ONTARIO

DEPARTMENT OF MINES

SAND AND GRAVEL
IN
SOUTHERN ONTARIO
1967-68

By

D.F. HEWITT and W.R.COWAN

INDUSTRIAL MINERAL REPORT 29

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SAND AND GRAVEL IN SOUTHERN ONTARIO, 1967-68

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Map 2184 - Sand and Gravel Pits in Southern Ontario, 1967-68.
Scale, 1 inch to 16 miles.

Foreword

This report is the 1968 supplement to Industrial Mineral Report No. 11, Sand and Gravel in Southern Ontario, published in 1963, as a result of surveys carried out in 1961 and 1962. Field work for this report was carried out during parts of the summers of 1967 and 1968 by D.F. Hewitt, W.R. Cowan, G.R. Guillet and M.A. Vos. Gravel pits in central and eastern Ontario were mainly visited by D.F. Hewitt; and pits in southwestern Ontario by W.R. Cowan. Pits in the Ottawa area, the Bruce peninsula and the Stratford area were examined by M.A. Vos. Pits at Renfrew, Arnprior, Petawawa and the Parry Sound District were visited by G.R. Guillet.

In Southern Ontario 380 gravel pits were visited and examined. In the accompanying report 124 pits belonging to 77 companies are described. The pits described are mainly selected from companies producing over $100,000 worth of sand and gravel annually, as listed in statistical returns to the Ontario Department of Mines for the year 1966. The remaining 256 gravel pits are described in a report which is on open file and available for examination at the Ontario Department of Mines offices in Toronto.

The authors wish to thank the sand and gravel producers for their co-operation in this survey. Considerable assistance was given by A. Rutka and Z. Katona of the Materials and Testing Division of the Ontario Department of Highways.

SAND AND GRAVEL IN SOUTHERN ONTARIO, 1967-68

by

D.F. Hewitt[1] and W.R. Cowan[2]

Introduction

In recent years there has been a substantial expansion of the sand and gravel industry in Ontario. Production has increased from 70,208,199 tons valued at $40,344,071 in 1961, to 94,751,250 tons valued at $67,664,191 in 1967. This amounts to an increase in value of 70 percent in six years. In 1967 approximately 77 companies and individual operators produced over $100,000 worth of sand and gravel in Southern Ontario. Several hundred smaller pits were worked by local operators and contractors, often on an on-demand basis by portable plants. Several large operators do custom crushing for individuals, counties and townships. It is estimated by the authors that there are probably several hundred small pits, in intermittent operation, which are unrecorded in the statistical files.

Most of the larger producers have permanent plants, but a large proportion of the total sand and gravel production from medium-sized and small producers comes from portable crushing and screening plants. These plants are widely used by contractors for road contracts, where large tonnages of granular base course and surface course gravel are required.

The principal uses for sand and gravel are: for fill, granular base course and surface course in roads; aggregates in asphalt construction; coarse and fine aggregates in concrete; mortar and concrete blocks; and fill. Specifications for sand and gravel to be used in concrete and asphalt construction are becoming stricter, and the presence of deleterious materials, such as chert and shale, restrict the markets for gravel from some areas of the province. Benefication of sand and gravel to remove deleterious materials from sand and gravel is being practised in places in Ontario.

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Round and crushed gravel competes with crushed stone as a coarse aggregate for concrete, preference mainly depending upon cost and availability. Concrete made with round stone aggregate is easier to work especially where concrete is placed in confined spaces. However, the irregular surfaces of the crushed aggregate give slightly better binding qualities and increased strength to the concrete.

Deposits of sand and gravel are widespread in Southern Ontario. Because sand and gravel are low-priced commodities, sand and gravel producers are commonly localized near urban areas. In the Toronto area, it is becoming increasingly difficult to find sources of good quality sand and gravel. Gravel suitable for concrete aggregate is shipped into Toronto by rail from as far west as Paris, and from as far east as Brighton. Resources of high quality gravel are scarce in Toronto, the nearest source being the Stouffville area. The price of sand and gravel in Metropolitan Toronto is made up of approximately 40 percent for the material and 60 percent for the cost of haulage to the site. These figures vary from area to area within Metropolitan Toronto.

(I) Production of Sand and Gravel in Ontario, 1945 - 1967.

Year	Tonnage	Value
1967	94,751,250	$ 67,664,191
1966	94,123,982	67,254,821
1965	88,564,687	63,405,954
1964	76,917,396	54,589,444
1963	80,259,750	56,338,204
1962	76,600,813	52,365,204
1961	70,208,199	40,344,071
1960	77,660,833	43,929,708
1959	73,981,703	39,695,602
1958	67,469,064	40,055,031
1957	66,129,158	36,699,895
1956	61,436,363	34,379,015
1955	51,488,067	29,949,730
1954	46,433,191	25,577,612
1953	43,658,099	24,359,496
1952	43,423,737	23,240,203
1951	39,218,058	19,905,293
1950	30,278,234	15,553,186
1949	22,320,753	11,214,136
1948	20,587,398	10,468,216
1947	20,230,499	9,034,131
1946	14,880,006	6,738,695
1945	10,466,891	4,466,862

The output of sand and gravel from 1961 to 1967 came from the sources given in (II).

(II) Output of Sand and Gravel in Ontario

Source		1961	1962	1963	1964	1965	1966	1967
Private Pit operators	tons	30,905,527	37,742,342	41,033,231	42,406,064	53,939,630	60,179,741	54,933,565
	$	21,237,199	27,102,169	30,265,051	31,552,711	38,482,968	43,093,266	40,701,703
Dredged from the Great Lakes and Rivers	tons	1,123,897	1,074,148	1,003,666	1,264,731	1,479,324	1,320,255	1,057,651
	$	1,380,597	1,257,201	1,158,613	1,563,194	1,750,842	1,584,306	1,144,852
Ontario Department of Highways	tons	24,395,141	21,123,800	23,802,679	19,876,157	19,914,573	19,322,120	25,832,370
	$	10,977,813	15,842,850	17,852,009	14,907,118	16,686,700	16,041,408	19,374,278
Counties and Townships	tons	12,214,371	14,820,156	13,033,912	12,211,227	12,003,199	12,821,163	12,534,787
	$	6,107,186	7,410,078	6,516,956	6,105,614	6,001,600	6,410,582	6,267,394
Railway Ballast	tons	1,569,263	1,840,367	1,386,262	1,159,217	1,227,961	480,703	392,877
	$	641,276	752,906	545,575	460,807	483,844	116,259	175,964
Total	tons	70,208,199	76,600,813	80,259,750	76,917,396	88,564,687	94,123,982	94,751,250
	$	40,344,071	52,365,204	56,338,204	54,589,444	63,405,954	67,245,821	67,664,191

Commercial Materials

The main commercial materials produced by sand and gravel operators are the following:

1-inch crushed or round gravel
3/4-inch crushed or round gravel
5/8-inch crushed or round gravel
3/8-inch crushed or round gravel
3/4-inch crusher run gravel
concrete sand
brick sand
asphalt materials
railroad ballast
pit run gravel and fill

Specifications and uses of sand and gravel are given by Hewitt and Karrow (1963, p.6-17). Types of sand and gravel deposits are also described by Hewitt and Karrow (1963, p.17-33). Some suggestions for prospecting for sand and gravel are also given in the 1963 report.

Sand and Gravel Producers 1967

Southern Ontario

The following is a list of 325 sand and gravel producers in 1967 in Southern Ontario, which have been reported to the Ontario Department of Mines.

Sand and Gravel Producers 1967

Southern Ontario

Company or Pit	Location
Aberfoyle Sand and Gravel Ltd.	Preston
Acme Sand and Gravel Ltd.	Orillia
Adams Sand and Gravel Ltd.	Chatham
Angelstone Limited	Preston
Aprile Contracting Ltd.	Stouffville
Armstrong Bros. Co. Ltd.	Brampton
Attridge pit	Bothwell
Avery, M.L.	Beaverton
Axford, K.R., Sand and Gravel	St. Thomas
Baker Sand and Gravel	Oak Ridges
Bancroft Concrete Products	Bancroft
Bannerman, H.	Kincardine
Barnes Gravel Supply	Sarnia
Bassett, Harold	Trenton
Beamish, K.J., Construction Co. Ltd.	Thornhill
Bell, W.J., and Son	Stittsville
Bennett, W.B., Paving and Materials Ltd.	Oshawa
Bertrand & Frere	L'Orignal
Billie Construction Co. Ltd.	Ottawa
Black, David	Grand Valley
Blacktop Construction Ltd.	Bridgeport
Blair, A.L., Construction Ltd.	Moose Creek
Blair, Milton	Arnprior
Blair Sand and Gravel Products Ltd.	Galt
Bowmanville Sand and Gravel	Bowmanville
Braas Brothers	Niagara Falls
Brant County	Burford
Brantford City	Brantford
Brantford Township	Brantford
Brazeau pit	Ottawa
Brennan Paving Co. Ltd.	Hamilton
Browning, Mel	Churchill
Brundige Construction Co. Ltd.	Frankville
Burke pit	Ottawa
Burnside, C.	Ottawa
Byron Stone	London

Company or Pit	Location
C. and L. Equipment Rentals	Huntsville
Cable, H.	Forest
Caledon Sand and Gravel Ltd.	Caledon
Campbell, Max	Ilderton
Campbellville Gravel Supply Ltd.	Campbellville
Cam, W.	Hensall
Caradoc Township	Komoka
Cardinal Construction Co. Ltd.	Cardinal
Carpenter Sand and Gravel	London
Caston, T.	Wyevale
Cayuga Quarries Ltd.	Simcoe
Chamberlain pit	Gravenhurst
Chefero, J., Sand and Gravel Ltd.	Maple
Clark, R.S., and Son	Ingersoll
Cleveland, Roy	Cedar Springs
Collingwood Sand and Gravel	Collingwood
Commercial Sand and Gravel Ltd.	Stouffville
Conert Construction Ltd.	Napanee
Connor Transport Ltd.	Maple
Consolidated Sand and Gravel Ltd.	Toronto
Conway, Robert	Embro
Cook, Allan G.	Barrie
Cook, H.E.	Stirling
Cooke, J., Concrete Blocks Ltd.	Aldershot
Cookson Construction Ltd.	Simcoe
Coon Brothers	Gravenhurst
Cooney Sand and Gravel	Frankford
Cooper, H.	Watford
Cope, A., and Sons Ltd.	London
Coppins Sand and Gravel	Uxbridge
Corbett, J.N., Gravel Supply	Mt. Elgin
Cox Construction Ltd.	Guelph
Coyle, F.S.	Lakefield
Crawford-Ontario Sand and Gravel Ltd.	Maple
Davey Gravel Co.	Orillia
Dennis, C.M.	Monkton
Dereham Township	Tillsonburg
Dibblee Construction Co. Ltd.	Ottawa
Dick, Jas., Construction Co. Ltd.	Bolton
Dobbs, Roy	Arthur
Doey Gravel and Construction Ltd.	Cedar Springs
Donegan, H.F.	Listowel
Dorion-Anderson Asphalt Ltd.	Midland
Doughty, T.F.	Peterborough
Duff, J.C., Ltd.	Rexdale

Company or Pit	Location
Dunseith Brothers	Woodstock
Durham Stone and Gravel Ltd.	Durham
Eagleson, J.	Cobourg
Edgewater Construction Co.	Sarnia
Ennis, B., Sand and Gravel	Orillia
Enniskillen Township	Petrolia
Erie Concrete Products Ltd.	London
Erie Sand and Gravel	Kingsville
Elliott, G.	Clinton
Essex County	Leamington
Farrow, Clinton	Newtonville
Fennel pit	Picton
Ferguson, A.R.	Gravenhurst
Finch, W. and Sons	Bracebridge
Flintkote Co. of Canada	Paris
Fonthill Sand and Gravel	Fonthill
Forbes pit	Lions Head
Forwell Ltd.	Kitchener
Foster, R.R., and Sons	Ottawa
Fowler Construction Co. Ltd.	Bracebridge
Franceschini Brothers Const. Co. Ltd.	Cooksville
Frazer Duntile Ltd.	Ottawa
Gagne, C.	Casselman
Galt Sand and Gravel	Galt
Gemmell, K.	Lanark
General Concrete Ltd.	Goodwood
Gibbs Brothers	Parkhill
Gilbert, K.	Ailsa Craig
Gilmour pit	Mono Mills
Giordano Sand and Gravel	Whitevale
Glendale Sand and Stone	London
Gloucester Township	Ottawa
Gordon, T.	Barrie
Gormley Sand and Gravel	Stouffville
Gough, S.	London
Gould, A.	Renfrew
Grandmaitre, D.	Eastview
Grant, Hugh	Ottawa
Greenwood Construction Co. Ltd.	Orangeville
Griffin Bros. (Gananoque)	Gananoque
Griffin, Frank	Barrie
Guelph Sand and Gravel	Guelph
Halton County	Milton
Hamilton, A.F.	Woodstock

Company or Pit	Location
Hancock Sand and Gravel	Sunderland
Harnden and King Construction Ltd.	Cobourg
Hartholm Farm	Woodstock
Harwich Township	Blenheim
Hayward and Picket	Milton
Hess, I.A.	Brougham
Highland Creek Sand and Gravel Ltd.	West Hill
Hillis, T.H.	Grand Valley
Hodgins Bros.	Parkhill
Hoffer, E.S., and Sons	Elmira
Hoffman Concrete Products Ltd.	Renfrew
Holman Construction Co. Ltd.	Rockwood
Hopkins Sand and Gravel	Foxboro
Huffman, G.F.	Cedar Springs
Hunt Builders Supplies	Lambeth
Hurds Sand and Gravel	Parry Sound
Huron Gravel Ltd.	Chatham
Innisfil Gravel Supplies	Barrie
Isaac, K.	Thedford
Johnson Bros. (Bothwell) Ltd.	Bothwell
Johnson, Ed., Construction Ltd.	Sarnia
Johnson pit	Kingston
Johnston, G.M.	Renfrew
Jones Bros.	London
K. and E. Sand and Gravel	Sarnia
Kasaboski, B.	Renfrew
Keillor Const.	Dorchester
Kennette Contracting	Tecumseth
Kerr, J.E.	Wingham
Keyes, C.S.	Woodstock
Keystone Contractors	Windsor
King, E.C., Contracting Ltd.	Owen Sound
King Paving and Materials Ltd.	Oakville
Kingston Sand and Gravel	Kingston
Kinsale Sand and Gravel	Kinsale
Kling, Frank	Seaforth
Lafontaine Sand and Gravel	Penetang
Lake Erie Sand and Gravel	Merlin
Lambton County	Petrolia
Lantz, John C.	Gads Hill
Lasby Sand and Gravel	Preston
Lavis Contracting Co.	Clinton
Lawrence, C.	Utterson
Leamington Sand and Gravel	Leamington
Lee Sand and Gravel	Stouffville
Lennox Sand and Gravel	Wilton

Company or Pit	Location
Livingston Sand and Gravel	Brampton
Lobo Development	Komoka
Lockyer Bros.	Alton
Macklaim's Construction Company	Parry Sound
Mann Construction Limited	Guelph
Markham Sand and Gravel	Markham
Marshall, J.F., and Sons Ltd.	London
Martin, Harold, Construction Ltd.	New Lowell
Martin, J.A.	Paris
Martini Sand and Gravel	Preston
Mathews, K.	Forest
Maurer and Klages	Hanover
Mawson, R.	Parkhill
McClellans Sand and Gravel	Kilworthy
McColgan Sand and Gravel	Barrie
McCoy, A.H.	Stittsville
McDougall, A.	Palmerston
McFarland, H.J., Construction Co. Ltd.	Picton
McGibbon, R.	L'Amable
McGuffin, W.W.	London
McInnis, J., Sand and Gravel	Sarnia
McIntyre, C.	London
McKay, D.	Bridgenorth
McKendry, J.W.	Kingston
McKenzies Sand and Gravel	Collingwood
McLaughlin and Sons Ltd.	London
McLaws Gravel and Crushing Ltd.	St. Thomas
Meier, Jack, Sand and Gravel	Campbellford
Menary Construction Co.	Brantford
Meyers, R.W.	Prescott
Mill Lake Stone	Parry Sound
Miller Paving Ltd.	Toronto
Moffat Construction and Materials Ltd.	Ottawa
Moffat pit	Picton
Moyer Sand 1965 Ltd.	Fonthill
Murray Construction Ltd.	Harriston
Murray, J.E.	Moorefield
Nairn Bros.	St. Marys
Nelson, Fred, and Sons Ltd.	Keene
Newbiggin, A.	Komoka
Nichols, G.I., Gravel Supply	Delhi
Nixon pit	Lions Head
Norfolk Quarry	Simcoe
North Eastern Paving Materials	Petawawa
Ormell Sand and Gravel	Fenelon Falls

Company of Pit	Location
Orr Unsworth Ltd.	Ottawa
Oshawa Paving	Oshawa
Otto Construction Co.	Tavistock
Oxford Sand and Gravel	Woodstock
Parkway Sand and Gravel	Toronto
Parton Sand and Gravel	Parry Sound
Patterson Bros.	Grand Bend
Patterson, Lorne	Utterson
Peel Sand and Gravel	Cooksville
Penetang Sand and Gravel	Penetang
Pickering Township	Claremont
Pilon, B.	Elmvale
Pinewood Aggregates	Maple
Playfair, J.	Lanark
Polzier pit	Brantford
Premier Building Materials	Toronto
Preston Sand and Gravel	Preston
Price, S.A.	Kemptville
Prince Edward County pit	Picton
Pyne, V.	Ridgetown
Radford, G.	Blyth
Raleigh Township	Cedar Springs
Regan, J.B.	Toronto
Reid pit	Stirling
Reid Sand and Gravel	Pontypool
Richardson's pit	Pontypool
Riddell, A.L.	Kinburn
Riverside Construction Co.	London
Roberts, F.H., and Sons Ltd.	Unionville
Robertson Sand and Gravel Ltd.	Waterford
Rockmor Products Ltd.	Maple
Rockway Holdings	Kitchener
Royel Paving Ltd.	Lindsay
Ruckle, V.W., Construction Ltd.	Brownsville
Rump Sand and Gravel	Ottawa
Rydall pit	Lions Head
Sabiston, Jas.	Thornhill
Salisbury Sand and Gravel	Brampton
Sandore Gravel Co.	Schomberg
Sandy Contracting Ltd.	Goderich
Schneider Sand and Gravel	Kitchener
Schwandt Construction Ltd.	Caledon
Schultz pit	Nobleton
Scott, D.	Ailsa Craig
Seegmiller, E. and E., Ltd.	Kitchener

Company or Pit	Location
Seeley and Arnill Ltd.	Wasaga Beach
Sharpe Bros.	Odessa
Shelton Bros.	Ingersoll
Shouldice pit	Lions Head
Skinner, Robt.	Huntsville
Sleeman Bros. Sand and Gravel	Port Hope
Smith, H.	Ridgetown
Smith, W.	Ancaster
Smith, W.D., and Sons	Oshawa
Smith's Construction Ltd.	Arnprior
South Dumfries Township	Paris
Southwinds Development Co.	London
Spinks Gravel Ltd.	Leamington
Spragges pit	Kettleby
Spratt Sand and Gravel	Ottawa
Springbank Sand and Gravel Ltd.	Clarkson
Standard Paving Ltd.	Ottawa
Stewart, H.C.	Komoka
Stewart, R., Construction Ltd.	Orillia
Stonehouse, L.A.	Sarnia
Strickler, R.	Wilsonville
St. Davids Sand and Gravel	Thorold
Sunderland Sand and Gravel	Sunderland
Superior Sand Gravel and Supplies Ltd.	Maple
Sutherland, W.J.	Bond Head
Sweets Sand and Stone Ltd.	Seeleys Bay
Talbot Sand and Gravel	St. Thomas
Tanner, A.	Stratford
Teedons Sand and Gravel	Midland
Telephone City Gravel Co.	Brantford
Thompson, R.	Bobcaygeon
Thompson, R., Sand and Gravel	Burks Falls
Thomson Bros. Construction Ltd.	Campbellford
Thornton, G.B.	Woodstock
Thurston, M.	Sarnia
Totten, L., and Co.	Renfrew
Towland Construction Ltd.	London
Townsend Township	Waterford
Tree, A.	Woodstock
Trenton Aggregates	Trenton
Trenton Gravel Products	Trenton
Trent Valley Sand and Stone	Brighton
Triangle Paving Ltd.	Port Credit
Tripp Construction Co. Ltd.	Whitby
Turnbull, L.	Grand Bend

Company or Pit	Location
Uxbridge Township	Goodwood
Varcoe, Cliff, Ltd.	Barrie
Vogler, N.	Ridgetown
Warder pit	Lions Head
Warnock and Johnson	Markham
Warren Bituminous Paving Co. Ltd.	Kitchener
Waterford Sand and Gravel	Waterford
Watt, M.	Huntsville
Weber, R. & P., Concrete Products Ltd.	Kitchener
West, C., Sand and Gravel	Sarnia
White's pit	Huntsville
Wight, H.	Princeton
Wilkinson, G.A.	Huntsville
Woolatt Industries Ltd.	Windsor
Wright, W.J.	Wardsville
Young, G.	Powassan
Young, R.A., Sand and Gravel	Huntsville
Yundt Bros.	Stratford
Yundt & McCann	Stratford

Descriptions of Sand and Gravel Pits

In the following section 124 sand and gravel pits belonging to 77 companies are briefly described. These pits are mainly selected from companies producing over $100,000 worth of sand and gravel annually as listed in statistical returns to the Ontario Department of Mines for the year 1966. The remaining 256 sand and gravel pits examined are described in a report which is on open file and available for examination at the Ontario Department of Mines offices in Toronto.

The following frequency scale is used in pebble counts of gravel:

Flood	over 50%
Abundant	25 - 50%
Common	10 - 25%
Scarce	5 - 10%
Rare	2 - 5%
Very rare	less than 2%

ESSEX COUNTY

Erie Sand and Gravel Company

This pit is located on lots 1 and 2, concession II, Mersea Township, Essex County about 1½ miles northwest of Leamington. The deposit is thought to be in a glacial Lake Arkona beach. Reserves are large.

The water table is located about 15 to 20 feet below the present surface and overburden is 2 feet thick. Interstratified sand, granule and pebbles form a very complex face with numerous crossbeddings generally dipping easterly. Gravel content is variable between 15 and 30 percent in fine stone with a maximum size of 3 inches. Ten percent of the stone exceeds one inch. An eight foot face consists of medium gravel and sand containing 60 percent stone and 40 percent sand. Twenty percent of the gravel exceeds 1 inch and the maximum size is 4 inches. Cementation which occurs in some gravel lenses breaks down on handling.

A clay band 3 to 6 inches thick is found in the western portion of the pit; this poses some problems in extraction.

A pebble count gives the following assemblage: Limestone (flood); dolomite (common); chert (scarce); sandstone (very rare); quartzite (rare); shale (rare); siltstone (very rare); Precambrian basic igneous rocks (scarce); Precambrian acidic igneous rocks (scarce); and Precambrian metamorphic rocks (rare).

Excavation is by a front end loader or by a 7/8 yard dragline if material from below the water table is being used. The material is trucked to the processing plant where it is dumped into a hopper and conveyed to a 3 deck Dillon 4 by 10 foot screen. Screen sizes are varied to suit needs. Washing water is provided by two 6 inch pumps and dewatering is by a Wemco screw. Concrete sand goes to a radial stacker and stone is conveyed to stockpiles. Plaster sand is screened out separately.

Products include B road gravel, round stone of various sizes, concrete sand and mortar sand. Haulage is by truck.

Kennette Contracting Company Limited

Two pits are being worked in gravel deposits which are thought to be beaches of glacial Lake Warren. The first of these (Manchester Pit) is located on lot 1, concession IV, Mersea Township, Essex County, adjacent to Leamington Sand and Gravel. Reserves are nearly depleted with bedding sand and pit run sand and gravel comprising the only products. The deposit is flooded as the water table is only 8 feet below the surface.

A pebble count from this deposit gives the following assemblage: Limestone (abundant); dolomite (scarce); sandstone (rare); quartzite (very rare); chert (rare); shale (rare); siltstone (very rare); Precambrian acidic igneous rocks (common); Precambrian basic igneous rocks (common); and Precambrian metamorphic rocks (rare).

Excavation is by dragline at this pit. The processing equipment located at this pit is used to process material trucked from the second pit. The material is fed into a hopper conveyer by a Caterpillar 950 loader. After passing over a screen which removes the oversize stone the material goes to a 3 deck rotary screen at which time it is also washed. One and one quarter inch oversize stone, ¾ inch stone, 3/8 inch stone and sand are separated. The stone goes to stockpiles; the sand goes to a rotary screen with two dewatering screws made by Parker Plant Viaduct Works where the concrete and mortar sand are separated, dewatered, and conveyed to stockpiles.

The second Kennette pit is located on lot 19, concession IV, Gosfield South Township, Essex County. The water table is 8 feet below the surface.

Stripping operations were underway at the time the pit was visited and construction of a new Cedarapids screening and washing system is underway to replace the operation at the first pit. The gravel was poorly exposed; one six foot face consists of crossbedded sands and fine gravels dipping southeasterly. Eighty percent of the material is sand and 20 percent gravel of which 10 percent exceeds 1 inch in diameter. Cobbles have a maximum size of 3 to 4 inches but erratic boulders up to 4 feet in diameter are occasionally encountered.

The material is excavated by a Caterpillar 950 loader and dumped into a hopper with a 2 inch grizzly screen. The material

is then conveyed to trucks which take the pit run material to the plant at the first pit.

Spinks Gravel Limited

This operation is located in a gravel beach deposit which is probably of Lake Arkona age. The plant, which is no longer operated because reserves are nearly depleted, is located on lot 12, concession III, Gosfield South Township, Essex County. Concrete sand and mortar sand from former processing are still sold from stockpiles.

A pit which provides pit run sand and fill is located on lot 12, concession II, Gosfield South Township, Essex County. A 10 foot face consists of crossbedded medium to fine sand with no gravel. Overburden consists of 2 feet of fine, weathered gravel.

The operation is described by Hewitt and Karrow (1963, p.122).

Woolatt Industries Limited

This pit is located on lots 1 and 2, concession II, Mersea Township, Essex County. The pit is found at an altitude of about 725 feet which is the height for glacial Lake Arkona beaches in this area as suggested by Chapman and Putnam (1966). An unconfirmed report states that mastodon bones were removed from this pit many years ago. Present reserves are limited due to property lines.

Five feet of poorly sorted crossbedded gravel dipping northeast at about 20 degrees form the upper unit of a 15 foot face. This contains about 15 percent stone of which 10 percent exceeds 1 inch in diameter and the maximum size is 3 inches. This is underlain by 10 feet of horizontally interstratified sand and pebble layers containing 95 percent sand. Overall composition of the face is 95 percent sand and 5 percent stone. The maximum pebble size noted was 3 inches and only 5 percent of the stone exceeds 1 inch in diameter.

A pebble count from the 1 inch oversize pile gives the

following assemblage: Limestone (flood); dolomite (common); chert (scarce); quartzite (rare); sandstone (very rare); shale (rare); siltstone (very rare); Precambrian acidic igneous rocks (scarce); Precambrian basic igneous rocks (scarce); and Precambrian metamorphic rocks (rare).

A sand sample obtained from this pit gives a sieve analysis as shown in (1).

(1) Woolatt Industries Limited

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200
Weight Percent	-	-	0.3	4.4	27.5	61.2	4.3	2.3

Excavation is by a ¾ yard dragline from the top of the face; from here the material is trucked to the screening-washing plant where it is dumped into a hopper-conveyer. The material is conveyed to a 3 deck vibrating screen where it is also washed; the products are 5/8 inch and 3/8 inch stone and minus 1/4 inch sand. The sand is further washed and screened to give concrete and mortar sand. The oversize stone is used for bedding stone or is crushed by a portable Pioneer crusher to produce 5/8 inch stone.

Stone for the pre-mix plant located at the site is brought in. Haulage is by truck.

The operation is described by Hewitt and Karrow (1964, p.122).

KENT COUNTY

Adams Sand and Gravel Limited

This pit is located in lots 16 and 17, concession XII, Harwich Township, Kent County, near Pinehurst, Ontario. The deposit is apparently located in deltaic materials laid down in glacial Lake Warren 12,000 to 13,000 years before the present.

The pit is largely flooded with the water table located

12 to 15 feet below the surface. Fifty to 55 feet of gravel overlies black shale of the Kettle Point Formation; a fact which is reflected in the pebble lithology.

Composition of the gravels and sands varies considerably along the length of the pit - about ½ mile. The operation at the western end produces 40 to 50 percent sand while at the northeastern end of the pit the material is more than 80 percent sand. A 12 foot face at the northeastern end consists of southwesterly dipping, crossbedded medium to coarse sands with a few enclosed layers of fine gravel. The estimated composition of this face was 95 percent sand and 5 percent gravel. The maximum boulder size noted was 8 inches in diameter. A pebble count on partially crushed one inch oversize material shows the following assemblage: Dolomite (common); limestone (abundant); shale (abundant); chert (rare); Precambrian acid igneous rocks (scarce); Precambrian basic igneous rocks (scarce); Precambrian metamorphic rocks (scarce).

A sieve analysis of a sand sample obtained from this pit is given in (2).

(2) Adams Sand and Gravel Limited.

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	0.7	9.7	27.8	34.8	18.6	7.0	0.3	1.1

Extraction of material is by two Sauermann slack line 2 yard scrapers, each capable of excavating 600 yards per day. The first of these is located at the south western end of the pit. The material is dumped directly into a hopper and passes over a 1½ inch screen. Oversize goes to a Sawyer-Massey jaw crusher and recirculates while undersize is conveyed directly to a Simplicity screening system which has a Pioneer roll crusher included in the circuit. Products are 3/8 inch, 3/4 inch, and oversize stone and concrete sand.

The operation at the northeastern end of the pit produces 1/4 inch, 3/8 inch, 3/4 inch and oversize stone as well as concrete sand which accounts for 80 percent of the production. Material from the scraper is conveyed to a rotary screening unit where it is washed and screened. The sand passes through a double-screw dewatering system. Washing water is pumped

from a pond and returns to the pond after passing through a settling basin.

The property is described by Hewitt and Karrow (1963, p.122).

LAMBTON COUNTY

E. Johnston Construction

Two pits are being operated by this company. The first of these is located on lot 9, concession VIII, Plympton Township, Lambton County. The gravel is a beach deposit of glacial Lake Warren. Overburden consists of 2 feet of weathered sand and gravel.

One 6 foot face has an upper unit consisting of 4 feet of sand and pebble gravel all of which is less than 1 inch in diameter. This is underlain by 2 feet of fine gravel of which 10 percent exceeds 1 inch in diameter and the maximum size is 3 inches. Overall composition of this face is 80 percent sand and 20 percent gravel. The maximum size of cobbles is 3 inches and less than 5 percent of the pebbles exceed 1 inch in diameter. There is some clay in the gravel.

Pit run gravel is the only product.

A second pit is located on lot 42, concession IX, Sarnia Township, Lambton County about ½ mile west of Blackwell. This deposit is apparently part of a Lake Algonquin beach.

The entire pit is flooded and no faces are available for examination. The gravel fraction is reported to be nearly depleted; it is estimated that about 15 percent of the material is stone of which 10 percent exceeds 1 inch in diameter and the maximum size is 3½ inches. The pebble and cobble fraction is made up of considerable amounts of limestone, dolomite and Precambrian rocks and of lesser amounts of chert, siltstone and shale.

A sieve analysis of a sand sample from this pit is given in (3).

(3) E. Johnston Pit

		-4	-8	-14	-28	-48	-100	-200
Mesh	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	1.9	1.9	2.6	3.7	13.4	67.0	7.6	1.9

The material is recovered from the pond by a dragline.

Products include pit run sand and fill. Haulage is by truck.

ELGIN COUNTY

McLaws Gravel and Crushing Limited (McKinley)

This pit is located on lot 16, concession IV, Yarmouth Township, Elgin County. The deposit is located at or slightly above the 800 foot contour on the south side of the Sparta moraine and is possibly a beach deposit of glacial Lake Whittlesey. The material has a thickness of 8 to 10 feet and is overlain by 2 to 3 feet of topsoil.

One 10 foot face consists of horizontally stratified medium gravels which are not well sorted. Some south-dipping crossbeds were noted. The composition of this face is 60 percent sand and 40 percent stone. Forty percent of the stone exceeds 1 inch and 5 percent exceeds 4 inches; the maximum cobble size is 6 inches. Fine sand is generally lacking.

A second 6 foot face consists of stratified sand and gravel containing 80 percent sand and 20 percent stone. Fifteen percent of the stone exceeds 1 inch in diameter and the maximum size is 3 inches.

A pebble count from this pit gives the following assemblage: Limestone (abundant); dolomite (common); chert (common); siltstone (very rare); shale (very rare); sandstone (rare); Precambrian acidic igneous rocks (rare); Precambrian basic igneous rocks (rare); and Precambrian metamorphic rocks (scarce). The pebbles are generally rounded to well rounded.

A sieve analysis of a sand sample taken from this pit is given in (4).

(4) McLaws Gravel and Crushing Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	1.2	10.6	31.5	38.4	15.9	1.4	0.1	0.9

Products from the pit include pit run gravel, crusher run gravel and fill. Excavation is by a Linkbelt power shovel and crushing by a Universal 880 Senior portable crusher. An Allis Chalmers Tracto-Shovel is used for other work at the pit and haulage is by truck.

MIDDLESEX COUNTY

J. F. Marshall and Sons Limited

Sand and gravel is being extracted from five pits located in an outwash sheet related to the Thames Valley spillway.

The first of these is located on the Fanshawe park road, lots 3 and 4, concession IV, London Township, Middlesex County. Extensive workings have created a pit nearly ¾ mile in length. A 20 foot face exposes 6 feet of stratified sand and fine gravel with some south-dipping crossbeds. This is 95 percent sand with a maximum pebble size of 2 inches. This is underlain by 15 feet of poorly sorted, horizontally stratified, medium to coarse gravels. Composition of this lower unit is 95 percent stone and 5 percent sand. Maximum boulder size is 8 inches; 10 percent of the gravel exceeds 4 inches in diameter while 50 percent exceeds one inch. Pebbles and cobbles are rounded to well rounded and pebble composition for this deposit is as follows: Limestone (flood); dolomite (common); chert (scarce); Precambrian acid igneous rocks (rare); Precambrian basic igneous rocks (rare); Precambrian metamorphic rocks (rare); siltstone (rare); sandstone (very rare).

Excavation is by a 6 yard Michigan 375A loader and the material is hauled to the plant by trucks where it is dumped into a hopper. A portable Pioneer crusher acts as a primary crusher and mortar sand is also screened off at this point. The remainder of the crusher run material is conveyed to a three deck Cedarapids screen where the material is also washed

with water pumped from a pond. From the screens washed concrete sand is stockpiled, peastone is conveyed to a stockpile and minus 7/8 inch stone is conveyed to a bin and thence to a stockpile. The plus 7/8 inch material passes over a $1\frac{3}{4}$ inch screen and oversize goes to a jaw crusher while undersize goes to a cone crusher. The crushed products pass over a two deck Cedarapids screen to produce peastone; the remainder is recirculated.

A second smaller plant at this pit processes crushed gravel. Material is conveyed to a screening-washing deck where washed concrete sand and stone are separated and conveyed to stockpiles.

A second pit, adjacent to the above, is located on lot 3, concession IV, London Township near Fanshawe Dam. Four feet of overburden overlies 25 feet of poorly sorted, sub-stratified gravel. Stone comprises 80 to 90 percent of the material. Maximum boulder size is 6 inches; 65 percent of the stone exceeds one inch diameter and 10 to 15 percent exceeds 4 inches. A second 25 foot face has 4 feet of topsoil overlaying 6 feet of fine gravel containing only 15 percent stone. This is underlain by 15 feet of the coarse gravel with boulders up to 15 inches present.

An American power shovel feeds a Cedarapids portable crusher to produce 7/8 inch crusher-run gravel at this pit.

A third pit is located on lot 4, concession VI, London Township. Reserves are large and the deposit is the same as that in which the other pits are located. Four to six feet of weathered topsoil overlies 30 to 40 feet of medium to coarse gravels which are poorly sorted and horizontally stratified. Composition of one face is estimated to be 85 to 90 percent stone, 10 percent sand and up to 5 percent clay and silt. The maximum size of boulders seen was 7 inches; 10 percent of the gravel exceeded 4 inches in diameter and 55 percent exceeded one inch. Pebbles and cobbles are rounded to well rounded but very variable in shape. A pebble count from this face shows the following assemblage: Limestone (flood); dolomite (abundant); chert (rare); siltstone (very rare); sandstone (very rare); Precambrian basic igneous rocks (scarce); Precambrian acid igneous rocks (very rare); Precambrian metamorphic rocks (scarce).

A sieve analysis of sand from this pit is given in (5).

(5) J. F. Marshall and Sons Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	9.3	22.5	25.4	24.0	10.2	2.6	1.0	5.0

The gravel extends to 6 feet below the present base where clay balls are deleterious. Clay or till probably underlies the gravel. The water table is 8 to 12 feet below the base of present operations.

The gravel is fed into a Nordberg portable crusher with a 4¼ foot Symons cone. The products are ¾ inch stone and minus ¼ inch concrete sand. Construction of a building to house the equipment is underway after which time equipment for washing the stone will be added. An Eagle dewatering screw will be used for the sand.

A fourth pit used for the production of concrete sand is located on lot 5, concession V, London Township. The lower 25 feet of a 30 foot face consists of well sorted, crossbedded medium to fine sands. The crossbeddings are varidirectional but the overall trend suggests a southwesterly flow. A few thin (less that ½ inch) layers of silt and clay occur. Composition of this unit is 95 percent sand and 5 percent stone which has a maximum size of 2 inches.

The top five feet consists of poorly sorted fine gravel. Composition is 40 percent stone and 60 percent sand. Five percent of the gravel exceeds one inch in diameter and the maximum pebble size is 3 inches.

A Euclid 72-31 loader feeds a Cedarapids portable screening plant to produce concrete sand and oversize stone. The sand is stockpiled by truck. A second Seco screen screening plant also is used to produce concrete sand for stockpiling by a Caterpillar 944A loader.

A sieve analysis of a sand sample obtained from this pit is given in (6).

Photo 1 - J.F. Marshall pit, London.

(6) J. F. Marshall and Sons Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	0.4	2.0	5.8	34.8	39.0	16.2	0.9	0.9

The fifth pit operated by Marshall is located on lot 5, concession IV, London Township. This is used primarily for a sand pit.

Riverside Construction Limited

A large number of pits are presently being operated in the London area by this company. One of these is located 1 mile southeast of Byron on the Baseline Road, London, adjoining the Byron Stone pit. The material has the same deltaic origin as that of Byron Stone. Reserves are large; more than 60 feet of gravel is reported to exist below the present working level giving an overall depth of more than 150 feet.

The present working face is at a level below that being worked by Byron Stone. The 18 foot face consisted of poorly sorted, sub-stratified gravel and sand. Crossbedding was present but no overall trend was apparent. The gravel was composed of 50 percent sand and 50 percent stone and in places silt and clay comprised up to 10 percent of the material. The maximum boulder size was 12 inches; 10 percent of the gravel exceeded 4 inches and 40 percent exceeded 1 inch. Boulders and cobbles were rounded to well rounded and largely elliptical in shape. A large number of Precambrian acidic and basic rocks were found in the boulder fraction. Cementation has impeded operations at the upper levels.

A pebble count on ¾ inch stone shows the following assemblage: Limestone (flood); dolomite (common); chert (scarce); shale (very rare); sandstone (rare); Precambrian acidic igneous rocks (rare); Precambrian basic igneous rocks (rare); Precambrian metamorphic rocks (rare).

The processing plant at this pit has a capacity of 1800 tons per day. A 5/8 yard Linkbelt power shovel feeds a portable Cedarapids crusher and screener with 7/8 and 1/2 inch

screens. The minus 1/2 inch fraction is stockpiled for bedding sand and the plus 7/8 inch stone recirculated through the crusher. The 1/2 to 7/8 inch fraction is passed through a rotary screener to provide 7/8 inch stone and minus 1/2 inch material not retrieved by the first screening.

A second Riverside operation is located on lots 48 and 49, concession A, south of Thames River, Westminster Township, Middlesex County, Ontario (G.R. 718584 St. Thomas West).

The deposit is located in valley train gravels related to the Thames River spillway.

A 35 foot face had 5 feet of dirty gravel containing less than 10 percent sand overlying 30 feet of poorly sorted stratified sand and gravel. Stratification was not well developed and some crossbedding was present. The composition of this material was 60 percent sand and 40 percent stone with silt and clay comprising up to 10 percent of the total. The largest boulder noted was 14 inches in diameter; 5 percent of the gravel exceeded 4 inches in diameter and 15 percent exceeded 1 inch.

A pebble count on 3/4 inch pebbles from this face showed the following assemblage: Limestone (flood); dolomite (rare); sandstone (rare); siltstone (very rare); chert (common); Precambrian acidic igneous rocks (scarce); Precambrian basic igneous rocks (scarce).

Blending sand is extracted from a second pit which is closer to the river. Twenty to thirty feet of fine uniform sand has no stratification other than very fine partings. Clay balls up to 5 inches in diameter and pebbles make up to 5 percent of the material; the remainder is sand.

The gravel is extracted by a power shovel and fed into a portable Cedarapids crusher to produce 3/4 inch crusher run at a rate of 12-1400 yards per day. This is trucked to a permanent screening and washing plant where it passes over a triple deck screen, is washed, and the coarse washed sand passed through a dewatering screw. Screens are varied to produce three sizes of stone and coarse sand.

The blending sand is extracted by a dragline and fed into a portable dry screening plant which has a capacity of about 800 yards per day. Pebbles and clay balls are screened out and the sand is trucked to the main plant where it is blended 50 percent with the coarse sand to produce a second grade of sand.

A third operation (Riverside Pit, No. 5) is located on lot 13, concession II, West Nissouri Township, Middlesex County, two miles southwest of Thorndale. The deposit is located in a sheet of glaciofluvial outwash gravels associated with the Thames River spillway. Three feet of weathered gravel overburden overlies 10 to 12 feet of gravel. Water boils at the base of the pit suggest that the water table is near that level.

The 10 foot east face appears to be made up of two gravel units separated by an undulating layer of fine sand and clay suggesting that the gravels may have been deltaically deposited into a proglacial lake with a fluctuating water level. The 6 foot upper gravel unit consist of crossbedded fine gravels and poorly sorted coarse gravels. Estimated composition of this unit is 90 percent gravel and 10 percent sand. The maximum cobble size is 5 inches; 5 percent of the gravel exceeds 4 inches in diameter and 50 percent exceeds 1 inch. The lower gravel unit is 4 to 6 feet thick and consists of crossbedded fine gravels containing up to 10 percent silt and clay. Direction of dip is variable but overall trends suggest that currents were toward the south. The composition of this unit is 60 percent sand and 40 percent stone. Maximum stone size is 4 inches and 20 percent of the gravel exceeds 1 inch.

The north face of this pit consists of southeast dipping, crossbedded coarse gravels. The gravel becomes finer with depth and contains a few pockets of sand and granule. Gravel makes up 85 percent of this face and sand 15 percent. The maximum cobble size is 6 inches; 10 percent of the gravel exceeds 4 inches in diameter and 60 percent exceeds 1 inch.

A pebble count on one inch round stone from this pit gives the following assemblage: Limestone (flood); dolomite (abundant); chert (scarce); Precambrian acidic igneous rocks (rare); Precambrian basic igneous rocks (rare); Precambrian metamorphic rocks (rare).

A sieve analysis of sand obtained from this pit is given in (7).

(7) Riverside Construction Co. Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	1.5	2.7	8.7	27.0	35.7	22.7	1.1	0.6

The material from this pit is excavated by a front end loader and trucked to a permanent processing plant located on lots 5 and 6, concession III, London Township, Middlesex County (Riverside Pit No. 3). The plant can produce 35 different products but usually produces only 5 products at any one time. Plant capacity is 2700 tons in an 11 hour day.

The material is conveyed to a 3 deck Cedarapids 4 by 12 vibrating screen which had 5/16 inch screens in at the time of visit. The plus 5/16 material goes to a Telsmith cone crusher, the 3/16 to 5/16 material is washed and stockpiled as peastone, and the minus 3/16 material is washed and conveyed to an Eagle classifier to obtain mortar sand and concrete sand. Dewatering is by two Eagle dewatering screws. The concrete sand goes to a radial stacker for stockpiling and the mortar sand is conveyed to a stockpile.

Material from the crusher is conveyed to a dry screening plant where dust and rock flour are screened out for use as a filler, tennis court surfacing etc. Five-sixteenths inch oversize recirculates to the crusher and the remaining fraction is conveyed to a vibrating screen and washer where peastone is separated and stockpiled. The sand goes to bins and is trucked out.

The washing water is pumped to and from a pond in the former gravel pit.

Several other pits are operated by the company on a part time basis.

Towland Construction Limited

Outwash gravels associated with the Thames Valley spillway are being worked on lot 7, concession IV, London Township, Middlesex County on the Fanshawe Park road.

Up to 4 feet of weathered sand comprises the overburden. One 19 foot face has 4 feet of medium to coarse sand containing crosslaminations and ripple marks overlying 15 feet of gravel. The gravel is poorly sorted medium to coarse gravel with weakly developed horizontal stratification. This contains 90 percent stone of which 40 percent exceeds 1 inch in diameter and 5 percent exceeds 4 inches. The maximum cobble size is 6 inches but boulders up to 3 feet in diameter have been

excavated. A second 10 foot face has 2 feet of stratified fine sand overlying 8 feet of fine well sorted gravels with some crossbeddings. These dip northeast at 20 to 25 degrees but this is not consistent with dip directions elsewhere in the pit. The gravel unit contains 95 percent stone. Twenty percent of the gravel exceeds 1 inch in diameter and 5 percent exceeds 4 inches; the maximum cobble size is 6 inches.

Minor cementation does not impede operations.

A pebble count from this pit gives the following assemblage: Limestone (flood); dolomite (common); chert (scarce); sandstone (very rare); Precambrian acidic igneous rocks (scarce); Precambrian basic igneous rocks (scarce) and Precambrian metamorphic rocks (scarce). Siltstone was also noted in the face. The pebbles are generally rounded to well rounded.

A sieve analysis of a sand sample obtained from this pit is given in (8).

(8) Towland Construction Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	0.6	1.2	7.5	33.1	49.7	7.1	0.2	0.6

Crushing and screening equipment is brought to the pit to provide stockpiles of crushed and screened stone and gravel. An asphalt plant is also located on the property. Haulage is by truck.

A new pit in the same deposit is located on lot 5, concession IV, London Township.

HURON COUNTY

F. Kling Limited

A sand and gravel pit is operated in an esker deposit in lot 21, concession III, McKillop Township, Huron County,

approximately 1¼ miles northeast of Seaforth. A 20 foot face consists of stratified sand and coarse gravel composed in part of boulders. In the boulder deposit the stone content exceeds 60 percent, and boulders up to 3 feet are found. A pebble count of one-inch crushed stone indicates 90 percent limestone and dolomite, 5 percent acid igneous rocks, 4 percent basic igneous rocks and 1 percent quartz and sandstone.

A crushing, screening and washing plant in lot 22, concession II produces stone, concrete sand and asphalt sand.

George Radford

A gravel pit is operated in a kame deposit by George Radford in lot 25, concession XIV, Hullett Township, Huron County. The face, which is up to 45 feet high, exposes an irregular deposit of sand and gravel. The sand is fine to medium. The gravel predominates near the top of the deposit. In one section of the face an estimated 20 percent of stone occurs. The stone does not exceed 1 foot in diameter; 25 percent of the stone exceeds 4 inches in size and 60 percent exceeds one inch in size. A higher percentage of stone occurs in other faces. The pebbles consist of limestone, dolomite, acid and basic igneous and metamorphic rocks and minor shale.

A portable crushing and screening plant is employed as required.

Joynt Pit

Yundt Brothers

A gravel pit is operated by Yundt Brothers in lot 26, concession XIII, West Wawanosh Township, Huron County, about 1½ miles west southwest of Whitechurch, in a kame deposit. A 25 foot face exposed stratified sand and gravel with locally some beds of clay. The stone content of the face is approximately 50 percent. Boulders do not exceed 1 foot in diameter, with 25 percent of the stone exceeding 4 inches in size, and 50 percent exceeding one inch in size. A pebble count indicated 75 percent limestone and dolomite, 10 percent acid igneous and metamorphic rocks, 6 percent white chert, 5

percent basic igneous rocks, 2 percent soft dolomite and shale, plus minor quantities of sandstone and quartz.

There is a portable crushing, screening and washing plant producing concrete aggregate, concrete sand, HL3 and HL5.

PERTH COUNTY

Yundt and McCann

On the southern outskirts of St. Marys, on the St. Mary's Cement Company property, in concessions XVI and XVII, Blanshard Township, Perth County, a gravel pit is operated by Yundt and McCann. A 15 foot face exposed a stony till. The upper 9 feet of the face is coarse gravel, sand and silt, with 65 percent stone. Boulders up to 1 foot in diameter occur and 40 percent of the stone exceeds 6 inches in size, with 70 percent exceeding one inch in size. The boulders are usually well rounded, but occasionally tabular. A pebble count of one-inch crushed aggregate shows 75 percent limestone and domomite, 10 percent acid igneous rocks, 10 percent basic igneous rocks, plus minor quantities of sandstone, quartz and chert.

The gravel is crushed to produce concrete aggregate. The sand and silt is largely sold for fill or stock piled.

NORFOLK COUNTY

Cayuga Quarries Limited

This pit is located one mile northwest of Simcoe, Ontario on lot 3, concession XIII, Windham Township, Norfolk County in what is probably a deltaic deposit.

The deposit is being worked to a depth of 15 feet at which level the water table is encountered. One 10 foot face consists of crossbedded fine gravels; dip directions are variable but an eastward direction of transport may be inferred from the overall trend. Composition of this material is 85 percent sand and 15 percent stone. Five percent of the stone exceeds 1 inch in diameter and the maximum pebble size

is 3 inches.

A second 15 foot face has 6 feet of medium sand overlying 9 feet of east-dipping, crossbedded, fine gravels. Composition of this face is 80 percent sand and 20 percent gravel of which 10 percent exceeds 1 inch in diameter and the maximum size is 4 inches. A pebble count from the 1 inch oversize stockpile shows the following assemblage: Dolomite (flood); limestone (common); chert (scarce); brown shale (very rare); siltstone (very rare); sandstone (very rare); Precambrian acidic igneous rocks (scarce); Precambrian basic igneous rocks (rare); and Precambrian metamorphic rocks (rare).

A sieve analysis of a sand sample obtained from this pit is given in (9).

(9) Cayuga Quarries

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	3.3	6.2	13.6	45.7	28.6	2.3	-	0.3

The material is excavated by a Michigan 175A loader or a Northwest dragline and trucked to stockpiles near the plant by a 15 ton Euclid truck. Material is then loaded into a hopper-conveyer and conveyed to an electrically operated, Assinck portable screen. One inch oversize stone is screened off and stockpiled for later crushing by a Universal portable crusher. The minus 1 inch material goes to a surge pile and is conveyed to a 2 deck Dillon 4 by 8 screen with spray bars for washing. One quarter and five eights inch screens produce peastone and three quarter inch stone which goes to bins while the minus one quarter inch fraction goes to an Eagle 6 valve classifier which separates concrete sand and mortar sand. These products pass through twin 24 inch Eagle dewatering screws and are stockpiled. Water is pumped from a pond by two 6 inch pumps and returns to the pond via a 2-stage settling pond.

Products include several sizes of crushed stone, A and B granular road gravel, mortar sand, concrete sand and pit run gravel. In addition an asphalt plant and a pre-mix concrete plant are located near the pit.

Capacity of the washing and screening plant is 130 tons

per hour.

OXFORD COUNTY

Oxford Sand and Gravel Limited

The pit operated by this company is located 1½ miles west of Currie on lots 3 and 4, concession V, West Oxford Township, Oxford County. A large quantity of material has already been extracted from the pit but reserves are large. The pit is located in outwash gravels in front of the Ingersoll moraine but structures within the gravels indicate a somewhat diverse history.

A 70-80 foot depth is being worked at three levels. Four to six feet of overburden overlies the gravels while the pit is bottomed at the water table.

The lowest lift has a 15 foot north face composed of medium to fine crossbedded sands with no apparent preferred direction of dip. Contortions and dragfolds, suggesting pressure or overriding from the west, occur near the base of this sand. Estimated composition at this level is 95 percent sand and 5 percent fine gravel and granule.

For the middle lift a 25 to 30 foot west face is composed of stratified, poorly-sorted, coarse gravels containing a few sand lenses. Strata are generally horizontal but show an undulating surface. Minor cementation occurs and till boulders up to six inches in diameter occur as do chert boulders up to eight inches in diameter. Estimated composition of this face is 95 percent stone and 5 percent sand. Maximum size of boulders is 10 inches; 20 percent of the gravel exceeds 4 inches and 70 to 80 percent exceeds one inch. A pebble count of one inch round stone from this face gives the following assemblage: Siltstone (rare), chert (common), limestone (common), dolomite (abundant), Precambrian acid igneous rocks (scarce), Precambrian basic igneous rocks (scarce) and Precambrian metamorphic rocks (very rare).

The upper lift has a 25-30 foot west face composed of poorly sorted stratified coarse gravels. Strata are largely horizontal but some south-dipping crossbeds do occur. Composition of this face is 95 percent stone and 5 percent sand. The maximum boulder size was 14 inches; 15 percent of

the gravel exceeds 4 inches and 70 percent exceeds one inch. Sand is more abundant in the south face of this lift where 10 to 15 foot layers of sand occur.

A sieve analysis of a sand sample from this pit is given in (10).

(10) Oxford Sand and Gravel Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	1.0	7.3	20.9	26.0	31.6	12.9	0.2	0.1

The material is excavated from the pit with a 1½ yard Northwest power shovel and trucked to the plant which is located on Highway 59 at lot 18, concession III, East Oxford township. The material is fed into a hopper and conveyed to a Dillon 2 deck 5 x 12 screen. The top deck has a 2¾ inch "grizzly" from which the oversize goes to an 18 by 36 jaw crusher and is recirculated. The lower screen is varied in size with product required but oversize goes to a 4 foot short head Symons cone crusher and is recirculated. Throughs are conveyed to a second 2 deck Dillon with 5 by 14 screens. Two sizes of stone are taken from these screens and stored in two 30 ton bins while sand passes the lower screen. The sand goes to a Wemco classifer and the products are removed at three valves. The end valves pass mortar and concrete sand to dewatering screws (one Eagle and one Wemco) and thence to stockpiles. The centre valve passes coarse material to a 3 x 6 Coleman screen to produce plus 3/16 inch chipstone.

Because of the lightweight chert and other deleterious materials found in the gravel, a Wemco Mobil-Mill heavy media separation unit is used to beneficiate the stone. The stone is fed into the cone separator containing the fluid media of predetermined gravity; in this case it is composed of powdered magnetite and ferrosilicon in a water suspension. The heavier specific gravity gravel sinks and the lighter particles float. The products are removed and the drained media is pumped back into the circuit. The products are screened, washed and stockpiled while the fine media particles washed off at this point are taken to the magnetic separator for recovery, cleaning and segregation from non-magnetic foreign solids. From here it passes through a densifier spiral which controls

the density and rate of flow of media returning to the cone separator. Finally the reclaimed media is demagnetized before returning to the media circuit.

A full range of washed crushed stone, blended gravel, concrete sand, mortar sand and unwashed road aggregates are available from this plant.

V. W. Ruckles

This pit is located on lot 20, concession VI, Dereham Township, Oxford County, 1½ miles northwest of Dereham Centre. The deposit is situated in a sheet of outwash gravels between the St. Thomas and Westminster moraines. Reserves appear to be quite large although the thickness is variable.

Excavation is to a depth of 15 feet where the water table occurs. Cementation is present below the water table and this has been encountered during dragline operations below this level. One 15 foot face has an upper 4 foot unit of horizontally stratified, poorly sorted, medium gravels. This is underlain by 11 feet of well sorted crossbedded gravels dipping towards the southeast. Composition of this face is 60 percent stone, 30 percent sand and 5 to 10 percent silt and clay. The maximum cobble size is 6 inches; 5 percent of the gravel exceeds 4 inches in diameter and 40 percent exceeds 1 inch. A second face shows 15 feet of uniform, fine sand. Bedding is highly variable. A third face has 12 feet of non sorted coarse gravel containing 80 percent stone and 20 percent sand. Sixty percent of the gravel exceeds 1 inch in diameter and 20 percent exceeds 4 inches while the maximum cobble size is 7 inches.

The composition is very variable. Several faults were noted in the sands and numerous cut and fill structures were present. A pebble count from this pit shows the following assemblage: Limestone (flood); dolomite (common); quartzite (very rare); chert (rare); Precambrian basic igneous rocks (common); Precambrian acidic igneous rocks (rare); Precambrian metamorphic rocks (very rare); Precambrian jasper conglomerate (very rare).

A sieve analysis of a sand sample obtained from this pit is given in (11).

(11) V. W. Ruckles

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	0.7	1.9	3.9	9.6	22.3	47.8	12.7	1.1

A portable crusher is brought in as required to provide stockpiles of crusher run gravel. Other products include pit-run gravel and fill which are excavated by an Insley dragline, a Hough Payloader or a Caterpillar 955 loader. Haulage is by truck.

BRANT COUNTY

Consolidated Sand and Gravel Company (East Paris Pit)

(A Division of S.P. and M. Materials Limited)

Grand River spillway terrace deposits are currently being worked on lot 26, concession I, South Dumfries Township, Brant County. Extensive excavations have been carried out previously on lots 27 and 28 where the plant is located. The pit area is located within the town limits of Paris, and in S. Dumfries Township, east of the Grand River. Reserves in this deposit are large.

At the north end of the pit cementation is prominent and impedes operations. One 40 foot face consists of horizontally stratified gravels through which a 2 foot band of fine sand and silt courses about 10 feet above the base of the pit. Gravel comprises 95 percent of this material. Seventy percent of the gravel exceeds 1 inch in diameter and 15 percent exceeds 4 inches; cobbles have a maximum size of 14 inches. Pebbles and cobbles are rounded to well rounded.

At the south end of the pit 20 feet of stratified gravel overlies 15 feet of crossbedded fine sand. Crossbeddings dip in numerous directions but appear to have an overall southerly trend.

A pebble count from this pit gives the following assemblage: Dolomite (flood); limestone (scarce); siltstone (common); chert (very rare); Precambrian acidic igneous rocks

(rare); Precambrian basic igneous rocks (very rare); and Precambrian metamorphic rocks (very rare).

A sieve analysis of sand from this pit is given in (12).

(12) Consolidated Sand and Gravel (East Paris Pit)

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	4.7	10.5	13.8	21.8	33.7	12.6	1.0	1.9

At the pit, a Lima power shovel excavates material and loads it into a hopper. The material is electrically conveyed ½ to 1 mile to a surge pile at the plant which has a capacity of 500 tons per hour.

The pit run material is conveyed from the surge pile to a 6 by 16 foot 3 deck Telsmith screen with 3 inch, 1½ inch, and 7/8 inch screens. Oversize from the 3 inch screen goes to a primary crusher while oversize from the 1½ inch and 7/8 inch screens go to a 4 foot Symons Shorthead cone or to a 4 foot Symons Standard cone crusher. Minus 7/8 inch material goes to 2, 3 deck 4 by 14 foot Dillon screens with 7/16 inch, 3/16 inch slot and 1/8 inch slot openings. Material retained on the two upper screens goes to 2, 4 by 14 foot Tyler screens with 7/16 inch and 3/16 inch screens to produce 3/4 inch round stone and 3/8 inch round stone for storage in bins. Material retained on the 1/8 inch slot screen is conveyed as coarse sand to a stacker for stockpiling. Minus 1/8 inch material goes to a Wemco dewatering screw; the dewatered sand goes to a stacker as medium sand and the water and fines which overflow are pumped to a cyclone and thence to a Dorr Oliver rake for silt and water removal before stockpiling.

Material from the crushing circuit goes to 2, 4 by 14 foot 2 deck Dillon screens with 1¼ inch and 7/8 inch screens. Oversize from the top and bottom decks returns to the crushers and recirculates.* Minus 7/8 inch material goes to two 4 by

* A portion of the crusher recirculation may be diverted over a third 4 by 14 foot Dillon screen to provide crushed sizes for conveyor delivery to the asphalt plant.

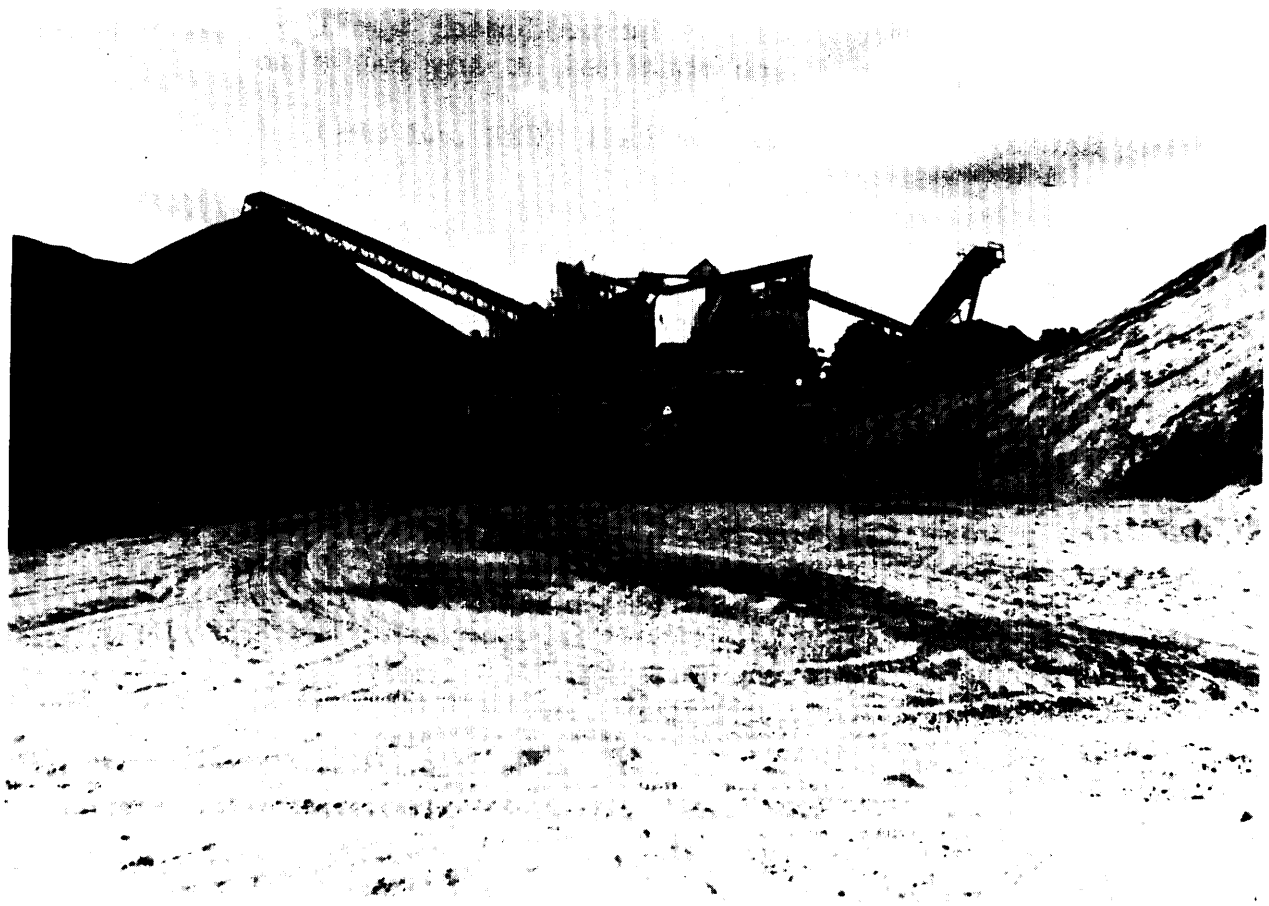

Photo 2 - Consolidated Sand and Gravel Limited, East Paris operation.

14 foot 3 deck Dillon screens with 7/16 inch, 1/4 inch, and 1/8 inch screens. Oversize from the 7/16 inch screen goes to a 3/4 inch crushed stone bin while material retained on the 1/4 inch screen goes to a 3/8 inch crushed stone bin. Material retained on the 1/8 inch screen goes to a 1/4 inch chip stone bin or else through a ball mill and recirculated. Minus 1/8 inch material goes to the Wemco screw circuit to produce medium and fine sand.

In all 27 products may be produced; usually 5 or 6 sand and 7 stone products are obtained at any one time.

Haulage is by truck or rail (CNR and CPR).

Consolidated Sand and Gravel Company (West Paris)

(A Division of S.P. and M. Materials Limited)

Gravel deposits related to the Grand River spillway system have been worked very extensively by this company leaving a very large area of excavation. The spillway itself is usually correlated with the Paris and Galt moraines at about 13000 years B.P.; since the spillway was reoccupied during different glacial episodes, the gravels throughout the spillway system vary in age. Present excavation is taking place on lot 33, concession II, South Dumfries Township, Brant County; former pits and the processing plant are located on lots 32, 33, 34, 35, concession I, South Dumfries Township. The complex is located about one-half mile west of Paris.

The thickness of gravel in the present working area is between 15 and 30 feet with about 2 feet of overburden. The gravel is underlain by a clay till and the water table occurs at the base of the pit. A 25 foot east face of the pit contains substratified, poorly sorted coarse gravel of which 60 percent is estimated to be stone. The largest boulder noted in the face was about 10 inches in diameter but boulders up to 4 feet in diameter had been excavated previously. Ten percent of the stone exceeds 4 inches in diameter while 75 percent exceeds 1 inch.

Pebbles and cobbles are rounded to well rounded and a count of pebbles from the above face gives the following assemblage: Dolomite (flood); limestone (common); siltstone (very rare); Precambrian acidic igneous rocks (rare);

Precambrian basic igneous rocks (rare); and Precambrian metamorphic rocks (common). Marble, siltstone, volcanic conglomerates and rotten metamorphics were noted in the cobble and boulder fractions.

The north face of the pit near the railway is 15 feet high and consists of substratified, poorly sorted, coarse gravel containing a few lenses of sand and a few thin layers of well sorted gravel. Crossbedding was evident but this did not indicate and predominant direction of current flow. The material contained 55 percent stone and up to 10 percent silt and clay with sand forming the remainder. Ten percent of the stone exceeds 4 inches in diameter while 60 percent exceeds 1 inch; the maximum cobble size was 6 inches.

A sieve analysis of sand from this pit is given in (13).

(13) Consolidated Sand and Gravel (West Paris)

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200	
Weight Percent	8.1	9.7	11.4	18.1	32.3	16.0	2.4	2.0

Excavation of the gravel is by a 6 yard Caterpillar 988 loader. The material is carried from the pit by a conveyer belt to a surge pile where the material feeding the processing plant is controlled.

The material goes to a 2 deck Tyler 5 by 12 screen with 3 inch and 2 inch openings. Oversize from both screens goes to a 4¼ foot Symons cone for primary crushing. Minus 2 inch material goes to two 3 deck Tyler 4 by 14 foot screens with 7/8 inch, 1/4 inch and a 0.102 inch slot, screens. Seven-eights inch oversize goes to one of two 4-foot Symons Shorthead cone crushers. The 1/4 to 7/8 inch fraction goes to a 3 deck 4 by 14 foot Tyler screen to give three sizes of round stone for stockpiling and minus 5½ mesh sand to a Dorr Oliver rake. Material retained on the slot screen goes to a coarse sand stockpile while the undersize goes to a Dorr Oliver rake where medium sand is raked off and the finer material pumped to a Hydroseparator where fine sand goes to a Dorr Oliver rake and silt and clay are removed as wastage.

Material from the primary crusher goes to a 3 deck 5 by

12 Dillon with 1 7/8, 7/8 and 1/4 inch screens. Oversize from the top deck goes to the secondary crushers while the two middle sizes go to a 3 deck Tyler 4 by 14 foot screen to give 1 1/2, 3/4 and 3/8 inch crushed stone and minus 0.110 inch sand to the Dorr Oliver rake. Minus 1/4 inch from the 5 by 12 Dillon goes to a 4 by 10 Dillon screen with a 5 1/2 mesh screen to give coarse sand for stockpiling and undersize for the initial Dorr Oliver rake.

Material from the secondary crushers goes to a 2 deck 5 by 12 foot Dillon screen with 7/8 and 1/4 inch openings. Oversize recirculates to the crushers and plus 1/4 inch goes to the 4 by 14 Tyler producing crushed stone. Minus 1/4 inch material goes to the 4 by 10 foot Dillon screen to produce coarse sand and minus 5 1/2 mesh for the initial Dorr Oliver rake.

Stockpiling is by conveyors, a clam shovel and various loaders and transportation is by truck and rail (CNR).

Production capacity is about 500 tons per hour.

The Flintkote Company of Canada Limited

A large reserve of gravel in a Grand River spillway terrace is being worked on lots 16 to 21, concession II, Brantford Township, Brant County. The water table occurs at the base of the pit - 40 to 50 feet below the surface.

The main pit is located on lots 17 and 18.

At the lower lift a 40 foot face consists of unevenly sorted, stratified, coarse gravel. Estimated composition of the face is 50 percent gravel and 50 percent sand. Seventy percent of the gravel exceeds 1 inch in diameter and 10 percent exceeds 4 inches; the maximum boulder size noted in the face was 12 inches but boulders up to 4 feet in diameter have been excavated.

Cross-bedding occurs and this dips easterly where noted. In places layers of clean white sand up to 12 feet thick occur. A discontinuous 4 foot layer of gritty, silty, sand till occurs about 20 feet below the surface. This till, where it occurs, impedes operations.

A 20 foot face at the upper lift consists of unsorted sand and gravel in which stratification is only weakly developed. The material is very variable with bands of sand up to 4 feet thick occurring. Generally gravel comprises 40 percent of this face and sand 60 percent. Forty percent of the gravel exceeds 1 inch in diameter and 5 percent exceeds 4 inches.

A pebble count from this pit gives the following assemblage: Dolomite (abundant); limestone (abundant); sandstone (very rare); Precambrian acidic igneous rocks (rare); Precambrian basic igneous rocks (very rare); and Precambrian metamorphic rocks (rare).

The material is excavated by a 1¼ yard power shovel and hauled to the Plant by Euclid trucks. The 200 tons per hour Plant is entirely equipped with Barber-Green or Telsmith components. The material from the pit is dumped on to a 13" x 13" grizzly and to a screen with 2¼ inch openings. The oversize goes to a 13B breaker-crusher and throughs go to a cone crusher and recirculate to a 2 deck screening-washing unit, which includes a Telsmith Super Scrubber. Stone is conveyed to stockpiles and the sand goes to a classifier and thence to dewatering screws before stockpiling. Washing water is obtained from the Grand River.

Although a wide range of crusher stone can be produced, 3/8 inch and 3/4 inch are the main stone products. Mason sand and concrete sand are also produced.

Haulage is by truck or rail (CNR and CPR).

A second pit is located on lot 19, concession II, Brantford Township adjacent to the main pit. A 20 foot face consists of unevenly sorted coarse gravel in which stratification is only weakly developed. Gravel comprises 50 percent of this material. Seventy percent of the gravel exceeds 1 inch in diameter and 30 percent exceeds 4 inches; cobbles have a maximum size of 8 inches.

A third pit in the same deposit is located on lots 16 and 17, concession I, Brantford Township.

Telephone City Gravel Company Limited

Two pits are being operated by this company. The first of these is located on lots 19 and 20, concession III, Brantford Township, Brant County. The large gravel reserves form part of a spillway terrace of the Grand River system. The water table occurs near the base of the pit. Stratified silt and sand comprises the overburden which varies from 0 to 8 feet in thickness.

A 30 foot face in the lower lift on lot 19 has a 20 foot upper unit consisting of clean medium to fine sand. Crossbedding is varidirectional but the sand mass tends to dip southeasterly; minor vertical faults are present in the sand. This sand mass thins to the west and thickens to the east and it appears as though it may be a small delta. Ten feet of stratified medium gravel underlies the sand. This gravel is partially cemented. Composition of the gravel is 80 percent gravel and 20 percent sand. Cobbles have a maximum size of 6 inches; 5 percent of the gravel exceeds 4 inches in diameter and 30 percent exceeds 1 inch. A pebble count from this gravel gives the following assemblage: Dolomite (flood); limestone (common); chert (rare); Precambrian acidic igneous rocks (rare); Precambrian basic igneous rocks (very rare); and Precambrian metamorphic rocks (scarce). Siltstone was noted elsewhere in the pit.

A sieve analysis of sand from the deposit described above is given in (14).

(14) Telephone City Pit #1.

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	-	0.2	0.4	3.3	55.9	36.8	2.5	0.9

The upper lift in this portion of the pit area consists of 20 feet of poorly sorted coarse gravel containing 95 percent stone. Fifty percent of the gravel exceeds 1 inch in diameter, 10 percent exceeds 4 inches, and the maximum boulder size is 14 inches. Pebbles and cobbles are well rounded.

East of this an area of very coarse material is encountered. A 15 foot face consists of poorly sorted coarse gravel containing

up to 5 percent fines. Ninety-five percent of the material is stone. Forty percent of this exceeds 4 inches in diameter and 60 percent exceeds 1 inch; boulders in the face have a maximum size of 16 inches but boulders up to 3 feet in diameter have been excavated.

Here a contractor operates a portable crusher to provide stockpiles of crusher run gravel for the processing plant.

On lot 20 gravel is being excavated from a 30 foot face. Five feet of stratified sand overlies 25 feet of medium gravel containing 80 percent gravel and 20 percent sand. Thirty percent of the gravel exceeds 1 inch in diameter and 5 percent exceeds 4 inches; cobbles have a maximum size of 6 inches.

Excavation from this face is by a Ruston Bucyrus dragline and by a Michigan loader. Euclid trucks haul the material to the processing plant which has a capacity of 300 to 350 tons per hour in a 10 hour day. The following description of the plant is taken from Karrow (Hewitt & Karrow 1963, p.139):

"Gravel is fed to a 1-deck Niagara inclined vibrating 5- by 12-foot screen that feeds oversize to a Pioneer 24- by 36-inch jaw crusher; material then goes to a 2-deck Tyrock 5- by 12-foot inclined vibrating screen. Oversize goes to a 4-foot Nordberg Standard cone crusher and middlesize goes to a 3-foot Nordberg crusher; crushed products are combined with undersize to go to a 1-deck Tyler 5- by 10-foot inclined vibrating screen. Oversize returns to the 3-foot cone crusher, and undersize goes to a 2-deck Niagara 5- by 12-foot inclined vibrating screen, and then to stockpiles.

Undersize from the primary screen goes to a scrubber and 4-valve settling tank. Coarse material from the scrubber is sorted on a Spartan 2- by 4-foot horizontal vibrating screen. Fines from the settling tank go to gravity sand cones. River water is used for washing."

A full range of sand, gravel and crushed products are available. Haulage is by truck or rail (CPR).

A second pit, Telephone City #2, is located on lot 14, concession V, Brantford Township. The gravel is largely outwash in origin but some of the upper materials may be deltaic. Reserves are large; excavation is generally to a depth of 20 feet and the gravel extends to a depth of at least 30 feet below this. The water table occurs at the base of the pit. Overburden thickens from about 2 feet on the west

to 15 feet on the east side of the pit. Cementation occurs but does not impede operations.

A 20 foot west face has 2 feet of weathered sand overburden containing a few layers of fine pebbles. This is underlain by 3 feet of crossbedded sands containing minor fine gravel. The lower 15 feet consists of poorly sorted medium gravels with weakly developed horizontal stratification. Gravel comprises 95 percent of this lower unit. Sixty percent of the gravel exceeds 1 inch in diameter and 10 percent exceeds 4 inches; cobbles have a maximum size of 8 inches. Pebbles and cobbles are sub-rounded to rounded and largely ovoid in shape; the larger cobbles are rounded to a lesser degree and more variable in shape.

The south face has a 15 foot basal unit consisting of poorly sorted, sub-stratified coarse gravel containing 80 percent stone and 20 percent sand. Seventy percent of the gravel exceeds 1 inch in diameter, 20 percent exceeds 4 inches, and the maximum size is 8 inches. This is overlain by 6 feet of stratified sands, gravels and silts.

A pebble count from this pit gives the following assemblage: Dolomite (flood); limestone (common); sandstone (scarce); chert (very rare); Precambrian acidic igneous rocks (scarce); Precambrian basic igneous rocks (rare); and Precambrian metamorphic rocks (rare).

A sieve analysis of sand obtained from the south end of the pit is given in (15).

(15) Telephone City Pit #2

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	-	0.5	4.8	44.7	48.8	1.1	0.05	0.05

Extraction is by a dragline from a pond at the base of the pit. A portable crusher is brought to the pit as required to provide stock piles of 5/8 and 7/8 crusher run gravel. Haulage is by truck.

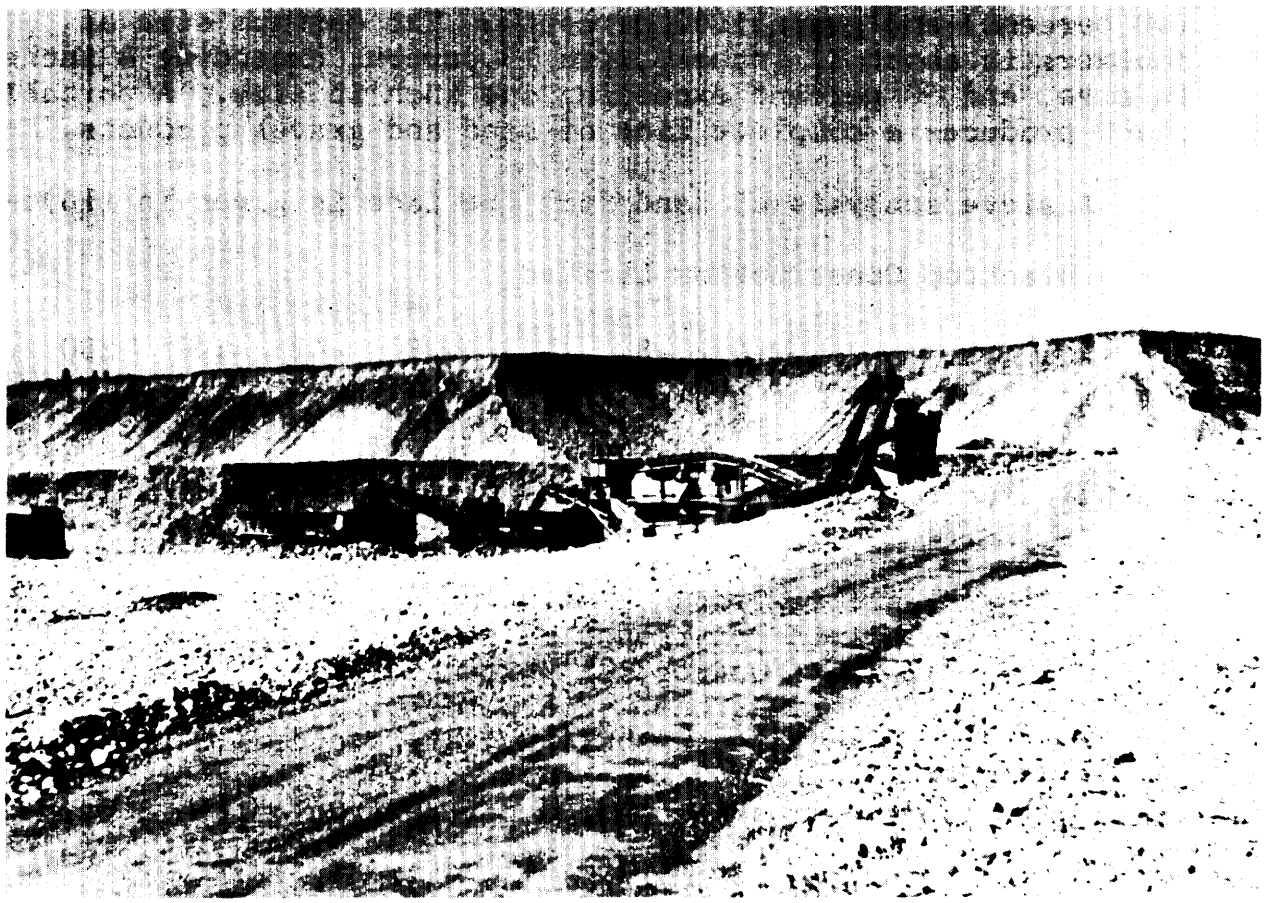

Photo 3 - Telephone City Gravel Company, Brantford.

WATERLOO COUNTY

Blacktop Construction Limited

The gravel pit and plant of Blacktop Construction Limited is on the Bridgeport-Breslau road near Bridgeport, in lot 112 G.C.T. Waterloo Township, Waterloo County. The deposit is a spillway gravel. A 10-foot face exposes stratified sand (40 percent) and gravel (60 percent). The maximum size of boulders is about 12 inches, with 15 percent exceeding 4 inches in size, and 50 percent exceeding one inch in size. A portable plant produces a complete line of sand and gravel products.

A sieve analysis of sand from the face is given in (16).

(16) Blacktop Construction Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	1.0	2.9	7.1	31.9	46.9	8.6	0.7	0.9

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 31 percent; feldspar, 15.5 percent; Paleozoic limestone, 42.5 percent; grey shale and siltstone, 1 percent; black shale and siltstone, 2.5 percent; hornblende, 1 percent; pyroxene, 0.5 percent; Precambrian limestone, 1 percent; sandstone, 3 percent; dolomite, 2 percent.

Blacktop Construction Limited

A second gravel pit is operated by Blacktop Construction Limited in lots 16, 17 and 18, concession A, Wellesley Township, Waterloo County, three miles north of Heidelberg. The deposit is a kame. A 40 foot face exposes 50 percent sand and 50 percent gravel. Boulders up to 15 inches in diameter occur. Twenty five percent of the stone is greater than 4 inches in diameter. A portable plant produces a complete line of sand and gravel products.

Blair Sand and Gravel Products Limited

This pit is located on lot 17, concession XI, North Dumfries Township, Waterloo County about two miles west of Galt on the Roseville Road. The deposit is situated within a large outwash sheet; overburden is only one foot thick.

The material contains a high percentage of stone. Minor cementation is present. One 18 foot face consists of poorly sorted coarse gravel which has a 4 foot band of better sorted, finer gravel transecting the middle of the face. This unit is crossbedded and suggests transport toward the southwest. Composition of this face is 80 percent stone and 20 percent sand. The maximum boulder size is 18 inches in diameter; 30 percent of the gravel exceeds 4 inches in diameter and 70 percent exceeds 1 inch.

A pebble count from this face gives the following assemblage: Dolomite (flood); limestone (scarce); chert (rare); Precambrian acidic igneous rocks (rare); Precambrian basic igneous rocks (rare); siltstone (very rare); sandstone (very rare).

A second face consists of 15 feet of substratified, uniform, coarse gravel. Ninety percent of this material is stone and 10 percent is sand. Eighty percent of the stone exceeds 1 inch in diameter and 25 percent exceeds 4 inches; the maximum boulder size noted was 10 inches.

A sieve analysis of a sand sample obtained at this pit is given in (17).

(17) Blair Sand and Gravel Products Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	3.8	8.2	32.1	44.8	9.7	0.8	0.1	0.5

Excavation at the pit is by power shovel. The gravel is fed into a Cedarapids portable screening plant. Minus ¼ inch concrete sand is taken off and stockpiled while the oversize material goes to a portable Cedarapids crusher to give minus ¾ inch stone. This material is screened further at a second

portable screen to give ¾ inch stone for stockpiling; the dust and small chips go to a bin. Material to be used in the pre-mix concrete plant is washed on a portable screening-washing plant and dewatered by an Eagle screw.

The principal product at this pit is ¾ inch stone for concrete aggregate; sand, pit run gravel and other sizes of crushed stone are also available.

Concrete sand for the pre-mix plant is the principal product of a second pit which is located on lot 29, concession XII, North Dumfries Township, Waterloo County. The deposit is located in the same outwash sheet but is much finer in composition.

One 18 foot face consists of stratified fine gravel containing a few narrow bands of fine sand. Coarse sand and granule make up a considerable portion of the material and some cementation is present. The estimated composition of this face is 70 percent sand and 30 percent gravel. Twenty percent of the material exceeds 1 inch in diameter and the maximum size is 4 inches.

A pebble count from this face gives the following assemblage: Dolomite (flood); limestone (scarce); chert (rare); sandstone (very rare); Precambrian acidic igneous rocks (scarce); Precambrian basic igneous rocks (very rare); Precambrian metamorphic rocks (rare).

A sieve analysis of a sand sample obtained from this pit is given in (18).

(18) Blair Sand and Gravel Products Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	0.9	2.2	14.0	51.3	29.0	2.0	0.2	0.4

A crusher is brought to the pit as required. The concrete sand is taken to the pre-mix plant and various sizes of crushed stone are stockpiled.

Forwell Limited

Forwell Limited is operating a pit on lot 23, concession XII, North Dumfries Township, Waterloo County. The deposit is located in a large sheet of glacio-fluvial outwash gravels and reserves are large. Overburden is generally less than 3 feet thick. Cementation is prominent and may be problematical in parts of the deposit.

One 20 foot face consists of two units. The upper unit consists of 8 feet of poorly sorted, coarse gravel containing 95 percent stone with minor silt and clay. The maximum cobble size is 10 inches; 20 percent of the gravel exceeds 4 inches in diameter and 60 percent exceeds 1 inch. The lower 10 feet consists of stratified medium gravel which has a 2 foot band of cross-laminated sand running through it. Composition of this unit is 40 percent stone and 60 percent sand. Maximum cobble size is 4 inches and 20 percent of the gravel is greater than 1 inch in diameter. The base of the face is covered with slump material.

A second 18 foot face consists of stratified, uniform medium gravel in which the pebbles and cobbles are rounded to well rounded. Estimated composition of this face is 85 percent stone and 15 percent sand. The maximum cobble noted was 4 inches in diameter; 60 percent of the stone exceeds 1 inch in diameter.

Very fine uniform sand appears to form the base of the pit in places.

A pebble count from this pit gives the following assemblage: Dolomite (flood); limestone (common); chert (rare); Precambrian basic igneous rocks (very rare).

A sieve analysis of a sand sample obtained at this pit is given in (19).

(19) Forwell Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	0.6	1.9	13.3	49.9	29.6	4.1	0.1	0.5

Concrete sand and crushed stone are the principal products of this pit. Crushing, screening and washing is carried out by a contractor to provide large stockpiles of useable materials.

Forwell Limited

A second gravel pit operated by Forwell Limited is on the east side of the Grand River one quarter mile south of No. 7 highway, in lot 121, G.C.T. Waterloo Township, Waterloo County. The pit and plant are described by Hewitt and Karrow (1963, p.134-5). In 1967 a 20-foot face examined consisted of about 30 percent gravel and 70 percent sand. Approximately 10 percent of the stone exceeded 4 inches in size and 40 percent exceeded one inch in size.

A sieve analysis of sand from the face is given in (20).

(20) Forwell Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	1.4	3.5	3.5	10.6	46.2	28.8	3.7	2.3

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 38 percent; feldspar, 15.5 percent, Paleozoic limestone, 35 percent; grey shale and siltstone, 4.5 percent; black shale and siltstone, 1 percent; hornblende, 1.5 percent; mica, 0.5 percent; sandstone, 1.5 percent; acid igneous rocks, 0.5 percent; chert, 0.5 percent; dolomite, 1.5 percent.

Preston Sand and Gravel

The plant and pit of Preston Sand and Gravel are on the northeast side of the town of Preston, one quarter mile east of highway No. 24, on Eagle Street. The pit and plant are described by Hewitt and Karrow (1963, p.135). In 1967 a gravel pit was being operated on the north side of Eagle Street. A 20-foot face consists of coarse gravel (70 percent) and medium sand (30 percent). The maximum size of boulders is 10 inches, with 20 percent exceeding 4 inches and 60 percent exceeding one inch in size.

A pebble count on a face sample gave the following assemblage:

	Frequency
Dolomite,	Flood
Limestone,	Common
Black shale,	Very Rare
Chert,	Very Rare
Siltstone,	Scarce
Basic igneous rocks,	Very Rare
Metamorphic rocks,	Very Rare.

A sieve analysis of sand from the face is given in (21).

(21) Preston Sand and Gravel

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200	
Weight Percent	1.4	1.1	1.4	7.1	27.5	52.9	7.9	0.7

A mineralogical analysis of this sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: quartz, 43.5 percent; feldspar, 16.5 percent; Paleozoic limestone, 28 percent; grey shale and siltstone, 6 percent; black shale and siltstone, 3.5 percent; hornblende, 1.5 percent; dolomite, 1 percent.

WELLINGTON COUNTY

Aberfoyle Sand and Gravel

The gravel pit and plant of Aberfoyle Sand and Gravel are located on lot 25, concession VII, Puslinch Township, Wellington County. A 20-foot face examined consisted of coarse gravel (60 percent) and coarse sand (40 percent). The maximum size of boulders observed was 6 inches, with 30 percent of the stone exceeding 4 inches in size, and 60 percent exceeding one inch in size. There is a permanent plant on the property which produces a complete line of washed sand and gravel products.

A sieve analysis of sand from one face is given in (22).

(22) Aberfoyle Sand and Gravel

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	6.5	15.1	23.0	25.6	13.3	5.9	3.3	7.3

A mineralogical analysis of this sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: quartz, 18.5 percent; feldspar, 11 percent; Paleozoic limestone, 28.5 percent; grey shale and siltstone, 6.5 percent; garnet, 1 percent; hornblende, 3 percent; mica, 2 percent; limonite-hematite, 0.5 percent; sandstone, 1 percent; acid igneous rocks, 1.0 percent; dolomite, 28 percent.

Cox Construction Limited

Watson Road Pit

The Watson Road gravel pit is 1½ miles north of Guelph, and one-quarter mile north of No. 24 highway in concession VII, Guelph Township, Wellington County. The pit is two-tenths of a mile north of the Speed river. A 20-foot face exposes stratified sand (60 percent) and medium gravel (40 percent). The maximum size of boulders is about 6 inches, with 10 percent of the stone over 4 inches in size, and 40 percent over one inch in size. There was no plant at the time of the writer's visit.

Cox Construction Limited

Rothsay Pit

The Rothsay pit is located one mile north of Rothsay on County road 7 in the west half of lot 8, concession XIV, Maryborough Township, Wellington County.

Guelph Sand and Gravel Company

(A Division of S.P. &.M. Materials Limited)

The pit and plant of Guelph Sand and Gravel are on the west edge of the city of Guelph, north of the Speed River and highway No. 24, in lot 2, concession I, Division E and lot 21, Division A, Guelph Township, Wellington County. The deposit is described by Hewitt and Karrow (1963, p.141-2). Since 1962 the gravel pit has been extended for more than a mile west of the plant. An 8 to 10-foot face observed by the writer in 1967 consisted of stratified sand (80 percent) and fine gravel (20 percent). The maximum size of boulders was 6 inches, with 10 percent exceeding 4 inches in size, and 50 percent exceeding one inch in size.*

A sieve analysis of sand from the face is given in (23).

(23) Guelph Sand and Gravel Company

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200	
Weight Percent	1.3	3.5	8.9	32.0	43.1	9.1	0.8	1.3

A mineralogical analysis of this sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: quartz, 37.5 percent; feldspar, 13 percent; Paleozoic limestone, 35.5 percent; grey shale and siltstone, 2.5 percent; black shale and siltstone, 6 percent; mica, 0.5 percent; limonite-hematite, 1 percent; Precambrian limestone, 2 percent; sandstone, 1 percent; acid igneous rocks, 1 percent.

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* Material is also draglined by a 2½ yard Lima from below water. Depths range from 6 to 18 feet below water over most of the deposit.

The following plant description was kindly provided by Guelph Sand and Gravel Company.

"Excavation of the gravel above water and from dragline windrows is by Caterpillar 966 B loader. The material is carried from the pit to the plant by a fleet of Mack 10 yd. dump trucks. It is dumped into hoppers at the plant.

The material is fed from the hoppers to a 5 x 12 2 deck Dillon screen with 4" and 7/8" openings. Oversize from the 4" deck goes to a 15 x 30 Jaw Crusher. Oversize from the 7/8" deck goes to a 3' Standard Symons crusher. Minus 7/8" material is conveyed to surge pile storage.

Crushed material from the jaw and 3' Standard crusher is conveyed to a 3½ deck 5 x 12 Dillon screen with 1½", 7/8",9/16" and 3/16" openings. Oversize from the 1½" and 7/8" decks is fed to a 3' shorthead and a 2' standard Symons crusher. The product of these crushers is recirculated to the 5 x 12, 3½ deck Dillon screen. Material from the 9/16" deck goes to the surge pile. Material from the 3/16" deck goes either to a storage bin for stockpiling or to the surge pile. Material which passes the 3/16" deck goes either to a storage bin for stockpiling or to the surge pile.

Stored material drawn from the surge pile goes to a 5 x 14 3 deck Dillon screen where water is introduced. This screen is equipped with 7/16", 3/16" and .102" decks. Material from the 7/16" deck goes via conveyor to the 3/4" gravel stockpile. Material from the 3/16" deck goes to a bin for stockpiling by truck. Material from the .102" deck is split partially to blend with concrete sand and the balance goes to a bin for stockpiling by truck.

The sand and water which passes the .102" deck is pumped to a 28' Eagle Dialsplit classification tank. Concrete sand blended by the tank goes to a 60" Wemco screw dewaterer and then via conveyor to stockpile. Brick sand or Asphalt sand also blended in the tank is flumed to stockpile. Overflow water and surplus sand fractions are sent to waste.

The plant operates at 320 tons per hour. Materials are loaded by various cranes and loaders for shipment by truck and rail (C.N.R.)."

Guelph Sand and Gravel Company

A second gravel pit has been opened by Guelph Sand and Gravel in lot 11, concession V, Puslinch Township, Wellington

County. The deposit is in the Speed spillway of glacial age. An 18-foot face examined consisted of coarse gravel (70 percent) and coarse sand (30 percent). The maximum size of boulders is 12 inches, with 30 percent exceeding 4 inches in size, and 70 percent exceeding one inch in size. The gravel is trucked to the plant in Guelph for processing.

A sieve analysis of sand from the face is given in (24).

(24) Guelph Sand and Gravel

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	2.0	3.5	12.9	42.7	28.7	7.5	1.1	1.6

A mineralogical analysis of this sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 28 percent; feldspar, 11 percent; Paleozoic limestone, 41 percent; grey shale and siltstone, 5.5 percent; black shale and siltstone, 2 percent; garnet, 0.5 percent; hornblende, 1.5 percent; mica, 0.5 percent; acid igneous rocks, 1 percent; basic igneous rocks, 0.5 percent; dolomite, 8.5 percent.

GREY COUNTY

E. C. King Limited

Denham Pit

The Denham gravel pit operated by E.C. King Limited is in lot 2, concession IX, Derby Township, Grey County. The 15 foot face is composed of stratified medium to coarse sand and gravel. The stone content is approximately 40 percent, with a maximum size of boulders about 1 foot. Twenty-five percent of the stone exceeds 4 inches in size and 60 percent exceeds ½ inch in size. A pebble count indicated 90 percent Paleozoic dolomite and limestone, and 10 percent basic metamorphic and acid igneous rock, together with minor shale.

The sand and gravel from the Denham pit is trucked to

the nearby E.C. King plant for crushing and screening.

E. C. King Limited

The gravel pit of E.C. King Limited is located in lots 5 and 6, concession XI, Derby Township, Grey County. A 24 foot face examined consisted of 10 feet of sand and gravel composed of approximately 40 percent stone, underlain by 14 feet of well stratified fine to medium sand with occasional thin beds of clay less than one inch in thickness. The maximum size of boulders is 2 feet, with 20 percent of the stone exceeding 4 inches in size and 70 percent exceeding ½ inch in size.

A crushing, screening and washing plant produces a complete line of stone and sand products including concrete stone and concrete sand.

WELLAND COUNTY

Fonthill Sand and Gravel

The gravel pit operated by Fonthill Sand and Gravel is on lot 9, concession VII, Pelham Township, Welland County, just north of highway No. 20, two miles west of Fonthill. The property is described by Hewitt and Karrow (1963, p.50). A new permanent plant was erected in 1965 and produces a complete line of washed aggregates as well as crusher run gravel.

A pebble count of gravel from this pit gave the following assemblage:

	Frequency
Silurian dolomite,	Common
Ordovician limestone,	Abundant
Siltstone,	Common
Sandstone,	Rare
Shale,	Rare
Pebble conglomerate,	Common
Precambrian acid igneous rocks,	Rare
Precambrian metamorphic rocks,	Scarce.

Moyer Sand 1965 Limited

The gravel pit of Moyer Sand 1965 Limited is on lots 10 and 11, concession VII, Pelham Township, Welland County, just north of highway No. 20, 2½ miles west of Fonthill. The pit and plant are described by Hewitt and Karrow (1963, p.50).

A pebble count of the gravel from this deposit gave the following assemblage:

	Frequency
Ordovician limestone,	Common
Silurian dolomite,	Common
Maroon and grey siltstone,	Abundant
Grey Medina sandstone,	Common
Red Queenston shale,	Rare
Precambrian acid igneous rocks,	Very rare
Precambrian metamorphic rocks,	Rare
Conglomerate	Rare.

A sieve analysis of sand from one of the faces is given in (25).

(25) Moyer Sand 1965 Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	0.3	0.4	0.9	6.7	28.2	43.9	11.0	8.6

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gives the following mineral constituents: Quartz, 24.5 percent; feldspar, 10 percent; Paleozoic limestone, 30 percent; grey shale and siltstone, 17 percent; red shale and siltstone, 15 percent; black shale and siltstone, 1.5 percent; hornblende, 1 percent; limonite, 1 percent.

HALTON COUNTY

Armstrong Brothers Company Limited

The Armstrong Brother's Glen Williams pit is on lot 24, concession XI, Esquesing Township, Halton County, in the Georgetown spillway. It is described by Hewitt and Karrow (1963, p.54).

Campbellville Gravel Supply Limited

The Campbellville plant and pit of Campbellville Gravel Supply Limited is located on the Campbellville-Kelso road on lots 5 and 6, concession IV and V, Nassagaweya Township, Halton County. The deposit is a coarse kame gravel composed predominantly of Amabel dolomite, with some Black River and Trenton limestone, some Precambrian crystalline rocks and minor siltstone. A 25-foot face examined consisted of approximately 70 percent stone and 30 percent sand. Maximum size of boulders was 24 inches, with 40 percent of the stone exceeding 4 inches and 70 percent exceeding one inch in size.

A permanent crushing, washing and screening plant makes a complete line of sand and gravel products.

J. C. Duff Limited

Brooks Pit

A gravel pit on the farm of Fred Brooks, lot 23, concession V, Esquesing Township, Halton County, just west of the village of Limehouse, was operated in 1967 by J.C. Duff Limited. The pit is described by Hewitt and Karrow, (1963, p.55).

A pebble count of the gravel gives the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Amabel dolomite,	Common
Brown siltstone,	Rare
Potsdam sandstone,	Scarce
Red siltstone,	Rare
Precambrian acid igneous rocks,	Scarce
Precambrian metamorphic rocks,	Scarce.

At the time of the writer's visit in 1967, a portable plant was in operation at the property.

Franceschini Brothers Construction Company Limited

A gravel pit is operated by Franceschini Brothers Construction Company Limited in a kame terrace deposit on lot 11, concession IV, Nelson Township, Halton County, south of the Hayward and Picket pit. The property is described by Hewitt and Karrow (1963, p.53), under the name DCB Gravel Company. A 30-foot face exposes interstratified and cross-bedded medium gravel and sand. Gravel makes up 60 percent of the face, with sand making up 40 percent. The maximum size of boulders is 8 inches, with 30 percent of the stone exceeding 4 inches in size and 60 percent exceeding one inch in size.

A pebble count of gravel from this deposit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Abundant
Amabel dolomite,	Abundant
Brown Dundas siltstone,	Common
Red siltstone,	Common
Potsdam sandstone,	Very rare
Queenston shale,	Very rare
Precambrian acid igneous rocks,	Rare
Precambrian metamorphic rocks,	Rare

Hayward and Picket Limited

The gravel pit operated by Hayward and Picket Limited is located on lot 12, concession IV, Nelson Township, Halton County, 4 miles southwest of Milton. The property is described by Hewitt and Karrow (1963, p.53).

A pebble count of gravel from the pit gives the following assemblage:

	Frequency
Green and brown Dundas siltstone,	Abundant
Maroon Grimsby siltstone,	Scarce
Black River and Trenton limestone,	Common
Amabel dolomite,	Scarce
Aphanitic grey dolomite,	Common
Sandstone,	Rare
Cemented conglomerate,	Common
Precambrian granitic rocks,	Rare
Precambrian metamorphic rocks,	Scarce.

King Paving and Materials Limited

A gravel pit is operated by Nelson Crushed Stone, about a mile south of Kilbride, on lot 7 or 8, concession I, Nelson Township, Halton County. The 20-foot face exposes stratified medium sand and gravel composed of approximately 50 percent stone and 50 percent sand. The maximum size of boulders is 24 inches, with 30 percent exceeding 4 inches and 50 percent exceeding one inch in size. There is a permanent crushing and screening plant.

The principal products are granular A and B, and pit run gravel.

Springbank Sand and Gravel Limited

A gravel pit is operated by Springbank Sand and Gravel on lot 11, concession V, Nelson Township, Halton County, about 4 miles southwest of Milton. A 20-foot face examined consisted of stratified coarse sand and gravel. The gravel is capped

by up to six feet of till. The face is composed of approximately 30 percent stone and 70 percent sand. The maximum size of boulders is 10 inches, with 30 percent of the stone exceeding 4 inches and 50 percent exceeding one inch in size.

A portable plant is employed at the pit. The principal products are crusher run and granular B gravel.

Springbank Sand and Gravel Limited

Springbank Sand and Gravel pit No. 11 is located on lot 5 or 6, concession V, Nassagaweya Township, Halton County. The deposit consists of coarse kame gravel. A 25-foot face examined was comprised of approximately 70 percent stone and 30 percent sand. The maximum size of boulders is about 24 inches, with 50 percent of the stone exceeding 4 inches in size and 70 percent exceeding one inch in size. A portable crushing plant produces crusher run and a portable screening plant removes plus 4 inch stone to produce Class B granulars. A dry screened sand is produced by scalping.

Springbank Sand and Gravel Limited

A deposit of well stratified fine sand has been opened by Springbank Sand and Gravel in lot 21, concession X, Esquesing Township, Halton County. The 25-foot face exposed consists entirely of sand. A sieve analysis of a sand sample from the face is given in (26).

(26) Springbank Sand and Gravel Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	0.5	0.55	0.5	2.25	32.65	52.7	7.25	3.6

PEEL COUNTY

Armstrong Brothers Company Limited

Bouvaird Pit

Bouvaird's pit of Armstrong Brothers Company Limited located on lot 11, concession II E, Chinguacousy Township, Peel County, is described by Hewitt and Karrow (1963, p.63). The pit produces mainly granular A and B gravel, crusher run

and sand fill. The face on the Cartier property was mainly fine sand. The face on the Pouws property was fine and coarse sand with fine gravel.

A pebble count of gravel from this deposit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Grey aphanitic dolomite,	Common
Sandstone,	Rare
Brownish Dundas siltstone,	Rare
Precambrian acid igneous rocks,	Scarce
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Scarce.

Armstrong Brothers Company Limited

Donnelly Pit

The Donnelly pit operated by Armstrong Brothers Company Limited is on lot 13, concession II E, Chinguacousy Township, Peel County, a mile south of Heart Lake. The property is described by Hewitt and Karrow (1963, p.63).

A pebble count of gravel from this property gives the following assemblage:

	Frequency
Black River and Trenton limestone,	Abundant
Brown Dundas siltstone,	Abundant
Dolomite,	Rare
White Potsdam sandstone,	Very rare
Cemented conglomerate,	Common
Precambrian acid igneous rocks,	Rare
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Rare.

Armstrong Brothers Company Limited

Caledon Pit

The Caledon pit of Armstrong Brothers Company Limited is on the west side of highway No. 10 in concession I W, Caledon Township, Peel County, one mile south of Caledon. The property is described by Hewitt and Karrow (1963, p.66).

The deposit is a spillway gravel. One 20-foot face examined consisted of medium sand (60 percent) and coarse gravel (40 percent). About 30 percent of the stone exceeds 4 inches in size, and 60 percent exceeds one inch in size. Portable plants produce crusher run gravel, sand and stone.

A pebble count of gravel from this pit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Abundant
Brownish Dundas siltstone,	Abundant
Dolomite,	Rare
Sandstone,	Rare
Black shale,	Very rare
Precambrian granitic rocks,	Rare
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic gneisses,	Scarce.

Armstrong Brothers Company Limited

Chassels Pit

Chassels pit of Armstrong Brothers Company Limited is located on the south side of No. 7 highway, two miles east of Brampton in lot 5, concession III E, Chinguacousy Township, Peel County. The pit was inactive when visited in 1967. The pit is in the south end of the Brampton esker.

Armstrong Brothers Company Limited

Mono Mills Pit

A gravel pit is operated by Armstrong Brothers Company Limited on lot 23, concession VI E, Caledon Township, Peel County, on the south side of highway No. 9, just west of the village of Mono Mills. The pit is described by Hewitt and Karrow (1963, p.67) under the name Mineral Industries Sand and Gravel Limited.

A pebble count of gravel from this deposit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Amabel dolomite,	Very rare
Dundas siltstone,	Abundant
Red Queenston shale,	Very rare
White Potsdam sandstone,	Very rare
Precambrian granitic rocks,	Scarce
Precambrian metamorphic rocks,	Scarce.

Caledon Sand and Gravel Limited

The gravel pit operated by Caledon Sand and Gravel Limited is on the east side of highway No. 10, a mile south of Caledon, on lot 13, concession I E, Caledon Township, Peel County. The property is described by Hewitt and Karrow (1963, p.65).

A pebble count of gravel from this deposit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Abundant
Dundas siltstone,	Abundant
Sandstone,	Rare
Dolomite,	Very rare
Precambrian acid igneous rocks,	Scarce
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Scarce.

Consolidated Sand and Gravel Company

Malton Pit

Consolidated Sand and Gravel Company operates a sand and gravel pit on lot 10, concession V, Chinguacousy Township, Peel County. The property is 6 miles northwest of Malton and 1½ miles north of highway No. 7. Brampton lies 5 miles southwest of the property.

The glaciofluvial outwash deposit consists of well-sorted, well-stratified sand containing minor interstratified fine to medium gravel. A 20 foot face at the west end of the pit consisted of fine to medium stratified sand. Gravel is recovered from a pond in the floor of the pit by dragline.

A pebble count of gravel from this pit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
White Potsdam sandstone,	Scarce
Siltstone,	Rare
Black shale,	Very rare
Clay balls,	Rare
Precambrian acid igneous rocks,	Common
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Scarce

A sieve analysis and mineralogical analysis of sand from this pit, and a description of the plant are given in Hewitt and Karrow (1963, p.64). The plant produces ¾-inch stone, 3/8-inch stone, ¼-inch stone, granular A, pit run gravel, sand fill, concrete sand and brick sand.

Consolidated Sand and Gravel Company

Caledon Pit

A gravel pit is operated by Consolidated Sand and Gravel Company in lot 8 or 9, concession II E, Caledon Township, Peel County. The deposit is a spillway gravel. A 20-foot face

exposed medium gravel (70 percent) and coarse sand (30 percent). The maximum size of boulders is about 8 inches, with 30 percent exceeding 4 inches in size, and 50 percent exceeding one inch in size.

The gravel is hauled to the Malton plant of Consolidated Sand and Gravel for processing.

J. C. Duff Limited

The Brampton pit of J.C. Duff Limited is described by Hewitt and Karrow (1963, p.60). In 1967 the northeast face, which is 30 feet high, was being worked. It consisted of approximately 20 percent stone and 80 percent sand. Thirty percent of the stone exceeded one inch in size. There is some cementation of the gravel on the north face. The northeast face is composed of stratified fine and coarse sand and fine gravel.

A sieve analysis of sand from the northeast face is given in (14).

(14) J.C. Duff Limited

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200	
Weight Percent	0.15	0.7	1.75	4.45	12.5	36.25	25.15	19.05

A mineralogical analysis of the sand by the Laboratory Branch of the Ontario Department of Mines indicates the following mineral constituents: Quartz, 49 percent; feldspar, 11 percent; Paleozoic limestone, 27.5 percent; grey shale and siltstone, 2.5 percent; black shale and siltstone, 4 percent; hornblende, 1 percent; mica, 0.5 percent; acid igneous rock, 0.5 percent; cemented aggregates, 4 percent.

Franceschini Brothers Construction Company Limited

Franceschini Brothers Construction Company Limited operate a sand pit on the farm of Stewart Scott, on lot 2, concession I E, Toronto Township, Peel County. A 25-foot face exposes well stratified sand.

A sieve analysis of sand from the pit is given by Hewitt and Karrow (1963, p.60).

Franceschini Brothers Construction Limited

Brampton Pit

The Brampton pit of Franceschini Brothers Construction Limited is described by Hewitt and Karrow (1963, p.61). The pit produces mainly granular A and B gravel, crusher run and sand fill. The faces are variable from place to place ranging from stratified fine and medium sand, to sand and medium gravel.

A pebble count of gravel from this deposit gives the following assemblage:

	Frequency
Black River and Trenton limestone,	Abundant
Dolomite,	Scarce
Brownish Dundas siltstone,	Abundant
Potsdam sandstone,	Rare
Cemented conglomerate,	Rare
Precambrian acid igneous rocks,	Rare
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Scarce.

Franceschini Brothers Construction Limited

Dodd Pit

The Dodd gravel pit operated by Franceschini Brothers Construction Limited is on the south side of highway No. 51,

just west of Caledon, on lot 15, concession I W, Caledon Township, Peel County. The pit is described by Hewitt and Karrow (1963, p.66).

A pebble count of the gravel gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Brownish Dundas siltstone,	Scarce
Amabel dolomite,	Scarce
White Potsdam sandstone,	Rare
Precambrian acid igneous rocks,	Common
Precambrian metamorphic rocks,	Scarce.

Gormley Sand and Gravel Limited

The Brampton pit of Gormley Sand and Gravel Limited located in lot 7, concession III E, Chinguacousy Township, Peel County is described by Hewitt and Karrow (1963, p.60).

In 1967 the Brampton pit of Salisbury Sand and Gravel was operated intermittently by Gormley Sand and Gravel Limited. The pit is described by Hewitt and Karrow (1963, p.61).

Peel Sand and Gravel Limited

A gravel pit is operated by Peel Sand and Gravel Limited on lot 14, concession II E, Chinguacousy Township, Peel County. A 20 foot face examined consisted of stratified fine sand and fine gravel; a second face was composed of medium gravel and coarse sand. The principal products are sand fill, pit run gravel, granular A and B gravel.

A sieve analysis of sand from the face is given in (27).

(27) Peel Sand and Gravel Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	3.85	2.05	2.25	7.8	28.45	37.05	10.65	7.9

A mineralogical analysis of the sand by the Laboratory Branch of the Ontario Department of Mines indicates the following mineral constituents: Quartz, 47 percent; feldspar, 11.5 percent; Paleozoic limestone, 21.5 percent; grey shale and siltstone, 9.5 percent; black shale and siltstone, 2.5 percent; hornblende, 1.5 percent; limonite, 1.0 percent; sandstone, 0.5 percent; acid igneous rock, 1.0 percent; cemented aggregates, 4.0 percent.

Premier Building Materials Limited

The gravel pit operated by Premier Building Materials Limited is on lots 18 and 19, concession III W, Caledon Township, Peel County, on the east side of highway No. 24, 2 miles south of Alton. The property is described by Hewitt and Karrow (1963, p.67). The main pit now has a 20-foot face consisting of stratified sand (75 percent) and medium gravel (25 percent). About 5 percent of the stone exceeds 4 inches in size and 50 percent exceeds one inch in size.

A pebble count of gravel from the pit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Dolomite,	Common
Brown Dundas siltstone,	Common
Sandstone,	Rare
Precambrian acid igneous rocks,	Very rare
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Rare.

Springbank Sand and Gravel Limited

The processing plant and pit of Springbank Sand and Gravel Limited is in Mississauga at 2535 Mississauga Road and is part of lots 12 and 13, Range 3, C.I.R., Peel County. The plant and pits are described by Hewitt and Karrow (1963, p.55). The plant produces a complete line of washed sand and stone. Materials for processing come from the local pits or other properties of the company.

SIMCOE COUNTY

Allan G. Cook Limited

A gravel pit is operated by Allan G. Cook Limited on the north side of No. 90 highway in concession XI, Vespra Township, Simcoe County. A 12-foot face is composed of stratified sand (70 percent) and medium gravel (30 percent). The maximum size of boulders is 6 inches, with 10 percent exceeding 4 inches in size, and 40 percent exceeding one inch in size. The deposit is a beach.

A sieve analysis of sand from the face is given in (28).

(28) Allan G. Cook Limited

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200	
Weight Percent	3.6	4.5	12.1	32.9	35.3	4.9	2.7	4.0

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gives the following mineral constituents: Quartz, 32 percent; feldspar, 15 percent; Paleozoic limestone, 42 percent; grey shale and siltstone, 2 percent; hornblende, 5.5 percent; sandstone, 0.5 percent; acid igneous rocks, 2.5 percent; basic igneous rocks, 0.5 percent.

Harold Martin Construction Limited

The gravel pit operated by Harold Martin Construction Limited is located on lots 2 and 3, concession IV, Sunnidale Township, Simcoe County. A 15 foot face exposes stratified sand and medium gravel consisting of approximately 40 percent stone and 60 percent sand. The maximum size of boulders observed was 6 inches, with 10 percent of the stone exceeding 4 inches in size, and 50 percent exceeding one inch in size.

A crushing, screening and washing plant produces a complete line of stone and sand products including ¾ and 3/8-inch stone, concrete sand and crusher run gravel.

McColgan Sand and Gravel Limited

A gravel pit in a beach deposit is worked by McColgan Sand and Gravel Limited on lot 13, concession VI, Vespra Township, Simcoe County. A 20-foot face exposes stratified sand (60 percent) and medium gravel (40 percent). The maximum size of boulders is 6 inches, with 20 percent exceeding 4 inches in size, and 50 percent exceeding one inch in size. There is a portable plant in the pit.

A sieve analysis of sand from the face is given in (29).

(29) McColgan Sand and Gravel Limited

Mesh	-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	0.8	2.2	4.9	14.0	48.9	23.9	2.8	2.5

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gives the following mineral constituents: Quartz, 40.5 percent; feldspar, 24.5 percent; Paleozoic limestone, 24.5 percent; grey shale and siltstone, 2 percent; garnet, 1 percent; hornblende, 5.5 percent; epidote, 0.5 percent; sandstone, 1.5 percent.

Cliff Varcoe Limited

Cliff Varcoe Limited operate a sand and gravel pit and plant on lots 13 and 14, concession IV, Vespra Township, Simcoe County, 3 miles north of Barrie on the east side of highway No. 27. The pit and plant are described by Hewitt and Karrow (1963, p.82).

A second pit is operated a mile and a quarter west of the plant on lot 13, concession VI, Vespra Township. This beach deposit consists of well-stratified, well-sorted sand and gravel. The 15-foot face exposes about 35 percent stone and 65 percent sand. The maximum size of boulders is 6 inches, with 20 percent of the stone exceeding 4 inches in size, and 50 percent exceeding one inch in size. The sand and gravel are hauled to the plant for processing.

A pebble count of gravel from this pit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
White sandstone,	Very rare
Precambrian acid igneous rocks,	Common
Precambrian basic igneous rocks,	Scarce
Precambrian metamorphic rocks,	Scarce.

A sieve analysis of sand from the face is given in (30).

(30) Cliff Varcoe Limited

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200
Weight Percent	6.2	8.2	8.1	15.9	26.4	28.1	5.4	1.7

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gives the following mineral constituents: Quartz, 43 percent; feldspar; 15 percent; Paleozoic limestone, 36 percent; garnet, 1.5 percent; hornblende, 2.5 percent; acid igneous rocks, 0.5 percent; basic igneous

rocks, 1.5 percent.

YORK COUNTY

J. Chefero Sand and Gravel Limited

The sand pit operated by J. Chefero Sand and Gravel Limited is on lot 25, concession III, Vaughan Township, York County, on the first sideroad north of Maple. A 30 foot face examined consisted of stratified fine sand and sparse fine gravel in the proportions of 90 percent sand and 10 percent stone.

A sieve analysis of sand taken from the face is given in (31).

(31) J. Chefero Sand and Gravel Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	0.25	1.45	2.35	7.45	40.85	46.05	1.0	0.6

A mineralogical analysis of the sand by the Laboratory Branch of the Ontario Department of Mines indicates the following mineral constituents: Quartz, 45 percent; feldspar, 11 percent; Paleozoic limestone, 34.5 percent; grey shale and siltstone, 3 percent; black shale and siltstone, 1.5 percent; garnet, 1.5 percent; hornblende, 2 percent; pyroxene, 0.5 percent; cemented aggregates, 1.0 percent.

The principal products are concrete sand, brick sand and sand fill. There are 2 screen plants. The property is described by Hewitt and Karrow (1963, p.71).

A pebble count of gravel from the pit gives the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Dolomite,	Very rare
Brownish Dundas siltstone,	Scarce
White Potsdam sandstone,	Rare
Black shale,	Very rare
Precambrian acid igneous rocks,	Scarce
Precambrian basic igneous rocks,	Rare
Precambrian metamorphic rocks,	Common.

Commercial Sand and Gravel Limited

A gravel pit operated in 1968 by Commercial Sand and Gravel Limited is on the east half of lot 14, concession IX, Whitchurch Township, York County. It is described by Hewitt and Karrow (1963, p.77) under the name of Western Sand and Gravel Limited.

A pebble count of gravel from this pit gives the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Dolomite,	Very rare
Black shale,	Rare
Siltstone,	Very rare
Sandstone,	Very rare
Precambrian acid igneous rocks,	Scarce
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Scarce.

A sieve analysis of sand taken from the face is given in (32).

(32) Commercial Sand and Gravel Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	5.1	7.25	9.8	16.7	31.4	26.8	2.1	0.85

A mineralogical analysis of this sand gives the following major mineral constituents: Quartz, 37.0 percent; feldspar, 13.0 percent; Paleozoic limestone, 37.0 percent; black shale, 2.0 percent; dolomite, 1.5 percent; acid igneous rocks, 5.0 percent; basic igneous rocks, 2.0 percent.

Connor Transport Limited

In 1967 Connor Transport Limited operated a gravel pit on the west side of highway 27, one half mile north of Elder Mills, in Vaughan Township. Production was by dragline from a pond on the property. There is a portable crushing and screening plant.

Connor Transport Limited

A sand pit was operated in 1967 by Connor Transport Limited on lot 20, concession IX, Vaughan Township, York County, on the west side of highway No. 27, one mile south of Kleinburg. The sand pit is described by Hewitt and Karrow (1963, p.68) under the name of Monarch Sand and Gravel Company.

Connor Transport Limited

A sand pit operated by Connor Transport Limited is on lot 26, concession III, Vaughan Township, York County, on the first sideroad north of Maple. A 30 foot face consists of fine stratified sand. The products are mainly brick sand and

sand fill. A sieve analysis of sand from the face is given in (33).

(33) Connor Transport Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	Nil	Nil	Nil	Nil	0.1	11.95	57.75	30.2

This is a very fine sand.

Crawford - Ontario Sand and Gravel Limited

The pits operated by Crawford-Ontario Sand and Gravel Limited are on lots 22, 23 and 24, concession III, Vaughan Township, York County, ½ mile north of Maple. The deposit consists predominantly of stratified fine and coarse sand with some fine gravel. A fifty-foot face examined consisted of stratified coarse and fine sand. A 35-foot face examined consisted of stratified sand and fine gravel.

A pebble count of gravel from the property gives the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Brownish aphanitic dolomite,	Rare
Brownish Dundas siltstone,	Scarce
White Potsdam sandstone,	Rare
Black shale,	Very rare
Precambrian acid igneous rocks,	Common
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Scarce.

Products include granular A and B gravel, sand fill, asphalt sand, concrete sand, brick sand, and plaster sand.

The property is described by Hewitt and Karrow (1963, p.71) under the name Ontario Sand and Gravel Company Limited.

Gormley Sand and Gravel Limited

The main pit and plant of Gormley Sand and Gravel is located on the east half of lot 9, concession VI, Whitchurch Township, York County. The deposit is a glacial spillway associated with the Oak Ridges kame moraine. The deposit and plant are described by Hewitt and Karrow (1963, p.75). A 25 foot face examined in 1967 consisted of stratified coarse sand and fine to medium gravel.

A pebble count of the gravel gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
White Potsdam sandstone,	Rare
Precambrian acid igneous rocks,	Common
Precambrian metamorphic rocks,	Common

Sieve analyses of sand from the lower and upper lifts of the pit are given in (34).

(34) Gormley Sand and Gravel Limited

Mesh	+4	-4 +8	-8 +14	-14 +28	-28 +48	-48 +100	-100 +200	-200
Weight Percent								
Lower lift	Nil	0.4	3.8	34.2	52.0	8.6	0.1	0.9
Upper lift	15.5	1.9	3.95	27.4	42.0	8.5	0.25	0.5

Mineralogical analyses of the sands from the lower and upper lifts give the following major mineral constituents: Quartz, 34.0 and 24.0 percent; feldspar, 10.5 and 12.5 percent; Paleozoic limestone, 48.5 and 57.5 percent; grey shale and siltstone, 0.5 and 1.5 percent; black shale, 2.0 and 0.5 percent; acid igneous rocks, 0.5 and 1.5 percent; basic igneous rocks, 1.5 and 0.5 percent.

The principal products are crushed stone, granular A and B gravel, asphalt sand and brick sand.

Highland Creek Sand and Gravel Limited

West Hill Pit

In 1967 Highland Creek Sand and Gravel Limited operated a gravel pit one-quarter mile north of Lawrence Avenue and 3/8 of a mile west of Morningside Drive. A 20-foot face exposed stratified sand and fine gravel consisting of approximately 30 percent stone and 70 percent sand. The maximum size of pebbles was about 4 inches, with 20 percent of the stone exceeding one inch in size. The deposit is part of the old Iroquois beach. The gravel is trucked to the main plant for processing.

A sieve analysis of sand from the face is given in (35).

(35) Highland Creek Sand and Gravel Limited

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200	
Weight Percent	3.3	3.3	5.1	13.5	49.7	21.4	1.8	1.9

A mineralogical analysis of the sand carried out by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 42.5 percent; feldspar, 11.0 percent; Paleozoic limestone, 34.5 percent; grey shale and siltstone, 3.5 percent; black shale and siltstone, 1.0 percent; hornblende, 2.5 percent; pyroxene, 1.0 percent; acid igneous rocks, 3 percent; basic igneous rocks, 1.0 percent.

Lee Sand and Gravel Limited

The gravel pit operated by Lee Sand and Gravel Limited is on lot 14, concession IX, Whitchurch Township, York County, 3½ miles north of Stouffville. The deposit is described by

Hewitt and Karrow (1963, p.77).

A pebble count of gravel from the property gave the following assemblage:

	Frequency
Black River and Trenton limestones,	Flood
Precambrian acid igneous rocks,	Common
Precambrian basic igneous rocks,	Rare
Precambrian metamorphic rocks,	Common

The principal products are granular B gravel, crusher run, pit run gravel, sand fill, concrete sand, asphalt sand, brick sand and stone.

Markham Sand and Gravel Limited

The sand and gravel deposit operated by Markham Sand and Gravel on lots 6 and 7, concession IV, Markham Township, York County is described by Hewitt and Karrow (1963, p.79). In 1967 the bank gravel was largely depleted, but some gravel was produced by dredging the pond in the pit.

A pebble count of gravel from the property gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Dolomite,	Rare
Potsdam sandstone,	Rare
Black and grey shale,	Rare
Brown Dundas siltstone,	Scarce
Precambrian acid igneous rocks,	Scarce
Precambrian metamorphic rocks,	Scarce.

Pinewood Aggregates Limited

The sand pit operated by Pinewood Aggregates Limited is ¾ mile north of Maple on lot 25, concession III, Vaughan Township, York County. A 40 to 50 foot face examined consisted of stratified fine sand with sparse fine gravel.

A sieve analysis of sand taken from the face is given in (36).

(36) Pinewood Aggregates Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	Nil	0.25	2.15	16.2	49.15	31.65	0.25	0.35

A mineralogical analysis of the sand by the Laboratory Branch of the Ontario Department of Mines indicates the following mineral constituents: Quartz, 52 percent; feldspar, 10 percent; Paleozoic limestone, 29 percent; grey shale and siltstone, 2.5 percent; black shale and siltstone, 5 percent; garnet, 0.5 percent; acid igneous rock, 1.0 percent.

The principal products are brick sand, asphalt sand, sand fill and pit run material. The property is described by Hewitt and Karrow (1963, p.71).

J. Sabiston Limited

The sand pit operated by J. Sabiston Limited is 2 miles east of Thornhill in the valley of a tributary of the Don River, on lots 3 and 4, concession II, Markham Township, York County. On the west bank of the river valley, a 40 to 50 foot face of well-stratified fine sand is exposed. The sand is free of pebbles. A till sheet from 5 to 20 feet thick overlies the sand. The clay layer in the bottom of the pit is rising in places. The principal products are brick sand, plaster sand and sand fill. The property is further described by Hewitt and Karrow (1963, p.74).

Superior Sand Gravel and Supplies Limited

Extensive sand and gravel pits have been opened on lots 21 and 22, concession III, Vaughan Township, York County, by Superior Sand, Gravel and Supplies Limited. These pits are north of the Maple-Richmond Hill road one quarter mile east of Maple. The deposit consists of stratified sand and some fine to medium gravel of glaciofluvial origin. The deposit has been opened up in several places and faces from 20 to 50 feet in height are being worked. One 30 foot face examined consisted of stratified fine gravel and sand and was composed of 50 percent fine gravel and 50 percent sand. The maximum size of boulders was 6 inches, with 40 percent of the gravel exceeding one inch in size. Some faces are suitable only for sand fill.

A pebble count of gravel from this deposit gives the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Dolomite,	Very rare
Potsdam sandstone,	Rare
Brown Dundas siltstone,	Scarce
Precambrian acid igneous rocks,	Scarce
Precambrian basic igneous rocks,	Rare
Precambrian metamorphic rocks,	Scarce.

The principal products are ¾-inch, 5/8-inch and 3/8-inch crushed gravel, ¾-inch and 5/8-inch round gravel, concrete sand, brick sand and sand fill.

The property and plant are described by Hewitt and Karrow (1963, p.69).

Warnock and Johnson

Groves Pit

The Groves pit operated by Warnock and Johnson in 1967 is located on lot 16, concession VIII, Markham Township, York County. At the west end of the pit a 3 to 5 foot till cap

rests on 10 feet of fine sand and fine gravel. Part of the north face consists of 12 feet of sandy, silty till with boulders up to 8 inches in size, mainly Paleozoic limestone. Along the north face at the east end 10 feet of sandy till overlies 4 feet of coarse sand and fine gravel. At the east end of the pit the writer observed 5 feet of sand and fine gravel on top of 6 feet of sandy till which in turn rests on sand. The sections are quite variable. This is one of the only pits utilizing both sand and gravel and till. Principal production is sand fill and pit run gravel.

A sieve analysis of a sand sample from the southeast face is given in (37).

(37) Warnock and Johnson, Groves Pit

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	1.75	3.4	5.75	13.0	30.0	37.9	5.0	3.2

A mineralogical analysis of this sand gave the following major mineral constituents: Quartz, 35.0 percent; feldspar, 15.0 percent; Paleozoic limestone, 44.0 percent; grey shale and siltstone, 1.0 percent; acid igneous rocks, 1.5 percent.

ONTARIO COUNTY

Campbellville Gravel Supply Limited

A gravel pit has been opened by Campbellville Gravel Supply Limited on the west half of lot 20, concession II, Uxbridge Township, Ontario County. A 30-foot face examined consisted of coarse sand and medium-to-fine gravel. The face was composed of approximately 30 percent stone and 70 percent sand. Maximum size of boulders was 6 inches, with 10 percent over 4 inches, and 50 percent over one inch. Black River and Trenton limestones make up 60 to 70 percent of the gravel, the bulk of the remainder being Precambrian crystalline rocks. It is a coarse outwash deposit.

A sieve analysis of a sand sample taken from a section of one face is given in (38).

(38) Campbellville Gravel Supply Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	21.8	11.6	19.6	36.0	9.5	0.55	0.15	0.75

Campbellville Gravel Supply Ltd.

A new gravel pit has been opened up by Campbellville Gravel Supply Ltd. on the east half of lot 23, concession III, Uxbridge Township, Ontario County. The face ranges from 20 to 60 feet in height and is composed of approximately 20 percent stone and 80 percent sand. The stone ranges up to 6 inches in size. The sand is very suitable for the manufacture of concrete sand. Substantial reserves estimated by the company at about 5,000,000 tons have been outlined.

Commercial Sand and Gravel Company

A pit operated by Commercial Sand and Gravel Company in 1967 is on lot 16, concession I, Uxbridge Township, Ontario County, just east of the pit of Stouffville Sand and Gravel Limited. A 20 foot face exposes stratified sand and medium gravel. The face is composed of approximately 30 percent stone and 70 percent sand. The maximum size of boulders is 6 inches; 30 percent of the stone exceeds 4 inches, and 60 percent of the stone exceeds one inch in size. The gravel is hauled to the plant on highway No. 48 for processing. This plant is described by Hewitt and Karrow (1963, p.77).

Commercial Sand and Gravel Company

A gravel pit operated in 1967 by Commercial Sand and Gravel Company is located on the west half of lot 17, concession

IV, Uxbridge Township, Ontario County. The deposit consists of stratified fine and medium sand, and fine gravel. A 30-foot face examined was composed of approximately 20 percent stone and 80 percent sand. The maximum size of boulders was 8 inches, with 20 percent of the stone exceeding 4 inches in size and 40 percent of the stone exceeding one inch in size.

A pebble count of gravel from this pit gave the following assemblage:

	Frequency
Black River and Trenton limestones,	Flood
Sandstone,	Very rare
Black shale,	Very rare
Precambrian acid igneous rocks,	Scarce
Precambrian metamorphic rocks,	Scarce

The sand and gravel is trucked to a central plant for processing.

Consolidated Sand and Gravel Company

A sand and gravel pit is operated by Consolidated Sand and Gravel Company on lot 15, concession V, Pickering Township, Ontario County. A 15-foot face consists of stratified sand with some gravel. The deposit is part of the Lake Iroquois beach. The sand and gravel is processed at the Pickering plant of Consolidated Sand and Gravel Limited, described by Hewitt and Karrow (1963, p.85).

A sieve analysis of sand from the pit is given in (39).

(39) Consolidated Sand and Gravel Company

Mesh	-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200
Weight Percent	3.2	3.3	5.7	10.2	23.4	41.6	9.9	2.7

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 33.5 percent; feldspar, 11.5 percent; Paleozoic limestone, 41 percent; grey shale and siltstone, 7 percent; black shale and siltstone, 5 percent; hornblende, 0.5 percent; pyroxene, 0.5 percent; acid igneous rocks, 1 percent.

There is 3 to 6 feet of overburden overlying the sand and gravel.

Consolidated Sand and Gravel Company

The gravel pit of Consolidated Sand and Gravel Company in lot 16, concession I, Uxbridge Township, Ontario County is described by Hewitt and Karrow (1963, p.79) under the name Stouffville Sand and Gravel Limited.

A pebble count of the gravel gives the following assemblage:

	Frequency
Black River and Trenton limestones,	Flood
Black shale,	Very rare
Precambrian acid igneous rocks,	Scarce
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Common.

Consolidated Sand and Gravel

Blake Pit

The Blake pit operated by Consolidated Sand and Gravel Company is located on lot 15, concession V, Uxbridge Township, Ontario County. A 30-foot face examined consisted of stratified sand (40 percent) and medium gravel (60 percent). The maximum size of boulders observed was 8 inches, with about 30 percent exceeding 4 inches and 60 percent exceeding one inch in size. The pebbles are mainly limestone and Precambrian crystalline rocks. The sand and gravel are

trucked to the Pickering plant of Consolidated Sand and Gravel for processing.

Consolidated Sand and Gravel Company

Lot 17, Concession V

A gravel pit has been operated by Consolidated Sand and Gravel Company on lot 17, concession V, Uxbridge Township, Ontario County. A 20-foot face examined consisted of stratified medium sand (70 percent) and fine gravel (30 percent). The maximum size of boulders observed was 8 inches, with 10 percent of the stone exceeding 4 inches in size, and 50 percent of the stone exceeding one inch in size. The gravel is trucked to a central plant for processing.

Giordano Sand and Gravel Limited

A gravel pit is operated by Giordano Sand and Gravel Limited in lot 12, concession IV, Uxbirdge Township, Ontario County. A 60 foot face exposes stratified medium sand (35 percent) and medium coarse gravel (65 percent). The maximum size of boulders is 12 inches, with 30 percent of the stone exceeding 4 inches in size and 60 to 70 percent exceeding one inch in size. There is 2 to 10 feet of overburden overlying the gravel. Gravel reserves are large.

A new crushing, screening, washing and classifying plant was erected in 1968 at the property and a complete line of sand and gravel products is produced.

Gormley Sand and Gravel Limited

A gravel pit was operated in 1967 by Gormley Sand and Gravel Limited on lot 18, concession III, Uxbridge Township, Ontario County. The pit, located north of No. 47 highway just east of Goodwood, exposed about 20 feet of stratified sand and medium gravel under a 5-foot cap of till. The face exposed

consisted of 50 percent stone and 50 percent sand. The maximum size of boulders is about 6 inches with 20 percent of the stone exceeding 4 inches and 60 percent exceeding one inch in size. The sand and gravel is trucked to a central plant for processing.

Hancock Sand and Gravel Limited

Hancock Sand and Gravel Limited operate gravel pits in the Sunderland esker in lots 9 to 11, concession III, Brock Township, Ontario County. The pits and plant are described by Hewitt and Karrow (1964, p.91). A new pit opened across the road in concession II was examined in 1967. A 30-foot face consisted of stratified sand (40 percent) and medium gravel (60 percent). The maximum size of boulders is 8 inches, with 30 percent of the stone exceeding 4 inches in size, and 60 percent exceeding one inch in size.

A sieve analysis of sand from this pit is given in (40).

(40) Hancock Sand and Gravel Limited

Mesh	+4	-4 +8	-8 +14	-14 +28	-28 +48	-48 +100	-100 +200	-200
Weight Percent	9.5	10.2	15.3	22.5	20.2	13.5	5.0	3.8

A mineralogical analysis of this sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 29 percent; feldspar, 11.5 percent; Paleozoic limestone, 45.5 percent; grey shale and siltstone, 5.5 percent; black shale and siltstone, 2.0 percent; hornblende, 1.0 percent; mica, 1.0 percent; limonite, 0.5 percent; acid igneous rocks, 3.0 percent.

A pebble count of gravel from the stockpile gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Sandstone,	Very rare
Precambrian acid igneous rocks,	Scarce
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Common.

Highland Creek Sand and Gravel Company Limited

In 1967 Highland Creek Sand and Gravel Limited operated a gravel pit on the Valley Farm road on lot 22, concession III, Pickering Township, Ontario County. A 25-foot face exposes stratified sand (70 percent) and fine gravel (30 percent). The maximum size of boulders is 6 inches, with 10 percent exceeding 4 inches in size and 30 percent exceeding one inch in size.

A sieve analysis of sand from the face is given in (41).

(41) Highland Creek Sand and Gravel Company Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	Nil	2.3	2.2	5.2	23.2	52.0	13.0	2.1

A mineralogical analysis of this sand by the Laboratory Branch of the Ontario Department of Mines gives the following mineral constituents: Quartz, 46 percent; feldspar, 13 percent; Paleozoic limestone, 31.5 percent; grey shale and siltstone, 2.5 percent; black shale and siltstone, 3 percent; garnet, 1.5 percent; hornblende, 0.5 percent; Precambrian limestone, 0.5 percent; acid igneous rocks, 1.5 percent.

Highland Creek Sand and Gravel Company Limited

A gravel pit was operated in 1965 and 1966 by Highland Creek Sand and Gravel Company Limited in part of lot 12,

concession IV, Pickering Township, Ontario County. The deposit, which is part of the Lake Iroquois beach, varied from 15 to 25 feet in depth and averaged 40 percent gravel and 60 percent sand. Over a quarter of a million tons were removed before operations were completed. Extensive rehabilitation took place in 1967 and the area was seeded in 1968. This is an excellent example of rehabilitation of a gravel pit after depletion.

Highland Creek Sand and Gravel Company Limited

A gravel pit is operated by Highland Creek Sand and Gravel Company Limited on lots 13 and 14, concession V, Pickering Township, Ontario County. The deposit is in the Lake Iroquois beach. The pit is described by Hewitt and Karrow (1963, p.87). A second pit operated on this property in 1965 was largely in stratified sand. The pit depth is now 25 feet.

Highland Creek Sand and Gravel Company Limited

A gravel pit was operated in 1967 by Highland Creek Sand and Gravel Limited on lot 16, concession V, Uxbridge Township, Ontario County. A 40-foot face exposes stratified sand (60 percent) and medium gravel (40 percent). The maximum size of boulders was 8 inches, with about 20 percent of the stone exceeding 4 inches in size and 50 percent exceeding one inch in size. The sand and gravel are trucked to a central plant for processing.

Miller Paving Limited

A gravel pit has been operated by Miller Paving Limited in lot 3, concession VI, Uxbridge Township, Ontario County. A 30-foot face exposes stratified medium sand and medium gravel composed approximately 40 percent stone and 60 percent sand. Maximum size of boulders is six inches, with 20 percent of the stone exceeding 4 inches in size, and 40

percent exceeding one inch in size. A portable plant produces crusher run gravel.

Miller Paving Limited

A large gravel pit has been opened by Miller Paving Limited in the west half of lot 18, concession VII, Uxbridge township. A 40-foot face examined consisted of stratified sand and medium gravel with approximately 60 percent stone and 40 percent sand. Maximum size of boulders observed was 8 inches, with 30 percent of the stone exceeding 4 inches in size, and 60 percent exceeding one inch in size. A pebble count of the gravel gave the following assemblage: Black River and Trenton limestone, 70 percent; Precambrian acid igneous rocks, 18 percent; Precambrian basic igneous rocks, 3 percent; Precambrian metamorphic rocks, 5 percent; white Potsdam sandstone, 4 percent.

A sieve analysis of sand from the face is given in (42).

(42) Miller Paving Limited

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200	
Weight Percent	22.0	12.6	13.2	24.4	22.7	3.8	0.35	0.95

A mineralogical analysis of this sand gave the following major mineral constituents: Quartz, 24 percent; feldspar, 17.5 percent; Paleozoic limestone, 51.5 percent; black shale, 1.0 percent; acid igneous rocks, 2.0 percent; basic igneous rocks, 1.0 percent.

John B. Regan Company Limited

A gravel pit is operated by John B. Regan Company Limited on lot 15, concession V, Pickering Township, Ontario County. A 12-foot face examined consisted of about 30 percent

medium gravel and 70 percent stratified sand. Approximately 10 percent of the gravel exceeded 4 inches in size, and 40 percent exceeded one inch in size. The gravel is rounded to well-rounded, and consists of approximately 60 percent limestone and 40 percent Precambrian crystalline rocks. The deposit is part of the Lake Iroquois beach.

The west part of the pit was examined in 1967 and the 12-foot face consisted of approximately 50 percent stone and 50 percent sand. Maximum size of boulders was 8 inches, with 30 percent of the gravel exceeding 4 inches in size and 50 percent exceeding one inch in size. Portable plants were producing crusher run gravel.

In 1968 a gravel pit was opened by John B. Regan Limited on the north part of this lot.

Sunderland Sand and Gravel Limited

The plant of Sunderland Sand and Gravel Limited is just east of highway No. 7, one mile south of Sunderland, on lot 12, concession IV, Brock Township, Ontario County. The pits and plant are described by Hewitt and Karrow (1963, p.91). A pit operated on the south side of the fifth concession road east of the plant was examined in 1967. It is in the Sunderland esker. A 25-foot face exposed consisted of stratified sand (30 percent) and coarse gravel (70 percent). The maximum size of boulders was 10 inches, with 30 percent exceeding 4 inches in size, and 70 percent exceeding one inch in size.

A sieve analysis of sand from this pit is given in (43).

(43) Sunderland Sand and Gravel Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	9.3	17.9	22.3	29.3	16.3	3.4	0.5	0.8

A mineralogical analysis of this sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 19.5 percent; feldspar, 12.0 percent; Paleozoic limestone, 50.5 percent; grey shale and siltstone, 10 percent; hornblende, 2.5 percent; mica, 2.0 percent; pyroxene, 0.5 percent; Precambrian limestone, 1.0 percent; sandstone, 0.5 percent; acid igneous rocks, 1.0 percent; basic igneous rocks, 0.5 percent.

A pebble count of gravel from the esker gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Sandstone,	Very rare
Precambrian acid igneous rocks,	Scarce
Precambrian basic igneous rocks,	Very rare
Precambrian metamorphic rocks,	Scarce.

Warnock and Johnson

In 1967 Warnock and Johnson were operating a gravel pit on lot 22, concession III, Pickering Township, Ontario County. The deposit is mainly stratified fine sand; one 25-foot face examined consisted of stratified sand (80 percent) and fine gravel (20 percent).

A sieve analysis of sand from one face is given in (44).

(44) Warnock and Johnson Pit

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	4.6	5.45	6.0	7.5	22.75	43.9	7.5	2.3

A mineralogical analysis of this sand gave the following major mineral constituents: Quartz, 30.5 percent, feldspar, 13.5 percent; Paleozoic limestone, 40.5 percent; black shale, 5.5 percent; acid igneous rocks, 4.5 percent; basic igneous rocks, 2.0 percent.

DURHAM COUNTY

W. B. Bennett Paving and Materials Limited

The plant of W.B. Bennett Paving and Materials Limited is on lot 32, concession VI, Clarke Township, Durham County. It is described by Hewitt and Karrow (1963, p.95) under the name of General Aggregates Limited. In 1967 a gravel pit was being operated by W.B. Bennett Paving and Materials Limited on lot 32 or 33, concession VII, Clarke township. A 40-foot face exposed interstratified sand (70 percent) and fine gravel (30 percent). The maximum size of boulders is 8 inches, with 20 percent exceeding 4 inches in size, and 50 percent exceeding one inch in size. The sand and gravel are trucked to the plant for processing.

A sieve analysis of sand from this pit is given in (45).

(45) W.B. Bennett Paving and Materials Limited

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200	
Weitht Percent	3.8	3.4	3.6	8.8	31.2	34.6	8.1	6.5

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gives the following mineral constituents: Quartz, 28.5 percent; feldspar, 24.5 percent; Paleozoic limestone, 39.5 percent; grey shale and siltstone, 2.5 percent; black shale and siltstone, 0.5 percent; garnet, 0.5 percent; hornblende, 2 percent; acid igneous rocks, 1 percent; cemented aggregates, 0.5 percent; sandstone, 0.5 percent.

W. B. Bennett Paving and Materials Limited

Moore Pit

The Moore pit of W.B. Bennett Paving and Materials Limited is located a mile west of highway No. 35, in concession I, Manvers Township, Durham County. The pit is in the Oak Ridges kame moraine. A 40-foot face exposes stratified sand (30 percent) and medium to coarse gravel (70 percent). The maximum size of boulders is 8 inches, with 20 percent exceeding 4 inches in size, and 60 percent exceeding one inch in size. The gravel is trucked to a central plant for processing.

A sieve analysis of sand from this pit is given in (46).

(46) Moore Pit

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200	
Weight Percent	1.9	6.3	8.5	17.3	29.1	25.4	7.0	4.6

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gives the following mineral constituents: Quartz, 34 percent; feldspar, 16.5 percent; Paleozoic limestone, 40 percent; grey shale and siltstone, 2.5 percent; black shale and siltstone, 1 percent; hornblende, 2 percent; pyroxene, 0.5 percent; acid igneous rocks, 1.5 percent; basic igneous rocks, 1.5 percent; epidote, 0.5 percent.

NORTHUMBERLAND COUNTY

Trent Valley Sand and Stone Limited

One of the largest gravel pits in Ontario is operated by Trent Valley Sand and Stone Limited, 4 miles west of Brighton on highway No. 2, on lots 14 and 15, concession II, Cramahe

Photo 4 - Trent Valley Sand and Stone Limited, Brighton.

Township, Northumberland County. The pit and plant are described by Hewitt and Karrow (1963, p.100-101).

A pebble count of gravel from the pit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Potsdam sandstone,	Very Rare
Precambrian acid igneous rocks,	Common
Precambrian basic igneous rocks,	Scarce
Precambrian metamorphic rocks,	Scarce

A sieve analysis of sand from the face is given in (47).

(47) Trent Valley Sand and Stone Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	7.5	14.3	21.5	23.2	13.0	9.6	4.7	6.5

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 42 percent; feldspar, 7 percent; Paleozoic limestone, 36 percent; grey shale and siltstone, 5 percent; hornblende, 4.5 percent; mica, 2.5 percent; acid igneous rocks, 0.5 percent; basic igneous rocks, 1.5 percent; tourmaline, 0.5 percent; dolomite, 0.5 percent.

PETERBOROUGH COUNTY

T. F. Doughty Limited

T.F. Doughty operates a gravel pit on lot 26, concession IX, Smith Township, Peterborough County, one mile northwest of Lakefield. The esker deposit and plant are described by Hewitt and Karrow (1963, p.97). A pebble count of gravel from the

deposit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Precambrian acid igneous rocks,	Common
Precambrian metamorphic rocks,	Rare

A sieve analysis of sand from the pit is given in (48).

(48) T.F. Doughty Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	1.1	3.3	4.6	8.4	27.9	38.0	11.7	5.0

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 45 percent; feldspar, 29 percent; Paleozoic limestone, 10.5 percent; grey shale and siltstone, 4.5 percent; hornblende, 5 percent; mica, 2.5 percent; Precambrian limestone, 1 percent; acid igneous rocks, 1.5 percent; basic igneous rocks, 0.5 percent; epidote, 0.5 percent.

Fred Nelson and Sons Limited

A gravel pit is operated by Fred Nelson and Sons Limited in concession X, Douro Township, Peterborough County, at Nassau Mills on the east side of the Otonabee river. The deposit is spillway gravel. A 20-foot face exposes coarse gravel (70 percent) and sand (30 percent). The maximum size of boulders is 24 inches, with 40 percent of the stone exceeding 4 inches in size, and 70 percent exceeding one inch in size. A portable crusher produces crusher run gravel.

Pinewood Aggregates Limited

The gravel pit operated by Pinewood Aggregates Limited is in the Bridgenorth esker on lot 21, concession VIII, Smith Township, Peterborough County, on the north side of the road two miles west of Lakefield. The pit and plant are described by Hewitt and Karrow (1963, p.97) under the name of C.C. Doughty.

A pebble count of gravel from this pit gave the following assemblage:

	Frequency
Black River and Trenton limestone,	Flood
Precambrian acid igneous rocks,	Common
Precambrian basic igneous rocks,	Rare
Precambrian metamorphic rocks,	Scarce.

Pinewood Aggregates Limited

A gravel pit is operated in the Norwood esker a mile west of Westwood, on lot 9, concession I, Asphodel Township, Peterborough County, by Pinewood Aggregates Limited. The deposit is described by Hewitt and Karrow (1963, p.99) under the name of Pax Sand and Gravel. In 1968 Pinewood Aggregates Limited installed a 350 ton an hour capacity Eagle washing plant.

HASTINGS COUNTY

Triangle Sand and Gravel Limited

A gravel pit is operated by Triangle Sand and Gravel Limited on the Gallivan Road in Sidney Township, Hastings County, 2 miles east of No. 14 highway. A 15 foot face exposed stratified sand (50 percent) and gravel (50 percent). About 30 percent of the stone exceeds 4 inches in size and 60 percent exceeds one inch in size. A complete line of sand and

Photo 5 - Triangle Sand and Gravel Limited, Stirling.

gravel products is produced. A washing-crushing plant is located on the property rated at 200 tons per hour. The plant consists of a 4 x 12- 3 deck screen, 28'-8 valve classifying tank with 2 - 36" dewatering screws, a 4' Telsmith cone crusher together with stockpiling conveyors, loaders, etc.

A sieve analysis of sand from the face is given in (49).

(49) Triangle Sand and Gravel Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	2.2	13.9	20.0	24.9	23.6	8.6	2.1	4.7

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 40.5 percent; feldspar, 10.5 percent; Paleozoic limestone, 30.5 percent; grey shale and siltstone, 11 percent; hornblende, 3.5 percent; mica, 1.5 percent; acid igneous rocks, 0.5 percent; basic igneous rocks, 0.5 percent; dolomite, 1.5 percent.

RENFREW COUNTY

Smiths Construction Company

The gravel pit operated by Smiths Construction Company is in lot 7, concession IV, Horton Township, Renfrew County, two miles east of Renfrew. The deposit is a kame. A 20-foot face exposes 50 percent sand and 50 percent gravel. The maximum size of boulders is 10 inches, with 20 percent of the stone exceeding 4 inches in size, and 60 percent exceeding one inch in size. There is a portable crushing and screening plant and an asphalt plant at the site. Products are pit run gravel, crusher run gravel and screened sand and gravel. A pebble count of gravel from the pit gave the following assemblage:

	Frequency
Precambrian granitic rocks,	Flood
Precambrian basic rocks,	Common
Precambrian metamorphic rocks,	Scarce
Paleozoic limestone,	Common
Precambrian limestone,	Rare.

A sieve analysis of a sand sample from the face is given in (50).

(50) Smiths Construction Company

Mesh	-4 +4	-8 +8	-14 +14	-28 +28	-48 +48	-100 +100	-200 +200	
Weight Percent	1.1	3.6	20.9	61.9	11.6	0.3	0.1	0.5

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 36 percent; feldspar, 23.5 percent; Paleozoic limestone, 1.5 percent; grey shale and siltstone, 5.5 percent; garnet, 1 percent; hornblende, 5.5 percent; mica, 3 percent; Precambrian limestone, 7 percent; acid igneous rocks, 9 percent; basic igneous rocks, 8 percent.

LEEDS COUNTY

Sweets Sand and Stone Limited

The gravel pit operated by Sweets Sand and Stone Limited is on the east side of highway No. 32, just south of its junction with highway No. 15, in lot 12, concession VII, Rear of Leeds and Lansdowne Townships, Leeds County. The deposit is described by Hewitt and Karrow (1963, p.111).

A pebble count of gravel from the pit gave the following assemblage:

	Frequency
Potsdam sandstone,	Common
Black River limestone,	Very Rare
Beekmantown dolomite,	Common
Precambrian acid igneous rocks,	Common
Precambrian metamorphic rocks,	Abundant
Precambrian basic igneous rocks,	Very Rare.

In 1967 a lower lift had been opened up exposing 15 feet of stratified sand (80 percent) and gravel (20 percent). The maximum size of boulders was about 8 inches, with 20 percent of the stone exceeding 4 inches in size, and 40 percent exceeding one inch in size.

A permanent crushing, screening and washing plant produces a complete line of stone, sand and crusher run gravel.

A sieve analysis of sand from the lower lift is given in (51).

(51) Sweet Sand and Stone Limited

Mesh	+4	-4 +8	-8 +14	-14 +28	-28 +48	-48 +100	-100 +200	-200
Weight Percent	6.1	21.1	37.8	20.5	8.1	4.3	0.7	1.4

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 54 percent; feldspar, 16 percent; Paleozoic limestone, 8.5 percent; grey shale and siltstone, 4 percent; garnet, 0.5 percent; hornblende, 4 percent; mica, 3 percent; limonite-hematite, 0.5 percent; Precambrian limestone, 4 percent; sandstone, 0.5 percent; acid igneous rocks, 4.5 percent; basic igneous rocks, 0.5 percent.

CARLETON COUNTY

Billie Construction Company Limited

The Brown sand and gravel pit operated by Billie Construction Company Limited is located on lot 1, concession IV, Osgoode Township, Carleton County. A 15-foot face exposes approximately 8 feet of sand and gravel consisting of 60 percent stone and 40 percent sand, underlain by 7 feet of medium to coarse sand. Ten percent of the gravel exceeds 6 inches in size, 20 percent exceeds 4 inches in size and 70 percent exceeds one inch in size. A pebble count indicates 75 percent Paleozoic limestone and dolomite, 10 percent acid igneous rocks and 15 percent basic metamorphic rocks, sandstone and shale.

There is a crushing and screening plant in the pit. The principal products are asphalt sand, crushed gravel and pit run gravel.

Smiths Construction Limited

A gravel pit operated by Smiths Construction Limited is located on lots 4 or 5, concession III, Fitzroy Township, Carleton County, about two miles southeast of Antrim. The pit is in a beach deposit. A 10-foot face exposes 60 percent stone and 40 percent sand. The maximum size of boulders is 4 inches, with 60 percent of the stone exceeding one inch in size. The gravel lies on Paleozoic limestone. A pebble count of gravel from the pit gave the following assemblage:

	Frequency
Paleozoic limestone,	Flood
Precambrian granitic rocks,	Common
Precambrian metamorphic rocks,	Very Rare
Precambrian limestone,	Very Rare

A sieve analysis of sand from the face is given in (52).

(52) Smith's Construction Limited

Mesh		-4	-8	-14	-28	-48	-100	-200
	+4	+8	+14	+28	+48	+100	+200	
Weight Percent	2.7	4.6	6.4	12.3	25.1	35.4	8.5	5.0

A mineralogic analysis of the sand by the Laboratory Branch of the Ontario Department of Mines gave the following mineral constituents: Quartz, 46 percent; feldspar, 10.5 percent; Paleozoic limestone, 10.5 percent; grey shale and siltstone, 9.5 percent; garnet, 0.5 percent; hornblende, 3.5 percent; mica, 3 percent; pyroxene, 0.5 percent; Precambrian limestone, 9.5 percent; sandstone, 1 percent; acid igneous rocks, 4 percent; dolomite, 1.5 percent.

Spratt Sand and Gravel Limited

A sand and gravel pit is operated by Spratt Sand and Gravel Limited in lots 29 and 30, concession IV, Gloucester Township, Carleton County. The deposit is mined below water level by an 8 inch suction dredge and is 90 percent sand. Coarser blending material is brought in from surrounding area pits. The products are washed and screened at the property.

Spratt Sand and Gravel Limited

Spratt Sand and Gravel Limited operates a crushing, screening and washing plant in lot 3, concession II, Huntley Township, Carleton County, near Stittsville, to supply the western part of the Ottawa area. The plant is described by Hewitt and Karrow (1963, p.117) and altered 1968.

Spratt Sand and Gravel Limited operate on lots 2 and 3, concession II, lots 2 and 6 concession III, Huntley township, Carleton county. On lots 2 and 3, concession II, a 25 foot face exposes fine sand, very coarse gravel and boulders. A new pit has been opened on lot 6, concession III. On lot 2, concession III, a 34 foot face exposes 4 feet of gravel

underlain by 30 feet of sand and interstratified silt beds. A pebble count indicated 80 percent Paleozoic limestone, 10 percent acid igneous rocks and 5 percent basic igneous rocks.

SELECTED REFERENCES

Hewitt, D.F. and Karrow, P.F.
1963: Sand and gravel in southern Ontario; Ontario Dept. Mines, Ind. Min. Rept. No. 11, accompanied by maps 2038, 2039, 2040, 2041, 2042.


MARSHALL


LINK-BELT

ONTARIO
DEPARTMENT OF MINES

HON. ALLAN F. LAWRENCE, *Minister of Mines*
D. P. Douglass, *Deputy Minister*   J. E. Thomson, *Director, Geological Branch*

Map 2184

Sand and Gravel Pits in Southern Ontario 1967-1968

Scale 1:1,013,760 or 1 Inch to 16 Miles

LEGEND

Kame moraines.
Spillways.
Eskers.
Abandoned beaches and shorelines.

SOURCES OF INFORMATION

Compilation by D. F. Hewitt and W. F. Cowan 1967 and 1968.

Glacial features after L. J. Chapman and D. F. Putnam, "Physiography of Southern Ontario," University of Toronto Press, 1951.

Cartography by D. V. Impey, Ontario Department of Mines, 1969.

Base map derived from Map 1957A, Ontario Department of Mines.

INDEX OF SAND AND GRAVEL OPERATORS AND PITS

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1 Erie Sand and Gravel Co.
2 Essex County
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4 Kenette Contracting Co. Ltd.
5 Leamington Sand and Gravel
6 Spinks Gravel Ltd.
7 Woolatt Industries Ltd.

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8 Huron Gravel Ltd.
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GRENVILLE COUNTY
1 Meyers, R. W.
2 Price, S. A.

RUSSELL COUNTY
1 Grandmaitre, D.

PRESCOTT COUNTY
1 Bertrand & Frere

DISTRICT OF MUSKOKA
1 C. and L. Equipment Rentals
2 Chamberlain's pit
3 Coon Brothers
4 Ferguson, A. R.
5 Finch, W. and Sons
6 Fowler Construction Co. Ltd.
7 Fowler Construction Co. Ltd.
8 Fowler Construction Co. Ltd.
9 Fowler Construction Co. Ltd.
10 Lawrence, C. D.
11 McClellans Sand and Gravel
12 Patterson, Lorne
13 Skinner, Bert
14 Wall, Merrack
15 White's pit
16 Wilkinson, G. A.
17 Young, Richard A., Sand and Gravel

DISTRICT OF PARRY SOUND
1 Hurd's Sand and Gravel
2 Macklaim Construction Co.
3 Mill Lake Stone
4 Parton Sand and Gravel
5 Thompson, R., Sand and Gravel
6 Young, Gilbert

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