

M. M. DILLON LIMITED

consulting engineers and planners

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19 October 1979

Regional Municipality of Halton
1151 Bronte Road
Oakville, Ontario
L6J 4Z3

Attention: Mr. D.J. Corbett, P.Eng.
Manager of Construction

Burlington Landfill Site
Phase I Expansion

Dear Sirs:

We are pleased to submit the report for the Phase I Expansion of the Burlington Landfill Site. This report will form part of the application to the Ministry of Environment for approval of the landfill.

This report reviews the remaining site capacity and indicates that all landfill capacity in Halton will be utilized by July 1980. The capacity provided under this modification would allow landfilling of the Region's wastes for an additional eight months, that is, until the Spring of 1981.

Yours truly,

M. M. DILLON LIMITED

WFW:gg
Encl..

W.F. Wells, P.Eng.
Project Manager



REGIONAL MUNICIPALITY OF HALTON
BURLINGTON LANDFILL SITE
PHASE I EXPANSION

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TABLE OF CONTENTS

	PAGE
1. INTRODUCTION	1
1.1 Purpose and Scope	1
1.2 Background	1
2. WASTE QUANTITIES	3
2.1 Landfill Requirements	3
2.2 Remaining Capacity and Estimated Site Closure Dates	3
2.3 Rates of Refuse Generation	5
3. SITE DESIGN	6
3.1 Site Design Capacity	6
3.2 Cover Material Requirements	7
3.3 Final Contour Design	8
3.4 Surface Drainage	8
3.5 Leachate Collection and Disposal System	9
4. SITE OPERATIONS	10
4.1 Site Access Road	10
4.2 Site Buildings and Scales	10
4.3 Site Equipment	11
4.4 Daily Operations	11
4.5 Site Rehabilitation	12

1. INTRODUCTION

1.1 Purpose and Scope

This report forms part of an application by the Regional Municipality of Halton to provide additional capacity at the existing Burlington Landfill Site. A hydrogeological study of the existing site and adjacent land has been prepared.

This report presents the proposed final contour modification of the existing site only and discusses design and operation aspects of the proposed expansion. In addition, the report deals with rates of refuse generation and landfilling in Halton including the remaining capacity at the existing sites.

1.2 Background

On 5 July 1978, Regional Council authorized M. M. Dillon Limited to produce a study to recommend the best strategy for the provision of landfill capacity until such time as major new Regional facilities for waste disposal and/or processing can be approved and developed.

Based on the investigations and recommendations of the study, Council adopted a plan for the development of additional capacity:

1. Expansion of the Oakville Landfill Site comprising the development of lands to the east of the present site, and providing capacity for 202,000 tonnes (221,800 tons) of refuse.

2. Modification of final contours to the existing Burlington Landfill Site. Referred to as Phase I of the Burlington Landfill Expansion, this phase comprises the provision of additional depth of landfilling on the north portion of the existing site to allow for the disposal of an additional 67,000 tonnes (73,900 tons) of refuse.
3. Expansion of the existing Burlington Landfill Site onto adjacent property. Referred to as Phase II of the Burlington Landfill Site Expansion, this phase comprises the acquisition of lands to the north of the present site for the development of capacity for 465,000 tonnes (511,000 tons) of refuse.

This report is prepared as the basis for the application made under part 2 of the plan.

2. WASTE QUANTITIES

2.1 Landfill Requirements

Based on data from mapping generated in 1978 and 1979, it was estimated that during a one year period from May 1978 to April 1979, approximately $413,000\text{m}^3$ (540,000 cu yd) of landfill capacity has been used in Halton. During that same period 173,000 tonnes (190,000 tons) of refuse were weighed, recorded and landfilled at the three Halton sites. Based on these data, it is estimated that 2.4m^3 of landfill capacity are required for each tonne of refuse landfilled. (2.8 cu yd landfill capacity/ton of refuse landfilled).

2.2 Remaining Capacity and Estimated Site Closure Dates

On 4 May 1979, aerial photography was taken of the Region's three remaining landfill sites. Contour mapping was generated for these sites and computer assisted volume calculations carried out.

From these calculations and a field survey carried out at the Georgetown Landfill Site on 14 July 1979 it is estimated that the remaining capacity is:

TABLE 1
LANDFILL CAPACITY REMAINING

Site	Date of Estimate	Capacity Remaining m ³ (cu yd)
Georgetown Landfill	14 July 1979	27,000m ³ (35,000 cu yd)
Oakville Landfill	4 May 1979	184,000m ³ (241,000 cu yd)
Burlington Landfill	4 May 1979	333,000m ³ (435,000 cu yd)

These volumes represent the volume between the existing contours and proposed final contours. For the Burlington Site the volume of the proposed excavation in the southwest area of the site has been included.

Using remaining site capacities, and rates of landfilling, the following site closure dates have been estimated.

TABLE 2
ESTIMATED SITE CLOSURE DATES

Site	Estimated Closure Date
Georgetown Landfill	October 1979
Oakville Landfill	April 1980
Burlington Landfill	July 1980

It is assumed that following the closure of the Georgetown Landfill Site that wastes from Halton Hills and Milton would be taken to the Oakville Site and that following the closure of the Oakville Site that all wastes would be taken to the Burlington Site.

2.3 Rates of Refuse Generation

Based on the data presented in the report, Review of Waste Quantities and Characteristics prepared by M.M. Dillon Limited in February 1979, and on a review of recent landfill weight records, the following projections have been derived for rates of refuse generation in the Region and for the City of Burlington.

TABLE 3
PROJECTED RATES OF REFUSE GENERATION

ESTIMATED ANNUAL TONNAGES (IN TONNES AND TONS)			
Year	Burlington	Region	Total
1980	87,000 tonnes (96,000 tons)	188,000 tonnes	(207,000 tons)
1981	89,000 tonnes (98,000 tons)	193,000 tonnes	(213,000 tons)
1982	91,000 tonnes (101,000 tons)	200,000 tonnes	(221,000 tons)
1983	94,000 tonnes (104,000 tons)	208,000 tonnes	(229,000 tons)

3. SITE DESIGN

3.1 Site Design Capacity

It is estimated that the 'Phase I addition' will provide an additional $314,000\text{m}^3$ (410,000 cu yd) landfill capacity. This volume represents the difference in elevation between the proposed final contours and existing site contours. An allowance for the application of 0.6m (2 ft) of final cover and a 4 to 1 refuse to cover ratio for estimating cover material requirements has been made in the calculation. It is estimated that an average refuse density of 600 kg/m^3 (1010 lb/cu yd) will be achieved in the operations.

Based on these assumptions, these contour modifications would allow the landfilling of 129,000 tonnes (142,000 tons) of refuse.

3.2 Cover Material Requirements

As of 4 May 1979, it was estimated that the volume of cover material remaining in proposed site excavation was $145,000\text{m}^3$ (190,000 cu yd) while the remaining landfill capacity was $333,000\text{m}^3$ (435,000 cu yd). This cover material was located primarily in a proposed excavation in the southwest area of the existing site. Assuming 15% bulking of cover material during excavation, the total volume of fill available is approximately $167,000\text{m}^3$ (219,000 cu yd).

The current landfilling of the remaining landfill capacity, assuming daily and intermediate cover requirements based on a 4:1 refuse to cover ratio and a final cover application depth of 0.6m (2 feet), have a total estimated cover material requirement of 121,000m³ (158,000 cu yd).

Deducting the present site's cover material requirements from the available volume, an estimated surplus of 46,000m³ (60,000 cu yd) of fill may be available for the operation of Phase I.

The Phase I operation, using the same assumptions for cover material as above, will require daily and intermediate cover material requirements of 54,000m³ (71,000 cu yd) and final cover material requirements of 46,000m³ (60,000 cu yd). The total cover material requirements for Phase I are 100,000m³ (131,000 cu yd), thus, the deficiency in cover material would be 54,000m³ (71,000 cu yd).

Recent discussions with Regional staff indicate that cover material requirements are significantly higher than estimated. Therefore, because of the present uncertainty with respect to the actual requirements of the current operations, the design of the Phase II expansion (the expansion onto lands north of the present site) takes into account the excavation of sufficient on-site cover material to support landfilling in both the Phase I and Phase II expansions. Should the cover material from the proposed excavation in Phase II not be available during the operation of Phase I, cover material will be obtained from off-site sources.

3.3 Final Contour Design

The proposed final contour plan is shown on Drawing 1. These have been set to take into account existing site topography and visibility from adjacent properties. The maximum elevation of landfilling on the present site is 171m (A.S.L.) while the maximum proposed elevation is 172m (A.S.L.). Maximum grades on the completed landfill will be 4:1 (approximately 24%) while minimum grades will be 2%.

The limit of landfilling and orientation of slopes are set to take into account the construction of ditches and swales. The toe of landfill slopes are set back a minimum of 10m from the brow of the ravine to allow for the construction of drainage works and the installation of litter control fences.

3.4 Surface Drainage

Inspection of the existing Burlington Site has revealed that erosion of the clay till overburden on the Falcon Creek ravine slopes has resulted in the creation of deep gullies in the underlying Queenston shale. As indicated on Drawing 1, it is proposed to construct a perimeter swale or ditch at the toe of the landfill slopes and to discharge runoff to the natural site drainage features. Drainage works will be constructed prior to beginning operation in the Phase I area. All surface runoff in the Phase I area during and after landfilling will be intercepted by the system.

In the detailed design of these works, consideration will be made to ensure that silting or erosion are minimized.

3.5 Leachate Collection and Disposal System

A toe drain leachate collection system has been designed for the existing site and is now scheduled for construction in the Fall of 1979. The system comprises the installation of approximately 1,100m of toe drain leachate collector piping discharging via 830m of leachate transmission sewer to an existing sanitary sewer opposite the Tridon plant on the North Service Road. This sewer is part of Burlington Skyway Water Pollution Control Plant sanitary sewer system.

The toe drain leachate collector system is designed to control the breakout of leachate on landfill slopes. Areas where leachate springs have been observed have been mapped and the toe drain collector will be extended to these areas.

It is proposed that the toe drain collector will be extended along the westerly limit of the Phase I expansion to the northerly site boundary. At that point, ultimate leachate flows from the proposed leachate system for the Phase II expansion will be collected.

4. SITE OPERATIONS

4.1 Site Access Road

Access to the site will be via the existing main site access to the existing weigh scales. Access to the landfilling area will be along the proposed route shown on Drawing 2.

The road base will be constructed of waste materials consisting primarily of a mixture of broken concrete, asphalt and bricks with no pieces greater than 15cm (6in). A minimum thickness of rubble of 30cm (12in) will be applied followed by 20cm (8in) of granular "B" and 15cm (6in) of granular "A". The minimum width of the travelled portion of the road will be 8m. The road will be crowned to a minimum crossfall grade of 2% and the maximum profile gradient will be 8%. Where site drainage crosses the access road, ditching and culverts will be installed to keep the road from becoming saturated during wet weather.

4.2 Site Buildings and Scales

The existing buildings and scales will be maintained, however, in preparation for the ultimate closure of the Oakville Site, a second scale will be installed to accommodate the eventual increase in traffic at the Burlington Site.

This scale will be a legal for trade electronic scale with digital readout and will have a capacity of 70 tonnes (77 tons) and a scale deck of 18.2m x 3m (60ft x 10ft). The present scale has a capacity of 28 tonnes (31 tons) with a 7.3m x 3m deck (24ft x 10ft).

4.3 Site Equipment

The present landfilling equipment comprises:

- i) 1 landfill compactor
- ii) 1 track type loader
- iii) 2 elevating scrapers (part-time)

The above equipment is adequate for the site's present and future landfilling requirements, however, upon closure of the Oakville Site and thus, the landfilling of all the Region's waste at the Burlington Site, one additional landfill compactor will be required.

4.4 Daily Operations

Landfilling will be carried out on a single working face 30 to 50m in length using a ramped method of operation, with a maximum depth of lift of 3m and a maximum working face slope of 3:1.

A 0.15m depth of cover material will be applied to the working face at the end of each day's operations. In areas where landfilling will not be carried out for an extended period, a minimum depth of 0.25m of cover will be applied to facilitate the movement of equipment and to minimize the exposure of refuse by erosion of cover material.

4.5 Site Rehabilitation

A program of progressive site rehabilitation will be undertaken following completion of landfilling. Completed areas will be covered with 0.6m (2 ft) of earth cover followed by 10cm (4 in) of topsoil and seeded. The program will be scheduled during periods when vegetative cover will be quickly achieved in order to minimize erosion.

Should topsoil be in short supply, consideration will be given to the application of treated and dewatered sewage sludge from the Burlington Skyway Water Pollution Control Plant. This program will be reviewed with the Ministry of the Environment prior to any undertaking.