTRUCTION COMPANY
Harlem Quarry

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
23.88	8.75	0.07	15.18	19.32	32.84	0.07	100.11

There is no permanent plant at the quarry. Crushing is done by a portable crushing and screening plant.



Dolomite, light buff to medium brown,
aphanitic to fine crystalline,
thin to medium bedded,
shaly in part,
white calcite crystals,
white sandstone layer 5.1' to 6.0'

QUARRY SECTION —
BRUNDIGE CONSTRUCTION COMPANY —
HARLEM QUARRY

Fig. 1 Geologic Section, Harlem Quarry

BRUNDIGE CONSTRUCTION COMPANY
Athens

A small quarry has been operated by Brundige Construction Company about half a mile north of Athens on lot 14, concession IX, Rear of Yonge and Escott township, Leeds county.

The quarry is in Beekmantown dolomite, (March formation). The 10-foot quarry face consists of medium brown, fine- to medium-crystalline, thick irregularly bedded, brown-weathering dolomite with abundant white calcite patches. A green glauconitic shale parting occurs 5 feet above the quarry floor.

A chemical analysis of a chip sample from the quarry face is given in (16).

(16) CHEMICAL ANALYSIS - BRUNDIGE CONSTRUCTION COMPANY
Athens Quarry

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
1.48	1.80	0.20	18.54	32.10	47.02	0.09	101.23

There is no permanent plant at the quarry which is operated intermittently.

A second small quarry is located on lot 15, concession X, Rear of Yonge and Escott township. The 11-foot quarry face is sandy Beekmantown dolomite of the March formation. Brown dolomite and grey mottled glauconitic dolomitic sandstone are interbedded. The upper 4 feet consist of medium-bedded, brown sandy dolomite and interbedded grey mottled glauconitic sandstone. The lower 7 feet is medium brown, thin- to medium-bedded dolomite with white calcite spots.

There is no permanent plant on the property.

BRUNDIGE CONSTRUCTION COMPANY
New Dublin Quarry

The New Dublin quarry of Brundige Construction Company is a mile south of New Dublin on the west side of the road in concession VI, Elizabethtown township, Leeds county.

The quarry is in Beekmantown dolomite (March formation). A 20-foot quarry face is exposed and consists of medium brown to dark brown, medium- to fine-crystalline, medium- to thick-bedded dolomite with common pink calcite patches. There are some green glauconitic shaly partings.

A chemical analysis of a chip sample from the quarry face is given in (17).

(17) CHEMICAL ANALYSIS - NEW DUBLIN QUARRY

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
10.10	1.88	0.16	16.84	29.14	42.80	0.06	100.98

There is no permanent plant at the property.

H.J. McFARLAND CONSTRUCTION COMPANY
Tincap Quarry

The Tincap quarry is on the north side of No. 29 highway a mile and a half west of Tincap in Elizabethtown township, Leeds county.

The quarry is in Beekmantown dolomite (March formation). A section of approximately 33 feet is exposed in two lifts, an upper 18-foot lift, and a lower 15-foot lift. The section is described in (18).

(18) QUARRY SECTION - TINCAP QUARRY

Beekmantown Domomite Unit	Description	Thickness feet
Upper Lift:		
5	Dolomite, medium brown, dark brown weathering, aphanitic to fine crystalline, medium- to thin-bedded, pitted weathering, abundant white calcite in patches, in part irregularly bedded	9.0
4	Dolomite, silty, light buff to light brown, buff-weathering, shaly in part, aphanitic, thin-bedded	5.0

		Thickness feet
3	Dolomite, medium to dark brown, thick to medium bedded, medium crystalline, shaly partings, in part mottled, white to pink calcite crystals	4.3
Lower Lift:		
3	Dolomite, same as 3 above	2.0
2	Dolomite, light buff, buff-weathering, aphanitic, thin-bedded, disconformity at base	1.4
1	Dolomite, medium brown and light buff, in part mottled, dark brown colour banding, aphanitic to medium crystalline, medium to thin bedded, shaly partings	14.0

Chemical analyses of chip samples of the upper and lower lifts are given in (19).

(19) CHEMICAL ANALYSES - TINCAP QUARRY

	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
Upper lift	10.00	5.13	0.51	15.52	28.00	40.62	0.26	100.04
Lower lift	10.92	4.06	0.20	17.32	25.68	42.32	0.22	100.72

There is no permanent plant at the quarry.

PERMANENT TRANSIT MIX CONCRETE LIMITED
Brockville

The Brockville quarry of Permanent Transit Mix Concrete Limited is in lot 4, concession I, Elizabethtown township, Leeds county, on the north side of highway No. 2 on the eastern outskirts of Brockville. The quarry and plant are described by Hewitt (1960, pp.19-20).

The quarry is in Beekmantown dolomite. When examined by the author in 1958 the quarry face was 15 to 20 feet in height. The quarry has since been deepened by 19 feet. The lower lift is thick bedded in contrast to the upper lift which is medium to thin bedded. The quarry section is described in (20).

(20) QUARRY SECTION - PERMANENT TRANSIT MIX CONCRETE
BROCKVILLE

Beekmantown Dolomite

Unit	Description	Thickness feet
Upper Lift:		
5	Dolomite, dark brownish grey, medium brown grey weathering; medium to fine crystalline; medium bedded; hard, dense, mottled; black shale partings; calcite crystals; upper beds rusty weathering, thin bedded	9.0
4	Dolomite, dark to light brownish grey, medium to light grey weathering; colour lamination in finer grained beds; medium crystalline grading upward to aphanitic; medium bedded; some graded bedding; shaly partings; calcite crystals	6.9
3	Dolomite, sandy; light brown, light buff-weathering; aphanitic; medium bedded; colour lamination light to dark brown; black shaly partings; 2 inches of black shale at base	2.3
Lower Lift:		
2	Dolomite, medium grey to light brown, aphanitic to medium crystalline, medium to thick bedded, some iron staining, calcite crystals, 2 inches shale at base	5.0
1	Dolomite, medium grey to buff, aphanitic to medium crystalline, thick bedded, shaly at top, rusty-weathering, calcite crystals, strong shaly partings.....	11.6

BRUNDIGE CONSTRUCTION COMPANY
Ferguson Corners

A small quarry has been operated at Ferguson Corners, on lot 24, concession III, Augusta township, Grenville county, three miles north of Maitland, by Brundige Construction Company.

The quarry is in Beekmantown dolomite, (Oxford formation). The eight-foot quarry face is composed of medium brown to grey, buff-weathering, thin bedded, aphanitic to medium crystalline dolomite. There is little overburden.

A chemical analysis of a chip sample from the quarry face is given in (21).

(21) CHEMICAL ANALYSIS - BRUNDIGE CONSTRUCTION COMPANY
FERGUSON CORNERS

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
10.04	4.06	0.58	16.54	27.48	42.10	0.48	101.28

There is no permanent plant at the quarry.

GLEN LAWRENCE CONSTRUCTION COMPANY
Iroquois

The Iroquois quarry, formerly operated by Iroquois Rock Company, is reported to have been operated by Glen Lawrence Construction Company. The quarry is described by Hewitt (1960, pp.20-23).

ARMSTRONG BROTHERS COMPANY LIMITED
SOUTH GLOUCESTER QUARRY
Ottawa

The South Gloucester quarry of Armstrong Brothers Company Limited is located in lots 24 and 25, concession V, Gloucester township, Carleton county, on highway No. 31 a few miles south of Ottawa.

Geology

The quarry is in Beekmantown dolomite (Oxford formation). The 21-foot face consists of medium grey to brownish grey, brown to buff-weathering, fine crystalline to aphanitic, medium bedded dolomite spotted with calcite crystals. From the quarry floor to the top of the quarry face the sequence of brown and grey dolomite is as follows: 7.6 feet of medium brown, medium bedded, aphanitic dolomite with calcite crystals; 3.4 feet of medium grey, medium bedded, aphanitic dolomite; 1.2 feet of medium brown dolomite with calcite crystals; 2.2 feet of medium grey, medium bedded, aphanitic dolomite; 1.8 feet of medium brown, medium bedded, aphanitic dolomite; 5 feet of grey dolomite with some brown interbeds, the upper part is brown-weathering.

Chemical analyses of the quarry face are given in (22).

(22) CHEMICAL ANALYSES - ARMSTRONG BROTHERS QUARRY

	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
Upper 9 feet	10.23	3.77	1.70	17.60	26.60	39.08	1.08	100.06
Lower 12 feet	6.12	3.52	0.24	18.18	28.90	43.20	0.15	100.35

Crushing and screening is done by a portable plant.

DIBBLEE CONSTRUCTION COMPANY LIMITED
SOUTH GLOUCESTER QUARRY
Ottawa

The South Gloucester quarry of Dibblee Construction Company Limited is in lot 25, concession V, Gloucester township, adjacent to Armstrong Brothers quarry on the south and the same 20-foot section of Beekmantown dolomite is quarried. The 20-foot face consists of medium grey to brown, medium bedded, aphanitic dolomite with patches of white calcite in places.

There is no plant at the quarry. Stone is trucked to the plant at the McCarthy road quarry.

3. TRENTON - BLACK RIVER LIMESTONES

The Trenton and Black River limestones of Ordovician age occur in two main areas in southern Ontario: the Georgian Bay - Lake Ontario area extending from Midland to Kingston, and the Ottawa - St. Lawrence basin. A general description of the stratigraphy of the Trenton and Black River limestones is given by Hewitt (1960, pp.24-28).

The following reports and maps of the Geological Survey of Canada deal with the Trenton and Black River limestones of southern Ontario:

Caley, J.F., and Liberty, B.A.
1950: Orillia - Brechin and Beaverton, Paper 50-11, G.S.C.
1952: Fenelon Falls, Paper 52-31, G.S.C.

Liberty, B.A.
1952: Lindsay, Paper 52-33, G.S.C.
1953: Newmarket, Paper 53-2, G.S.C.
1953: Alliston, Paper 53-9, G.S.C.
1953: Barrie, Paper 53-13, G.S.C.
1953: Orr Lake, Paper 53-16, G.S.C.
1953: Oshawa, Paper 53-18, G.S.C.
1953: Scugog, Paper 53-19, G.S.C.

Winder, C.G.
1954: Burleigh Falls and Peterborough Map-Areas, Paper 53-27, G.S.C.
1955: Campbellford Map-Area, Paper 54-17, G.S.C.

Liberty, B.A.
1960: Rice Lake - Port Hope and Trenton Map-Areas, Paper 60-14, G.S.C.
1960: Belleville and Wellington Map-Areas, Paper 60-31, G.S.C.

Liberty, B.A.
1963: Tweed, Kaladar and Bannockburn Map-Areas, Paper 63-14, G.S.C.

Wilson, A.E.
1946: Geology of the Ottawa - St. Lawrence Lowland, Ontario and Quebec, Memoir 241, G.S.C.

Quarries

LIMESTONE QUARRIES LIMITED
Uhthoff

The Uhthoff quarry formerly operated by Limestone Products Limited is now operated by Limestone Quarries Limited. The quarry and plant are described by Hewitt (1960,pp.31-33). Since this description the quarry has been deepened by thirty feet. This new quarry face is entirely in Lower Black River limestone. The upper 5 feet consist of the greenish buff dolomitic limestone which was exposed in ditches in the old quarry floor. This brownish to light olive grey dolomitic limestone weathers greenish-buff; it is aphanitic and medium bedded. The next 4 feet is a massive light brownish grey dolomitic limestone. This is followed by three feet of buff to grey aphanitic limestone containing nodules of white chalky chert. Below this is 16 feet of buff and grey mottled grey-weathering, medium to thick bedded, aphanitic to microcrystalline limestone. There is less microcrystalline limestone in the Lower Black River beds than in the overlying Middle Black River formation.

M. CAMPBELL QUARRY
Sebright

Black River limestone is quarried by M. Campbell approximately 2 miles west of Sebright on secondary highway No. 503, on lot 18, concession B, Rama township, Ontario county. The quarry has been used periodically by the County of Ontario for road construction.

INDUSMIN LIMITED
Coboconk

The quarry and lime plant of Cobo Minerals Limited are described by Hewitt (1960, pp.42-44). The company has been taken over by Industrial Minerals of Canada Limited (Indusmin Limited). A new rotary kiln has been installed. Lime production is at the rate of approximately 100 tons per day. Kiln feed is $\frac{1}{2}$ to $1\frac{1}{2}$ inch stone.

BLACK RIVER LIMESTONE PRODUCTS
Nogies Creek

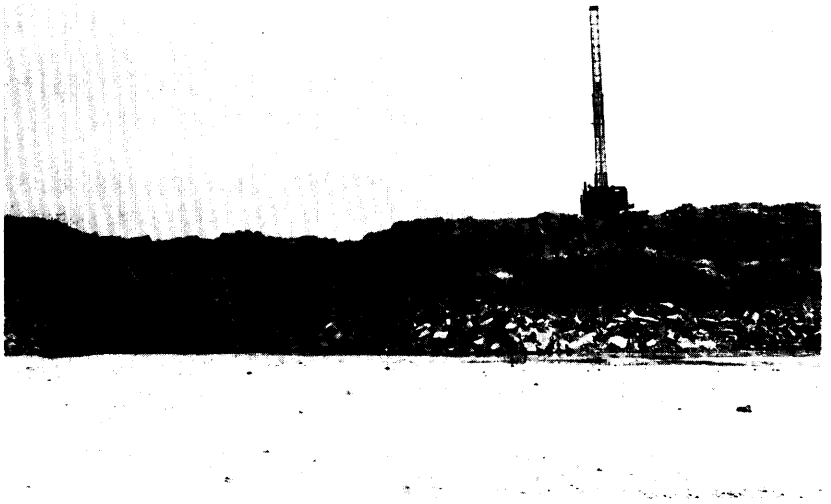
A small building stone quarry is being operated a mile north of highway No. 36, in lot 23, concession XIV, Harvey township, Peterborough county by Black River Limestone Products. The north opening 150 feet south of the road measures 200 by 50 feet and is on the eastern edge of a low Paleozoic scarp. The quarry face is 30 inches to 4 feet in height. The stone is pink to red, in part green mottled, aphanitic to fine crystalline, thin to medium bedded lower Black River limestone. Beds range from 2 to 6 inches in thickness, with some thicker beds up to 24 inches in thickness. Stone is removed by drilling and plug and feather.

Six hundred feet south of the north quarry is a second opening with a 2-foot face opened for a length of 150 feet. Beds are 2 to 5 inches thick. Ashlar and flagstone are the principal products.

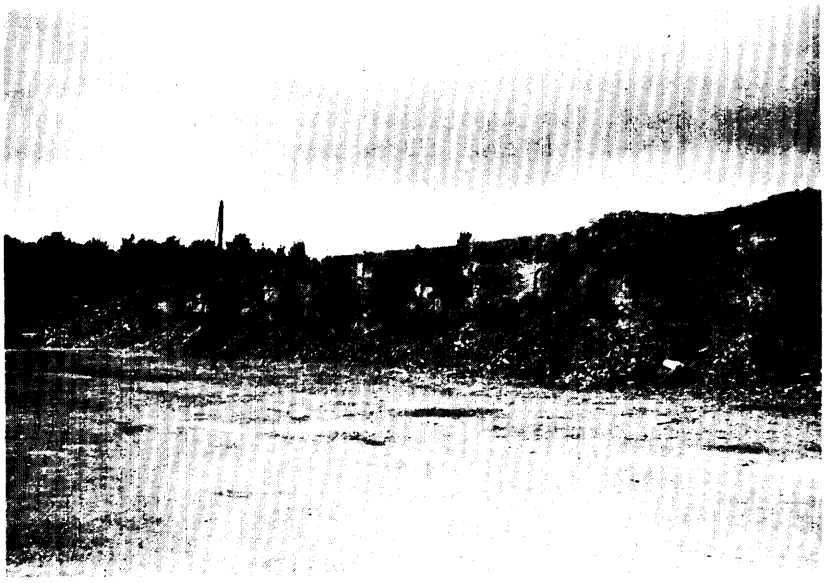
ST. LAWRENCE CEMENT COMPANY LIMITED
OGDEN POINT QUARRY

The Ogden Point quarry opened in 1958 by St. Lawrence Cement Company Limited is described by Hewitt (1960,pp.49-51). The 40- to 50-foot quarry face is composed of medium brownish grey, fine crystalline to aphanitic, thin to medium bedded argillaceous limestone with shaly partings. There is 5 to 10 feet of overburden.

The quarry face is drilled on a 18- by 20-foot pattern by a Joy Champion drill, drilling $6\frac{3}{4}$ inch holes. Stone is loaded by two 3 cubic yard Koehring diesel shovels on to four 34 ton Mack trucks for haulage to the primary crusher, a Williams hammermill, which reduces the run of quarry stone to minus 6 inches. The stone goes via conveyor to stockpiles which accommodate 70,000 tons. Stone from the stockpiles goes via conveyor to load ships at the dock. Production averages 12,000 tons per day or about 50,000 tons per week during the shipping season.



Ogden Point Quarry
St. Lawrence Cement Company Limited



Jas. D. Gray Quarry

H.J. McFARLAND CONSTRUCTION COMPANY
Bayside Quarry

The Bayside quarry sometimes operated by H.J. McFarland Construction Company is located at Bayside Station, half a mile north of No. 2 highway, on lot 19, concession I, Sidney township, Hastings county.

The quarry exposes 20 feet of medium to light grey, medium bedded, medium crystalline to aphanitic limestone grading from calcarenite to calcilutite. There are numerous shaly partings. The limestone belongs to the Middle Trenton formation.

Chemical analysis of a chip sample from the north quarry face is given in (23).

(23) CHEMICAL ANALYSIS - BAYSIDE QUARRY

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
4.96	3.33	0.47	0.70	49.27	39.78	0.17	98.68

DONALD MACDONALD CONSTRUCTION COMPANY
Consecon

A quarry was operated in 1963 by Donald MacDonald Construction Company 2½ miles south of Consecon in Hillier township, Prince Edward county. The quarry was not visited by the author.

CANADA CEMENT COMPANY LIMITED
Belleville

The Belleville plant and quarry of Canada Cement Company Limited are described by Hewitt (1960, pp.57-61).

LAKE ONTARIO PORTLAND CEMENT COMPANY
Picton

The quarry and plant of Lake Ontario Portland Cement Company at Picton are described by Hewitt (1960, pp.54-56). The quarry on the southeast side of the highway has been deepened by 18 feet. This lower lift is composed of medium grey, medium to thin bedded, aphanitic to medium crystalline limestone. There are abundant shaly partings. A new quarry has

been opened north of the road on lot 13. The quarry face averages 45 to 49 feet in height and is similar to that exposed in the adjacent quarry south of the road.

There have been some minor modifications in quarry and plant operation. Drilling of the new 49-foot quarry face is on a 19- by 18-foot pattern. Trucks are loaded by a 5 cubic yard P & H electric shovel and a 4½ cubic yard Northwest diesel shovel. A new hammermill has been installed for secondary crushing.

MARYSVILLE QUARRY

A quarry has been opened three miles east of Marysville and three-quarters of a mile north of highway No. 502 on lot 3, concession III, Richmond township, Lennox and Addington county by H.J. McFarland Construction Company.

The 20-foot quarry face is Middle Trenton limestone. The limestone is medium grey, thin bedded, medium crystalline to aphanitic, with abundant shaly partings.

A chemical analysis of a chip sample from the face is given in (24).

(24) CHEMICAL ANALYSIS - MARYSVILLE QUARRY

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
6.98	2.03	0.31	0.54	49.28	40.40	0.12	99.66

Crushing and screening is by portable plants.

ROBLINDALE QUARRIES LIMITED
Roblindale

The quarry and plant of Roblindale Quarries Limited, on highway No. 41 north of Napanee at Roblindale in Camden township, Lennox and Addington county, is described by Hewitt (1960,pp.61-3).

STOREY CONSTRUCTION LIMITED
Napanee

The Storey quarry at Napanee is described by Hewitt (1960, p.64).

H.J. McFARLAND CONSTRUCTION COMPANY
Napanee

A quarry has been operated by H.J. McFarland Construction Company just east of the Storey quarry on the north side of No. 2 highway on the eastern outskirts of Napanee. The quarry was closed in 1963.

A 13-foot section of Upper Black River limestone is exposed. It consists of medium grey, light-grey weathering, medium to thin bedded, microcrystalline to fine crystalline limestone with abundant shaly partings.

CARTER CONSTRUCTION COMPANY
Switzerville

A new quarry has been opened by Carter Construction Company near Switzerville on the north side of highway No. 401 on lots 9 and 10, concession VI, Ernestown township, Lennox and Addington county. The quarry was not examined by the writer.

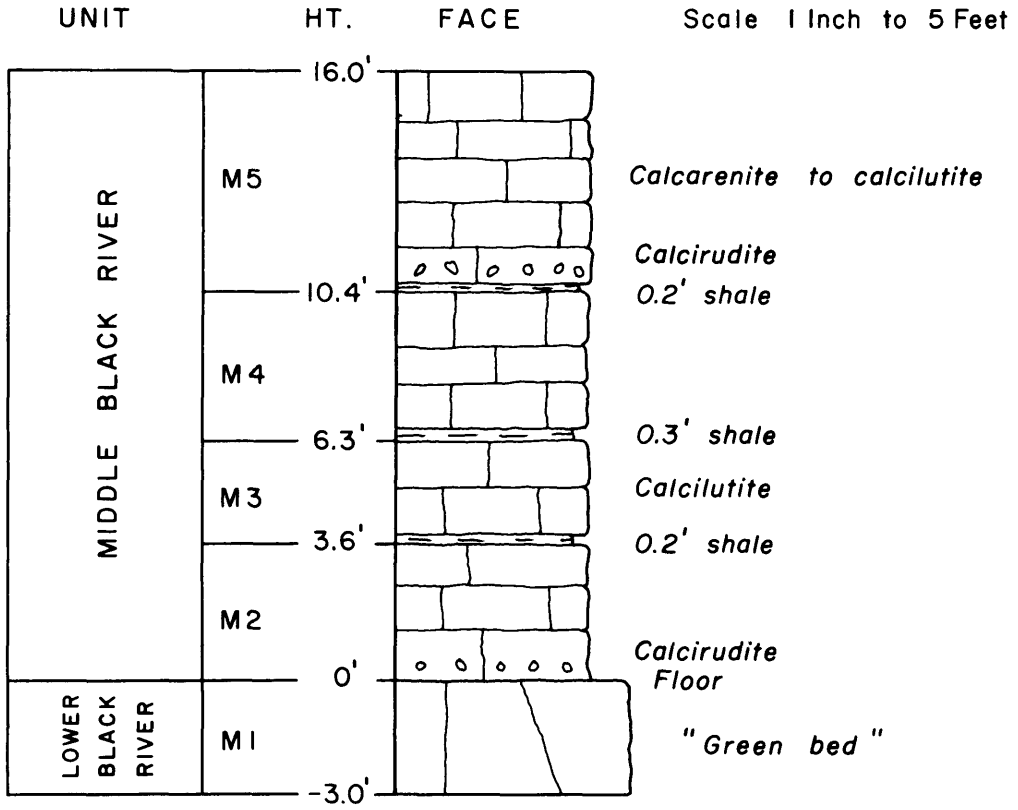
McGINNIS & O'CONNOR LIMITED
Westbrook Quarry

A quarry has been opened by McGinnis & O'Connor Limited a mile southwest of Westbrook near the west boundary of Kingston township on the line between concessions II and III.

The quarry is in Middle Black River limestone. The 16-foot quarry face exposes medium grey, light grey weathering, medium to thick bedded, microcrystalline to medium crystalline limestone. Below the quarry floor is a three-foot bed of greenish dolomitic limestone which probably marks the top of the Lower Black River formation. The geologic section is described in (25).

(25) GEOLOGIC SECTION - WESTBROOK QUARRY

Unit	Description	Thickness feet
M5	Limestone, light grey, microcrystalline to medium crystalline, calcarenite to calcilutite, medium bedded, shaly partings, 0.8 feet calcirudite at base	5.6
M4	Limestone, light grey, microcrystalline calcilutite, medium bedded, shale partings ..	4.1



QUARRY SECTION —

McGINNIS & O'CONNOR LIMITED — WESTBROOK

FIGURE 2

Geologic Section - Westbrook Quarry

		Thickness feet
M3	Limestone, calcilutite, medium to light grey, microcrystalline to aphanitic, shaly partings	2.7
M2	Limestone, medium brown, grey weathering, calcirudite, medium crystalline, coquinoid, medium bedded	3.6
(Quarry floor)		
M1	Limestone, dolomitic, medium grey, greenish weathering, aphanitic, thick bedded	3.0
	Total	19.0

Chemical analysis of a chip sample of the 16-foot quarry face is given in (26).

(26) CHEMICAL ANALYSIS - WESTBROOK QUARRY

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
7.16	2.73	0.47	2.92	46.04	41.66	0.11	101.09

There is a portable crushing and screening plant at the quarry.

MUNICIPAL SAND AND GRAVEL
Collins Bay

The Collins Bay quarry of Municipal Sand and Gravel is a mile east of Collins Bay on the south side of highway No. 33.

A 20- to 24-foot face of Middle Black River limestone is quarried. The limestone is medium grey, medium bedded, microcrystalline to medium crystalline, calcilutite to calcarenite. The upper 12 feet is calcirudite to coquinoid calcarenite with some microcrystalline beds.

A chemical analysis of a chip sample from the west quarry face is given in (27).

(27) CHEMICAL ANALYSIS - MUNICIPAL SAND AND GRAVEL COLLINS BAY

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
3.42	2.65	0.17	2.30	49.24	42.96	0.14	100.88

An Air Trac drill drills on an 8 by 8 foot pattern. Crushing and screening is by portable plant.

FRONTENAC QUARRIES LIMITED
Kingston

The quarry and plant of Frontenac Quarries Limited are described by Hewitt (1960,pp.67-69).

W.J. McKENDRY & SONS LIMITED
Kingston

A limestone quarry is operated by W.J. McKendry & Sons on the west side of Division Street, three miles north of highway No. 401 on the northern outskirts of Kingston.

The 18-foot quarry face is medium grey, light grey-weathering, thin to medium bedded, microcrystalline to medium crystalline, Middle Black River limestone with shaly partings.

A chemical analysis of ½-inch stone from the stockpile at the quarry is given in (28).

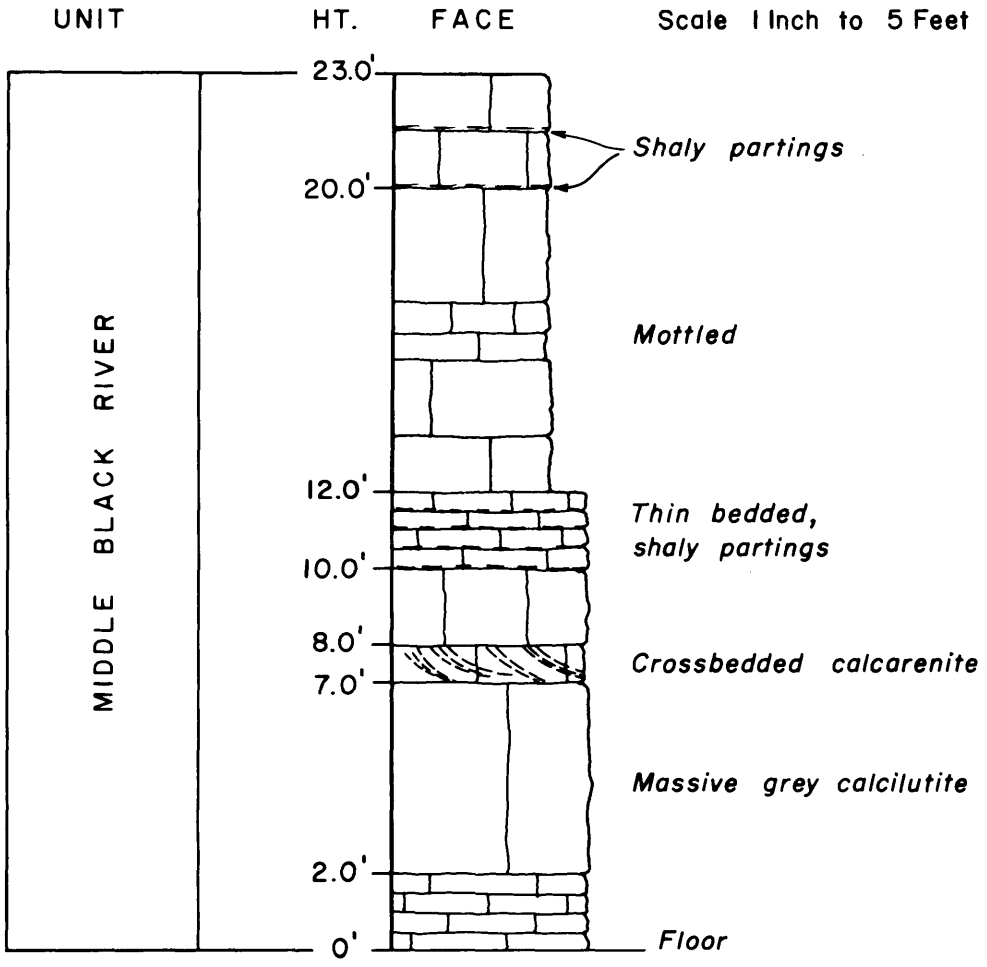
(28) CHEMICAL ANALYSIS - W.J. McKENDRY QUARRY

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
3.36	2.15	0.25	1.69	50.57	41.78	0.11	99.91

Portable equipment is used for crushing and screening.

GRIFFIN CONSTRUCTION (ONTARIO) LIMITED
Kingston

The Bilow quarry is reported to be operated by Griffin Construction (Ontario) Limited. The reported location is lot 29, concession IV, Kingston township, Frontenac county. The quarry was not visited by the author. Aggregate for concrete and granular base has been produced.



Limestone, medium brownish grey, grey weathering,
thin to massive bedded,
microcrystalline to fine crystalline,
shaly partings,
some corals,
calcarenite to calcilutite.

QUARRY SECTION — BRAESIDE QUARRY

FIGURE 3

Geologic Section - Braeside Quarry

McGINNIS & O'CONNOR LIMITED
Kingston

The Kingston quarry of McGinnis & O'Connor Limited on No. 15 highway two miles north of Barriefield is described by Hewitt (1960, pp.69-71). The quarry has been deepened by 18 feet on the northeast side in the Lower Black River formation.

GRIFFIN BROTHERS CONSTRUCTION
Joyceville

Griffin Brothers Construction is reported to have opened a quarry near Joyceville on lot 18, concession V, Pittsburgh township, Frontenac county.

BONNECHERE LIME COMPANY LIMITED
Eganville

The quarry and lime plant of Bonnechere Lime Company near Eganville are described by Hewitt (1960, p.85).

SMITH CONSTRUCTION COMPANY LIMITED
Braeside

The Braeside quarry of Smith Construction Company Limited is two miles west of Braeside on lot 16, concession A, McNab township, Renfrew county. The quarry is in Black River limestone.

The 23-foot quarry face is illustrated in figure 3. The section consists of medium brownish grey, grey-weathering, thin to massive bedded, microcrystalline to fine crystalline limestone with shaly partings. The stone grades from microcrystalline calcilutite to fine crystalline calcarenite sometimes showing crossbedding.

Chemical analyses of the upper 11 feet and the lower 12 feet of the quarry face are given in (29).

(29) CHEMICAL ANALYSES - BRAESIDE QUARRY

	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
Upper 11'	3.18	0.71	0.05	0.98	51.88	42.38	0.26	99.44
Lower 12'	7.22	1.40	0.04	0.86	48.54	41.44	0.33	99.83

H.J. McFARLAND CONSTRUCTION COMPANY LIMITED
Fallowfield Quarry
Ottawa

The Fallowfield quarry of H.J. McFarland Construction Company is a mile northeast of Fallowfield on lot 23, concession V, Nepean township, Carleton county.

Geology

The 36 foot quarry face is composed of Lower and Middle Black River limestone of Ordovician age. The upper 20 feet is a medium grey, light grey weathering, medium- to thin-bedded, microcrystalline to aphanitic limestone with black shaly partings. This calcilutite is assigned to the Middle Black River formation. The next 3.7 feet are "green beds": greyish-green, medium-bedded, aphanitic dolomitic limestone with shaly partings. These greenish weathering beds are thought to mark the top of the Lower Black River formation. The lower 12 feet of the quarry is medium grey, grey-weathering, thin- to medium-bedded, microcrystalline to aphanitic limestone with black shaly partings. It grades from calcilutite to calcarenite.

Chemical analyses of chip samples from the quarry face are given below:

(1) Middle Black River (Upper 10 feet).
(2) Middle Black River (Lower 10 feet).
(3) Lower Black River (Lower 15 feet).

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
10.82	3.83	0.21	0.68	46.42	38.34	0.04	100.34
9.44	3.34	0.18	0.58	47.26	38.96	0.21	100.01
18.18	5.50	0.26	4.54	37.04	34.48	0.11	100.11

Quarry Operation

There is approximately four feet of overburden. The 36-foot quarry face is worked in two 18 foot lifts. Drilling is done on a 9 by 9 foot pattern by a Gardner Denver Air Trac drill drilling 2½ inch holes. Stone is loaded by a Northwest diesel 80D 2½ cubic yard shovel. Three 22 ton Euclid trucks are on haulage.

The primary crusher is a Lippman 30 by 42 inch jaw crusher. The product goes to a one-inch grizzly which produces oversize and ¾-inch crusher run. The oversize goes to the secondary crusher, a Cedarapids impact breaker. The product goes to the screening plant which consists of four 4 by 14 foot three deck Cedarapids screens. The oversize from the top deck of the No. 1 screen is recrushed in a four-foot Symons short head cone crusher and returned to the screens. Products are ¾- inch crusher run, 1½ inch, 1 inch, ¾-inch, 5/8 inch, 3/8 inch and 3/16 inch stone. Plant capacity is approximately 400 tons per hour.

DIBBLEE CONSTRUCTION COMPANY LIMITED
FALLOWFIELD QUARRY
Ottawa

The Fallowfield quarry of Dibblee Construction Company is located a mile and a half east of Fallowfield on lot 21, concession IV, Nepean township, Carleton county.

Geology

The quarry is in Middle Black River limestone of Ordovician age. The 25-foot quarry face is composed of medium grey, grey-weathering, thin to medium bedded, microcrystalline to fine crystalline limestone which grades from calcilutite to calcarenite. Some clastic calcirudite beds are present. Shaly partings are common. The rock is well-jointed and many of the joint faces are rusty-weathering.

A chemical analysis of the lower 12 feet of the quarry face is given in (30).

(30) CHEMICAL ANALYSIS - FALLOWFIELD QUARRY
DIBBLEE CONSTRUCTION COMPANY

	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
Lower 12'	15.96	5.26	0.34	0.72	42.44	35.20	0.27	100.17

DIBBLEE CONSTRUCTION COMPANY LIMITED
McCARTHY ROAD QUARRY
Ottawa

The McCarthy road quarry of Dibblee Construction Company, located in lots 3 and 4, concession III, Gloucester township, Carleton county, was not in operation in June, 1963 when visited by the author. The crushing and screening plant was crushing stone from the Company's South Gloucester quarry.

The quarry and plant are described by Hewitt (1960, pp.77-80).

FRAZER DUNTILE LIMITED
Ottawa

The Clyde Avenue quarry of Frazer Duntile Limited in the western part of Ottawa is described by Hewitt (1960, pp.72-74).

OTTAWA VALLEY CRUSHED STONE LIMITED
Ottawa

The quarry and plant of Ottawa Valley Crushed Stone Limited in Gloucester township on the eastern outskirts of Ottawa is described by Hewitt (1960, pp.74-76).

FRAZER DUNTILE LIMITED
Orleans

The Orleans quarry of Frazer Duntile Limited is located on the north side of highway No. 17 at Orleans, in Gloucester township, Carleton county. A 25-foot face of Middle Black River limestone is exposed in the quarry. The stone is medium grey, medium to thick bedded, microcrystalline to aphanitic limestone. There is a small crushing and screening plant on the property. The quarry was inactive when visited by the author in June, 1963.

CLARENCE TOWNSHIP QUARRY

The Clarence township quarry is four miles east of Sarsfield, and about 8 miles south of Rockland, on lot 11 or 12, concession X, Clarence township, Russell county.

The 45-foot quarry face is composed of Upper or Middle Trenton limestone. The limestone is medium to light grey, microcrystalline to medium crystalline, medium to thick bedded calcarenite to calcilutite. There are some black shaly partings.

A chemical analysis of a chip sample from the quarry face is given in (31).

(31) CHEMICAL ANALYSIS - CLARENCE TOWNSHIP QUARRY

	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
45 Foot Face	6.30	3.49	0.09	0.62	49.30	40.04	0.32	100.12

BLAIR CONSTRUCTION COMPANY
St. Albert Station

A quarry is operated ½ mile west of St. Albert Station in lots 7 and 8, concession XII, Finch township, Stormont county, by Blair Construction Company.

A 10-foot face of Upper Black River limestone is quarried. The limestone is medium grey to dark grey or black, fine crystalline to microcrystalline, medium-bedded calcarenite to calcilutite. The old quarry of Silvertone Black Marble Company is on the property.

Crushing and screening is done by portable plant.

BERTRAND & FRÈRE CONSTRUCTION COMPANY LIMITED
L'Orignal

The L'Orignal quarry of Bertrand & Frère Construction Company Limited.is described by Hewitt (1960, p.80).

ROADS RESURFACING COMPANY
Apple Hill

The Apple Hill quarry of Roads Resurfacing Company is three miles south of Apple Hill in lot 31 of the ninth concession of Charlottenburgh township, two-tenths of a mile east of the Cornwall township boundary.

Twenty-five feet of Upper Trenton limestone are exposed in the quarry face. The limestone is medium-grey, medium to thick bedded, aphanitic to microcrystalline calcarenite to calcilutite. There are black shaly partings. Overburden is thin, rarely exceeding two feet. The area is a limestone plain.

Chemical analyses of a chip sample from the upper 15 feet of the quarry face and a sample of ½ inch stone from the stockpile are given in (32).

(32) CHEMICAL ANALYSES - ROADS RESURFACING QUARRY

	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	Total
Upper 15 feet	4.06	2.09	0.43	0.16	52.06	42.70	101.50
½-inch stone stockpile	2.68	2.33	0.31	0.22	52.64	42.08	100.26

There is no permanent plant at the quarry, crushing being done by portable equipment as required, mainly for road construction.

CORNWALL GRAVEL COMPANY
MACLEOD QUARRY
Cornwall

The MacLeod quarry of Cornwall Gravel Company is in lot 4, concession IV, Cornwall twonship, Stormont county, about 1½ miles east of Eamer. At the time of the author's visit in June 1963, the quarry was water-filled and inactive. A ten-foot section of Upper Black River limestone was exposed above water level. The limestone is medium grey, grey-weathering, microcrystalline and massive bedded.

DIBBLEE CONSTRUCTION COMPANY LIMITED
Cornwall

The Cornwall quarry of Dibblee Construction Company is four miles northwest of Cornwall in lot 23, concession IV, Cornwall township, Stormont county.

A 36-foot section of Middle Black River limestone is exposed in the quarry. The upper 12-foot lift consists of 5 feet of medium bedded, medium to dark grey, aphanitic limestone with black shale partings, overlain by a 7-foot massive bed of medium grey, aphanitic to microcrystalline limestone. The lower 24-foot lift consists of medium to dark grey, medium to thick bedded, microcrystalline limestone with black shale partings.

A chemical analysis of one-inch stone from the stockpile is given in (33).

(33) CHEMICAL ANALYSIS - DIBBLEE CONSTRUCTION COMPANY CORNWALL

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	Total
2.86	2.81	0.47	0.14	52.32	42.80	101.4

There is no permanent plant at the quarry; a portable crushing and screening plant is employed as required.

4. GUELPH - LOCKPORT DOLOMITE

The stratigraphy and distribution of the Guelph, Lockport and Amabel dolomites are described by Hewitt (1960, pp.88-90).

QUEENSTON QUARRIES LIMITED
Queenston

The quarry and plant of Queenston Quarries Limited are described by Hewitt (1960, pp.91-94). In 1962 a plant was installed to manufacture stone sand. Stone to be recrushed for chips and sand is fed to a Hazeman impact crusher. The product goes to a storage bin and from there via conveyor to a two deck 5 by 12 foot screen which produces washed chip and minus 4 mesh sand. The minus 4 mesh sand goes to a 6 valve settling tank where a concrete sand product is withdrawn and goes to an Eagle screw classifier for dewatering and on to the concrete sand storage.

WALKER BROTHERS QUARRIES
Thorold

The quarry and plant of Walker Brothers Quarries at Thorold are described by Hewitt (1960, pp.94-95).

PENINSULA LIMESTONE LIMITED

Peninsula Limestone Limited now operate the building stone quarry formerly operated by Niagara Cut Stone Limited at Thorold. The quarry is described by Hewitt (1960, p.96). A new stone cutting plant has been opened. In addition to three gang saws which have been equipped with diamond-set blades, there are two 36-inch and one 18-inch diamond saws and a guillotine. A full line of dimension stone and ashlar are produced.

ST. CATHERINES CRUSHED STONE LIMITED

The quarry and plant of St. Catherines Crushed Stone Limited are described by Hewitt (1960, pp.97-8). A chemical analysis of a composite sample of one-inch stone from the stockpile is given in (34).

(34) CHEMICAL ANALYSIS - ST. CATHERINES CRUSHED STONE

SiO_2	Al_2O_3	Fe_2O_3	Mgo	CaO	LOI	SO_3	Total
8.44	2.47	0.55	13.34	33.58	42.06	0.29	100.73

VINELAND QUARRIES AND CRUSHED STONE LIMITED
VINELAND QUARRY

The Vineland quarry of Vineland Quarries and Crushed Stone Limited is described by Hewitt (1960, pp.98-99). Drilling is now carried out by two drills of the air track type.

ARMSTRONG BROTHERS COMPANY LIMITED
VINEMOUNT QUARRY

The Vinemount quarry of Armstrong Brothers Company Limited is described by Hewitt (1960, pp.100-103). An Air Trac drill is now used in place of the wagon drills formerly employed.

A. COPE AND SONS LIMITED
STONEY CREEK QUARRY

The quarry and plant operated in Saltfleet township south of Stoney Creek by A. Cope and Sons Limited are described by Hewitt (1960, pp.103-105). A new quarry has been opened east of the old quarry.

The 20-foot face consists of medium brownish grey to light brown, aphanitic, thin, irregularly bedded Eramosa dolomite containing some white gypsum. The quarry face is drilled on a 10 by 10 foot pattern by an air track drill, drilling three inch holes.

In January 1961 a drillhole was drilled in the old quarry floor. The stratigraphic log of this hole is as follows: 0-14 feet, Vinemount shaly dolomite; 14-38 feet, brown Lockport dolomite; 38-55 feet, Ancaster chert beds; 55-60 feet, Gasport limestone; 60-65 feet, Decew dolomite; 65-97 feet, Rochester shaly dolomite and shale.

CANADA CRUSHED AND CUT STONE LIMITED
DUNDAS QUARRY
Dundas

The Dundas quarry of Canada Crushed and Cut Stone Limited, one of the largest limestone quarries in Ontario, is described by Hewitt (1960, pp.106-110). Production now comes from the new quarry located north of No. 5 highway.

Some modifications have been made in the screening and recrushing plant on the escarpment. One line of trommel screens has been replaced by six two deck screens.

JAMES D. GRAY AND SON
FLAMBORO QUARRY

The quarry and plant of James D. Gray and Son in West Flamboro township on the Brock road are described by Hewitt (1960, p.111).

A chemical analysis of a chip sample taken down the 20-foot quarry face is given in (35).

(35) CHEMICAL ANALYSIS - JAS. D. GRAY & SON

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
0.62	0.76	0.16	21.02	30.28	47.88	0.10	100.82

Some flagstone is produced from thin-bedded strata in the upper part of the quarry.

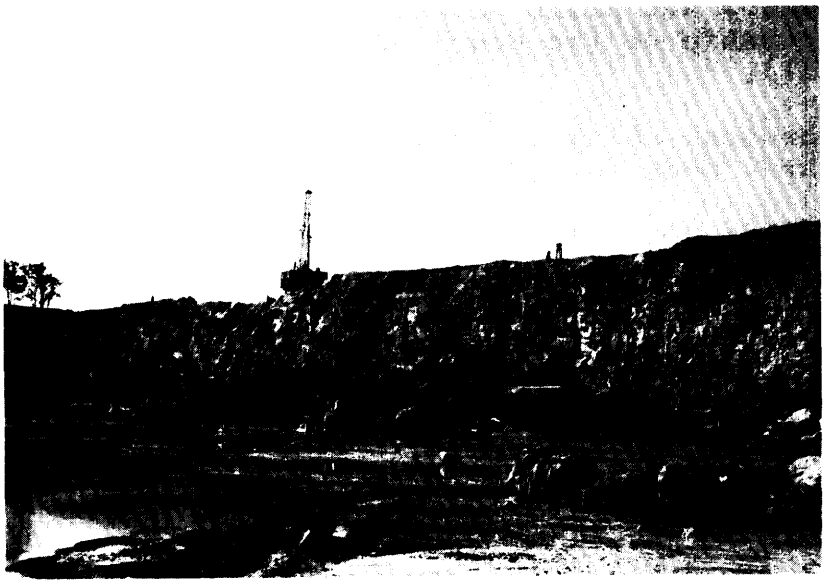
ARMSTRONG BROTHERS COMPANY LIMITED
Clappison Corners

The Clappison Corners quarry, formerly operated by King City Sand and Crushed Stone Limited and described by Hewitt (1960, pp.112-113), is now operated by Armstrong Brothers Company Limited. The quarry floor is composed of grey-green Thorold sandstone and shale. The quarry face exposes a complete section of the Reynolds, Irondequoit, Rochester and Gasport formations. The upper part of the quarry face is Goat Island dolomite.

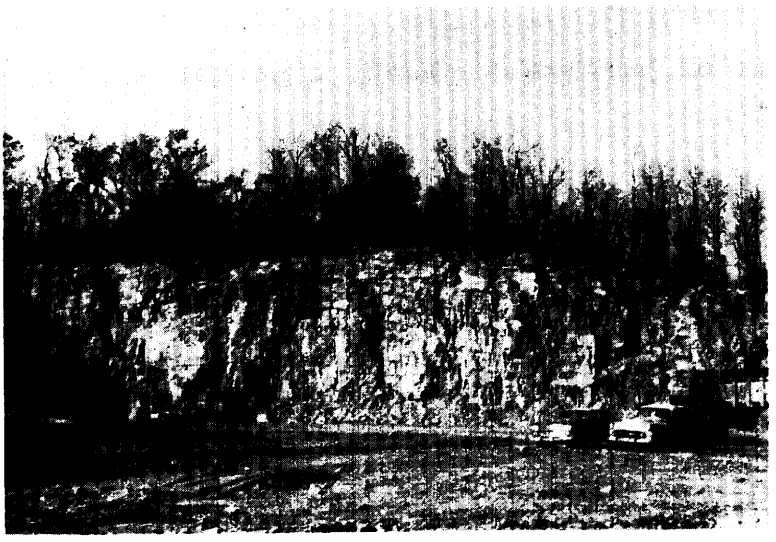
There is no permanent plant; a portable plant is employed as required.

NELSON CRUSHED STONE
Nelson

One of the largest limestone quarries in Ontario is operated in Nelson township, Halton county by Nelson Crushed Stone, a division of King Paving and Materials Limited. The quarry and plant are described by Hewitt (1960, pp.113-118). Some minor changes have been made in the plant since the 1960 report.



Nelson Crushed Stone Quarry



Milton Quarries Limited

BAY CRUSHED STONE
Mount Nemo

The quarry formerly operated by Lowville Quarries Limited, Hewitt (1960, p.118) has been taken over by Bay Crushed Stone. The property was not in operation when visited by the author in July, 1963.

MILTON QUARRIES LIMITED
Milton

The quarry and plant of Milton Quarries Limited are described by Hewitt (1960, p.119). The quarry face has advanced to the west into the escarpment and a 65- to 75-foot face of Amabel dolomite is now worked. Overburden now ranges from 0 to 20 feet in thickness.

Chemical analysis of a sample of 2-inch stone from the stockpile was supplied by the company and is given in (36).

(36) CHEMICAL ANALYSIS - MILTON QUARRIES LIMITED

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	S	P	LOI	Total
1.84	0.67	0.59	32.26	17.67	0.14	0.001	46.60	99.77

Some modifications have been made in quarry operation and plant since 1958. Drilling is contracted. A Quarry-master drills 6-inch holes on a 15 by 19 foot pattern. Stone is loaded by a 3 cubic yard P & H diesel shovel. Haulage is by three 31 TD 29 ton, rear-dump, Euclid trucks.

The product from the primary jaw crusher now goes to a two deck grizzly. A second secondary crusher, a $4\frac{1}{4}$ foot Symons Cone Crusher, has been added. The 2-inch stone surge pile now accommodates 12,000 tons.

In the secondary crusher building the 5 by 12 foot two deck screen now has $1\frac{1}{2}$ and 3/4 inch openings. Plant capacity is approximately 400 tons per hour.

CLOVERLEAF QUARRIES LIMITED
Campbellville

The quarry of Cloverleaf Quarries Limited on lot 8, concession IV, Nassagaweya township, Halton county, north of Campbellville, was not in operation when visited by the author in July, 1963. The quarry is in Amabel dolomite.

HALTON CRUSHED STONE LIMITED
Milton

The quarry and plant of Halton Crushed Stone are described by Hewitt (1960,pp.120-121). Since examined by the author in 1959, the quarry has been deepened and a face of 80 to 90 feet of Amabel dolomite is exposed. The lower lift of the quarry is 28 to 30 feet in height, the upper lift is 50 to 60 feet in height.

Geology

Grey-green Thorold shale is exposed in ditches in the quarry floor. This is overlain by 8 feet of Reynales dolomite. Four feet is exposed in the ditch and 4 feet in the base of the quarry face. Above this is the Amabel dolomite. The lower 10 to 12 feet of the Amabel dolomite is grey and buff banded medium crystalline crinoidal dolomite. This streaky grey facies of the Amabel dolomite may be the Gasport equivalent. Above this the dolomite is buff to light-grey in colour, buff-weathering, medium crystalline, crinoidal, medium to thick and irregularly bedded, reefy, stylolitic and fossiliferous.

The geologic section is described in (37).

(37) GEOLOGIC SECTION - HALTON CRUSHED STONE

Unit	Description	Thickness feet
Amabel dolomite:		
4	Dolomite, buff to light grey, buff-weathering, medium crystalline, crinoidal, medium to thick and irregularly bedded, reefy in part, stylolitic, highly fossiliferous	76.0+
3	Dolomite, grey and buff banded, grey-weathering, medium crystalline, crinoidal, medium to thick bedded, fossiliferous	10.0

Reynales dolomite:

2	Dolomite, grey to buff, mottled, aphanitic, medium-bedded, dense	8.0

Thorold shale:

1	Shale, grey-green, fissile	2.0+

Two chemical analyses of the stone from the Halton quarry are given in (38). The first was supplied by the company. The second is a sample of $\frac{3}{4}$ inch stone from the stockpile taken by the author.

(38) CHEMICAL ANALYSES - HALTON CRUSHED STONE

SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	S	CO_2	Total
0.59	0.04	0.46	31.08	20.59	0.04	46.88	99.68
0.16	0.69	0.33	30.28	21.02	-	47.22	99.70

Quarry Operation

Some minor modifications have been made in quarry operations. A Joy Heavyweight Champion drill drills $6\frac{3}{4}$-inch holes on a 16 by 16 to 18 by 18 foot pattern. The product from the primary impact crusher now goes to a 4 by 12 foot 2 deck scalping screen. Crusher run is extracted and stockpiled by stacker conveyor. The plus $2\frac{1}{4}$-inch stone goes to the surge pile which feeds the secondary crushing and screening plant. A $4\frac{1}{4}$ foot short head cone has been installed for secondary crushing in addition to the $4\frac{1}{4}$ foot standard cone crusher in the original plant.

Halton Crushed Stone Quarry

Dufferin Quarry
Associated Quarries & Construction Limited

ASSOCIATED QUARRIES & CONSTRUCTION LIMITED
DUFFERIN QUARRY
Milton

The Dufferin quarry of Associated Quarries and Construction Limited northwest of Milton is located on lots 9 and 10, concession I, Esquesing township, on the edge of the escarpment.

Geology

The 50- to 65-foot quarry face consists almost entirely of Amabel dolomite. The dolomite is light buff in colour, buff-weathering, medium to coarsely crystalline, thick to massive bedded, porous in part, highly fossiliferous. A six-foot section of grey crinoidal dolomite forms the base of the Amabel section. At the base of the quarry face about 5 feet of Reynales dolomite is exposed. It is a grey-green to buff, aphanitic, medium-bedded dolomite. This formation forms the quarry floor. The total thickness of Reynales dolomite in this area is about 8 feet. It is underlain by Thorold shale.

The geologic section is given in (39).

(39) GEOLOGIC SECTION - DUFFERIN QUARRY

Unit	Description	Thickness feet
Amabel Dolomite:		
3	Dolomite, light buff, buff-weathering medium to coarsely crystalline, thick to massive bedded, highly fossiliferous, in part porous	50+
2	Dolomite, medium grey, grey-weathering, medium crystalline, crinoidal, thick-bedded	6.0
Reynales Dolomite:		
1	Dolomite, grey-green, aphanitic, medium-bedded	8.0

Chemical analysis of a sample of one-inch stone from the stockpile is given in (40).

(40) CHEMICAL ANALYSIS - DUFFERIN QUARRY

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
1.30	1.54	0.30	20.94	29.52	47.44	0.12	101.16

Quarry Operation

The rock surface is irregular and from 2 to 15 feet of overburden is stripped by $2\frac{1}{2}$ cubic yard Lima diesel shovel and $\frac{3}{4}$ cubic yard Northwest backhoe. Due to the irregularity of the rock surface, in places final cleanup stripping is done by a small tractor and bucket, and hand labour. Drilling is done on contract. Six-inch holes are drilled on a 16 by 18 foot pattern. Due to the massive-bedded character of the stone some secondary blasting is required. Armour stone can be produced if required.

Stone is loaded by a 4 cubic yard Lima diesel shovel and a 2 cubic yard Bucyrus Erie diesel shovel on to four 25 ton Mack rear dump trucks for haulage to the primary crusher located on the edge of the escarpment.

The primary crusher is a 53 by 60 inch Cedarapids double impeller impact breaker which reduces the stone to minus 6 inches. A conveyor feeds this minus 6-inch product to a 40,000 ton surge pile. A conveyor takes the stone from the surge pile to a 6 by 14 foot two deck scalping screen with $2\frac{1}{4}$- and 7/8-inch openings. The plus $2\frac{1}{4}$-inch stone goes to an 84-inch Allis Chalmers Hydrocone Crusher. The minus $2\frac{1}{4}$ plus 7/8-inch stone goes either to the Hydrocone Crusher or to No. 3 screen. The minus 7/8-inch stone is stockpiled as crusher run stone.

The Hydrocone product goes to No. 2 screen, a 2 deck 7 by 20 foot screen with 1 5/8-inch and 7/8-inch openings. The plus 1 5/8-inch stone is returned to the Hydrocone Crusher; the minus 1 5/8-inch plus 7/8-inch product goes to a four foot Symons short head cone crusher. The minus 7/8-inch stone goes to No. 3 screen. The minus 1 5/8-inch stone can also be routed to No. 3 screen instead of recrushing, as desired. The product from the short head cone also goes to No. 3 screen.

In the screen tower there are two sets of screens: No. 3 screen is a two deck 6 by 20 foot screen with 1 5/8-inch and 7/8-inch openings; No. 4 screen is a two deck 8 by 20 foot screen with $\frac{1}{2}$ inch and 3/16 by 2-inch openings. Products made include 2-inch, $1\frac{1}{2}$-inch, $\frac{3}{4}$-inch, 3/8-inch stone, screenings, 2-inch and $\frac{3}{4}$-inch crusher run. There are seven 300 ton bins to accommodate these products. A conveyor below the bins permits blending and recrushing of various sizes. Two 15 ton Mack trucks are on stockpiling. Plant capacity is approximately 500 tons per hour.

ARMSTRONG BROTHERS COMPANY LIMITED
Georgetown

The Georgetown quarry of Armstrong Brothers Company Limited is described by Hewitt (1960, p.121).

ACTON LIMESTONE QUARRIES LIMITED
Acton

One of the largest limestone quarries in Ontario was opened near Acton in 1963 by Acton Limestone Quarries Limited at the old Dolly Varden quarry property, lots 23 and 24, concession IV, Esquesing township, Halton county. The quarry property is on the brow of the Niagara escarpment a mile east of Acton and 1½ miles west of Limehouse. The Canadian National Railway line passes the property and a siding has been built. It is approximately 34 miles by rail to the Union station in Toronto. Until 1930 the quarry was worked for the production of dolomitic lime by the Toronto Lime Company.

Geology

The 50-foot quarry face is composed entirely of Amabel dolomite. It is light buff to light grey in colour, buff-weathering, medium to coarsely crystalline, medium to thick and irregularly bedded, in part porous, highly fossiliferous, crinoidal.

The Reynales dolomite, which underlies the Amabel formation, is exposed in a roadcut a few feet below the present quarry floor. The Reynales dolomite is 8 feet thick, light buff to greenish grey in colour, buff-weathering, medium to thick-bedded and aphanitic in texture. The Reynales dolomite is underlain by about 10 feet of green shale and shaly dolomite of the Thorold formation. A few feet of red Grimsby shale are exposed below the Thorold formation.

Two chemical analyses of stone from the quarry are given in (41). A is an analysis given by Goudge (1938, p.242) of a sample representative of a 35 foot thickness of the dolomite quarried by Toronto Lime Company. B is an analysis of one-inch stone taken by the author from the stockpile.

(41) CHEMICAL ANALYSES - ACTON LIMESTONE QUARRIES

	SiO_2	Fe_2O_3	Al_2O_3	$Ca_3(PO_4)_2$	CaO	MgO	LOI	SO_3	Total
A	0.48	0.51	0.27	0.02	31.12	20.50	46.80	0.02	99.72
B	0.10	0.24	2.20	-	30.05	20.42	47.08	0.09	100.18

Quarry and Plant

The quarry face has been opened over a length of 1,200 feet along the escarpment. The rock surface is irregular and overburden varies from zero to about 15 feet in thickness. Stripping has been done by scrapers and a front end loader. Hydraulic jetting has been used to a limited extent in stripping operations. Ten-inch holes are drilled on a 25 by 27 foot pattern by a Bucyrus-Erie 50R rotary drill.

Stone is loaded by a 7 cubic yard P & H electric shovel into four 27 ton International Payhauler rear dump trucks for haulage to the primary crusher, a 54-inch Allis Chalmers gyratory. Oversize blocks which require secondary blasting are removed from the gyratory crusher by a 20 ton grapple.

The product from the primary crusher is minus 7-inch stone which is fed by a 2,000 t.p.h. feeder to a 54-inch conveyor No. 1 which stockpiles the stone in a 50,000 ton surge pile. This stone goes by conveyors Nos. 2 and 3 to the secondary crusher house where a 5 by 14 foot scalping screen separates the plus 4-inch stone which goes to the secondary crusher, a Telsmith gyratory set at $2\frac{1}{4}$ inches.

The product from the secondary crusher goes via 36 inch conveyor No. 4 to a Telsmith single deck 6 by 16 foot screen with 2-inch openings. This screen is in the tertiary crusher house which houses two Telsmith FC66 gyratory crushers set at $\frac{3}{4}$-inch. The plus 2-inch stone from this screen goes to one of the tertiary crushers. The minus 2-inch stone goes via conveyors Nos. 7 and 8 to No. 1 screen tower.

The minus 4-inch stone from the scalping screen goes via conveyor No. 5 to a two deck 6 by 16 foot screen in the tertiary crusher house. This screen has 2-inch and $\frac{3}{4}$-inch decks. The plus 2 inch stone goes to the tertiary gyratory crusher. Both the tertiary crushers are over conveyor No. 7 and the crusher products go via conveyors Nos. 7 and 8 to No. 1 screen tower. The minus 2 inch plus $\frac{3}{4}$-inch stone goes via conveyors Nos. 7 and 8 to the screen tower. The minus $\frac{3}{4}$-inch stone goes via conveyor No. 6 to a stockpile for $\frac{3}{4}$-inch crusher run.

At screen tower No. 1 the feed is split to two 3 deck 6 by 16 foot screens with 2-inch, 1-inch and $\frac{3}{4}$-inch decks. The plus 2-inch stone is returned to the tertiary crusher building for recrushing. The minus 2-inch plus 1-inch stone is stockpiled by stacker conveyor. The minus 1 inch plus $\frac{3}{4}$-inch stone is also stockpiled. Two 200 ton bins for these products are also located at the screen tower. The minus $\frac{3}{4}$-inch stone goes to screen tower No. 2.

At screen tower No. 2 the split feed goes to two 2-deck 6 by 16 foot screens with 5/8-inch and 3/8-inch decks. The minus $\frac{3}{4}$ plus 5/8-inch stone goes to a stockpile. The minus 5/8 plus 3/8-inch stone goes to a stockpile. Two 200 ton bins for these products are located at the screen tower. The minus 3/8-inch stone goes to screen tower No. 3.

At No. 3 screen tower the feed is split to two single deck 6 by 16 foot screens with $\frac{1}{4}$-inch cloth. The minus 3/8 plus $\frac{1}{4}$-inch stone goes to one stockpile while the minus $\frac{1}{4}$-inch screenings go to another stockpile. Two 200 ton bins for these products are also located at the screen tower. These bins at the screen towers are for truck loading of sized stone.

A 42-inch reclaiming conveyor is installed in the reclaiming tunnel under the six 50,000 ton stockpiles. The belt is fed by two Syntron feeders under each stockpile. Stone can be blended as desired by automatic electronic controls. The blended stone is conveyed from the reclaiming tunnel to an incline conveyor to a 36-foot shuttle conveyor over four 400 ton blending bins on the railway siding.

Plant capacity is approximately 1,000 tons per hour. Provision has been made in planning to double this capacity if required. The crushing and screening plant is completely automated.

ROCKWOOD LIME COMPANY LIMITED
Rockwood

The quarry and lime plant of Rockwood Lime Company Limited is described by Hewitt (1960, p.122).

CANADIAN GYPSUM COMPANY LIMITED
GUELPH QUARRY AND LIME PLANT

The Guelph quarry and lime plant of Canadian Gypsum Company Limited are described by Hewitt (1960, p.124). The 40-foot quarry face is now quarried in one lift. An Atlas-Copco wagon drill drills 3-inch holes on a 12 by 11 foot pattern. The lime plant has been increased from 13 to 15 vertical stack kilns fired by coal or gas.

A chemical analysis of the muck pile, taken in 1961 and supplied by the company, is given in (42).

Acton Limestone Quarries Limited
(Photo by Hunting Survey Corporation Limited)

New Glen Christie Quarry
Domtar Chemicals Limited

(42) CHEMICAL ANALYSIS - CANADIAN GYPSUM COMPANY

SiO_2	Fe_2O_3	Al_2O_3	CaO	MgO	SO_3
0.05	0.13	0.054	30.3	22.3	0.003

DOMTAR CHEMICALS LIMITED
GLEN CHRISTIE QUARRY AND LIME PLANT

The Glen Christie quarry and lime plant of Domtar Chemicals Limited are described by Hewitt (1960, pp.123-124). A new quarry was opened in September 1961, on the west side of the Canadian National Railway tracks. The new quarry is located in a slightly higher section of Guelph dolomite than the old quarry. The stone in the new quarry is somewhat finer and more even grained. There is 12 to 18 feet of stripping. The quarry face measures 47 feet in height. The stone is light buff, fine crystalline to aphanitic, thick and uniformly bedded, even bedded, fossiliferous, coralline Guelph dolomite.

The quarry face is drilled on a 9 by 9 foot pattern by Air Trac drill. Haulage is by two 15 ton diesel Autocar trucks.

Chemical analyses (43) of a representative diamond drill-hole (No. 19) on the site of the new quarry were kindly supplied by the company:

(43) CHEMICAL ANALYSES - DRILLHOLE 19 - DOMTAR CHEMICALS LTD.

Footage	CaO	MgO	Insoluble	Fe_2O_3	R_2O_3	LOI
0-31	(overburden)					
31-40	31.00	21.62	0.07	0.12	0.13	47.52
40-50	30.95	21.52	0.08	0.10	0.12	47.60
50-64	30.95	21.60	0.06	0.09	0.10	47.58
64-70	31.10	21.55	0.05	0.075	0.09	47.71
70-80	31.05	21.52	0.03	0.07	0.11	47.64
80-90	30.90	21.72	trace	0.08	0.10	47.52
90-100	31.00	21.65	0.01	0.06	0.08	47.70

COLLINGWOOD SAND AND GRAVEL LIMITED
Duntroon

A quarry has been opened by M. McKean of Collingwood Sand and Gravel Limited two miles west of Duntroon in Nottawasaga township, Simcoe county. The 40-foot quarry face exposes white to light buff, porous, massive to irregularly bedded, medium to coarse crystalline, fossiliferous Amabel dolomite. The face exposed in July, 1963, appeared to be in part reef stone. There is 2 to 4 feet of overburden.

A chemical analysis of one-inch stone from the stockpile is given in (44).

(44) CHEMICAL ANALYSIS - McKEAN QUARRY, DUNTROON

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	SO_3	LOI	Total
0.24	0.50	0.10	21.16	30.28	0.09	47.50	99.87

Drilling is contracted. A portable crushing and screening plant produces 2-inch, $\frac{3}{4}$-inch, $\frac{1}{2}$-inch and 3/8-inch stone, screenings and crusher run stone.

OWEN SOUND LEDGEROCK LIMITED
Owen Sound

The Cruickshank quarry of Owen Sound Ledgerock Limited is in lot 17, concession IV, Keppel township, Grey county, about 7 miles northwest of Owen Sound. The quarry face of 18 inches to 2 feet in height exposes medium grey-brown, thin bedded, aphanitic, banded Eramosa dolomite. The beds are from $\frac{3}{4}$- to $2\frac{1}{4}$-inches thick. A portable 14 to 18 inch diameter diamond saw is used to cut the stone into blocks measuring several feet square, which are removed from the quarry by bars and wedges and by a fork-lift truck.

The stone is cut by saw or guillotine. The main production is random flagstone, coursing, wallflag, copings, sills and mantles.

EBEL QUARRIES
Wiarton

The Ebel Quarries are on the south side of the Oliphant road, 1.8 miles west of Wiarton, in lots 6 and 7, concession XXIV, Amabel township, Bruce county. A seven-foot section of medium brown, aphanitic, thin to medium bedded Eramosa dolomite is exposed. Quarry faces are 2 to 3 feet in height. Beds are from $\frac{1}{2}$ to 10 inches in thickness. Bedding is extremely even and uniform. The stone is quarried by cutting the beds into rectangular slabs using portable 12- to 18-inch electric diamond saws. Stone is raised from the bed by bars, wedges and fork lift truck.

Stone is cut to required sizes by diamond saw or guillotine. Principal products are rockface and strataface coursing, flagstone, copings, sills, steps, etc.

BRUCE PENINSULA STONE QUARRIES
Wiarton

Bruce Peninsula Stone Quarries are on the north side of the Oliphant road, two miles west of Wiarton. From 6 to 8 feet of medium brown, thin to medium bedded, aphanitic Eramosa dolomite is exposed in the quarry face. Beds are 1 to 5 inches thick. The stone is cut in place by a 14 inch portable electric diamond saw. Coursing stone, flagstone, sills, copings, hearths and mantles are produced.

J.S. COOK QUARRY
Wiarton

The Cook quarry on the north side of the Oliphant road, 2.2 miles west of Wiarton, has been operated for over 50 years. From 3 to 6 feet of light buff to brown, thin to medium bedded aphanitic Eramosa dolomite is quarried. Beds range from 2 to 12 inches in thickness. Portable electric diamond saws are used to cut the stone in place. The stone is also cut by chisel and hammer or by plug and feather. Coursing stone, flagstone, sills, steps and rubble are produced.

WIARTON LEDGEROCK QUARRY
Wiarton

The Wiarton Ledgerock quarry of Owen Sound Ledgerock Limited is on the south side of the Oliphant road three miles west of Wiarton. Two to three feet of medium to dark brown, buff-weathering, thin bedded, aphanitic Eramosa dolomite are quarried. Beds range from 1 to 8 inches in thickness. Stone is quarried by portable 14 to 18 inch diamond saws. Ashlar, flagstone, sills and steps are the principal products. A guillotine is used for splitting ashlar coursing stone.

PERFECT STONE COMPANY
Wiarton

Some building stone has been quarried by Perfect Stone Company on lot 3, concession I, Albemarle township, Bruce county, about 13 miles north of Wiarton. A two-foot face of thin bedded, light brown to medium brown, banded, aphanitic Eramosa dolomite is quarried.

5. BOIS BLANC LIMESTONE AND BERTIE-AKRON DOLOMITE

The Bois Blanc cherty limestone of Devonian age and the underlying Bertie-Akron dolomite of Silurian age are quarried commercially by ten operators in the Fort Erie - Port Colborne - Hagersville area. Four of the quarries, Ridgemount Quarries, Canada Cement Company (Port Colborne), Canada Crushed & Cut Stone (Hagersville) and Hagersville Quarries, quarry only the Bois Blanc limestone. The other six operators, Geo. C. Campbell Company, Port Colborne Quarries, R.E. Law Crushed Stone, Dunnville Rock Products, Cayuga Quarries and Haldimand Quarries & Construction, quarry both the Bois Blanc limestone and the Bertie-Akron dolomite. For this reason these formations are dealt with together.

The stratigraphy and distribution of these formations are described by Hewitt (1960, pp.127-128).

GEO. C. CAMPBELL COMPANY LIMITED
Stevensville

The quarry and plant of George C. Campbell Company are described by Hewitt (1960, pp.128-130). A complete section of Bertie-Akron dolomite is exposed in this quarry. Two feet of dark grey Salina shaly dolomite are exposed in the quarry floor. Above this there is 44 feet of Bertie-Akron dolomite, overlain by the cherty Bois Blanc limestone.

A chemical analysis of the dark grey shaly Salina dolomite exposed in the floor is given in (45). Analyses of the quarry face are given in Hewitt (1960, p.128).

(45) CHEMICAL ANALYSIS - SALINA FORMATION

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
38.75	10.89	3.82	10.58	10.16	20.08	0.32	94.60

Quarry Operation

The quarry is now operated in two lifts, a lower 19-foot lift, and an upper 20- to 25-foot lift. The faces are drilled by Gardner-Denver Air Trac drills drilling $2\frac{1}{2}$-inch holes on an 8 by 8 foot pattern. The stone is loaded by a $1\frac{1}{4}$ cubic yard Northwest diesel shovel on to three 18 ton Euclid dump trucks for haulage to the primary crusher, a 30 by 42 inch jaw crusher. The product of the jaw crusher goes via 24 inch conveyor to the secondary crushing and screening plant where the stone is carried to a three deck 5 by 10 foot screen. The oversize from

the upper deck goes to a 4 foot Symons Standard Cone, whose product goes to a three deck 4 by 12 foot screen. The oversize from this screen is recrushed by a 3 foot Symons Standard Cone and returned to the screens. The main sizes of stone produced are 2-inch, 1-inch, $\frac{3}{4}$-inch, $\frac{1}{2}$-inch, 3/8-inch chips and dust. Crusher run is produced for road construction. Plant capacity is approximately 200 tons per hour.

RIDGEMOUNT QUARRIES LIMITED
Stevensville

The quarry and plant of Ridgemount Quarries Limited are described by Hewitt (1960, p.130). Drilling is now carried out by a Gardner-Denver Air Trac drill drilling 3-inch holes on a 7 by 7 foot or 7 by 8 foot pattern.

PORT COLBORNE QUARRIES LIMITED
Port Colborne

The quarry and plant formerly operated by Niagara Crushed Stone (Humberstone) Limited at Port Colborne, is now operated by Port Colborne Quarries Limited. The quarry and plant are described by Hewitt (1960,pp.130-132).

In the present operation the upper 8 to 10 feet of cherty Bois Blanc limestone is stripped off and not used. Two 20-foot lifts of the underlying Bertie-Akron dolomite are quarried. Dark grey shale which probably belongs to the Salina formation is exposed in the quarry floor. This would give a total Bertie-Akron section of 40 feet in thickness. The Bertie-Akron thickness is somewhat variable in this area due to the irregularity of the unconformity at the base of the overlying Devonian (Bois Blanc) limestone.

The quarry section is described as follows:

Unit	Description	Thickness feet
Bois Blanc Formation:		
	Chert, sandy siltstone and cherty limestone; limestone: cherty, light medium grey, medium crystalline to aphanitic; medium to thin irregularly bedded; rubbly weathering; abundant white chert; highly fossiliferous: coralline. Sandy siltstone: grey to green, glauconitic, aphanitic	9.0

Unconformity - irregular relief

		Thickness feet
Bertie-Akron Formation:		
3	Dolomite: mottled, medium brownish grey to light brown, buff-weathering, aphanitic, medium-bedded, shaly partings; upper few feet show some sand mainly as joint fillings	15.0
2	Dolomite: shaly, laminated, medium brownish grey, dark grey streaked, aphanitic, medium to thin bedded, shaly partings	10.0
1	Dolomite: medium to dark brown, brown-weathering, laminated, aphanitic, medium to massive bedded	15.0
Salina Formation:		
	Grey dolomitic shale	in floor

Chemical analyses of the Bois Blanc cherty limestone and the upper 15.5 feet of the Bertie-Akron dolomite are given in Hewitt (1960, p.131). Since the quarry has now been deepened, a chip sample of the lower 20 feet of Bertie-Akron dolomite from lift 1 was taken and the chemical analysis of this sample is given in (46).

(46) CHEMICAL ANALYSIS - PORT COLBORNE QUARRIES

	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	SO_3	LOI	Total
Lift 1	2.02	0.94	0.32	20.76	29.40	0.14	46.70	100.28

Quarry Operation

Some changes have been made in quarry and plant operation. Three Joy Challenger drills drill $4\frac{1}{2}$ inch holes on an 11 by 12 foot pattern. Stone is loaded by two $3\frac{1}{2}$ cubic yard Lima diesel shovels. Primary crushing is done by a Cedarapids impact crusher.

R.E. LAW CRUSHED STONE LIMITED
Port Colborne

The quarry and plant of R.E. Law Crushed Stone Limited at Port Colborne are described by Hewitt (1960, pp.134-136). Changes have since been made in the drilling, loading and haulage equipment and in the crushing and screening plant. Plant capacity has been increased to approximately 300 tons per hour. Loading facilities have been installed at the Welland canal for loading boats.

CANADA CEMENT COMPANY LIMITED
Port Colborne

The Port Colborne quarry and cement plant of Canada Cement Company are described by Hewitt (1960, pp.132-134).

DUNNVILLE ROCK PRODUCTS LIMITED
Dunnville

The Dunnville quarry which had been closed for two years was reopened in 1963 by Dunnville Rock Products Limited. The quarry and plant are described by Hewitt (1960, pp.136-138).

CAYUGA QUARRIES LIMITED
Cayuga

The quarry and plant of Cayuga Quarries Limited are described by Hewitt (1960, pp.138-140).

HALDIMAND QUARRIES & CONSTRUCTION LIMITED
Hagersville

The Hagersville quarries and plant of Haldimand Quarries and Construction Limited are described by Hewitt (1960, pp.140-142). In parts of these quarries there are two sandstone units in the lower part of the Bois Blanc formation, and Best (1953, p.35) places these both within the Springvale sandstone member of the Bois Blanc formation.

CANADA CRUSHED & CUT STONE LIMITED
Hagersville

The Hagersville quarry of Canada Crushed & Cut Stone Limited is described by Hewitt (1960, pp.143-144). Operations ceased at this quarry in October, 1963 and the plant was dismantled.

HAGERSVILLE QUARRIES LIMITED
Hagersville

The quarries and plant of Hagersville Quarries Limited are described by Hewitt (1960, pp.144-146). The quarry face has been deepened to 32 feet. A drilling pattern of 13 by 14 feet is now employed. The truck boxes have been increased to 15 ton capacity. In the crushing plant the secondary crusher, formerly a 10-inch McCully gyratory, has been replaced by a Symons 4-foot standard cone crusher.

6. DETROIT RIVER AND DELAWARE LIMESTONE AND DOLOMITE

High calcium limestone of the Detroit River group is quarried near Woodstock, by Domtar Chemicals Limited, Cyanamid of Canada Limited, Chemical Lime Limited, and Canada Cement Company. Limestone of the Delaware formation is quarried at St. Marys by the St. Mary's Cement Company. Detroit River limestone and overlying Delaware dolomitic limestone are quarried by Brunner Mond Canada Limited at Amherstburg. Detroit River limestone and dolomite are quarried by Amherst Quarries at Amherstburg. The Norfolk quarry has recently opened near Port Dover in the Delaware limestone.

A description of the stratigraphy and distribution of the Detroit River and Delaware formations is given by Hewitt (1960, pp.146-148).

DOMTAR CHEMICALS LIMITED
BEACHVILLE QUARRY AND LIME PLANT

The Beachville quarry and lime plant formerly operated by Gypsum Lime and Alabastine Limited is now operated by Domtar Chemicals Limited. The quarry and plant are described in Hewitt (1960, pp.149-152).

A new quarry has been opened adjacent to the old quarry, on the north side of the Canadian National Railway tracks. It is joined to the old quarry by a tunnel under the tracks. The quarry face is 62 to 64 feet in height. Quarry production averages approximately 3,000 tons per day.

CYANAMID OF CANADA LIMITED
BEACHVILLE QUARRY AND LIME PLANT

The plant and quarry of Cyanamid of Canada Limited at Beachville are described in Hewitt (1960, pp.152-155).

CHEMICAL LIME LIMITED
INGERSOLL QUARRY AND LIME PLANT

The quarry and plant of Chemical Lime Limited are described in Hewitt (1960, pp.155-158). Since 1960 the quarry floor has been raised 8 to 10 feet due to sulphur in the lower beds of the quarry. A lower lift of 57 feet and an upper lift of 32 feet are now worked. Quarrying is proceeding to the northeast towards the property of Cyanamid of Canada. Quarry production is 1,800 to 2,000 tons per eight-hour shift.

CANADA CEMENT COMPANY LIMITED
WOODSTOCK CEMENT PLANT
Zorra Station

The 3,200,000 barrel per year portland cement plant opened in 1957 is described in Hewitt (1960, pp.158-161). Only minor changes have been made since the 1960 report.

ST. MARY'S CEMENT COMPANY LIMITED
St. Marys

The quarry and cement plant of St. Mary's Cement Company are located on the southern outskirts of St. Marys on the east side of the north branch of the Thames river, in concessions XVI and XVII, Blanchard township, Perth county. The wet-process, 5 kiln cement plant has a rated capacity of 12,400 barrels per 24 hours or approximately 4,500,000 barrels per year. The addition of a fifth kiln in 1963 made this cement plant the largest in Ontario.

Geology

The geologic section is described by Hewitt (1960, pp.163-4). The main quarry face is Delaware limestone. Detroit River limestone and dolomite are exposed in the lower 12-foot lift. Along the north quarry face at the pump sump the Detroit River-Delaware contact can be examined. The Delaware limestone above is massive bedded and lighter in colour, the underlying

Detroit River limestone is thin bedded and chocolate to medium brown in colour. The contact is 4 feet below the quarry floor and is marked by a clay seam and rusty zone. Four feet above this contact at the quarry floor a thin limestone conglomerate may be seen. The underlying 12-foot Detroit River section is higher in magnesia than the Delaware limestone as indicated in (47).

(47) CHEMICAL ANALYSES - ST. MARY'S CEMENT COMPANY

Sample No.	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
1	0.48	1.00	0.20	0.68	53.61	43.28	0.04	99.29
2	0.42	0.65	0.03	0.34	54.76	44.24	0.03	100.47
3	1.08	2.86	0.26	11.28	40.06	44.46	0.07	100.07

Sample 1 is the 3.5 feet of Delaware limestone above the conglomerate layer at the quarry floor level. Sample 2 represents the 4 feet of Delaware limestone between the conglomerate layer and the underlying rusty zone marking the Detroit River contact. Sample 3 represents the 12 feet of Detroit River limestone and dolomite above water level in the sump.

Quarry Operation

The quarry operation follows that described by Hewitt (1960, pp.163-4). Haulage is now done by eight 22 ton and three 15 ton Euclid trucks. Four are on haulage in the quarry and five are on stripping. The quarry has been deepened at the west end by 6 to 8 feet.

NORFOLK QUARRY COMPANY
Port Dover

A quarry was opened in 1963 by Norfolk Quarry Company about two miles northeast of Port Dover on lot 13 or 14, concession II, Woodhouse township, Norfolk county.

There is 5 to 15 feet of overburden. The 21-foot quarry face consists of light grey to light grey-brown, grey-weathering, thick bedded, cherty, fossiliferous limestone. The white chert occurs in nodules and bands parallel to the bedding. The limestone belongs to the upper member of the Delaware formation. The chert content varies from about 5 to 10 percent.

Chemical analysis of a sample of one-inch stone from the stockpile is given in (48).

(48) CHEMICAL ANALYSIS - NORFOLK QUARRY

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
11.00	0.61	0.39	3.76	44.52	40.42	0.14	100.7

Crushing and screening is by portable equipment. Drilling is contracted.

BRUNNER MOND CANADA LIMITED
Amherstburg

The quarry and lime plant of Brunner Mond Canada Limited are described by Hewitt (1960, pp.164-167). A new quarry property has been acquired by the company in lots 28 to 30, concessions VI and VII, Anderdon township, Essex county.

AMHERST QUARRIES LIMITED
Amherstburg

The quarry of Amherst Quarries Limited is located in lot 22, concession III, Malden township, Essex county, on the south side of Pike road, about a mile east of Amherstburg. The quarry was opened during the summer of 1959.

Geology

The 45- to 55-foot quarry face consists of a 30- to 40-foot upper lift and a 15-foot lower lift. The upper 8 feet of the upper lift is limestone, the remainder of the section is dolomite. The entire section is assigned to the Lucas formation of the Detroit River group.

Where measured on the north side of the quarry, the upper 8 feet of the upper lift is a thick bedded biostrome of mottled light grey to buff, medium crystalline to aphanitic, porous, fossiliferous limestone. This is underlain by a massive 15-foot bed of buff-weathering, medium brown, fine crystalline dolomite. The lower 11 feet of the upper lift is buff-weathering, light brown to medium brown, medium to thick bedded, aphanitic dolomite with some black shaly partings and occasional calcite crystals. There is some brown colour banding in the dolomite.

The 15-foot lower lift consists of medium to chocolate brown, thick bedded, aphanitic dolomite with dark brown colour banding. Four feet of lighter buff dolomite at the top of the lower lift contains occasional white chert.

Norfolk Quarry
Port Dover

Amherst Quarry
Amherstburg

The quarry section is described in (49)

(49) QUARRY SECTION - AMHERST QUARRIES LIMITED

Unit	Description	Thickness feet
Lucas Formation, Detroit River Group		
Upper Lift:		
AQ 4	Limestone, light grey to buff, mottled, medium crystalline to aphanitic biostrome, thick-bedded, porous, fossiliferous.....	8
AQ 3	Dolomite, medium-brown, buff-weathering, fine crystalline, massive 15 foot bed, rare black bituminous partings.....	15
AQ 2	Dolomite, light to medium brown, buff weathering, medium to thick-bedded, aphanitic, black shaly partings, occasional calcite crystals.....	11
Lower Lift:		
AQ 1	Dolomite, medium brown to chocolate brown, thick-bedded, aphanitic, dark brown colour banding, rare white chert at top.....	15

Chemical analyses of chip samples of the various units in the quarry face are given in (50).

(50) CHEMICAL ANALYSES - AMHERST QUARRIES LIMITED

Unit	SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
AQ-4	1.64	0.17	0.03	1.78	52.64	43.24	0.14	99.64
AQ-3	8.12	1.00	0.04	16.74	30.82	43.14	0.21	100.07
AQ-2	0.36	0.82	0.24	16.54	35.56	46.14	0.10	99.76
AQ-1	0.88	0.40	0.28	19.16	32.16	46.80	0.17	99.85

7. HAMILTON LIMESTONE

Thin beds of grey medium crystalline limestone occur in the Hamilton formation of southwestern Ontario. The formation is principally grey shale. A small quarry recently opened by A.G. Cook near Thedford is in a limestone band in the Hamilton formation.

COOK QUARRY
Thedford

A new stone quarry has been opened on the west side of No. 82 highway one mile north of Thedford in Bosanquet township, Lambton county, by A.G. Cook Limited.

The eight-foot quarry face exposes medium grey to blue grey, thin-bedded, rubbly-weathering, coquinoid, highly fossiliferous limestone containing white chert. Chert may be seen standing out on weathered surfaces. The quarry floor exposes blue grey shale. The limestone and shale belong to the Hamilton formation of Devonian age.

Chemical analysis of a chip sample of the eight-foot limestone face is given in (51):

(51) CHEMICAL ANALYSIS - COOK QUARRY

SiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	LOI	SO_3	Total
14.82	2.88	0.18	0.46	44.68	36.04	0.08	99.14

The eight-foot face is drilled on a 6 by 6 foot pattern by Air Trac drill. A portable Cedarapids crushing and screening plant is employed to produce crushed stone mainly for road construction.

Bibliography

Best, E.W.
1953: Pre-Hamilton Devonian stratigraphy of southwestern Ontario; unpublished Ph.D thesis, University of Wisconsin.

Bolton, T.E.
1957: Silurian stratigraphy and paleontology of the Niagara escarpment in Ontario; Geol. Surv. Canada, Memoir 289.

Goudge, M.F.
1938: Limestones of Canada - Pt. IV, Ontario; Canada Dept. Mines and Resources, Bureau of Mines, Bull. 781.

Hewitt, D.F.
1960: The Limestone industries of Ontario; Ontario Dept. Mines, Ind. Mineral Circular No. 5.

Satterly, J.
1943: Mineral occurrences in the Haliburton area; Ontario Dept. Mines, Vol. LII, pt. 2.
1945: Mineral occurrences in the Renfrew area; Ontario Dept. Mines, Vol. LIII, 1944, pt. 3.

Wilson, A.E.
1946: Geology of the Ottawa - St. Lawrence lowland; Geol. Surv. Canada, Memoir 241.

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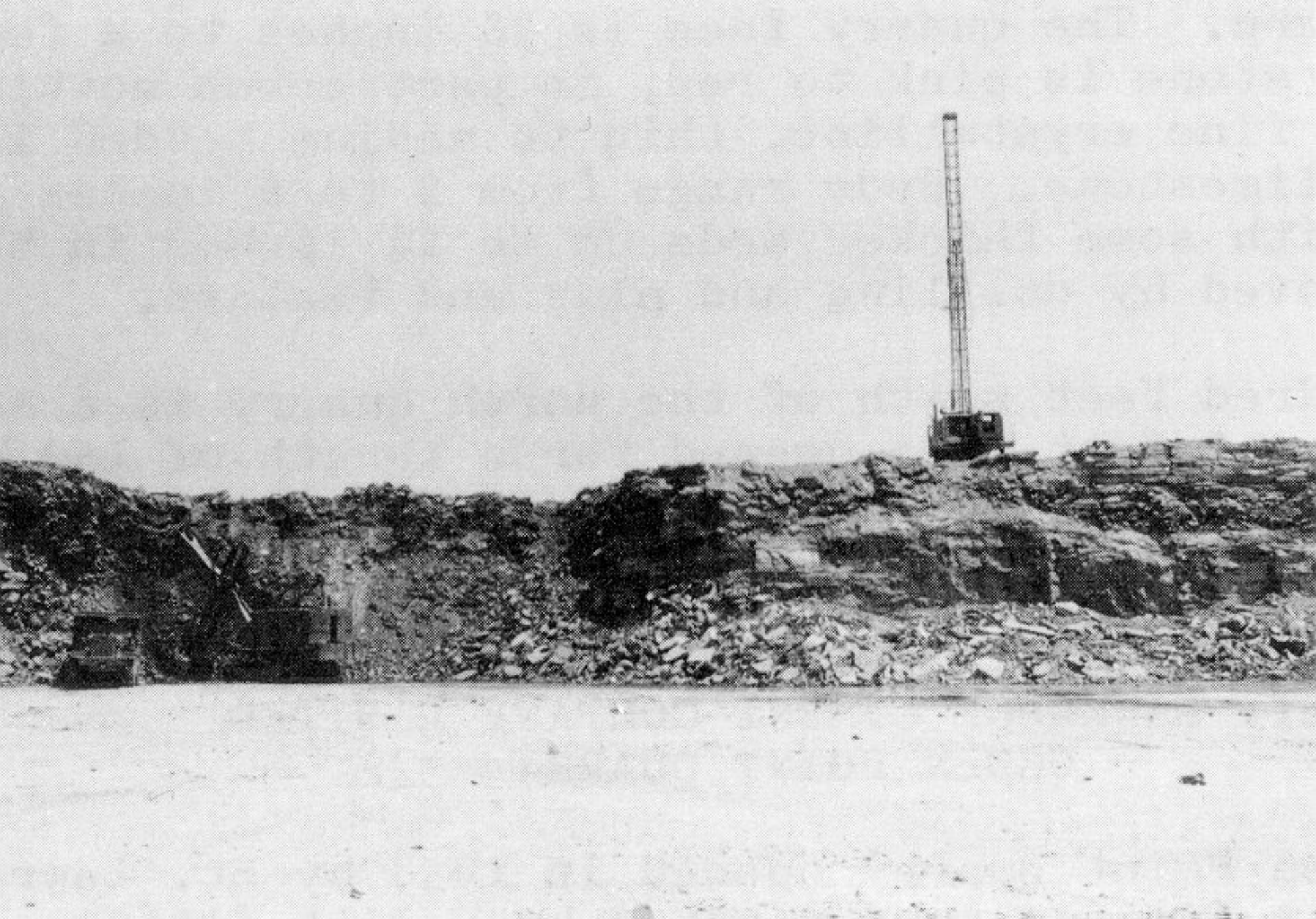

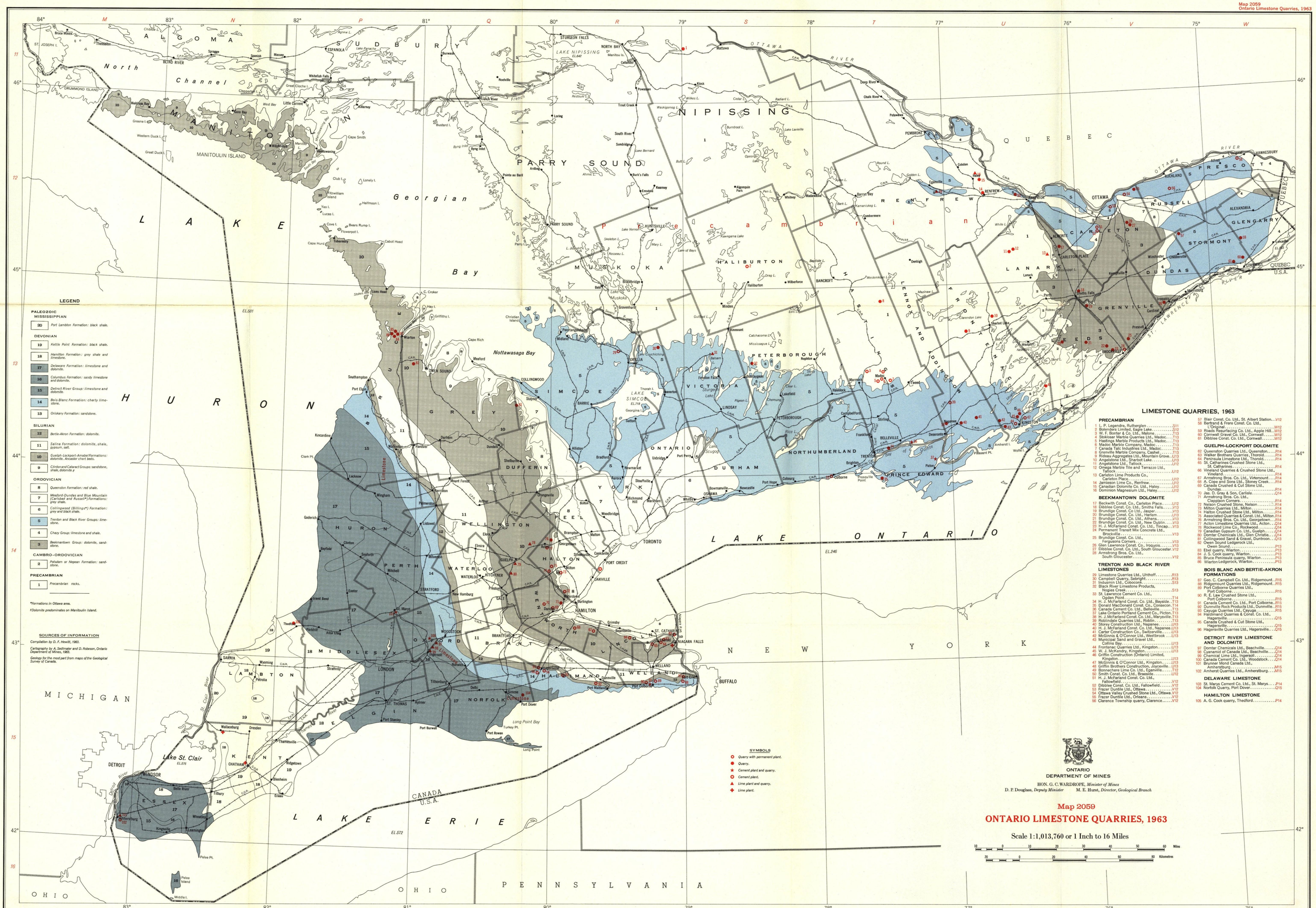

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