AGGREGATES IN BRAMPTON: EXTRACTION & REHABILITATION IN THE BRAMPTON ESKER AREA

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ABSTRACT

The extraction of aggregate (sand, gravel and crushed stone) in urban landscapes present challenges related to hydrogeology, ecology, land use and environmental impacts (noise, dust and truck traffic). The City of Brampton and the aggregate producers have faced the challenges created by urban extraction a succeeded in creating some outstanding rehabilitated sites.

At least 80 million tonnes of high quality sand and gravel have been extracted from the Brampton Esker area. The building of Toronto's infrastructure has been greatly assisted by aggregates sites close to construction projects such as the Gardiner Expressway, Ontario Place, the Queen Elizabeth Way, Pearson International Airport, early stages of the Toronto subway system and many other roads, streets and highways not only in the City of Brampton, but throughout the Region of Peel and the Greater Toronto Area.

Don Gordon, Commissioner of Parks and Recreation, City of Brampton, says it is "unequalled" to have the aggregate industry in a municipality because after the aggregate is extracted the land can be rehabilitated to network of parks and recreation areas, such as those in the Brampton Esker area. With more planning for rehabilitating pits and quarries, as required under the Aggregate Resources Act, the land can be returned to some exceptional land uses of benefit to all the public.

Aggregate extraction takes place to meet demand for sand, gravel and crushed stone created by growing and redeveloping urban areas. When extraction of aggregate occurs as close as possible to the markets, there are many benefits,

- *lower transportation costs;*
- *less pollution (shorter distance to market);*
- *less energy used in truck haulage;*
- *less damage to highways and other roads; and*
- *less truck traffic.*

Aggregate extraction is an interim land sue. Because the deposit was an esker, the City of Brampton has been able to create ecological linkages between sites and create a linked trail system. The land is borrowed for extractive use and returned to parkland and residential areas. The green spaces created are of value to all the residents of the area.

Fourteen sand and gravel operations have been identified in the City of Brampton and ten of these have been fully rehabilitated. Specific rehabilitation of these ten sites are described. Sand and gravel has been extracted since the turn of the century in Brampton and will continue in the year 2000 at the one remaining license site, Franceschini Bros. Aggregates Ltd.

Other municipalities with large numbers or growing numbers of aggregate operations can learn by studying what has occurred in the City of Brampton.

Background

The extraction of aggregate (sand, gravel and crushed stone) in urban landscapes presents special issues and concerns to be overcome. Some of the challenges relate to hydrogeology, ecology, land use, environmental impacts (noise, dust and truck traffic), etcetera.[1] The City of Brampton and the aggregate producers have faced the challenges created by urban extraction and succeeded in creating some outstanding rehabilitated sites. The Brampton Esker area was unusable for development before sand and gravel was extracted. By extracting aggregate resources, consumer demand was fulfilled and parks, recreational and residential land uses were created.

At least 80 million tonnes of high quality sand and gravel have been extracted from the Brampton Esker area. The building of Toronto's infrastructure has been greatly assisted by aggregate sites close to construction projects such as--the Gardiner Expressway, Ontario Place, the Queen Elizabeth Way, Pearson International Airport, early stages of the Toronto subway system and many other roads, streets and highways not only in the City of Brampton, but throughout the Region of Peel and the Greater Toronto Area.

The Parks and Recreation Master Plan for the City of Brampton sets out the criteria for parks in the City as follows, "Each area of the City should have access to parks that perform a variety of functions. Some may be passive parkland areas that provide beauty, buffering, relief from urban land form, as well as an area to walk, rest, think and picnic."

"Other areas need to provide active parkland space for sports functions ranging from children's play equipment areas to major, lighted baseball diamonds and sports complexes, as well as possibly performing many of the functions of a passive park."[2]

The City of Brampton has achieved its Master Plan objectives, by creating an exceptional park and open space system, after many areas were depleted of sand and gravel. The City of Brampton is growing rapidly, with the 1976 population at 103,445, the 1986 population increasing by over 80% to 188,415 and the 1996 population estimated at 261,000 (Figure 1). This rapid growth requires millions of tonnes of aggregate. The availability of water areas, resulting from extraction of aggregate below the water table, in the form of various lakes, has been a major asset in rehabilitation. Some exceptional opportunities in land rehabilitation around lakes are illustrated by Professor's Lake, the Parr Lakes North and South and Major Oaks

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The Aggregate Resources Act which came into effect in 1990 provides for enhanced rehabilitation by requiring the following,

- revised detailed site plans;
- more municipal involvement in site review;
- conformity to zoning bylaws;
- detailed consideration of surrounding land uses;
- retention of topsoil, subsoil and overburden;

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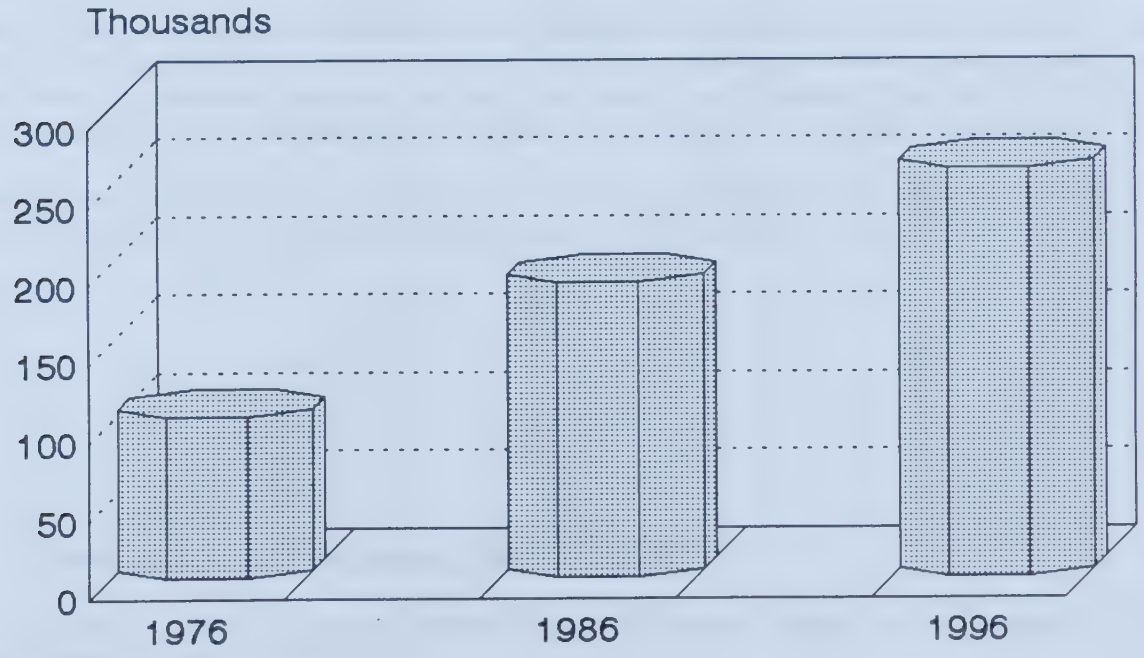
[1] Jaakson, R., "Recreation Design Alternatives for a Disturbed Urban Landform," Landscape Planning, 1981, pp. 31-68.

[2] City of Brampton, Parks and Recreation Master Plan Background Report, September 1990.

POPULATION

CITY OF BRAMPTON

FIGURE 1



- a fund for rehabilitating abandoned pits and quarries;
- an 8¢ per tonne rehabilitation security; and
- mandatory progressive rehabilitation.[3]

Geology

"An esker is a long narrow winding ridge of sand and gravel laid down as a stream deposit by glacial meltwater flowing through crevasses and channels in or beneath a stagnant ice-sheet...Owing to the fact that in many places the eskers were the last glacial material deposited, these prominent sand and gravel ridges running across the country form a good source of sand and gravel."[4]

The Brampton esker is located about 15 miles (25km) west of Toronto in the City of Brampton. The esker is believed to be of late Wisconsinan age (20,000 years ago) and was probably deposited when the Ontario ice lobe was undergoing ablation. The Brampton esker trends west-northwest and is approximately 4.5 miles (7km) long and varies from 0.1 miles (0.2km) to 0.4 miles (0.6km) wide.[5] The esker consists of variable deposits of coarse, medium, and fine gravel with stratified sand, silt and clays.[6]

History of Operations

In 1918, Ledoux[7] described four operations in the Brampton Esker area. Hewitt and Karrow[8] have detailed descriptions of nine sand and gravel pits operating in the Brampton Esker in 1963. Sand and gravel has been extracted from the Brampton Esker since the turn of the century. In all likelihood sand and gravel will still be produced from the one remaining licensed pit operated by Franceschini Bros. Aggregates Ltd. after the year 2000.

Fourteen sand and gravel operations have been identified in the City of Brampton. Ten of these sites have now been fully rehabilitated and two are in proposal stages. Details of these operations are given in Figures 2 and 4.

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[3] Statutes of Ontario, 1989, Aggregate Resources Act, 1989.

[4] Hewitt, D.F. and P.F. Karrow, Sand and Gravel in Southern Ontario. Ontario Department of Mines, Industrial Mineral Report 11, 1963, p. 23.

[5] Saunderson. Houston C, "Sedimentology of the Brampton Esker and Its Associated Deposits: An Empirical Test of Theory," Glacial Fluvial and Glacial Lacustrine Sedimentation. ed. by Alan V. Jopling and Barrie C. McDonald, 1975, pp. 155-176.

[6] Hewitt and Karrow, p. 59.

[7] Ledoux, A. Sand and Gravel in Ontario. Ontario Bureau of Mines, 1918, P. 79.

[8] Hewitt, D.F. and P.F. Karrow, Sand and Gravel in Southern Ontario. Ontario Department of Mines, Industrial Mineral Report 11, 1963, p. 59.

FIGURE 2 CITY OF BRAMPTON

AGGREGATE EXTRACTION SITES AND USE IN 1993

SITE #	AGGREGATE COMPANY	SITE NAME	USE IN 1993
1	Peel Sand and Gravel Ltd.	1st Line	Richvale Park, Sacred Heart, Terry Fox & Robert H. Lagerquist Sr. Schools
2	Armstrong Brothers Co. Ltd.	Donnelly	Donnelly Park, Barr Cres. & Esker Drive
3	Livingston Sand & Gravel	---	Maplehurst, Reynier & Astorville Parks
4	Armstrong Brothers Co. Ltd.	Bovaird	Proposed Development
5	Franceschini Bros. Construction Ltd.	Cooper	Graham Kaneff Proposed Development
6	Franceschini Bros. Construction Ltd.	Brampton	Active Licensed Operation
7	Salisbury Sand and Gravel Ltd.	---	Major Oaks Park
8	J.C. Duff Ltd.	Clarkson	Bramalea Ltd. Community Park
9	Kenmore Building Materials Ltd.	---	Bramalea Ltd. Community Park
10	Mel Ackroyd	---	La France Park
11	Gormley Sand and Gravel Ltd.	Parr	Parr Lake North & South & Vodden Street
12	Armstrong Brothers Co. Ltd.	Chassels	Norton Place Park
13	Standard Aggregates Inc.	Malton	Professor's Lake
14	John Ackroyd (Bramalea Ltd.)	---	Idle

Mineral Resource Production

Figure 3 shows the mineral resource production, as collected by the Ministry of Natural Resources, from 1974 to 1992. Mineral resource production in Figure 3 consists of both shale quarries and sand and gravel pits. After 1983, production is combined for the Cities and Brampton and Mississauga, for reasons of confidentiality.

In 1974, their were 4 (Brampton only) mineral resource licences producing a total of 1,958,834 tonnes of material. By 1992, their were 7 (Brampton & Mississauga) mineral resources licences producing a total of 259,277 tonnes.

MINERAL RESOURCE PRODUCTION

CITY OF BRAMPTON ('000 TONNES)

FIGURE 3

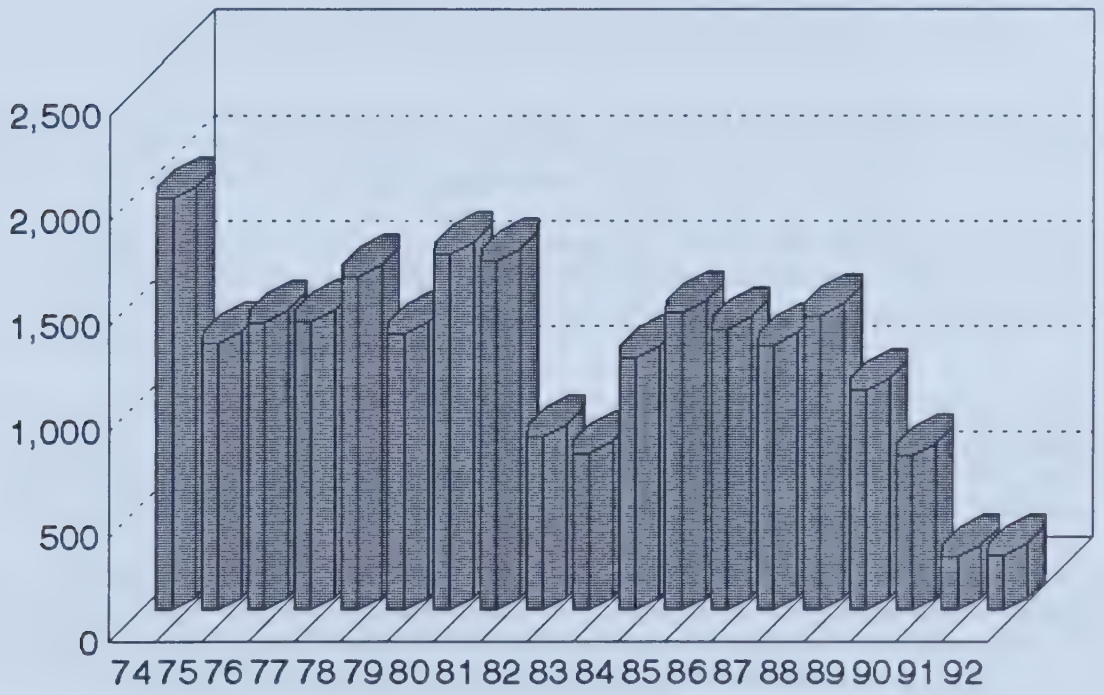

Figure 3, graphically indicates how production is directly related to the economy. The recessions that started in 1982 and 1990, clearly stand out with less mineral resources required in a time of general economic recession. Since 1990 the number of active licensed mineral resource operations has decreased to 3 (Brampton & Mississauga), as the resources are depleting.

Rehabilitation

PEEL SAND AND GRAVEL LTD. (1) This is an engineered landfill site. Approximately 60 feet (18.3 metres) of fill was placed in the site between 1972-1977. This site was opened in 1964 and aggregate was last extracted in 1972. The area currently has residential areas, Richvale Park and Sacred Heart, Terry Fox and Robert H. Lagerquist Sr. Schools, in the area that was previously extracted for aggregate. Richvale Park contains two major baseball diamonds, two major soccer pitches, two tennis courts, walkways, picnic areas, a toboggan run and both senior and junior playgrounds. R.H. Lagerquist Sr. School has two minor baseball diamonds and a basketball court. Terry Fox School has two minor soccer pitches and a basketball court.

ARMSTRONG BROTHERS CO. LTD. (2) This is the Armstrong Donnelly Site which was opened in 1938, was depleted of aggregate in 1977. Over 5 million tonnes of aggregate were removed from the pit and it was partially filled. This is now Donnelly Park surrounded by residences on Barr Crescent and Esker Drive. The park is planted with trees and shrubs and has a junior playground for children. Many lighted walkways cross the park.

LIVINGSTON SAND AND GRAVEL (3) The last extraction of aggregate from this site occurred in the mid 1960's and the site was partially filled. Today the area is a beautiful residential area between Kennedy Road and Richvale Drive. The area has three small neighbourhood parks--Maplehurst, Astorville and Reynier.

ARMSTRONG BROTHERS CO. LTD. (4) The Armstrong Bovaird site was opened in the early 1930's and depleted of aggregate in 1988. It is estimated that between 15-20 million tonnes was removed from the property over its 35 year life. The site is still licensed under the Aggregate Resources Act, awaiting rehabilitation to housing, parkland and trail development.

FRANCESCHINI BROTHERS CONSTRUCTION LTD. (5) The Cooper site was opened by Industrial Sand and Gravel in 1955 and later operated by J.C. Duff Ltd. It was taken over by Franceschini Bros. Construction Ltd. in 1961. Aggregate was extracted from this site between 1955 and 1988 (33 years). The property is now owned by Graham and Kaneff who propose to develop the site which is currently being engineered, filled, sloped and graded.

FRANCESCHINI BROTHERS CONSTRUCTION LTD. (6) This site is an active licensed operation under the Aggregate Resources Act. The licence is held by The Warren Paving & Materials Group Limited and operated by Franceschini Bros. Aggregates Ltd. The site was opened in 1958 and will operate for at least another 15 years. It is the only active licensed sand and gravel site remaining in the City of Brampton.

SALISBURY SAND AND GRAVEL LTD. (7) Many aggregate producers operated this site in the 1950's and 1960's. Production of aggregate stopped in 1971, the site was partially filled and rehabilitated to Major Oaks Park. The park contains a lake, several walkways and it is landscaped with trees and shrubs. The park is enjoyed by many local residents for outdoor recreation. The lake is stocked with trout and is surrounded by a major soccer pitch and a toboggan hill.

J.C. DUFF LTD. (8) & KENMORE BUILDING MATERIALS LTD. (9) Industrial Sand and Gravel originally opened these two properties and several other aggregate producers operated them periodically. Site 8 (Figure 1) was opened in 1954 and later operated by J.C. Duff Ltd. and site 9 was later operated by Armstrong Brothers Co. Ltd. These sites are currently owned by Bramalea Ltd. and are known as Bramalea Ltd. Community Park. Large parts of these sites were filled. Many sports activities take place at this site including soccer and baseball. The park includes a senior playground and a large parking lot surrounded by grassed areas and gardens. Many trees and shrubs landscape the site.

FIGURE 4 BRAMPTON Scale 1:35,000

1	PEEL SAND & GRAVEL LTD
2	ARMSTRONG BROTHERS CO LTD
3	LIVINGSTON SAND & GRAVEL
4	ARMSTRONG BROTHERS CO LTD
5	FRANCESCHINI BROTHERS CONSTRUCTION LTD
6	FRANCESCHINI BROTHERS CONSTRUCTION LTD
7	SALISBURY SAND AND GRAVEL LTD
8	J.C. DUFF LTD
9	KENMORE BUILDING MATERIALS LTD
10	MEL ACKROYD
11	GORMLEY SAND AND GRAVEL LTD
12	ARMSTRONG BROTHERS CO. LTD
13	STANDARD AGGREGATES INC
14	JOHN ACKROYD (BRAMALEA LTD)

MEL ACKROYD (10) The site was owned by Mel Ackroyd, opened by J.C. Duff Ltd. in 1955 and later operated Armstrong Brothers Co. Ltd. ABC Readymix and ABC Precast used the site as a yard. The site was filled and rehabilitated to La France Park. This is a small neighbourhood park with a senior playground and a minor soccer pitch.

GORMLEY SAND AND GRAVEL LTD. (11) This site was opened originally before 1918 and Armstrong Brothers Co. Ltd. reopened it in the 1930's and left the site in 1953. It is estimated that Armstrong Brothers Co. Ltd. removed between 10-15 million tonnes from this site. The Parr pits were operated by Gormley Sand and Gravel Ltd. between 1960 and 1971. Approximately 1.5 million tonnes of aggregate were extracted by Gormley Sand and Gravel Ltd. over 11 years. The site has two appealing lakes with subdivisions backing on them. These lakes are called Parr Lake North and South and are situated north and south of Vodden Street between Highway 410 and Dixie Road. Lighted walkways run along the west shore of the lakes and the parks are well landscaped and provide welcome open spaces.

ARMSTRONG BROTHERS CO. LTD. (12) The Chassels site was originally opened before 1918 and reopened by J.C. Duff Ltd. in 1949 and last operated as a gravel pit in 1966. Armstrong Brothers Co. Ltd. removed 200,000 tonnes of aggregate for a subdivision project. It is now the site of an attractive lake and recreational area surrounded by apartment buildings, condominiums and businesses. The area, known as Norton Place Park, is in a mature state of rehabilitation with many large trees and shrubs surrounding the lake. Park benches are available for the enjoyment of park users.

STANDARD AGGREGATES INC. (13) In 1989, Professor's Lake was awarded the Aggregate Producers' Association of Ontario (APAO) prestigious Bronze Plaque. Standard Aggregate Inc. was the last aggregate company to operate the site. Ledoux[9] in his 1918 report entitled "Sand and Gravel in Ontario" indicates this site was open in 1918. The site was reopened as a gravel pit in 1954 by Co-Op Trucking. It was subsequently operated by Commercial Sand and Gravel and in 1960 Consolidated Sand and Gravel (now Standard Aggregates Inc.) took over the pit. Peel Sand and Gravel Ltd. opened and operated a 100 acre (40 hectare) pit in the west half of the aggregate deposit. Consolidated Sand and Gravel eventually purchased the Peel Sand and Gravel Ltd. property.[10] This site was partially filled. The operation ceased in 1973. During its 19 year life this outwash deposit supplied an estimated 20 million tonnes of sand and gravel to the Toronto area.

The APAO Bronze Plaque was awarded to the City of Brampton and Standard Aggregates Inc. for the 203 acre (82 hectare) combined residential and recreational/parkland complex established in this former gravel pit. The main feature of the Professor's Lake complex is a 65 acre (26 hectare), spring fed lake. This lake was produced by extracting sand and gravel below the water table. The lake is used extensively for sailing, windsurfing, fishing and canoeing. Other recreational pursuits include watersliding, tennis, playgrounds and ice skating in the winter. Professor's Lake is surrounded by residential housing with the Professor's Lake Recreation Centre on the south shore. The Recreation Centre was built in 1982 including a boat house, beach, picnic area, miniature golf, food concessions and meeting rooms.[11]

Professor's Lake is classified as special, city wide parkland in the City of Brampton, Parks and Recreation Master Plan. This is an outstanding example of sequential land use. Don Gordon, Commissioner of Parks and Recreation for the City of Brampton calls Professor's Lake a "showcase" of extraction followed by rehabilitation. He says

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[9] Ledoux, A. Sand and Gravel in Ontario. Ontario Bureau of Mines, 1918, p. 79.

[10] Canadian Aggregates, "APAO Bronze Plaque Given to Brampton's Professor's Lake Site," August-September, 1989, pp. 6-7.

[11] Ibid, p. 7.

"people love water" and Professor's Lake is a significant water resource away from Lake Ontario. The lake is surrounded by lighted walkways and is it attractively encompassed by gardens, trees and shrubs.

JOHN ACKROYD (BRAMALEA LTD.) (14) This site was operated by several companies including J.C. Duff Ltd. and it ceased operation in the mid 1960's. Aggregate from this site was used to build Highway 400. The land is now owned by Bramalea Ltd. and it awaits development.

Conclusions

Aggregate extraction takes place to meet demand for sand, gravel and crushed stone created by growing and redeveloping urban areas. When extraction of aggregate occurs as close as possible to the markets, there are many benefits,

- lower transportation costs;
- less pollution (shorter distance to market);
- less energy used in truck haulage;
- less damage to highways and other roads; and
- less truck traffic.

Benefits such as those listed above have arisen because of aggregate extraction in the City of Brampton. Aggregate extraction is an interim land use. Because the deposit was an esker, the City of Brampton has been able to create ecological linkages between sites and create a linked trail system. The land is borrowed for extractive use and returned to parkland and residential areas. The green spaces created are of value to all the residents of the area.

Other municipalities with large numbers or growing numbers of aggregate operations can learn by studying what has occurred in the City of Brampton.

The lessons learned from the extraction and rehabilitation that has happened in the City of Brampton include,

1. The more planning of extraction and rehabilitation, the better the final results will be.

2. Extraction should be designed to maximize the final grades and landform required for the rehabilitation.

3. All fill placed in extraction sites, including types and amounts, should be carefully monitored as it progresses.

4. Co-operation and good will between the municipality and the aggregate producer is critical at all stages of aggregate extraction and rehabilitation.

PROCEEDINGS

CANADIAN LAND RECLAMATION ASSOCIATION

18th ANNUAL MEETING

1993

LANDSCAPE CHANGE :

OPPORTUNITIES AND NEW APPROACHES

SIR SANDFORD FLEMING COLLEGE
LINDSAY, ONTARIO

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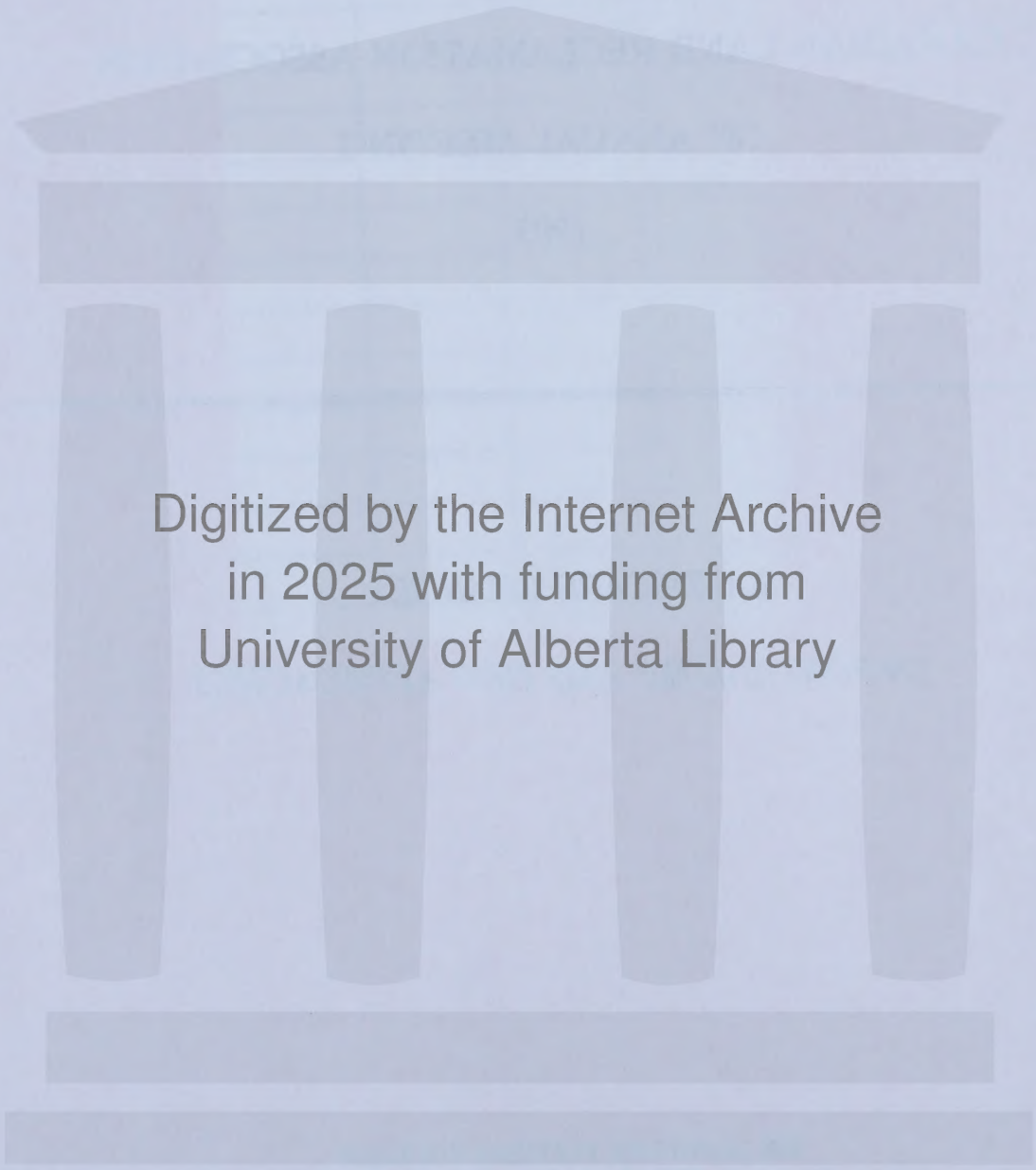

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